GLOBAL OPPORTUNITY REPORT 2015

Your guide to a world of opportunities

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For more information, visit *www.unglobalcompact.org*.

Monday Morning Global Institute and **Sustainia**

Monday Morning Global Institute is Scandinavia's leading think tank. For twenty-five years, the company has developed a wide range of activities and projects through cross-sector partnerships. A common denominator in our projects is the desire to build sustainable and resilient societies.

Sustainia is founded by Monday Morning Global Institute. Sustainia is a clear and achievable vision of a sustainable society built on scenarios in which readily available solutions, innovations and technologies are implemented on a large scale. Demonstrating the sustainable and exciting societies in which we could live – and creating the collaborative platform to make it happen – is at the heart of Sustainia's mission. Citizens, organizations and companies from all over the world make up the Sustainia community.

GLOBAL OPPORTUNITY REPORT

2015

Dear Global Change-Makers,

The future is not what it used to be. Past expectations of ever-growing abundance cannot be met. Infinite growth is not possible on a finite planet.

We use more of the Earth's resources than Earth can regenerate, and natural systems can´t cope with the waste from an economy built on ever-rising throughput of materials. At the same time, the reality that governments, communities and businesses need to navigate is increasingly complex – and the tolerance for navigational errors is zero. Furthermore, the cost of inaction is rising by the day.

But these are also truly exciting times. We may be the first generation that is able to understand the complex and systemic challenges surrounding us. Which means we know where we are headed if we do not change course. It is our obligation, as global change-makers, to act now and to shape a future where the planet thrives, where human creativity and collaboration can flourish and where we shape a society that is equal, stable and prosperous. A future filled with hope, prosperity and opportunity for everybody.

In order to get there, we need to break the link between the pursuit of human ambition and the depletion of the natural environment. We need to reinvent growth and harness the power of global business to create a new way of growing – fit for human reality in the 21st century. But first we need to shift to a new strategic mind-set. One where we abandon our natural inclination to focus on averting risk – and start embracing opportunities for a sustainable and prosperous society. These opportunities are abundant. And they are ripe for harvest. So let's start reaping!

The 2015 edition of the Global Opportunity Report offers a global guide to the opportunities for building a safe and sustainable future. We believe this guide is urgently needed.

Leaders from all parts of society, whether from business, politics, academia or NGOs, have one common responsibility – to build resilient and sustainable societies. In order to do this, they all need the same tool – the mind-set to spot the opportunities for sustainability and prosperity in an ever-changing and turbulent environment.

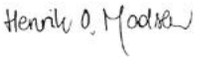
More than 6,000 private and public sector leaders from all parts of the world have taken part in co-creating this innovation platform. Together we have proved how five major global risks (the lack of fresh water, unsustainable urbanization, continued lock-in to fossil fuels, the rise in non-communicable diseases, and extreme weather) can be turned into 15 opportunities. Opportunities that serve as economic and social game-changers – for a safe and sustainable future. These 15 opportunities have been substantiated by more than 120 successful solutions, each of which inspires action and guides us towards the path of hope and prosperity.

Besides the mapping of a wide range of opportunities, the Global Opportunity Report provides an updated insight into the drivers of a new solutions economy. This includes a breakdown of which countries and sectors that appear to have the most innovative mind-sets, and how different business sectors prioritize the opportunities. The results provide a unique insight that is both interesting and sometimes surprising. And they further stimulate the ongoing efforts to map the opportunities and solutions that allow us to build a safer and more sustainable tomorrow. In the end, the report shows how business and other societal stakeholders can turn global risks into strong and viable business opportunities that will contribute to a more equal, resilient and prosperous society.

The Global Opportunity Report 2015 is the first step to developing a "GPS system for change-makers" around the world. Year by year we will deepen our understanding of risks and opportunities ahead. The greatest resource in this work is our growing opportunity network. The members will be our primary source of insights. Bringing together their combined experiences, insights and outlooks makes the Global Opportunity Report a unique tool for future-proofing your business and navigating safely in an ever-changing environment.

Our call for action goes out to you. We encourage you to join us on this journey towards a new strategic mind-set of opportunities, open innovation and co-creation – for a safer, smarter and greener future.

Enjoy your reading.



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The survey reported on in this report was conducted in collaboration with the research company YouGov. There are a total of 6,160 completed Computer-assisted web interviews (CAWI) with persons with management responsibility working in companies with a minimum of 100–200 employees. The survey was conducted between 11 to 28 November 2014.

DNV GL AS,
Høvik, Oslo

This report is available at www.globalopportunitynetwork.org

Contents

WELCOME TO A WORLD OF OPPORTUNITIES

This report aims to demonstrate that the great sustainability challenges facing societies today do not have to be seen only as risks to lifestyles and businesses as we know them. They can be seen as wakeup calls for us to start building a better world.

These are what we call opportunities. They are avenues of action that stakeholders in business, politics, finance or civil society can choose to travel when addressing global risks.

This report intends to showcase how a fairly simple and reproducible process can challenge our mindsets and inspire us to see risks as opportunities.

Three things define the term 'opportunities' in this report:

First, opportunities are always inspired by a risk or challenge of global importance and address this. We do not presume to make the point that the opportunities highlighted in this report are the only opportunities in existence, but we do believe that each of them offers considerable value to societies.

Second, opportunities are defined as opportunities for societies, not just for individuals or businesses. This does not imply that they cannot also represent opportunities for individuals or businesses – most often they will – only that the opportunities must first and foremost generate significant benefits for societies at large.

Third, opportunities must be sustainable. They must put societies on a more sustainable trajectory. In this respect we define sustainability as it was originally phrased in the Brundtland report: "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

To the right you will see the five risks that have inspired this year's analysis and the 15 opportunities they have inspired. In this report we will present the opportunities and describe how they have been received by more than 6,000 private and public sector leaders participating in the survey.

RISK #1

EXTREME WEATHER

Extreme weather events are likely to be more frequent and more severe in the coming decades. The concentration of people in vulnerable areas exacerbates the impacts.

OPPORTUNITIES:

EARLY WARNING AND FORECASTING SERVICES

Strong forecasting services can protect millions of people from extreme weather and have numerous business applications.

INVESTMENTS IN RESILIENCE

Channeling institutional investors' assets towards resilience-building can play an instrumental role in protecting societies from extreme weather.

COST-EFFECTIVE ADAPTATION

The necessary expenditure on climate resilience can be turned into pioneering projects creating a more sustainable future.

RISK #2

LACK OF FRESH WATER

Though access to water is protected under international human rights law, lack of fresh water threatens health and social cohesion and also poses risks to food and energy security.

OPPORTUNITIES:

WATER-EFFICIENT AGRICULTURE

Traditional approaches and modern technology can be combined to create agriculture that withdraws less water and produces more crops.

FRESH WATER PRODUCTION

New technologies and use of renewable energy can make desalination and purification viable options to meet water demands in arid environments.

SMART WATER REGULATION

Clever regulation can dramatically reduce the withdrawal of water in many contexts and open the area up to private investment.

RISK #3

UNSUSTAINABLE URBANIZATION

200,000 people migrate to cities every day. If not managed properly, the cost of congestion, pollution, and the detrimental health effects of such rapidly growing cities threaten future prosperity.

OPPORTUNITIES:

COMPACT, GREEN AND CONNECTED CITIES

Developing emerging cities in a compact, green and connected manner can reduce the capital cost of infrastructure and result in more attractive cities.

RURAL GROWTH INITIATIVES

Creating job opportunities and fostering growth in rural areas can relieve migration pressure and alleviate overcrowding in cities.

SMART CITIES

Big data and real-time data analytics and responses can make better use of available resources in stressed urban areas.

RISK #4

NON-COMMUNICABLE DISEASES

Non-Communicable Diseases (NCDs), including cardiovascular diseases, cancers, diabetes, and chronic lung diseases, pose a siginificant threat to lives, livelihoods and economic development globally.

OPPORTUNITIES:

COMBAT NCDs WITH MOBILE TECHNOLOGIES

Mobile technologies have an almost universal reach that can be converted into better access to health services and stronger health systems.

INNOVATIVE FINANCE FOR A HEALTHY GENERATION

New financial mechanisms can accelerate social policy innovation and include private sector finance for health initiatives targeting early childhood.

EVERYDAY HEALTH ENABLERS

Environments that facilitate health in the form of nutritious food choices or sufficient amounts of daily physical activity can greatly reduce NCDs.

RISK #5

LOCK-IN TO FOSSIL FUELS

In the energy system, lock-in to fossil fuels inhibits not only the immediate reductions in GHG emissions but also public and private efforts to introduce alternative energy technologies.

OPPORTUNITIES:

REGULATED ENERGY TRANSITION

Regulatory initiatives can accelerate the transition to cleaner and more efficient energy generation and provide dynamic incentives for innovation.

ENERGY AUTONOMY

Autonomous energy generation through off-grid or micro-grid renewable sources is tackling energy poverty and reinventing the role of households in energy systems.

GREEN CONSUMER CHOICES

Consumers' concerns about the environment and climate change can be translated into sustainable choices and initiate larger structural changes.

Executive Summary

The Global Opportunity Report 2015 seeks to inspire global change-makers to adopt a new mindset. A mindset that sees the sustainability challenges societies face not as obstacles to progress but rather as opportunities to create a safer and more sustainable future.

The report is part of a larger endeavour including hundreds of thought leaders and business executives in the search for opportunities to address a set of major global risks. Their insights have been distilled into the 15 opportunities presented in this report. The opportunities have in turn been tested in a global survey against the opinions of more than 6,000 private sector leaders across more than 21 countries.

The insights from this survey are the main focus of this report. They will serve as a guide for the reader in a world where opportunities are perceived very differently across geographic regions, business sectors and age groups. The survey shows that not all opportunities are seen as equally good, but almost all are favorites somewhere or for someone.

The term opportunities in this report is used to denote decisions on a strategic or systemic level. They are "avenues of action" that stakeholders in business, politics, finance or civil society can choose to travel when addressing global risks. But being on a systemic level, opportunities are not for the individual stakeholder or even individual group of stakeholders to seize by themselves. The need for collaborative action is a central element in our understanding of how societies change. The insights in the report map stakeholder expectations and confidence in the 15 opportunities. This allows readers to get a deeper insight into who they can work with – in which part of the world – to seize the opportunities described in this report to create prosperity and progress.

The Global Opportunity Report will be conducted annually to map and assess new opportunities derived from a new set of risks each year. The process towards each new report can be described as a collaborative innovation platform, where individuals and organizations are invited to join the work and contribute to expanding the opportunity mindset.

The project website www.opportunitynetwork.org has more information on how to be a part of this work.

This year's survey shows a very mosaic-like image with great differences in how opportunities are perceived around the globe. However, some key findings stand out:

Respondents in China, India and South America have the most confidence in opportunities – respondents in Europe most cautious
Respondents from China see the greatest potential when assessing whether they can benefit from pursuing the 15 opportunities. China is closely followed by India and South America.

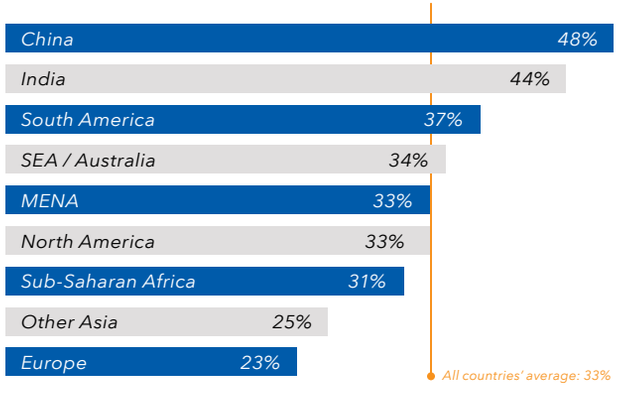
Overall score is a combination of an assessment of benefits for society from each opportunity and the capacity in each country to pursue the opportunity. The most positive responses (above 5 on a score from -10 to 10 of both parameters) are counted. Globally, approximately 33 percent of all responses fall into this category. Respondents from Europe are least optimistic, with only 23 percent seeing great potential in the opportunities. In comparison, the figure for China is 48 percent, India 44 percent, South America 37 percent and North America 33 percent *(see also figure below far left).*

Similarly, the survey shows the greatest optimism in China, India and South America, when respondents assess the benefits to their own business from pursuing each of the opportunities presented.

Manufacturing and finance sectors are most optimistic – governmental sector shows less optimism
Responses also show great differences in how respondents from different sectors assess the opportunities. This applies to which oppor-

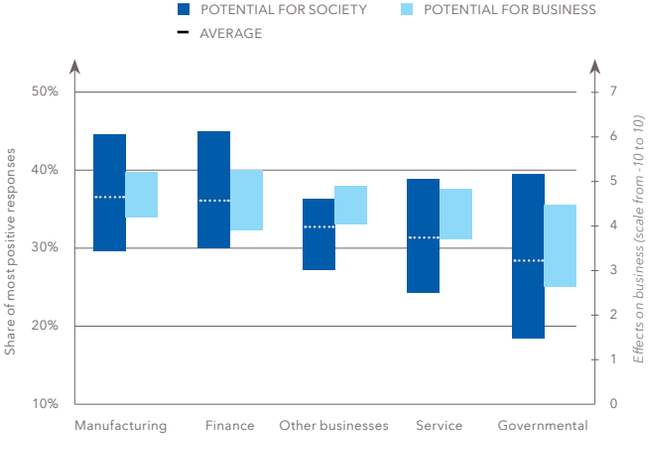
RESPONDENTS FROM CHINA AND INDIA SEE GREATEST POTENTIAL IN OPPORTUNITIES

Figure shows the share of most positive responses to all opportunities from specific geographic regions. Most positive responses rate opportunites above 5 on a scale from -10 to 10 on both the benefits for society and the capacity to pursue them.



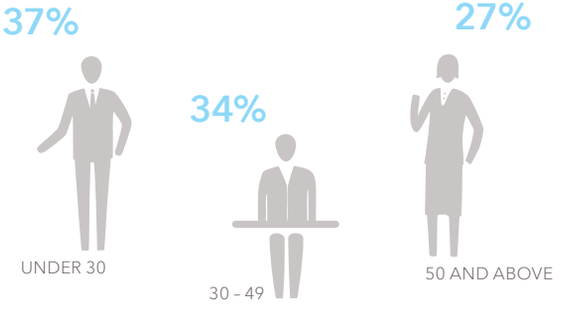
FINANCE AND MANUFACTURING SECTORS MOST OPTIMISTIC

Figure shows the range of opportunity scores in specific business sectors, when assessing opportunities' potential for society (left axis), and their potential for business (right axis).



YOUNGER GENERATION MORE OPTIMISTIC THAN THE OLDER

Figure shows the share of most positive responses to all opportunities from specific age groups. Most positive responses rate opportunities above 5 on a scale from -10 to 10 on both the benefits for society and the capacity to pursue them.



tunities they assess most favorably as well as the overall responses.

- **Responses from the finance sector** show the strongest correlation in all sectors between the opportunities assessed as carrying the greatest potential for society and the ones that will influence the sector most positively.
- **The manufacturing sector is the most positive** when assessing both benefits to society and benefits to business from the 15 opportunities. The finance sector is however very close behind. This is true both when asked for benefits to society and benefits to their own business.
- **Governmental sector least positive.** Respondents from this sector were consistently less positive than the other business sectors when assessing how the opportunities can affect societies and the capacity to pursue them *(see also middle figure opposite page).*

No opportunity suits all: 9 regions – 9 different favorites
In no two geographic regions do respondents place the same opportunity as their top choice assessed on the potential for societies. This reflects the observations made early in the process of making the report, when consulting experts in eight countries. Insights here showed the very different strategies developed in different regions.

TOP OPPORTUNITIES*
FOR SOCIETY

WATER-EFFICIENT AGRICULTURE

EVERYDAY HEALTH ENABLERS

FRESH WATER PRODUCTION

** Rankings are based on the share of "most positive responses" that each opportunity gets. Most positive responses rate opportunities above 5 on a scale from -10 to 10 on both the benefits for society and the capacity to pursue them.*

Future leaders are more optimistic about smart regulation
Contrary to the average, respondents under the age of 30 and women show great confidence in the ability of regulation to put societies on a more sustainable path. As these groups with some confidence can be expected to gain a stronger representation in leadership positions in the future it perhaps signals a stronger role for smart regulation in the coming years.

Strong confidence in water-related opportunities – opportunities to fight Lock-in to Fossil Fuels are rated highest by young people
The survey respondents show a strong confidence in the opportunities addressing the risk "Lack of Fresh Water". The three opportunities are rated overall as numbers 1, 3 and 5, based on how many respondents see great potential positive impact on society in them.

Respondents also see great potential in the opportunities adressing the risk of "Lock-in to Fossil Fuels". They are rated as numbers 4,6 and 8 overall. However, with the respondents under the age of 30 these opportunities are assessed even better, as number 1, 3 and 5.

On the opposite end of the spectrum, opportunities related to extreme weather get the least favorable assessments overall. However the opportunity of **Early Warning and Forecasting Services** is the most favored single opportunity in North America *(see figure right).*

TOP OPPORTUNITIES**
FOR BUSINESS

EVERYDAY HEALTH ENABLERS

SMART CITIES

ENERGY AUTONOMY

*** Rankings are based on the average of respondents' assessment of how beneficial opportunities are to their specific business.*

OPPORTUNITIES RANKED BY POTENTIAL POSITIVE IMPACT ON SOCIETY
– with favorites based on business sector, geographic region, gender, and age group

Figure shows the overall ranking of all opportunities based on the share of responses for the opportunity that fall into the category "most positive".

This is defined as respondents rating opportunities above 5 (on a scale from -10 to 10) on both the benefits to society and on societies' capacity to pursue the opportunities.

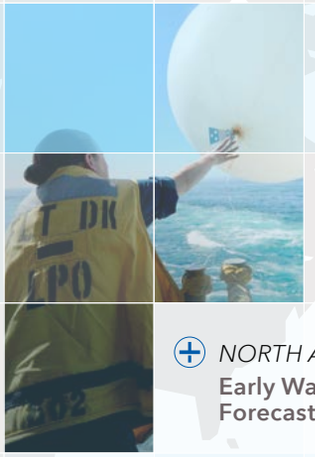
Data are indicative and caution should be taken when interpreting data, especially closely positioned data points.

A MOSAIC OF PREFERRED OPPORTUNITIES

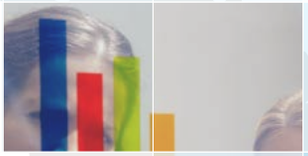
The Global Opportunity Report is based on two complementary enquiries, a series of workshops in eight commercial hubs on five continents, gathering more than 200 experts and professionals, and a survey of more than 6,000 private and public sector leaders.

The results of both the workshops and the survey demonstrate how differently the same great risks are addressed in different parts of the world. This very mosaic-like image shows not just great creativity but also the need to understand local contexts in order to point to the best suited opportunities and solutions in different parts of the world.

The results from the survey are presented on the following pages. These give a first set of insights into where respondents in different regions, business sectors and demographic groups look for opportunities to help navigate in a world of opportunities.



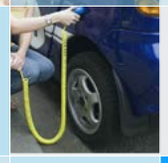
NORTH AMERICA
Early Warning and Forecasting Services



SOUTH AMERICA
Smart Water Regulation

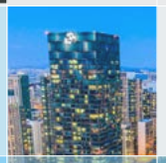


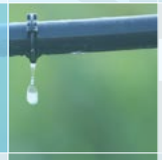




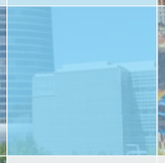
OTHER ASIA
Green Consumer Choices

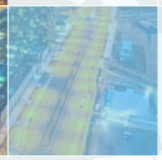
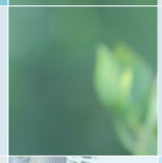
EUROPE
Fresh Water Production





MENA
Water-Efficient Agriculture

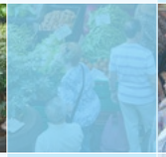



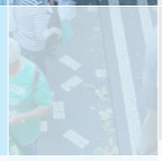

INDIA
Compact, Green and Connected Cities

CHINA
Smart Cities







SUB-SAHARAN AFRICA
Regulated Energy Transition

SOUTH EAST ASIA/ AUSTRALIA
Everyday Health Enablers

The Road to the Report

The Global Opportunity Report is the result of a process stretching over almost a year. Aiming to show how risks can be turned into opportunities, it has been produced by means of a 3-stage process.

1. Identify Risks

The starting point of the analysis is to select a set of global sustainability challenges and risks to inspire the work. The five selected for this year's report are: Extreme Weather, Lack of Fresh Water, Unsustainable Urbanization, Non-Communicable Diseases (NCDs) and Continued Lock-in to Fossil Fuels. We do not claim that these risks are the only or the most prominent challenges society is facing today – but certainly all are of great importance.

2. Identify Opportunities

Eight panel workshops in five continents *(see map on opposite page)* were conducted to bring insights from local stakeholders and sustainability experts to the process. More then 200 people participated – a mix of professionals from business, academia, and civil society. With these diverse groups, both with respect to business sectors and geography, more than 100 opportunities were identified at the eight panels.

This material formed the basis for identifying the 15 opportunities presented in this report. In this process, both internal DNV GL resources and external experts provided input. Some of the other opportunities identified at the panels are included on pages describing additional opportunities.

3. Survey the Opportunities

The attractiveness of these 15 opportunities was then measured in a global survey involving more than 6,000 private and public sector leaders from across the globe. The respondents were asked how important a particular opportunity is for their country. This included both evaluating its benefit for society, and the capabilities their countries have to pursue the opportunity. The responses to these questions form the basis of the general ranking of opportunities *(see the box below for details).*

Respondents were also asked to evaluate the value of the opportunities to business by considering two questions. The first question asked the respondents to consider the general expected effect on their own business; the second asked how likely their own business is to develop new business ventures related to the opportunity.

Further, the respondents were asked to evaluate how likely or unlikely different stakeholder groups in their country are to support the pursuit of the opportunity. Finally they were asked to evaluate when the opportunities will reach maturity.

Each of the opportunities is presented together with the information on how the respondents have measured its attractiveness for society and business. For all of the opportunities, a range of related solutions have also been identified. These solutions are examples of how opportunities are already exerting a positive impact on people around the globe.

TERMS AND DEFINITIONS IN THE SURVEY

*Respondents to the survey were identified as working within a specific sector of the economy. In this report we operate with five sectors: **Finance**, **Manufacturing**, **Service**, **Governmental** and **Other Businesses**.*

*In reporting on the survey results, we will name these "**business sectors**" or "**sectors**".*

*Respondents were also asked to indicate how strongly they believe representatives of different stakeholder groups in society will support each of the opportunities. The four stakeholder groups in the survey are: **Business**, **Finance**, **Politics** and **Civil Society**.*

*To avoid confusing terms, we will name these "**stakeholder groups**" or "**stakeholders**" when reporting survey results.*

*Geographically, respondents are grouped into nine **Regions** (see map on opposite page). Some regions are groups of several countries; other regions are single countries with very large populations (China and India).*

For some cross-sections of data we use the World Bank's country groups of "High-Income", "Upper-Middle-Income" and "Lower-Middle-Income" economies. No "Low-income" economies are represented in the survey. The words "country" and "economy" are used interchangeably.

*When presenting results we strive to use the term **most/least favorable** opportunities. This reflects that survey responses are generally very positive towards all opportunities and we don't have a baseline from which to assess the absolute score. Instead we focus on comparing results between individual opportunities, regions, etc.*

Data are indicative and should be interpreted conservatively.

Further description of the survey methodology, questions, etc. will be available on www.globalopportunitynetwork.org.

ASSIGNING RANKS TO OPPORTUNITIES

Respondents to the survey were asked to rate opportunities on a scale from -10 to 10 on a range of questions. These ratings are used to rank the opportunities in two specific ways:

***Impact on society:** These rankings are based on two questions. The first asks for respondents' evaluation of the benefits to society of pursuing the opportunity; the second asks for the respondents' evaluation of the economic, technological and institutional capabilities within their own country to pursue the opportunity.*

Each opportunity is ranked based on the percentage of reponses it receives that are 'most positive' (respondents rating them above 5 on a scale from -10 to 10 for both questions). This reflects that opportunities need to be both beneficial and attainable.

Impact on society is throughout the report used as the main ranking. It is represented on a vertical axis as seen to the right. Colors represent which risks the opportunities address.

***Impact on business:** Respondents have evaluated the value of opportunities to business by two questions. The first asked the respondents to consider the expected general effect on their own business; the second asked how likely their own business is to develop new business ventures related to the opportunity.*

Responses to these questions are throughout the report shown in horizontal bar graphs (see right) representing how each opportunity is rated relative to the average result for all opportunities within the respondent group. Responses to the first question decide the placing of opportunities on these graphs.

A Global Innovation Platform

The selection of opportunities is inspired by eight workshops – Opportunity Panels – on five continents. The opportunities have been assessed by a global survey covering nine geographic regions.

Opportunity Panel

Survey Region

RESPONDENT PROFILE – DEMOGRAPHICS

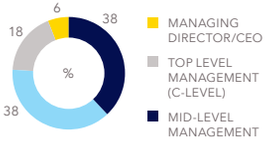
Total number of respondents:

6,160

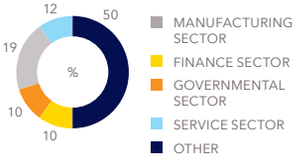
Assessments for each opportunity:

1,302 – 1,329

RESPONDENTS' PRIMARY ROLE

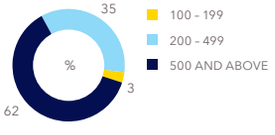


BUSINESS SECTORS OF RESPONDENTS

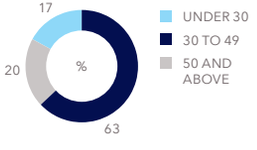


Due to rounding, percentages add up to 101.

NUMBER OF EMPLOYEES IN RESPONDENTS' BUSINESS



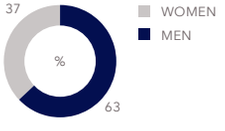
AGE PROFILE



COUNTRY OF RESIDENCE PROFILE*

** Using World Bank definitions. No "Low-income economies" are represented in the survey.*

GENDER PROFILE



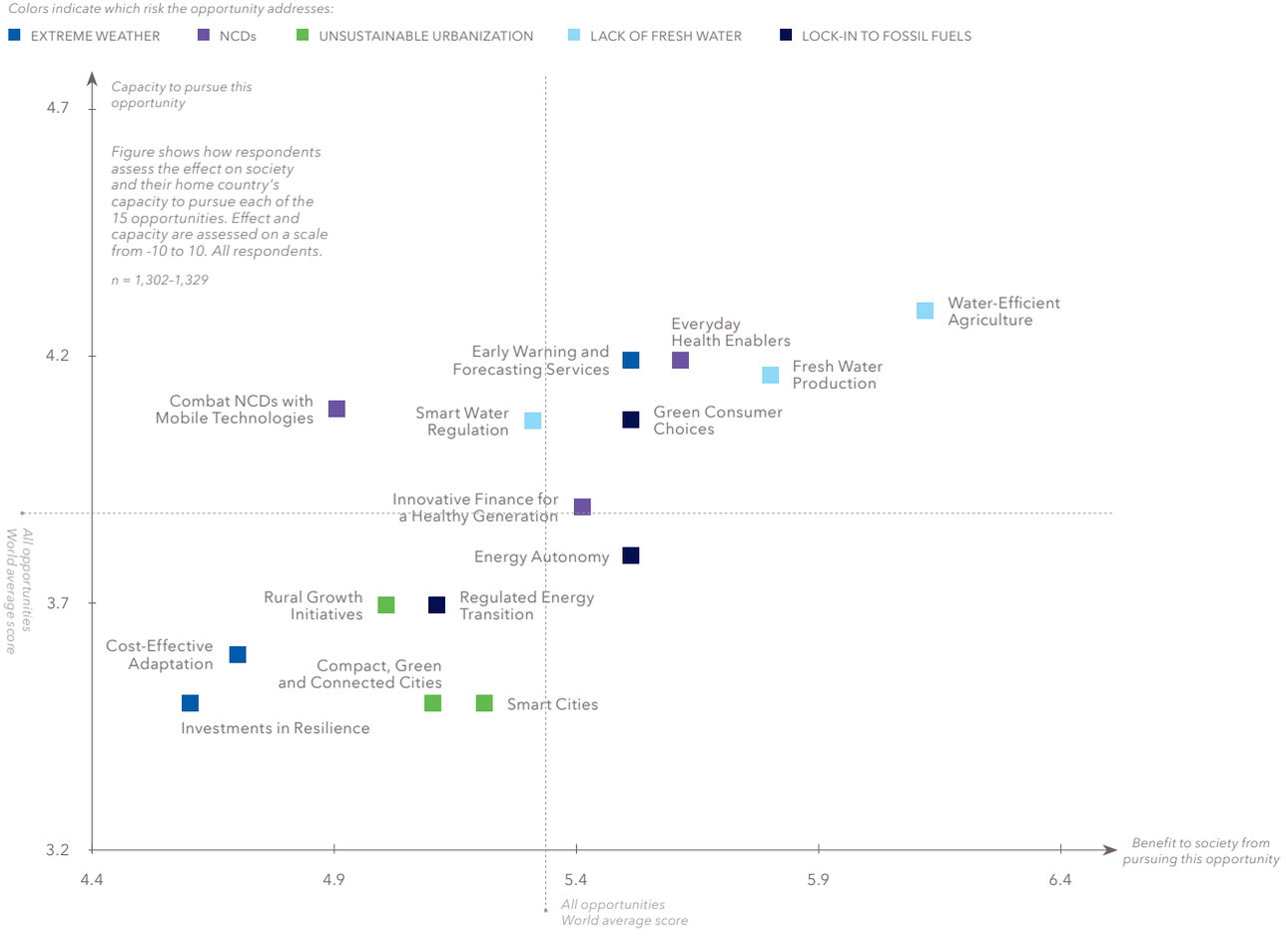
Strong Global Performance of Water-Related Opportunities

Opportunities inspired by the risk Lack of Fresh Water are generally rated highly positively by survey respondents across all regions, when assessed for their capacity to have a positive impact on societies. The overall best ranked opportunity is **Water-Efficient Agriculture** and the other two opportunities related to the risk Lack of Fresh Water are ranked as number three and five. Though caution should be exercized against placing too much faith in specific ranks, the strong performance for the water-related risks is obvious *(see figure on opposite page far right).*

A strong second is the opportunity **Everyday Health Enablers** addressing the risk of Non-communicable Diseases (NCDs). This opportunity is also placed in the top when assessed for its potential impact on business *(see figure below right).* However, when rating opportunities for their potential positive impact on business, respondents place the top rated opportunities quite closely together. This is also reflected when looking at regional business favorites *(see following pages).*

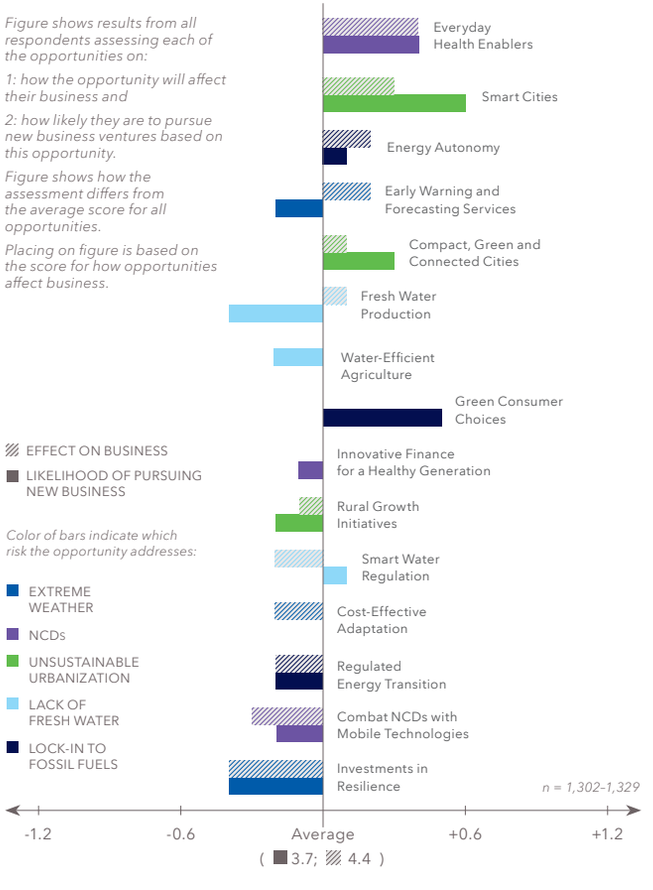
ALL OPPORTUNITIES ARE ASSESSED POSITIVELY

Overall results for all opportunities when assessed on their benefits to society and on the capacity of respondents home countries to pursue them. All opportunities are rated positively. The average is 5.3 and 3.9 on the two axis on scales going from -10 to 10. The distribution on this figure and the "bubble graph" on the opposite page shows a tendency from respondents to rate opportunities equally highly on both parameters.



BUSINESS OPPORTUNITIES FOUND FOR URBANIZATION AND NCDs

Though data show a varied picture, several of the opportunities assessed to have the greatest benefits for business relate to urbanization and NCDs.



Generally, all opportunities have been rated at the positive end of the scales for all survey questions, but the lack of a baseline for this survey makes it hard to determine exactly how to interpret this. What can be said is that the distribution of answers to questions relating to the positive impact on societies *(figure below)* indicates that respondents see a close to linear connection between the benefits for society from an opportunity and the capacity to pursue it. This can be interpreted as both a strong belief that if an opportunity is beneficial, capacity to pursue it will be found, or as a belief that the best opportunities are the ones that we have the greatest capacity to pursue.

FINDING THE BEST RANKED OPPORTUNITY

When attributing a rank to an opportunity in geographic regions and across age and gender groups we focus on the "most postive" scores – the highlighted area in the figure below. The percentage of answers in this area determines how an opportunity is ranked (see figure on the right).

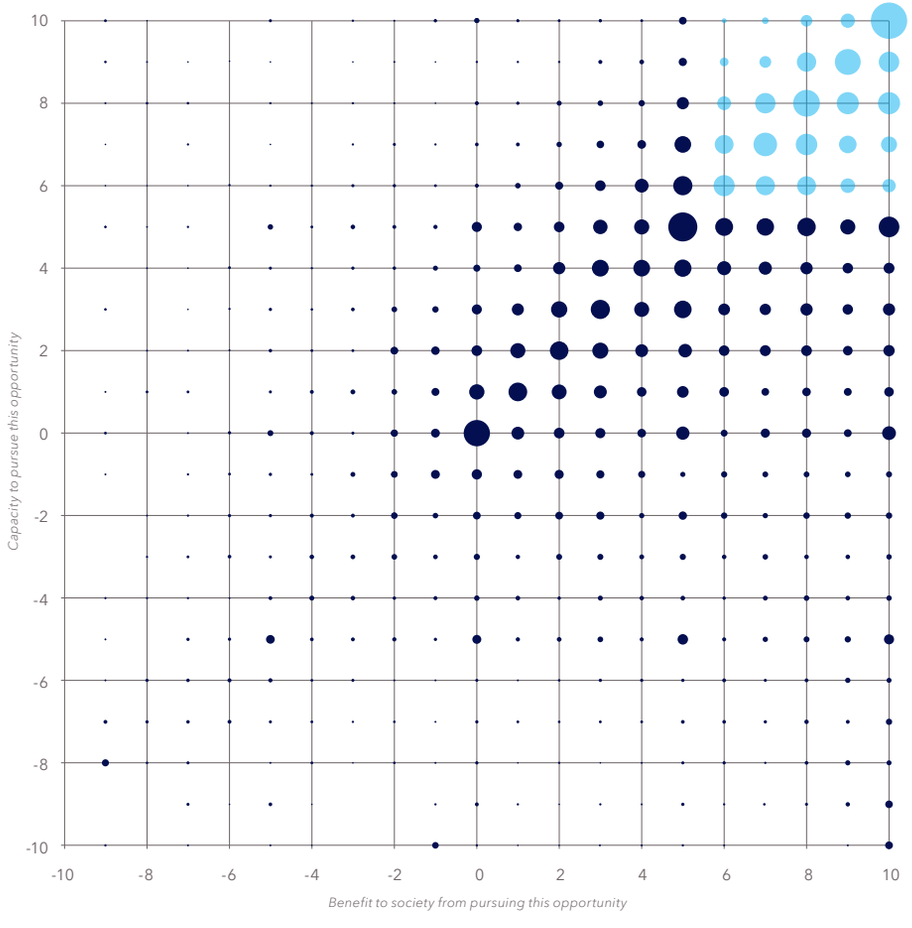


Figure shows distribution of all survey responses over the full range of possible answers for the questions assessing impact on society (horizontal axis) and capacity of home country to pursue opportunity (vertical axis). -10 marks most negative response, 10 marks most positive.

Size of bubbles indicate how many survey responses are given with the specific ratings matching its position of the figure:

NUMBER OF RESPONSES: 932 470 1

The lighter blue area marks responses that are above 5 (very positive) when assessing both benefits and capacity.

RESPONSES ABOVE 5 ON BOTH AXES:

n = 19,716

WATER-RELATED OPPORTUNITIES RANKED HIGHLY

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

Figure shows the overall ranking of all opportunities. Rankings are based on the share of very positive responses relating to each opportunity when assessed on both the benefits to society and on societies' capacity to pursue them.

Very positive responses are defined as ratings above 5 on a scale from -10 to 10.

n = 19,716

No Opportunity Suits All

Responses across geographic regions show distinct differences. First of all, responses from China, India and South America are markedly more positive than responses from Europe and Other Asia. The European respondents report less confidence in their most favorably rated opportunity – **Fresh Water Production** – than Chinese respondents do in their least favored opportunity – **Investments in Resilience**. *(see figure on opposite page)*

Differences of this kind are well known from other surveys, where respondents in India and China generally answer more positively than the world average. However, looking more deeply into the data shows that this cannot be the full explanation. The very favorable assessment of opportunities in China is to a large part driven by very positive responses from respondents from the manufacturing sector in China. Respondents from other business sectors in China are only mildly more positive than their colleagues around the globe. Similarly we see that manufacturing sector respondents outside China are not markedly more positive than respondents from other sectors.

The survey itself cannot give answers to why the manufacturing sector respondents in China show such great confidence in the opportunities. Neither can it explain why respondents in Europe are less enthusiastic but it does raise interesting questions for later review.

Another marked difference between regions is that no two have the same opportunity placed in the top, when assessing how great its impact can be on societies *(see figure on opposite page)*. This confirms the impression from the eight Opportunity Panel workshops conducted in August/September 2014 that inspired the choice of opportunities for the report. In these workshops there was also a marked difference in the opportunities proposed.

When looking at the opportunities that respondents believe to have the most positive impact on their business *(table below)* **Smart Cities** and **Everyday Health Enablers** come out top in three regions each. Generally there is a good coherence between the opportunities assessed to be most beneficial to society *(opposite page)* and the ones assessed to have the greatest positive impact on business *(below)* within the regions.

TOP OPPORTUNITIES FOR BUSINESS, PER REGION

Number indicates how beneficial respondents in each region rate the opportunities for impact on their business.

(Average score on scale from -10 to 10)

Color indicates which risk the opportunity addresses:

- EXTREME WEATHER
- UNSUSTAINABLE URBANIZATION
- LOCK-IN TO FOSSIL FUELS
- NON-COMMUNICABLE DISEASES
- LACK OF FRESH WATER

CHINA

SMART CITIES · 6.9

INDIA

COMPACT, GREEN & CONNECTED CITIES · 6.2

SOUTH AMERICA

WATER-EFFICIENT AGRICULTURE · 6.6

MENA

ENERGY AUTONOMY · 5.3

NORTH AMERICA

EARLY WARNING & FORECASTING SERVICES · 4.7

SUB-SAHARAN AFRICA

SMART CITIES · 5.7

SOUTH EAST ASIA AND AUSTRALIA

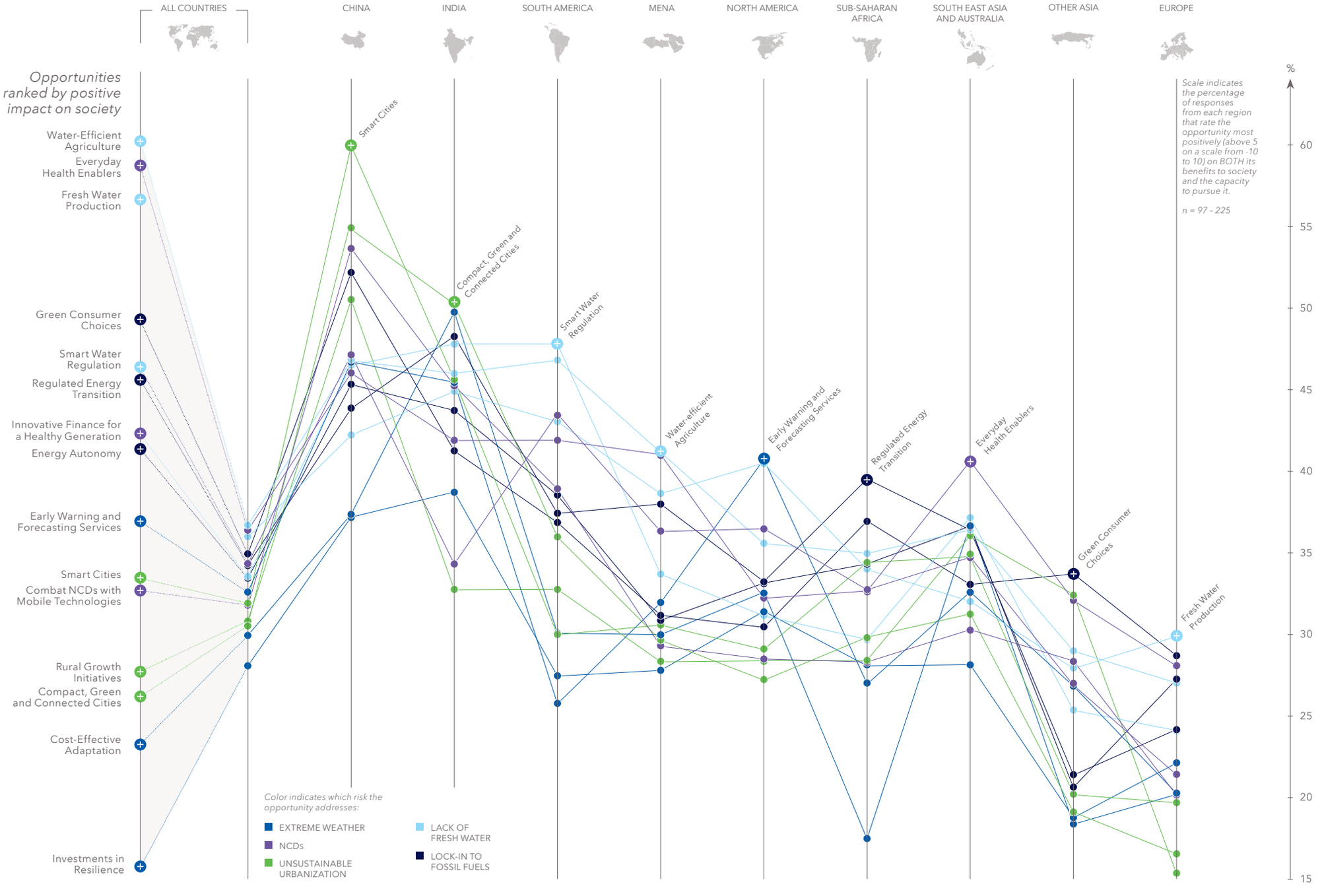
SMART CITIES · 5.4

OTHER ASIA

EVERYDAY HEALTH ENABLERS · 4.1

EUROPE

EVERYDAY HEALTH ENABLERS · 3.9


ALL COUNTRIES
CHINA
INDIA
SOUTH AMERICA
MENA
NORTH AMERICA
SUB-SAHARAN AFRICA
SOUTH EAST ASIA AND AUSTRALIA
OTHER ASIA
EUROPE
Opportunities ranked by positive impact on society
Water-Efficient Agriculture
Everyday Health Enablers
Fresh Water Production
Green Consumer Choices
Smart Water Regulation
Regulated Energy Transition
Innovative Finance for a Healthy Generation
Energy Autonomy
Early Warning and Forecasting Services
Smart Cities
Combat NCDs with Mobile Technologies
Rural Growth Initiatives
Compact, Green and Connected Cities
Cost-Effective Adaptation
Investments in Resilience
Smart Cities
Compact, Green and Connected Cities
Smart Water Regulation
Water-efficient Agriculture
Early Warning and Forecasting Services
Regulated Energy Transition
Everyday Health Enablers
Green Consumer Choices
Fresh Water Production
Scale indicates the percentage of responses from each region that rate the opportunity most positively (above 5 on a scale from -10 to 10) on BOTH its benefits to society and the capacity to pursue it.
n = 97 - 225
%
60
55
50
45
40
35
30
25
20
15
Color indicates which risk the opportunity addresses:
EXTREME WEATHER
NCDs
UNSUSTAINABLE URBANIZATION
LACK OF FRESH WATER
LOCK-IN TO FOSSIL FUELS

Women, the Young and the Lower-Middle-Income Economies Rate Opportunities Highest

The survey respondents, aged between 16 and 77, originate from more than 21 countries of different income groups. With such a diverse demographic, dissecting the data in terms of gender, age and income groups offers insights into respondents' relative optimism and attitudes towards the opportunities described in this report.

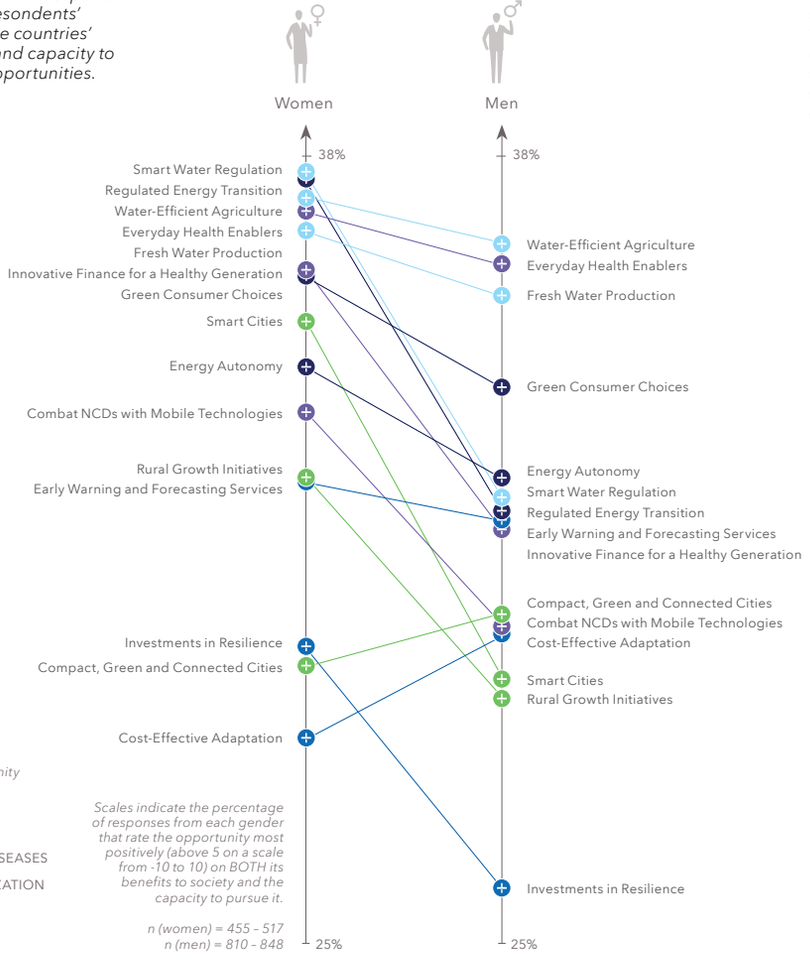
Contrasting the responses of men and women shows a pattern often seen in sustainability-related surveys, that women are consistently more positive. **Compact, Green and Connected Cities** and **Cost-Effective Adaptation** are the only exceptions to this rule. Some of the most pronounced differences in opinion between men and women occur when assessing the opportunities of **Smart Cities**, a **Regulated Energy Transition** and **Smart Water Regulation**.

Comparing the three different age groups of respondents reveals an even larger disparity than that between genders. While there is a 10 percentage point difference in performance between women's and men's most favoured and least favoured opportunity, the variation is 19 percentage points when considering different age groups. This rises even higher, to 26 percentage points, when comparing the three categories for income level of respondents' country of residence.

Younger respondents, those under the age of 30, are more positive overall than their older counterparts. Generally speaking, opportu-

GENDER

Results from male and female respondents. Rank is based on resondents' assessment of their home countries' benefits from pursuing and capacity to pursue each of the 15 opportunities.



Color of plus markers and lines indicate which risk the opportunity addresses:

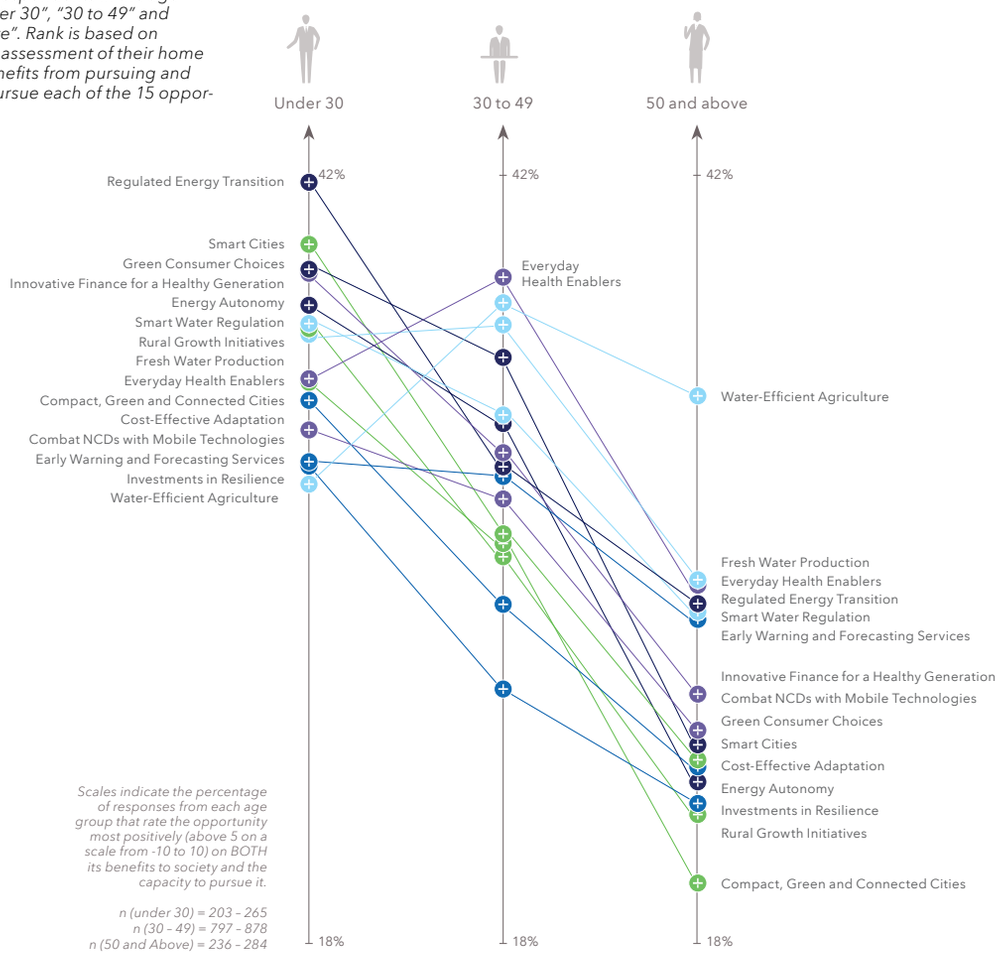
- EXTREME WEATHER
- NON-COMMUNICABLE DISEASES
- UNSUSTAINABLE URBANIZATION
- LACK OF FRESH WATER
- LOCK-IN TO FOSSIL FUELS

Scales indicate the percentage of responses from each gender that rate the opportunity most positively (above 5 on a scale from -10 to 10) on BOTH its benefits to society and the capacity to pursue it.

n (women) = 455 – 517
n (men) = 810 – 848

AGE GROUPS

Results from respondents in the age groups: "Under 30", "30 to 49" and "50 and Above". Rank is based on respondents' assessment of their home countries' benefits from pursuing and capacity to pursue each of the 15 opportunities.



Scales indicate the percentage of responses from each age group that rate the opportunity most positively (above 5 on a scale from -10 to 10) on BOTH its benefits to society and the capacity to pursue it.

n (under 30) = 203 – 265
n (30 – 49) = 797 – 878
n (50 and Above) = 236 – 284

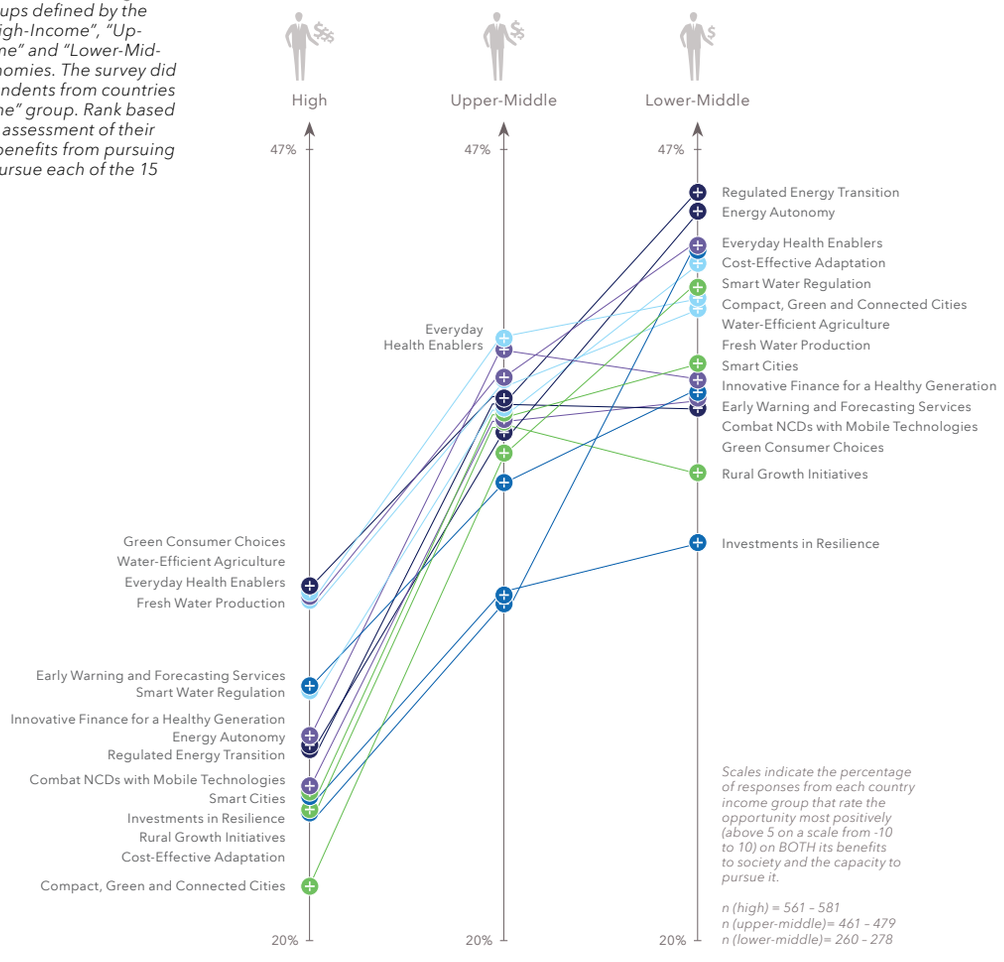
nities are rated less positively by the oldest respondents. The Unsustainable Urbanization-related opportunity of **Smart Cities**, highly rated by respondents under 30 but viewed as less important by those over 50, clearly illustrates this tendency. It also highlights the fact that the different age groups produce markedly dissimilar ratings. The overall best rated opportunity, **Water-Efficient Agriculture**, is clearly the favourite among respondents over 50, while those under 30 rated it at the very bottom. Indeed, only one opportunity, **Regulated Energy Transition**, appears as one of the top six according to both the youngest and oldest age groups. Conversely, men and women share four favourites despite their different scores.

Viewing the same results through the lens of differing income levels across economies, a different picture emerges. Respondents from countries in the high-income group (World Bank's definitions) rated opportunities less favorably both with respect to the potential positive social impacts and the perceived capacity to pursue them.

Regulated Energy Transition and **Energy Autonomy**, the two favorites of countries in the lower-middle-income group, do not feature among the top five in the high-income economy group. Conversely, **Green Consumer Choices** and **Water-Efficient Agriculture**, favored by countries in the high-income group, were not as favorably rated in countries in the two middle-income groups.

COUNTRY INCOME GROUPS

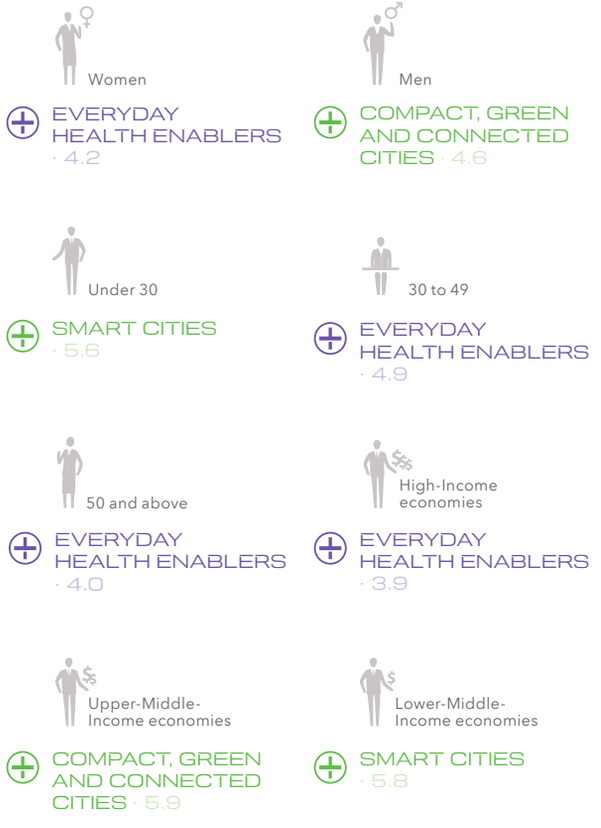
Results from respondents residing in three country groups defined by the World Bank as "High-Income", "Upper-Middle-Income" and "Lower-Middle-Income" economies. The survey did not include respondents from countries in the "Low-income" group. Rank based on respondents's assessment of their home countries' benefits from pursuing and capacity to pursue each of the 15 opportunities.



TOP OPPORTUNITIES FOR BUSINESS, PER GROUP

Number indicates how beneficial respondents in each group rate the opportunities with respect to effect on their business area.

(Average score on scale from -10 to 10)



BUSINESSES WELCOME THE OPPORTUNITIES

Manufacturing Sector Shows Great Optimism – Driven by China

A very positive response from the Chinese manufacturing sector places manufacturing as the most optimistic of all business sectors.

Of all business sectors, respondents from the manufacturing sector give the most favorable assessment of the potential positive impacts of the opportunities on society. This is mainly due to very positive responses from the manufacturing sector in China.

Compared to their counterparts in other countries, manufacturing sector respondents in China consistently rate opportunities more positively. Filtering the Chinese respondents out of the data reveals that the non-Chinese manufacturing sector is not more positive than other sectors. However, with China being the world's largest producer of manufactured goods, this result is a salient one, reflecting an important sector's relative optimism.

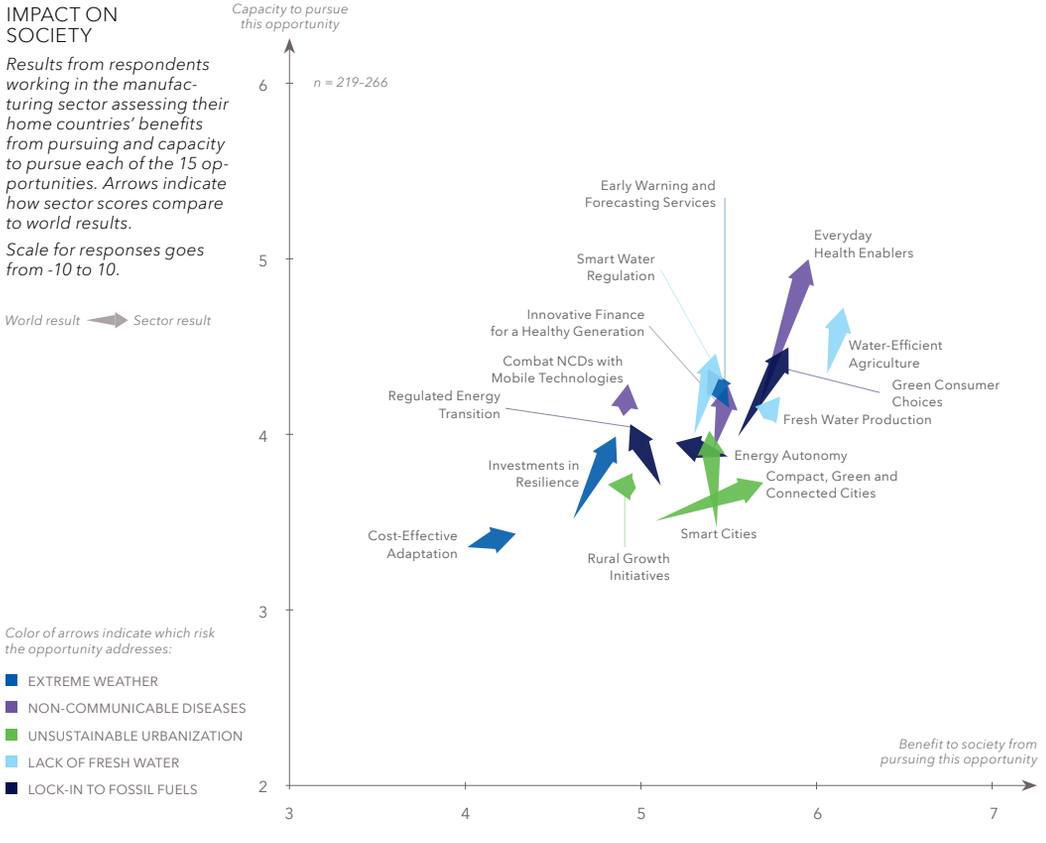
When considering the overall positive effect on business, respondents from the manufacturing sector place the opportunities **Green Consumer Choices, Everyday Health Enablers, Compact Green and Connected Cities** as well as **Smart Cities** in the top end. These opportunities are also all in the top five when respondents assess how likely they are to pursue new business ventures related to the opportunity. The sector's responses show some coherence between opportunities considered most beneficial to society and those most beneficial to business, as respondents from this sector also rated these opportunities in the top half in terms of their potential positive impact on society.

IMPACT ON SOCIETY

Results from respondents working in the manufacturing sector assessing their home countries' benefits from pursuing and capacity to pursue each of the 15 opportunities. Arrows indicate how sector scores compare to world results.

Scale for responses goes from -10 to 10.

World result → *Sector result*



Color of arrows indicate which risk the opportunity addresses:

- EXTREME WEATHER
- NON-COMMUNICABLE DISEASES
- UNSUSTAINABLE URBANIZATION
- LACK OF FRESH WATER
- LOCK-IN TO FOSSIL FUELS

IMPACT ON BUSINESS

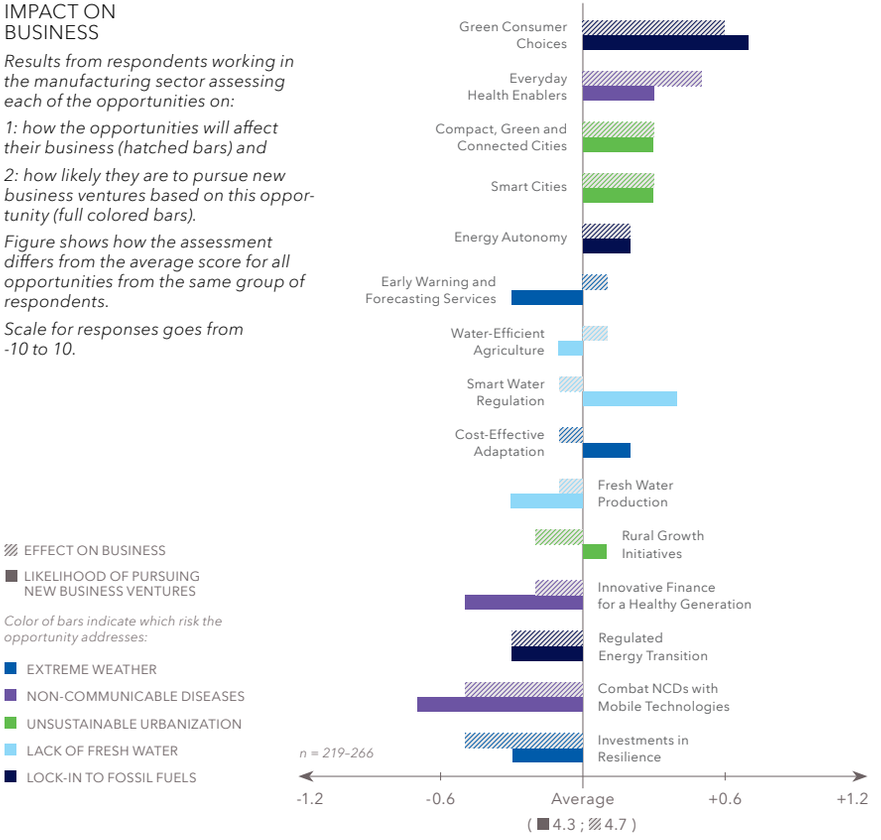
Results from respondents working in the manufacturing sector assessing each of the opportunities on:

1: how the opportunities will affect their business (hatched bars) and

2: how likely they are to pursue new business ventures based on this opportunity (full colored bars).

Figure shows how the assessment differs from the average score for all opportunities from the same group of respondents.

Scale for responses goes from -10 to 10.



▨ EFFECT ON BUSINESS

■ LIKELIHOOD OF PURSUING NEW BUSINESS VENTURES

Color of bars indicate which risk the opportunity addresses:

- EXTREME WEATHER
- NON-COMMUNICABLE DISEASES
- UNSUSTAINABLE URBANIZATION
- LACK OF FRESH WATER
- LOCK-IN TO FOSSIL FUELS

Finance Sector: What's Good For Society is Good For Us

Responses from the finance sector show strong coherence when pointing to what's good for society and what's good for the finance sector.

Responses from the finance sector show a strong link between the opportunities assessed to carry the greatest potential benefits for society and the opportunities that will influence the finance sector itself most positively. The opportunities that are expected to have a large positive impact on society are also seen as the attractive ones for developing new business ventures.

Respondents from the finance sector clearly see greatest benefits for business from the opportunity **Everyday Health Enablers**. This applies both to the opportunity's overall effect on the finance sector and to how likely it is that respondents' own businesses will pursue the opportunity with concrete investments and venture creation.

Compared to other business sectors, the finance sector is more positive about the potential positive societal impacts of opportunities relating to the risks Extreme Weather and Unsustainable Urbanization. However, **Regulated Energy Transition** stands out with a less positive reception.

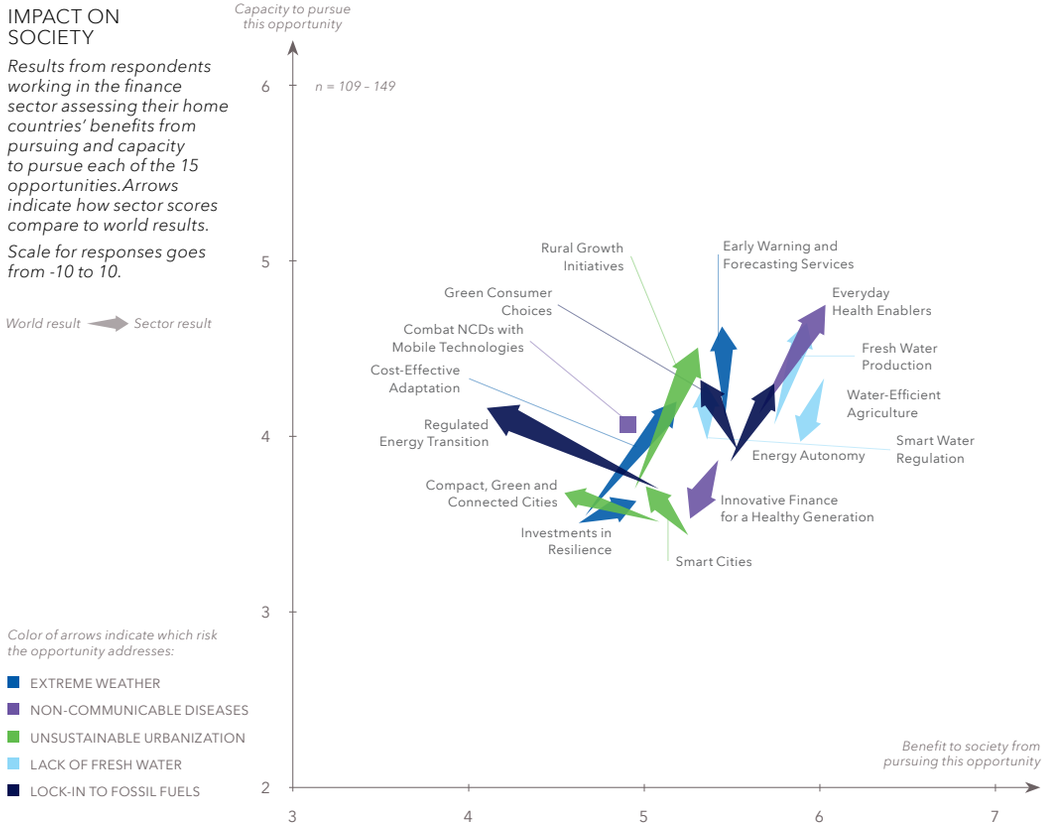
Even though respondents from this sector see a relatively negative effect on their business area from **Green Consumer Choices**, they are as likely to pursue new ventures emerging from this opportunity as from the opportunity assessed as best for business, **Everyday Health Enablers.**

IMPACT ON SOCIETY

Results from respondents working in the finance sector assessing their home countries' benefits from pursuing and capacity to pursue each of the 15 opportunities.Arrows indicate how sector scores compare to world results.

Scale for responses goes from -10 to 10.

World result → *Sector result*



IMPACT ON BUSINESS

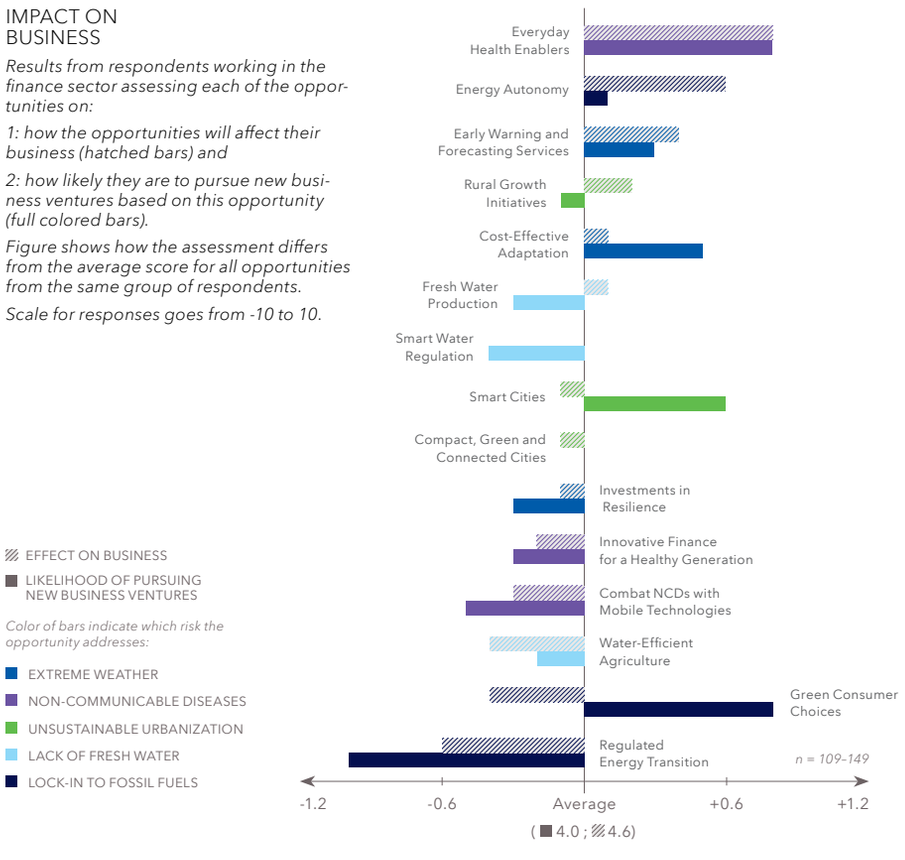
Results from respondents working in the finance sector assessing each of the opportunities on:

1: how the opportunities will affect their business (hatched bars) and

2: how likely they are to pursue new business ventures based on this opportunity (full colored bars).

Figure shows how the assessment differs from the average score for all opportunities from the same group of respondents.

Scale for responses goes from -10 to 10.



Governmental Sector Shows Less Optimism

The governmental sector is the least positive sector, both when it comes to evaluating the benefits for societies and how opportunities will affect their own activities.

The governmental sector is expected to play an important role in realizing many of the opportunities described – especially the regulation-oriented ones. However, respondents from this sector are consistently less positive about how the opportunities can positively affect society and society's capacity to pursue them than the other business sectors. However it should be stressed that the overall response to the opportunities is also positive in this sector, just less positive than in the other sectors.

Respondents from the governmental sector assess **Fresh Water Production** and **Smart Cities** as the opportunities with the greatest positive potential impact upon their activities. However, when rated in terms of prospective new ventures, **Green Consumer Choices, Everyday Health Enablers**, and **Compact, Green and Connected Cities** rank higher.

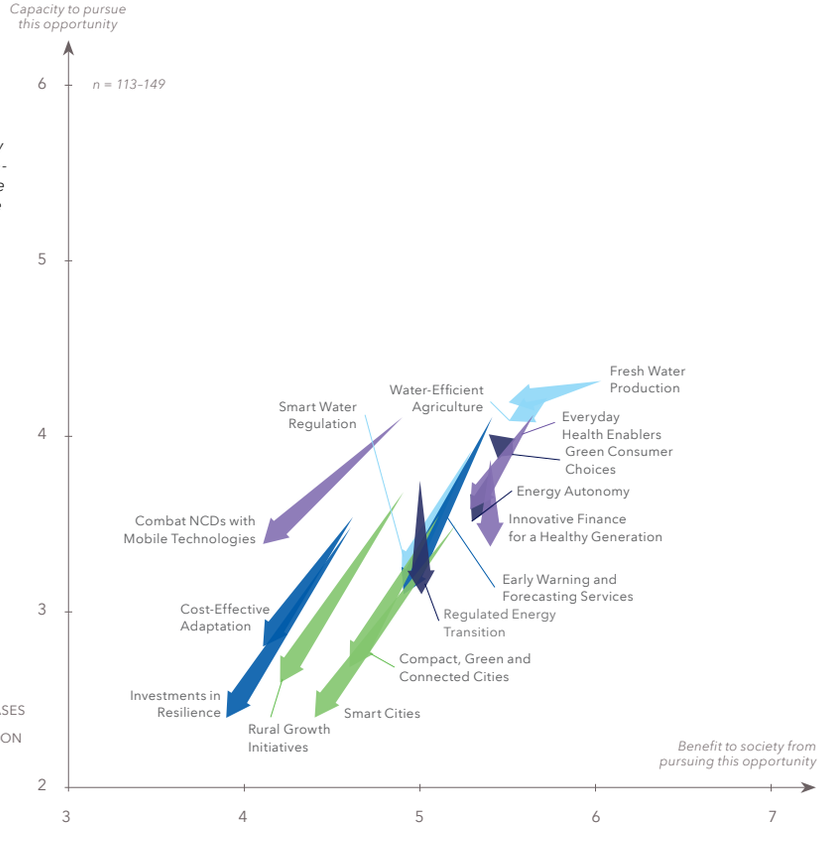
Opportunities related to the risk of Continued Lock-in to Fossil Fuels are all ranked among the better half of all opportunities in terms of the potential positive impacts upon governmental sector activities. All opportunities related to water are rated among the very best opportunities in terms of positive impacts on society. In fact, respondents from this sector, together with the finance sector, assess these opportunities higher than those related to any other risk.

IMPACT ON SOCIETY

Results from respondents working in the governmental sector assessing their home countries' benefits from pursuing and capacity to pursue each of the 15 opportunities. Arrows indicate how sector scores compare to world results.

Scale for responses goes from -10 to 10.

World result → *Sector result*



Color of arrows indicate which risk the opportunity addresses:

- EXTREME WEATHER
- NON-COMMUNICABLE DISEASES
- UNSUSTAINABLE URBANIZATION
- LACK OF FRESH WATER
- LOCK-IN TO FOSSIL FUELS

IMPACT ON BUSINESS

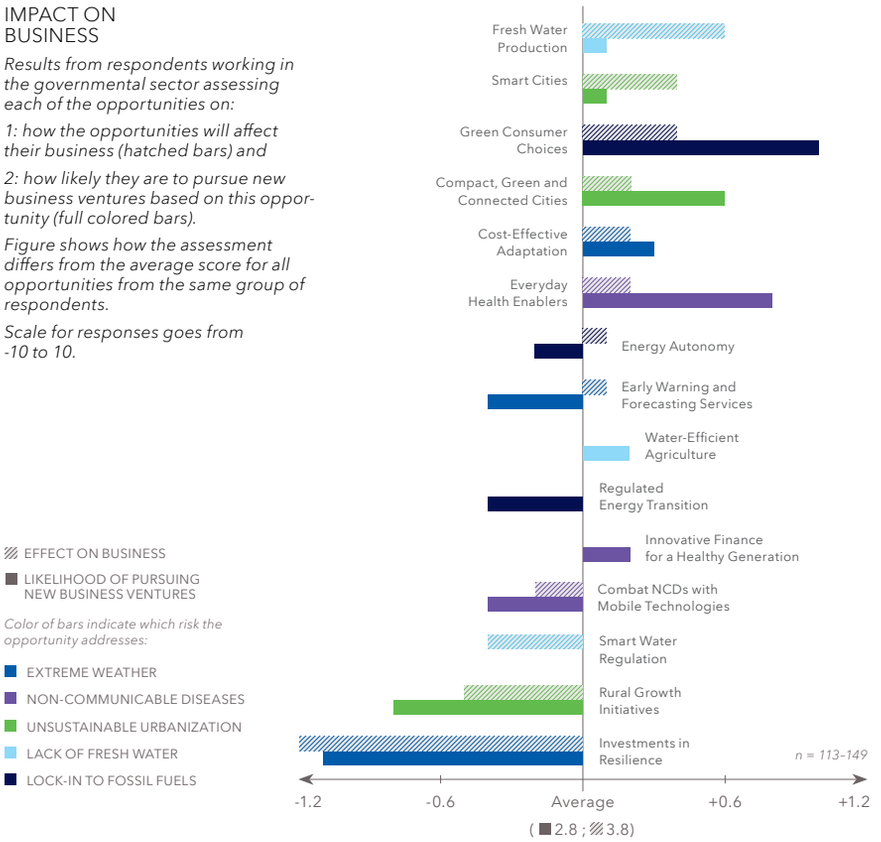
Results from respondents working in the governmental sector assessing each of the opportunities on:

1: how the opportunities will affect their business (hatched bars) and

2: how likely they are to pursue new business ventures based on this opportunity (full colored bars).

Figure shows how the assessment differs from the average score for all opportunities from the same group of respondents.

Scale for responses goes from -10 to 10.



EFFECT ON BUSINESS

LIKELIHOOD OF PURSUING NEW BUSINESS VENTURES

Color of bars indicate which risk the opportunity addresses:

- EXTREME WEATHER
- NON-COMMUNICABLE DISEASES
- UNSUSTAINABLE URBANIZATION
- LACK OF FRESH WATER
- LOCK-IN TO FOSSIL FUELS

Service Sector Sees the Business Benefits of Fighting NCDs

Opportunities to fight non-communicable diseases are rated highly for their business potential by the respondents from the service sector.

Respondents from the service sector show high confidence in the business potential of the opportunities related to fighting the risk Non-communicable Diseases (NCDs), when compared to respondents from other sectors. Respondents also assess **Everyday Health Enablers** to be one of the best opportunities in terms of its overall effect on society, suggesting that the service sector can be an important actor in pursuing this opportunity.

The opportunity **Smart Cities** gets the most favorable assessment of all when rated for the capacity to inspire investment in new business ventures.

Examining the service sector respondents' evaluation of the potential positive impact on society of the opportunities presented, it is clear that they rate opportunities associated with the risks Unsustainable Urbanization and the Lack of Fresh Water less favorably than the average.

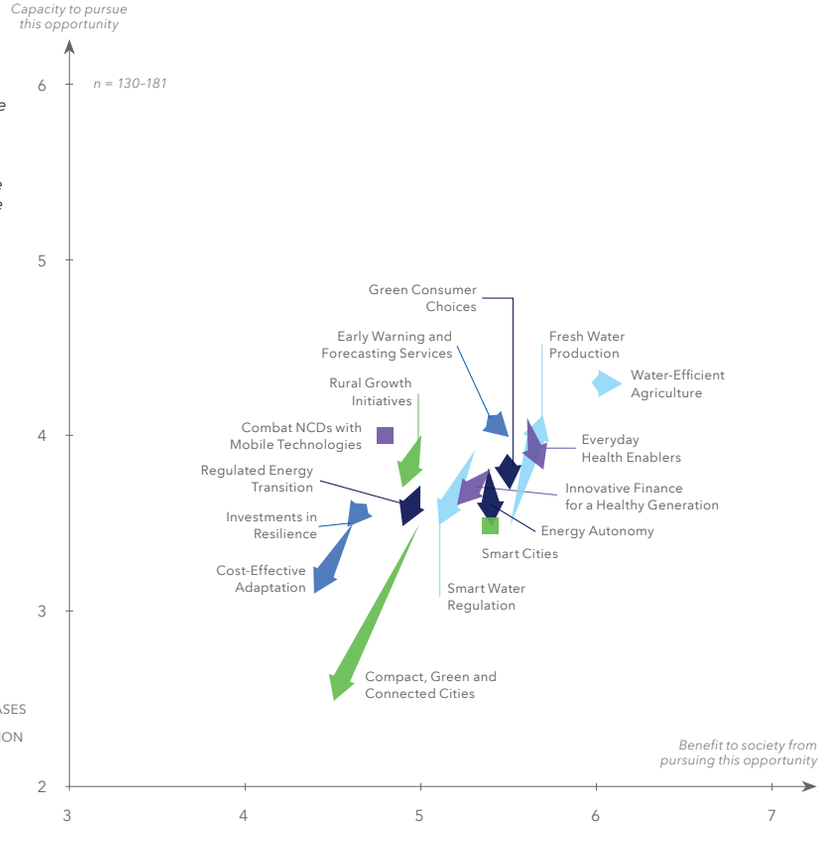
Another interesting survey result is the fact that although service sector respondents assess **Innovative Finance for a Healthy Generation** as one of the most likely to positively affect their business areas, it is rated as one of the least likely to be pursued.

IMPACT ON SOCIETY

Results from respondents working in the service sector assessing their home countries' benefits from pursuing and capacity to pursue each of the 15 opportunities.Arrows indicate how sector scores compare to world results.

Scale for responses goes from -10 to 10.

World result → *Sector result*



Color of arrows indicate which risk the opportunity addresses:

- EXTREME WEATHER
- NON-COMMUNICABLE DISEASES
- UNSUSTAINABLE URBANIZATION
- LACK OF FRESH WATER
- LOCK-IN TO FOSSIL FUELS

IMPACT ON BUSINESS

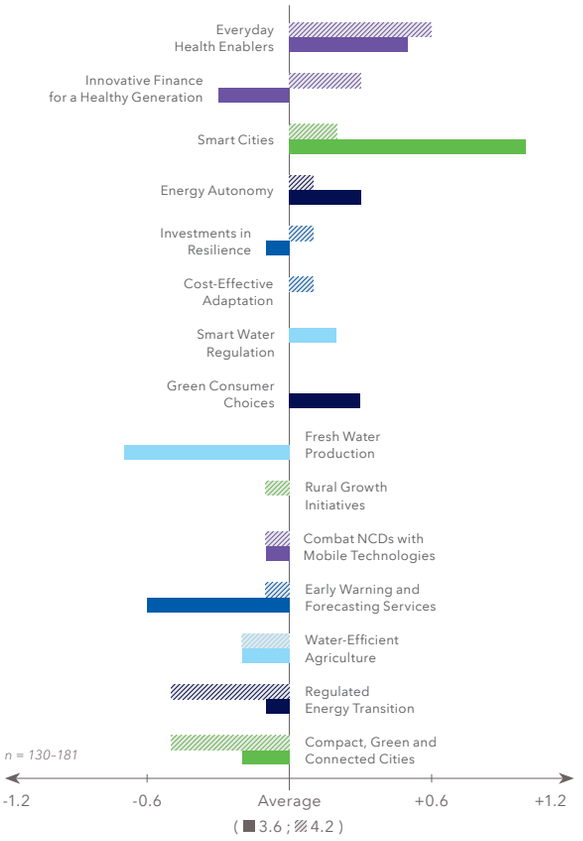
Results from respondents working in the service sector assessing each of the opportunities on:

1: how the opportunities will affect their business (hatched bars) and

2: how likely they are to pursue new business ventures based on this opportunity (full colored bars).

Figure shows how the assessment differs from the average score for all opportunities from the same group of respondents.

Scale for responses goes from -10 to 10.



- EFFECT ON BUSINESS
- LIKELIHOOD OF PURSUING NEW BUSINESS VENTURES

Color of bars indicate which risk the opportunity addresses:

- EXTREME WEATHER
- NON-COMMUNICABLE DISEASES
- UNSUSTAINABLE URBANIZATION
- LACK OF FRESH WATER
- LOCK-IN TO FOSSIL FUELS

"Other Businesses" Sector Results Close to World Averages

The diverse composition of the *other businesses* sector allows for few strongs signal in the data apart from a strong confidence in the business potential related to the **Smart Cities** opportunity.

The *other businesses* sector encompasses respondents from a wide range of sectors including the construction, healthcare, academia, trade, transport, food, mining and extraction, and agriculture sectors. Accordingly, overall responses from these sectors reflect the fact that it comprises a very diverse group of respondents, and there are no clear trends as to how the opportunities' positive impact on society is evaluated compared to the cross-sector average. However, findings are included as they may be indicative of businesses' overall impression of the opportunities described.

The **Smart City** opportunity is a very clear favourite in terms of pursuing new ventures and is also regarded as presenting a positive influence upon business. Respondents also assess **Compact, Green and Connected Cities**, another opportunity arising from the risk of Unsustainable Urbanization, as more likely to both affect business positively and be pursued for new ventures than others.

Even though respondents from the sector as a whole view **Water-efficient Agriculture** and **Fresh Water Production** as having a more positive influence upon their business activities than average, those two opportunities are seen as less likely to be pursued as new business ventures.

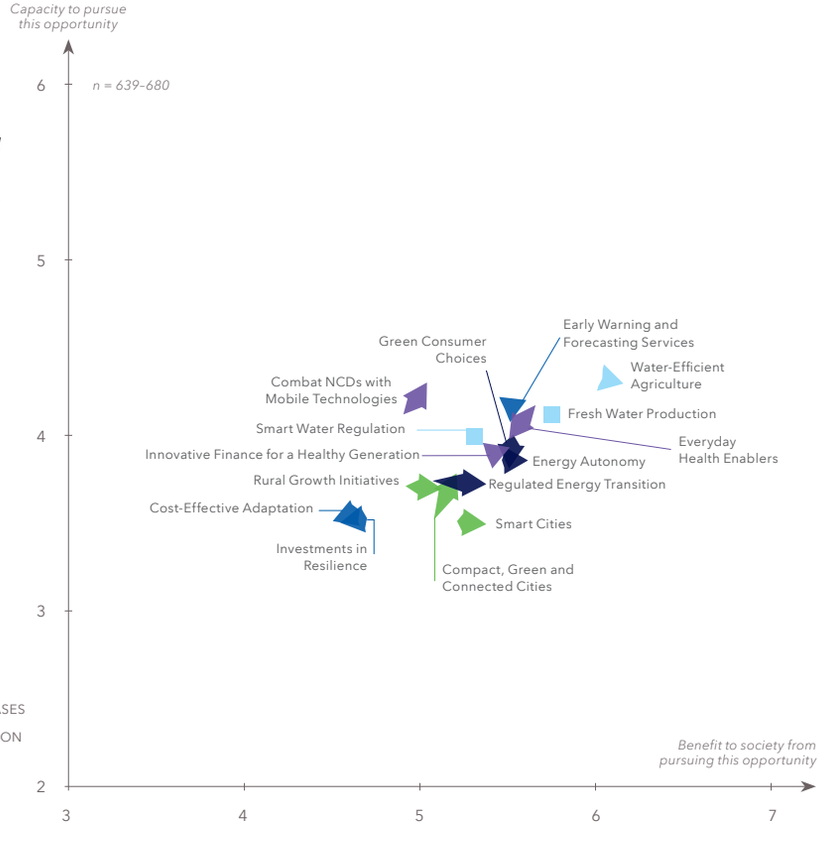
Additionally, respondents from the *other businesses* sector judge **Green Consumer Choices** to offer less of a positive influence upon their business than average, but at the same time it is one of the opportunities they report to be most likely to pursue for new business ventures.

IMPACT ON SOCIETY

Results from respondents working in the "other businesses" sector assessing their home countries' benefits from pursuing and capacity to pursue each of the 15 opportunities. Arrows indicate how sector scores compare to world results.

Scale for responses goes from -10 to 10.

World result → *Sector result*



Color of arrows indicate which risk the opportunity addresses:

- EXTREME WEATHER
- NON-COMMUNICABLE DISEASES
- UNSUSTAINABLE URBANIZATION
- LACK OF FRESH WATER
- LOCK-IN TO FOSSIL FUELS

IMPACT ON BUSINESS

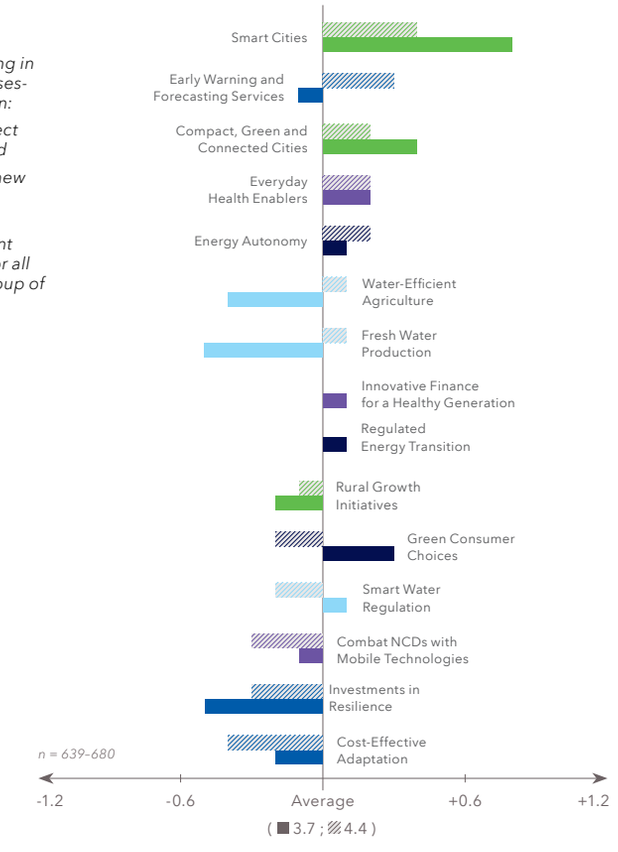
Results from respondents working in the "other businesses" sector assessing each of the opportunities on:

1: how the opportunities will affect their business (hatched bars) and

2: how likely they are to pursue new business ventures based on this opportunity (full colored bars).

Figure shows how the assessment differs from the average score for all opportunities from the same group of respondents.

Scale for responses goes from -10 to 10.



- EFFECT ON BUSINESS
- LIKELIHOOD OF PURSUING NEW BUSINESS VENTURES

Color of bars indicate which risk the opportunity addresses:

- EXTREME WEATHER
- NON-COMMUNICABLE DISEASES
- UNSUSTAINABLE URBANIZATION
- LACK OF FRESH WATER
- LOCK-IN TO FOSSIL FUELS

Opportunities and Megatrends

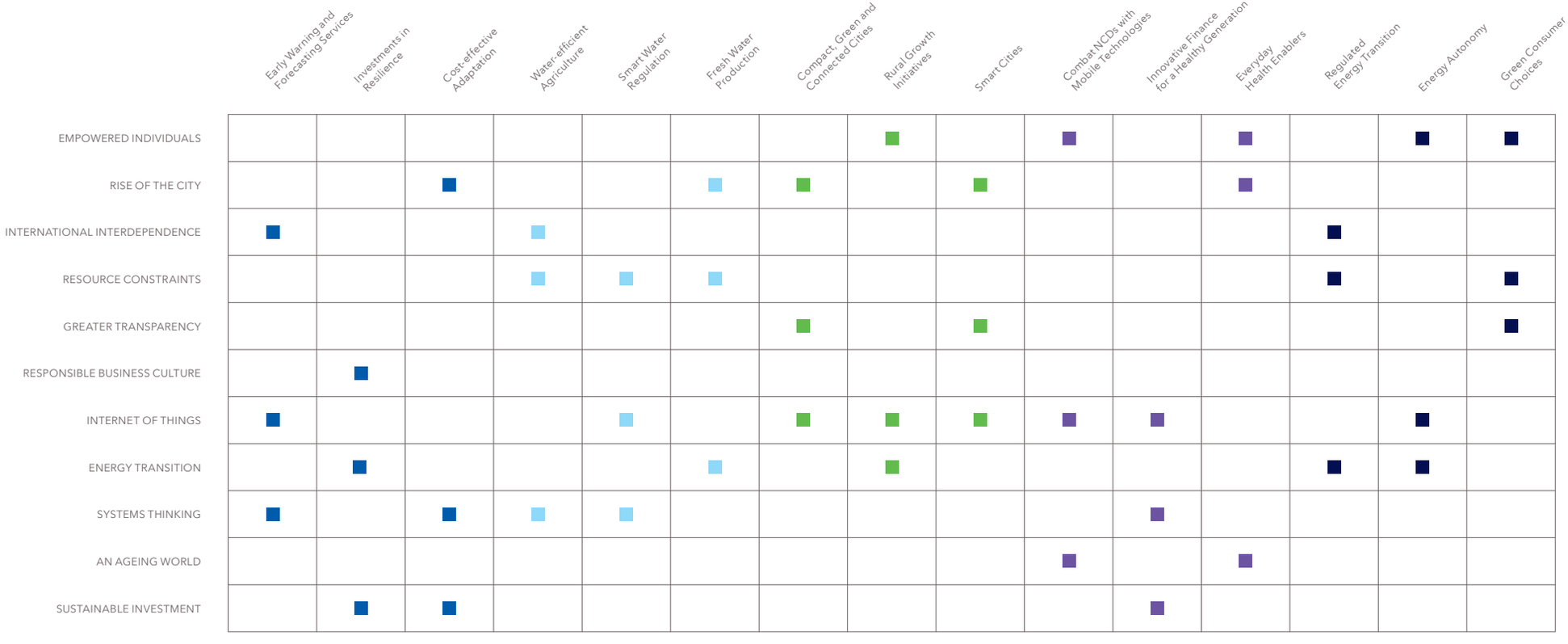
Opportunities do not arise by themselves; they are shaped by the bigger megatrends in society. On these pages we present 11 megatrends and show how the opportunities presented in this report can be seen as reflections of systematic global developments.

In this report, opportunities are seen as avenues for action that stakeholders can travel down when addressing global risks. As such, they are not individual initiatives but rather strategic choices of direction for sectors and societies at large. In the context of socio-technical theory, opportunities lie in the middle level, sometimes called the "regime" level, tucked in between the overarching landscape containing megatrends on top, and the innovative niche-level solutions below. Detailed descriptions of the opportunities and the niche innovations, or solutions, that they inspire are presented in the following pages. These 11 megatrends should be seen as features of the landscape that shape opportunities and can either facilitate or inhibit their success.

OPPORTUNITIES AND MEGATRENDS

Figure shows how the 15 opportunities relate to 11 megatrends. Megatrend descriptions on opposite page. Markers show the three megatrends that we believe each opportunity is most most related to.

Colors indicate which risk the opportunity addresses: EXTREME WEATHER · NCDs · UNSUSTAINABLE URBANIZATION · LACK OF FRESH WATER · LOCK-IN TO FOSSIL FUELS



11 Megatrends

EMPOWERED INDIVIDUALS: Individuals will gain a growing influence on key aspects of their lives, from managing their own health to piecing together their own education. In professional life, a growing number of individuals will create their own businesses using the spreading internet access and the rise of 3D printing to access a global customer base directly and immediately, without the need to go through traditional distribution intermediaries. More self-reliant, better-educated and healthier individuals will be critical both in the role as consumers and as citizens demanding transparency and credibility from governments and businesses.

RISE OF THE CITY: Populations globally are flocking to cities at an unprecedented pace, and existing megacities are rising to prominence as political and economic entities of greater influence than many nations. In the context of sustainability, cities are often "just the right size" in terms of regulatory and planning power to handle many approaching challenges spanning the creation of low-carbon infrastructure to providing living spaces that allow inhabitants to lead healthy and prosperous lives.

INTERNATIONAL INTERDEPENDENCE: The world will continuously become more integrated economically and culturally. Likewise, many sustainability-related challenges from global warming to water scarcity span borders and can only be solved at the international level. If nation states cannot manage the tasks, other actors such as cities or international corporations are positioning themselves to become frontrunners. The challenges ahead and the rebalancing of power between regions will also require international institutions to evolve.

RESOURCE CONSTRAINTS: Natural resources, including essentials such as water, food and energy, are under combined pressure from the forces of population growth, economic growth and environmental threats, particularly climate change. Sustainable resource management will become a growing responsibility for many national and local governments. In business, the rising prices of many commodities will place the ability to use resources efficiently at the center of competitiveness.

GREATER TRANSPARENCY: Governments and businesses alike will face growing demands for transparency in their activities. New "licenses to operate" demand transparent and fair conduct, often stretching to encompass the operations of suppliers and partners. This is especially important in the context of sustainability, as the public and private sectors will need to work together more closely in order to handle many of the challenges ahead. Within these public-private partnerships, transparency will be especially important to preserve legitimacy and ensure that outcomes match expectations.

RESPONSIBLE BUSINESS CULTURE: Concerns about the environment, social impacts and good governance will continue to rise on the agenda of businesses globally, and not just because it is "the right thing to do". Evidence is growing that companies with a strong performance on Environmental, Social and Governance standards are more profitable than their competitors. Although it may remain unclear whether or not this is because these companies are better managed or perhaps more in touch with overall societal movements, the trend is undeniable.

INTERNET OF THINGS: Advances in embedded software and sensor technology have made the internet of things possible. Processes and complex operations can not only be monitored but also controlled by autonomous systems relying on a steady flow of sensor data. While utilities, production industry and traffic control systems may be obvious early adopters, this also has the potential to profoundly change personal health care, transportation and just about every other aspect of modern life.

ENERGY TRANSITION: The dramatic reduction in renewable energy costs, divestment from fossil fuels and the rise of distributed energy generation all point to a transition away from centralized carbon-based energy production to an energy system dominated by (distributed) renewable energy generation. Building integrated energy infrastructure that combines electricity, heat, transport and, in some places, gas is crucial if this is to be executed efficiently.

SYSTEMS THINKING: Spearheaded by natural sciences (especially climate and earth systems science) and enhanced by sensor and big data advancement, there is a growing momentum moving analyses out of silo mentalities to reveal a broader perspective. Policy initiatives and investment decisions will become increasingly guided by a greater understanding of the complexities of the challenges ahead. However, a new mindset adept at navigating in a complex world still needs to manifest itself.

AN AGEING WORLD: The world population will continue to grow and to grow older. In the short to medium term many emerging economies face problems with providing education and employment for the more than half of the world population that is under 24 years old, but in the longer term the growing number of elderly people will pose a challenge of perhaps even greater proportions to public health care and social security. Empowerment of women will continue to increase and can potentially have dramatic socioeconomic effects.

SUSTAINABLE INVESTMENT: Institutional investors are becoming increasingly focused on sustainability, not only in the form of CSR management but also in terms of identifying investment opportunities related to solving greater sustainability challenges. The number of social and green bonds issued is rising fast. These relatively new financial products seem poised to move out of niche status and into mainstream investment portfolios. Investing in resilient infrastructure or preventive health interventions, for example, can give investors secure long-term returns that lower their overall risk exposure.

FROM RISKS TO OPPORTUNITIES

RISK 1

EXTREME WEATHER

Extreme weather events are likely to be more frequent and more severe in the coming decades. The concentration of people in vulnerable areas exacerbates the impacts.

EXTREME WEATHER

Extreme weather events are likely to be more frequent and more severe in the coming decades. The concentration of people in vulnerable areas exacerbates the potential impacts.

Extreme weather is by far the most costly type of natural disaster, with floods and droughts being the main causes of both human and economic losses. The growing world population and the rising concentration of people in coastal areas put even more people and property at risk from extreme weather. It is estimated that more than 630 million people live in low-elevation coastal zones (less than 10 metres above sea level), and nearly two-thirds of urban settlements with more than five million inhabitants are also at least partially located in these areas.

Continued emission of greenhouse gasses will cause further global warming and long-lasting changes in all components of the climate system, increasing the likelyhood of severe, pervasive and irreversible impacts for people and ecosystems. Climate change affects key development and security issues, such as food security and political and social stability.

The Intergovernmental Panel on Climate Change considers it very likely (with over 90 percent probability) that the frequency and/or duration of heatwaves will increase. It is considered to be over 66 percent likely that many land areas will experience an increase in the frequency and/or severity of heavy precipitation events in the early 21st century. There is less confidence in predictions regarding the development in tropical cyclones in the coming decades, but the IPCC projects that it will become very likely in the late 21st century that extreme high sea level events will increase in number and/or severity. Simultaneously, droughts are creating severe losses, both in the economy and in terms of the number of people affected. They also have the potential to hit agricultural production and thus affect food prices globally.

FLOODS ARE THE GREATEST CHALLENGE

People affected by extreme weather, 1992–2012

Source: UNISDR. 'Impacts of disasters since the 1992 Rio de Janeiro Earth Summit'. 2012.

FACTS AND FIGURES

Since 1992, storms have caused losses of 720 bn USD.

The years 2001–2012 were all among the top 13 warmest years on record.

Over the last 30 years natural disasters took the lives of over 2 million people. Extreme weather caused almost 90 percent of such disasters, over 70 percent of the casualties and almost 80 percent of economic losses. Between 1970 and 2008, over 95 percent of deaths occurred in developing countries.

IMPACTS

Typhoon Haiyan hit the Philippines in November 2013. Casualties were estimated to be at least 6,000 with close to 2,000 still missing.

Hurricane Sandy hit the USA, Canada and the Caribbean in October, 2012, causing around 50 bn USD in damages and claiming at least 162 lives in the USA alone. It was the second largest Atlantic storm on record.

Thailand experienced devastating floods in 2011. The damage was estimated at around 45 bn USD, 600 were killed and 12.8 million people were affected by the disaster. Millions of tons of food crops were also destroyed.

Floods in Central Europe resulted in an estimated 15.2 bn USD of economic loss, the biggest in 2013.

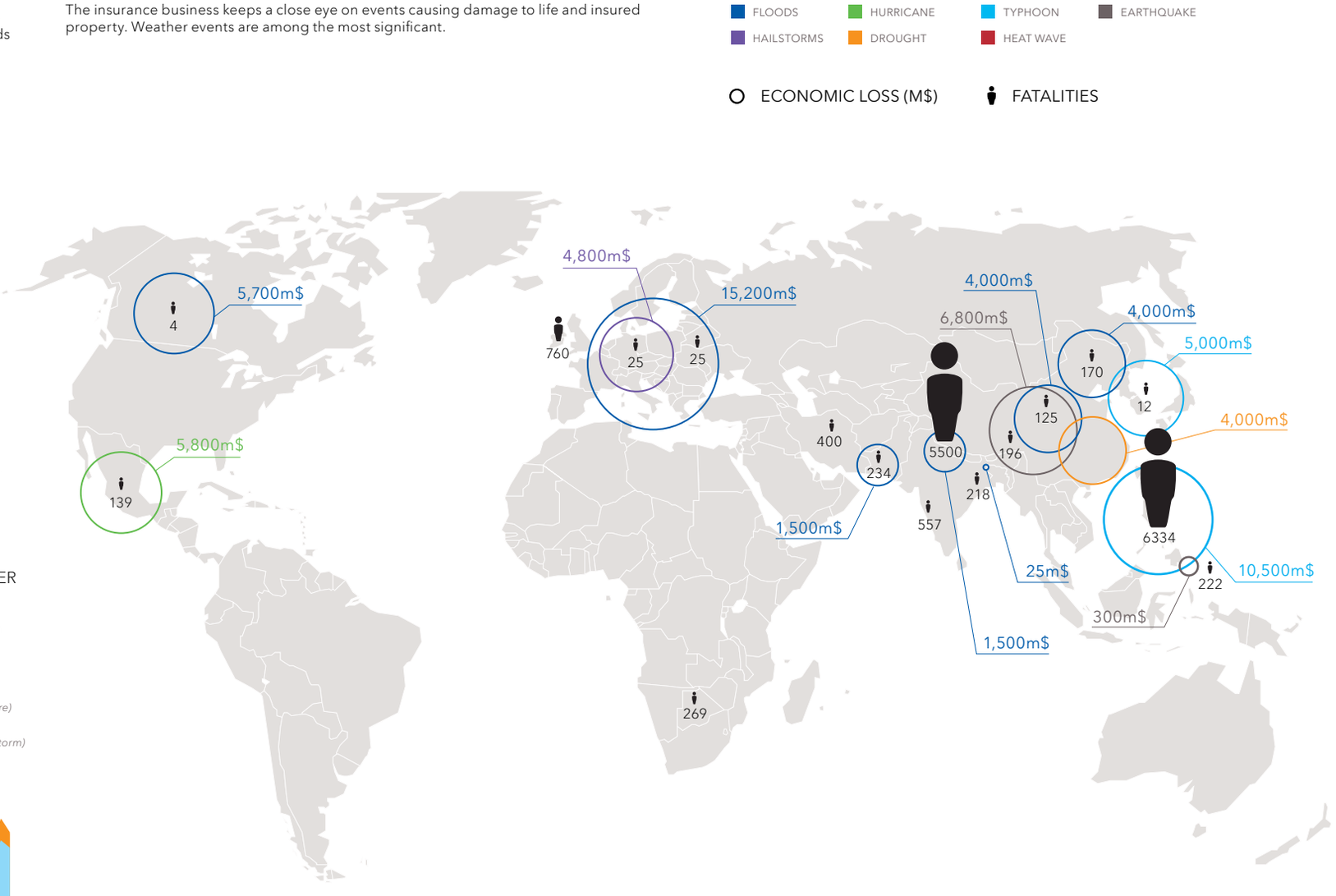
During the 2013 tornado season in the USA, three thunderstorms caused damages amounting to 10.3 bn USD.

The historic drought in California this year could leave 14,500 unemployed.

Extreme Weather Dominates List of Greatest Loss Events

Loss of life and property in the ten largest loss events in each loss category in 2013

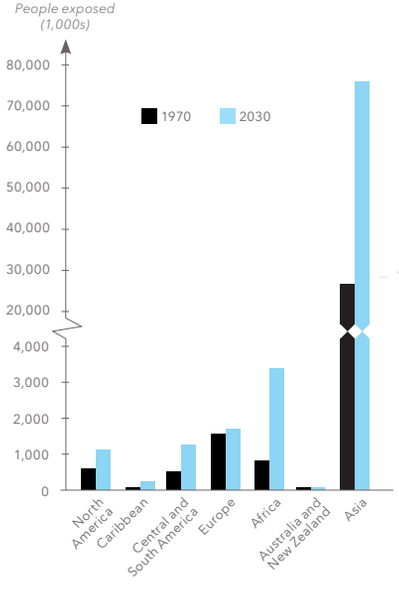
The insurance business keeps a close eye on events causing damage to life and insured property. Weather events are among the most significant.



MORE PEOPLE WILL BE AT RISK

People exposed to floods per year, 1970 vs. 2030

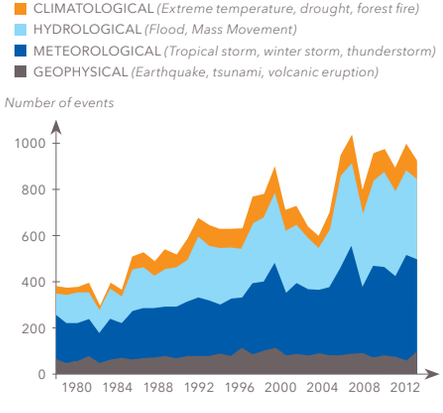
Floods are the most common type of extreme weather event – either caused by heavy downpours, meltwater flows or by storm surges. As floods become more frequent, and as more people live in vulnerable areas, the number affected by floods each year will more than double.



GROWING LOSSES TO EXTREME WEATHER

Loss events worldwide 1980–2013

The number of extreme weather events has risen rapidly over the past three decades. In the same period geophysical events such as earthquakes remain a smaller and non-rising threat.



Sources: Figure Left (upper) – IPCC. 'Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation'. Report. 2012.
Figure Left (lower) – Munich Re. 'Global Natural Catastrophe Update – 2013'. 2013. Map – 'Global Natural Catastrophe Update – 2013'. 2013.

OPPORTUNITIES

BUILDING RESILIENCE

Opportunities to address extreme weather events generate multiple co-benefits, while balancing the immediate need for protection with long-term efforts to avoid even more dangerous climate change.

EARLY WARNING AND FORECASTING SERVICES

The human and economic benefits of developing early warning and forecasting services can vastly outweigh the costs. In addition to providing millions of people with the time to protect their families and property from extreme weather, the collected data also has numerous applications within industries.

INVESTMENTS IN RESILIENCE

Institutional investors can play an instrumental role in protecting societies against extreme weather by channelling assets towards resilience investments. The growing interest in this field is exemplified by various trends, including the rise of green bonds.

COST-EFFECTIVE ADAPTATION

The necessary expenditure on climate resilience can become a vehicle for pioneering projects creating a more sustainable future. Focusing on the co-benefits of extreme weather proofing opens for new ways of designing cities and landscapes.

OPPORTUNITY

EARLY WARNING AND FORECASTING SERVICES

In addition to providing millions of people with the time to protect their families and property from extreme weather, strong forecasting services have numerous business applications.

Creating a safe and liveable environment in the face of extreme weather is one of the most pressing challenges facing societies in the 21st century, but tools for minimizing the impacts are available today. Early warning systems can predict when and where extreme weather events like tropical cyclones or meltwater floods will hit, providing millions of people with the extra time necessary to protect themselves, their families, and their possessions.

Advances in sensor technology as well as big data processing power, combined with a nearly universal access to mobile phones, make it possible to collect, process and deliver data for early warning more efficiently and faster than ever before. These attributes explain the relatively low cost of this opportunity, which if done wisely can be realized for an investment of just a few billion USD worldwide per year. Achieving this will require efforts to secure open data and international collaboration.

The potential for saved lives and property alone is estimated to outweigh the costs by a factor of at least 2 to 5. However, many sectors from construction to health care can also experience the benefits of better forecasts during times of "normal" weather. Accounting for these efficiency gains, the benefits of investing in better meteorological services are estimated to be up to 30 times larger than the costs.

As an additional application, this opportunity can give contractors, city planners, and politicians the tools to predict which areas will be threatened by extreme weather in the coming decades. This will enable them to make better-informed choices to protect construction and infrastructure investments worth trillions of dollars per year.

Background

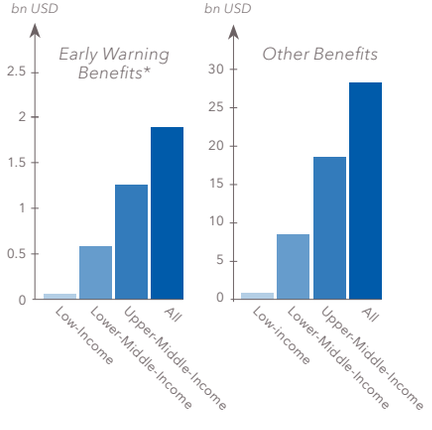
State of the art weather, climate, and hydrological information services are vital tools in adapting to a future with more extreme weather events. However, many countries, especially low- to upper-middle-income economies, have not invested in the capacity to adequately monitor, forecast, and interpret weather and climate data. Moreover, the climate data that do exist are not publicly available in many countries, limiting international collaboration and the potential innovation of new data-based services.

BENEFITS GROW WITH HIGHER INCOME

Likely annual benefits from an annual investment of 1 bn USD in upgrading hydrometeorological services in low- to upper-middle-income economies to the standards of most high-income economies.

Source: Hallegate, S, 2012, "A Cost Effective Solution to Reduce Disaster Losses in Developing Countries", World Bank Policy Research Working Paper.

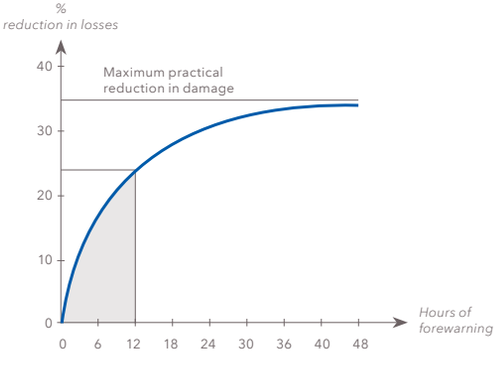
*Early warning benefits numbers do not count the number of deaths avoided due to better early warning systems. A conservative estimate (same source) puts the annual fiscal value of this between 0.7 and 3.5 bn USD.



EARLY WARNING SAVES LIVES AND PROPERTY

Day's curve for damage mitigation as a function of forecast lead times indicates that a 12-hour warning before an extreme weather event can reduce losses by almost 25 percent.

Source: Hallegate, S, 2012, " A Cost Effective Solution to Reduce Disaster Losses in Developing Countries", World Bank Policy Research Working Paper.



SOLUTIONS SEIZING THIS OPPORTUNITY:

Forewarned and Forearmed

Both public and private initiatives are making forecasts and climate data more widely available for the benefit of people and business.

Weather Forecasting for Improved Business Operations

ImpactWeather by StormGeo provides hundreds of companies representing various sectors ranging from healthcare to retail with weather forecasts that help them prepare for and overcome weather-related challenges.

Access to this information enables businesses to, among other things, avoid risks to personnel and assets, maximize productivity, and enhance safety programs.

Promoting Awareness with Openly Accessible Weather Risk Data

Insurers in Austria have partnered with government authorities to promote climate risk awareness by means of an openly accessible risk zoning and mapping tool.

This makes it possible for policy makers, aspiring homeowners, planners, and developers to assess the weather-related risks to their activities and take preventative action.

Early Warning System Protects Communities against Flooding

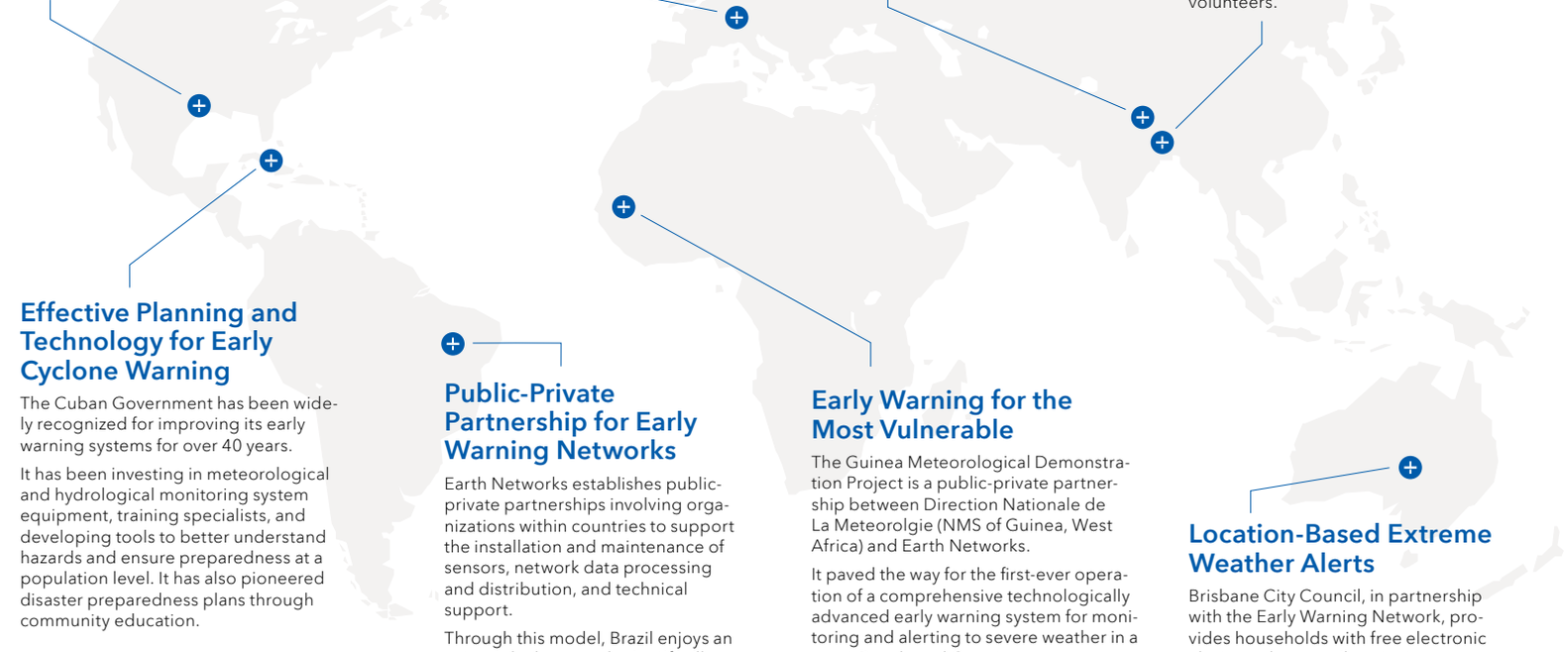
Practical Action orchestrates disaster risk management interventions in vulnerable communities. In Nepal, it works to strengthen coping strategies and to establish appropriate community monitoring systems.

During a 2013 monsoon, a telemetric system and electronic display board inside a local police office provided up-to-date warnings that allowed about 2,620 people to escape to safety.

Community Networks for Rapid Evacuation

Having incurred catastrophic losses from tropical cyclones and storm surges in the past, Bangladesh's Cyclone Preparedness Programme has dramatically reduced death tolls associated with extreme weather events in the country.

Evacuation to established storm shelters can begin less than 15 minutes after warnings are issued by the Bangladesh Meteorological Department, thanks to a transceiver telecommunications network and a highly organized team of volunteers.



Effective Planning and Technology for Early Cyclone Warning

The Cuban Government has been widely recognized for improving its early warning systems for over 40 years.

It has been investing in meteorological and hydrological monitoring system equipment, training specialists, and developing tools to better understand hazards and ensure preparedness at a population level. It has also pioneered disaster preparedness plans through community education.

Public-Private Partnership for Early Warning Networks

Earth Networks establishes public-private partnerships involving organizations within countries to support the installation and maintenance of sensors, network data processing and distribution, and technical support.

Through this model, Brazil enjoys an extremely dense and scientifically advanced lightning sensor network for early warnings against heavy rainfall and flooding.

Early Warning for the Most Vulnerable

The Guinea Meteorological Demonstration Project is a public-private partnership between Direction Nationale de La Meteorolgie (NMS of Guinea, West Africa) and Earth Networks.

It paved the way for the first-ever operation of a comprehensive technologically advanced early warning system for monitoring and alerting to severe weather in a Least Developed Country.

Location-Based Extreme Weather Alerts

Brisbane City Council, in partnership with the Early Warning Network, provides households with free electronic alerts, such as emails or text messages, when severe weather, including destructive winds or cyclones, is expected to impact their residential address.

CO-BENEFITS

LIVES SAVED

Upgrading the meteorological and hydrological services of low- to upper-middle-income economies (World Bank definitions) to the standards of most European countries would save 23,000 lives per year.

PROTECTING PROPERTY

Upgrading the meteorological and hydrological services of low- to upper-middle-income economies would save 1.9 bn USD annually in avoided property damage. Added to the effect on the economy of avoiding human losses, this brings the estimated economic value of the benefits to somewhere between 2.6 and 5.4 bn USD annually.

FOSTERING GROWTH

The potential for productivity gains from better information on weather, water and climate as described is great and can contribute to economic growth.

ENABLING BETTER PLANNING

Upgraded data on long-term climate developments can inform decision makers, helping them to make smarter and more resilient choices in a range of areas from transport planning to assessing future workforce productivity.

NEW BUSINESSES

Creating open access to meteorological data can open up for innovative new businesses to develop new applications. This can create new goods and services for the benefit of customers.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- **Early Warning and Forecasting Services**
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

The Top Opportunity in North America

Early Warning and Forecasting Services is the best rated opportunity in North America, when assessed for its potential positive impact on society. Across other regions it is generally placed in the middle range of opportunities. It is the most favourably rated of the three opportunities addressing the risk of extreme weather, when looking at all countries as a group.

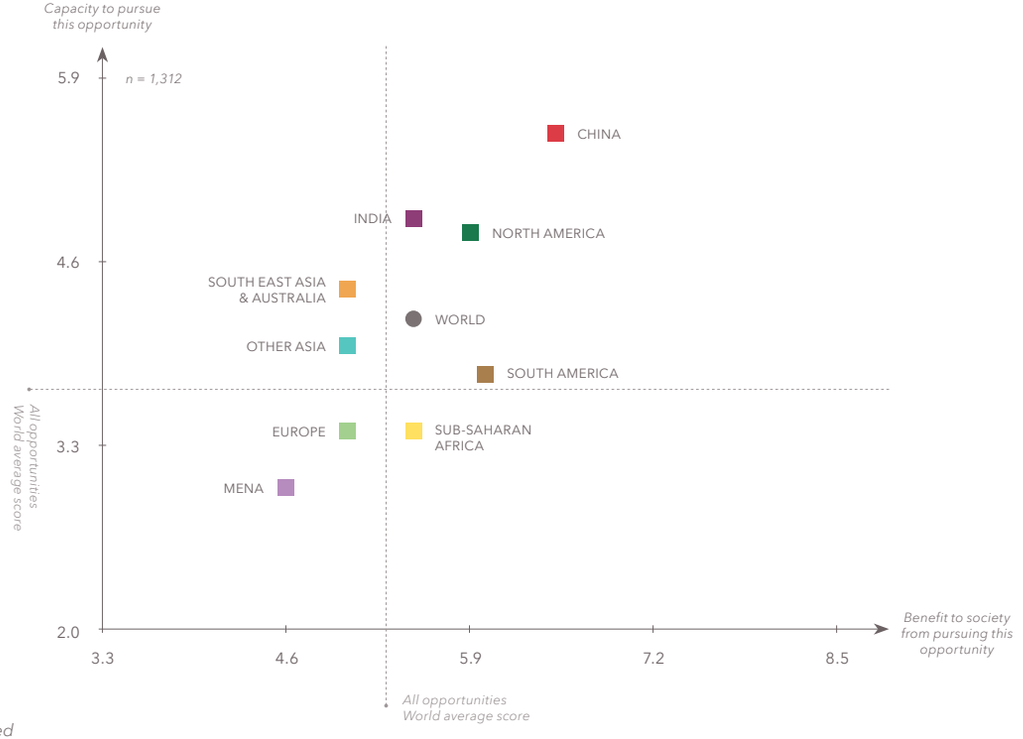
Respondents from the finance sector see this opportunity as one of top three when assessing the positive impact it will have on their business. They also place it well above average when assessing its potential to inspire new venture creation.

While respondents from the governmental and manufacturing sectors also see the above average positive effect on their business from this opportunity, they are much less likely to pursue new business ideas inspired by it.

Survey respondents perceive stakeholders within business and civil society to be the strongest supporters of this opportunity.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

Most Attractive in North America

The respondents in North America perceive this opportunity as the most favourable for society closely followed by Fresh Water Production opportunity.

Least Attractive in South America

In South America survey respondents see this as the opportunity least favourable for society.

Top Three for Finance Sector

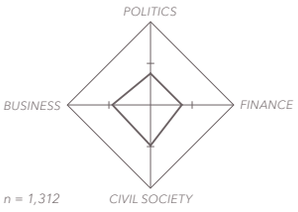
Respondents from the finance sector rate this opportunity as one of the most attractive opportunities for their business.

Now or in the Near Future in India

Around half of all respondents in India find the opportunity to either have reached full potential already or within the next 2 years.

STAKEHOLDER BACKING – GLOBAL

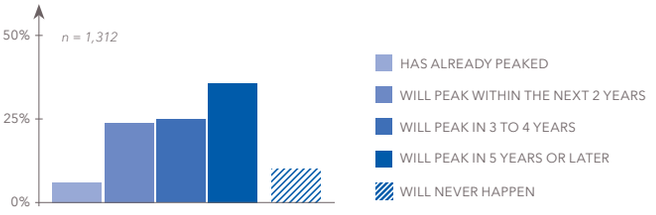
Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.



AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

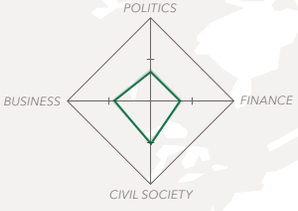
TIMELINESS OF OPPORTUNITY – GLOBAL

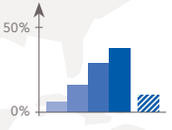
Estimation of when this opportunity will reach full potential – global results.



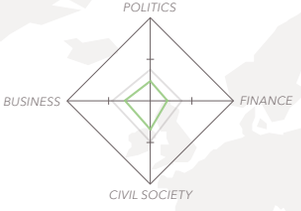
Regional results

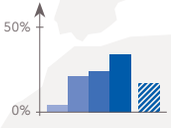
NORTH AMERICA



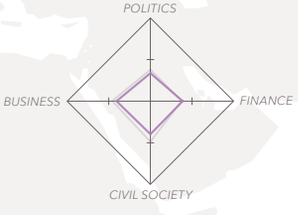


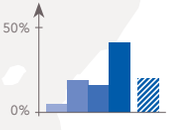
EUROPE



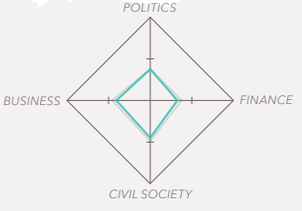


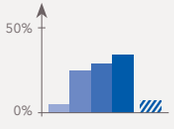
MENA





OTHER ASIA





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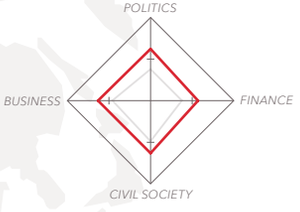

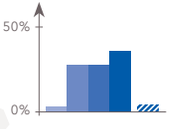

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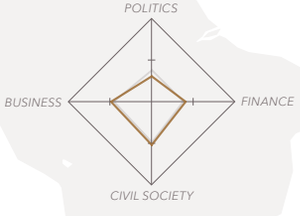
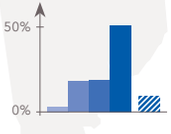
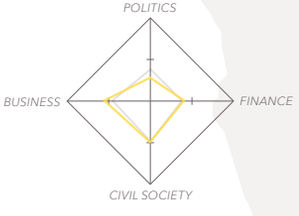
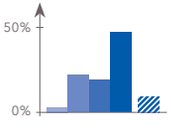


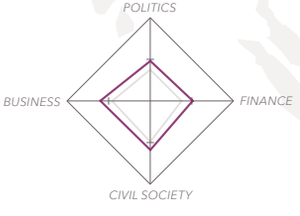


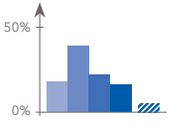
SUB-SAHARAN AFRICA



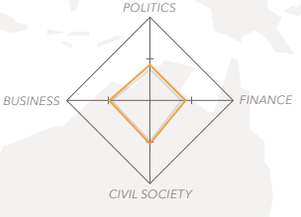


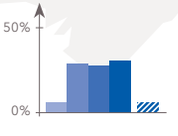
INDIA





SOUTH EAST ASIA & AUSTRALIA





OPPORTUNITY

+ INVESTMENTS IN RESILIENCE

Institutional investors can play an instrumental role in protecting societies against extreme weather by channelling assets towards resilience-building initiatives and infrastructure.

Today, institutional investors in OECD countries alone manage assets worth almost USD 80 trillion. If just a fraction of this volume of capital is directed towards investments in infrastructure resilient to extreme weather, both societies and investors will benefit. Local and national governments will be able to mobilize the vast capital investments required to protect cities and infrastructure from increasingly frequent extreme weather events. At the same time, institutional investors will be able to invest in asset classes with a steady long-term income stream. These assets also have a low association with other asset classes, thus lowering investors' overall risk profile. Investors are also becoming increasingly interested in using the environmental, social and corporate governance profile of companies as a measure by which to evaluate their attractiveness.

The World Bank estimates that just one percent of the assets managed by pension funds today are invested in infrastructure, but it sees great potential to increase this figure. The size of the climate-related bond market has almost tripled since 2005, illustrating that these asset classes are becoming more attractive to investors. However, governments and markets alike can take further action to help mobilize private sector capital for infrastructure resilient to extreme weather. To achieve this, governments can create clear and predictable policy frameworks combined with a transparent pipeline of investable projects.

Public-private partnerships or other innovative joint financing schemes can be used to create attractive investment opportunities with low risk for private investors. For their part, investors can upgrade their capacity to understand and predict the special challenges and risks associated with these investments.

Background

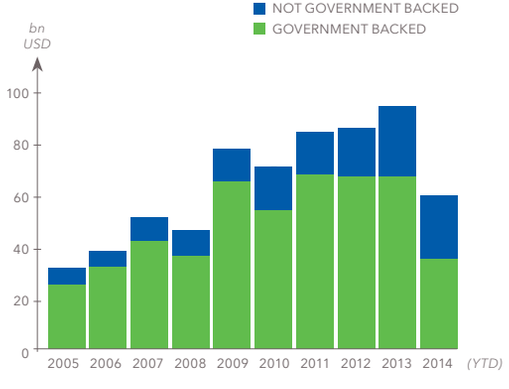
The need for investment in order to create resilience against extreme weather over the coming decades amounts to tens of trillions of USD. Governments globally are not expected to be able to raise these sums by themselves, prompting the need for the private sector to enter the arena of providing capital for extreme weather resilience initiatives and infrastructure.

CLIMATE-RELATED BONDS ON THE RISE

Total issued bonds whose proceeds are primarily used for financing transition to low carbon economy, bn USD.

Source: HSBC/Climate Bonds Initiative, 2014, "Bonds and Climate Change – the State of the Market 2014", p.3

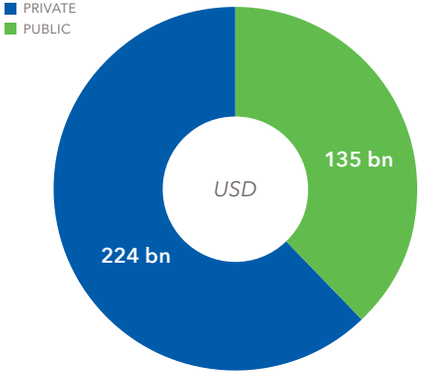
Note: 2014 YTD signals issuance until June 10th this year.



THE PRIVATE SECTOR PLAYS A CRUCIAL ROLE IN CLIMATE FINANCE

More than half of the funds allocated to climate finance in 2012 originated from the private sector. The public sector contributes by providing incentives, technical support, and more.

Source: Climate Policy Initiative. "The Landscape of Climate Finance". Accessed online. 2013.



SOLUTIONS SEIZING THIS OPPORTUNITY:

Finding the Funds to Create Resilience

Green bonds and public/private partnerships are prominent tools in raising the capital needed to protect societies from extreme weather.

Investing in Climate-Friendly Projects

As part of its goal to accelerate climate adaptation, the German KfW Development Bank committed 5.3 bn Euros to climate and environmental protection in 2013.

These investments help to create new and effective technologies in its partner countries. In India, projects have included cyclone protection and early warning systems.

Reaching for Climate Resilience through Public-Private Partnership

The Mayesbrook Climate Change Park is a project worth £1.2 million that transformed an unkempt park into a model green space to help equip the local community against climate change risks, including flooding and higher temperatures.

Environmental services analysis has calculated that the benefits of the project amount to seven times its cost.

Green Bond Proceeds for Extreme Weather Adaptation

The World Bank is seeking to attract private sector and institutional investors to climate adaptation. It has already mobilized more than 5.3 bn USD through 61 green bond transactions that provide investors with high-quality credit, fixed-income investment opportunities.

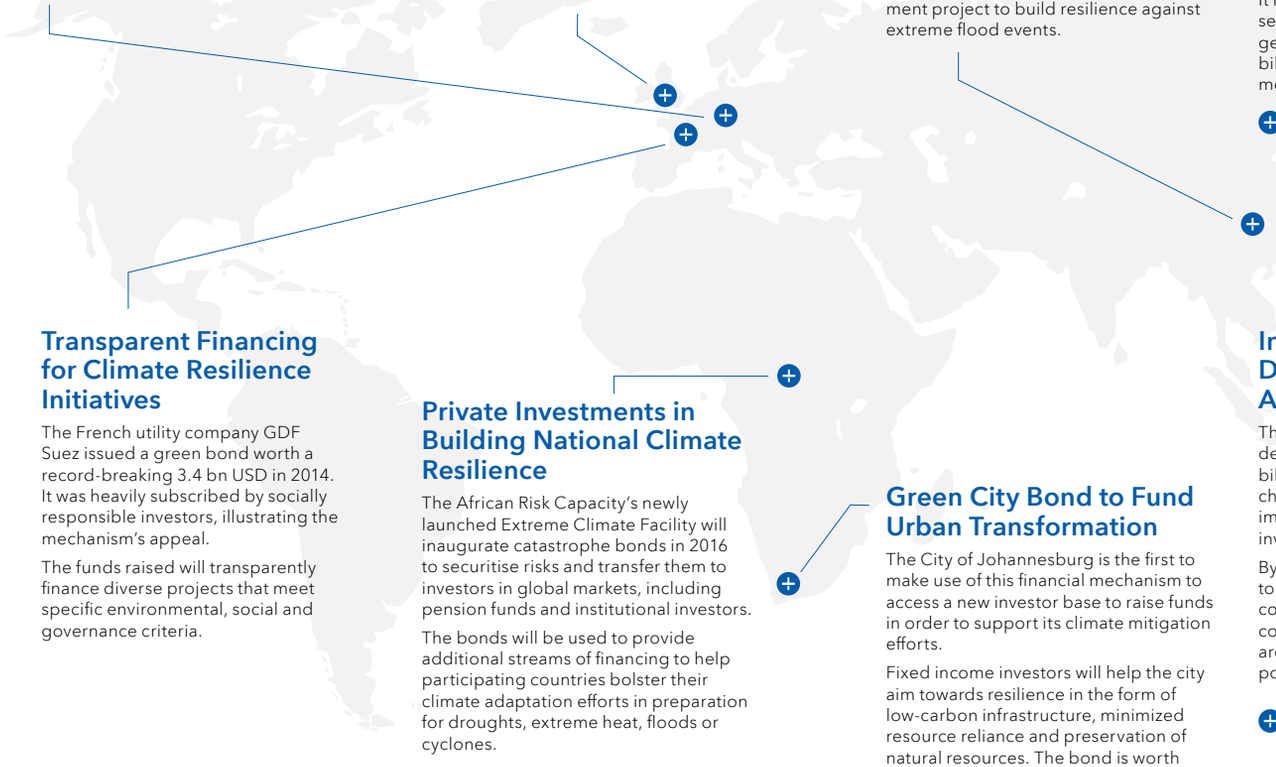
In China, for example, proceeds from these bonds have been used to fund the Xining Flood and Watershed Management project to build resilience against extreme flood events.

Fuelling Climate Finance Innovation

The Global Innovation Lab for Climate Finance is founded on the principle that well-designed financial instruments and public support that reduces private investors' risk while improving returns could be a powerful tool for catalysing climate adaptation and mitigation in developing countries.

It has set out to design and pilot a new set of climate finance instruments to generate solutions. It aims to unlock billions of dollars in new climate investments.

Developing Countries



Transparent Financing for Climate Resilience Initiatives

The French utility company GDF Suez issued a green bond worth a record-breaking 3.4 bn USD in 2014. It was heavily subscribed by socially responsible investors, illustrating the mechanism's appeal.

The funds raised will transparently finance diverse projects that meet specific environmental, social and governance criteria.

Private Investments in Building National Climate Resilience

The African Risk Capacity's newly launched Extreme Climate Facility will inaugurate catastrophe bonds in 2016 to securitise risks and transfer them to investors in global markets, including pension funds and institutional investors.

The bonds will be used to provide additional streams of financing to help participating countries bolster their climate adaptation efforts in preparation for droughts, extreme heat, floods or cyclones.

Green City Bond to Fund Urban Transformation

The City of Johannesburg is the first to make use of this financial mechanism to access a new investor base to raise funds in order to support its climate mitigation efforts.

Fixed income investors will help the city aim towards resilience in the form of low-carbon infrastructure, minimized resource reliance and preservation of natural resources. The bond is worth approximately 143 million USD.

Informing Investment Decisions for Climate Adaptation

The Notre Dame Global Adaptation Index ranks nations based on their vulnerability and readiness to cope with climate change. It focuses on sectors that can be improved by public and private sector investment.

By making this data visible to all, it aims to facilitate investments in vulnerable communities, especially in developing countries. This directs funds towards areas where they can create the most positive impacts.

Global

CO-BENEFITS

INCREASED COMPETITIVENESS OF RESILIENT SOLUTIONS

By creating bigger markets for resilient solutions, institutional investors can help them achieve scale and become more competitive.

GREATER RESILIENCE TO EXTREME WEATHER

Tens of millions of people who today live in conditions vulnerable to extreme weather could lead safer and more productive lives if the funding gap for infrastructure were bridged.

PUBLIC FUND FLEXIBILITY

Putting more institutional investor capital into proven resilience measures can free up public funds for gap funding of innovative new solutions.

NEW BUSINESS OPPORTUNITIES

A study of how the companies in Standard & Poor's Global 100 index (S&P Global 100) react to the risks from global warming indicates that many of these companies perceive new business opportunities arising from handling extreme weather.

DIVERSIFIED INVESTMENT PORTFOLIOS

Investing in extreme weather resilience can open new asset classes to institutional investors with weak correlation to other assets, thus giving them a lower overall risk profile.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- **Early Warning and Forecasting Services**
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- **Cost-Effective Adaptation**
- **Investments in Resilience**

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

The Least Favorable Opportunity

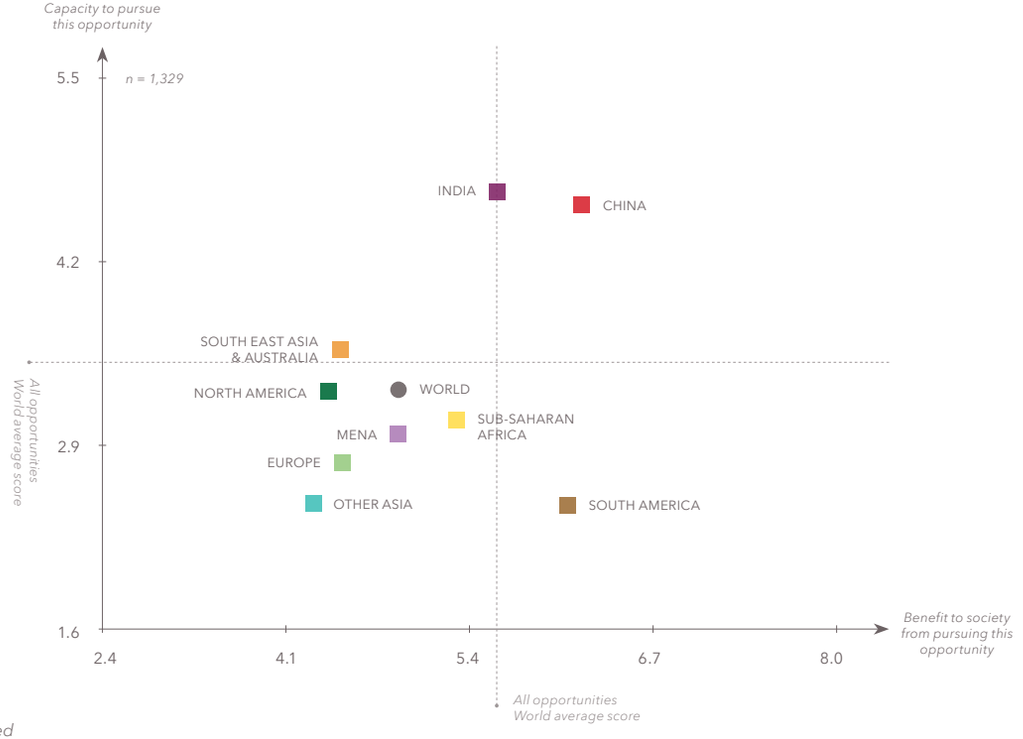
Several of the solutions related to the opportunity **Investments in Resilience** are based on public-private partnerships or other forms of public-private co-financing. As such, the survey results from both the governmental and finance sectors are of special interest. However, respondents from these sectors assess this opportunity as the least favourable opportunity when assessed for its potential benefits for society. This reflects a generally less favorable reception of this opportunity by survey respondents. In the overall results for all geographic regions, it is seen as the least preferred opportunity.

In Europe and Sub-Saharan Africa it does get the best assessment of the three opportunities related to the risk of extreme weather risk. However the skepticism towards it is still strong even in these regions. When asked when this opportunity will reach its full potential, one third of all respondents in Europe believe this opportunity "will never happen".

Respondents in the finance and service sectors place this opportunity in the midrange when looking at its benefits to their businesses, while it is placed below average in other sectors.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

Best in High-risk Areas

Respondents in regions with a high vulnerability to extreme weather, such as China, India and South East Asia, see strongest stakeholder backing for this opportunity.

The Extreme Weather Choice in Europe and Sub-Saharan Africa

Even as the opportunity is perceived to be the least favorable overall respondents in Europe and Sub-Saharan Africa place this opportunity as their top choice for addressing extreme weather.

Least Preferred for Business

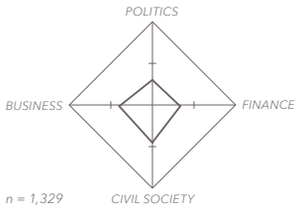
When assessed for benefits to business and capacity to inspire new business ventures, this opportunity is seen as the least favorable.

Better Half for Service Sector

Respondents from the service sector have assessed this opportunity to be in the top half of all opportunities.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

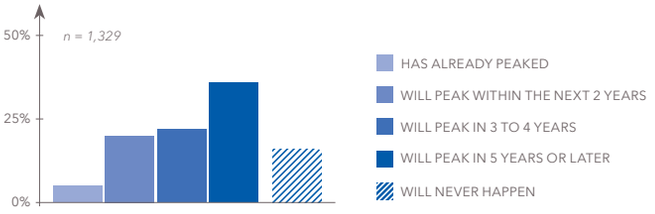


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

3.7

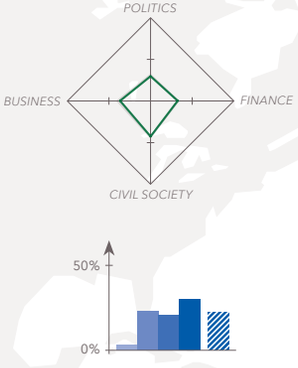
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

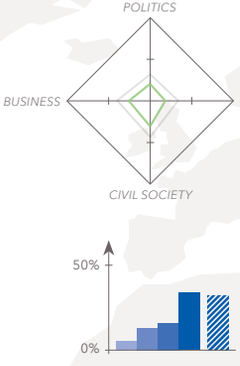


Regional results

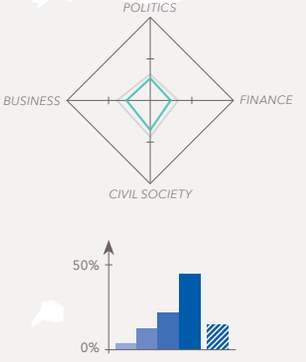
NORTH AMERICA



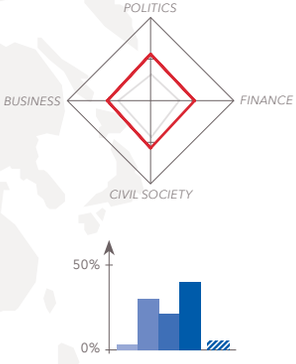
EUROPE



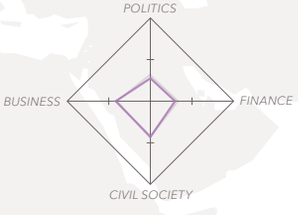
OTHER ASIA



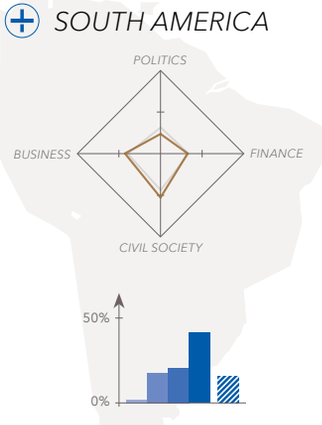
CHINA



MENA



SOUTH AMERICA



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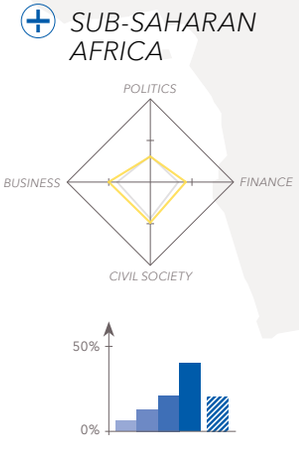
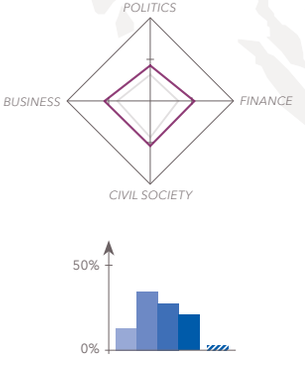
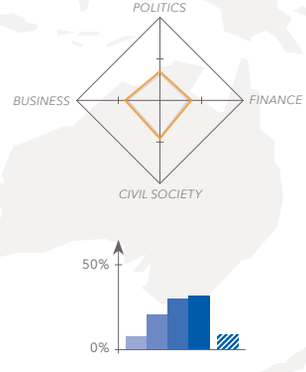


INDIA



SOUTH EAST ASIA & AUSTRALIA



OPPORTUNITY

+ COST-EFFECTIVE ADAPTATION

The necessary expenditure on climate adaptation can be turned into pioneering projects creating a more sustainable future.

Addressing extreme weather need not be costly. In fact, adopting sustainability measures in order to build resilience against extreme weather can generate a variety of co-benefits for a small additional cost. Relevant initiatives range from investments in public transport and renewable energy generation to creating city parks or developing coastal wetlands, which will also protect freshwater resources. What ties all of these components together is the wealth of potential benefits that can result from them, including more attractive cityscapes, increased biodiversity, and reduced public health expenses.

A recent study estimated that between now and 2030, investments in urban, energy, and land use systems will amount to 90 trillion USD. Adding just 0.5 percent to this figure could turn this expense into an agent of active change towards a more efficient and sustainable economy. Moreover, the extra cost can often be offset by the energy savings and other benefits that result from putting societies on a more sustainable trajectory. An example is redirecting traffic from the city center to create more green areas. This will help the city cope with extreme downpours or floods while at the same time create health benefits by lowering air pollution.

These initiatives often lead to immediately felt positive impacts on the people affected. Ultimately, adopting an investment strategy for extreme weather adaptation that prioritizes cost-effective initiatives with a mitigation aspect could yield rapidly felt co-benefits. This can also build both public and political support for investing in sustainability in the long run.

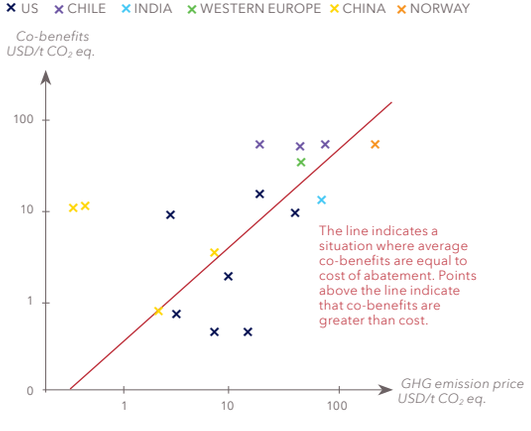
Background

In the coming 15 years, it is estimated that investment in urban, energy and land use systems will amount to the staggering sum of 90 trillion USD. Many of these investments will be inevitable due to the need to protect cities and vital infrastructure against extreme weather. For a relatively modest additional cost of around 270 bn USD a year, these necessary investments can simultaneously support the transition to a more sustainable society. Much of the cost will be offset by subsequent savings in energy or other efficiencies that they can trigger. However, there is also the possibility that these upcoming investments will contribute to locking societies into unsustainable pathways.

CO-BENEFITS CAN PAY FOR MITIGATION OF CLIMATE CHANGE

Review of existing regional estimates of co-benefits in 2010 at different GHG emission prices.

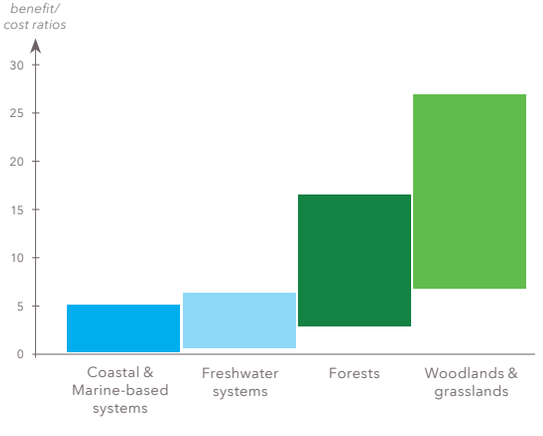
Source: Bollen, J. et al. (2009), "Co-Benefits of Climate Change Mitigation Policies: Literature Review and New Results", OECD Economics Department Working Papers, No. 693, OECD Publishing.



PROMISING RETURN ON INVESTMENTS

Cost benefit analyses of investments in ecological system restoration suggest high benefit-cost ratios across a range of areas.

Source: Global Restoration Network, 2011, "Investing in Our Ecological Infrastructure"



SOLUTIONS SEIZING THIS OPPORTUNITY:

Creating Liveable Communities

Collaborating with local communities plays a significant role in many of the solutions related to this opportunity.

Street Trees Reduce Runoff

Trees planted alongside streets, especially when combined with smaller vegetation, can reduce runoff by absorbing rainwater, consequently lowering water levels during heavy rainfall.

In Lisbon, Portugal, the combined benefits associated with street trees (including cleaner air, energy savings, increased property values, and CO_2 reduction) amount to 4.48 USD per 1 USD invested.

Green Roofs and Small Parks

Laying out small parks and constructing green roofs is a relatively cheap solution for creating greater retention of rain water during heavy downpours.

In the district of Delfshaven the largest green roof in Europe will be constructed on top of a new business centre. The green roofs and 'pocket parks' help to keep the city cool.

Climate-Resilient Neighbourhood

In the Klimakvarter (climate neighborhood), located in Copenhagen's Østerbro district, planners want to prepare the city for heavy rains with green solutions at street level. The approach is to view rainwater as a positive – and visible – element of the city.

By retaining rainwater above ground in green reservoirs, swales and storage tanks, rainwater becomes an active part of a neighbourhood's urban identity and residents' lives.

Afforestation Combining Adaptation and Mitigation

Forests contribute to climate change adaptation and mitigation simultaneously by sequestrating carbon, acting as a barrier against gusts and storm surges, and protecting communities in areas prone to extreme weather.

Forestry plays a significant role in Bangladesh, where it is a cost-effective method of dissipating wave energy, lowering the risk of landslides, and reducing floods on embankments. This is why The Bangladesh Climate Change Resilience Fund allocated 35 million USD to afforest or reforest areas exposed to cyclones, storm surges, and landslides.

Rebuild by design

As a response to the damages hurricane Sandy caused in New York, a flood protection system around Manhattan will be constructed. The proposed system from architects BIG not only shields the city against floods and storm water, it also provides social and environmental benefits.

It is designed with different compartments. Each comprises a physically separate flood protection zone and is designed in close consultation with the associated communities to accommodate local needs.

Regreening Africa

The African Regreening Initiatives work with local partners in several parts of Africa.

Agroforestry – planting trees in vulnerable croplands – increases resilience to extreme weather and generates extra benefits from increased yields, recharge of groundwater, providing fodder and firewood, and storing carbon.

It is a cost-effective and "climate-smart" way to intensify and diversify agriculture.

Ecosystem-Based Risk Reduction

An ecosystem-based approach to flood risk reduction recognises the value of natural flows and floods and ensures that ecosystem management and restoration measures are employed alongside human engineered risk reduction interventions.

By restoring wetlands as natural infrastructure, the Chilika Development Authority in India has secured livelihoods of 200,000 fishermen and 40,000 farmers in Lake Chilika basin.

Wetlands for Stormwater Management

The Australian city of Salisbury developed 250 hectares of low-lying saline land into storm water detention basins and wetland habitat – simultaneously conserving natural resources and contributing to climate adaptation.

Wetlands harvest and purify stormwater runoff, which is considered a resource for agriculture and industry. This improves natural habitats for local flora and fauna, and creates opportunities for recreation and environmental education.

CO-BENEFITS

JOBS AND GROWTH

Programs to restore and protect natural infrastructure have created new jobs both directly and indirectly e.g. as a result of better protection against mudslides or increased soil quality, raising yields from agriculture.

ENERGY AND GREENHOUSE GAS SAVINGS

The few life cycle analyses that have been carried out on ecological infrastructure projects suggest that they are a sustainable alternative to conventional manmade infrastructure, especially when considering energy consumption and greenhouse gas emissions.

RECREATIONAL VALUE

Investing in, for example, parks and trees in cities not only helps to manage heat waves and heavy downpours but also generates a proven effect on the populations' well-being and health. Increases in property value have also been shown.

PROTECTION OF VULNERABLE POPULATIONS

Better protection against extreme weather can save lives. In many parts of the world, the poorest and most exposed population groups are especially vulnerable to extreme weather because they live in low-lying coastal areas or in places exposed to mudslides. They also have little access to basic services and infrastructure.

REDUCED RUNOFF AND CONTAMINATION OF FRESH WATER

Ecological infrastructure like wetlands often have the capacity to absorb or process nutrients or other substances that can pollute marine areas. Greater resilience to extreme weather can also prevent local pollution e.g. contaminating freshwater sources.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- **Early Warning and Forecasting Services**
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- **Cost-Effective Adaptation**
- **Investments in Resilience**

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

A Dividing Opportunity

The opportunity **Cost-Effective Adaptation** sees great variance in rating among geographic regions. In India, respondents place it as the second most favorably rated opportunity (but very close to number one) when assessing its potential for positive impact on society. However in Sub-Saharan Africa and Other Asia it is rated as the least favourable on this scale and it is also very close to the low end of the scale in China.

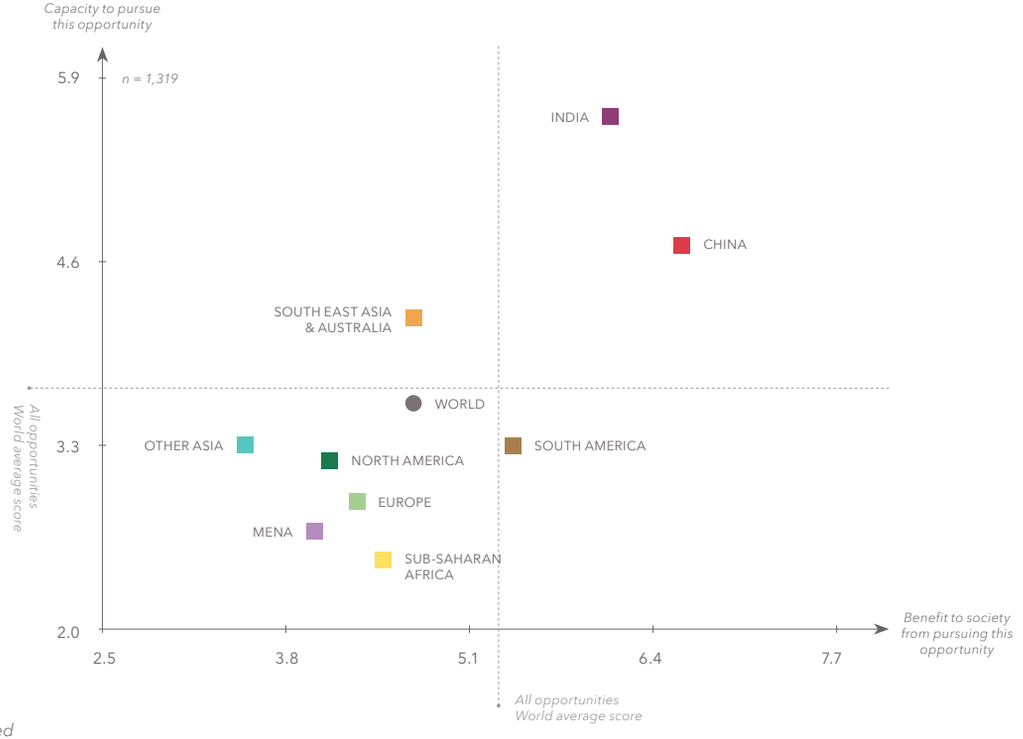
Respondents place the greatest confidence in this opportunity's potential in lower-middle-income economies. Mirroring its performance between regions, it is one of the opportunities with the greatest divergence in rating between economies. It gets the most positive responses from respondents in the lower-middle-income economies and weaker backing in upper-middle and high-income economies.

Respondents see civil society stakeholders as the most supportive stakeholder group for this opportunity, while stakeholders in politics are seen as the least supportive.

Assessed on its impact on business, respondents from most sectors place it in the mid-range of opportunity. The exception is the "other business" sector, where respondents see this opportunity as the least favorable for business.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

An Opportunity for the Future

A majority of all respondents believe this opportunity will reach full potential in 5 years or later.

Strong Backing in Lower-Middle-Income Economies

More than 40 percent of respondents in lower-middle-income economies believe there are great benefits for society and the capacity in place for pursuing this opportunity.

Very Divergent Ratings

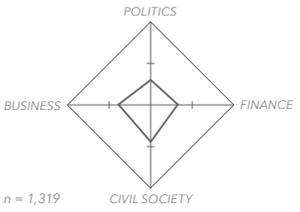
This opportunity is seen as the best for society by respondents in India, but is less well received in Sub-Saharan Africa and Other Asia, where it is perceived as the least favorable of all.

Equal Backing from Both Genders

As one of the only opportunities, both women and men have assessed Cost-Effective Adaptation equally, in the lower range for males and as the least favored opportunity for females.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

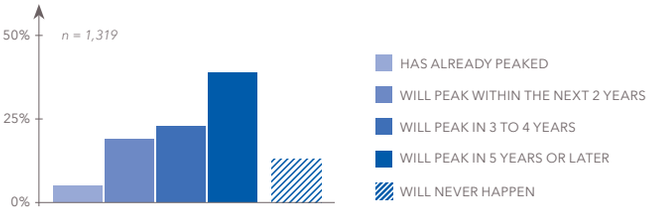


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

3.6

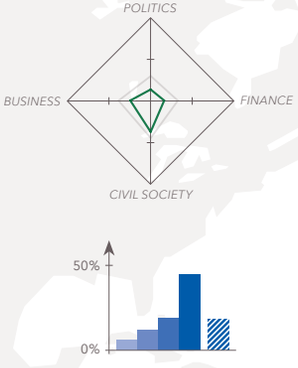
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

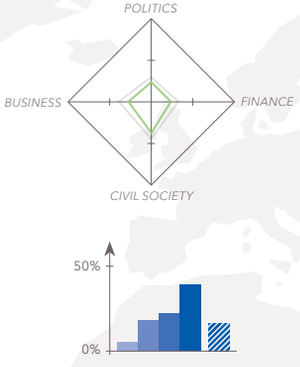


Regional results

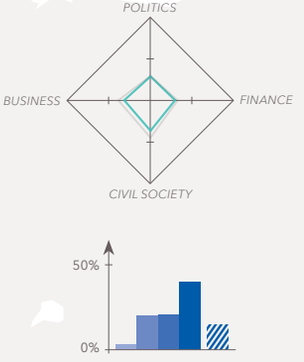
NORTH AMERICA



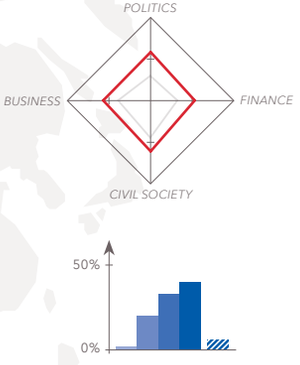
EUROPE



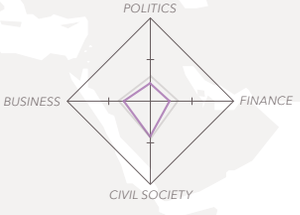
OTHER ASIA



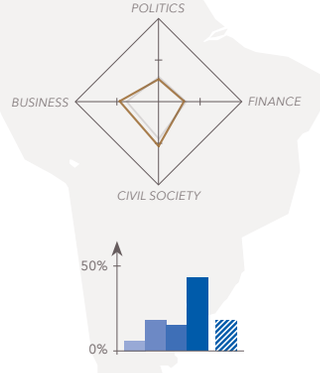
CHINA



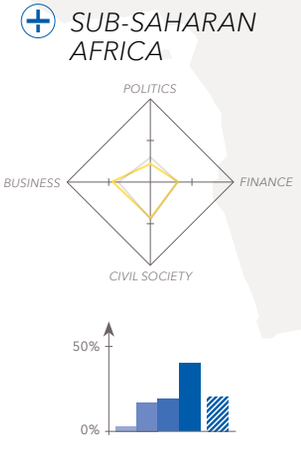
MENA



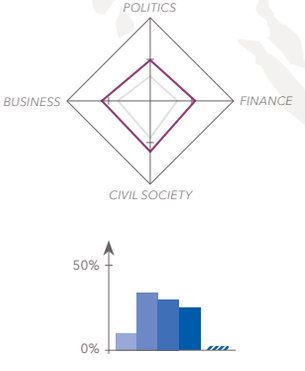
SOUTH AMERICA



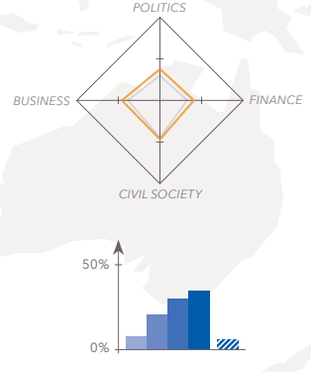
SUB-SAHARAN AFRICA



INDIA



SOUTH EAST ASIA & AUSTRALIA



MORE OPPORTUNITIES

This report presents 15 opportunities based on the insights gathered at eight workshops – Opportunity Panels – conducted on five continents with more then 200 experts and sustainability professionals. However, one report cannot do justice to all the great ideas generated, and by no means do we claim these to be the only opportunities out there. To round off this section of opportunities, we briefly present five additional opportunities inspired by the work with the report.

PUBLIC AWARENESS AND ENGAGEMENT

Current extreme weather events, heavily reported on, have the capacity to make abstract climate change warnings concrete. As such, they can generate stronger awareness and better-informed public debate about climate change and associated costs, if utilized appropriately by the media and other stakeholders.

EXTREME WEATHER INSTITUTE

Countries around the world have developed methods of mitigating and adapting to the threats of extreme weather. Establishing an accessible and centralized global repository of best practices would facilitate knowledge-sharing and collaboration across borders.

ECOLOGICAL INFRASTRUCTURE

Natural systems such as wetlands and mangroves can provide cost-effective solutions to many extreme weather challenges. Ecological infrastructure refers to the use of such natural systems to provide, for example, coastal protection, and heavy downpour or meltwater management, while creating substantial environmental co-benefits.

NATURAL SERVICE MONETIZATION

Monetizing natural services in order to include their value among other assets would be a very strong political and cognitive tool. Indeed, protecting natural services is often cheaper than replacing them. Stopping or reversing the current damage can prove a very profitable investment, with great potential for building extreme weather resilience.

RESILIENT COMMUNICATIONS SYSTEMS

When an extreme weather event hits, damage to communication systems hinders the recovery process. Strengthening these systems can lower this impact and service other critical systems such as healthcare, emergency relief and rebuilding efforts, enabling societies at risk of extreme weather to withstand and recover from disaster more rapidly.

YOUR NOTES:

HOW WILL YOU BRIEF YOUR CHAIRMAN ON THE **NEW OPPORTUNITIES**?

RISK 2

LACK OF FRESH WATER

The right to “sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses” is protected under international human rights law. While lack of fresh water threatens health and social cohesion, it also poses risks to food and energy security.

LACK OF FRESH WATER

Though access to water is protected under international human rights law, lack of fresh water threatens health and social cohesion, and also poses risks to food and energy security.

Demographic pressures, the rate of economic development, climate change, urbanization and pollution are all putting unprecedented pressure on the world's freshwater resources. Worldwide, an estimated 768 million people remain without access to an improved source of water. Some estimates, however, put the number of people whose right to fresh water is not met as being high as 3.5 billion – while 2.5 billion remain without access to improved sanitation. At the current rate of investment, 1 billion people will not benefit from the Millennium Development Goal (MDG) of halving the number of people without proper access to fresh water and sanitation.

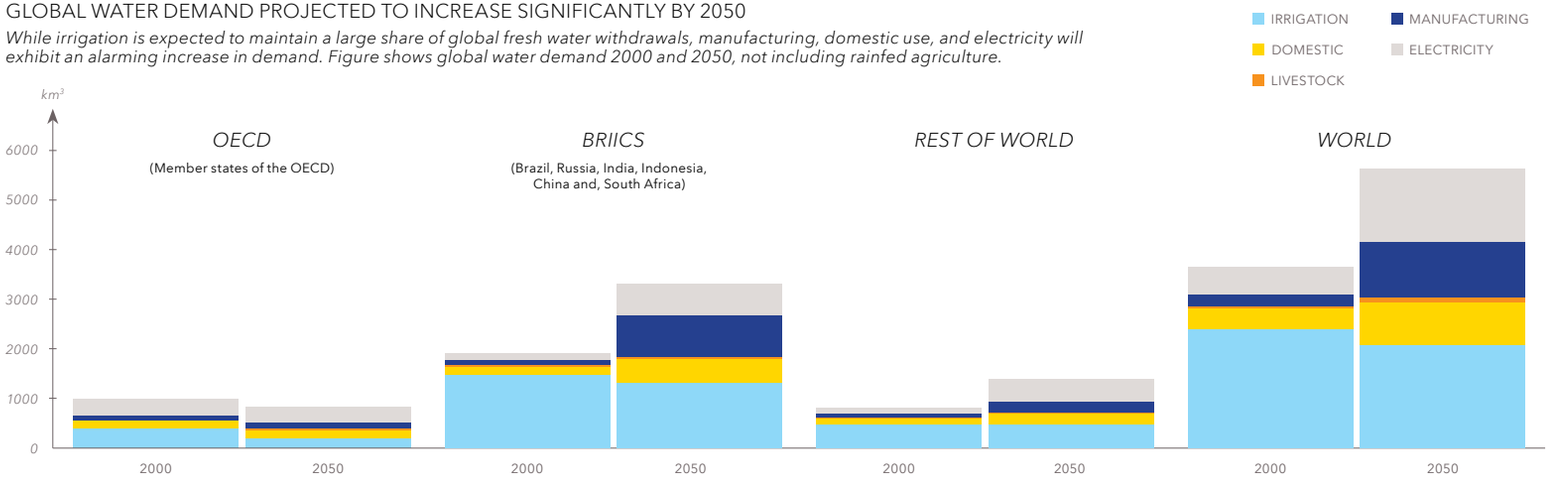
The demand for water is growing and is projected to overshoot supply by 40 percent in 20 years' time. There is already extensive local and regional water stress. Several factors add to this:

- Urbanization will make more people dependent upon often scarce local water resources, especially in developing countries.
- Climate change affects the water supply in several regions.
- Poor sanitation and water management lead to extensive water waste and pollution.
- Water use is deeply intertwined with agriculture and energy (the food-energy-water nexus) sharing a range of linked vulnerabilities.
- Pollution from agriculture, industry, extraction and urban areas threatens groundwater and freshwater sources such as lakes and rivers, resulting losses to ecosystem services.

When people lack access to water, either large amounts of their disposable income have to be spent on purchasing it from vendors or large amounts of time, in particular that of women and children, have to be devoted to collecting it. This erodes the capacity of the poor to engage in other productive activities.

GLOBAL WATER DEMAND PROJECTED TO INCREASE SIGNIFICANTLY BY 2050

While irrigation is expected to maintain a large share of global fresh water withdrawals, manufacturing, domestic use, and electricity will exhibit an alarming increase in demand. Figure shows global water demand 2000 and 2050, not including rainfed agriculture.



Source: WBCSD. 'Facts and Trends – Water'. Report. 2005.

FACTS AND FIGURES

Global water demand (in terms of withdrawals) is projected to increase by 55 percent by 2050, mainly because of growing demands from manufacturing (400 percent), thermal electricity generation (140 percent) and domestic use (130 percent).

Of the estimated 1,400 million cubic km of water in the world, only 0.003 percent, about 45,000 cubic km, is termed freshwater resources. This category covers water that theoretically can be used for drinking, hygiene, agriculture and industry. However, not all of it is accessible.

IMPACTS

Nearly ten percent of watersheds in the USA are overexploited. For nearly half the country, water stress is projected to worsen by the middle of the century because of climate change.

In India, more than 70 percent of annual rainfall occurs during three months of the year; most of it floods out to sea. Farmers who lack irrigation must contend with water scarcity throughout much of the year.

When water from the Aral Sea was withdrawn to irrigate cotton, the annual flow was reduced by almost 85 percent Consequently, sea level fell by 16 meters between 1981 and 1990. Fish catch, which totaled 44,000 tonnes a year in 1950, vanished. Toxic dust-salt from the dry seabed was deposited on the surrounding farmland, killing crops.

Fish and wildlife die when they do not have access to water. Freshwater habitats host disproportionately high levels of biodiversity and in some regions 50 percent of freshwater fish species are already threatened or endangered.

Water Resources are Already Scarce in Many Regions

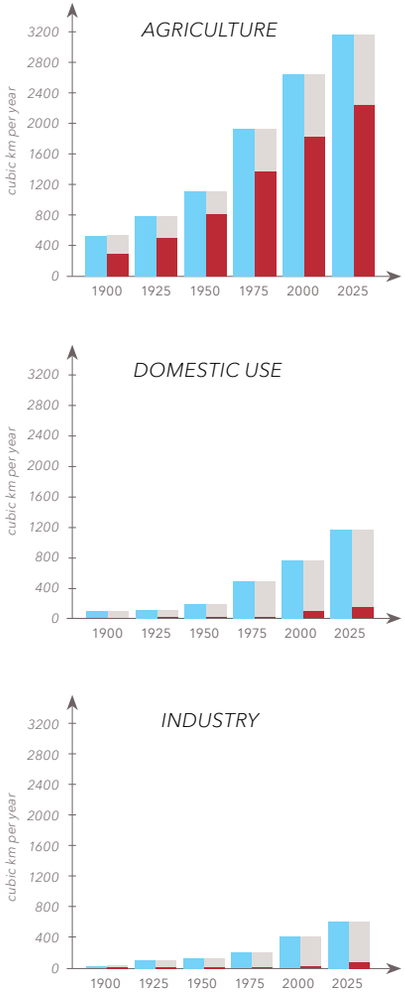
Areas of physical and economic water scarcity

AGRICULTURE LAGS BEHIND ON EFFICIENCY GAINS

The amount of water extracted and consumed 1900–2025

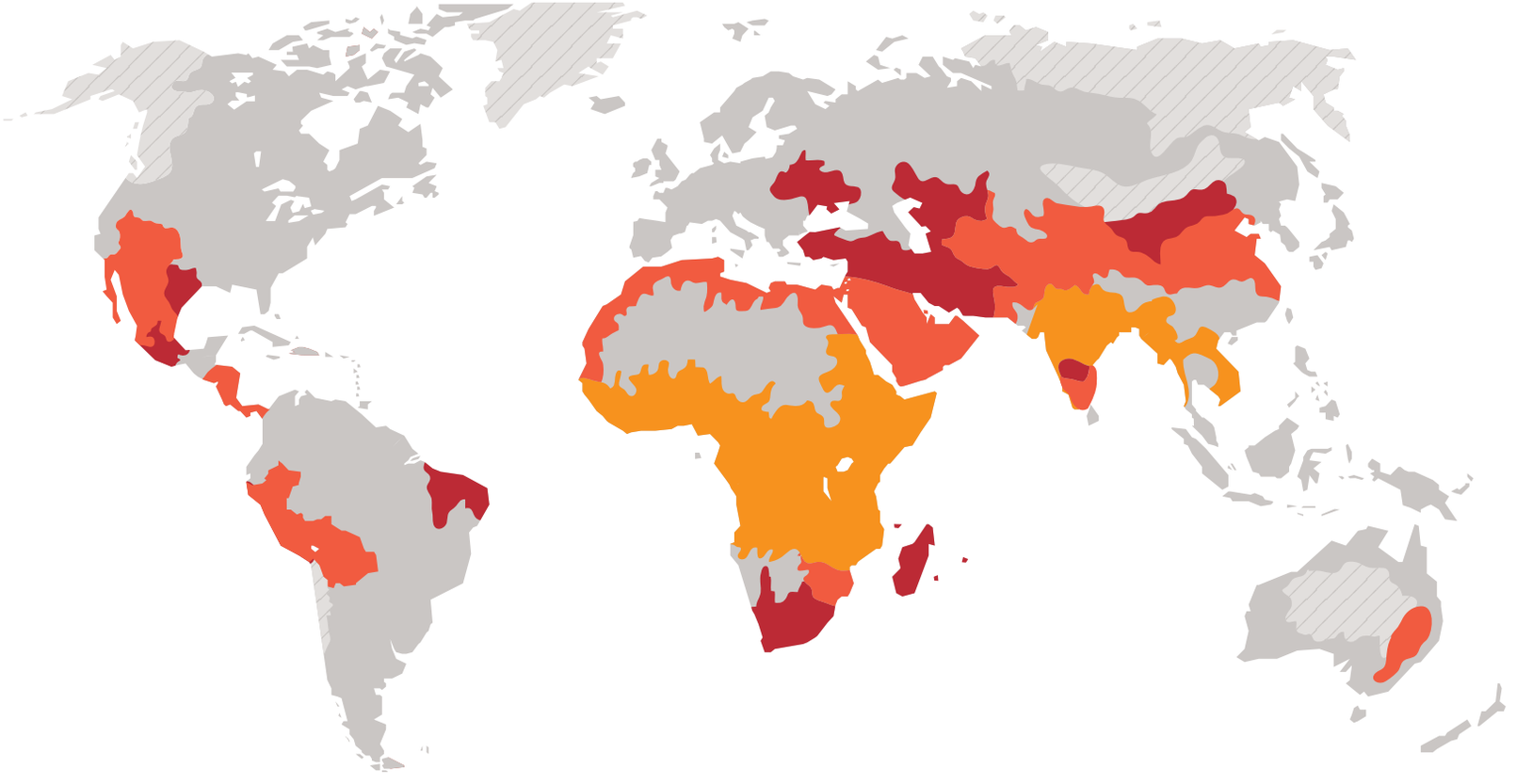
The grey area marks the amount of water that can be reused or reintroduced into waterways after use. Agriculture accounts for the greatest consumption.

- EXTRACTION
- CONSUMPTION
- REINTRODUCED



- PHYSICAL WATER SCARCITY: Use of water resources is approaching or has exceeded sustainable limits. More than 75 percent withdrawn.
- APPROACHING PHYSICAL WATER SCARCITY: More than 60 percent of river flows have been withdrawn. These basins will experience physical water scarcity in the near future.
- ECONOMIC WATER SCARCITY: Human, institutional, and financial capital limit access to water even through water is available to meet human demands. Less than 25 percent of water from rivers withdrawn, but lack of fresh water exists.
- LITTLE OR NO WATER SCARCITY: Abundant water resources relative to use, with less than 25 percent of water from rivers withdrawn for human purposes.
- NO DATA

* Since the data presented below was collected, additional regions have begun experiencing higher levels of water scarcity.



Source: Figure Left – Philippe Rekacewicz, UNEP/GRID-Arendal, Online: grida.no/graphicslib/detail/trends-and-forecasts-in-water-use-by-sector_f884 Accessed 15/08/14.
Map – Molden, D. 'Comprehensive Assessment of Water Management in Agriculture'. London. International Water Management Institute Report. 2007.

OPPORTUNITIES

MEETING THE NEEDS OF ALL

In addition to ensuring reliable supply, using freshwater resources more efficiently comes with great cost savings, enhanced drought resilience, and many other benefits. These opportunities take into account the growing competition from the agriculture, household, industry and energy sectors.

WATER-EFFICIENT AGRICULTURE

Adopting efficient irrigation technology, traditional water management techniques, and effective rainwater harvesting methods has the potential to greatly reduce fresh water extraction for agriculture and significantly increase crop yields.

FRESH WATER PRODUCTION

Increasingly energy-efficient production of fresh water will be an important contributor to meeting the growing demand for water in arid parts of the world. Reusing water through wastewater treatment or desalination of seawater are already available and new technologies are positioned to further develop the capacity to produce fresh water.

SMART WATER REGULATION

Managing freshwater resources and consumption wisely can dramatically reduce the withdrawal of water in many contexts. Clever pricing mechanisms as well as measuring, monitoring and labelling water usage are prominent tools that can also act to attract more investments in water infrastructure.

OPPORTUNITY

+ WATER-EFFICIENT AGRICULTURE

Agriculture is by far the greatest consumer of fresh water, but it does not have to be wasteful. Traditional approaches and modern technology can be combined to create agriculture that withdraws less water and produces more crops.

Making use of traditional water management techniques along with modern irrigation technology can dramatically reduce the amount of fresh water used in agriculture. This would also ease the pressure on freshwater sources, leaving more for domestic and industrial uses while increasing crop yields at the same time.

Although 80 percent of agriculture (making up about 58 percent of the global food basket) is already rainfed, available rainwater can be harvested, stored, and used much more efficiently. It is estimated that improved rainwater management techniques can multiply crop yields by a factor of 2 to 4 in parts of Africa and Asia. More efficient rainwater use can often be achieved by introducing or readopting traditional methods of water retention and rain harvesting that require low capital expenditure.

In areas where irrigation is needed, efficient technologies such as drip irrigation can reduce water consumption by 30 to 70 percent and improve yields by 30 to 200 percent for various crops. Soil monitoring and irrigation scheduling are also helpful techniques in this arena. In addition, more efficient water management in agriculture, including improved watershed management, can considerably reduce soil degradation by minimizing runoff that washes out nutrients.

Collaborating with famers and spreading awareness about water management is vital, and governments can also provide the conditions necessary for improving efficiency in water usage by effectively coordinating the sectors competing for the resource.

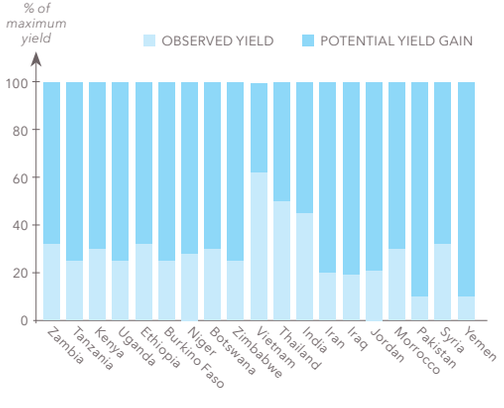
Background

With the world population expected to reach nine billion by 2050, estimates project that cereal production will need to increase by 70 to 100 percent in the next 25 to 30 years to meet the growing demand. Approximately 45 percent of food production originates from areas without any water management systems and agriculture already accounts for 70 percent of total water withdrawals worldwide. Increasing water productivity in agriculture will be vital to securing food supplies in the future. The sector is also the least adept at reusing and reintroducing water.

RAINFED YIELDS CAN BE MULTIPLIED BY A FACTOR OF 3 TO 4

Observed yield gap (for major grains) between farmers' yields and achievable yields in rainfed agriculture in selected countries -100% denotes achievable yield level.

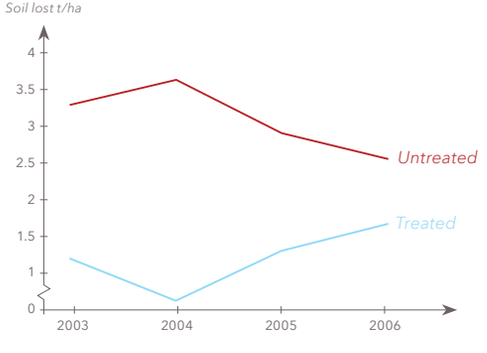
Source: CAB International, 2009, "Rainfed agriculture: unlocking the potential" edited by Suhas P. Wani, Johan Rockström, and Theib Oweis



INTEGRATED WATER MANAGEMENT REDUCES SOIL EROSION

Effect on soil erosion of integrated water management (IWM). IWM builds both the physical and the societal structures needed to better harvest and use water. Data from Adarsha watershed,India. Comparison of treated (with IWM) with untreated areas.

Source: CAB International, 2009, "Rainfed agriculture: unlocking the potential" edited by Suhas P. Wani, Johan Rockström, and Theib Oweis



SOLUTIONS SEIZING THIS OPPORTUNITY:

Feeding More With Less Water

New watersaving technologies are developed in high-income economies, but making water-efficient agriculture accessible to small farmers is crucial to revolutionizing agriculture in low-income economies.

Innovative Soil Polymer for Water Savings

BountiGel by mOasis is a non-toxic soil additive that decreases the stress on plants. It can reduce overall water use by 25 percent while eliminating 15 percent of water-related energy utility expenditure. As a result, a grower of suitable crops can generate more income per acre.

Data-Driven Irrigation

The Dacom TerraSen Station is a solar-powered device that collects data regarding current soil moisture conditions, soil temperature, rainfall, and irrigation at several depths.

The information is then automatically transmitted to farmers, who receive relevant irrigation advice for all their crops.

Low-Tech Gravity-Powered Irrigation

Netafim cost-effectively increases smallholder farmers' water efficiency while improving yields and crop quality.

A gravity-based drip irrigation system delivers precise quantities of water and nutrients directly to crop root zones, eliminating excessive water consumption.

Planting Technology for Deserts

Using only a one-time dose of 15 liters of water, the Groasis Waterboxx can achieve a crop survival rate of over 90 percent in the most water-scarce environments. The box prevents water from evaporating and collects rain and condensation from its surroundings, releasing only 50 ml each day.

Reclaiming Wastewater for Irrigation

Prompted by the need to protect a lake and natural reserve from municipal wastewater discharges, the City of Orlando and Orange County launched the Conserv II initiative to upgrade treatment systems for groundwater recharge and wastewater reclamation.

This project reclaims 58,000,000m3 of water annually, 60 percent of which is used for irrigation.

Aerial Imaging to Improve Water Use

The OverView service by TerrAvion provides farmers with weekly aerial images of their land using specialized cameras capable of capturing thermal and infrared views of crops that can be accessed online.

The information can be used to guide decisions regarding irrigation by revealing which areas are receiving too much or too little water.

Effective Rainwater Harvesting

In the Machakos District of Kenya, rainwater harvesting techniques for supplemental irrigation achieved increased crop yields of 20 percent, crop diversification for lowering risk, and better nutrition along with higher family incomes, according to UNEP.

The project was orchestrated by community groups comprised largely of local women.

Affordable Sprinkle Irrigation System

iDE's sprinkle irrigation technology is appropriate for use by smallholder farmers where water supply is seasonal or scarce.

It drastically reduces costs relative to alternatives, and is also very water efficient, increases farmer incomes, and creates a return on investment in less than one year.

CO-BENEFITS

PROTECTION AGAINST MUDSLIDES

Better water retention can reduce risk of mudslides and floods downstream because of slow release to downstream channels or storm sewers.

REDUCED RUNOFF

Using water-efficient techniques reduces excess runoff from agricultural lands that often contain pesticides, fertilizers, and other substances, thereby reducing oxygen depletion and other negative impacts.

POVERTY ALLEVIATION

Investments in efficient irrigation can alleviate poverty by stimulating the rural economy. Greater food production can also keep food prices down despite growing demand.

GENDER EQUALITY

Reducing competition for water in agriculture can reduce gender disparities. Women typically experience 20 to 40 percent lower yields partly due to their not geting equal access to water resources. Ensuring available water supplies are able to serve all competing local smallholders equally can help to combat this disparity.

DROUGHT RESILIENCE

By requiring less water, farms will be more able to cope by continuing to produce during times of drought.

ECOSYSTEM RECOVERY

Improved land stewardship can provide habitat value for many species, reducing farmers' losses to pests, providing windbreaks, and potentially offering regulatory relief.

Opportunities ranked by positive impact on society

- **Water-Efficient Agriculture**
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

The "Best for Society" Opportunity

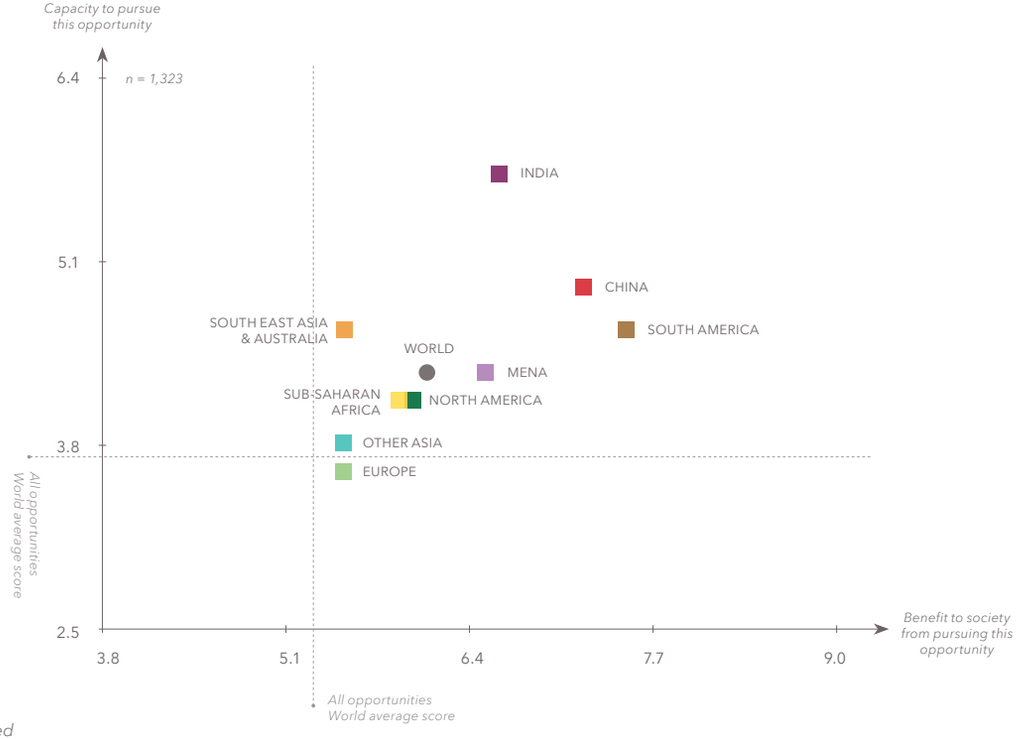
Water-Efficient Agriculture is the most favorably rated of all opportunities, when assessed for potential beneficial impact on societies. It is also the best of an overall very strongly rated field of fresh water-related opportunities. Interestingly, it is rated as the top opportunity in only one region, MENA, and only by a very small margin; however steady placing in the upper end of the opportunity field in all regions earns it the top position.

A few other results stand out. Despite its overall top position, it is the opportunity rated least favourably by the age group under 30. It is also seen as one of the less attractive opportunities from a business standpoint, especially regarding its potential to inspire new business ventures.

As for most other opportunities, stakeholders from civil society and business are perceived as its strongest supporters, and this picture is true across almost all regions.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

Best Rated Opportunity for Societies

Water-Efficient Agriculture takes the position as the best rated opportunity for society, narrowly followed by Everyday Health Enablers and Fresh Water Production.

Least Favored by Young Generation

Despite performing strongly across the board geographically, Water-Efficient Agriculture is actually the least favored opportunity of all in the age group under 30.

Average Opportunity for Business

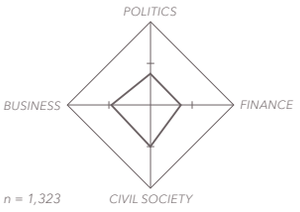
Across sectors this opportunity gets average ratings when assessed for its benefits to business overall and its power to inspire new business ventures.

Driven by Civil Society and Business

Perceived backing from stakeholder groups is strongest from civil society and business. Less from politics and finance.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

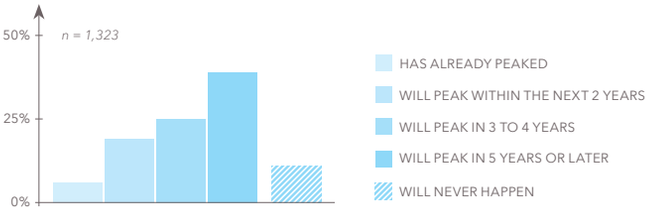


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

4.2

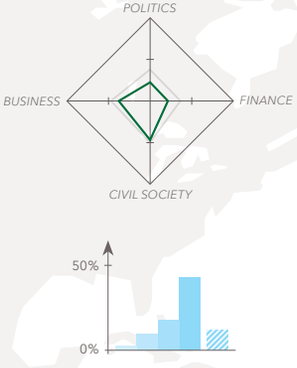
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

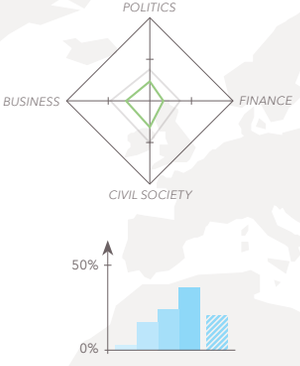


Regional results

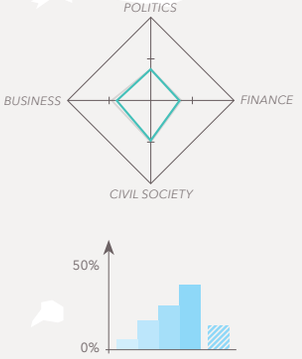
NORTH AMERICA



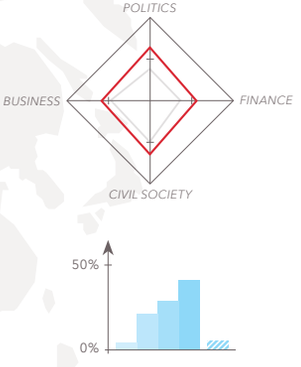
EUROPE



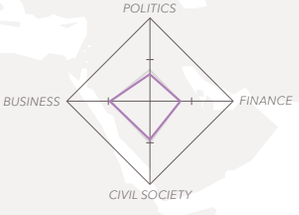
OTHER ASIA



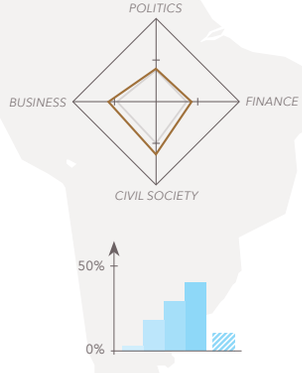
CHINA



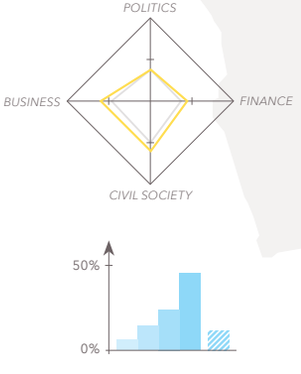
MENA



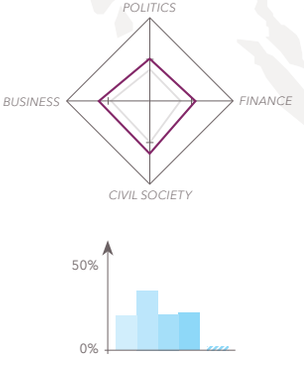
SOUTH AMERICA



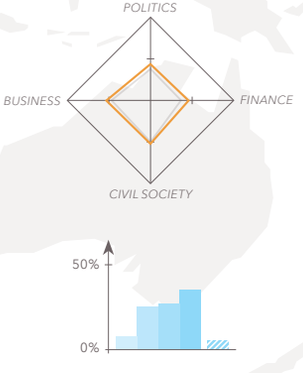
SUB-SAHARAN AFRICA



INDIA



SOUTH EAST ASIA & AUSTRALIA



OPPORTUNITY

+ FRESH WATER PRODUCTION

In areas where freshwater resources are scarce, producing them might be the most viable option. New technologies can do this efficiently using renewable energy.

Developing new sources of fresh water can help to meet the needs of populations and industries in areas where traditional water sources cannot meet the growing demand. Although increased water efficiency and conservation can go a long way, existing freshwater resources cannot adequately meet demand in arid parts of the world in the long term (especially in large cities).

Treating wastewater for reuse is the most energy-efficient way of reclaiming water for consumption. However, advances in seawater desalination over the past decade have made this technology another viable source. Desalination plants can today produce fresh water at a cost of less than 2 USD/m3, meaning it would cost less than 10 US cents per day to provide one person with the WHO-recommended daily minimum of 49 litres of clean water. Currently, a major limitation of desalination is its high energy consumption, which is often supplied largely by fossil fuels. However, less energy-intensive plants are being developed, many of which are powered by renewable energy sources. Different approaches can be adopted simultaneously. For example, by 2050 countries in the Middle East and North Africa region are expected to meet 18 percent of their fresh water demand through increased efficiency gains, 14 percent through reuse of wastewater and 22 percent through solar-powered desalination.

In the longer run, new technologies like Ocean Thermal Energy Conversion (OTEC) could also become viable. OTEC generates electricity from thermal energy in the oceans and produces plenty of fresh water in the process. OTEC is untested on a large scale but is estimated to already be economically viable in island states if the fresh water produced is used. This promises a possible way around the so-called water-energy-(food) nexus, or the dilemma surrounding water and energy production wherein one often requires the other.

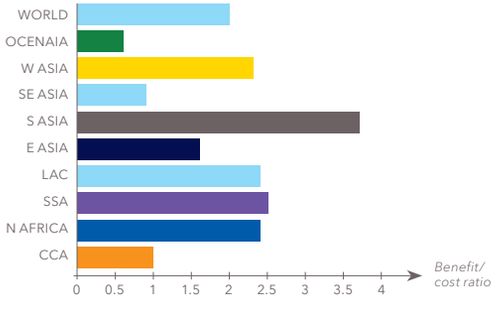
Background

The world's need for water is set to outgrow extraction capacity by 40 percent in 2030. At the same time, the growing concentration of people in cities increases local demand. An estimated 150 million people currently live in cities with perennial water shortages. As cities grow larger in size and number, this figure can be expected to rise possibly up to 1 billion by 2050.

HIGH RETURN IN PROVIDING DRINKING WATER

Benefit-cost ratios of interventions to attain universal access of improved drinking-water sources, by region.

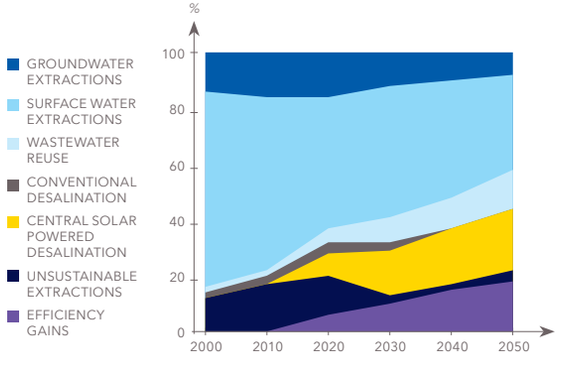
Source: WHO. 'Global costs and benefits of drinking-water supply and sanitation interventions to reach the MDG target and universal coverage'. Report. 2012



INCREASED PROJECTED USE OF DESALINATION USING RENEWABLES

Physical water scarcity in the MENA region forces new methods for meeting the water demand.

Source: FICHTNER, 'Use of Desalination and Renewable Energy to Close the Water'. Report. 2011



SOLUTIONS SEIZING THIS OPPORTUNITY:

Multiple New Sources of Drinking Water

Solutions to produce fresh water range from large-scale plants and innovative floating platforms to low-tech solutions applicable to all contexts globally.

Turning wastewater into clean water and energy

Cambrian Innovation provides a bioelectrically enhanced wastewater-to-energy system. While at the same time providing treatment for wastewater, the system is also capable of providing heat and electricity by creating methane gas from the organic matter in the water.

Designed for wineries and breweries, the system is constructed to be completely automated and remotely monitored.

Wave-Powered Desalination

The Ocean Oasis uses a combined wave energy converter and desalination plant floating offshore for delivering clean water to the mainland.

Using wave energy does not put additional pressure on the existing electricity grid, and fresh water can be produced without the often large carbon footprint of traditional desalination. With a production cost of 2.5 kWh per m3 of fresh water, this solution provided by DNV GL is able to produce an average of 4,920 m3 of fresh water per day.

Recycling old tankers as Waste Water Plants

Converting old product tanker ships into floating wastewater treatment plants can create a flexible solution that can be designed to match the exact needs of the specific location in terms of size and degree of wastewater treatment needed.

Developed by DNV GL, it provides wastewater treatment for up to around 250,000 people.

Chlorine Generator Kills Waterborne Pathogens

Waterstep has created a mini water treatment plant that provides a continuous supply of safe water. It is a flexible system easily paired with filtration, storage tanks, and hand pumps, depending on its site of deployment.

The design results in faster, thorough sanitation of water through the distribution of manufactured chlorine gas that kills waterborne pathogens.

all over the world

Water Purification and Distillation

A solar desalination solution, Carocell panels developed by F Cube, emit no greenhouse gas, use no chemicals, no costly membranes, no filters, no electronics, and no ongoing power source is required other than solar.

The system produces potable water from any source including seawater, contaminated or polluted water. Single panels can supply water for households, a series of panels can provide for a village or the panels can be set up as a largescale water farm.

all over the world

Decentralized Wastewater Treatment

BioBooster is a decentralized wastewater treatment plant based on an advanced membrane ultrafiltration process developed by Grundfos.

It enables wastewater treatment at the point source of pollution thereby minimising the ecological impact. It is a scalable system that can match exact wastewater capacity and specific types of flows from both industrial and municipal sources.

Clay Pots for Producing Safe Water

SPOUTS of Water is non-profit in Uganda that employs local residents in the production of low-cost ceramic water filters, made of clay, water, and rice husks.

These filters are effective in removing over 99 percent of microbiological contaminants, providing safe drinking water currently needed by 10 million Ugandans.

Desalination with Solar Energy

A simple forward osmosis system by Trevi Systems that uses membranes to desalinate seawater by using thermal heat. The process has the ability to desalinate ocean water at 1/8th the electrical energy of current systems.

The system's low-grade heat requirement enables the heat to be provided by solar thermal or co-generation.

CO-BENEFITS

PROTECTING HEALTH

Making clean fresh water available reduces the need to use contaminated water sources, which can help to avoid a range of different waterborne diseases like diarrhoeal diseases. These diseases alone are responsible for an estimated 4.1 percent of the total global burden of disease and are responsible for the deaths of 1.8 million people every year.

GREATER TIME EFFICIENCY

Easy access to safe drinking water can bring significant economic benefits. The greatest by far is the value of time saved from not having to fetch water from far-off sources. These time savings have been estimated to amount to 2 bn USD in the Sub-Saharan Africa region alone.

NEW BUSINESS AREAS FOR INVESTMENT

As the need for high-quality water treatment increases, specifically for potable or high-quality industrial use or re-use, low-pressure membrane technology could develop a market potential of up to 85 billion m3 by 2030 – 56 times its volume in 2005.

DECENTRALIZED WATER TREATMENT

Many new technologies for fresh water production can operate in a decentralized manner, without access to a large energy supply. This allows for mobile solutions that can operate in isolated areas where there is an acute need – e.g. conflict areas or places impacted by natural disasters.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- **Fresh Water Production**
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

SURVEY RESULTS:

Favorite in Europe

Across regions the opportunity **Fresh Water Production** is assessed as one of the top three opportunities for societies.

This is the most positively rated opportunity in Europe and a close second in North America, when assessed for its potential positive impact on society. On the same scale it is also the most favorably rated opportunity by respondents from the group of high-income economies as a whole.

Respondents from the governmental sector see this as the top opportunity when it comes to positive impact on business. However they do not see it as an obvious area for new business ventures. The same pattern is evident looking across other sectors. Respondents from all business sectors as a group expect **Fresh Water Production** to have an impact on business close to the average of all opportunities, but it is one of the opportunities they see as least likely to inspire new business ventures.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.

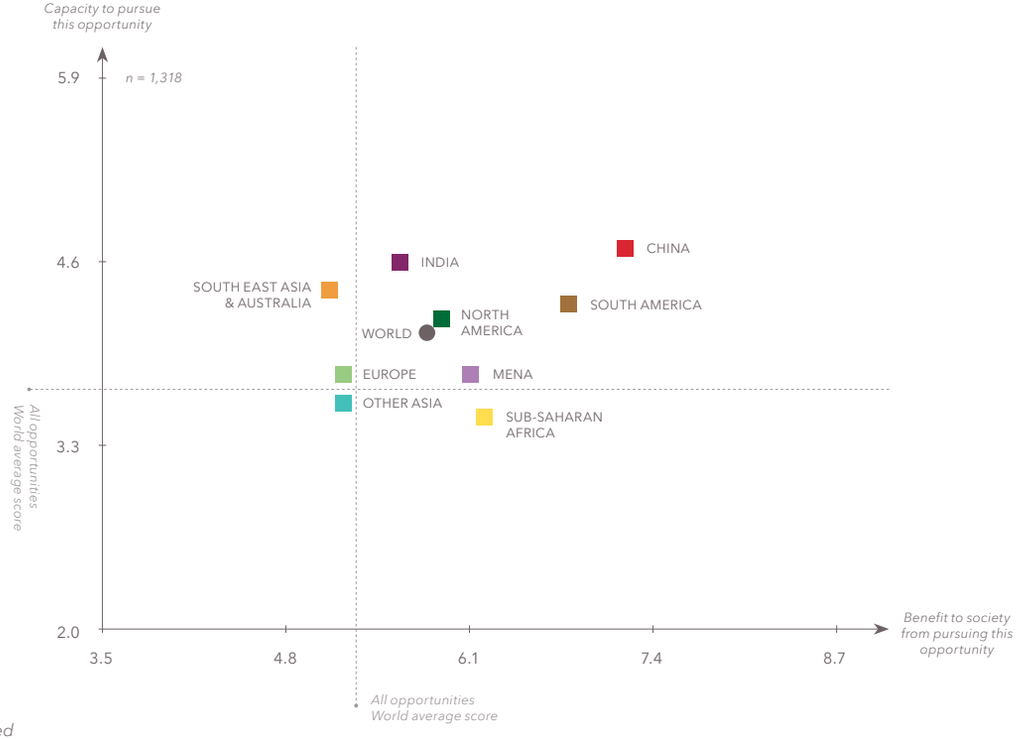


Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

OPPORTUNITY AT A GLANCE:

Rated Highly in Europe and North America

This opportunity is rated very positively for its potential impact on society in Europe (most favorable) and North America (second most favorable).

Asia is Sceptical

In China and South East Asia respondents are sceptical about this opportunity, placing it among the five least favorable opportunities.

Governmental Sector Sees Business Opportunities

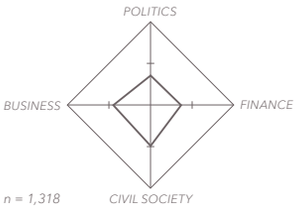
Respondents from the governmental sector see this as the opportunity most beneficial to their business. In the *other businesses* sector it is rated averagely on this parameter.

A High-Income Favorite

Fresh Water Production is placed as one of the favorites in high-income economies for the potential to impact society positively.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

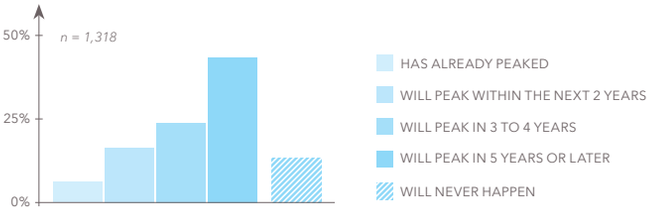


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

4.1

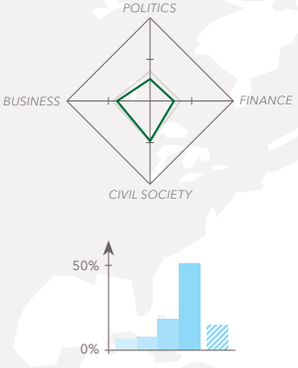
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

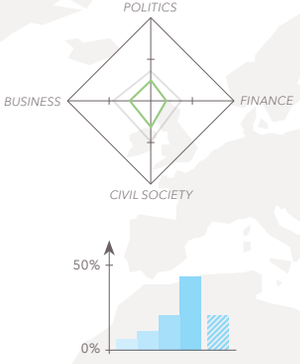


Regional results

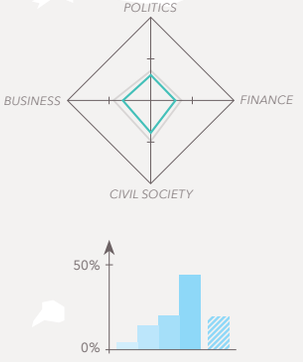
NORTH AMERICA



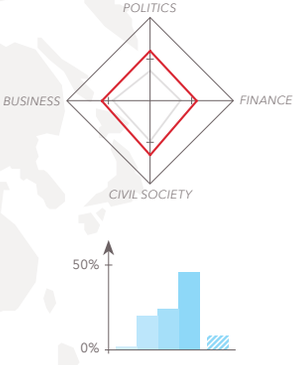
EUROPE



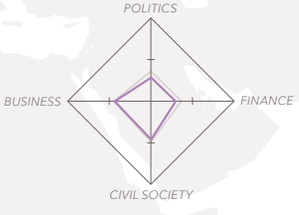
OTHER ASIA



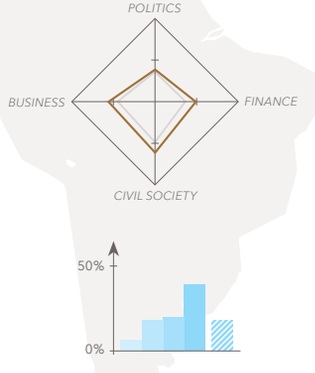
CHINA



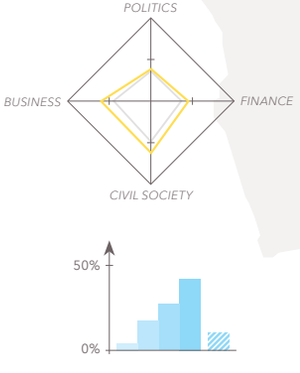
MENA



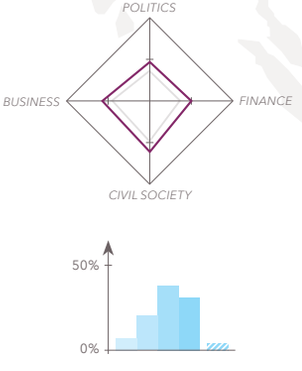
SOUTH AMERICA



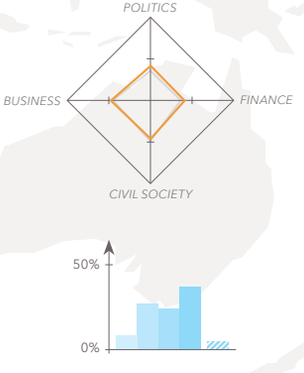
SUB-SAHARAN AFRICA



INDIA



SOUTH EAST ASIA & AUSTRALIA



OPPORTUNITY

+ SMART WATER REGULATION

Regulating fresh water extraction and consumption wisely can dramatically reduce the withdrawal of water in many contexts and open the area up to private investment.

Smart regulation can significantly influence fresh water availability and consumption. As a public good, water is often heavily regulated. With careful planning regulations in this area can reduce consumption in several ways and even result in more water being available for households and industry.

Introducing pricing mechanisms that encourage efficiencies among the large water consumers in agriculture and industry is a starting point. For example, introducing penalties for misuse, a price premium, or a progressive pricing scheme, whereby the first units of water are cheap, followed by rapidly rising prices for greater quantities, can incentivize the adoption of efficient water practices. The revenues from such a scheme can be reinvested to create more efficient water infrastructure. If kept in a closed loop, the funds could also help industry and agriculture create further savings and remain competitive in spite of rising water prices. To enable this, measuring and monitoring water use is crucial but can also be supplemented by other initiatives like labelling products to allow consumers to make water-efficient purchases.

Mobilizing private sector investment to renovate and expand water infrastructure is also an option. The OECD estimates that the societal benefits of expanding water infrastructure to meet the Millennium Development Goals can outweigh the costs by a factor of almost nine. This could warrant government action to incentivize private sector investments towards infrastructure. Indeed, businesses, governments, NGOs, and farmers have a shared interest in preserving water resources that, through smart regulation, can form the basis of many beneficial projects.

Available tools in this arena include: issuing water-related bonds, creating transparent and predictable regulatory environments, and developing a transparent pipeline of investable projects. However, it could also entail establishing private-public partnerships under which the private sector delivers most of the capital while the public shoulders most of the risk. Finally, governments (national and local) can also play a significant role in enabling better collaboration between stakeholders competing for the same water resources.

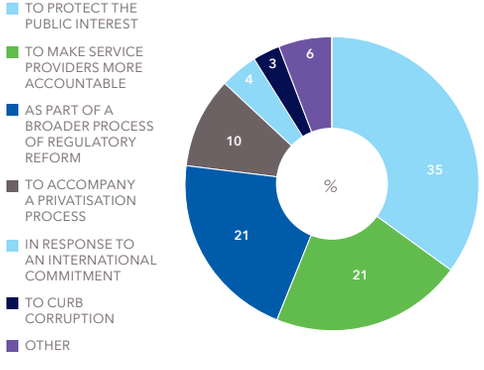
Background

In many places water infrastructure is becoming overloaded, meaning water has to be transported over long distances leading to large volumes being wasted. In Brazil, for example, 40 percent of all water is lost due to leakage and, as in other places, many people experience poor water quality and accessibility. As intense downpours leading to contamination of freshwater resources as well as longer dry periods or droughts become more frequent, the need for smart water regulation, enabling various public and private stakeholders to collaborate on these issues, will become increasingly vital.

PROVIDING WATER TO THE PUBLIC

The main reasons for regulating water in cities.

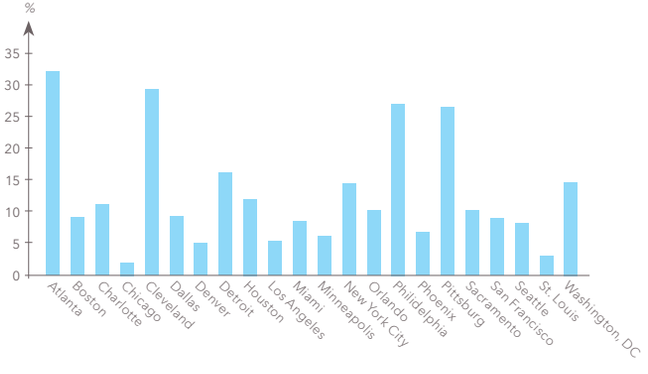
Source: OECD. 'Managing water for future cities – policy perspectives'. Report. 2014.



POSSIBLE TO RETAIN 1/3 MORE WATER WITH BETTER INFRASTRUCTURE

Performance of 22 major US cities in terms of percentage of water that is lost in water distribution systems because of leakages.

Source: Growing Blue. 'Leaks in Water Distribution Systems'. July 2012. Online: growingblue.com/category/case-studies/u-s-case-studies/



SOLUTIONS SEIZING THIS OPPORTUNITY:

Promoting Stakeholder Collaboration

Creating new partnerships and helping sectors work together to co-manage water resources are prominent features of many solutions relevant to this opportunity.

Public-Private Partnership for Improved Irrigation

Designed as a hybrid scheme based largely on the design-build-operate (DBO) model, a public-private partnership initiated by the Egytian government has been established to ensure sufficient water for irrigation.

The project covers an area of approximately 80,000 hectares. The public sector will assume ownership of the assets and take most of the associated risks, while the private operator will design, construct and operate the project for a 30-year period.

Public-Private Partnership Ensures Water Supply

The Chinese government's interest in private participation in water infrastructure and its emergence as the first water PPP market among low- and middle-income economies has opened a huge investment market.

With 309 projects and 8.2 bn USD in investments, China accounted for 58 percent of all private water projects in the last decade. Most of these projects were implemented under build-operate-transfer agreements.

Water Efficiency Labelling Scheme

The Hong Kong Special Administrative Region has initiated a labelling scheme for common types of plumbing fixtures and water-consuming appliances.

The products involved will incorporate a water efficiency label that will inform consumers about their level of water consumption and water efficiency to help them make better choices.

Financing Water Infrastructure Through Bonds

By introducing bonds for financing water infrastructure and providing access to water, the Asian Development Bank and Daiwa Securities Group have raised 1.1 bn USD since 2010.

Supported projects include new water supply systems in urban areas, major rehabilitation of existing irrigation systems and investment in wastewater management.

Asian countries

Pricing Water for Efficient Use

Pricing the usage of water and for discharging water to the sewerage system can help ensure efficient use of water resources.

The government of New South Wales, Australia, is focusing on reducing water demand by replacing the annual water allowance with a usage-based pricing scheme. This incentivizes customers to conserve water and creates a fairer charge for low water users.

Labelling for Sustainable Consumption and Production

In order to promote sustainable purchasing and procurement, the Mexican government has launched a project to label the water impacts of products and services.

By involving three key industries (glass packaging, cement and tequila) the work will focus on labelling water usage where the impact is significant.

Water User Association

In Yemen, groundwater conservation efforts were undertaken to alleviate the strain caused by agriculture, which consumes 90 percent of the country's available fresh water.

Water User Associations orchestrated by the government along with the World Bank save 83,000,000m3 of water per year by educating farmers about efficient irrigation methods, facilitating communication between government and farmers, and regulating groundwater abstraction.

The Adarsha Watershed Management Project

Through collaboration between private organizations, NGOs and government bodies, the Adarsha Watershed Management Project tackles acute problems, including low rainwater use efficiency and high soil erosion.

Focusing on community-based watershed management involving the use of traditional knowledge, the project has increased groundwater levels along with incomes.

CO-BENEFITS

SOCIAL STABILITY

In rural areas, efficient and multifunctional water infrastructure can ensure food security, thereby safeguarding social stability. Elsewhere, appropriate water regulations can ensure a reliable and long-term water supply to the same effect.

INCENTIVES FOR EFFICIENCY

Recognizing the economic value of water can help guarantee its preservation as natural capital and increase efficiency levels.

SECURE HOUSEHOLD ACCESS

Attaching a price to water consumed by industry or agriculture would reduce external costs to society and the environment. This would also conserve more of the resource to ensure a bountiful supply for individuals and households.

TRANSPARENCY

Labelling water usage on consumer products would prompt agriculture and other sectors to devote resources towards improving their water management and decision-making.

INFORMED CONSUMER CHOICES

Labelling products with embedded water consumption levels would empower consumers to make more sustainable choices.

ADEQUATE WATER QUALITY

Investments in sustainable water solutions will generate significant health benefits, as people avoid illness due to better water quality. This opportunity would also help ensure access to water as a basic human right.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- **Smart Water Regulation**
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

Top Rated in South America

In South America, this opportunity is rated highest among all in terms of positive impacts on society. This is not unexpected, as this region currently is struggling with water scarcity issues. Across all regions, this opportunity is found in the top five of all opportunities.

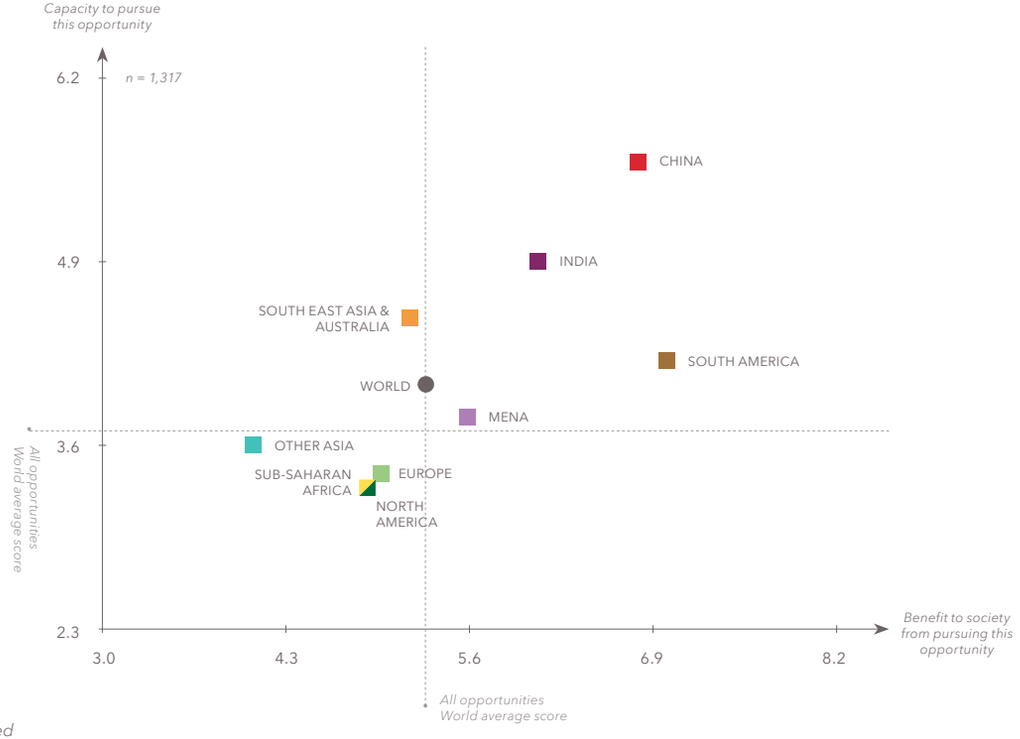
As this opportunity has a great focus on regulation, it is interesting that respondents actually do not see stakeholders in politics as being the most supportive. Civil society stakeholders are expected to provide the greatest backing.

For all country income groups this opportunity is in the top range of preferred opportunities when assessed on capacity to positively affect society.

When assessing the timeliness of this opportunity, almost half of all respondents see this opportunity as reaching maturity in 5 years or later.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

No. 1 in South America

Smart Water Regulation is the most favorably rated opportunity in South America when assessed on its potential positive impact on society.

Governmental Sector Sees Little Opportunity

This is one of the lowest rated opportunities when assessed for its effect on own business by respondents in the governmental sector.

Consistently Placed in Upper Half

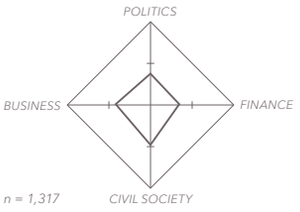
Across all regions, this opportunity is placed in the upper half of the field of opportunities for society. It as placed in the top in South America and second in South East Asia.

A Favourite among Women

Of all the opportunities, Smart Water Regulation is the most preferred among female respondents.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

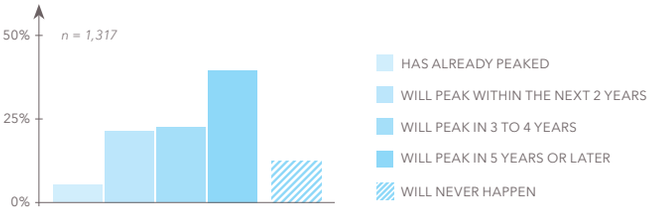


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

4.0

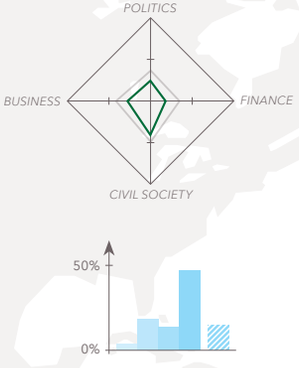
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

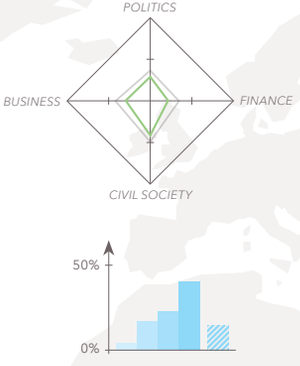


Regional results

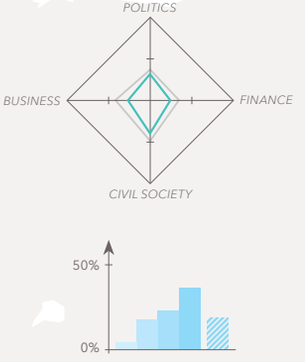
NORTH AMERICA



EUROPE



OTHER ASIA



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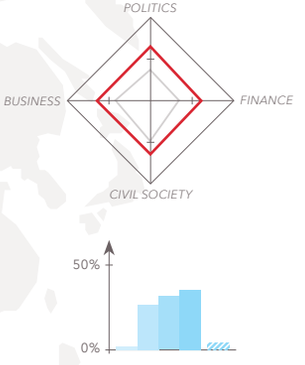

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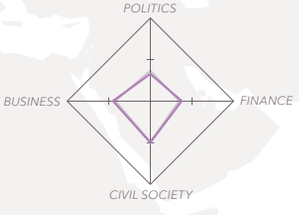
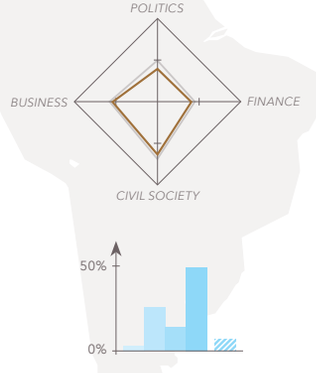
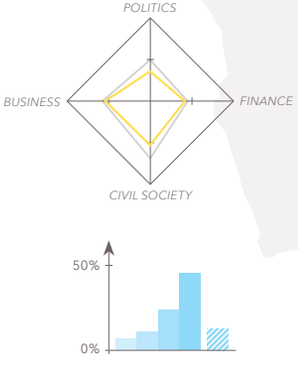


SOUTH AMERICA



SUB-SAHARAN AFRICA



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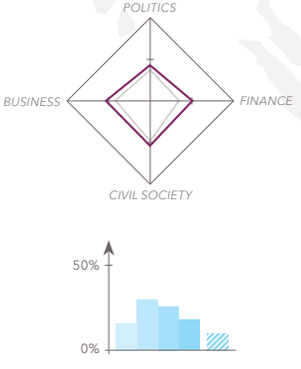
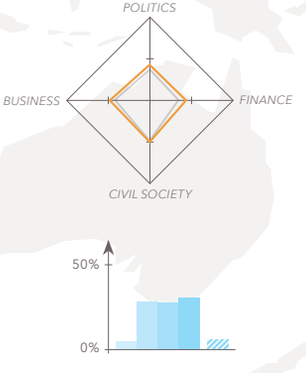


SOUTH EAST ASIA & AUSTRALIA



MORE OPPORTUNITIES

This report presents 15 opportunities based on the insights gathered at eight workshops – Opportunity Panels – conducted on five continents with more then 200 experts and sustainability professionals. However, one report cannot do justice to all the great ideas generated, and by no means do we claim these to be the only opportunities out there. To round off this section of opportunities, we briefly present five additional opportunities inspired by the work with the report.

EFFICIENT MUNICIPAL WATER USE

Adopting efficient landscape irrigation technology, efficient plumbing fixtures, appropriate water pricing structures, and rainwater harvesting methods can greatly reduce municipal per capita demand rates and reduce energy consumption. Considerable potential exists to expand these programs and methods to reduce municipal demand further.

WATER RECYCLING

Water recycling and reuse in households and industry have great potential to bolster efficiency and conservation efforts, while generating substantial environmental and economic gains. Making use of both treated wastewater and grey water onsite or on a municipal level are important aspects of this.

VIRTUAL WATER TRADE

Virtual water, or the volume of water embedded within food or other products reflecting the amount needed in their production, is traded between regions of differing water-scarcity levels. Accounting for these regional differences could enhance allocation decisions and tackle inefficiency on a global level.

MONITOR AND MEASURE WATER USE

Water management on all levels stands to benefit from accurate and systematic monitoring and measurement of water use for enhanced accounting and footprinting. In many contexts, from achieving industry-wide water efficiency goals to savings within individual households, measurement precedes management.

WATER-EFFICIENT TECHNOLOGY INNOVATION AND ADOPTION

Technology, especially within irrigation and recycling, can greatly accelerate the achievement of water conservation and efficiency goals. An assortment of initiatives, from funding research and innovation to increasing the rate of adoption through regulation or incentives, could be adopted to realize these gains.

YOUR NOTES:

HAS YOUR ORGANIZATION **FOUND ITS OPPORTUNITIES** YET?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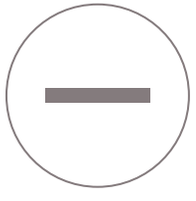
RISK 3

UNSUSTAINABLE URBANIZATION



Although urbanization in itself can be a positive force, many cities around the world are struggling to cope with the effects of rapidly evolving cityscapes, from slums to urban sprawls.

UNSUSTAINABLE URBANIZATION

200,000 people migrate to cities every day. If not managed properly, the cost of congestion, pollution, and the detrimental health effects of such rapidly growing cities threaten future prosperity.

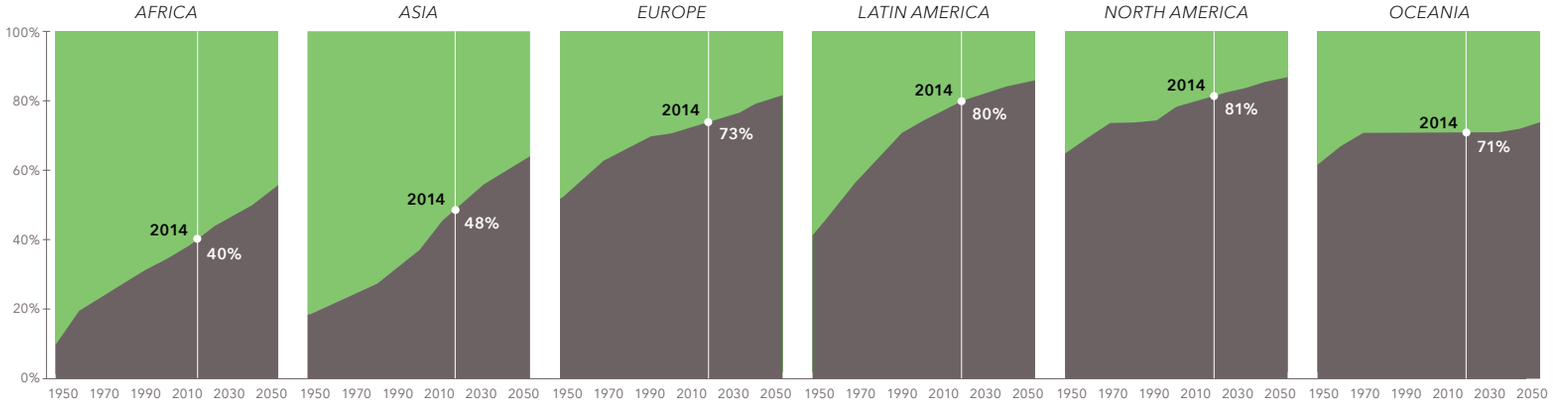
Each year close to 70 million people move from rural areas to cities, creating the greatest ever influx of people into urban areas. Urbanization in itself is not necessarily a problem. Indeed, it can be argued that having a larger portion of the world's population in cities can make it easier to handle the stresses that more than 7 billion people put resources and the environment. However, for this to be true, and for urban dwellers to live productive and fulfilling lives, proper planning is vital. Many cities are today failing in this mammoth and extremely complex task, as they struggle to accommodate the new arrivals and to create or maintain functioning infrastructure. Often the result is a breakdown in services and a growth in slum dwellings.

While already stressed, cities face other challenges when planning for a future with larger populations combined with growing environmental concerns:

- Many cities are situated on the coast or near waterways, making them vulnerable to flooding – this will become an increasingly alarming problem as global warming causes sea-level rise and more extreme weather events.
- Increasing global temperatures make hot cities even hotter, causing loss of lives and productivity.
- Huge numbers of people living closely together – often without proper sanitation or waste handling – are perfect incubators for outbreaks of disease.
- Local pollution from industry, traffic, power, and heating generation is a major source of illness and discomfort.

CITIES ARE GROWING GLOBALLY

Unprecedented urban growth is moving the majority of the world population to cities.



Source: United Nations. 'World Urbanization Prospects – The 2011 Revision'. Report. 2012.

FACTS AND FIGURES

Urban areas are a key sources of greenhouse gas (GHG) emissions across sectors and currently account for over 70 percent of global energy use.

Of the expected 80–100 billion USD per year in climate change adaptation costs, up to 80 percent are expected to be borne by urban areas.

400 million urban dwellers are exposed to risks associated with sea-level rise. These risks are most pronounced in the least developed regions of the world.

The number of city-dwellers without immediate access to tap water and the number of people without access to basic sanitation increased by 20 percent between 2000 and 2008.

IMPACTS

An estimated 3,069 people died prematurely in Hong Kong in 2012 due to air pollution and 151,300 were hospitalised for pollution-related illnesses.

If current trends hold, China's urban population will reach one billion by 2030. In 20 years, China's cities will have grown by more than the current population of the United States.

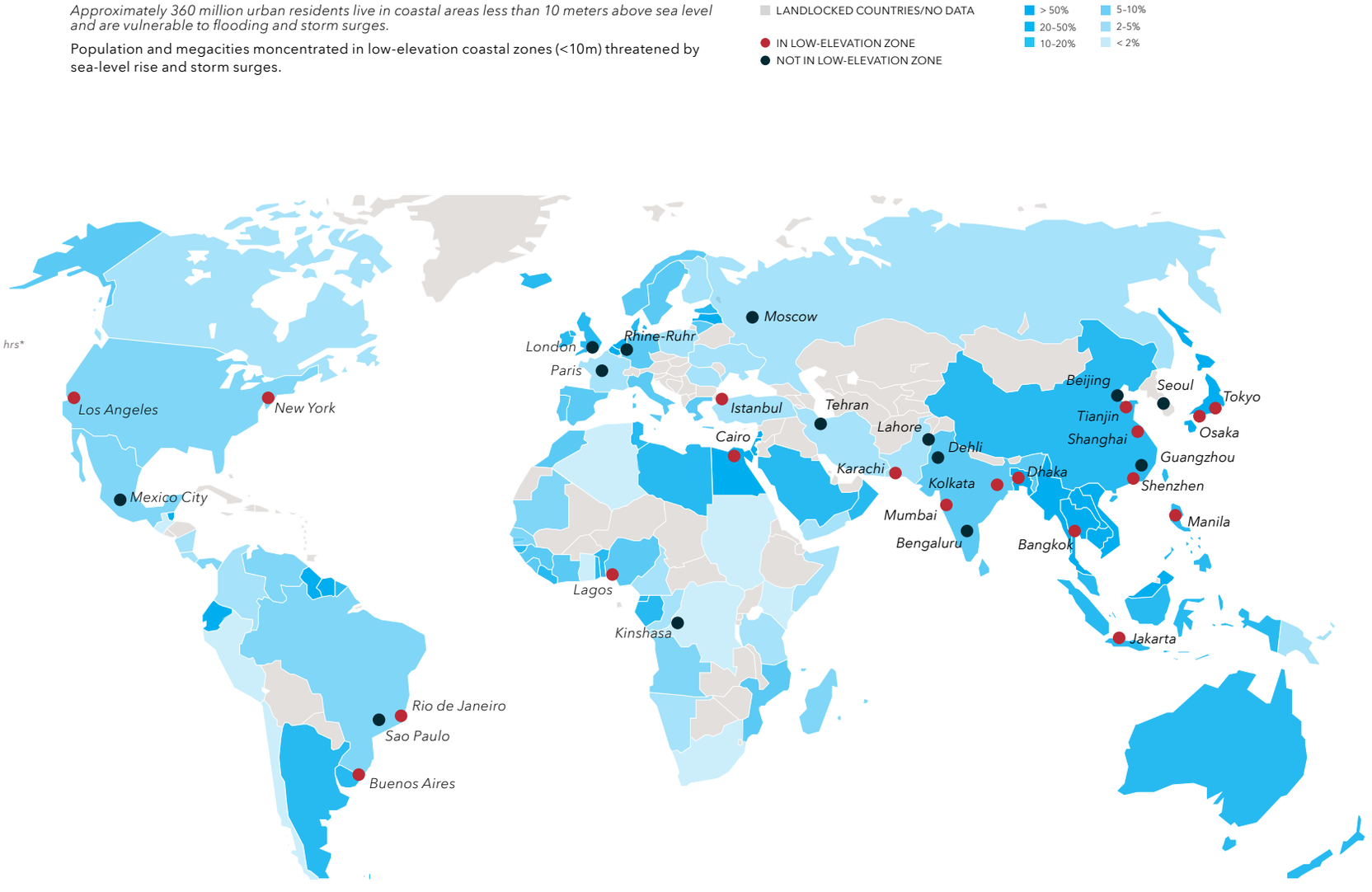
Although cities in India attract many due to their promise of a better life, significant challenges exist. One in six residents lives in unsanitary conditions within large slums.

In March 2014, after air pollution exceeded safe levels for five days in Paris and surrounding areas, the French government imposed major traffic restrictions. Public transport was made free in an attempt to encourage people to leave their cars at home.

Several Megacities are Threatened by Sea-level Rise and Storm Surges

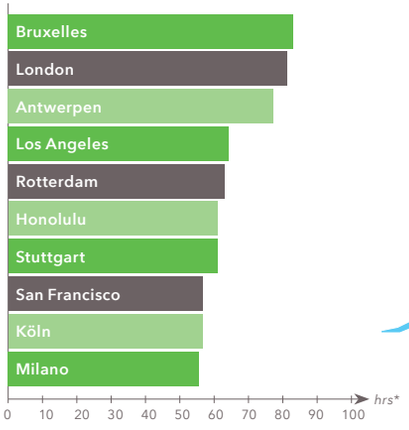
Approximately 360 million urban residents live in coastal areas less than 10 meters above sea level and are vulnerable to flooding and storm surges.

Population and megacities moncentrated in low-elevation coastal zones (<10m) threatened by sea-level rise and storm surges.



MILLIONS OF HOURS ARE WASTED IN TRAFFIC EVERY DAY AROUND THE GLOBE

Number of hours spent in traffic in the top 10 most congested cities in Europe and the US.

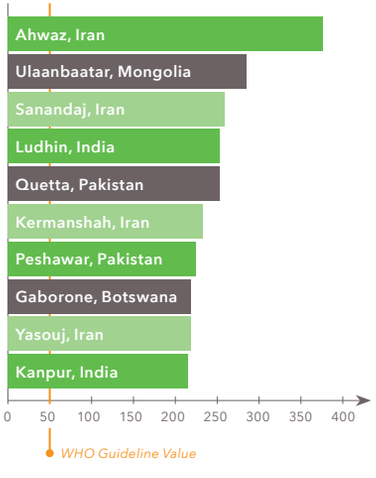


*Hours per capita per year

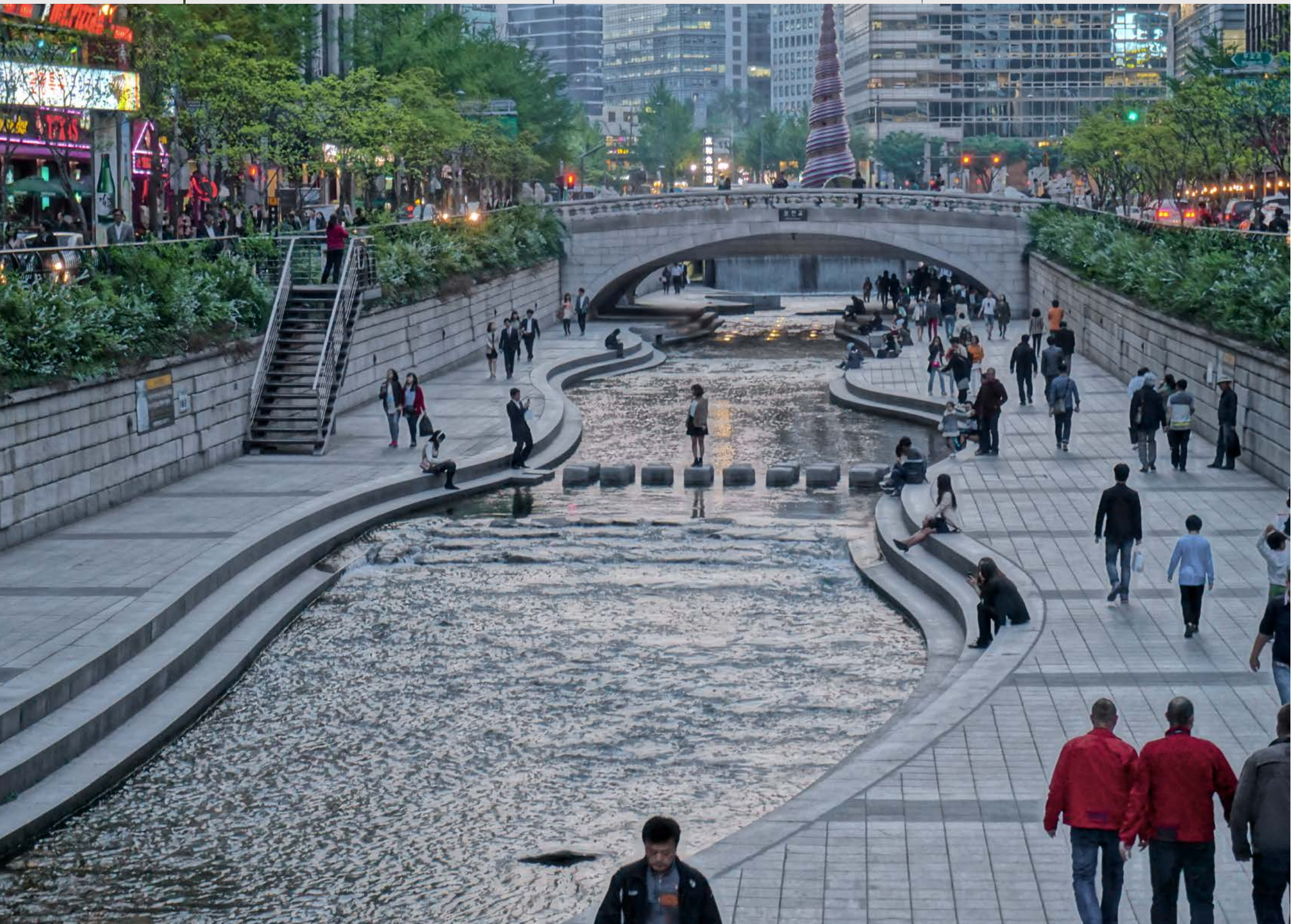
AIR POLLUTION WELL ABOVE SAFE LEVELS

Cities with the worst outdoor air pollution.

These cities have the highest average of particulate matter (PM10) measured in micrograms pr. cubic meter of air.



Source: Figure Left – INRIX. 'Traffic Scorecard'. Online: www.inrix.com/scorecard/keyfindings.asp Accessed 15/08/14. Figure Left (lower) – WHO. 'Ambient (outdoor) air pollution database'. May 2014. Map: World Bank. 'Cities and Climate Change: An Urgent Agenda'. Report. 2010.



OPPORTUNITIES

MANAGING GROWTH

Opportunities to address unsustainable urbanization aim to enable cities to handle the large influx of people through development or by diverting the flow of migration to more manageable areas.

COMPACT, GREEN AND CONNECTED CITIES

Developing emerging cities to be compact, green and connected woulc not only reduce the capital cost of infra-structure investments, but also create liveable, attractive cities. Integrated transport solutions, compact urban growth and green areas are key priorities to make emer-ging cities sustainable.

RURAL GROWTH INITIATIVES

Creating job opportunities and fostering growth with a low environmental impact in rural areas could be an effective means of reducing poverty. This could relieve migration pressure and help alleviate additional overcrowding in cities that are already struggling to adequately meet the needs of their existing inhabitants.

SMART CITIES

The constant development of technologies to make use of big data and real-time data analytics and responses makes it possible to make better use of available resources in stressed urban areas. Integration across traditional sectors and sharing of information can help cities become more sustainable.

OPPORTUNITY

+ COMPACT, GREEN AND CONNECTED CITIES

Developing emerging cities in a compact, green and connected manner can reduce the capital cost of infrastructure investments and result in more attractive cities.

In developing countries, most of the people migrating from rural to urban areas move to small or medium-sized cities. These "emerging cities" are currently less burdened by overcrowding than many existing megacities. As they grow, far-sighted planning and investments will be needed to ensure that they are developed in a safe, productive and environmentally friendly fashion. This can result in more liveable cities, but it can also dramatically reduce the capital costs of accommodating the influx of new arrivals. Indeed, focusing on developing emerging cities in a compact, green and connected manner could potentially reduce the capital costs of infrastructure investment by 6 percent (or 3 trillion USD globally) between now and 2030. This would simultaneously create impressive annual returns due to energy savings, higher productivity and reduced healthcare costs.

Crucial to this development is a focus on city planning that leads to more compact but also greener cities, in which many daily needs can be met within walking or biking distance and where long-range mobility is provided for by efficient, well-connected public transport. This would reduce air pollution, create more socially cohesive neighborhoods and drive faster growth due to energy and time savings.

Private investors can also benefit from promoting development with a focus on more compact, green, and connected cities. More housing units can be built if less room is needed for roads and parking, while parks and green areas in cities make them more attractive to buyers. Evidence of positive effects on property prices, biodiversity and reduced obesity due to physical activity has also been found. In addition, the benefits of achieving a healthier and better-connected city can also be expected to create employment in the long term, leading to a virtuous cycle in which more compact urban hubs concentrate innovation and job creation, in turn attracting more talent and capital. Public-private partnerships which facilitate collaboration between different stakeholder groups can be a valuable aspect of this approach.

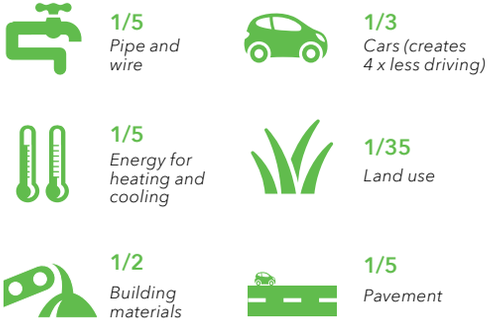
Background

Today 33 cities have grown to a size of more than 10 million people. Many of these megacities will have great difficulty accommodating a further influx of people from rural areas adding to existing problems of air pollution, lack of basic services, slums and congestion. Ensuring that the smaller, rapidly expanding emerging cities adopt a more sustainable trajectory from the outset will prevent them from encountering familiar challenges in the future.

CITIES ARE MORE EFFICIENT

Compared with suburban sprawls, cities use:

Source: UN-Habitat, "Sustainable Urban Energy, a sourcebook for Asia", Report, 2012.



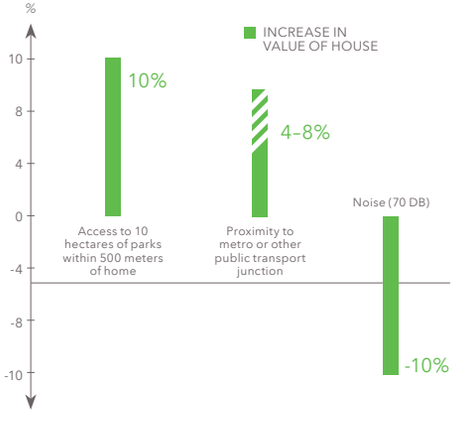
PARKS AND PUBLIC TRANSPORT MAKE AREAS ATTRACTIVE

Effect on house prices from access to parks, proximity to public transport, and noise levels in Denmark.

Source: Mandag Morgen, "Gevinster ved investeringer i byliv og bykvalitet", Report, 2013.

* Price increase for each 10 hectares of park – between 500 and 1,000 meter effect on house price is +2 % pr. 10 hectares.

** Effects wears off slowly to appr. 1,500 meter



SOLUTIONS SEIZING THIS OPPORTUNITY:

Learning From the Best

Solutions for green, compact and well-conected cities can often be seen in best practices from existing cities. If applied concertedly in emerging cities, they can help to create liveable and sustainable urban environments.

Creating a Healthy Connected City

The City of Portland has made a targeted effort to ensure that diverse communities are given equitable access to amenities and economic opportunities, which has been a problem in the area due to rapid population growth.

Through careful planning and investment, the Health Connected City strategy seeks to ensure close proximity to crucial services and thereby promote active transportation for improved health, affordability, liveability and air quality in the city.

Green Streets and Alleys

The Philadelphia Water Department provides technical assistance to other agencies undertaking renewal projects in order to encourage green stormwater infrastructure elements. Green stormwater elements (such as planters, rain gardens, and street trees) could be added to streets when repairs or other work like on-street parking is added, sidewalks widened, or medians installed.

Such green elements can contribute to decreased crashes and injuries, and bring a more comfortable and visually appealing environment.

Integrated Public Transport

In order to make travelling by public transport easy, convenient and fast, the Capital Region in Denmark has developed an integrated public transport system consisting of metro lines, trains and buses.

Several components make it attractive to use: an online journey planner, the ability to use same ticket on all forms of transport, and bicycles are allowed on the metro and trains.

Designing a Compact, Green and Connected City

The city of Dongtan, near Shanghai, seeks to become the world's first purpose-built eco city complete with sustainable transportation, efficient water systems, green spaces, and carbon neutrality.

Once developed, the city is expected to consume 64 percent less energy when compared to a traditional city of its size.

Greening the City with an Urban Forest

In order to achieve a resilient, healthy and diverse urban environment, the city of Melbourne has implemented a greening strategy. It consists of different elements like increasing canopy cover, increasing urban forest diversity, improving vegetation health and improving soil moisture and water quality.

The benefits of an urban forest include preventing heat islands, reducing stormwater flows, encouraging outdoor activities, increasing property value, and reducing energy costs.

Low-Carbon Growth in an Emerging City

The City of Montería, Colombia, together with Proactiva Medio Ambiente, have, through a public-private partnership, initiated a plan comprising 26 actions to reduce GHG emissions by 20 percent by 2019.

The actions cover areas ranging from urban mobility through increased use of bikes, to waste management, and protecting the city's natural heritage with biodiversity and reforestation. The detailed plan is developed together with key stakeholders in the city, notably the university, companies, farmers, and architects, as well as the public.

Reclaiming Roads for Recreation

Ciclovias are city streets in the capital of Columbia, Bogotá, that have been freed from motorized traffic to allow the free and safe circulation of thousands of people on bicycle, skates or foot for a few hours, usually on Sundays or holidays.

Running for more than 40 years, more than 2 million people come out every week to cycle, hang out, and eat outdoors. This has resulted in the promotion of public health, local economic development and social cohesion in communities.

Rio Bus Rapid Transit

The city of Rio de Janeiro faces significant traffic and transportation challenges and is in the process of constructing four Bus Rapid Transit (BRT) lines to improve mobility for its citizens and in preparation for the 2016 Olympic Games.

The City expects it to carry up to 63 percent of Rio's population regularly. Creating a high-quality BRT system can enable municipal authorities to increase liveability, mobility, and sustainability for a cost that is 10 to 100 times lower than smilar metro lines.

CO-BENEFITS

MINIMIZED INFRASTRUCTURE COSTS

If infrastructure is developed correctly, medium-sized cities would require less investment. Building the infrastructure to support sustainable urban areas costs much less than retrofitting it later.

LOWER DEMAND FOR TRANSPORT

Building compact midsize cities with public services located close to where citizens live reduces demand for transport, and consequently minimizes the associated negative externalities. Efficient public transport such as Bus Rapid Transit systems create benefits that outweigh costs by a factor of up to 2.8.

REDUCED ENERGY CONSUMPTION

New buildings can often reduce energy and water consumption by a factor of three or four compared with the average building mass today. At the same time, retrofitting buildings with clever use of daylight, ventilation and temperature control can increase productivity sometimes by double-digit percentages.

HEALTHIER ENVIRONMENTS

Living within a one-kilometer radius of a green space is significantly linked with reduced risk of a number of common diseases. Better indoor environments also have a positive effect on health.

STIMULATED KNOWLEDGE DIFFUSION AND GROWTH

High density, combined with a diversity of urban functions, is believed to stimulate knowledge diffusion and thus economic growth.

GREATER SOCIAL EQUALITY

Compact cities with shorter travel distances and functioning public transport systems create lower travel and commuting costs – this facilitates the mobility, and facilitates easier access to a diversity of local services and jobs.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- **Compact, Green and Connected Cities**
- Cost-Effective Adaptation
- Investments in Resilience

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

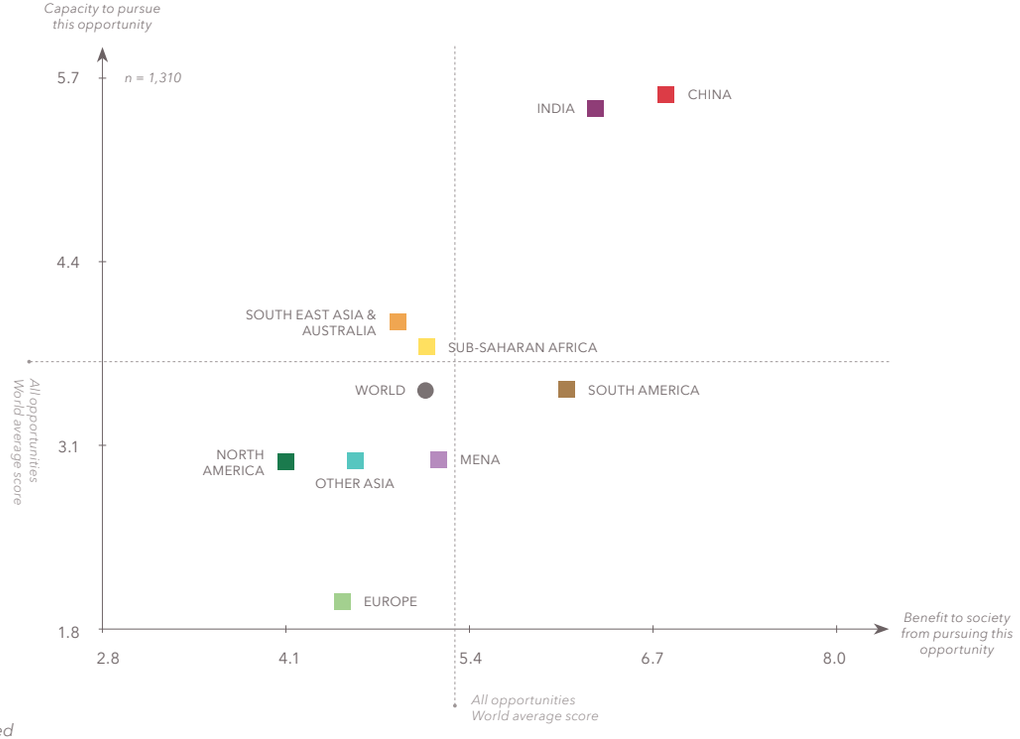
A Favorite in China and India

In India the respondents find the opportunity of building **Compact, Green and Connected Cities** to be the most favorable for societies, and it is number two in China. This is especially interesting in light of the massive urbanization these countries are expected to see in the coming decades. Less favorable ratings in other regions – it is least favored in North America and rated below average in Europe and Other Asia – place this opportunity among the three least favorably rated across all regions.

Respondents in lower-middle-income economies place this opportunity in the top end, while respondents in high-income economies see it as the least favourable of all opportunities. When assessed for its benefits to businesses and the capacity to inspire new business ventures this opportunity is rated highly. This is driven mainly by results from the manufacturing, governmental and *other businesses* sectors.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

Popular in Lower-Middle-Income Countries

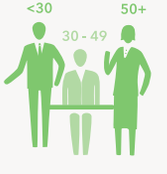
This opportunity is rated as the favorite opportunity for creating sustainable cities by respondents from lower-middle-income economies.

Near Future in SEA, India and China

A majority of respondents fromt South East Asia, India and China expect this opportunity to reach full potential within the next 4 years. In India, this is 70 percent.

Governmental Sector Sees Benefits

The opportunity has been assessed to affect the governmental sector positively and will be pursued for new business. The same applies to the *other businesses* and manufacturing sectors.

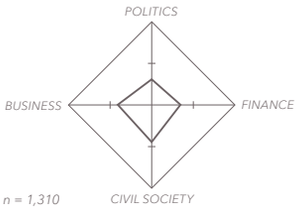


Not for Those Aged 50 and Above

Respondents at the age of 50 and above have compact, green and connected cites as their least preferred opportunity.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

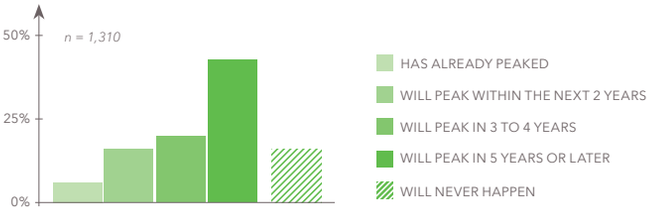


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

3.7

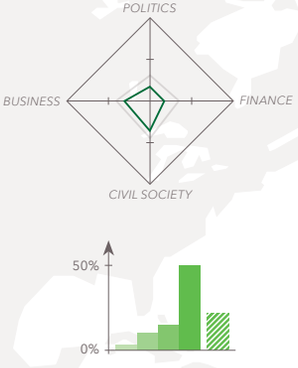
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

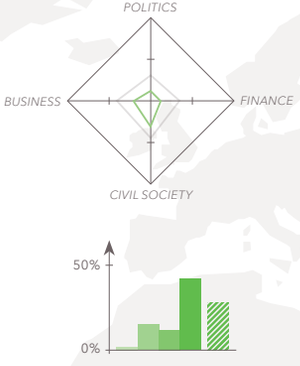


Regional results

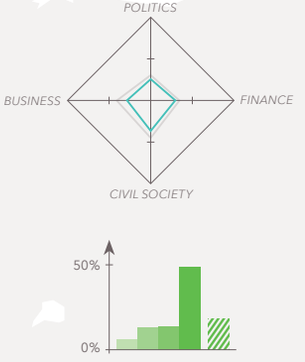
NORTH AMERICA



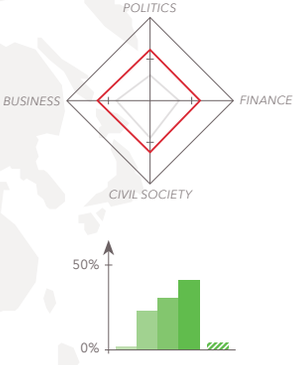
EUROPE



OTHER ASIA



CHINA



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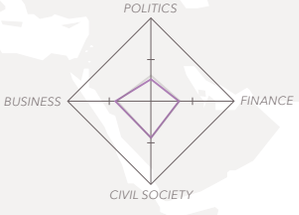
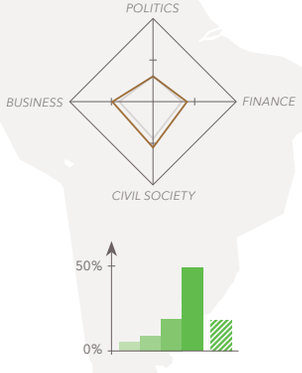
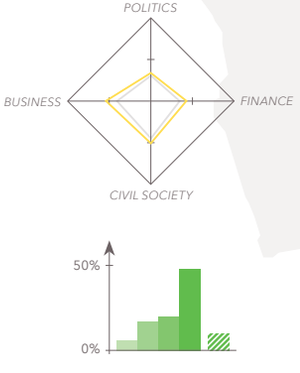


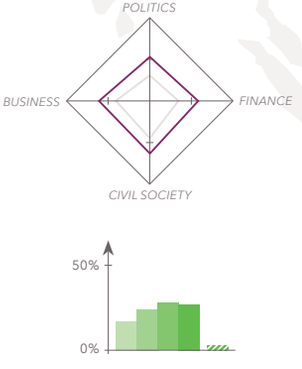
SOUTH AMERICA



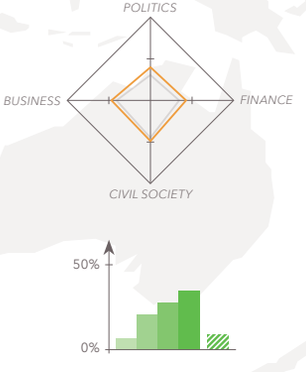
SUB-SAHARAN AFRICA



INDIA



SOUTH EAST ASIA & AUSTRALIA



OPPORTUNITY

+ RURAL GROWTH INITIATIVES

Creating job opportunities and fostering growth with a low environmental impact in rural areas can relieve migration pressure and alleviate overcrowding in cities.

Providing the inhabitants of rural areas and small towns with the proper living conditions and opportunities to necessary prosper will both combat poverty and reduce the incentive to migrate to cities. Directing efforts towards a suite of development strategies targeted at villages and small towns in rural areas can create the basis for economic development with a low environmental impact and slow down the influx of people to sprawling megacities.

Initiatives such as securing access to energy, communication, and infrastructure could enable broader economic development and access to new jobs in rural areas. Advances in technologies like distributed energy generation, mobile phones and the internet, along with the possible rise in distributed production via 3-D printing, can act together to provide the technological foundation for extended rural growth.

Access to mobile phones is already almost universal in most parts of the world, and distributed energy generation, especially through solar power, is rapidly positioning itself as one of the fastest-growing energy sources. In developing economies, these developments are already improving standards of living in many rural areas by spreading access to health care and distance education. They are also providing new tools for developing the rural economy, such as delivering weather forecasts or market information to farmers.

Many of these initiatives are driven by unsubsidized markets; however, governments could accelerate development by channelling funds into the necessary physical infrastructure. On top of the potential macroeconomic gains, focusing on rural development and small towns can reduce poverty, seeing as 85 percent of the world's poor currently live in these areas.

Background

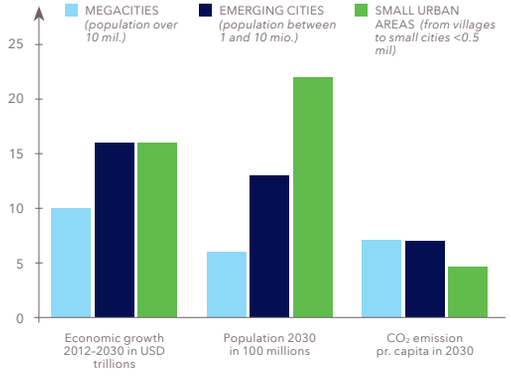
Three quarters of the world's most impoverished people live in rural areas, with many seeking to migrate to cities. Each year close to 70 million people move from rural areas to cities, creating the greatest ever influx of people into urban areas. Many cities are today failing in the mammoth and complex task of coping with the growing population. They are struggling to accommodate the new arrivals and to create or maintain adequate infrastructure and services.

SUSTAINABLE GROWTH IN RURAL AREAS

Expected growth in economy, population and greenhouse gas emissions in various settlement sizes to 2030.

Source: Adapted from: The Global Commission on the Economy and Climate, "Better Growth, Better Climate" – Chapter 2, p. 5. Floater and Rode, Report, 2014.

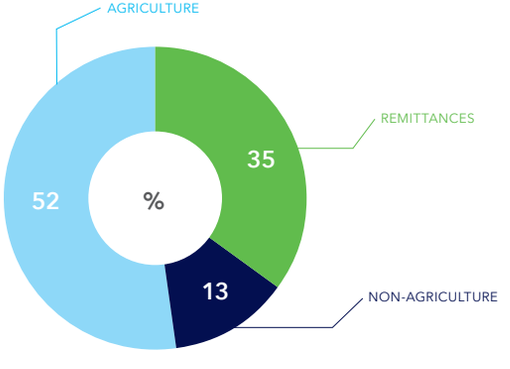
Note: Small urban areas are highly different in nature and estimates should be treated an indicative.



AGRICULTURE, NOT INDUSTRY, PULLS PEOPLE OUT OF POVERTY

Total average contribution to poverty reduction from growth in agriculture, remittance and non-agriculture in selected countries.

Source: UNEP, "Green Economy Report", Report, 2011.



SOLUTIONS SEIZING THIS OPPORTUNITY:

Creating the Building Blocks for Growth

Improving access is the key to many of the solutions relating to this opportunity. Access to energy, to financial services and to markets is a vital part in most initiatives identified.

Small-Business Approach to Sustainable Rural Electrification

The Foundation Rural Energy Services established small-scale, commercial energy companies to electrify off-grid areas affordably using solar energy.

Solar Home Systems along with solar power plants to supply mini-grids are both employed, financed by a fee-for-service model. 30,252 customers were supplied with solar home systems by the end of 2013.

South Africa, Mali, Uganda, Burkin Faso and Guinea-Bissau

Business Opportunities with Solar Systems

Many in rural Somaliland do not have access to a reliable grid, and technicians can be hard to find. Phaesun improves existing shops' service quality using solar energy, which permits them to recharge mobile phones, and operate fridges or even televisions.

It targets private enterprises in non-electrified areas, fuelling growth, new job opportunities, and autonomy in rural areas.

Safe Water Supplies New Opportunities to Rural Women

A water supply and sanitation sector project coordinated in partnership with the Asian Development Bank in rural Uzbekistan has improved local health conditions, strengthened institutional capacity, and empowered women in the community.

The project included the construction of chlorination facilities, wastewater drainage facilities, latrines, and septic tanks. It has freed women from the need to collect water from distant sources, allowing time for more productive activities.

Rural Roads for Access to Markets and Crucial Services

Neglected roads in India aggravate urban-rural inequalities by impeding access to markets, schools, and hospitals. This leads many in remote towns to seek better opportunities in cities.

In response, an Asain Development Bank-supported Rural Roads Sector II Investment Program provided around 2,900 km of all-weather rural roads to 1,503 communities. The many resulting benefits included higher immunization rates, higher school enrolment, access to employment opportunities, and the switch to higher-value crops.

Mobile-Based Farming Information

Airtel Africa's "Voice of the Farmer" program provides farmers with agricultural information that increases their productivity and potential income.

Widespread access to advice and relevant information, which can be delivered over mobile networks in rural areas, can help farmers make better decisions to improve their prospects.

Creating Social Progress by Restoring Grasslands

By educating and empowering the inhabitants of rural areas, the Savory Institute aims to tackle the problems of grassland degradation and desertification, which compromise food production.

Local hubs organize farmers and equip them with holistic livestock management skills. Local inhabitants and their families experience the benefits of healthy land in the form of reduced poverty and hunger.

Microinsurance for Smallholders

Average Crop Revenue Election (ACRE) programs insure farmers against unfavourable weather conditions that may threaten their crops. As more households sign on, microinsurance has proven to serve a real need in rural areas.

Instead of visiting farms to determine conditions on the ground, cloud data is used to calculate what payouts are due to farmers. Over 180,000 farmers have already felt the benefits of this system.

Building Rural Resilience with Alternative Sources of Food and Income

With rain patterns becoming increasingly unpredictable due to climate change, farmers in rural Timor-Leste often risk losing their harvests.

Mercy Corps has established aquaculture training programs in these areas to mitigate this risk and improve the quality of life. Tilapia fish, which thrive in small static ponds and breed quickly, have proven to be ideal safety nets in these communities.

CO-BENEFITS

IMPROVED QUALITY OF LIFE

Seeing as a large proportion of the world's poor currently live in rural areas, targeting sustainable development efforts here can potentially reach more of those in need.

INCREASED FOOD PRODUCTIVITY

Approximately 25 percent of the world's agricultural land is severely degraded, causing loss of productivity. Restoring just 12 percent of the world's degraded agricultural land could feed 200 million people by 2030, while also strengthening climate resilience and reducing greenhouse gas emissions.

LOWER PRESSURE ON EXISTING CITIES

As the influx of people from rural areas is slowed down or even reversed, larger cities will be able to create sustainable living conditions for their current inhabitants.

FASTER ECONOMIC GROWTH

Providing the inhabitants of rural areas with more opportunities has the potential to accelerate economic growth by increasing productivity and improving access to markets and information.

ENHANCED RESILIENCE

Rural development can help communities become more resilient to extreme weather events by providing crucial infrastructure and technology.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
- Smart Cities
- Combat NCDs with Mobile Technologies
- **Rural Growth Initiatives**
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

The Finance Sector's Top Choice for Sustainable City Development

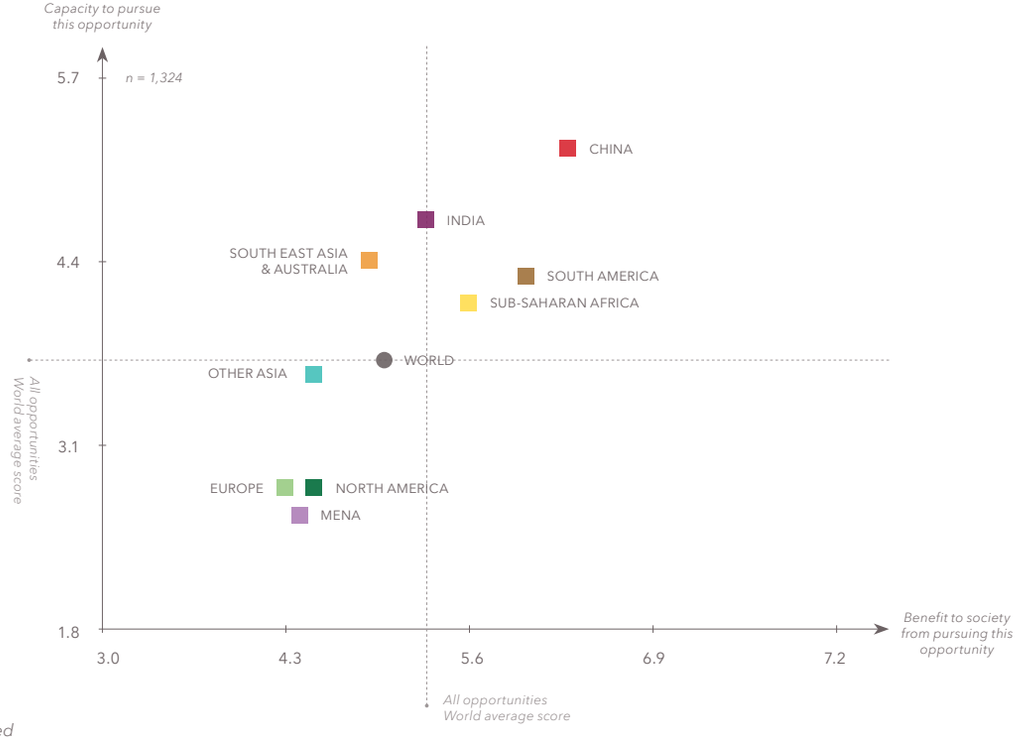
The opportunity **Rural Growth Initiatives** is quite differently rated across geographical regions. In the region Other Asia (covering Korea, Japan and Russia), it is seen as one of the top opportunities when assessed for its potential positive impact on society. However, it is also the least preferred opportunity within the regions Europe, India and MENA on the same scale.

When looking at responses across business sectors, again it is rated with great differences. The finance sector puts it in the high end of all opportunities for its potential impact on society, but is the least preferred opportunity for respondents in the manufacturing and governmental sectors. Finance sector respondents also believe this opportunity will affect their business positively, but they do not expect to pursue new business ventures inspired by it.

In North America and MENA around 60 percent of the respondents assess that it will be at least fiver years before this opportunity reaches full potential – if ever. In China, SEA and India, however, 60 percent of respondents believe it will reach full potential within 4 years.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

Good for Finance but No New Biz

This is by far the preferred urban opportunity by respondents in the finance sector. However they don't see new business ventures coming as easily from this opportunity compared to the others.

Not for the Over 50s

For respondents aged 50 and above, this opportunity is one of the least preferred ones, in line with the other two urban opportunities.

Diverging Ratings

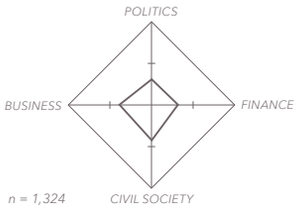
Rural Growth Initiatives is considered to be one of the most favorable opportunities in the Other Asia region, while being at the very bottom in Europe, India and MENA.

Not for Europe and N. America

One out of four respondents in North America and Europe have assessed that this opportunity will never be influential in their countries.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

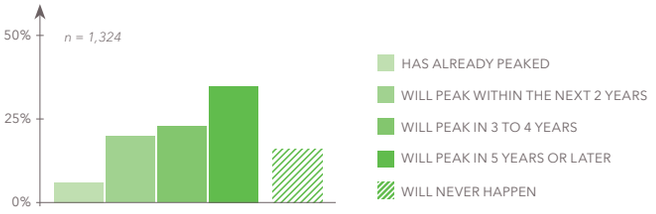


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

3.5

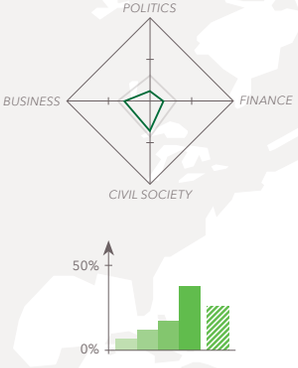
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

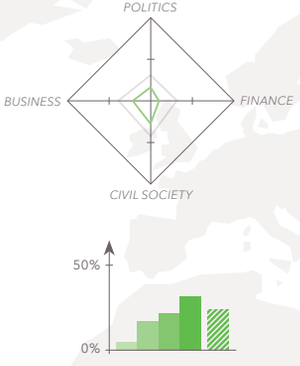


Regional results

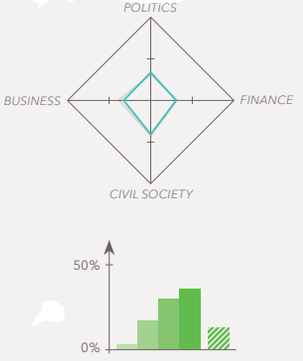
NORTH AMERICA



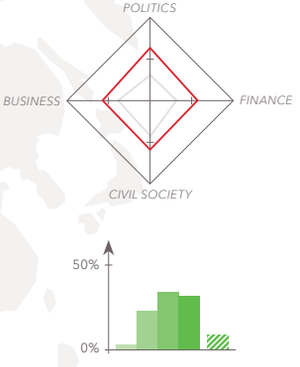
EUROPE



OTHER ASIA

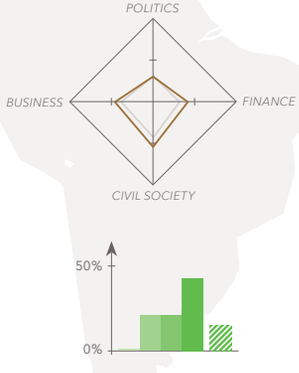


CHINA

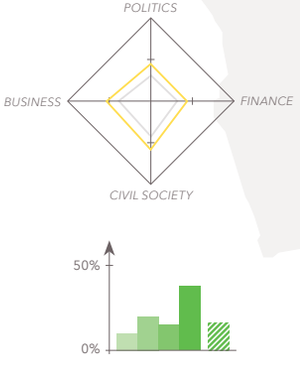


MENA

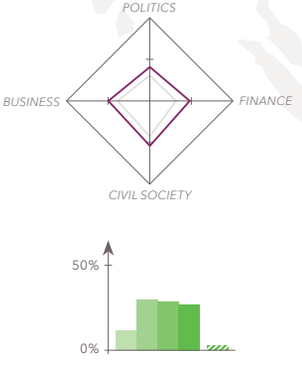
SOUTH AMERICA



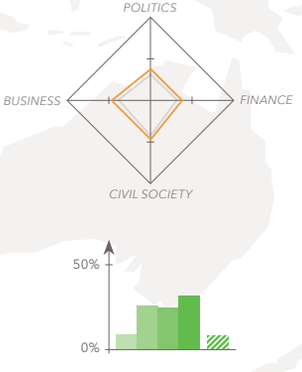
SUB-SAHARAN AFRICA



INDIA



SOUTH EAST ASIA & AUSTRALIA



OPPORTUNITY

+ SMART CITIES

The constant refinement of technologies to make use of big data and real time-data analytics and responses can make better use of available resources in stressed urban areas.

The concept of smart urbanism encompasses the planning, designing and operating of cities in ways that foster efficiency, liveability and sustainability. Making urban areas "smart" demands both traditional disciplines like city planning and architecture (which can realize the gains of more efficient buildings and transport systems), but also new technologies such as smart grids, sensors, and big data. Developing a smart city also requires collaboration with the people and companies based in the area.

Information and communications technology, big data analytics, and Geographic Information Systems (GIS) can be useful tools in facilitating smarter choices. They can lead to a more integrated management of different areas like water, electricity and transport to better prioritize investments and maximize value. Additionally, collecting data about air pollution and water flows, for example, can highlight health and environmental impacts on the list of national priorities. This can enable cities to better address the well-being concerns of their inhabitants, help to overcome general sustainability concerns, and open up to greater citizen involvement in decision-making processes.

Smart urbanism has the potential to promote a sustainable transition in cities within both emerging and established markets. In emerging economies, there is an immediate need to develop smarter cities to meet the demands of rapidly growing populations. Where needs are great and resources are scarce, smart priorities and stakeholder participation are especially crucial. In established markets, ageing systems are often deteriorating, information is rarely shared, and cities are frequently hampered by inefficacies resulting from a lack of collaboration. Information sharing and collaboration between sectors throughout the stages of infrastructure development can significantly increase efficiency and at the same time provide substantial co-benefits.

Smart urbanism entails adopting a strategic direction. By using new participatory forms of city governance and extended use of technologies and open data systems, the planning and operating of cities has the potential to become increasingly sustainable.

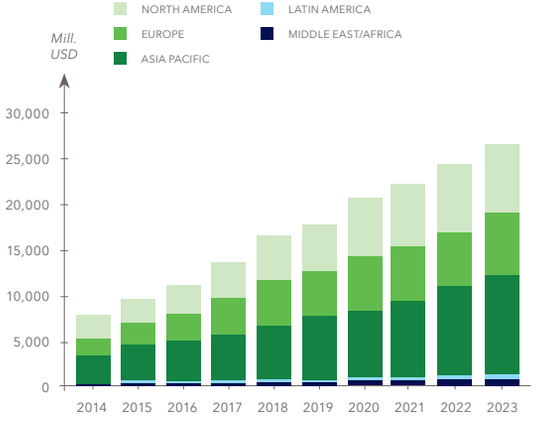
Background

Cities around the globe are struggling to handle the effects of rapid urbanization. Pollution and congestion put enormous pressure on the urban areas. However, it is often very hard or expensive to radically change, for example, road grids in established cities. The rise in mobile sensor and data crunching capacity promises to solve this gridlock by offering more efficient uses of existing infrastructure.

HUGE MARKET POTENTIAL FOR SMART CITY TECHNOLOGY

Smart City technology annual revenue by region in world markets 2014–2023.

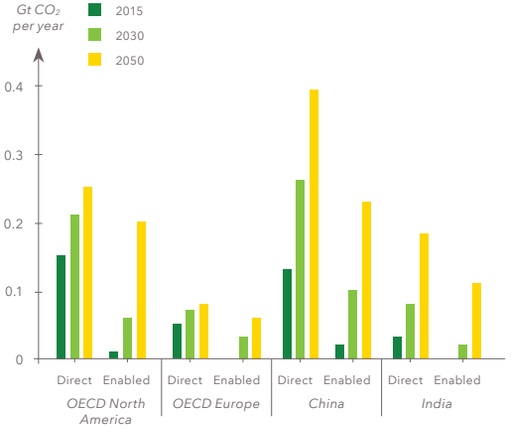
Source: Woods, E. and Lawrence, M. 'Smart Cities and the Energy Cloud – Reshaping the Energy Landscape'. Report. 2014



SMART GRIDS CAN HELP GLOBAL CLIMATE

Regional CO_2 emissions reduction from smart grid deployment. Direct reductions are energy savings from peak load management and better efficiency. Enabled reductions are greater integration of renewables.

Source: IEA. 'Technology Roadmap – Smart Grids'. Report. 2011



SOLUTIONS SEIZING THIS OPPORTUNITY:

Putting Data into Action

Opening and sharing data is a key theme in many smart city solutions globally.
Open data can make create greater integration across sectors and can be a strong tool for public participation in city development.

City Data Transparency for Crowdsourcing Innovation

NYC OpenData is a platform that makes a vast array of data generated by New York City agencies and other organizations freely available for public use. Many themes, including transportation, environment, social services, public safety, business, and education are covered by available datasets.

The initiative aims to bolster accessibility, transparency, and accountability in city government by centralizing previously isolated sources of information from which meaningful innovations, including mobile apps, can be developed.

Testing New Smart City Initiatives

The Amsterdam Smart City platform unites over 70 partners in business, government, and research with a vision to fuel economic growth and environmental sustainability by establishing the Amsterdam Metropolitan Area as a smart city.

Aiming to create generate connectivity, the project employs an inclusive approach to developing and piloting new programs relating to many aspects of urban life and infrastructure. Acquired knowledge and experiences are made freely available online.

Adopting a National Smart City Strategy

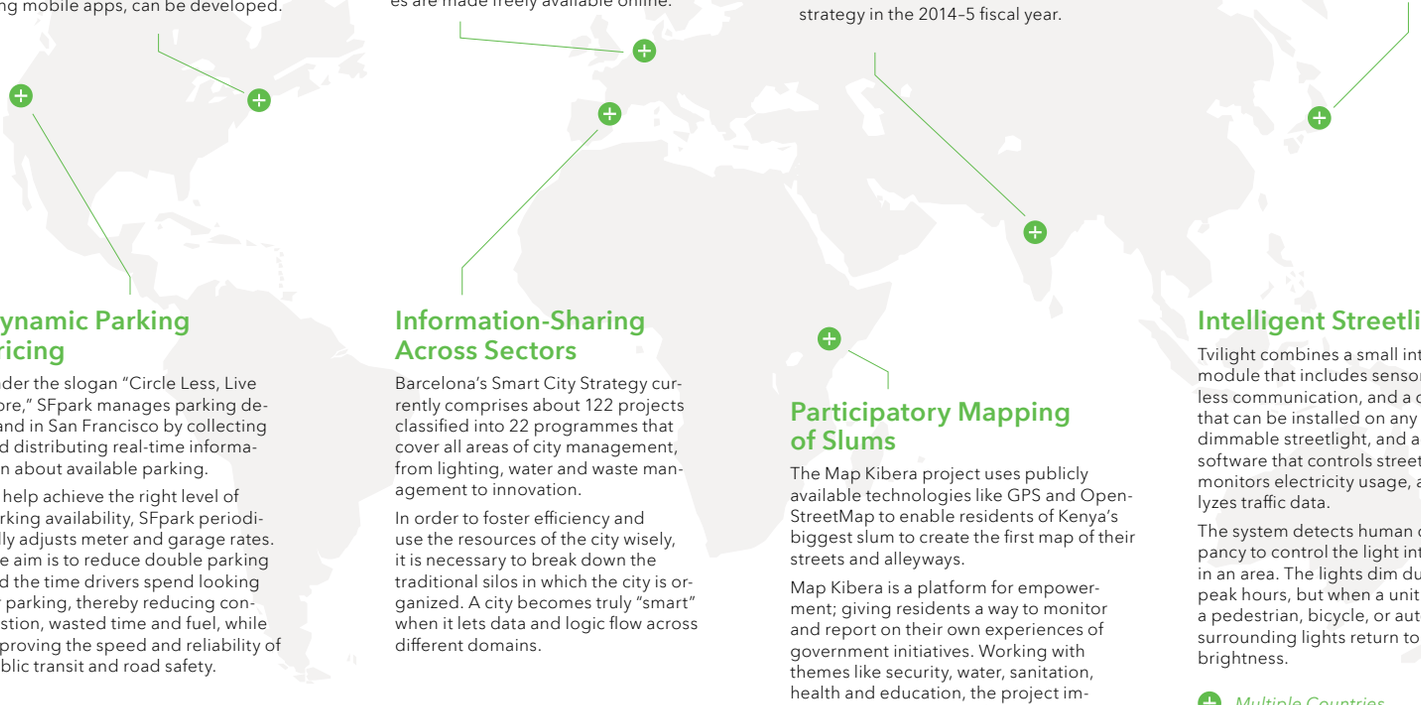
India has declared its ambition to develop 100 smart cities by 2022, setting goals for a range of areas including energy use, water and waste management, sanitation, green transportation, ICT, and smart buildings.

It also envisages developing modern satellite towns around existing cities as a part of this program. The government allocated 1.2 bn USD to the Smart Cities strategy in the 2014–5 fiscal year.

Cooperation Between Citizens, Businesses and the City

The Yokohama Smart City Project (YSCP) is an effort to develop a model for smart cities by means of cooperation between citizens, private companies, and the municipality.

The project focuses on large-scale operational experiments in energy management, organized by the City of Yokohama and private partners.



Dynamic Parking Pricing

Under the slogan "Circle Less, Live More," SFpark manages parking demand in San Francisco by collecting and distributing real-time information about available parking.

To help achieve the right level of parking availability, SFpark periodically adjusts meter and garage rates. The aim is to reduce double parking and the time drivers spend looking for parking, thereby reducing congestion, wasted time and fuel, while improving the speed and reliability of public transit and road safety.

Information-Sharing Across Sectors

Barcelona's Smart City Strategy currently comprises about 122 projects classified into 22 programmes that cover all areas of city management, from lighting, water and waste management to innovation.

In order to foster efficiency and use the resources of the city wisely, it is necessary to break down the traditional silos in which the city is organized. A city becomes truly "smart" when it lets data and logic flow across different domains.

Participatory Mapping of Slums

The Map Kibera project uses publicly available technologies like GPS and OpenStreetMap to enable residents of Kenya's biggest slum to create the first map of their streets and alleyways.

Map Kibera is a platform for empowerment; giving residents a way to monitor and report on their own experiences of government initiatives. Working with themes like security, water, sanitation, health and education, the project improves the livelihoods of the residents in a participatory process.

Intelligent Streetlights

Tvilight combines a small intelligent module that includes sensors, wireless communication, and a dimmer that can be installed on any existing dimmable streetlight, and advanced software that controls streetlights, monitors electricity usage, and analyzes traffic data.

The system detects human occupancy to control the light intensity in an area. The lights dim during off-peak hours, but when a unit detects a pedestrian, bicycle, or automobile, surrounding lights return to full brightness.

Multiple Countries

CO-BENEFITS

ENERGY SAVINGS

Better information on energy use opens for significant energy savings and consequently less pressure on the environment. An estimate puts the potential global savings at 170 bn kWh per year.

EFFICIENT POWER GRIDS

It costs to modernize the electricity grid. However, studies have calculated that the related savings exceed the costs by far. A recent study estimated the cost to realise a US Smart Grid is about 400 bn USD, but the benefits exceed this by a factor of 4.5.

EFFICIENT BUILDINGS

Improving energy management in commercial buildings, including investment in more advanced control systems and recommissioning buildings to ensure they are functioning properly has strong return on investment, about 40 percent for new buildings and 90 percent for older buildings.

EASY TRANSPORTATION CHOICES

In many cities, it is hard for citizens to learn how to travel while generating the least amount of emissions, or to find safe routes for biking. Smart cities use geodata and publish real-time information about current traffic conditions and transportation alternatives so citizens can better plan their journeys.

SECURITY AND SAFETY

Many people are afraid to walk in neighbourhoods that they believe are dangerous. Providing open, reliable statistics about crime in all areas of a city can help make its citizens feel more secure.

CONSUMER SAVINGS

It has been estimated that by implementing smart meters European households can save 10 percent of their consumption. That corresponds to an average of around 60 Euros per year per household.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
- **Smart Cities**
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

SURVEY RESULTS:

The Top Choice in China

The **Smart Cities** opportunity is one of the best rated opportunities for its potential for business. Respondents in the large *other businesses* sector rate it as the opportunity with the greatest positive impact on business, and it is also close to the top in the governmental sector. Respondents in the service sector have assessed this opportunity to be the one most likely to inspire new business ventures. Respondents from the finance sector are also likely to seek to develop new business ventures inspired by this opportunity.

The strong potential for business is also reflected in the geographical cross-section of responses. In China it is the opportunity most respondents believe will inspire new business.

However if the business potential is strong, investors might have to wait a bit. In many regions a majority of respondents believe they will have to wait at least five years for this opportunity to reach full potential.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.

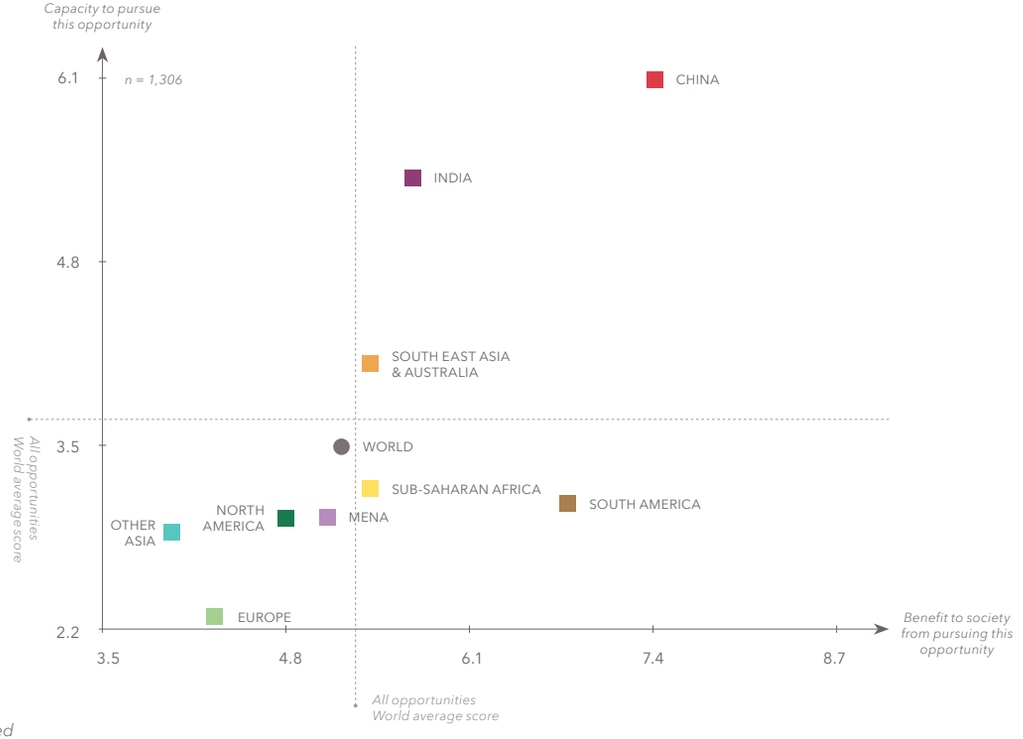


Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

OPPORTUNITY AT A GLANCE:

Favourite among the Young

Smart Cities is one of the most positively rated opportunities among the younger age group below 30 when assessed for potential for positively impacting society.

More Development Needed

Respondents have assessed this opportunity to be in the very low end when assessing the institutional, technological and economic capacity to pursue it.

Diversity among Regions

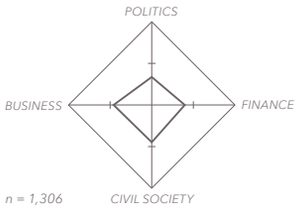
In China this opportunity is perceived to have the greatest potential of all to affect society positively – by a large margin – but it is in the lower range in the Americas and Other Asia.

New Biz for Service Sector

Respondents from the service sector have assessed smart cities to be an area in which to pursue new business. The same applies to respondents from the *other businesses* sector, who also see a very positive effect on their business from this opportunity.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

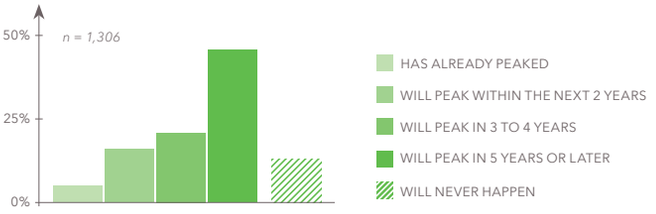


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

4.0

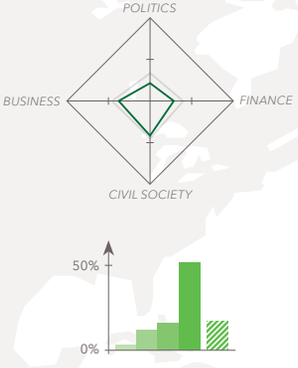
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

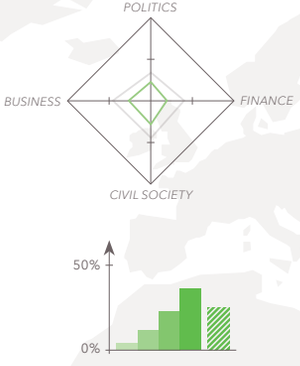


Regional results

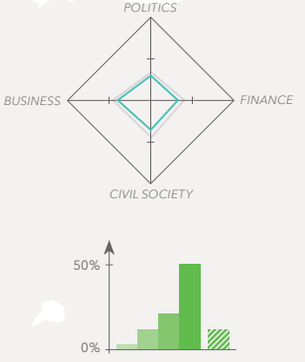
NORTH AMERICA



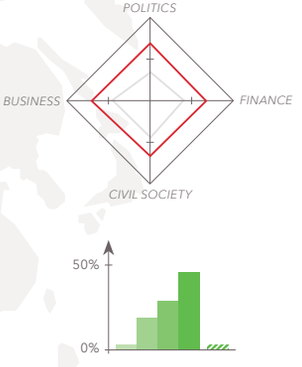
EUROPE



OTHER ASIA



CHINA



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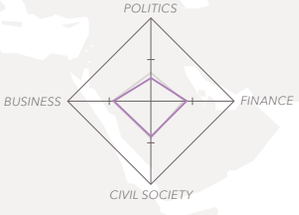

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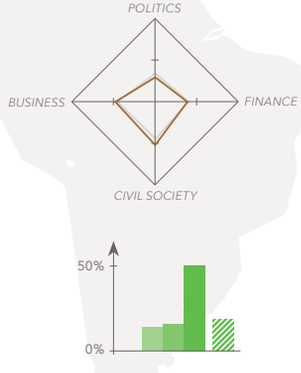

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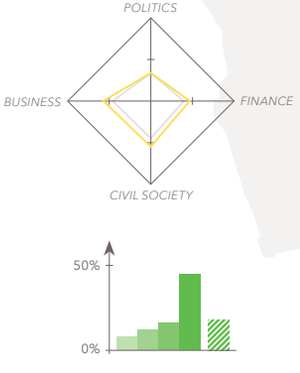

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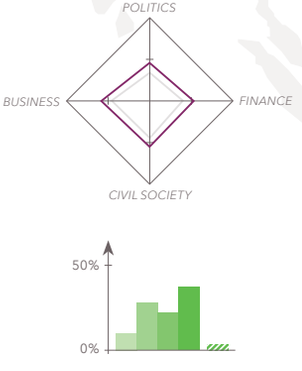
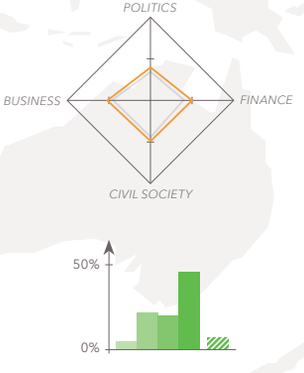


SOUTH EAST ASIA & AUSTRALIA



MORE OPPORTUNITIES

This report presents 15 opportunities based on the insights gathered at eight workshops – Opportunity Panels – conducted on five continents with more then 200 experts and sustainability professionals. However, one report cannot do justice to all the great ideas generated, and by no means do we claim these to be the only opportunities out there. To round off this section of opportunities, we briefly present five additional opportunities inspired by the work with the report.

COLLABORATION FOR SUSTAINABLE URBAN AREAS

Greater collaboration between cities for sharing best practices is vital and has already been initiated to some extent. However, seeing as cities are entities of great political and economic power, intensifying and developing collaboration between them could result in considerable impact.

MODULAR PLAYBOOK FOR SUSTAINABLE CITIES

Developing a comprehensive, strategic collection of best practices for metropolitan expansion and resilience or regeneration could be a valuable contribution to the development of sustainable cities. It should have a long-term outlook and be modular in order to ensure flexibility and adaptability. It should also encompass policy and legal options or strategies.

M-MOBILITY

m-Mobility is a way of utilising mobile technologies for enhancing mobility and optimising the use of available space and resources. This could include apps to determine the best road and bicycle routes or conditions, and an integrated ticketing system allowing passengers to use different modes of transport on the same journey.

RESILIENT AND RECYCLING CITIES

Cities could be made more resilient by improving their energy and resource use efficiency, partly in terms of recycling and introducing means of accommodating transport needs (both for people and goods). This involves people-centred approach, which creates benefits for society, business, and the economy, and ensures sustainable cities, even when they are growing fast.

URBAN PUBLIC-PRIVATE PARTNERSHIP CLUSTERS

Creation of clusters of regional development with Public-Private partnerships. Building the clusters away from the megacities will spread the opportunity for all and retain people in their localities. The use of such collaborative platforms could accelerate improvements in quality of life and in access to better services.

YOUR NOTES:

HOW WILL YOU ENGAGE YOUR ORGANIZATION TO SEARCH FOR **NEW OPPORTUNITIES**?

RISK 4

NON-COMMUNICABLE DISEASES

Non-Communicable Diseases (NCDs), including cardiovascular diseases, cancers, diabetes, and chronic lung diseases, pose a significant threat to lives, livelihoods and economic development globally.

NON-COMMUNICABLE DISEASES

Non-Communicable Diseases (NCDs) pose a significant threat to lives, livelihoods and economic development globally.

NCDs affect an increasing number of people globally, causing a range of detrimental effects including loss of life expectancy or quality, lower (to no) income, missed opportunities for education and weakened family ties. The impact NCDs have on health systems and services also threatens to compound the problem of rising healthcare costs.

NCDs are often chronic in the sense that they are long-term conditions that, although they may be controlled, are often incurable. Previously seen as "affluence diseases", statistics now show that about three quarters of all NCD deaths occur in low- or lower-middle-income countries, where NCDs are rising fast.

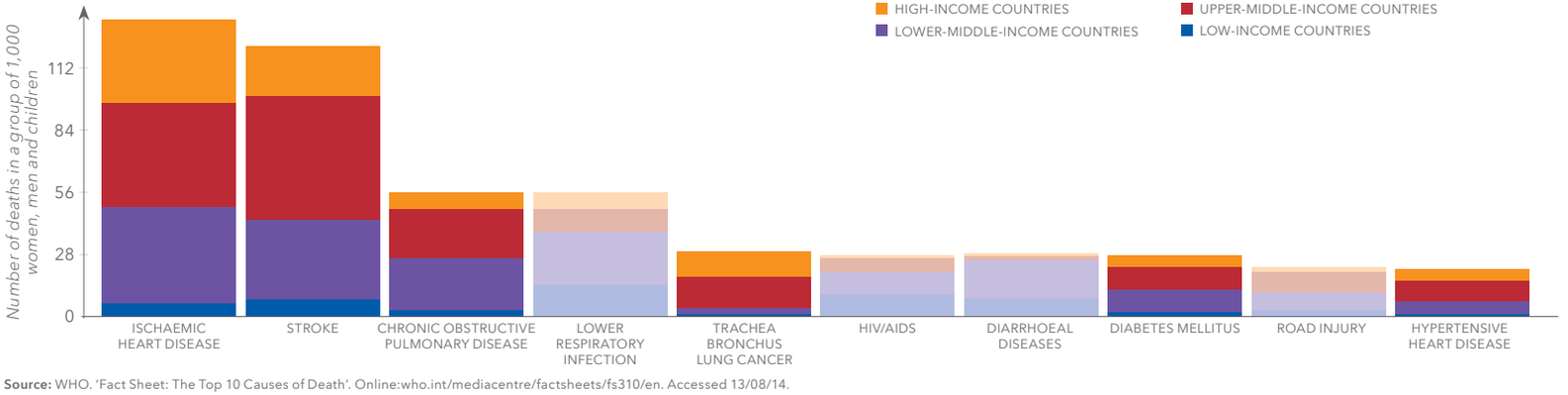
The prevalence of NCDs relates to various things including social and economic inequality as well as the more immediate factors listed below:

- Physical inactivity is linked to the rise of metabolic and cardiovascular diseases along with certain cancers.
- Environmental factors are significant contributors to the development of respiratory and cardiovascular diseases.
- Poor diet may relate to salt, sugar, fat or quantity of food consumed. It is correlated to metabolic diseases and even linked to certain cancers.
- Tobacco increases chronic lung disease and cancer.
- Alcohol abuse increases prevalence of metabolic disease and cancers.

Chronic diseases are a growing burden both in terms of the direct costs of healthcare (where available) and as a loss of productivity. Despite healthcare efforts, the loss of "healthy life years" caused by NCDs is far greater than other conditions. In all, a continued rise in chronic NCDs is a serious threat to life, happiness and economic growth, especially where the options for treatment are limited and the environmental factors behind the rise are strongest.

6 OUT OF 10 GREATEST KILLERS ARE NCDs

Top 10 causes of death across country income groups. Non NCDs are greyed out.



Source: WHO. 'Fact Sheet: The Top 10 Causes of Death'. Online:who.int/mediacentre/factsheets/fs310/en. Accessed 13/08/14.

FACTS AND FIGURES

NCDs are the top cause of death globally, killing 36 million people every year and accounting for 68 percent of all deaths in 2012.

Nearly 80 percent of NCD deaths – 29 million – occur in low- and middle-income economies.

IMPACTS

*In the **USA** sedentary jobs have increased by 83 percent since 1950. Physically active jobs now make up about 25 percent of the workforce, 50 percent less than in 1950. Obesity costs American companies 225.8 bn USD per year in productivity losses. An obese employee costs employers an additional 460–2,500 USD in medical costs and sick days per year.*

*Studies in **China** showed that tobacco use increased the risk of sick leave by 32 percent to 56 percent.*

*In 2004 an estimated 1.4 million to 2 million **Indians** experience grave economic consequences and 600,000 to 800,000 people were impoverished by the costs of caring for cardiovascular disease and cancer.*

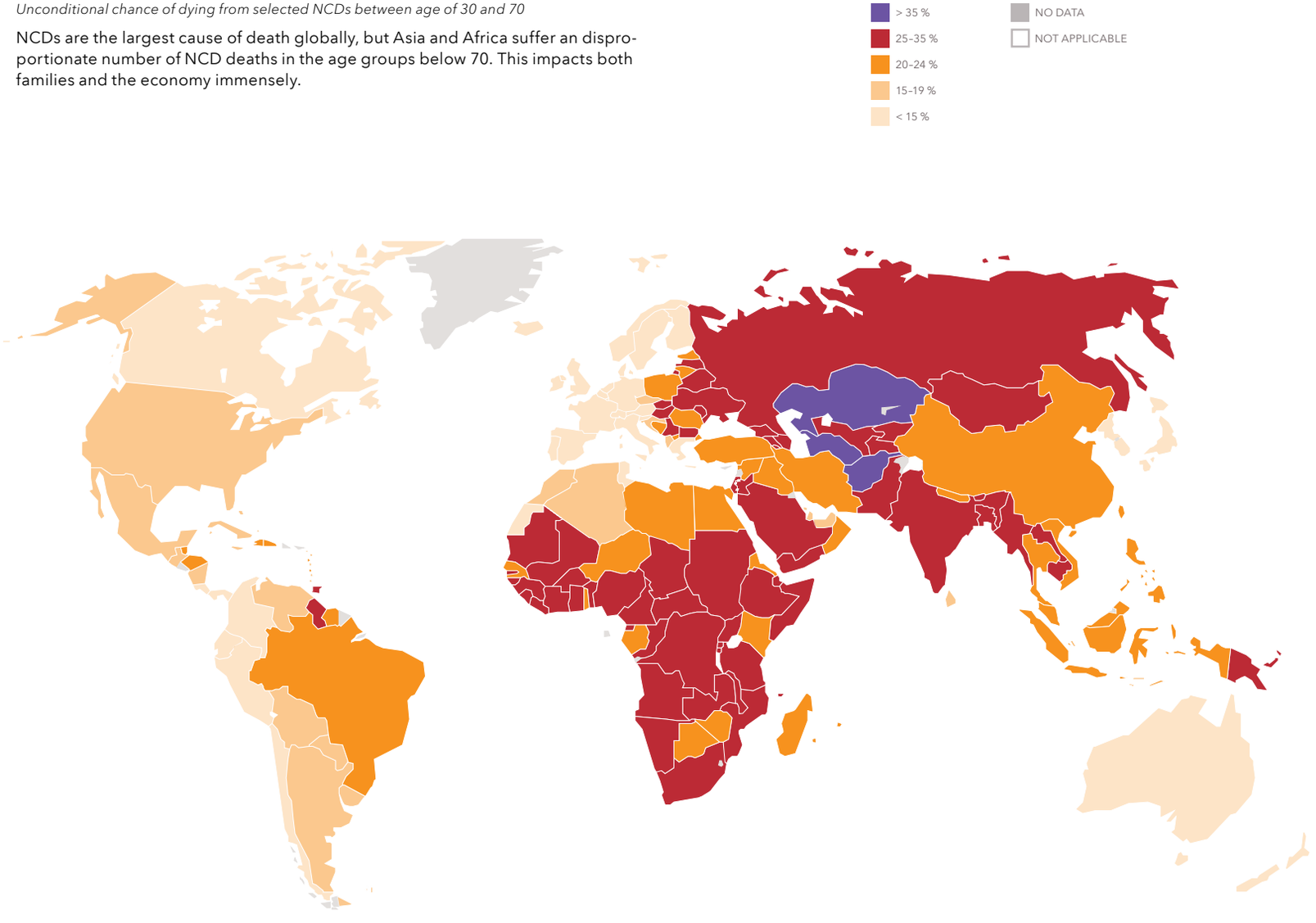
*In **SEAR** countries* around 3 billion people cook and heat their homes using solid fuels which produce high levels of household (indoor) air pollution, killing 4.3 million people a year. In the eleven Asian SEAR countries, they caused over 600,000 deaths in 2004 alone.*

* Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste.

Africa and Asia are Most Vulnerable to NCDs

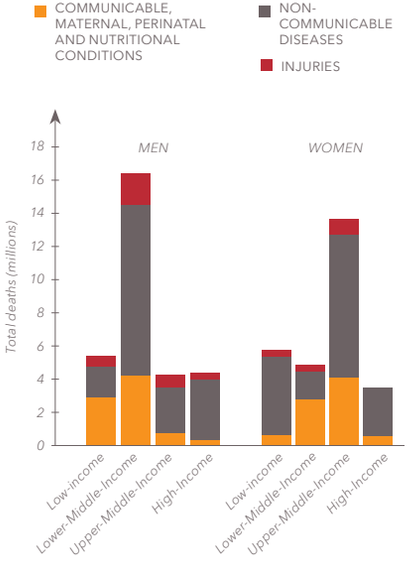
Unconditional chance of dying from selected NCDs between age of 30 and 70

NCDs are the largest cause of death globally, but Asia and Africa suffer an disproportionate number of NCD deaths in the age groups below 70. This impacts both families and the economy immensely.



NCDs COST 36 MILLION LIVES

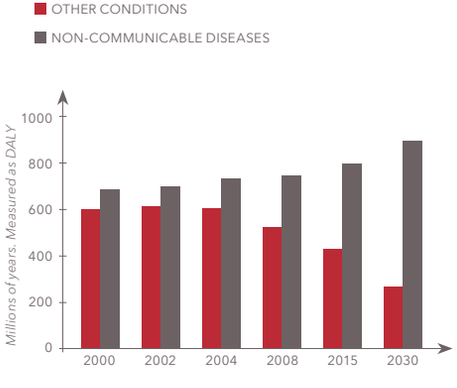
Total deaths (millions) by broad cause groups 2008



NCDs CAUSE LARGE SCALE DISABILITY

Millions of years of "health life" lost globally to NCDs and other conditions

The number of "Disability Adjusted Life Years" (DALY) lost to NCDs is already outpacing the effects of other conditions, and the gap will grow. Each DALY lost represents the loss of a healthy and productive year for one person.



Sources: Figure Left (upper) – WHO. 'Deaths from NCD's. Online:www.who.int/gho/ncd/mortality_morbidity/ncd_total_text/en Accessed 11/07/14.
Figure Left (lower) – WHO. 'The Global Burden of Disease: Updated Projections'. Report. 2008. Map – Interaction. 'Global Health: Investing in Our Future'. Report. 2013.


DYKNING UNDER BROEN FORBUDT

OPPORTUNITIES

ACHIEVING BETTER QUALITY OF LIFE

Opportunities to combat the rise of NCDs emerge when combining innovative regulation and finance with new or existing technologies. They can generate long-term benefits for those suffering from or at risk of developing an NCD, but also for policy makers and investors today.

COMBAT NCDs WITH MOBILE TECHNOLOGIES

Due to accelerating rates of network coverage and low hardware costs, mobile technologies have an almost universal reach. This can mean better access to health services and used to build stronger health systems in which patients are empowered to manage many aspects of their own conditions.

INNOVATIVE FINANCE FOR A HEALTHY GENERATION

Investing in early childhood development can be a powerful preventative tool by which to nurture a healthy and productive society. Financial mechanisms such as social impact bonds can accelerate social policy innovation and include private sector finance for health initiatives.

EVERYDAY HEALTH ENABLERS

Creating living environments that are designed to facilitate health in the form of nutritious food choices or sufficient amounts of daily physical activity can greatly reduce the social and financial impact of NCDs.

OPPORTUNITY

COMBAT NCDs WITH MOBILE TECHNOLOGIES

Mobile technologies have an almost universal reach that can be converted into better access to health services and stronger health systems.

Mobile technologies, digital communications, and social media are powerful tools that can be used to prevent NCDs by creating networks for health access and giving patients and doctors new tools for prevention and treatment. Prominently, mobile health (mHealth) initiatives that use mobile phones to gather and deliver health information have significant potential in this field.

The potential scale of this opportunity is vast, as globally there are almost as many mobile phone subscriptions as there are people. This almost universal access contributes to some of the greatest benefits of mHealth solutions: they are cost-effective and have a wide geographical and social range.

Initiatives are already being deployed around the world for a great variety of purposes. These include delivering health promotion messages regarding NCD risk factors, identifying counterfeit medicines, surveying populations, nudging individuals to rethink unhealthy behaviors, and helping to implement national NCD policies. Moreover, the relative novelty of the mHealth approach, combined with the almost universal reach of the technology, fosters innovation that can be tailored to meet both mass markets and specific needs. Notably, new sensors and technologies capable of conducting, storing, transmitting, and evaluating diagnostic tests through mobile phones are an area of rapid development.

Combined with the advent of big data, these technologies are likely to generate novel applications in the future, potentially showing great relevance to the challenge of efficiently managing medical records and creating more transparent and patient-centered healthcare. Coupled with accelerating rates of high-speed network coverage and rapidly decreasing hardware costs, mHealth approaches to combatting NCDs are becoming uniquely positioned to provide life-saving information and services to all.

Background

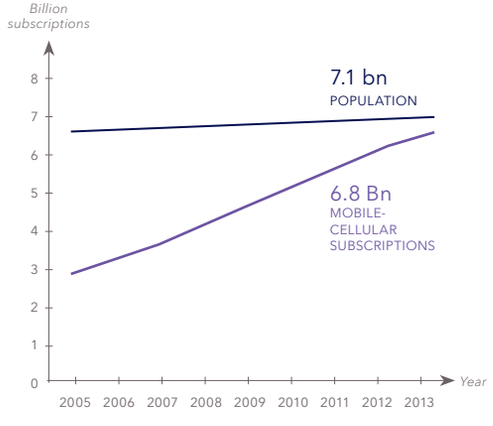
Half to two-thirds of the premature deaths attributable to NCDs annually can be avoided if established interventions to reduce risk factors such as tobacco use, unhealthy diets, physical inactivity, and the harmful use of alcohol are implemented.

Health systems that adequately cater to the needs of people suffering from NCDs could reduce mortality by up to a third.

MOBILE TECHNOLOGIES CAN REACH ALMOST EVERYONE

Mobile technologies reach more people than any conventional healthcare infrastructure or delivery system. This highlights the potential scale and impact of mHealth interventions.

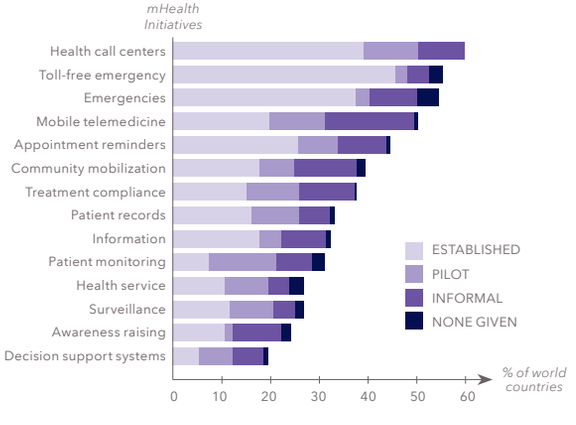
Source: mHealth Alliance. 'Five Years of Mobilizing for Health Impact: Key Achievements & Future Opportunities'. Report. 2013.



mHEALTH FOR MULTIPLE ASPECTS OF HEALTH CARE

Currently there are mHealth pilot projects seeking to discover the full potential in everything from awareness raising to treatment compliance.

Source: WHO. 'mHealth: New Horizons For Health Through Mobile Technologies'. Report. 2011.



SOLUTIONS SEIZING THIS OPPORTUNITY:

Bridging the Distance Between Patients and Health Services

Initiatives within mHealth are diverse, ranging from mass text messages to diagnostic tools that allow patients to monitor and manage their conditions. They can also enable doctors to access a much larger pool of patient data for diagnostics and treatment.

Software Linking Patients to Doctors

SANA, developed by MIT and CSAIL, is open source software for mobile phones that enables low-cost data transfers to improve health systems in low-resource settings.

Allowing any form of medical data to be captured and transmitted, SANA enables real-time remote interaction between patients and doctors.

Phones for Chronic Illness Management

Blue Star by WellDoc aims to help chronic disease patients to better manage their conditions.

It delivers clinically validated disease management tools via mobile phones, reducing hospital admissions and healthcare costs in the process.

Mobile Microphone Stethoscope

Developed by Oxford University and the University of Cape Town, this stethoscope allows patients to record their own heart rhythms using only standard hands-free mobile microphones widely available in most countries.

Data can then be sent to health professionals for inspection and diagnosis.

Text Messages for Diabetes Prevention

The mDiabetes initiative generates population-level awareness about diabetes and encourages healthier behavior by sending millions of free and culturally relevant text messages available in many languages.

Developed by Arogya World and Nokia Life, the service operates in India and has already reached one million users who are receiving the text messages over a period of six months.

Barcode Scanning for Instant Nutritional Information

Fooducate is a mobile app that allows grocery shoppers to access information about the nutritional content of thousands of food items using their smartphones.

The app also makes it possible to compare products, view the positive and negative highlights of specific items, and select better alternatives.

Free Text Messages for Identifying Counterfeit Medicine

Tackling the problem of dangerous counterfeit medicines in developing countries, the mPedigree network uses text messages to enable patients to verify drugs before using them.

It partners with legitimate drug manufacturers who label their products with a scratch-off code which can be verified by means of a free text message.

Smartphones Preventing Blindness

Consisting of a smartphone and low-cost adapter capable of capturing images of the retina, Peek Vision offers eye examinations to patients in remote areas.

Results can be shared with doctors abroad, while GPS data keeps track of patients' locations for future treatment, inspection and diagnosis.

Scaling mHealth Innovation Against NCDs

Specifically targeting NCD prevention, treatment, and policy, the global Be Healthy, Be Mobile initiative orchestrated by the WHO, IFPMA, and ITU seeks to scale up mHealth interventions or integrate mHealth operating procedures into existing NCD control activities (including smoking cessation) in various countries.

Global

CO-BENEFITS

PATIENT EMPOWERMENT

The use of mobile technology can support those suffering from NCDs by allowing them to better monitor and manage their own condition. This leads to early detection of complications as well as the possibility of avoiding excessive and expensive hospitalization.

RESEARCH AND INNOVATION

New business opportunities may arise from the collection of patient data that – with proper attention to patients' privacy – can be a valuable asset for research and innovation.

MORE WIDESPREAD AWARENESS

mHealth has proven useful in conducting household surveys, increasing health literacy, promoting healthy diets, and spreading awareness of health opportunities amongst young people.

BETTER HEALTH SYSTEMS

mHealth initiatives are already making an impact by training healthcare workers, facilitating enhanced data collection, enabling patients to voice their concerns, and delivering crucial health information to the public.

GREATER HEALTH EQUALITY

Mobile technology has the ability to reach individuals who have previously been inaccessible and thus helps to reduce inequality.

REMOTE ACCESS TO EXPERTS

In regions with few human resources, mobile technologies can offer further benefits by connecting patients or community health workers to physicians based elsewhere.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
- Smart Cities
- **Combat NCDs with Mobile Technologies**
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

The Opportunity at Hand

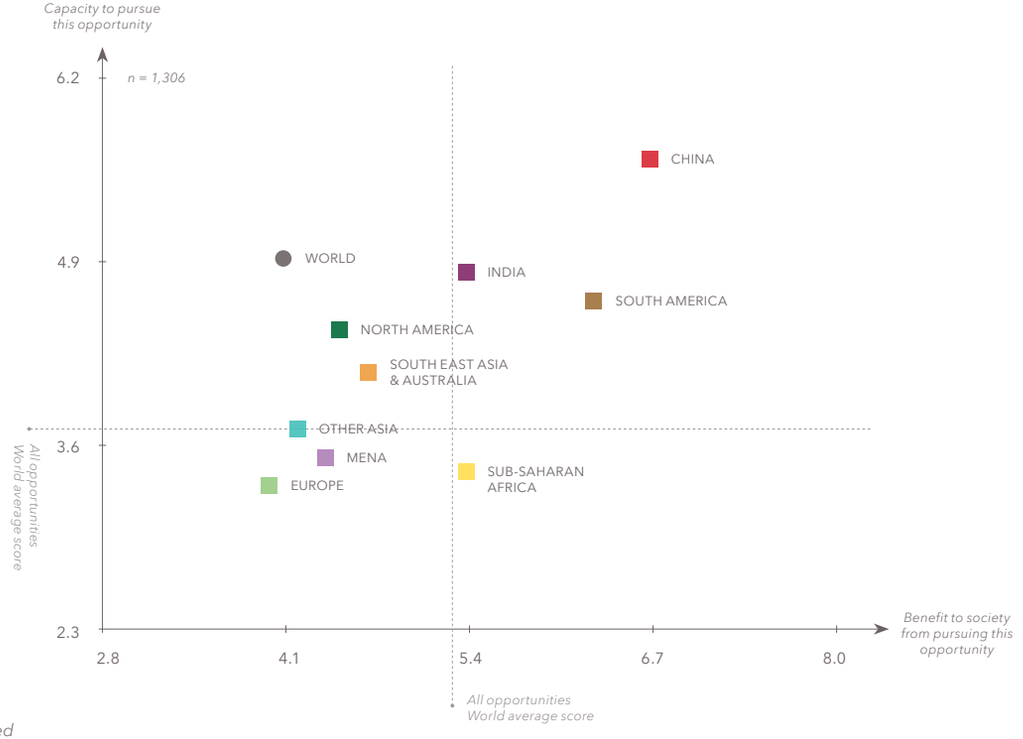
The opportunity of **Combatting NCDs with Mobile Technologies** gets mixed assessments from the survey respondents. On the one hand, when assessed across all regions for its potential positive impact on society, it is seen as the least favorable of the three opportunities related to NCDs. On the other, it performs very strongly on the same criteria in China and India.

When sectioned for business sectors the data show an opportunity that is in the lower end when assessed for the positive impact it will have on business in these sectors. Respondents from all sectors rate this opportunity well below average for the positive impact on their sectors. They also show less than average interest in pursuing new business ventures inspired by this opportunity.

When asked abut the timeliness of this opportunity there is a worldwide agreement that it will not reach full potential in the near future. However respondents from India sees this opportunity to be closer to maturity.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

Preferred for NCDs in India and China

Though this opportunity is generally assessed least positively of the NCD-related opportunities, it is with quite a large margin the preferred one in China and India.

India Expects Rapid Deployment

Respondents in China and especially India also see this as an opportunity that is much closer to reaching maturity. In India one respondent in five believe it has already peaked.

Lack of Investment Interest

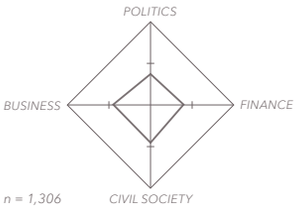
This opportunity is not inspiring much interest for new business ventures. Overall, for all sectors, it is placed as the next-least favorable.

Support Expected from Civil Society

Stakeholders from civil society, and to a lesser degree from business, politics and, finance are expected to support this opportunity.

STAKEHOLDER BACKING – GLOBAL

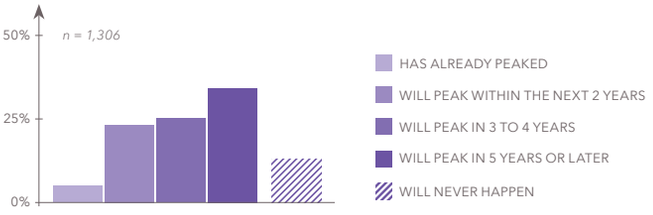
Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.



AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

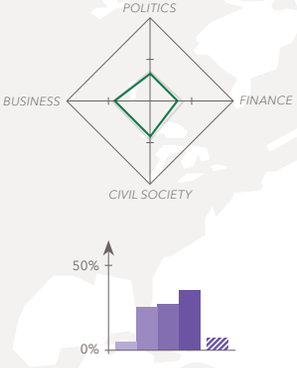
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

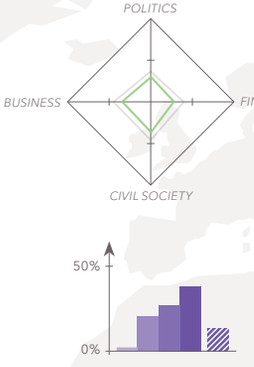


Regional results

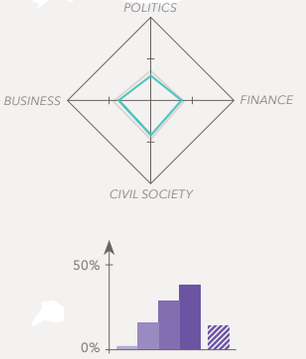
NORTH AMERICA



EUROPE



OTHER ASIA



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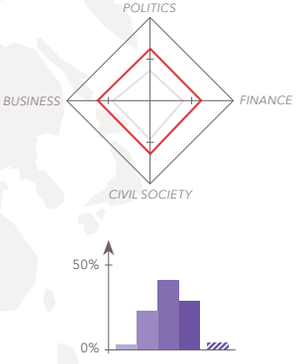

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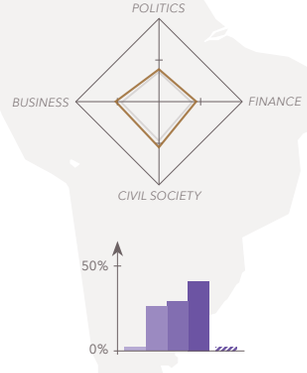
SOUTH AMERICA



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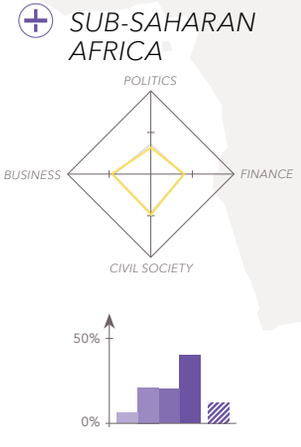
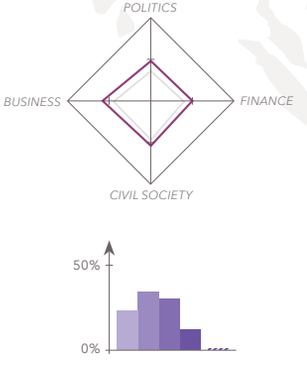
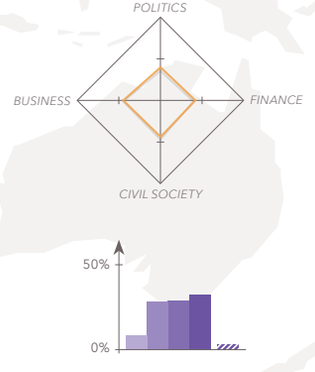


INDIA



SOUTH EAST ASIA & AUSTRALIA



OPPORTUNITY

INNOVATIVE FINANCE FOR A HEALTHY GENERATION

Financial mechanisms such as social impact bonds can accelerate social policy innovation and include private sector finance for health initiatives targeting early childhood development.

Early childhood and adolescence offer an unparalleled opportunity for investment in human capital, including the prevention of NCDs. Over half of the 36 million annual NCD deaths result from behaviors that started or were reinforced during adolescence, highlighting the long-term health potential of focusing efforts on nurturing a healthy generation.

Innovative financial mechanisms can accelerate social policy innovation and multiply societal benefits by funding proven initiatives, such as educating and supporting parents or delivering services directly to children. For example, Social Impact Bonds (SIBs) that establish "pay-for-performance" contracts between governments and investors can direct private capital towards these goals by allowing investors to share in the gains. SIBs have attracted a great deal of interest and are a viable means of funding pre-natal, early childhood, and pre-school services as well as home visits – all of which are relevant to the prevention of NCDs.

There is a strong economic rationale behind preventing new generations from repeating the mistakes of their parents. Return on investment factors of 9 to 20 are common when evaluating key preventive health services. However, as the benefits often materialize several years or decades after intervention, short term public budgets tend to overlook this low-hanging fruit.

Later in life, financial inclusion, through health insurance schemes for example, is vital to support persons who do eventually develop NCDs. This support could shield households from the excessive health care costs that push millions into poverty every year. Increasing access to the large selection of cheap generic drugs suitable for NCD treatment could be yet another approach to alleviating financial burdens and keeping people healthy and productive throughout life.

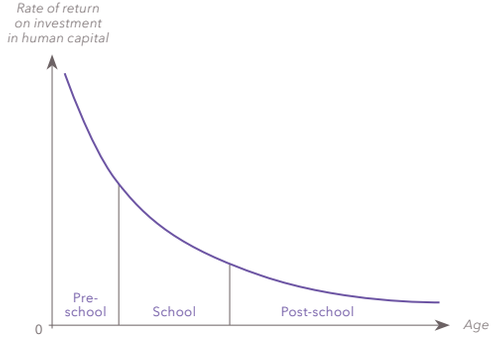
Background

People under 25 currently make up around 43 percent of the global population, rising to 60 percent in the least developed countries. The early years of childhood and adolescence exert a powerful influence on future health prospects, with factors such as maternal under- and over-nutrition or low birth weight increasing the risk of NCDs later in life. However, strained public budgets hinder the scaling of proven interventions, even though their cost is often dwarfed by the consequences of inaction.

CHILDHOOD IS THE BEST WINDOW OF INVESTMENT OPPORTUNITY

With initial investment set at equal levels across age groups, the rate of return of human capital investment is many times higher in early childhood when compared to later programs.

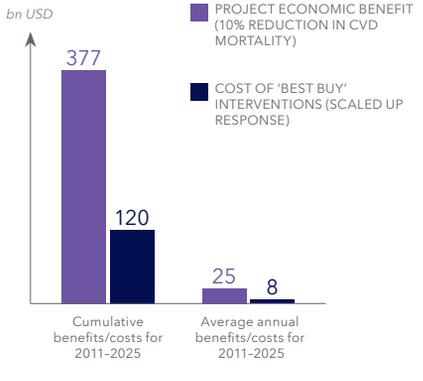
Source: Cunha et al. 'Interpreting the Evidence on Life Cycle Skill Formation'. Paper. 2005.



BENEFITS OF NCD INTERVENTIONS OUTWEIGH THE COSTS

The cost of scaling up 'best buy' interventions for cardiovascular disease (CVD) between 2011–2025 will be a fraction of the projected economic benefits.

Source: WEF. 'From Burden to "Best Buys": Reducing the Economic Impact of Non-Communicable Diseases in Low- and Middle-Income Countries'. Report. 2011.



SOLUTIONS SEIZING THIS OPPORTUNITY:

New Ways to Deliver Health Services

Solutions that focus on vulnerable population groups are prominent within this opportunity. Giving low-income families access to services can improve the general health of future generations for a relatively small investment, and new players are entering the field.

School Programs for Low-income Families

For every dollar invested in the Child Parent Centers in Chicago Public Schools, a large-scale early education program for providing services including family support to low-income households, nearly 11 USD in returns can be expected over the child's lifetime.

When accounting for the benefits arising from smoking reduction, this figure rises to 12 USD.

Freeing up Public Resources with Generic Drug Procurement

Procuring cheaper generic NCD medication would in many countriesfree up resources for other crucial needs, including early childhood development interventions.

In France, for example, a generic substitution policy saved the government almost 2 bn USD in 2008 alone. Such efficiency gains could subsequently be reinvested in preventative health initiatives targeting early childhood.

Public-Private Partnership Fights Stunting

Stunting is caused by a lack of vitamins and minerals in early childhood and increases the risk of chronic illness. The Community-Based Health and Nutrition to Reduce Stunting Project is a 131.5 million USD public-private partnership that works to reduce the incidence of stunting.

It aims to increase household incomes through cost savings, generate productivity growth, and enable higher lifetime earnings, benefiting both families and society at large.

Insurance for Access to Rural Newborn Health Services

The New Cooperative Medical Scheme is an innovative social health insurance mechanism implemented in China to decrease the financial barriers for poor households to gain access to newborn health services.

Subsidies for facility births in rural areas are a key tool in the strategy. In collaboration with UNICEF, this was achieved by means of evidence-driven assessments, advocacy for support policy revisions, and the development of new policies.

Social Impact Bond to Prevent Asthma Emergencies

The Asthma Management Demonstration Project aims to develop a Social Impact Bond to scale the benefits of improving the health of children from low-income families suffering from asthma. Reduced cost of emergency hospital visits will fund the bond.

Rigorous data collection and evaluation methodologies are used to measure the social and financial benefits of upfront investment in asthma.

Social Impact Bond for Quality Preschool Services

In 2013, the first Social Impact Bond for financing early childhood was established in Utah to support a targeted curriculum program focused on increasing school readiness and academic performance among at-risk 3 to 4-year-olds, which have proven NCD prevention value.

The associated potential for savings on remedial services arising from this Pay-for-Success agreement covering a seven-year period exceeds potential payments to lenders.

Identifying and Alleviating Financial Barriers to Health

The Ministry of Health in Timor-Leste adopted an innovative community-based approach to alleviate barriers to maternal and child health services in vulnerable populations.

Making it easier to identify the women at highest risk, community action plans including financial incentives and micro-credits have greatly increased the percentage of women accessing institutions for delivery.

Early Childhood Care as a Social Investment

In line with the growing interest in social investing, which focuses on both social and financial return, the GoodStart Syndicate was established across the public, private, and community sectors to provide child care services in Australia.

Goodstart Early Learning functions as a non-profit that reinvests all surplus funds to improve its services. Serving more than 72,000 children, it is the biggest social enterprise of its kind in the country.

CO-BENEFITS

RESILIENT SOCIETIES

Benefiting entire communities, early childhood development programs are an extremely cost-effective means by which to promote resilient societies in the future. Programs can focus on varying goals such as reducing dropout rates, improving school achievements, increasing adult productivity, or raising levels of social functioning.

GREATER PRODUCTIVITY

About half of business leaders believe NCDs will hurt their company's bottom line in the next five years. Consequently, protecting children from NCDs will also create a more productive workforce in the future.

MACROECONOMIC GAINS

Preventative measures also pay off on a national scale. For example, reducing the mortality rate for ischaemic heart disease and stroke by 10 percent reduces economic losses in low- and middle-income countries by around USD25 billion per year. This is three times the cost of intervention.

BENEFITS FOR ALL STAKEHOLDERS

SIBs create benefits for all stakeholders. Governments enjoy the fact that savings can occur across agencies, while taxpayers are protected from the risk of innovation. Service providers also benefit from the dependable multi-year flow of funding that can help them scale operations. Philanthropic investors are attracted to the rigorous performance assessments associated, while commercial investors get the opportunity to enter a promising new market.

EXCELLENT RATES OF RETURN

The benefits of investing in early childhood development can far outweigh the costs. For example, one preschool program yielded USD 8.14 in benefits per USD1 invested by the time children reached the age of 27.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- **Innovative Finance for a Healthy Generation**
- Energy Autonomy
- Early Warning and Forecasting Services
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

The American Choice to Counter NCDs

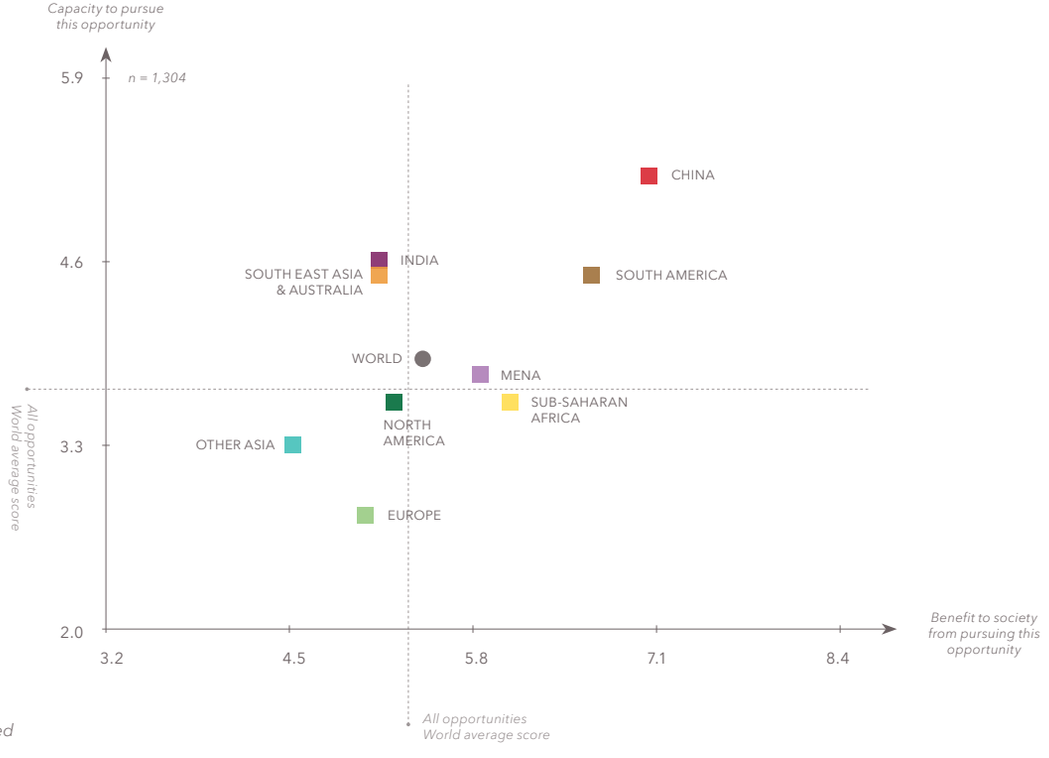
The **Innovative Finance for a Healthy Generation** is seen as the best choice of the three opportunities to fight NCDs in North and South America assessed on its potential positive impact on societies. It shares first position with **Everyday Health Enablers** in Sub-Saharan Africa.

As this opportunity places a great focus on developing new finance mechanisms, the response from the finance sector is of special interest. Respondents in this sector place it in the lower end of the range both when it comes to assessing the opportunity's potential positive impact on business in general and to the likelihood that this opportunity will inspire new business ventures. Respondents from the finance sector also assess the potential positive impact on society from pursuing this opportunity to be below the average of all opportunities.

Overall it is placed in the middle range of opportunities. This is true both when it comes to impact on society and impact on business. Respondents from the service sector however rate it highly in terms of positive impact on business.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

Preferred for NCDs in Americas

Respondents from South and North America rate this highest for its impact on society of the three opportunities to fight non-communicable diseases.

Business in South Seen as Positive

While globally, civil society stakeholders are expected to react most favorably to this opportunity, in Sub-Saharan Africa and South America business stakeholders are seen as most positive.

Not Picked Up by Finance Sector

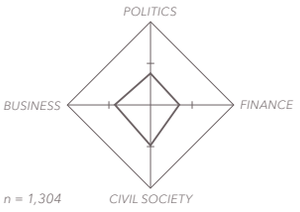
Though this opportunity has a strong focus on developing new financial tools, respondents from the finance sector assess it as one of the less favorable opportunities for business.

Service Sector Potential

The service sector respondents place this – along with the other NCD opportunities – at the high end when assessed on benefits and opportunities for business.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

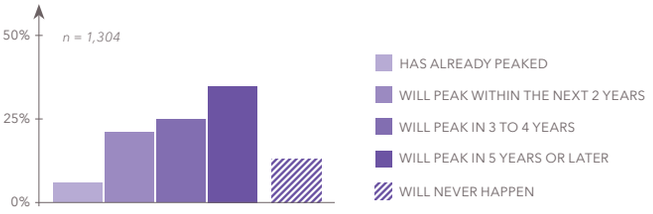


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

4.0

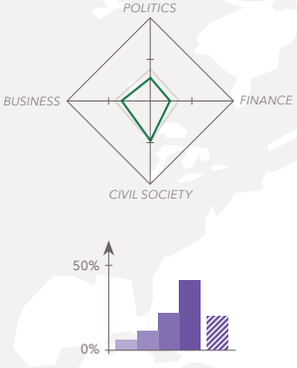
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

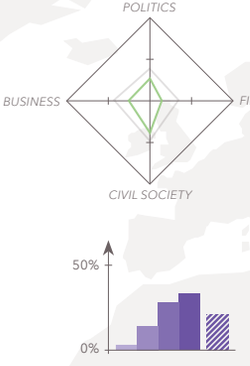


Regional results

NORTH AMERICA



EUROPE



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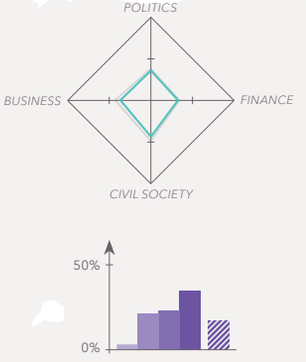
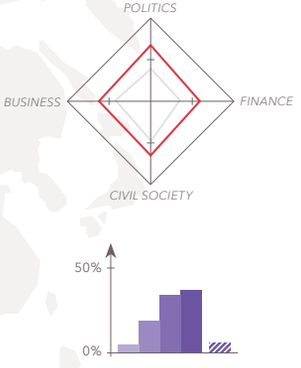


CHINA



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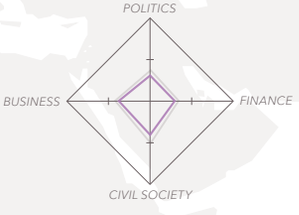
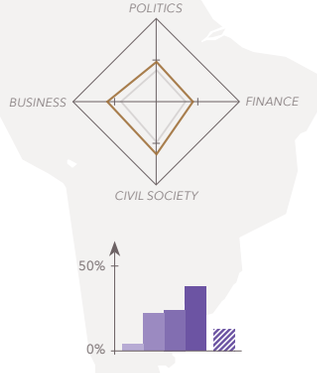
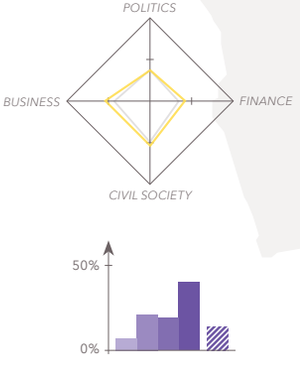


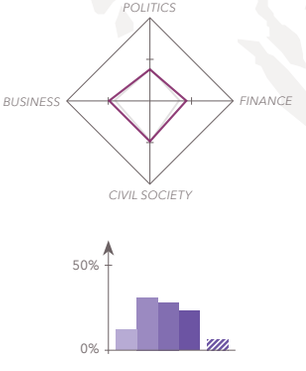
SOUTH AMERICA



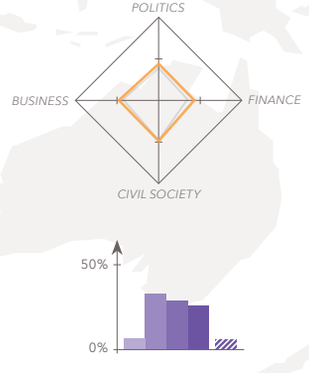
SUB-SAHARAN AFRICA



INDIA



SOUTH EAST ASIA & AUSTRALIA



OPPORTUNITY

+ EVERYDAY HEALTH ENABLERS

Environments that facilitate health in the form of nutritious food choices or sufficient amounts of daily physical activity can greatly reduce the social and financial impact of NCDs.

Much of the global NCD burden could be alleviated if healthy options were the natural ones with regard to the many daily choices people face. Making it easy for people to enjoy healthy diets and engage in sufficient daily physical activity are important aspects of this approach.

According to the WHO, 2.7 million lives could be saved annually by increasing fruit and vegetable consumption. One way of realizing this potential gain is by targeting existing price barriers for these foods. Food taxes, subsidies, price promotions, vouchers, and rewards are among the effective interventions and incentives that can be used to address price barriers. Tax revenues can subsequently be channelled towards health promotion efforts to multiply the positive impact.

Food suppliers can also be incentivized to provide healthy food by applying a "polluter pays" principle to the industry. This would require companies to pay for the proven health costs of unhealthy foods high in, for example, sodium. Alternatively, in lower-income settings, mechanisms such as conditional cash transfers can be a powerful social investment and an effective means of enabling healthy food choices.

Equally, as physical inactivity is the fourth-highest risk factor for mortality worldwide, designing compact cities that facilitate movement is another important enabler of health for people at all income levels. Since people spend 70 to 90 percent of their time indoors, designing workplaces, schools, and homes that encourage physical activity can help to combat the growing problem of sedentary lifestyles. Healthy employees mean a more productive workforce for businesses and less pressure placed on national health systems. Infrastructure such as bike lanes or pedestrian-friendly roads that enable active transportation can generate financial gains while improving the health of entire populations.

Background

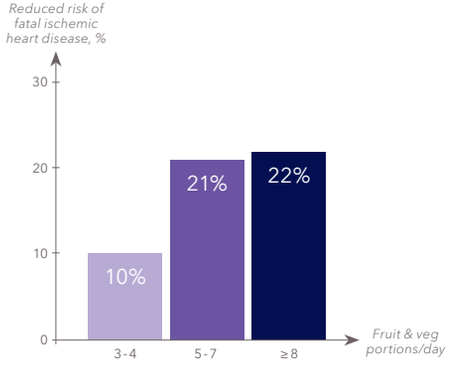
Many different types of barriers prevent people from making healthy choices in their daily lives. For example, the prevalence of sedentary jobs combined with infrastructure that makes physically active transport unpleasant or impossible means that many city dwellers do not engage in enough physical activity, lack of which causes 6 percent of all deaths globally.

Likewise, although healthy diets rich in fresh fruits and vegetables can reduce the risk of various NCDs, cheap and prevalent fast foods high in salt and fat are often the easiest or most affordable options.

FRUITS AND VEGETABLES CAN SAVE LIVES

An increased intake of fruit and vegetables will lower the risk of heart disease.

Source: Crowe, F. L. et al. 'Fruit and vegetable intake and mortality from ishaemic heart disese: results from the European Prospective Investigation into Cancer and Nutrition (EPIC)-Heart study'. European Heart Journal. 2011

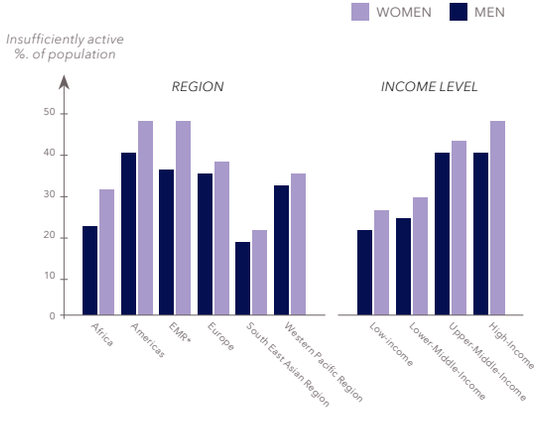


BIG POTENTIAL FOR REDUCING NCDs WITH MORE PHYSICAL ACTIVITY

20 to 45 percent of populations across regions are insufficiently physically active, especially in upper-middle and high-income countries.

Source: WHO. 'Prevalence of insufficient physical activity'. Online: who.int/gho/ncd/risk_factors/physical_activity_text/en/

* EMR = Eastern Mediterranean Region



SOLUTIONS SEIZING THIS OPPORTUNITY:

Making Health the Easier Choice

Initiatives to make everyday life healthier are often about connecting the dots, like putting farmers in contact with customers or enabling citydwellers to move from A to B while benefiting from lifesaving exercise.

Equalizing Access to Health Facilities

Children and adults residing in low-income areas of urban Honolulu engage in lower amounts of physical activity, partly because they lack access to safe exercise facilities.

To help solve this problem, a joint-use agreement called In-Motion was established to make use of existing school facilities previously inaccessible on weekends and evenings. Community members are offered activity programs and the opportunity to exercise free of charge.

Incentivizing the Supply of Healthy Food Options

The Healthy Food Financing Initiative provides one-time grants and loans to improve access to healthy food in underserved areas by developing or expanding corner stores, farmers markets, and other forms of healthy food retail.

In Pennsylvania, the model helped develop 88 healthy food retailers and created thousands of jobs.

Clear Labelling of Healthy Food Products

The Nordic countries of Norway, Sweden and Denmark have adopted a common Green Keyhole food labelling scheme to help consumers recognize healthier food options.

As a voluntary scheme for food producers, items bearing the symbol must conform to nutritional regulations in certain food groups.

Using Food Tax Revenues to Invest in Health

Revenues from taxes on unhealthy foods can be channelled towards health promotion efforts in order to multiply their positive health impacts.

In French Polynesia, for example, the Etablissement Pour la Prevention used revenue generated from a tax on alcohol and sweetened snacks or drinks to fund health promotion efforts, including obesity prevention.

Effective Governance Transforming the Built Environment

By means of significant institutional and urban transformations throughout the 1990s and 2000s, the city of Bogotá has reduced car dependency and enabled physical activity in the city.

Having overcome significant obstacles, the initiative has been praised for reducing the use of private vehicles and promoting active transportation.

Conditional Cash Transfers for Healthier Eating

The Brazilian conditional cash transfer system called bolsa familia, which has 13.9 million households enrolled (2012), provides families with extra income to spend on food.

The program has encouraged greater consumption of green vegetables, according to one review. The scheme is also cost effective, returning 1.78 reais to the economy per real invested.

Daily Dose of Healthy School Food

Daily access to nutritious food at school is crucial for children's development. In Côte d'Ivoire, a 'farmer-to-school' model called One School, One Canteen provides smallholder famers with the technical and financial support they need to supply healthy school meals. As such, the scheme benefits local economic development, child health, and the environment simultaneously.

In one academic year, 265,000 schoolchildren in 2,027 schools benefited from the initiative.

Workplace Built to Enable Health

The Sahibinden.com office space is packed with features to encourage its occupants to be physically active throughout the workday.

It is encircled by a 250m running track used for walking meetings, has a fully-equipped gym and sports facilities with free personal training, yoga, pilates, and dance lessons, ergonomic furniture, indoor air quality systems, and even a "rainforest" room to facilitate brainstorming.

CO-BENEFITS

STRONG ENVIRONMENTAL SYNERGY

Healthy foods such as fruits and vegetables often have a low environmental impact. As the growing world population will require food production to rise by 50 percent by 2030, prioritizing healthy low-impact foods over resource-intensive ones will be of significant environmental benefit. Also, empowering city dwellers to engage in active transportation would improve health while reducing emissions.

GREATER WORKFORCE PRODUCTIVITY

Businesses stand to benefit greatly from reduced costs and the higher productivity of employees who enjoy daily health enablers in their workplaces and commutes.

REDUCING INEQUALITY

By allowing low-income families the financial freedom to invest in better quality food, which is capable of helping children remain attentive during school hours, reducing price barriers has the potential to help reduce social inequality.

LOWERING ANNUAL DIRECT MEDICAL COSTS

In the USA, research has shown that being active can translate into a USD 1,429 saving on medical expenses due to factors associated with obesity.

BUILDING COMMUNITY SPIRIT

Increasing levels of participation in appropriate sport and physical activity can contribute to social cohesion, neighbourhood revitalization and an increased sense of communal identity. Increased public investments in infrastructure can also yield societal benefits, such as new job opportunities.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- **Everyday Health Enablers**
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

The Top Business Opportunity

Where the opportunity **Everyday Health Enablers** really stands out is in its impact on business. It is the opportunity which respondents across all sectors rate as having greatest positive effect on business and it also performs strongly when assessed for its capacity to inspire new business ventures.

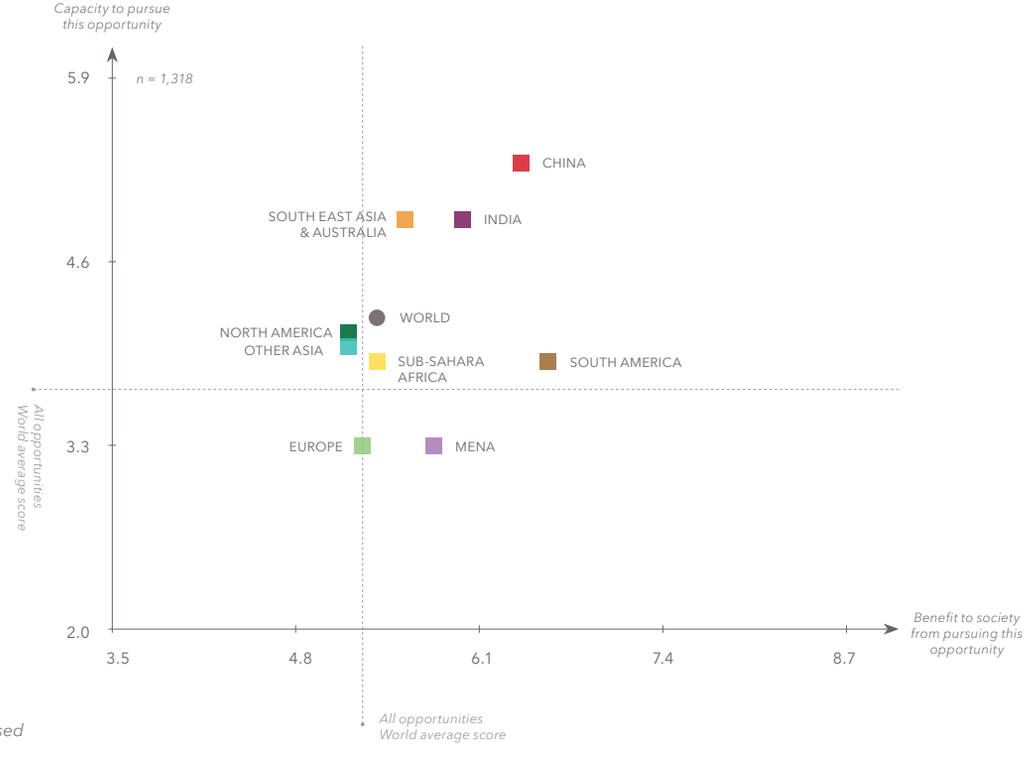
Respondents in the finance and service sectors are in particular positive towards this opportunity, and even though it is rated less favorably by the governmental sector, this opportunity is seen as one of the most likely to be pursued actively by respondents in this sector.

Geographically, the opportunity of **Everyday Health Enablers** is doing well across most regions. Though it gets few top rankings, the consistently positive responses adds up to a place as the second highest rated opportunity in terms of the potential positive impact on societies.

The expected backing from stakeholders is strongest for civil society and business stakeholders in all regions except China, where the image is flipped, so politics and finance stakeholders are seen as most positive.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

Top NCD Opportunity

This opportunity is the best rated of the three that address NCDs. It is also very close to being the overall best assessed opportunity.

Most Favorable for Business

This opportunity is assessed as the one of all 15 opportunities that is most beneficial to business across all sectors, and is specifically top rated by respondents from the financial and service sectors.

Consistently High Score

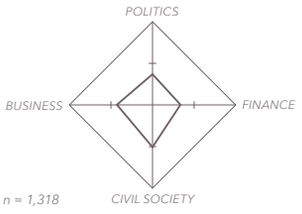
Respondents across regions consistently rate Everyday Health Enablers highly. Only in one region, India, is it among the five least favored opportunities.

Driven by Civil Society and Business

The perceived stakeholder backing for this opportunity is greatest with stakeholders from civil society and from business. This is true for all regions except China.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

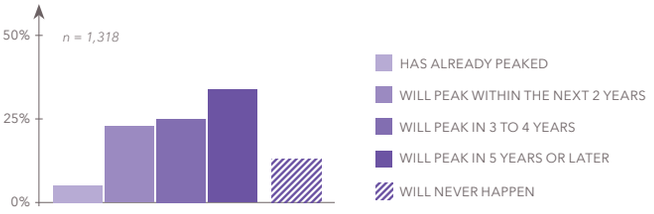


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

4.0

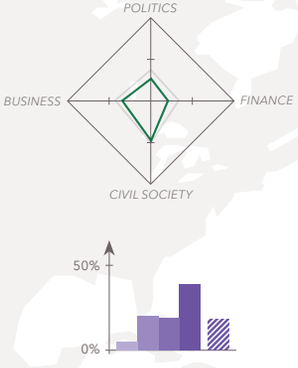
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

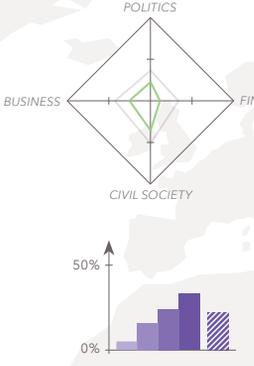


Regional results

NORTH AMERICA



EUROPE



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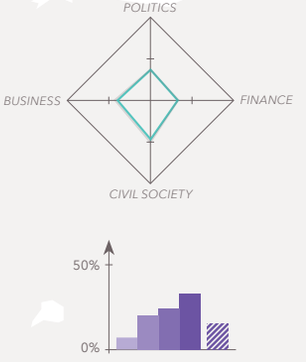
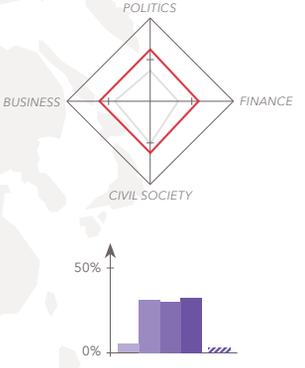


CHINA



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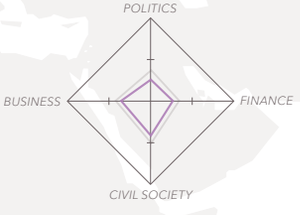
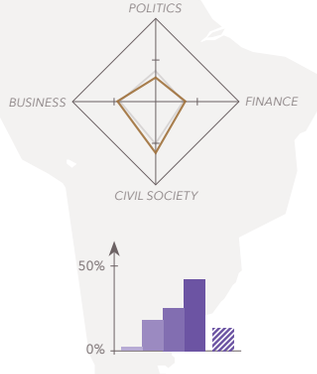


SOUTH AMERICA



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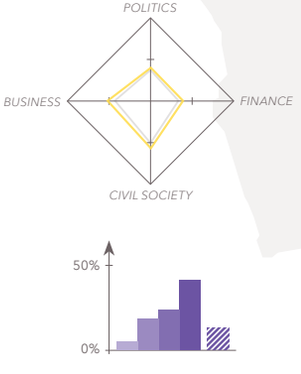
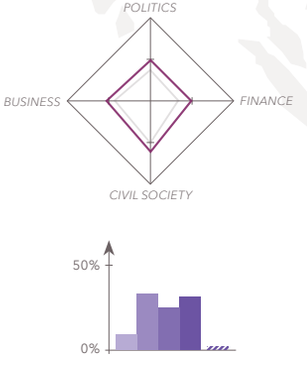
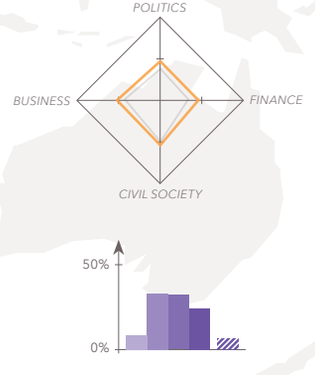


INDIA



SOUTH EAST ASIA & AUSTRALIA



MORE OPPORTUNITIES

This report presents 15 opportunities based on the insights gathered at eight workshops – Opportunity Panels – conducted on five continents with more then 200 experts and sustainability professionals. However, one report cannot do justice to all the great ideas generated, and by no means do we claim these to be the only opportunities out there. To round off this section of opportunities, we briefly present five additional opportunities inspired by the work with the report.

ROBUST HEALTH SYSTEMS

In order to be able to plan and pursue opportunities and solutions within the health sector, it is vital that the local, national, and global health systems include strong public organizations and financing including modern governance and policy development. Further, as data play a crucial role, it is necessary to ensure access to standardized health records and data across systems.

EDUCATION AND AWARENESS RAISING

As many NCD risk factors are lifestyle-related, education and awareness raising can be instrumental tools of prevention. In addition to social media campaigns and health education initiatives, schools and set curricula could be used to help equip children with healthy habits from an early age.

HEALTHY WORKPLACES

As the number of sedentary jobs increases, there are clear benefits associated with designing healthy workplaces to enable and incentivize healthy behaviour while at work. This is an opportunity to both improve individuals' health prospects and save employers large sums.

COMBAT POLLUTION

Successfully tackling air pollution (indoor and outdoor) can save millions of lives. Exposure is linked with cancer and cardiovascular diseases such as strokes and ischaemic heart disease. Having caused around one in eight global deaths in 2012, it is the largest environmental health risk.

UNIVERSAL HEALTH COVERAGE

Achieving universal access to healthcare, through insurance mechanisms for example, can help ensure that all NCD patients are able to cope and remain productive despite chronic conditions like diabetes. This can greatly reduce the number of people who are pushed into poverty every year due to NCD-related out-of-pocket medical expenses.

YOUR NOTES:

HOW DO YOU PREPARE YOUR BUSINESS FOR A **NEW WORLD OF OPPORTUNITIES**?

RISK 5

CONTINUED LOCK-IN TO FOSSIL FUELS

"Lock-in" refers to the inertia created by large investments in infrastructure that lasts for decades. In the energy system, lock-in to fossil fuels inhibits not only the immediate reductions in GHG emissions necessary to avoid even more dangerous climate change but also the public and private efforts to introduce alternative energy technologies.

CONTINUED LOCK-IN TO FOSSIL FUELS

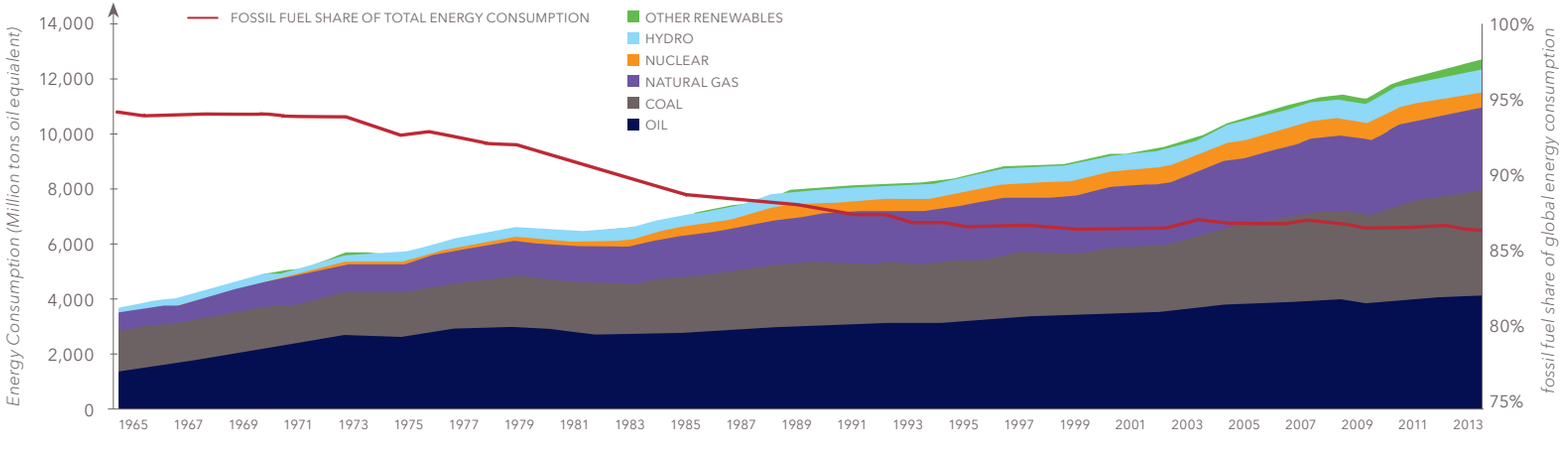
In the energy system, lock-in to fossil fuels inhibits not only the immediate reductions in GHG emissions necessary to avoid more dangerous climate change but also the efforts to introduce renewable energy.

Today, fossil fuels account for approximately 86 percent of all energy consumption. Despite growing investments in renewable energy, this figure has been constant for the last 20 years. Over the coming 20 years, the annual investment needed to meet the world's growing energy demands will rise steadily from 1,600 bn USD today to 2,000 bn USD in 2035.This requires huge investment in new energy infrastructure, and, without a dramatic shift in investment patterns, the largest portion of new investments in energy infrastructure will go towards fossil fuels. This will push the energy system towards greater emissions of greenhouse gases, putting the world on a trajectory that could result in a temperature rise of 4 to 6 degrees Celsius, leading to severe and irreversible negative impacts on human and natural systems. Fossil fuel consumption in power and heat generation and transport also contributes significantly to local pollution, causing widespread damage to health. If political action on emission policies or consumer preference at a later date should shift energy demand away from fossil fuels, the continued high levels of investment in the fossil fuel-based energy system represents a major risk of stranded assets.

Transport is the fastest-growing source of CO_2 emissions and is estimated to account for about 20 percent of energy-related CO_2 emissions. In this sector, the lock-in to fossil fuels is mainly maintained by previous and ongoing investments in infrastructure, such as refuelling stations for fossil fuels, ports, airports, roads, and urban zoning, creating a growing transport need. The refuelling infrastructure servicing fossil fuel-based transport hinders the transition to alternative fuels for personal transportation.

FOSSIL FUELS KEEP THEIR SHARE OF THE ENERGY MIX

After a partial decline in the dominance of fossil fuels from 1970–1995 the total fossil fuel share of global total energy consumption has been stable at around 86 percent



Source: BP. 'BP Statistical Review of World Energy 2014'. Report. 2014.

FACTS AND FIGURES

Without a dramatic change of policy or investment, CO_2 emissions from the energy sector are projected to rise from 13.0 gigatonnes (Gt) in 2011 to 15.2 Gt in 2035, retaining a share of around 40 percent of global emissions.

The transport sector accounted for 27 percent of final energy consumption and 6.7 Gt CO_2 direct emissions in 2010, with CO_2 emissions projected to approximately double by 2050.

1,199 new coal-fired plants, with a total installed capacity of 1,401,278 megawatts (MW), are being proposed globally. China and India together account for 76 percent of the proposed new coal power capacities. Coal already accounts for over 40 percent of global CO_2 emissions.

In 2012, the 200 largest listed oil, gas and coal companies spent 674 bn USD on developing new reserves. This is five times as much as they returned to shareholders (126 bn USD). ExxonMobil alone plans to spend 37 bn USD a year on exploration in each of the next three years.

IMPACTS

Following the crisis in Fukushima, Japan, Germany is set to close all its nuclear power plants by 2022, which is expected to increase the country's reliance on coal. Utilities across Germany have resorted to coal as the mix of coal-generated electricity rose to 45 percent in 2013, the highest level since 2007.

In 2009 annual damage due to air pollution in the EU from the energy sector was found to be between 66,473 and 111,606 million euros (including CO_2 emissions).

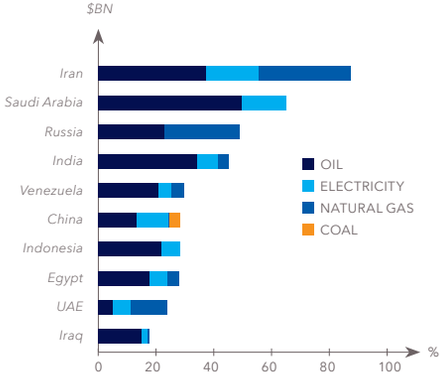
Expected Growth in Energy Demand is Greatest in Asia

Primary energy demand 2013–2035

Global energy demand is shifting its centre of gravity to Asia.
The region is expected to drive the 65 percent of global growth in energy demand over the next 20 years

FOSSIL FUEL CONSUMPTION SUBSIDIES IN EMERGING AND DEVELOPING COUNTRIES 2012

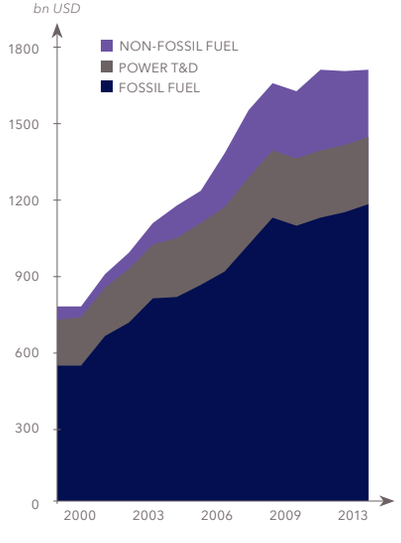
Top 10 countries with the largest fossil fuel consumption subsidies.

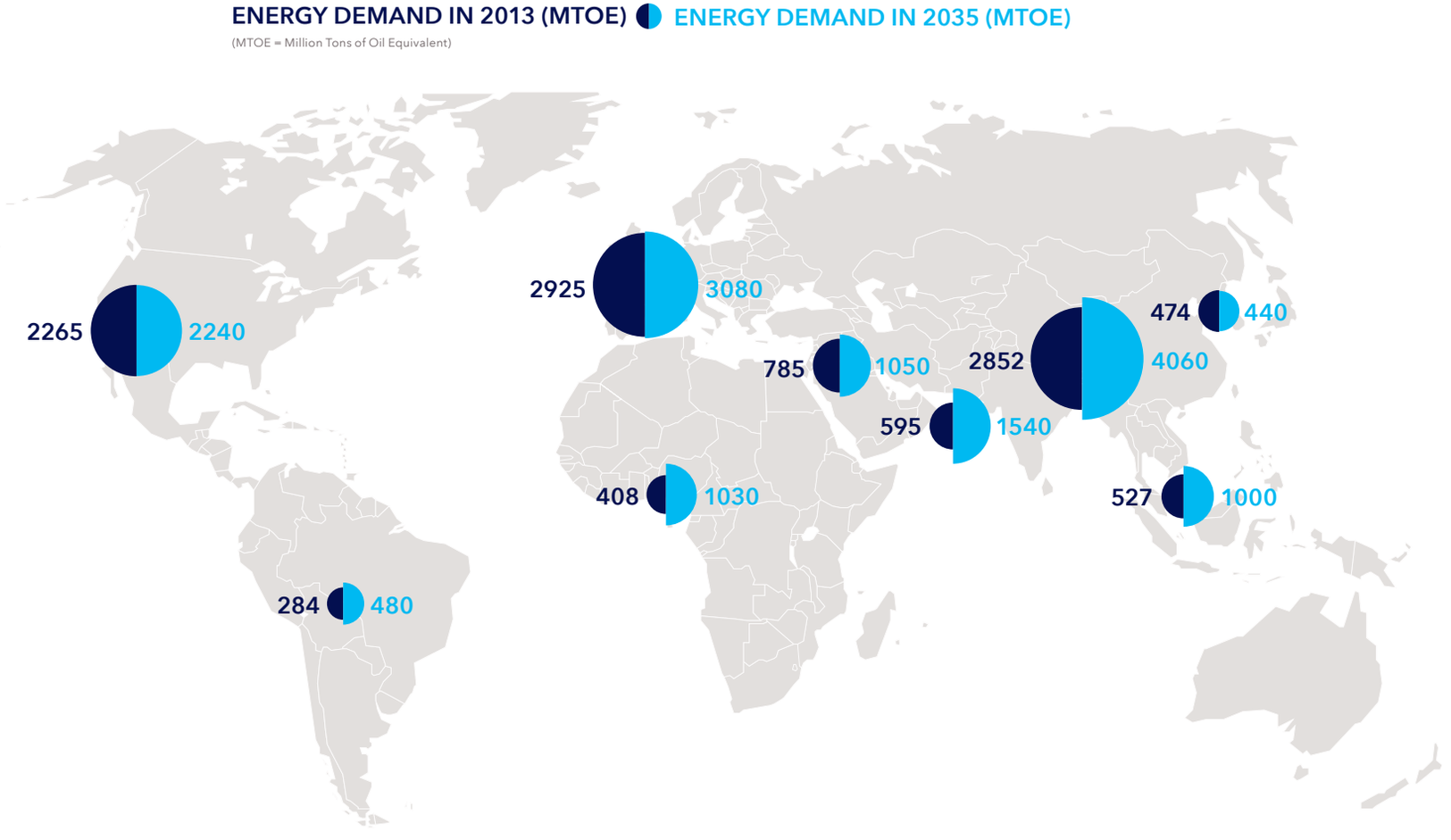


SPENDING ON FOSSIL FUELS IS 4X GREATER THAN ON RENEWABLES

Investment in global energy supply from fossil fuel, non-fossil fuel and power T&D.

Non-fossil fuel includes all renewable technologies, nuclear and biofuels. Power T&D is transmission and distribution for the power sector: this cannot be assigned to either fossil-fuel or non-fossil fuel consumption.





Source: Figure Left (upper) – Global Restoration Network. 'Investing in our Ecological Infrastructure'. 2011. Figure Left (lower) – EIA. 'World Energy Investment Outlook'. Report. 2014. Map – BP. 'BP Statistical Review of World Energy 2014'. Report. 2014. and EIA. 'World Energy Investment Outlook'. Report. 2014.

OPPORTUNITIES

ENABLING A NEW ENERGY SYSTEM

Opportunities to address the risk of lock-in to fossil fuels exist in many forms, reflecting the complexity of making major changes to the energy system. They represent three distinct avenues of action, but ultimately all of them are probably needed to achieve an energy transition.

REGULATED ENERGY TRANSITION

Regulatory initiatives can accelerate the transition to cleaner energy generation. Redirecting fossil fuel subsidies, trade regulation favoring low-carbon products and services, and setting a price on fossil fuels that reflects their cost to the environment are all prominent tools. Besides pushing for a more sustainable energy system, clear and meaningful regulation can provide dynamic incentives for innovation of new low-carbon solutions.

ENERGY AUTONOMY

Autonomous energy generation from renewable sources is a promising means of electrifying off-grid areas. In many high-income countries, small scale energy systems today are transforming the role of households in national energy infrastructure. This approach generates several added benefits, including the chance to combat energy poverty and increase resilience to extreme weather events.

GREEN CONSUMER CHOICES

Consumers' concerns about the environment and climate change can be translated into sustainable choices. Making the green choices easy and attractive can empower consumers to act and thereby initiate larger structural changes by applying pressure from the demand-side.

OPPORTUNITY

+ REGULATED ENERGY TRANSITION

Regulatory initiatives can accelerate the transition to cleaner and more efficient energy generation and consumption and provide dynamic incentives for innovation.

Implementing a range of regulatory initiatives can accelerate the transition to cleaner energy generation. These include redirecting fossil fuel subsidies, favouring low-carbon products through trade regulation, and setting a price on fossil fuels that reflects their true costs. If implemented in a concerted manner and at an appropriately stringent level, these initiatives can act as a strong vehicle for shifting demand and investment away from fossil fuels and towards low-carbon alternatives.

Currently, fossil fuels are among the most heavily subsidized commodities. In many cases, the impact is so significant that renewables will be cost-competitive with fossil-fuel-based energy in an unsubsidized market. Consequently, redirecting fossil fuel subsidies towards investments in energy efficiency and low-carbon technologies will have a dual effect against fossil fuel lock-in by making them less attractive investments while lowering demand. Investing the redirected funds can support the development of efficient low-carbon energy systems, facilitate industrial energy efficiency and develop clean energy opportunities in international markets.

National governments or regional bodies like the European Union can use existing international trade regulations to promote a shift away from energy-intensive products relying heavily on fossil fuels. In many countries, the costs to human health incurred due to local air pollution as a result of fossil fuels exceed GDP growth, in effect making the country poorer each year. Reflecting damages such as these in the price of fossil fuels through taxes or trade schemes could shift energy consumption to sources that protect both the climate and local livelihoods and environments. In addition, this would enhance national economic resilience by providing funds for the transition to sustainable energy systems.

Background

Subsidies for fossil fuel consumption, today around 600 bn USD per year, have led to an inefficient allocation of resources and market distortion by encouraging excessive energy consumption, greater reliance on private vehicles and urban sprawl. A study in the USA found that the health impacts of burning fossil fuels add up to 886.5 bn USD annually, or 6 percent of GDP. In several countries, the growth in GDP is lower than the hidden costs they are facing as a consequence of using fossil fuels both now and in the future.

EFFECTS OF DIFFERENT TYPES OF POLICY MEASURES

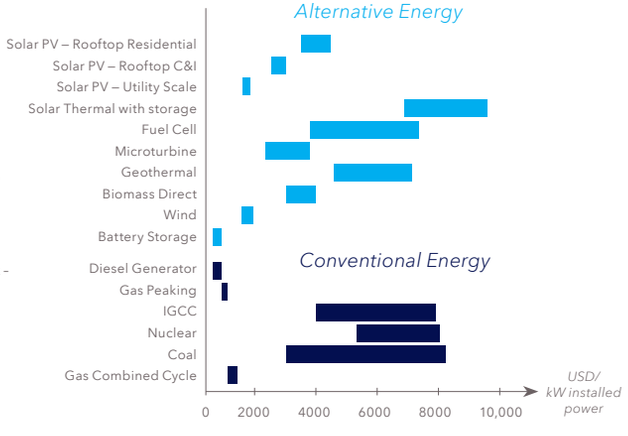
A global case study of 80 policy initiatives directed at creating greener buildings shows quite a large difference in effect measured on a scale from High (value 3) to No effect (value 0). The graph shows average scores for different kinds of policy measures.

Source: Adapted from UNEP-SBCI, "Assessments of policy instruments for reducing greenhouse gas emissions from building operations", Report, 2007.

THE GAP IN CAPITAL COST IS CLOSING DOWN

Declining costs for installing alternative energy generation, coupled with uncertain long-term fuel costs for conventional generation technologies, are working to close former gaps in electricity costs.

Source: IEA, "World Energy Outlook – 2013", Report, 2013.



SOLUTIONS SEIZING THIS OPPORTUNITY:

Pushing For a More Sustainable Energy System

National and local governments globally have developed and tested a range of policy tools that can accelerate a shift to a more sustainable energy system. Many focus on efficiencies, while others target the consumption of fossil fuels directly.

Provincial Carbon Tax

A straightforward and transparent carbon tax scheme has been effectuated in the province of British Columbia, Canada. The tax has led to a drop in fuel consumption, is revenue neutral and contributed to a decline in GHG emissions.

The scheme has been implemented without affecting the economic growth in the region. The initial tax rate was relatively low and has increased gradually to allow families and businesses time to reduce their emissions.

The NO_x Fund

The Norwegian NO_x fund, established by 15 cooperating business organisations, is an example of charging operators for emissions and then using the available funds for abatement technology, research etc.

The Fund is a cooperative effort where participant enterprises in Norway may apply for financial support for NO_x reducing measures. Payments made to the Fund is intended to replace the governmental NO_x tax for participant enterprises.

National Renewable Energy Policy

The broadly backed energy agreement from 2012 intends to ensure that in Denmark renewables will provide more than 35 percent of energy consumed in 2020.

This is a step towards the long-term goal for a green-growth economy, aiming for zero fossil fuels in the Danish energy and transport system by 2050.

This will mainly be accomplished by expanding wind power, and biogas and by designing a smart grid that can accomodate a large portion of renewable energy.

Electrified Short Shipping

The increasing stress placed on land based logistic networks is driving the search for alternatives. One of the most promising is short sea shipping.

"ReVolt" is a vessel that is greener, smarter and safer than conventionally fuelled and operated vessels. Autonomous, fully battery powered and highly efficient – "ReVolt" is a new shipping concept that offers a possible solution to the growing need for transport capacity. Compared to a diesel-run ship "ReVolt" could save up to 34 Million USD during its estimated 30-year-life-time.

Global

Setting a Standard for Buildings

Imposing mandatory energy standards for buildings is among the most effective means to reduce the overall energy consumption.

Several building certification schemes are available through national Green Building Councils. Implementing these in new buildings or retrofits can cut emissions drastically, sometimes by 80 percent or more.

Global

National Carbon Tax to Cut Emissions

A carbon tax in Chile targets the electricity sector and large factories. It is intended to cover about 55 percent of the nation's carbon emissions.

The tax is meant to incentivize power producers to gradually move to cleaner sources to help reduce the country's greenhouse gas emissions. It is part of a larger scheme also including a tax on pollutants and a levy on imported vehicles.

China's Pilot CO_2 Trading Program

China is testing CO_2 trading schemes aimed at reducing emissions of greenhouse gas. The programs cover roughly 40 to 60 percent of emissions from the cities and/or provinces that are part of it. It applies to power and other heavy manufacturing sectors such as steel, cement, and petrochemicals.

Eight such programs are included in the five-year plan for 2011 to 2015. A national program is possible in the coming five-year plan for 2016 to 2020.

Energy Efficiency Standards for End-use Products

In 1998, The Japanese government initiated a program, the Top Runner Approach, to improve energy efficiency of end-use products and to develop the world's best energy-efficient products.

By 2009, the program had achieved mandatory energy efficiency standards for 21 products. The improvement to energy efficiency required by the program ranged from 16 to 80 percent. These have been achieved for all products, and often greatly exceeded.

CO-BENEFITS

RESOURCE-EFFICIENT PRODUCTION

Regulation and standards are among the most efficient tools to promote low-carbon products and services. Pushing businesses to adopt low-carbon business models allows them to be better prepared for a future where resource efficiency will be crucial to profitability.

REDUCED GHG EMISSIONS

Setting a "real" fossil fuel price (that reflects future costs related to climate change) is regarded as one of the most powerful tools to combat GHG emissions. By adjusting prices for carbon-intensive products and services, it has wide-ranging impacts on energy generation and consumption patterns, for example.

INCENTIVES FOR INNOVATION

Public gap funding can promote research, development and technological innovation for low-carbon alternatives, reducing the price gap between conventional, carbon-intensive technologies and alternatives.

GREATER BUDGET REACH

Eliminating subsidies frees up funds that can be invested in energy efficiency, poverty reduction, education or other areas where they can be more beneficial to society.

SOCIAL STABILITY

A regulated and smooth transition to a low-carbon energy system lowers the risk of financial turmoil and geopolitical crisis.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- **Regulated Energy Transition**
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

SURVEY RESULTS:

The Younger Age Group's Favorite

The respondent group under 30 years of age rates **Regulated Energy Transition** away from fossil fuels as the opportunity with the greatest potential positive impact on society. It is also the best rated opportunity for society by respondents in the group of lower-middle-income economies and in Sub-Saharan Africa. In high- and higher-middle-income economies it is generally placed in the middle of the range.

When viewed through the business lens, respondents find it less compelling. While still rated positively overall, it is placed firmly among the least favorable opportunities when assessed for its benefits for business generally. When rated for its capacity to inspire new business ventures, it is placed in the lower half of the opportunity range except by respondents from the *other businesses* sector.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.

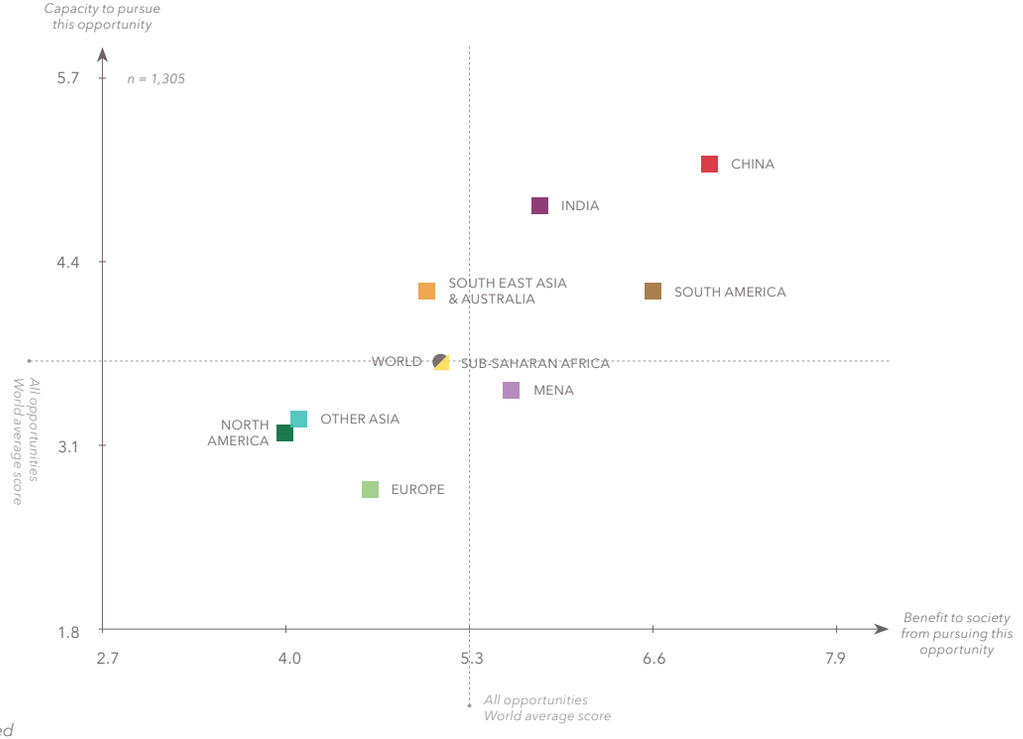


Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

OPPORTUNITY AT A GLANCE:

Top Opportunity for Under 30s

The respondents in the age group under 30 rate the opportunity to create a regulation-driven energy transition away from fossil fuels as the most favorable of all.

The Top Opportunity in Lower-Middle-Income Economies

This opportunity is placed most favorably in lower-middle-income economies, when assessed for its potential positive impact on society.

Less Popular with Business

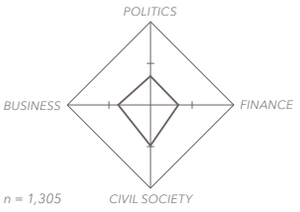
Regulated Energy Transition is among the opportunities rated least favorably for its benefit to business and for the likelihood of inspiring new business ventures.

Other Businesses Might Invest

Respondents in the *other businesses* sector see this opportunity as slightly above average when assessed for its capacity to inspire new business.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

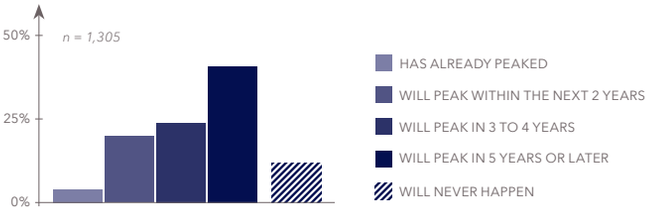


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

3.8

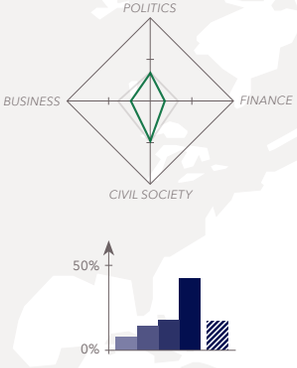
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

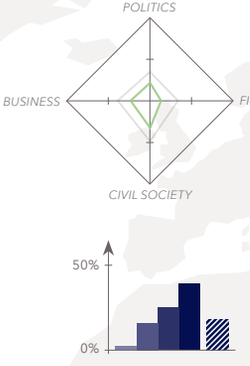


Regional results

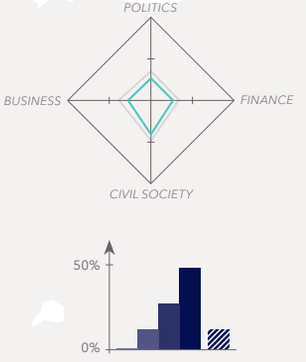
NORTH AMERICA



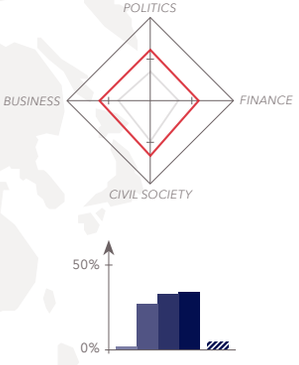
EUROPE



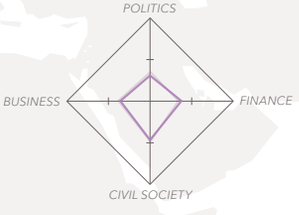
OTHER ASIA



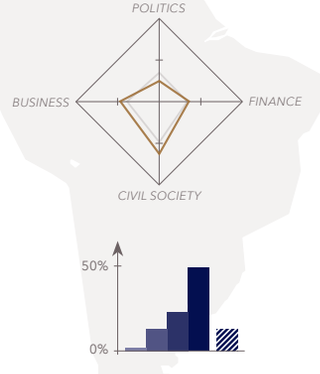
CHINA



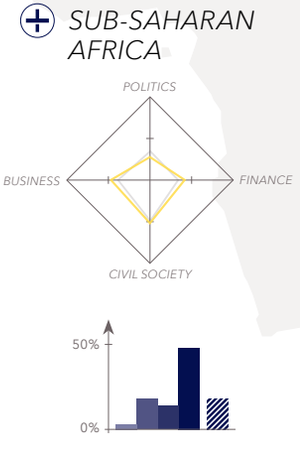
MENA



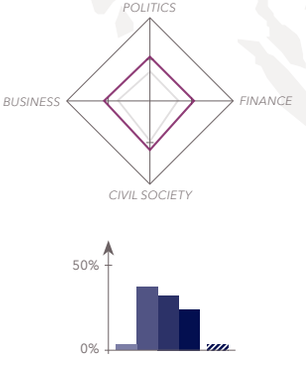
SOUTH AMERICA



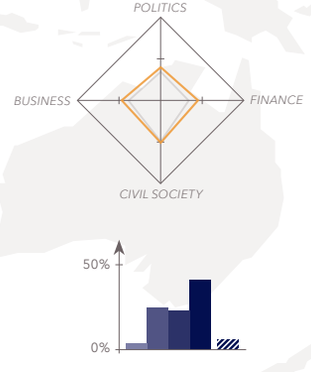
SUB-SAHARAN AFRICA



INDIA



SOUTH EAST ASIA & AUSTRALIA



OPPORTUNITY

ENERGY AUTONOMY

Autonomous energy generation through off-grid or micro-grid renewable sources is tackling energy poverty and reinventing the role of households in energy systems.

Off-grid and micro-grid renewable energy generation technologies are gaining momentum in emerging and developed economies. Distributed energy generation is well placed to meet the needs of the 1.4 billion people who lack access to energy worldwide. However, there is also growing interest in decentralized energy within developed countries. This suggests that the viability of distributed energy generation will not become redundant in low-income communities as they grow richer. In Germany, for example, households and farmers are now the major players in renewable energy generation, with utilities today owning only 12 percent of the country's renewable energy assets.

The pursuit of **Energy Autonomy** for larger groups can bring significant added benefits. For example, autonomous micro-grids with the ability to "island" from the grid provide greater local resilience in the face of extreme weather events like Hurricane Sandy in the USA in 2012.

In off-grid contexts, renewable energy sources often constitute a flexible, easy-to-use, and affordable means of electrification. They can reduce greenhouse gas emissions and significantly decrease the risk of sunk assets in the form of carbon-intensive energy infrastructure. As such, it is possible to "leapfrog" to a distributed low-carbon energy system while meeting the urgent need for access to electricity. This goes hand-in-hand with the advent of mobile technologies, illustrating the potential for developing countries to bypass a fixed network in favour of a more flexible and modular array of mini-grids.

In developed economies, a variety of business models and financing opportunities related to **Energy Autonomy** have already emerged. For example, leasing solutions have rapidly achieved scale in the USA by offering both households and businesses the opportunity to produce energy by installing solar panels on their roofs. In the rural context, there are numerous options for third-party financing to bolster the integration of renewables more rapidly.

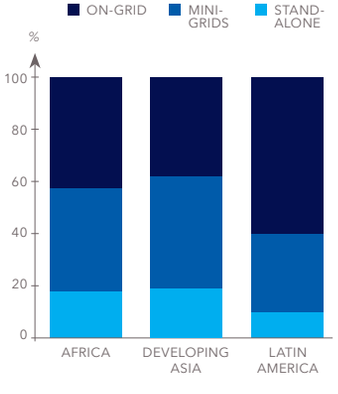
Background

One estimate suggests that off-grid installations can account for almost 60 percent of the additional generation necessary to meet the goal of universal access to energy by 2030. The IEA has also projected that mini-grid and off-grid solutions, comprising of up to 90 percent renewable energy, will receive 56 percent of investment ahead of this target.

AUTONOMOUS ENERGY CRUCIAL FOR UNIVERSAL ACCESS TO ENERGY

In Africa and developing Asia, stand-alone and mini-grid generation is estimated to constitute around 60 percent of power required in order to reach universal access to energy by 2030.

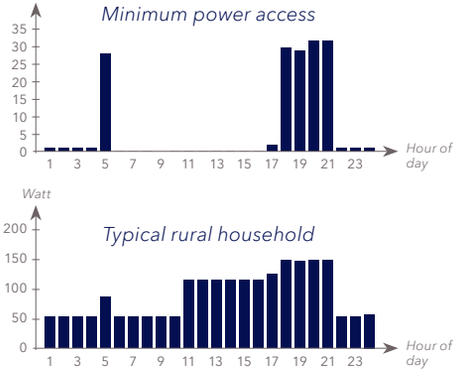
Source: IOREC, "International Off-Grid Renewable Energy Conference: Key Findings and Recommendations". Report. 2012.



SCALING UP CAPACITY TO REFLECT HOUSEHOLD DEMAND GROWTH

Electricity consumption tends to grow with access. Renewable energy infrastructure can be modular, so it is possible to scale up capacity gradually to reflect the transition from absolute minimum consumption towards typical rural household levels.

Source: Global Wind Energy Council and Greenpeace. "energy [r]evolution: A Sustainable ASEAN Energy Outlook". Report. 2012.



SOLUTIONS SEIZING THIS OPPORTUNITY:

Rolling Out the Distributed Energy System

Falling capital costs for renewables – especially solar – combined with innovative business models are transforming energy systems globally.

Creating Energy Prosumers by Eliminating Financial Hurdles

Solar City inspects homes and installs solar panel systems at no upfront cost to the consumer.

It then calculates a locked-in energy price that households can expect to pay for decades into the future, accumulating significant financial savings at the same time.

Energy Storage for Off-Grid Systems

Aquion Energy supplies off-grid and micro-grid energy generation systems with storage and backup power to increase efficiency and stability.

The US-based company delivers rugged systems that can support a variety of loads.

"Energy Internet" for Decentralizing Urban Power Generation

This integrated system controls the electricity system in Mannheim, Germany, from power generation via the grid to consumption, permitting diverse actors to provide energy in a common marketplace.

With its high uptake of renewable and decentralised energy sources and operating as a public-private partnership, the city aims to deconstruct the barriers between energy consumers and producers, or energy dealers and distribution network operators.

Large-Scale Rural Electrification through Microfinance

A large-scale network of partner organizations providing microfinance allows this solution to provide rural households with access to technology or services for off-grid renewable energy.

IDCOL Solar Home System Program does this by mediating between funding agencies and local organizations that interact directly with households. The aim is to finance four million solar home systems in Bangladesh by 2016.

Affordable and Adaptable Technology for Remote Solar Generation

This High-Concentration PhotoVoltaic Thermal system, developed by IBM and Airlight Energy, resembling a 10-meter-high sunflower, is capable of converting 80 percent of the sun's energy into useful electricity and heat.

With components that can be sourced locally, this technology has the potential to affordably electrify remote areas while creating jobs and boosting the economy. A commercial version is expected to reach the market by 2017.

Solar-Powered Broadband over Television Frequencies

'White spaces' are unused channels of the wireless spectrum that are commonly used for television. In Kenya, they are being used to deliver low-cost broadband access to communities as radio signals in television bands that travel longer distances and penetrate more obstacles.

Developed by the Kenyan government together with Indigo and Microsoft, solar-powered base stations make this solution possible in off-grid areas.

Mobile Pay-as-You-Go Solar Power System

A 'pay-as-you-go' solar energy generation service, offered by M-KOPA, is serving over 100,000 off-grid households, with 2,500 joining every week. It aims to phase out communities' reliance on harmful kerosene by supplying durable solar technologies at a lower price.

After having completed mobile payments for the device, households can enjoy years of free and clean energy.

Smart Meters for Remote Renewable Energy Supply Management

Targeting off-grid communities with access to less than six hours of daily power, Gram Power secures private or subsidy funding to set up a microgrid with solar, wind and biomass energy sources.

Smart distribution meters eliminate theft and payment defaults, optimize supply, allow wireless payments, and collect grid performance data.

CO-BENEFITS

VITALIZED COMMUNITIES

Achieving access to energy would greatly empower communities with better-functioning health centres, school lighting, reliable water pumps for sanitation, improved air quality, and innumerable opportunities for income-generation and economic growth.

NEW BUSINESS MODELS

A variety of concrete business models and financing opportunities with relevance to all environments emerge from this opportunity, including leasing models and micro-finance initiatives.

MACRO-ECONOMIC GROWTH

Reliable energy supply can facilitate enterprise and help to stimulate the economy and create new jobs. Many activities, including study or income-generating tasks like handicraft production, also greatly benefit from adequate access to light.

REDUCED HEALTH RISKS

Millions of households currently rely on kerosene lamps for lighting. These increase the risk of burns, injuries and poisonings. Replacing these with electric lighting alternatives can prevent these sorts of accidents.

SUSTAINABLE SPREAD OF ENERGY ACCESS

As demand increases, installing renewable energy systems in off-grid areas will help to prevent rising environmental costs. Tapping into unlimited resources, renewables allow for sustainable access to energy with prospective price decreases, while minimizing threats to ecosystems.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- Green Consumer Choices
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- **Energy Autonomy**
- Early Warning and Forecasting Services
- Smart Cities
- Combat NCDs with Mobile Technologies
- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

The Solid Business Opportunity

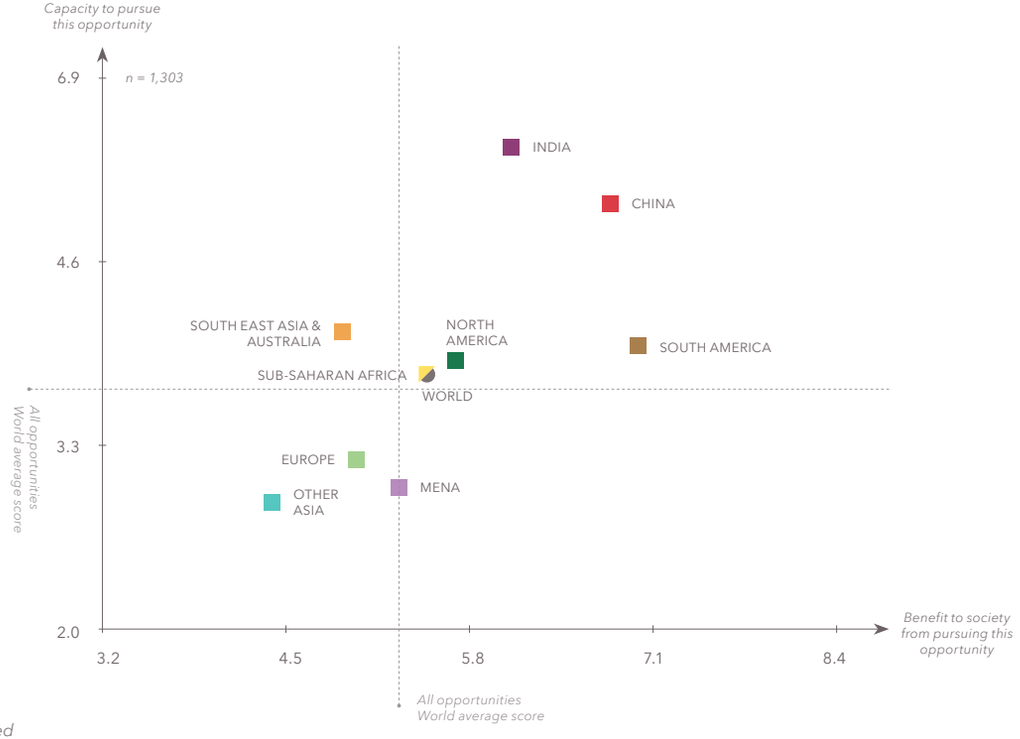
Energy Autonomy is seen as one of the opportunities with the greatest potential to create benefits for business, with the finance sector respondents being most positive. When asked if their companies would pursue new business ventures derived from this opportunity, they are less positive, but the opportunity is still rated above average on this aspect in all business sectors except the governmental sector.

This opportunity gets very different ratings from respondents in high-income economies compared to respondents from lower-middle-income economies. In the latter group it is seen by respondents as the second most attractive opportunity assessed on its potential positive impact on society. In the former it is placed below average.

Overall, it is rated in the middle group when assessed for impact on society. Across regions it is consistently placed around the middle of the range when assessed for its impact on society. As for most opportunities, the younger respondents rate it most favorably.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

Great Influence from Income Levels

While this opportunity is assessed as the least favorable by respondents in high-income economies, it is seen as the second most favorable in lower-middle-income economies.

Strong Business Impact

It is in the top three of opportunities when rated by the benefits to business overall. As a potential investment area it is placed slightly above average.

East-West Divide

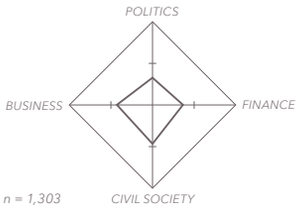
In S. and N. America, Europe, MeNa and Sub-Saharan Africa, civil society is seen as most likely to support this – political stakeholders least. In China, India and Other Asia it is the opposite.

Support from All Business Sectors

While not at the absolute top in any sector, Energy Autonomy is rated above average in all business sectors, when assessed for impact on business. Finance is most positive.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

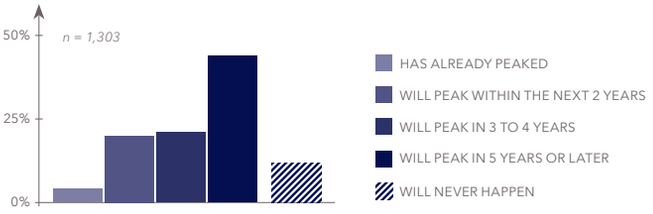


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

3.9

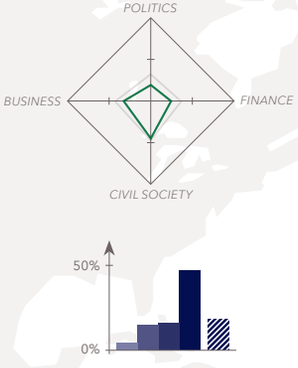
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

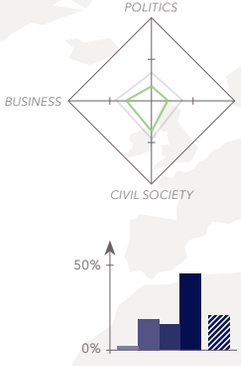


Regional results

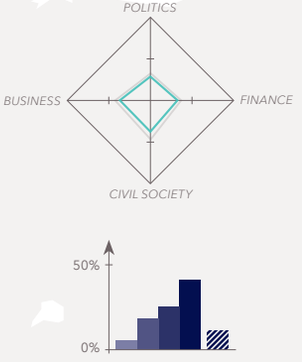
NORTH AMERICA



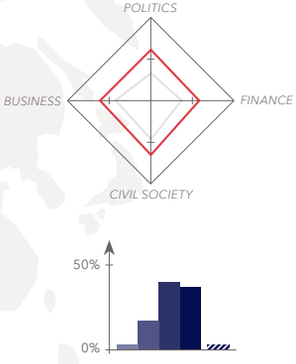
EUROPE



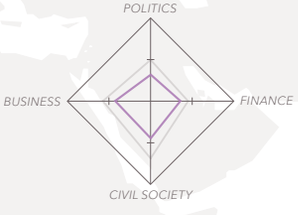
OTHER ASIA



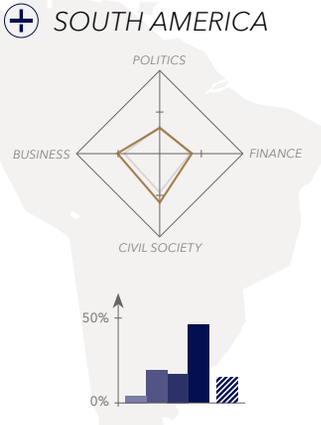
CHINA



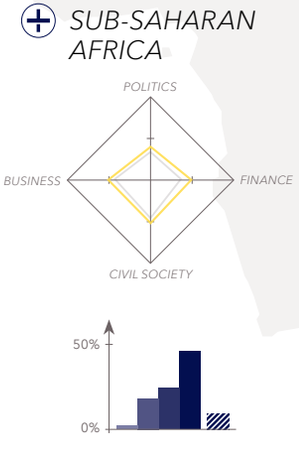
MENA



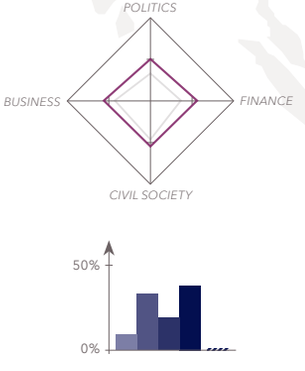
SOUTH AMERICA



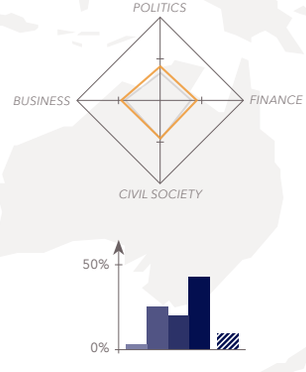
SUB-SAHARAN AFRICA



INDIA



SOUTH EAST ASIA & AUSTRALIA



OPPORTUNITY

GREEN CONSUMER CHOICES

Consumers' concerns about the environment and climate change can be translated into sustainable choices and initiate larger structural changes.

Consumer demand for greener product and service options can drive a shift towards a more sustainable economy. Changing consumer behaviour can result both in an increased uptake of renewable energy in households and in the selection of consumer products made with the use of clean power.

Many consumers today are concerned about sustainability, but making it easy and attractive to be a "green consumer" is crucial to translate this interest into action. One area where initiatives have directed consumer behaviour in a more sustainable direction is in the purchase of electric cars. In an increasing number of markets, like Norway, sales are growing in part because of governmental interventions that make buying an electric car an attractive choice for consumers. This can be achieved through, for example, tax incentives or initiatives like privileged parking status or access to restricted lanes. Public procurement policies that favour "green" products and services can directly increase demand for these options. Resulting spillover effects on private consumption have also been shown to exist.

Social norms also play an important role in determining consumer choices. Studies show that social norms are the prime reason why people choose sustainable products and services. For example, opting to holiday close to home to avoid the emissions resulting from air travel has a high signaling value for the individual. As such, the value of being associated with a sustainable lifestyle can be leveraged to promote more sustainable consumer choices. Design and marketing to make green products attractive are essential, while regulation can also ensure that greenwashing is avoided.

Consumers care about sustainability, but if they are to act accordingly, credible information about the benefits of green choices as well as initiatives to facilitate them (such as footprinting and labeling) need to be adopted. These can also help to influence upstream suppliers to initiate larger structural changes.

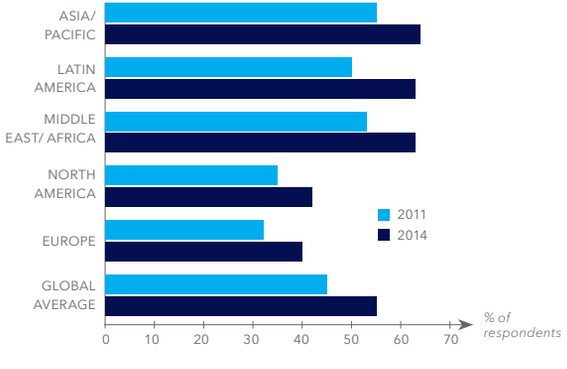
Background

As the world's population is growing and is expected to reach 9 billion by 2050, the consumption of fossil fuel-related products and services like energy and transportation will put huge pressure on the climate. An even faster growing global middle class will add significantly to this pressure. People's consumer preferences and actions will therefore be an important factor for tackling the demand for energy and avoiding a lock-in to fossil fuels.

GROWING WILLINGNESS TO PAY

Willingness to pay extra for goods and services from socially responsible companies, in selected regions, 2011 and 2014.

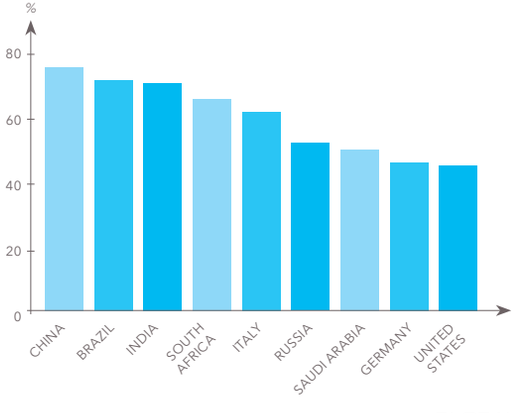
Source: Nielsen, 'Doing Well by Doing Good – Increasingly, consumers care about corporate social responsibility, but does concern convert to consumption?'. Report. 2014



CONSUMERS SHOW INCREASING CONSIDERATION FOR SUSTAINABILITY

Consumers worldwide indicate an increasing concern for sustainability factors in their purchasing decisions.

Source: Accenture, UNGC and Havas Media. 'The Consumer Study: From Marketing to Mattering'. Report. 2014.



SOLUTIONS SEIZING THIS OPPORTUNITY:

Making Green the New Black

From investor advice to school programs, multiple strategies are being deployed globally to convince consumers to "go for green".

Saving Energy Through Data and Cloud Software

Opower uses a combination of a cloud-based platform, big data, and behavioural science.

The software analyzes energy data and presents personalized insights to consumers via the Web and through text, phone, and mail communications in order to guide reductions in energy consumption. Opower has enabled savings of over 4 terawatt-hours, equivalent to 6 billion pounds of carbon.

USA, UK, Canada, France, Australia, New Zealand and Japan

Incentives for Choosing Electric Cars

Promoting the use of electric cars in Norway has been achieved by providing both financial and everyday usage incentives.

The users of e-cars get free parking and permission to use restricted lanes, thereby receiving clear advantages compared with traditional cars. Consequently, e-cars have proven to be an effective measure, since Norway is now the country with the highest uptake of electric cars globally.

Citizen's Participation Program for Protecting the Environment

Through the Eco-mileage program, the Seoul metropolitan government employs energy consultants to help participants determine the best way to save energy.

Points are earned according to the amount of energy saved and can be redeemed as discounts on eco-friendly products or public transport vouchers.

The program has demonstrated significant successes, not only in reducing energy consumption and carbon emissions, but also in raising public awareness. Membership has surpassed 1.6 million.

Electric Cars as a Power Supply

The "LEAF to Home" power system can, in the case of powerouts, supply electricity from Nissan LEAF electric vehicles' onboard batteries to a home, when used with the "EV Power Station" unit developed by Nichicon.

The system generates enough output to allow all household electronics to function at once, even during morning and evening consumption peaks. The LEAF's lithium-ion batteries can store up to 24kWh of electricity, sufficient to supply an average Japanese household for about two days.

Bike-Sharing Goes Electric

As a response to growing demand, BiciMAD offers 123 self-service stands for 1,560 electric bicycles around the city of Madrid.

This enables citizens and visitors to get around the city in clean and efficient manner. Electric bikes were selected in order to provide transportation in Madrid due to its many slopes.

Lagos Youths get Involved in Energy Awareness

The city of Lagos is cultivating the next generation of climate-conscious citizens through its Power Kids Program, an interactive, extra-curricular activity that teaches children about electricity and alternative forms of energy.

It is designed to immerse students at the junior secondary school level in an energy-awareness curriculum, hoping to influence their subject choices at the senior secondary level.

Choosing Renewables

In several countries consumers have the option to choose freely which energy supplier to purchase their power from.

Many utility companies around the globe show what percentage of the energy they offer comes from renewable sources. Increasing the demand will help to increase the amount of renewable energy produced.

Multiple countries

Making Investments Sustainable

The Australian Institute, in a partnership with 350.org and Market Forces, has mapped the dependencies on fossil fuels among various companies operating in Australia.

This can provide valuable information for the sustainability-conscious consumer. In addition, it has shown that getting rid of fossil fuel-related investments has had no significant impact on the returns.

CO-BENEFITS

HEALTHIER LIVES

Choosing non-motorized transportation options generates health benefits. A large study of the bike-sharing program in London concluded that there is a positive overall health effect reflecting reductions in diseases caused by physical inactivity.

BETTER LOCAL ENVIRONMENT

On both a local and regional level, transitioning to a green economy could lead to significant improvements in air, water and soil quality. Phasing out fossil fuels can protect the local environment and air quality, which is a pressing concern in many cities.

CARSHARING WILL SAVE YOU MONEY

Carsharing has the benefit of creating a cost-saving alternative to car ownership while offering environmental and sustainability gains. Owning a car comes with big expenses, partially for operating it, but also for maintenance and lost value. The overall expenses are much lower for carsharing.

BETTER CONDITIONS FOR WORKERS

When consumers choose green products, which make use of a more socially responsible supply chain, they promote better conditions for the people employed in production. In this way, benefits are passed down the production line and improve the living conditions for many.

Opportunities ranked by positive impact on society

- Water-Efficient Agriculture
- Everyday Health Enablers
- Fresh Water Production
- **Green Consumer Choices**
- Smart Water Regulation
- Regulated Energy Transition
- Innovative Finance for a Healthy Generation
- Energy Autonomy
- Early Warning and Forecasting Services
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- Rural Growth Initiatives
- Compact, Green and Connected Cities
- Cost-Effective Adaptation
- Investments in Resilience

Figure above shows how this opportunity (highlighted) is assesed compared to all opportunites for its potential positive impact on society. Based on all survey responses. Other opportunities for the same risk are highligted in a lighter shade.

SURVEY RESULTS:

The Opportunity Dividing Businesses

The opportunity **Green Consumer Choices** is placed firmly in the top end for all regions when assessed for its capacity to have a positive impact on societies. However the most interesting result is perhaps derived from the responses to the questions regarding its attractiveness for business.

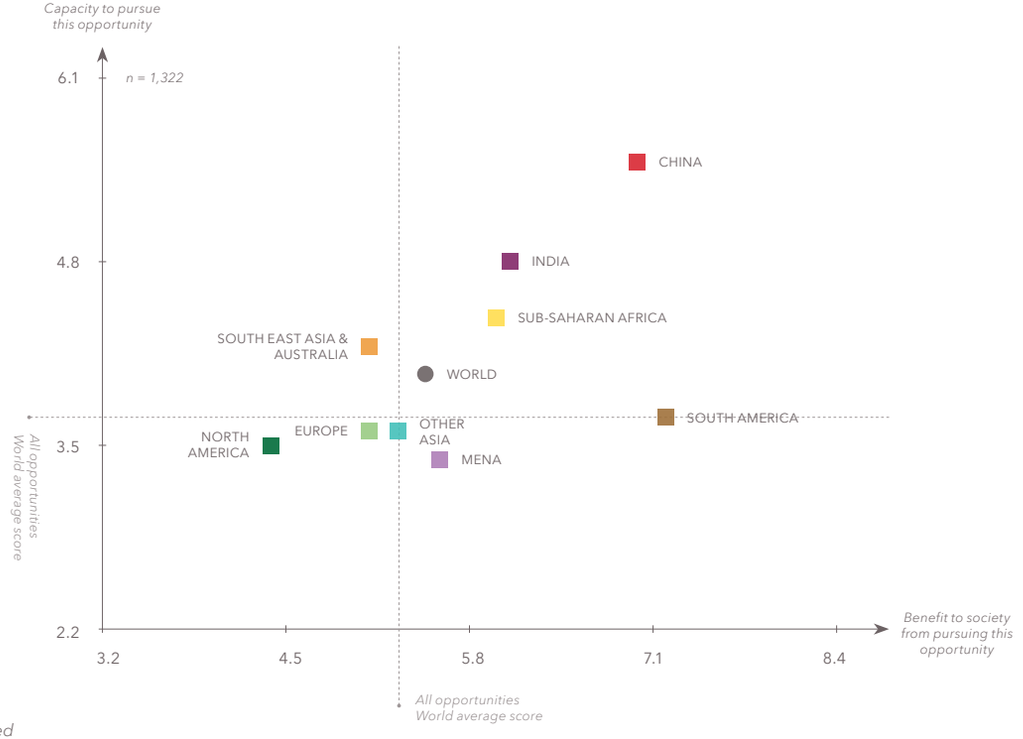
In the manufacturing sector it is right at the top both when rated for its benefits to business generally and for its ability to inspire new business ventures. In the governmental sector it is also seen as very strong on both of these aspects.

In the finance, *other businesses* and, to a lesser degree, the service sectors it is seen as one of the least favorable opportunities for business in general. Despite this, respondents from all three sectors see this opportunity as one of the most likely to inspire new business.

The survey itself does not explain this, but one theory can be that though many businesses today perceive "green" as an added cost, they realize that they will have to adapt to consumer demands for green products and services.

BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), World and geographic regions. Scale goes from -10 to +10.



OPPORTUNITY AT A GLANCE:

Splits Business

Manufacturing and governmental sectors see this as the most and third most favorable opportunity for business in general. Finance and *other businesses* see it as second and fourth least favorable.

Top Assessment from High-Income Economies

Respondents in high-income economies see this opportunity as the most promising one for creating societal benefits.

Well Received in All Income Groups

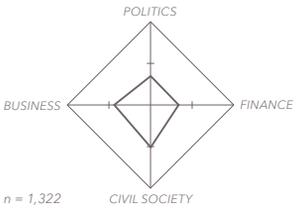
This opportunity gets the most evenly-balanced support between high-, upper-middle- and lower middle-income economies.

Governments Likely to Invest

The governmental sector respondents place this opportunity as the one most likely to inspire new initiatives in their sector.

STAKEHOLDER BACKING – GLOBAL

Perceived backing for this opportunity from key stakeholder groups. Figures indicate average of survey responses. Center represents "neutral", outer rim represents "extremely positive" – global results.

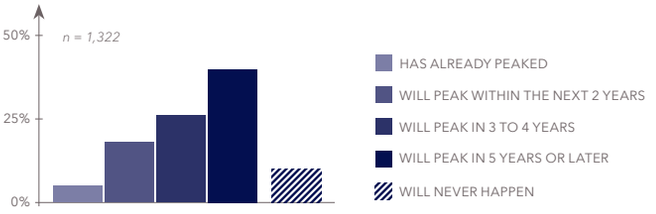


AVERAGE – ALL STAKEHOLDER GROUPS – GLOBAL RESULT.

4.0

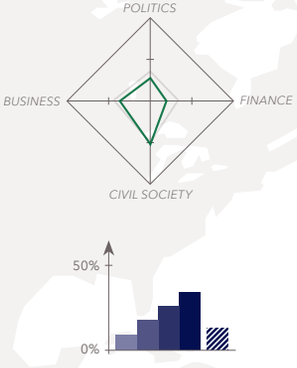
TIMELINESS OF OPPORTUNITY – GLOBAL

Estimation of when this opportunity will reach full potential – global results.

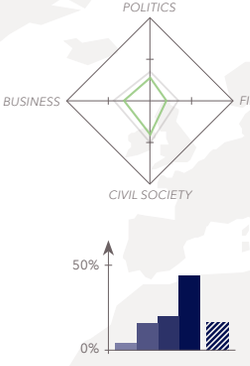


Regional results

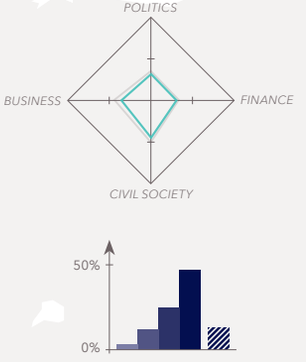
NORTH AMERICA



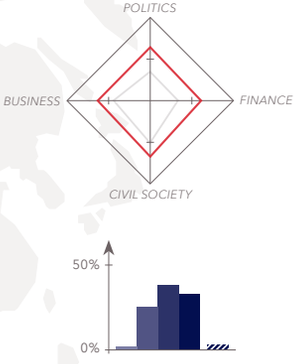
EUROPE



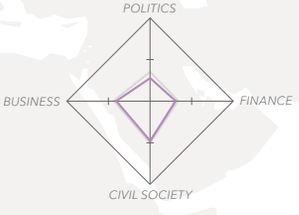
OTHER ASIA



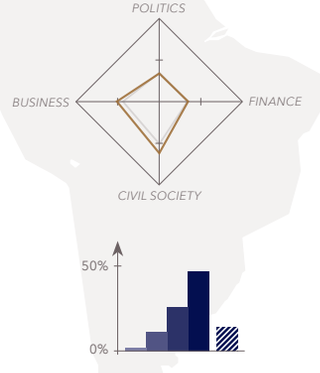
CHINA



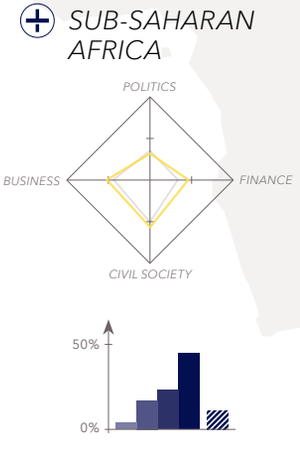
MENA



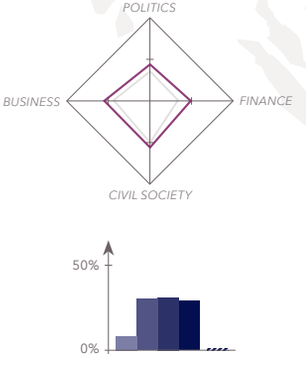
SOUTH AMERICA



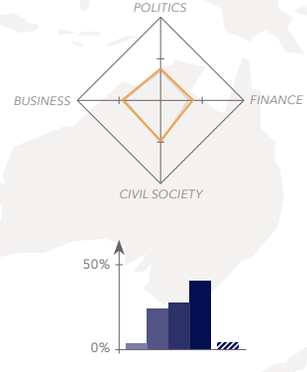
SUB-SAHARAN AFRICA



INDIA



SOUTH EAST ASIA & AUSTRALIA



MORE OPPORTUNITIES

This report presents 15 opportunities based on the insights gathered at eight workshops – Opportunity Panels – conducted on five continents with more then 200 experts and sustainability professionals. However, one report cannot do justice to all the great ideas generated, and by no means do we claim these to be the only opportunities out there. To round off this section of opportunities, we briefly present five additional opportunities inspired by the work with the report.

UN-LOCK FUND

The term "Un-lock fund" refers to a new financial mechanism to attract capital from institutional investors, including pension funds, towards renewables. This could, for example, involve guaranteed loans or soft loans. Such a fund could help overcome the high upfront costs associated with a transition away from fossil fuels.

ENERGY EFFICIENCY MEASURES

A key element of disconnecting the economy from fossil fuels is to cut energy demand through efficiency measures and energy conservation through smart energy usage. If less energy is used in general, societies are also less reliant on energy imports and hence have greater energy security and are more resilient to energy price fluctuations.

RELIABLE AND EFFICIENT ENERGY STORAGE

Many renewable energy sources will be more reliable and cost-effective if they are supplemented with an efficient energy storage system. This will allow them to meet energy demand and accommodate the fluctuations caused by the intermittent availability of sunshine and wind. An economically and environmentally feasible storage system can facilitate renewable energy in meeting a greater share of the total energy demand.

INTELLIGENT DEMAND SIDE TECHNOLOGIES

Enabling smarter energy use through intelligent demand side technologies can reduce energy consumption and make it possible for consumers to intentionally select non-fossil energy suppliers.

CARBON CAPTURE, UTILIZATION AND STORAGE

Carbon capture, utilization and storage (CCUS) is a key technology in the ongoing global energy transition. It can enable the maintenance of energy supply and the production of essential materials while limiting climate change. It can be applied to power stations or petrochemical processing plants and the captured CO_2 can be used for such things as enhancing recovery in hydrocarbon reservoirs or recycled to be used in various products.

NOTES:

HOW WILL YOUR ORGANIZATION DEVELOP THE **OPPORTUNITY MINDSET**?

THE ROAD AHEAD

Building Momentum for Action on Sustainability

This year's report marks the beginning of the endeavour to seek out and champion global opportunities. In the coming years the project partners will continue to expand the network and build momentum towards action for a sustainable future. As it grows, the Global Opportunity Network will strive to establish itself as a collaborative innovation platform to foster a global shift in mindset.

A crucial component of these efforts will involve inviting more individuals and organizations to join us as partners in this mission. True to the belief that no meaningful change can take place without multi-stakeholder collaboration, the Global Opportunity Network will continue to engage innovators from all sectors, regions, and professions, as the process of identifying risks, collectively brainstorming opportunities and measuring their appeal by means of a global survey enters its second iteration.

The first step has already been taken, as respondents in this year's survey have pointed us towards the risks they believe are the most pressing for us to tackle next (the figure on the right shows the results). Although there was some variation across regions, financial issues are clearly of high concern, as unemployment/underemployment, poverty, severe economic inequality, and financial crisis were the risk most often pointed to as being most pressing.

News and developments will be announced on our social media outlets throughout the year. You are more than welcome to reach out to us if you would like to learn more about our ongoing work, discover how you can participate, or if you would like to join us at an opportunity panel.

Read more at Globalopportunitynetwork.org

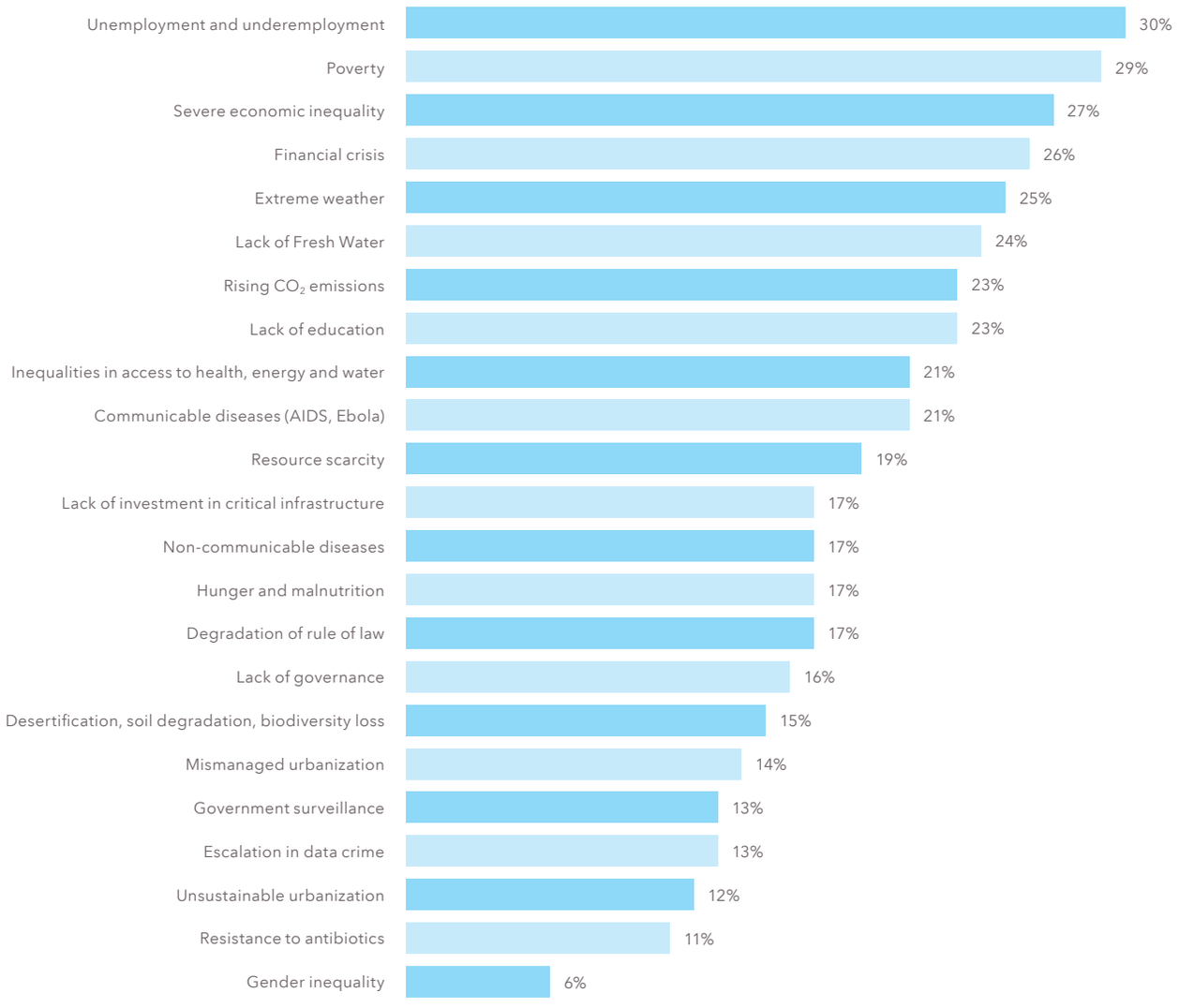
Follow us on Social Media:

- @Opportunitynetw
- #globalopportunity
- facebook.com/globalopportunitynetwork
- linkedin.com/company/global-opportunity-network

THE MOST PRESSING RISKS

Results from the risk section of the Global Opportunity Survey. Respondents were asked to choose the five most pressing risk from the list. Numbers indicate the percentage of respondents indicating the risk as one of the five most pressing.

n = 6,160



Process and Methodology Notes

The insights in the Global Opportunity Report are based on two large investigations: a global series of eight workshops with leading persons in business, academia, civil society, etc. – labeled Opportunity Panels – and a survey of 6,160 private and public sector leaders.

The survey reported on in this report was conducted in collaboration with the research company YouGov. There are a total of 6,160 completed Computer-assisted web interviews (CAWI) with persons with management responsibility working in companies with a minimum of 100–200 employees. The survey was conducted between 11 to 28 November 2014. YouGov has been responsible for collecting the data and the Global Opportunity Secretariat has done the analysis of the data. Survey responses are based on claimed behavior rather than actual metered data.

Respondents to the survey were identified as working within a specific sector of the economy. In this report, we operate with five sectors; brackets indicate the number of respondents :

- Finance (598)
- Manufacturing (1,158)
- Service (721)
- Governmental (619)
- Other Businesses (3,064)

In order to have a solid number of respondents, various different sectors have been combined to one named *Other Businesses*. *Other Businesses* is a combination of the following sectors: Academia (367), Agriculture (57), Construction (405), Food (160), Healthcare (393), Mining and Extraction (94), Trade (295), Transport (238) and Other (1,055).

The survey was conducted globally and in the report we operate with nine regions. Some regions are groups of several countries; other regions are single countries with very large populations (China and India). The regions are composed of:

- China
- Europe (France, Germany, Italy, Spain, UK)
- India
- MENA (Turkey and unspecified other countries in MENA region)
- North America (US, Canada and Mexico)
- Other Asia (Russia, Japan and South Korea)
- South America (Brazil and Argentina)
- South East Asia and Australia (Australia, Indonesia, Malaysia and Singapore)
- Sub-Saharan Africa (South Africa)

Respondents' management responsibilities, country of residence, age, sectoral affiliation, gender and age were also recorded to allow to cross section data from the survey along these lines.

When illustrating answers from the survey in the report the number of answers is denoted as *n*. In some instances *n* is reported as an interval, as not all opportunties have been assessed by the same number of respondents. In order to get representive data, each opportunity has been assessed by at least 1,300 respondents and at least 100 for each business sector and region.

When illustrating percentages in the figures not all of them add up to 100, due to rounding.

In the report we operate mainly with two areas – the impact on society and the impact on business. These two areas are reported differently:

- Each opportunity's impact on society is reported as the percentage of reponses it receives that are 'most positive' (respondents rating them above 5 on a scale from -10 to 10). When the impact on society is illustrated on a scatter chart, the values are simple averages.
- The impact on business is reported as a simple average of the responses, either within a specific sector, region or other cross sections of data used throughout the report. Data are indicative and caution should be taken when interpreting data, especially closely positioned data points as confidence intervals of the data do not allow all rankings to be separated.

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