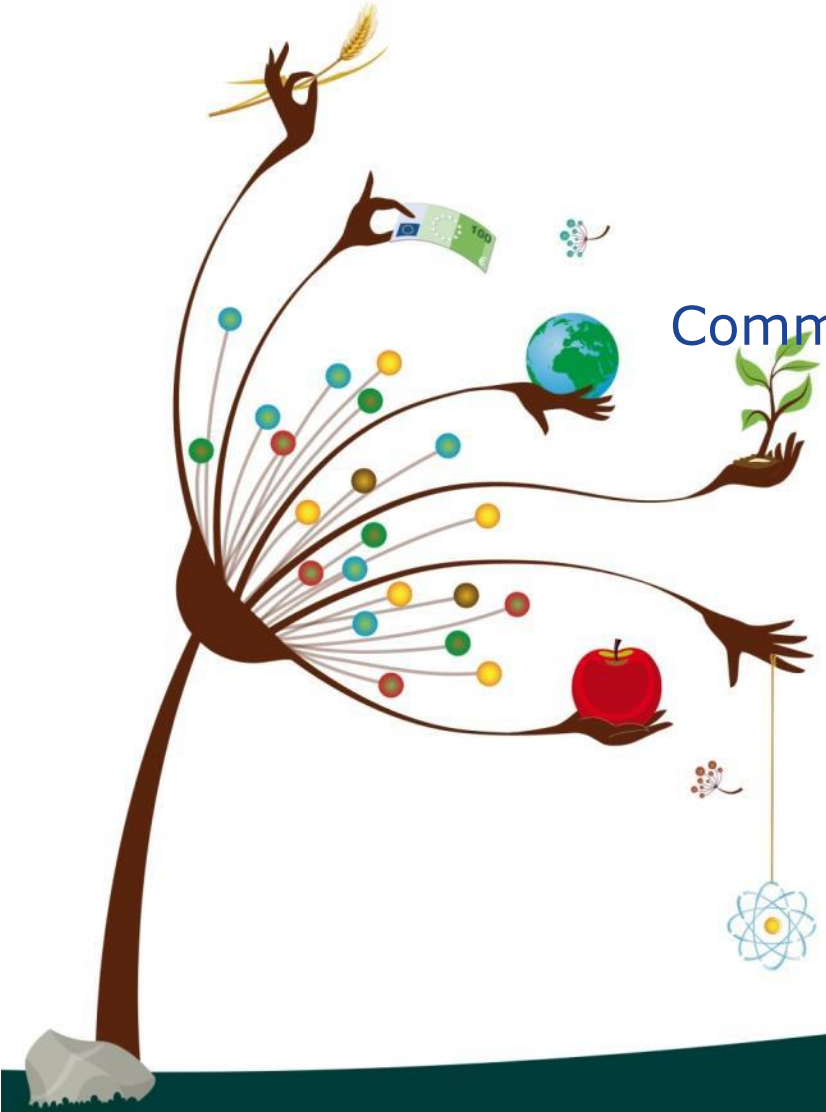
The European Commission's science and knowledge service

Joint Research Centre



Darren McGarry
Communication Energy, Transport & Climate

Visualisation Workshop

European Commission

Solar impulse 2

- Innovative science, pioneering materials
- 5 month journey, No fossil fuel
- 2 pilots will fly 35000 km
- 1700 solar cells, 72 m wing span

2 objectives:

1. To promote pioneering materials
2. To promote clean energy

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"The success of the project will not just depend on the spread of its wings but also on the spread of its message"…

BBC world news

European Commission

Society is facing many challenges

- From energy to migration, & food to environment

Acceptance & implementation of technologies & policies relies ultimately on support from EU citizens

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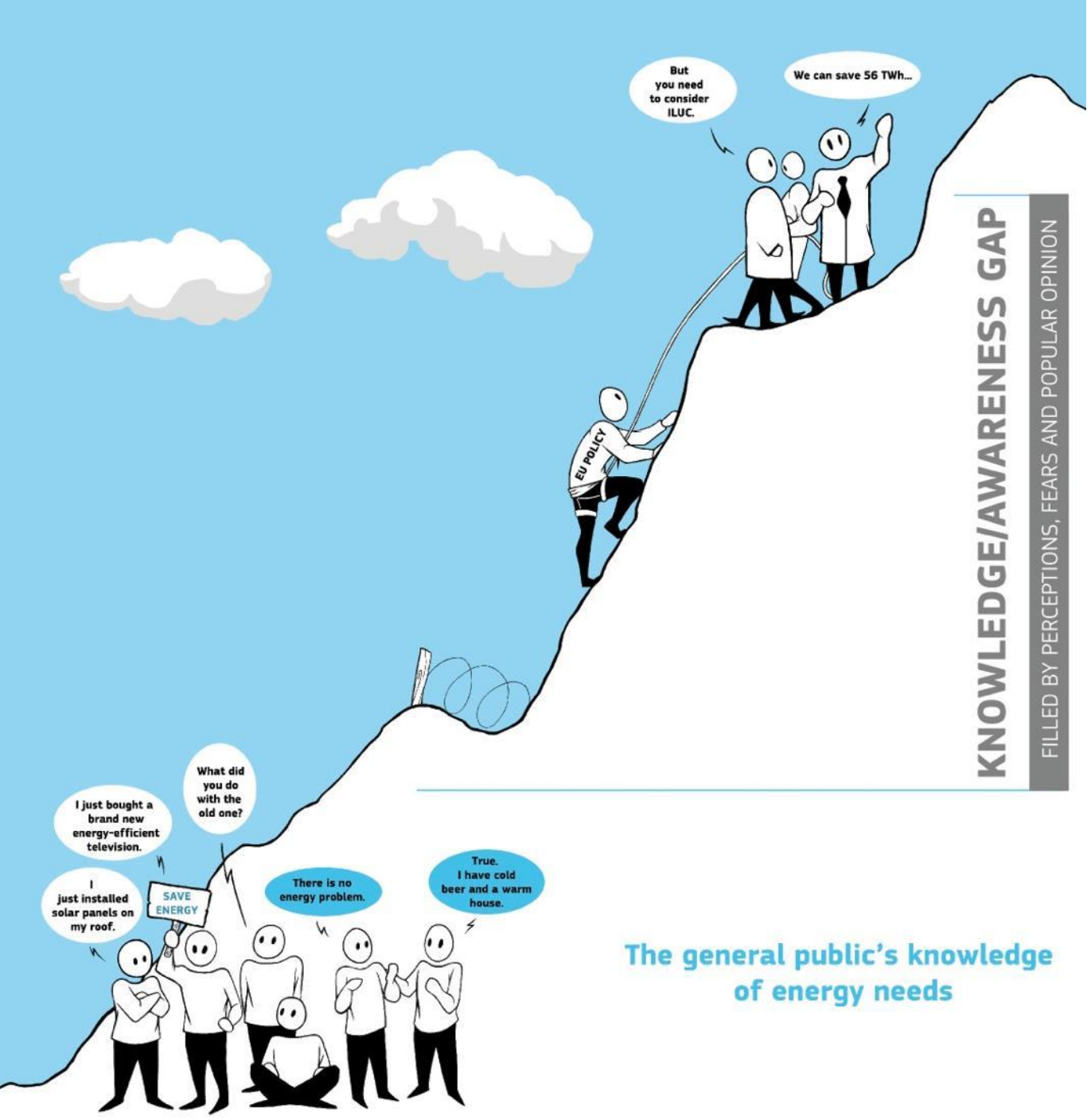


The general public's knowledge of energy needs

European Commission

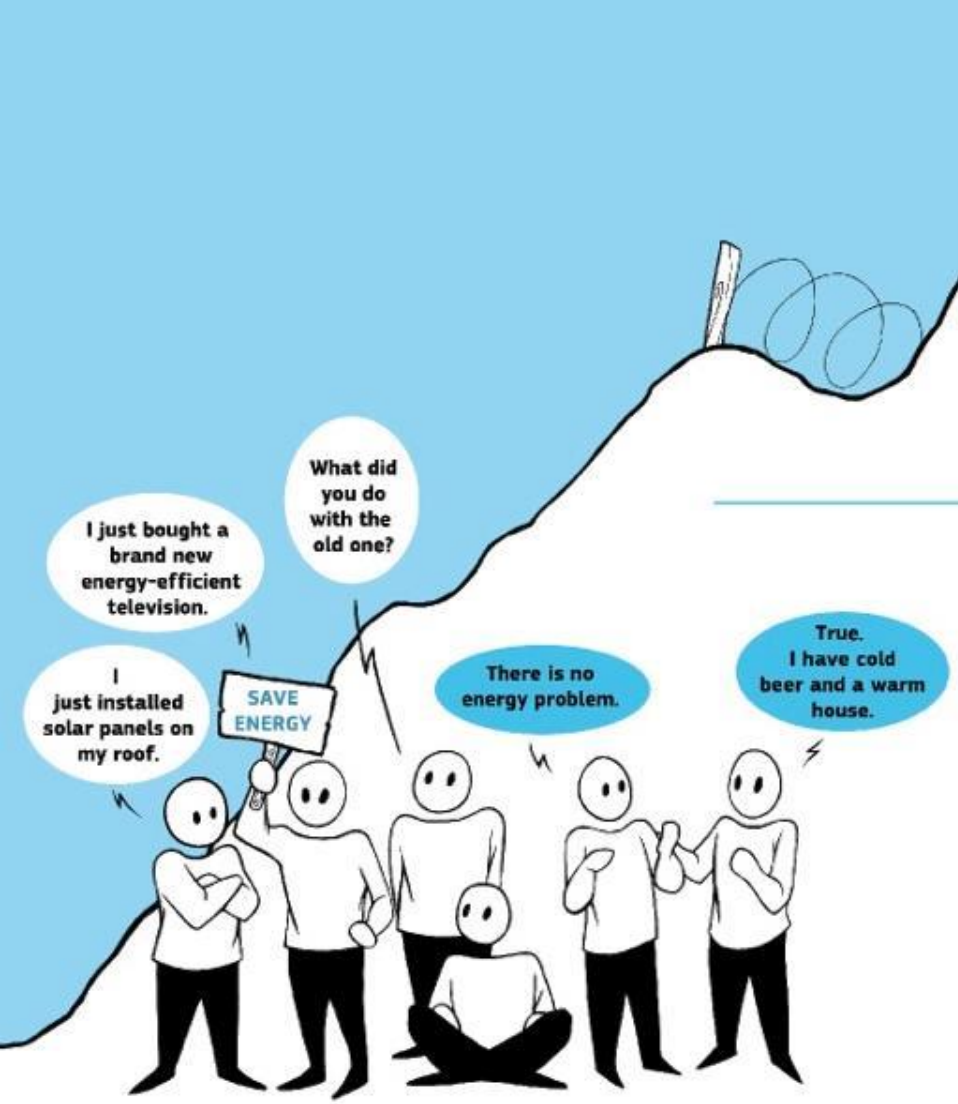
KNOWLEDGE/AWARENESS GAP

FUELLED BY PERCEPTIONS, FEARS AND POPULAR OPINION

European Commission

KNOWLEDGE//

FILLED BY PERCEPTIONS,



The general public's knowledge of energy needs

European Commission

WHY…….. removing the barriers

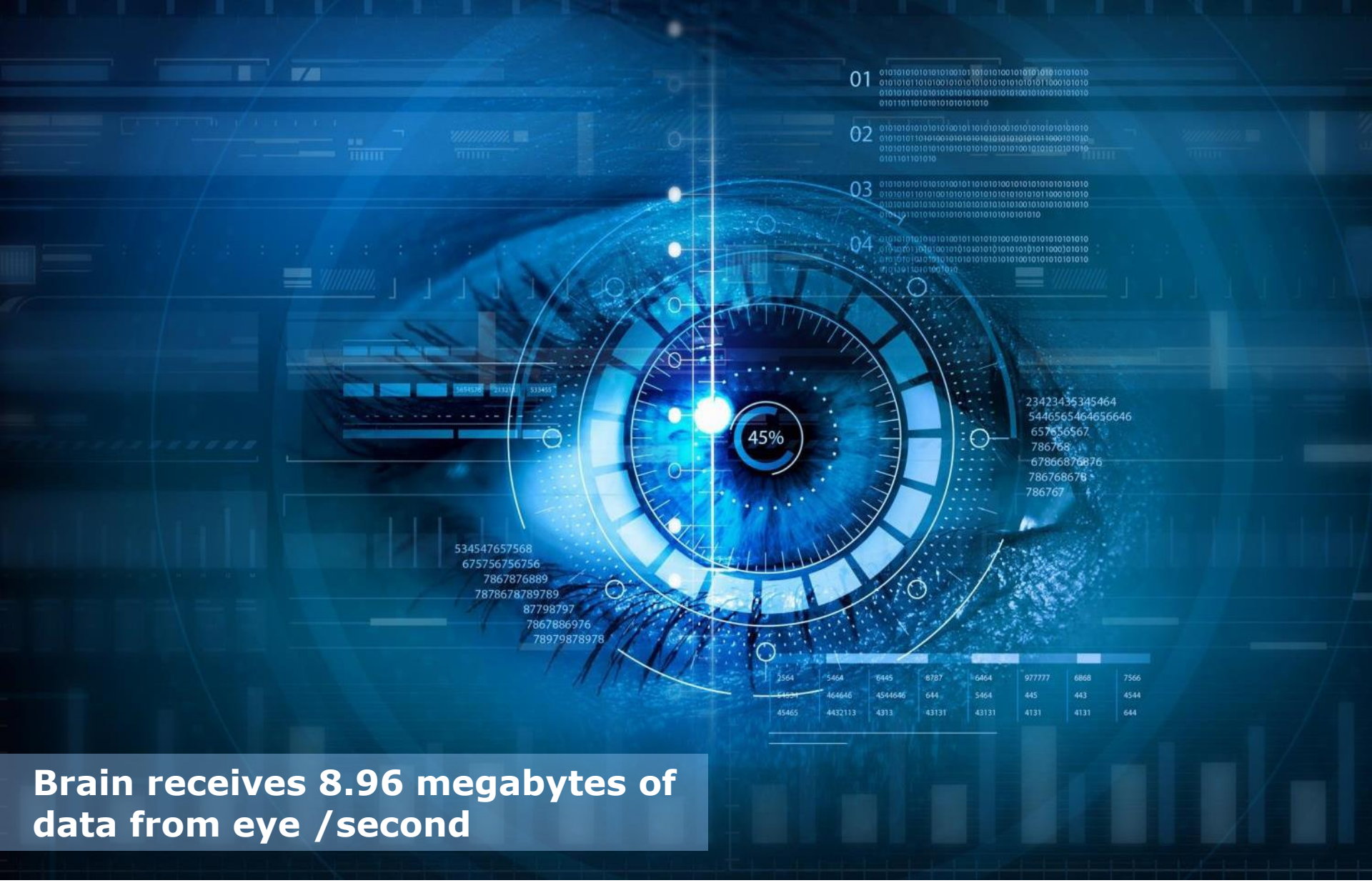
Public Awareness & Knowledge

If citizens are not aware or do not have the knowledge to make a balanced decision

- Can form major barrier to the implementation of Policy & Technologies
- Wastes millions of investment, negative climate for investment
- Results in the escalation of the problem

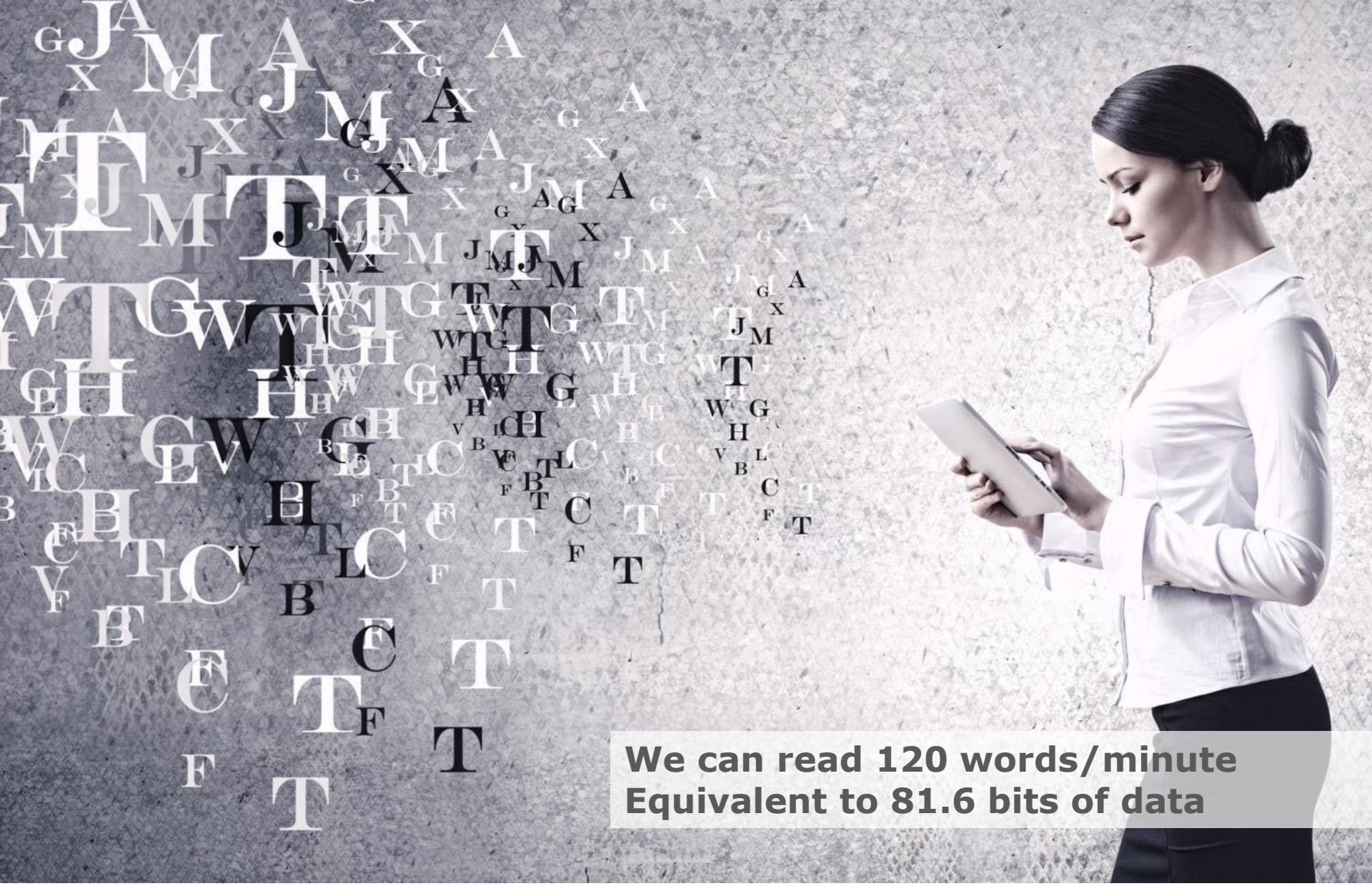
European Commission

European Commission



Brain receives 8.96 megabytes of data from eye /second

European Commission



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Visual Communication is in our DNA

- Your data/information is only as good as your ability to communicate
- Choose the correct means to visualise
- There is a need to identify key messages
- Create a story

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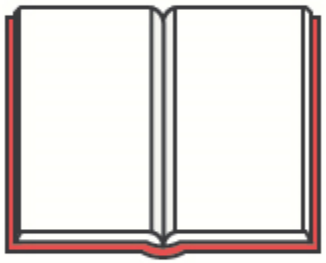
THE HUGE INCREASE IN VISUALIZED INFORMATION...

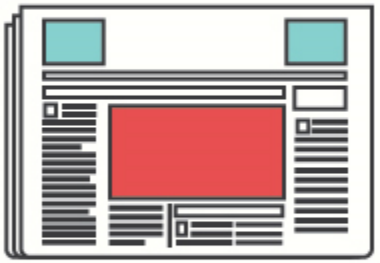


400%

in literature
(since 1990)

9900%

on the internet
(since 2007)

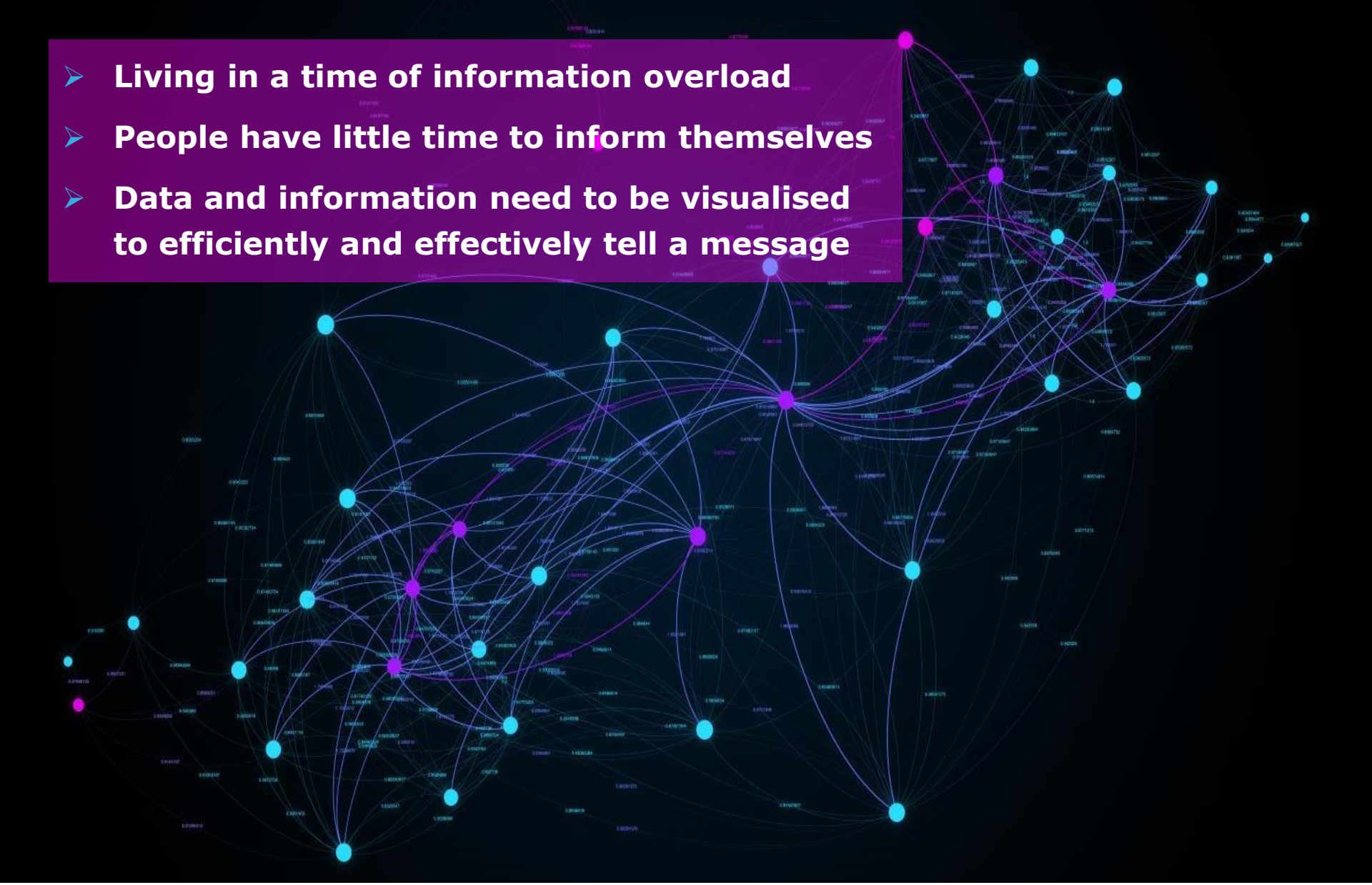


142%

in newspapers
(between 1985 & 1994)

European Commission

- Living in a time of information overload
- People have little time to inform themselves
- Data and information need to be visualised to efficiently and effectively tell a message



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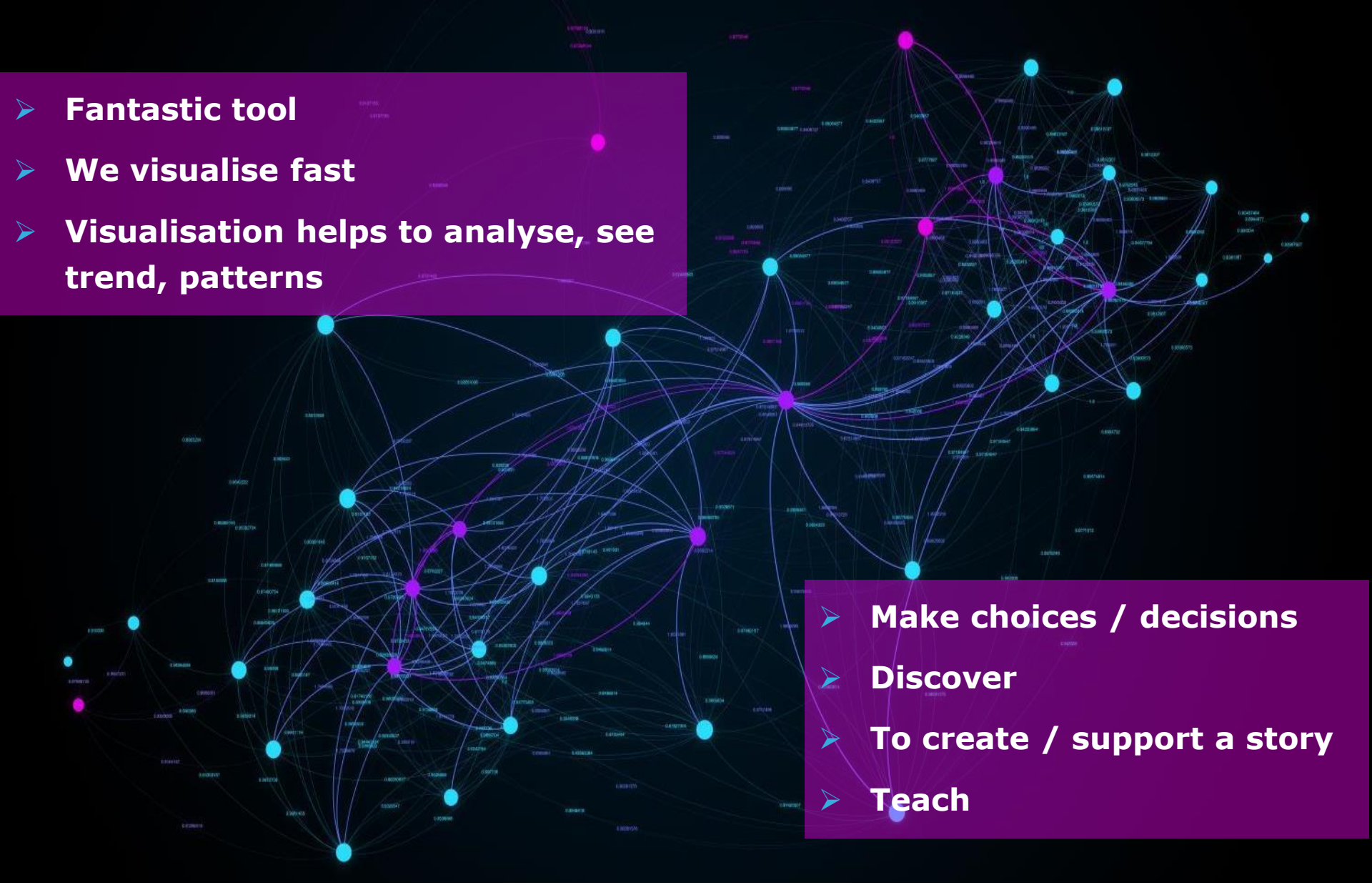

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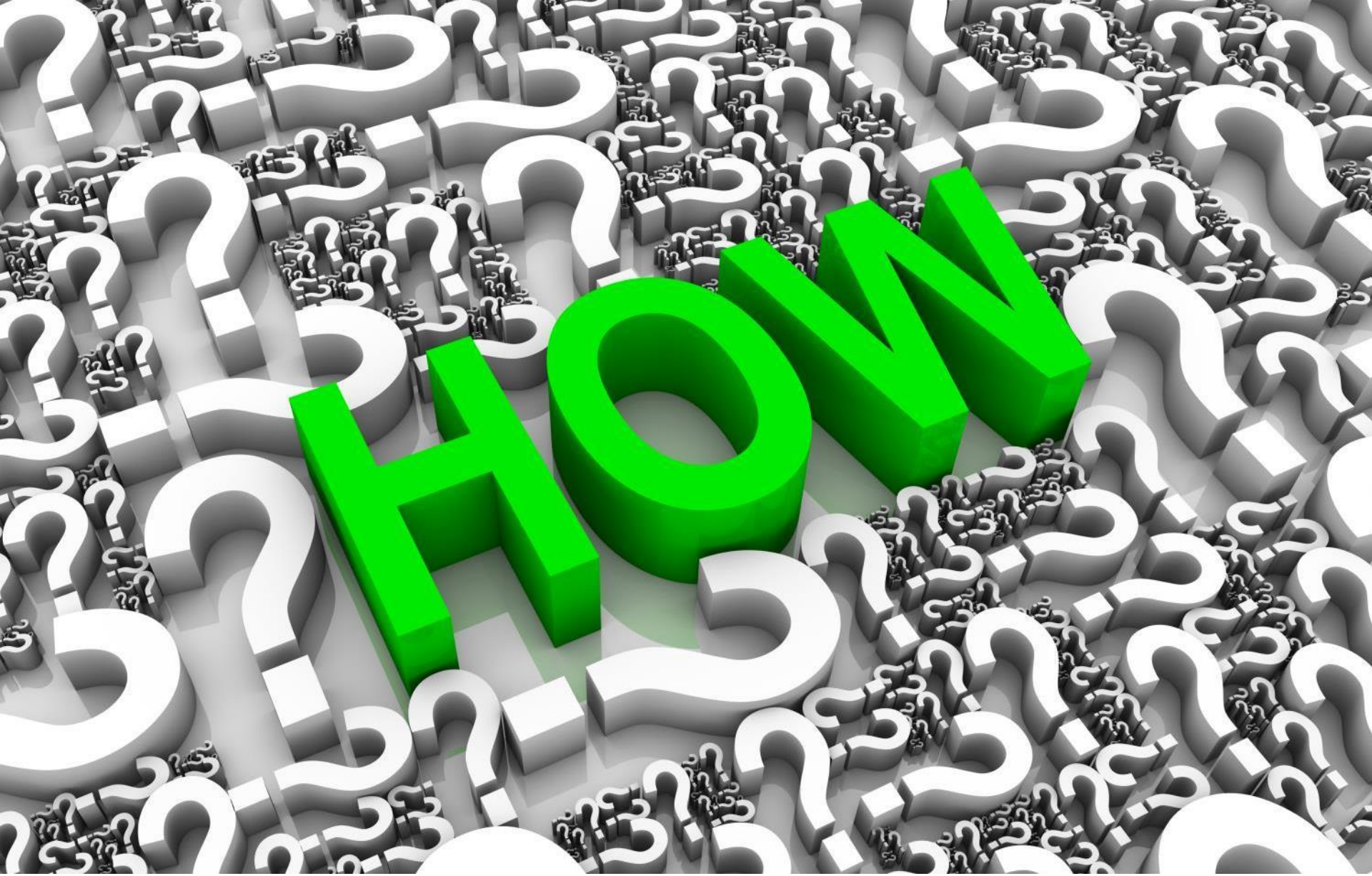

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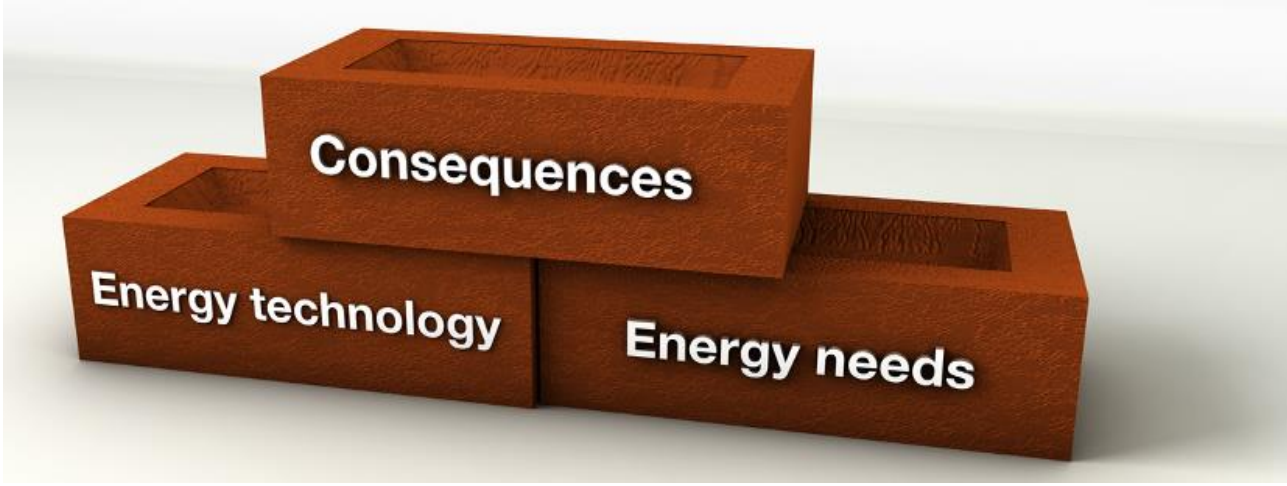
Fundamental Building Blocks

- Environment, perceptions, culture and education, style of language.
- Target young people (students of today voters of tomorrow).
- Education, training and communication a strategic activity, not an afterthought.



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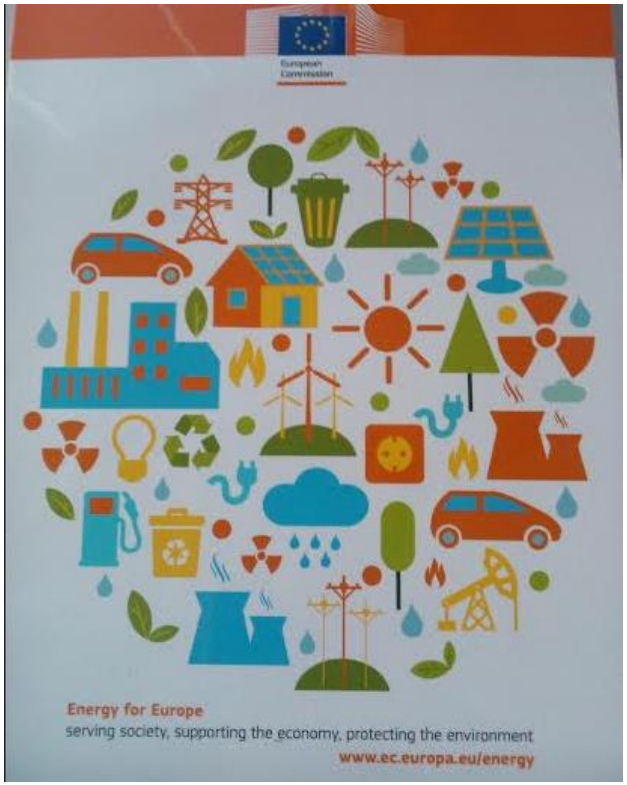
Dare to be critical
Fundamental messages
……..who needs enemys ?

IAEA / EU / nuclear ind. /nuc.
Medical ind.



LATEST

EU and IAEA review nuclear cooperation
9 February 2015

European Commission

European Commission

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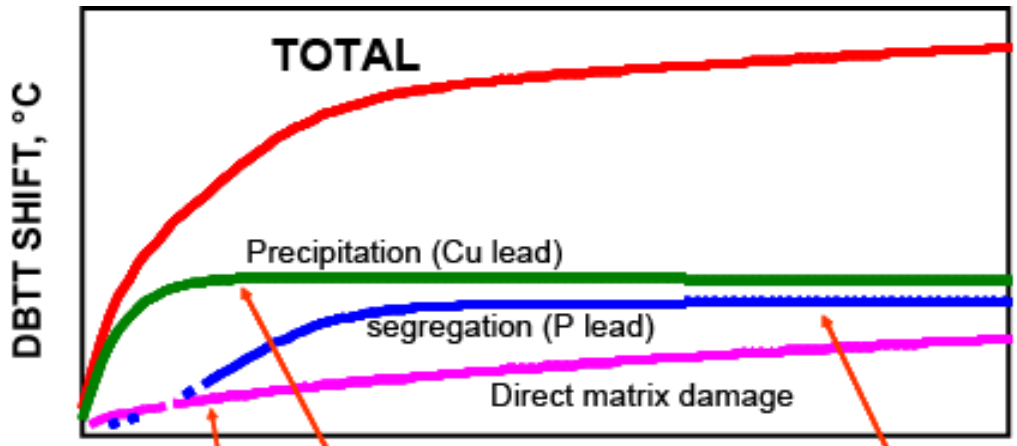
Exercise - Communication Innovation



$$DBTT_{shift} = a\ \Phi^{1/2} + b\ (1 - e^{-\Phi / \Phi_{Sat}}) + c\ [.5 + .5\ Tangh\ (\frac{\Phi - \Phi_{start}}{d})]$$

$\Phi_{Sat} = \Phi_{Sat1}(Mn)$

$b = b_1(Ni, Mn) * Cu$

$c = c_1(Ni) * P$

$\Phi_{Start} = \Phi_{Start1}(Mn)$

Ageing Nuclear power plants

How is it possible to present relatively complex information to a non-technical audience ?

Research Reactor located near to many agricultural companies

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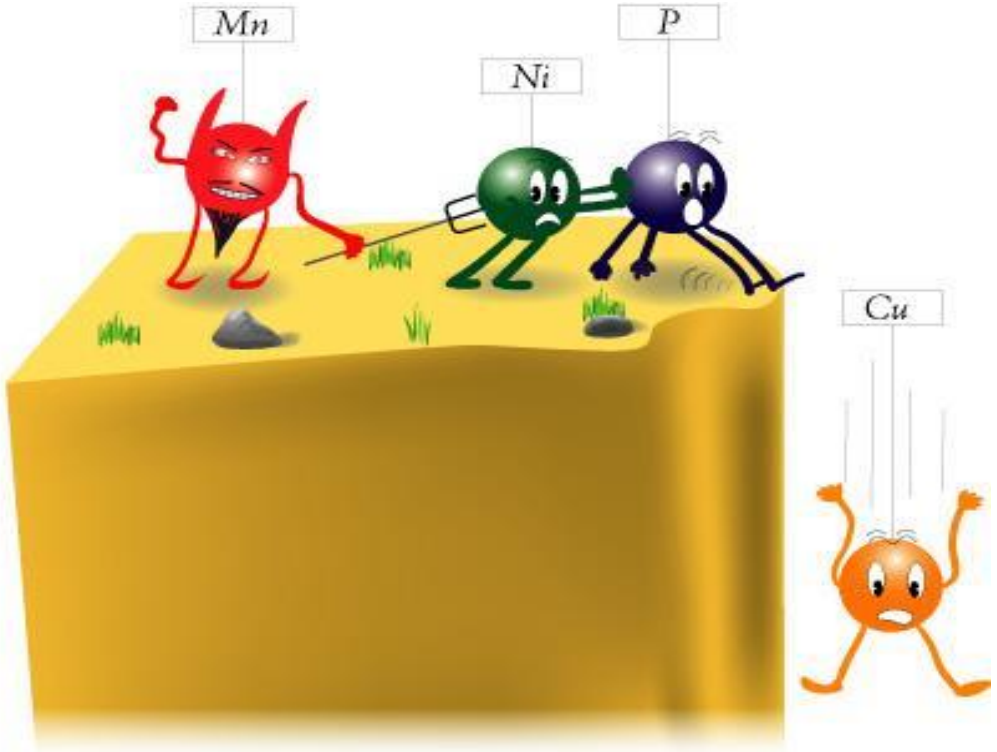
Getting the message across



What is the key message?

WIND ENERGY update

KEY FINDINGS FROM WEU'S O&M RESEARCH

5.9 GW of combined wind capacity

Collected in Europe between **1993** and **2009**

About **180,000** years of operational projects

Analyzed using **WindRAT** software by Sciemus

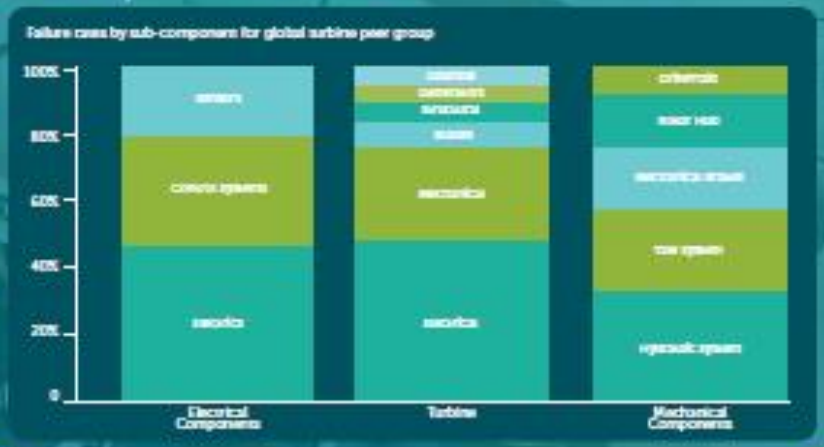
FINDING 1

Electrical components are the leading cause of lost days per year:

50% of instances of turbine failure

60% of days lost per year

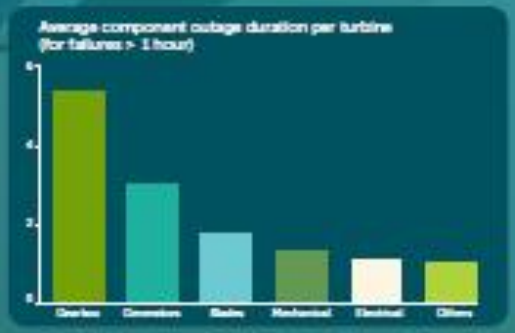
- However electrical components failures have a relatively low duration, they are fixed really quickly, causing on average outages of less than one day.



FINDING 2

Gearboxes fail rarely but when they do they cause the longest outages:

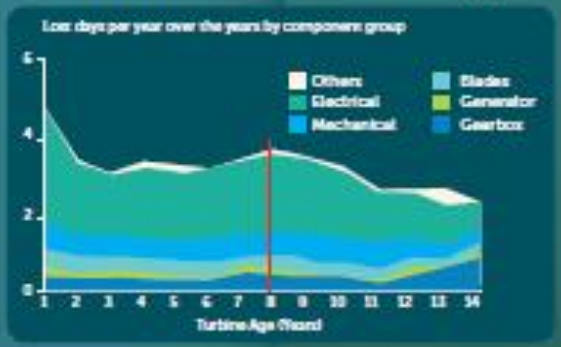
- Gearboxes stand on the other side of the spectrum. Although gearbox failures account for less than 5% of total failures, they cause the longest outages. The average gearbox outage in our research group lasts 5.4 days, compared to just under one day for the average electrical failure.
- This is due to the greater difficulties in repairing turbines at greater heights and also the inherent complexity of this component.
- However, electrical components fall more often and account for 2.11 days lost over the turbine lifetime, the highest number of days lost per component group.



The average gearbox outage in our research group lasts 5.4 days

FINDING 3

Turbines have a higher failure rate in the early years



It is not well known why but the highest number of problems is encountered shortly after commissioning, causing the highest number of days lost per year. Then lost days per year decline sharply by the second year of operation. From then it peaks at year 8 before decreasing, overall, for the lifetime of the turbine.

These facts were all extracted from the Wind O&M Report 2016

DOWNLOAD THE FULL REPORT BROCHURE HERE

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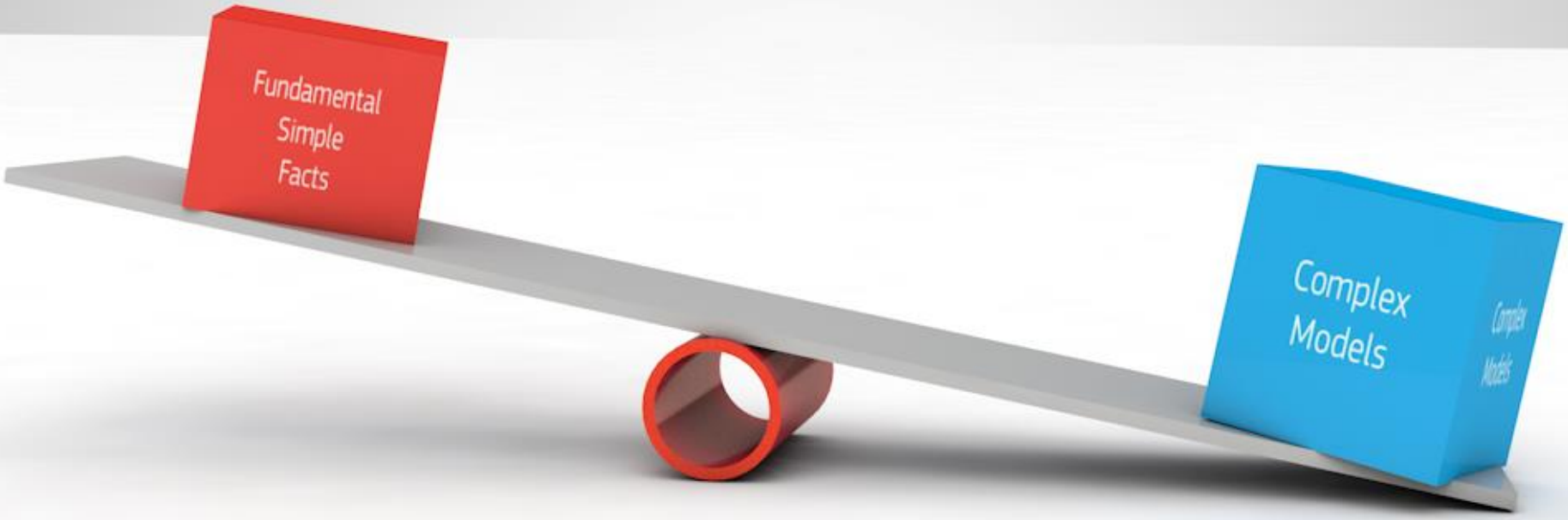

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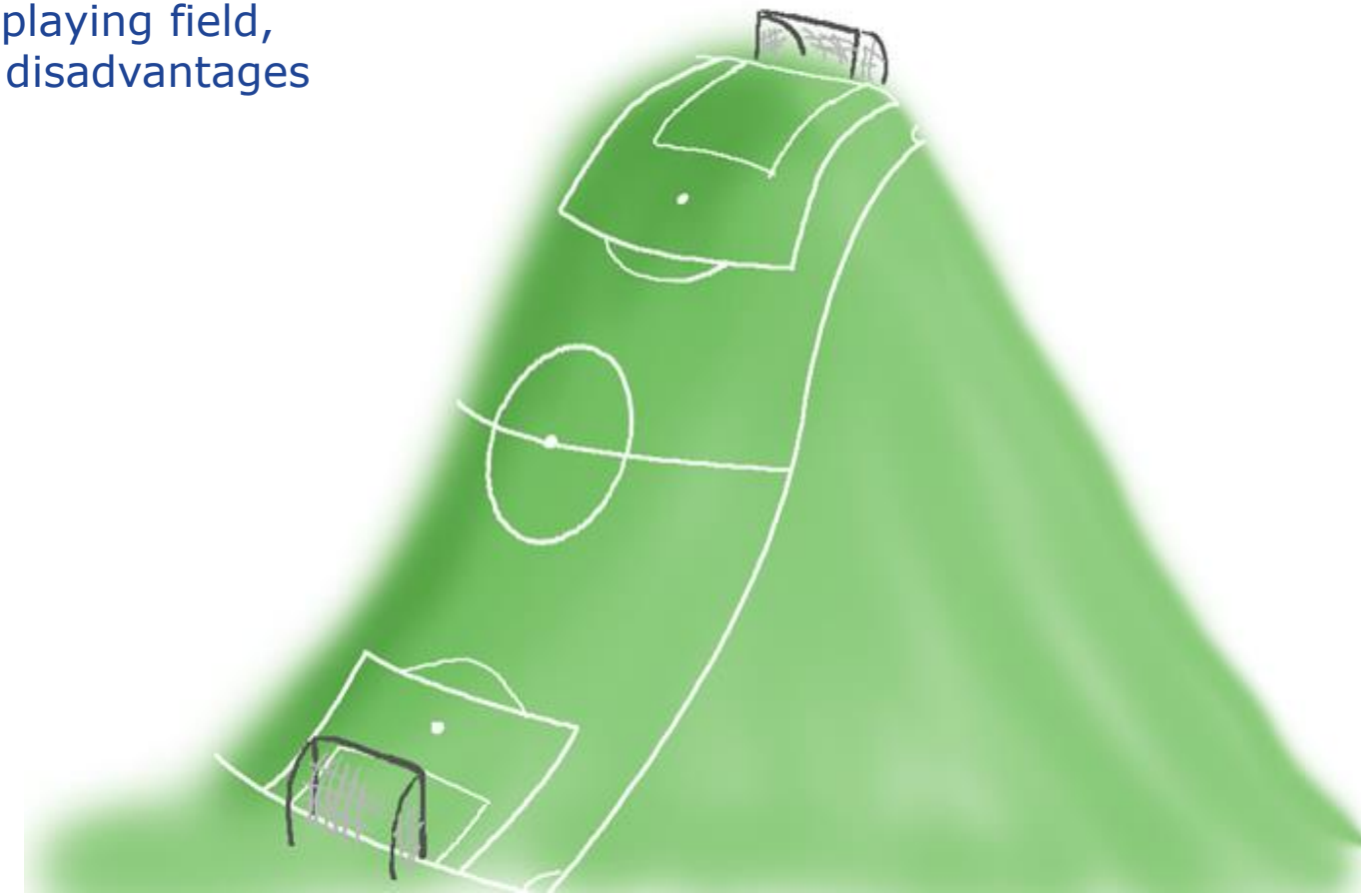
Fundamental Building Blocks

- Creating a level playing field, advantages and disadvantages



Is it this Simple?....

.....we need to understand what citizens /stakeholders think

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Be Visual.....

Does the story end here.....

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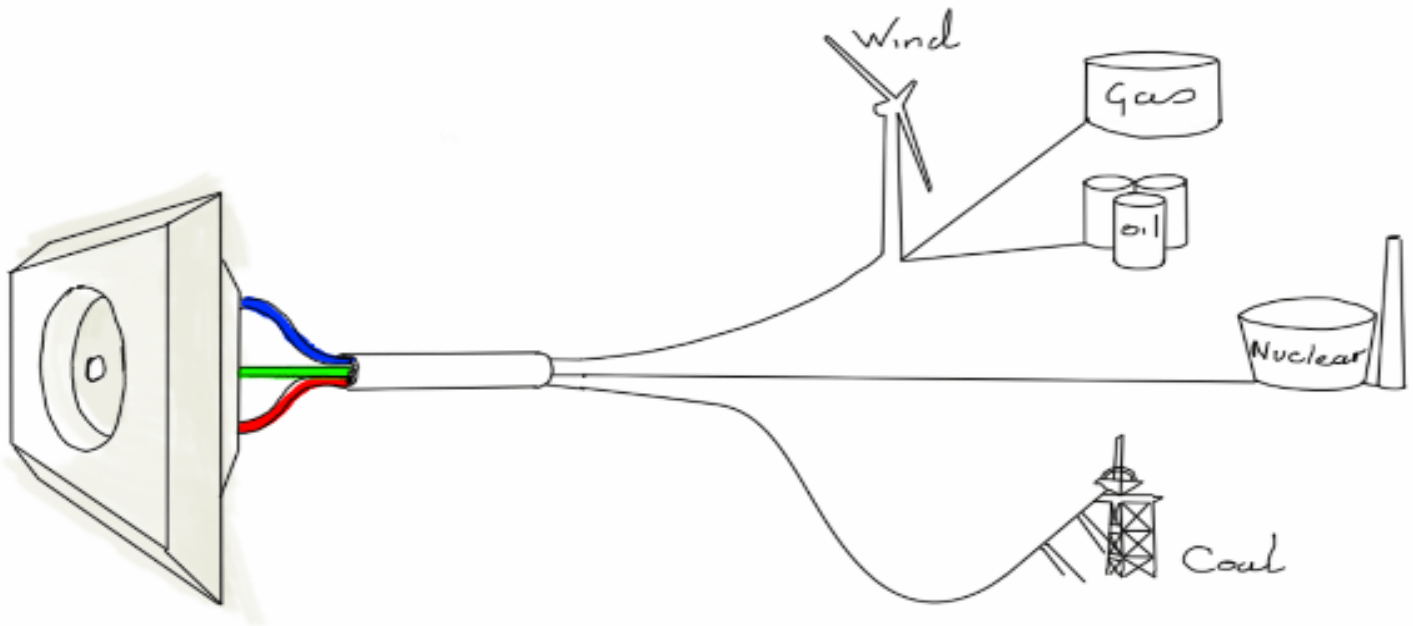

Base load, Energy security

Be Visual

YouTube passed FaceBook as largest social media site

- 20% of citizens are influenced by what they read
- 83% by what they see

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WE DISCOVER THE VARIETY OF ENERGY

European Commission
Institute for Energy & Transport

COAL POWER

European Commission

European Commission

1

batch

of cupcakes made by only 1 kWh of energy

JRC – JOINT RESEARCH CENTRE

To ensure that you still can enjoy your electric devices, our **Institute for Energy and Transport** is responsible for the research to provide enough energy for your future.

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http://snehls.de/visdat/gruppe4/

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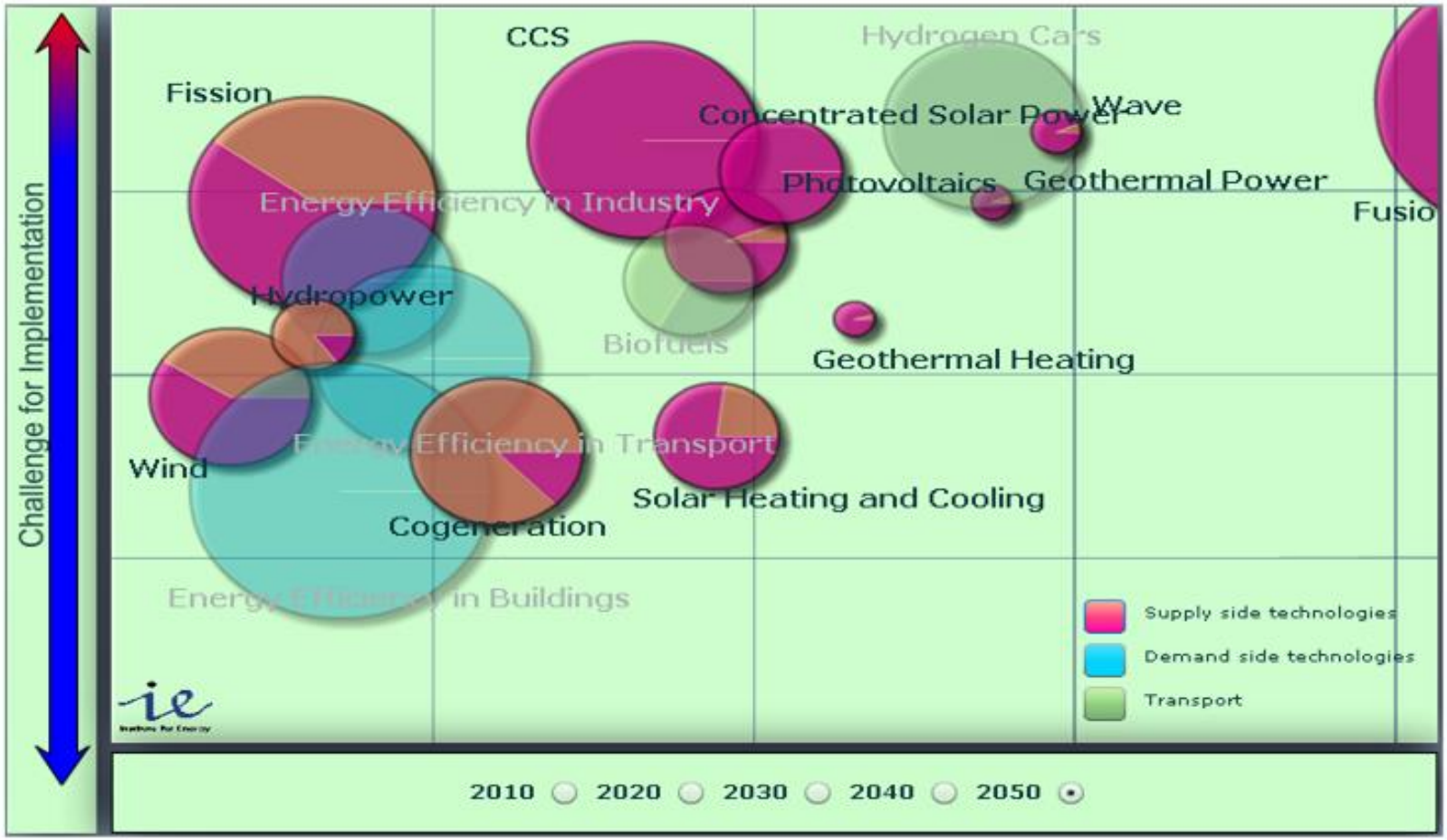
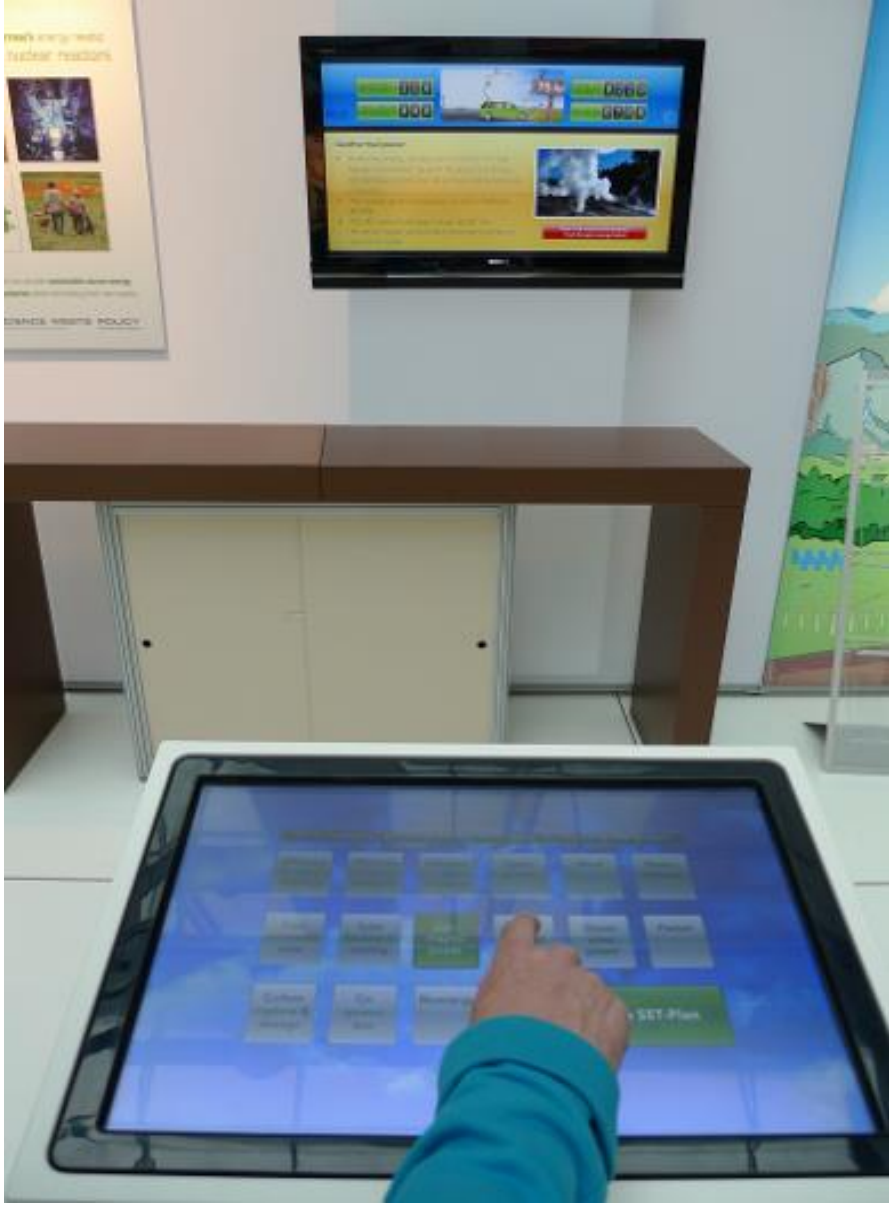
Communication Innovation



European Commission



Communication Innovation

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it's 2050

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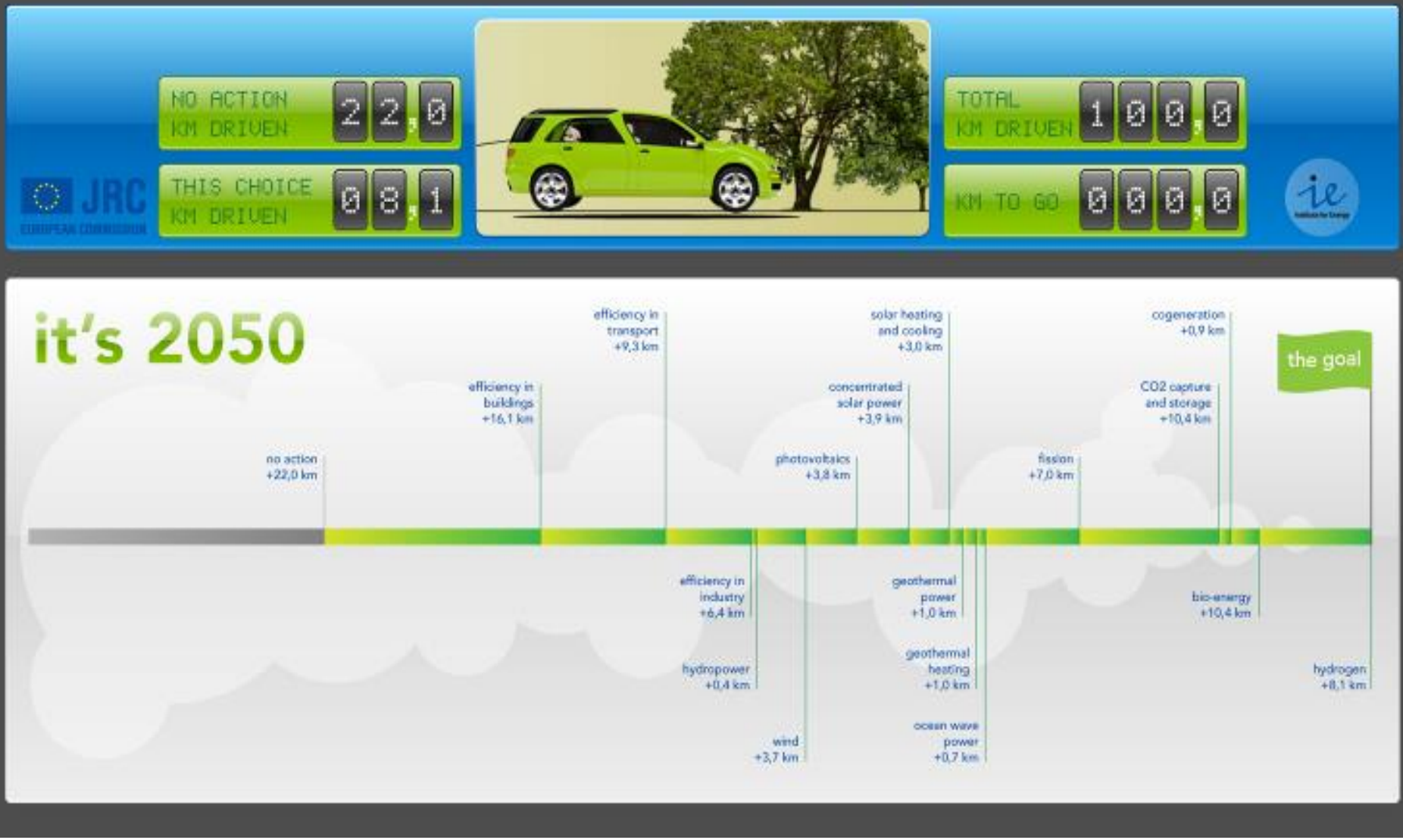

We've reached the goal! The relative potential of all the energy technologies is shown in a clear everyday language

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European Commission

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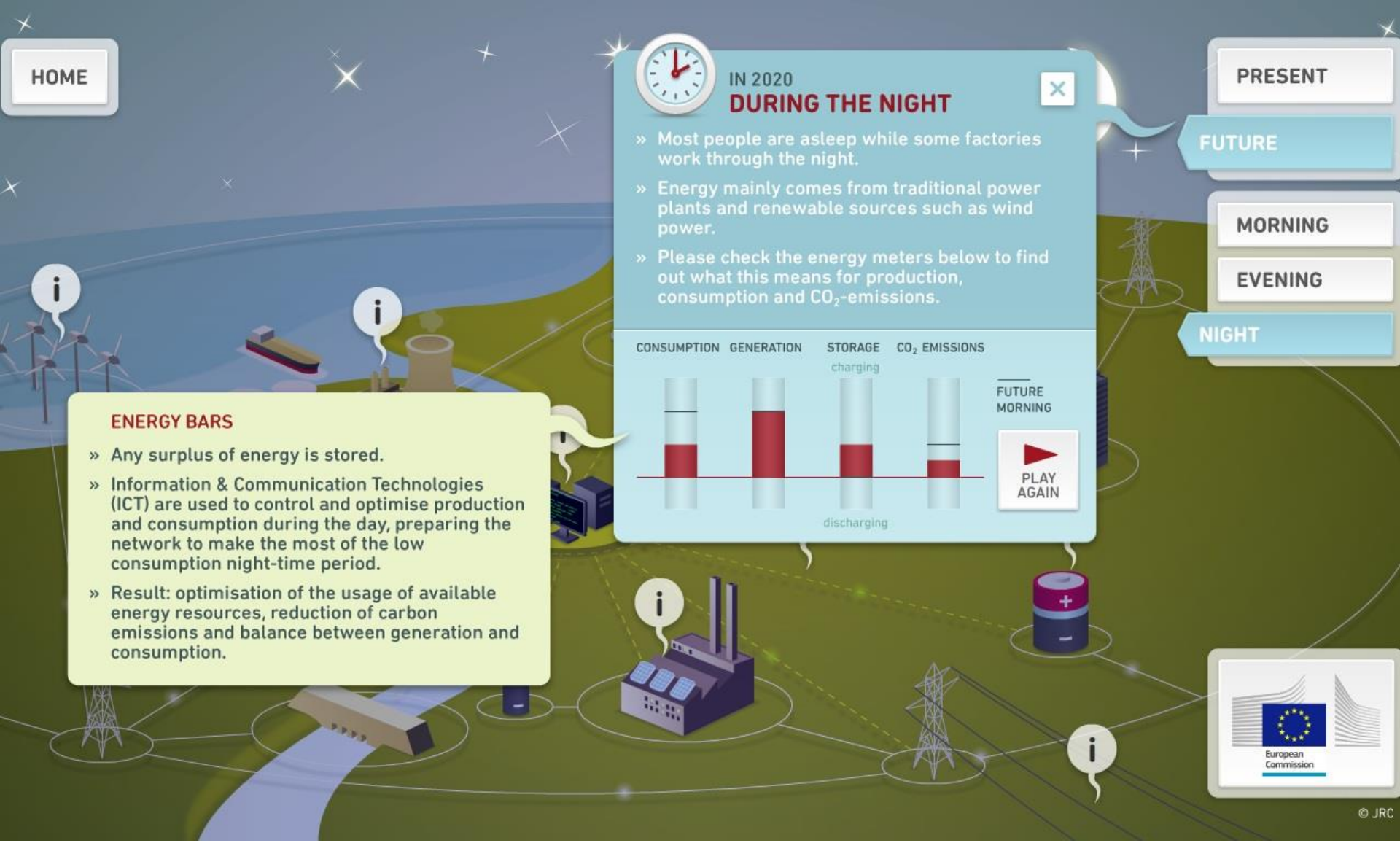
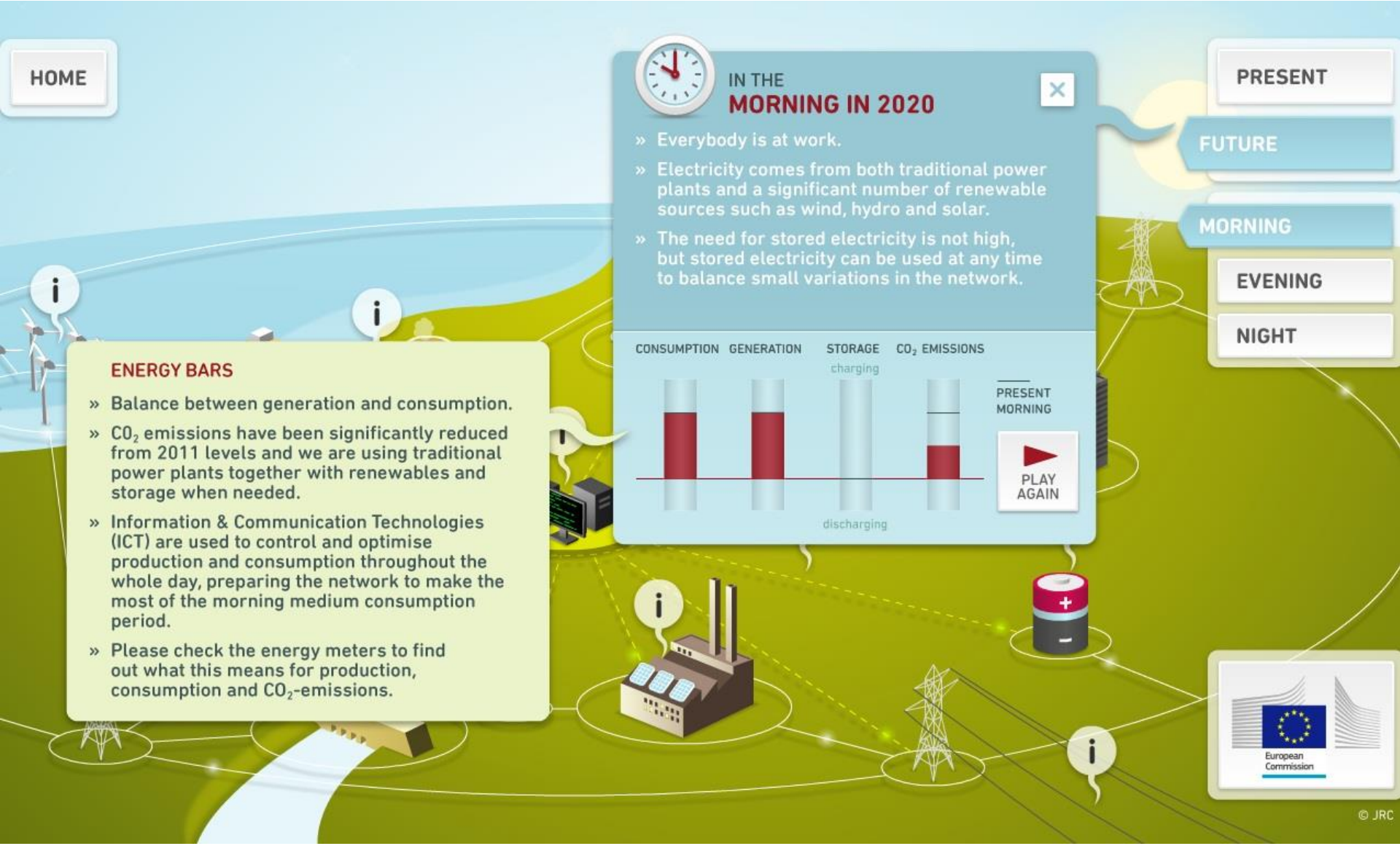


European Commission



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56TWh, savings of approximately 50%, 28TWh

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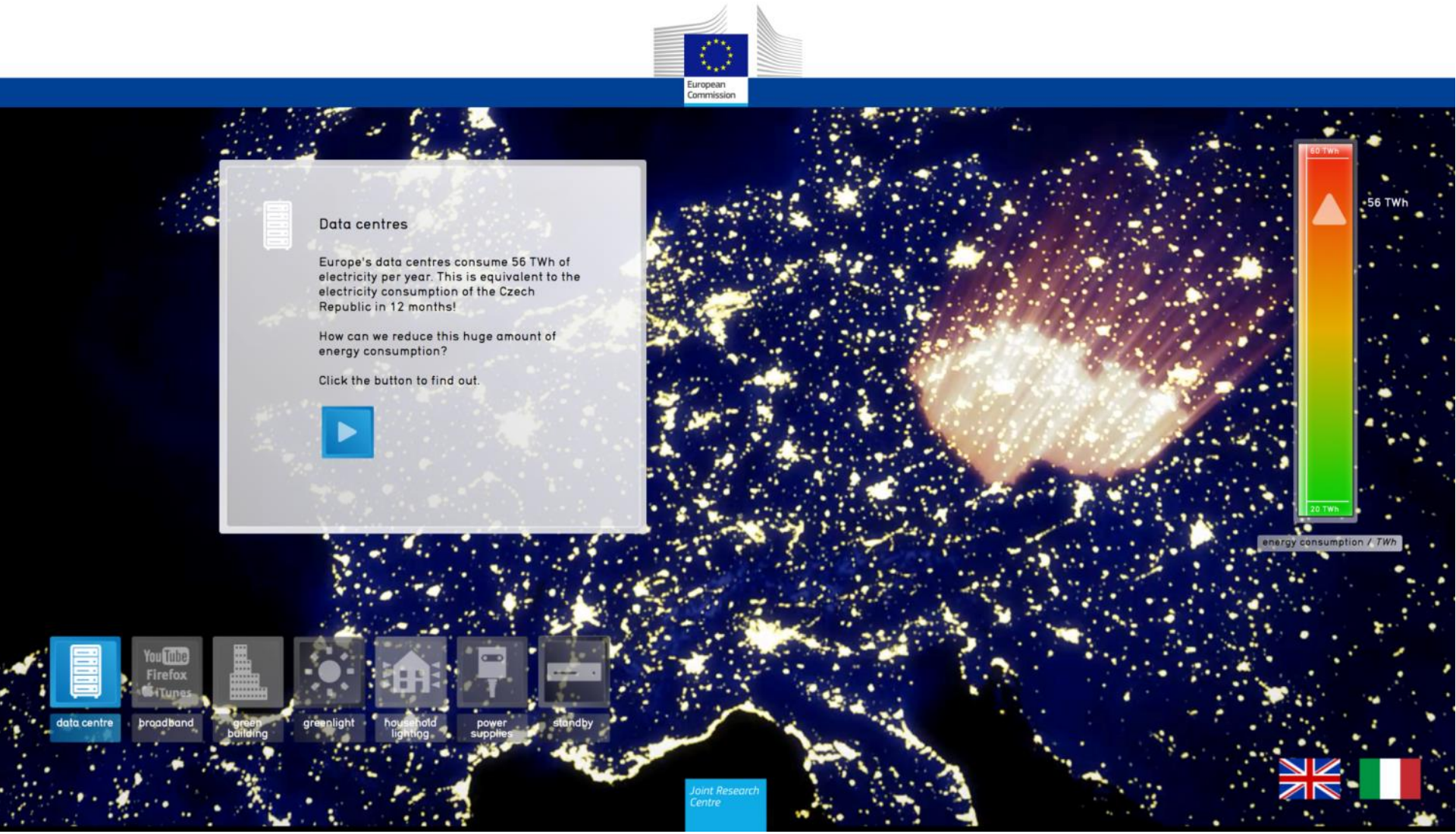

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Approaches to data Visualisation

- Computer programmes
- Graphics / Design

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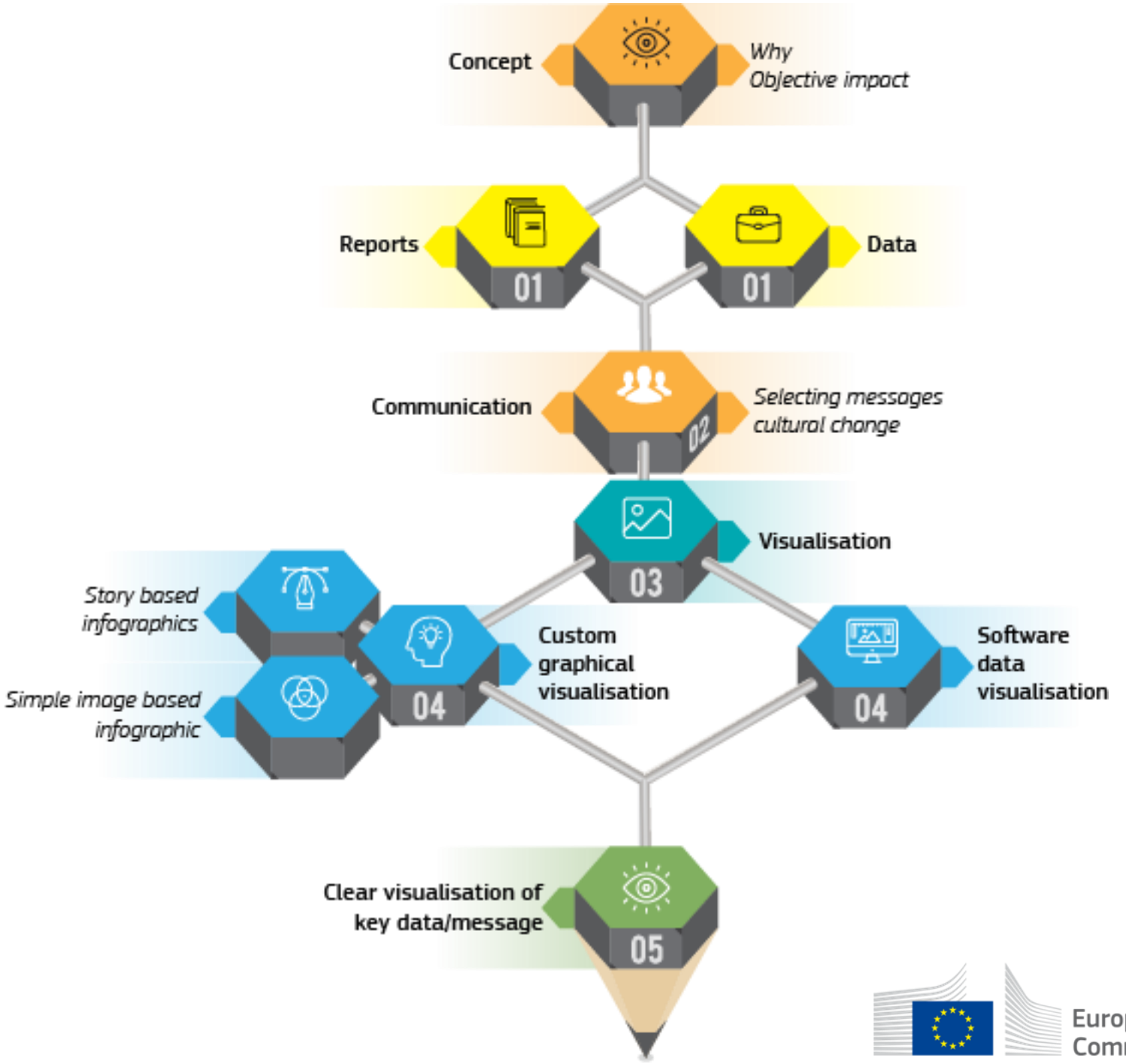
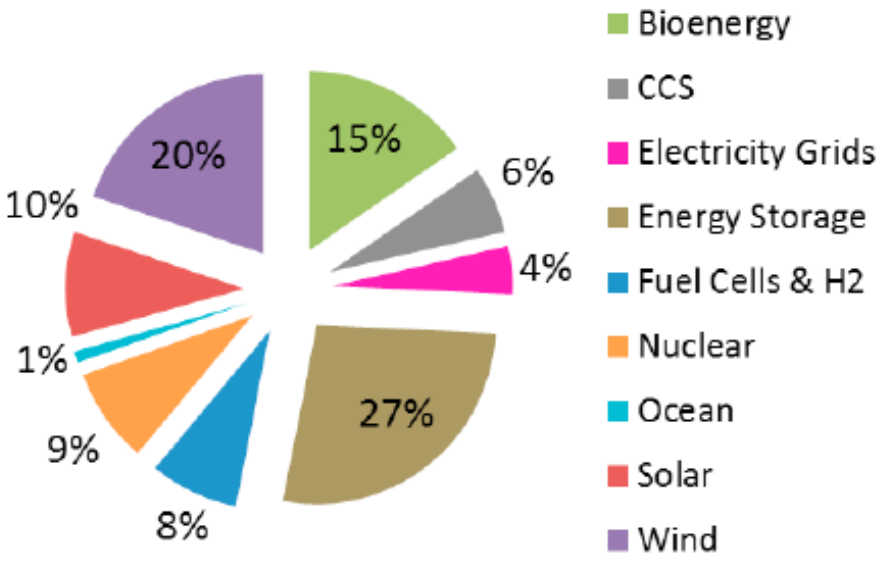


GENERAL IDEAS

- Simplification of the graphics
- Reduction to one message
- Only one graphic per page
- Same style in every graphic
  - Uniform headlines: Colour, Size, Font
  - Uniform colours that suit the topic
- Striking legends that are easy to recognize

lockstoff

European Commission

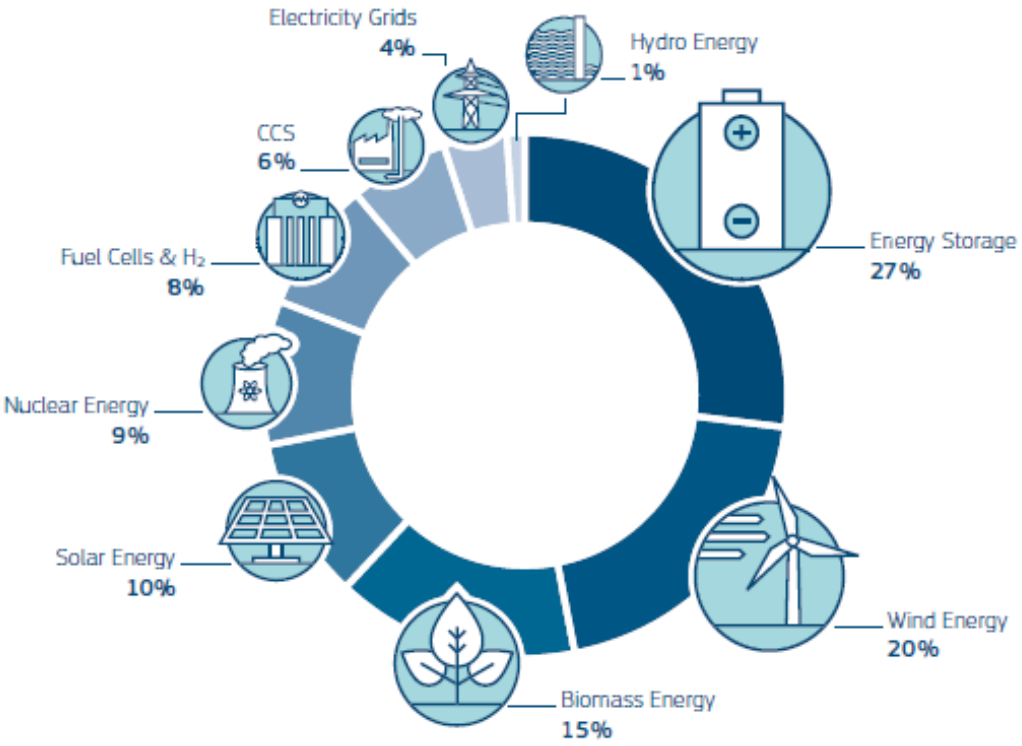


Focus on R&D investment per technology

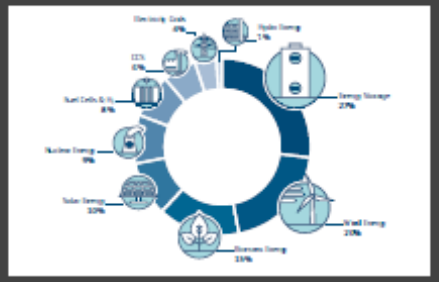
lockstoff

European Commission

CORPORATE R&D INVESTMENT IN 2011
PER TECHNOLOGY



RING CHART WITH ICONS



- Focus on energy technologies
- Icons instead of coloured pieces
  - No legend needed
  - Icons are easy and fast to understand
- Uniform lettering of the single pieces > clear to recognize
- Hierarchy of percentages in both shading and size of single pieces and size of the icons

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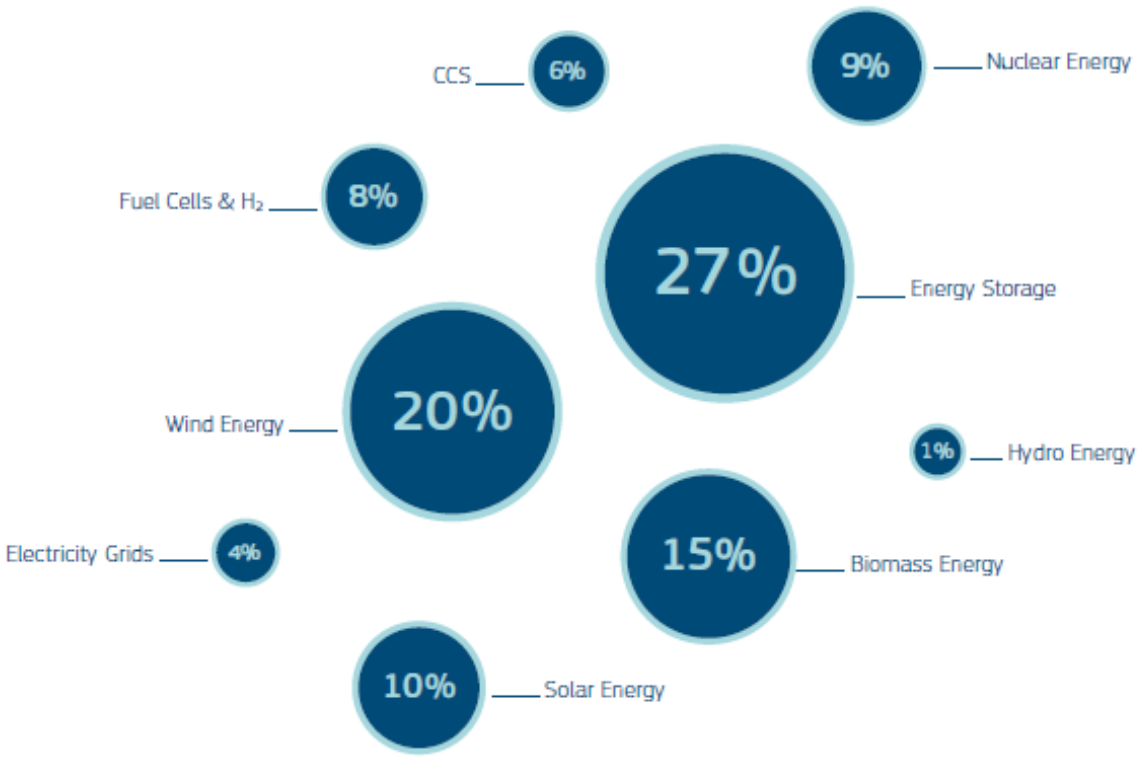
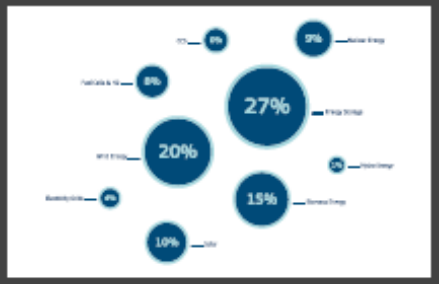
CORPORATE R&D INVESTMENT IN 2011
PER TECHNOLOGY



BUBBLE CHART



- Focus on percentages
- Reduced visualization with different bubble sizes
- Uniform lettering of the single bubbles
- No legend needed
- Free composition

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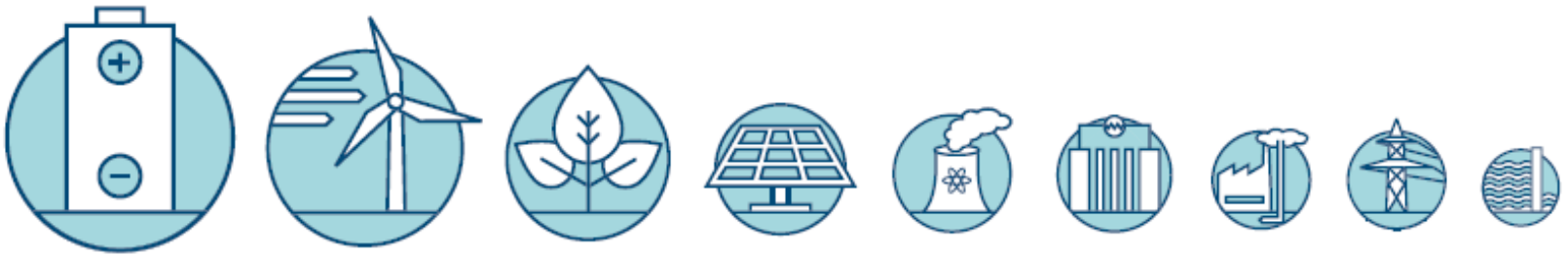
CORPORATE R&D INVESTMENT IN 2011

PER TECHNOLOGY



Energy Storage	Wind Energy	Biomass Energy	Solar Energy	Nuclear Energy	Fuel Cells & H_2	CCS	Electricity Grids	Hydro Energy
27%	20%	15%	10%	9%	8%	6%	4%	1%

BUBBLE CHART WITH ICONS – ORDERED COMPOSITION

- Focus on hierarchy of energy technologies
- Ordered composition of different sized icons
  - Message clear at first sight
- Icons are easy and fast to understand
- Percentages in lettering are emphasized

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TO SUM UP

- Simplification and reduction make graphics easier to understand
- Many ways to express the same data
- Different messages are told depending on the type of chart

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Examples of software

- **D3 Software**

See examples, some knowledge of Java script / HTML can help
Templates available, open source

- **Pivot tables, or SQL / Matlab**

one of Excel's most powerful features. A pivot table allows you to extract the significance from a large, detailed data set.

- **Google fusion, data, maps & tables**

Share data on google drive, visualise, interactive maps

- **Color brewer**

Is the colour palette OK, colour blind, projector etc

Software & charting libraries

Interactive charts:
- datawrapper.de
- Google charts
- Maps: Google Fusion tables/CartoDB

Infographics:
- infogr.am
- piktochart.com

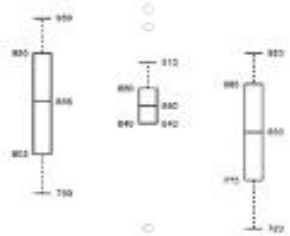
Charting tools:
- Raw: app.raw.densitydesign.org
- Datavisual: datavisu.al

Site:
- shorthand.com/social
- strikingly.com
- sway.com

Dashboards:
- tableausoftware.com
- qlik.com
- powerbi.microsoft.com

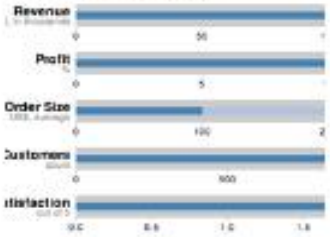
Javascript Libraries:
- highcharts.com
- d3js.org

Box Plots

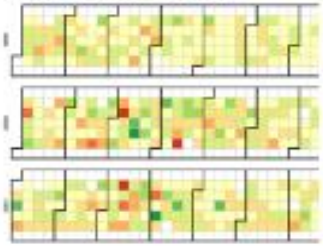


Bubble Chart

Bullet Charts



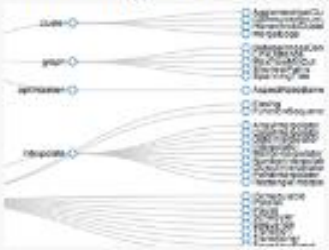
Calendar View



Non-contiguous Cartogram

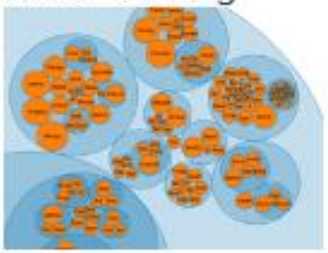
Chord Diagram

Dendrogram

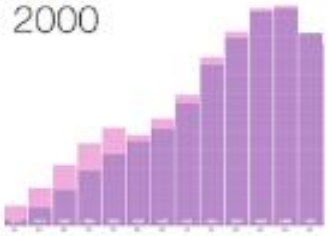


Force-Directed Graph

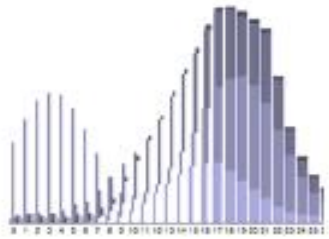
Circle Packing



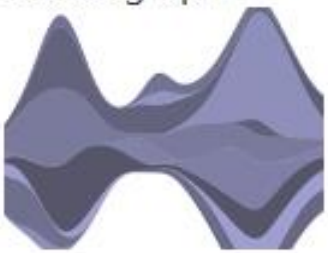
Population Pyramid



Stacked Bars



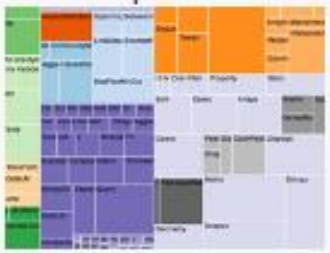
Streamgraph



Sunburst

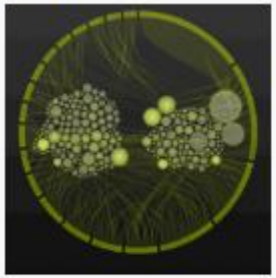
Node-Link Tree

Treemap



Voronoi Diagram

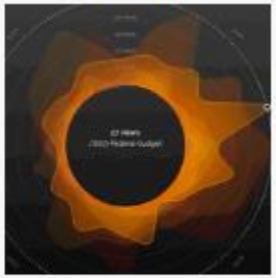
Halo



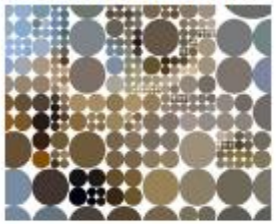
Radial Progress

NFL Predictions

Corona Radar

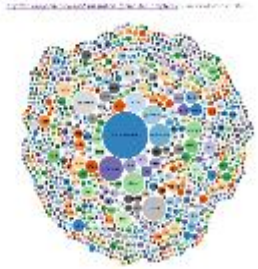


Koalas to the Max

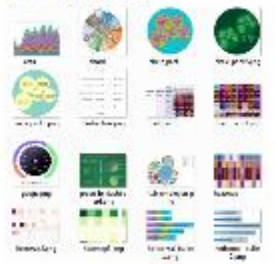


Sankey Creator

Convert any page into bubbles



D3 Builder

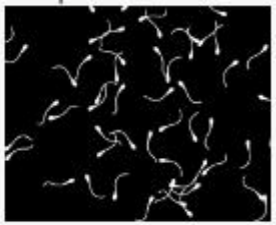


Particles

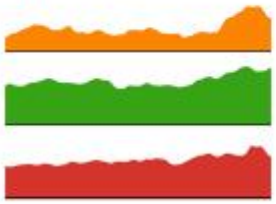
Indented Tree

Rounded Rect

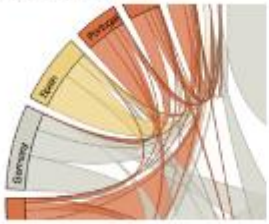
Tadpoles



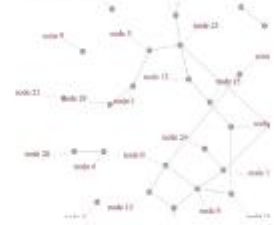
Showreel



Euro Debt



Labeled Force Layout



Circle-Square Illusion