

# Управление качеством воздуха в странах Восточного региона

RPP3 – Final Project Workshop

## The Model System THOR-AirPAS

23-26 September, 2014, Copenhagen, Denmark



**MWH**



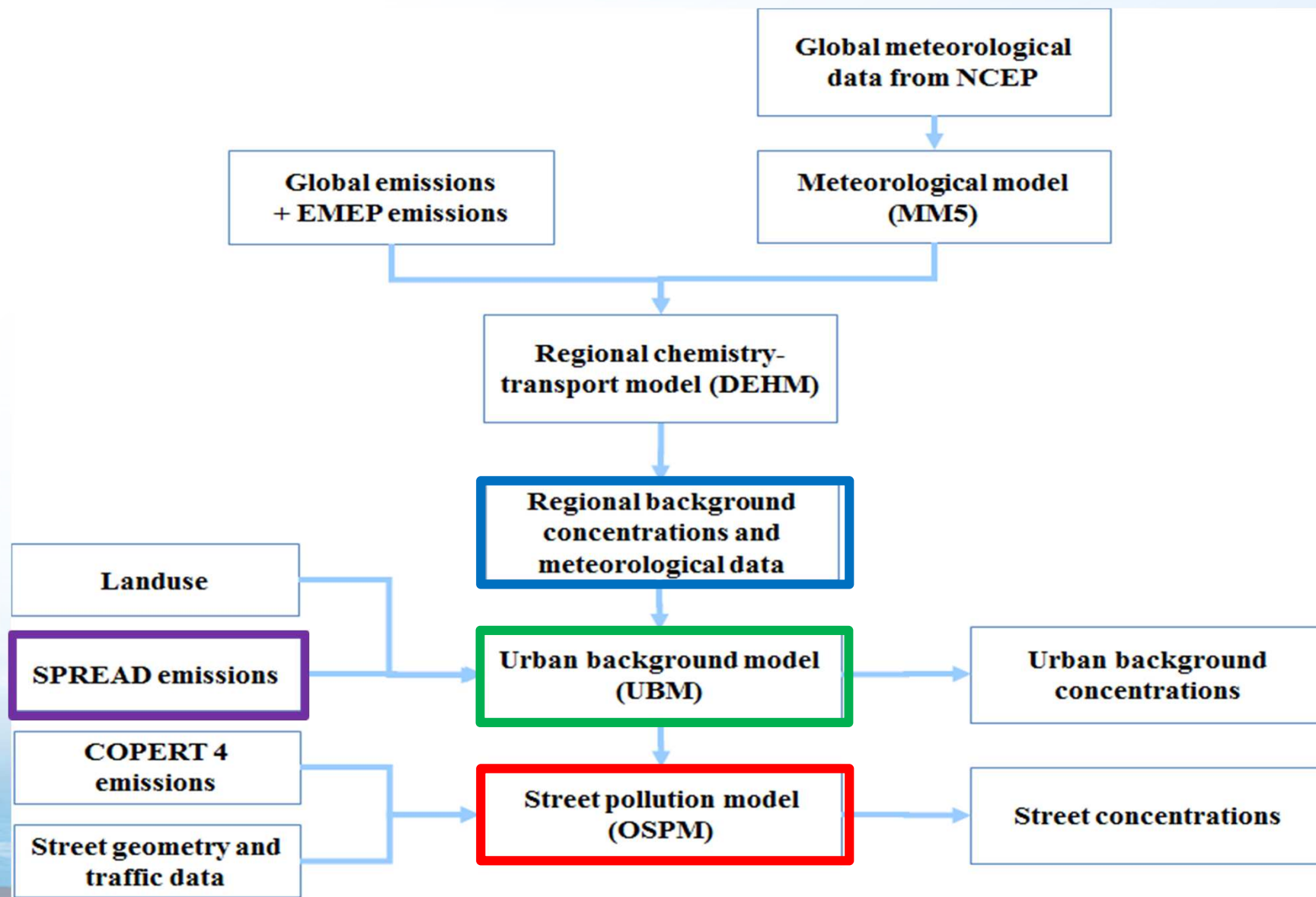
# *Training Workshop, Yerevan, June 2014*



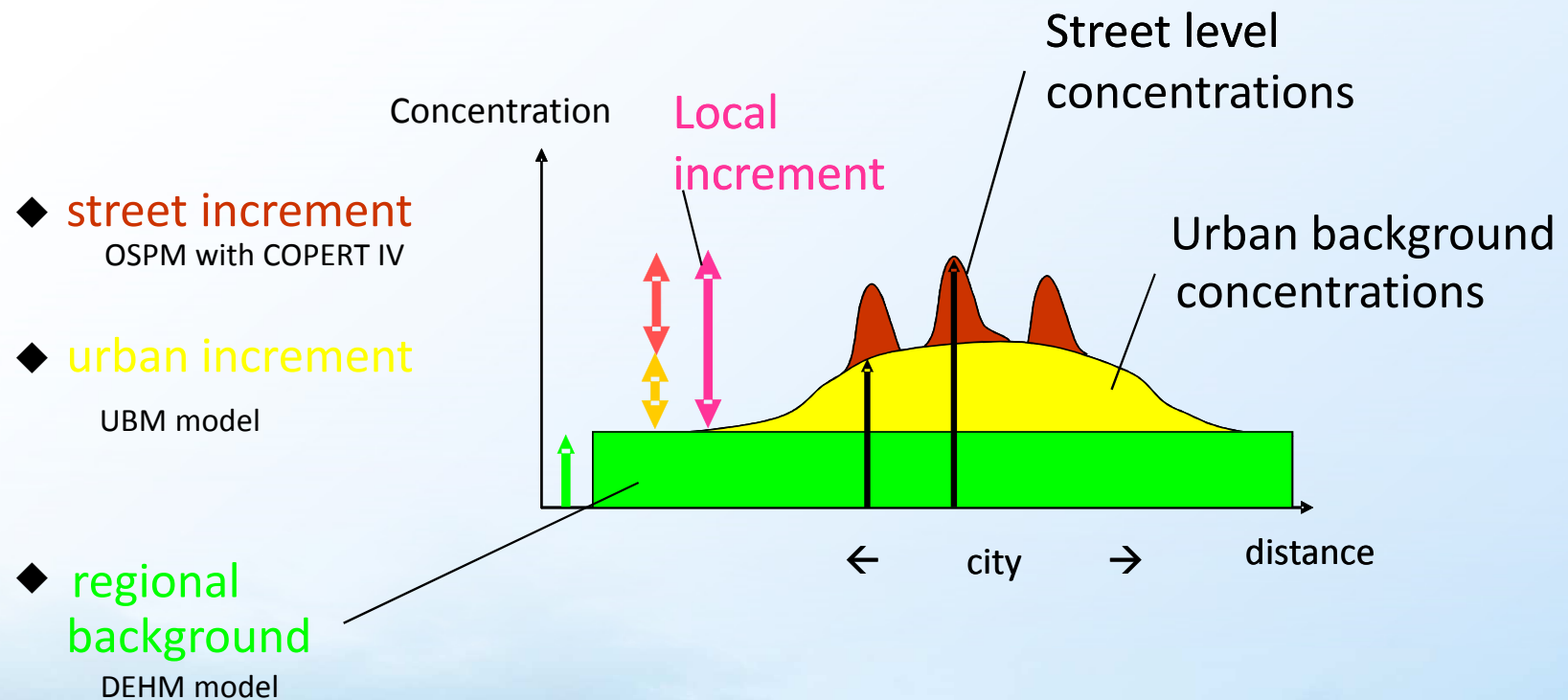
# *Training Workshop, Chisinau, July 2014*



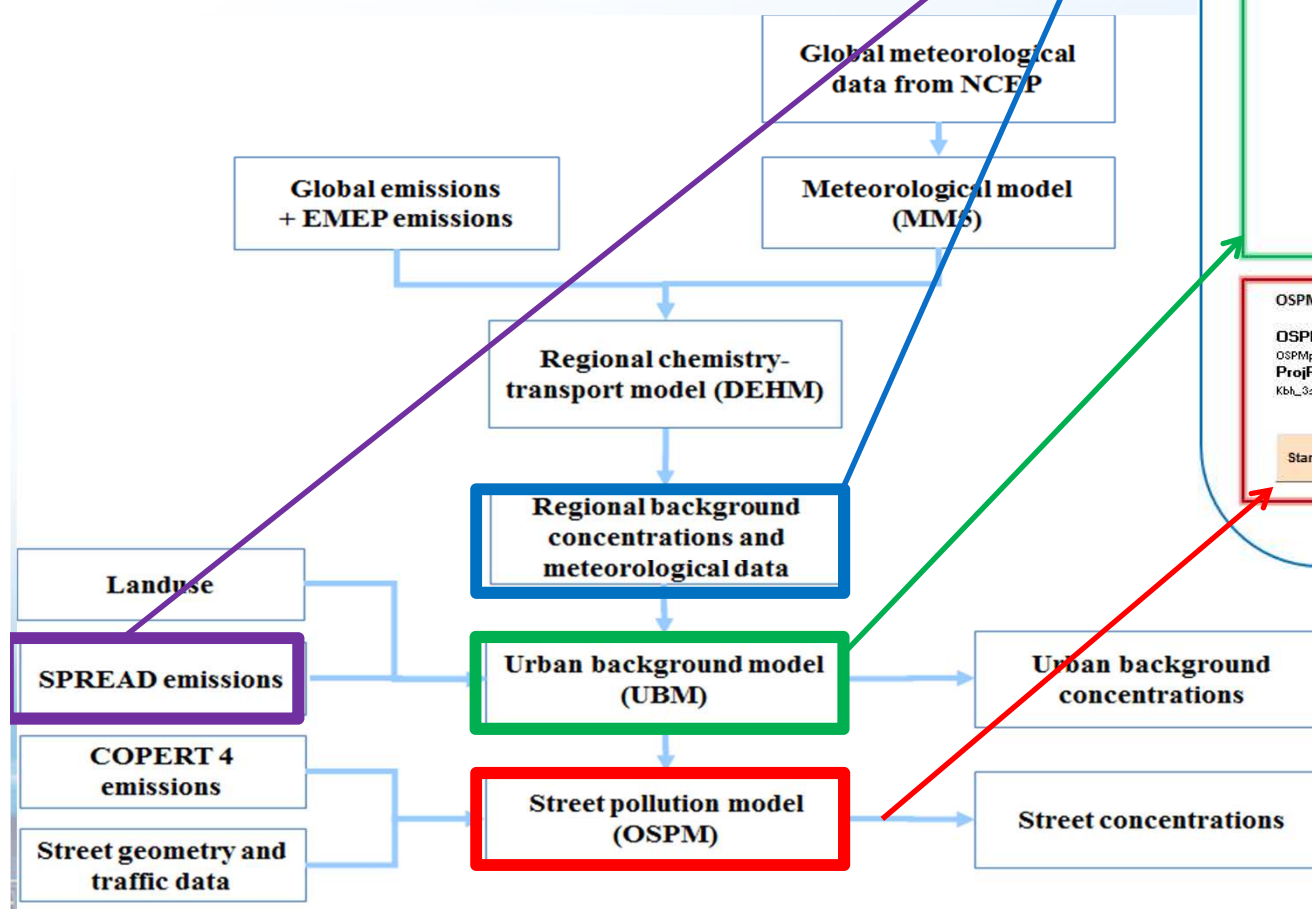
# The THOR Integrated Model System Applied to in the RPP3-Project



# Modelling intra-urban variability



# THOR-AirPAS overview:



## THOR-AirPAS Air Pollution Assessment System Setup for Denmark, Copenhagen, years 2000 - 2012

DEHM - Regional background and meteorology

Open DEHM file in TextPad

DEHM file: A0G\_haerly\_Rurand\_Tour.dat

SPREAD - Urban Emissions

Show Transport Emi.

Show Area Emi.

Show Point Emi.

Transport emissions: Copenhagen\_Transport.csv

Other area emissions: Copenhagen\_Area.csv

Point source emissions: Copenhagen\_Point.csv

UBM - Urban Background Model

Grid or Rec. val. Calculate for whole grid

Edit Rec. val.

Run UBM

StartDate: 01-01-2012 00h

EndDate: 02-01-2012 23h

RunName: 20140618

FolderName: Kbh\_3src

Export of UBM Emissions (Sum of Transport and Area including Scaling)

Export as GIS-polygon shp file

Open in TextPad

Export of UBM concentration results (averages only)

Export as GIS-polygon shp file

Open in TextPad

Export as GIS-point shp file

OSPM - Operational Street Pollution model

OSPM Project Name:

OSPMProject\_20140618.osp

ProjPathName (as in UBM):

Kbh\_3src

StreetName: Main Street North

Height (m): 55

Width (m): 66

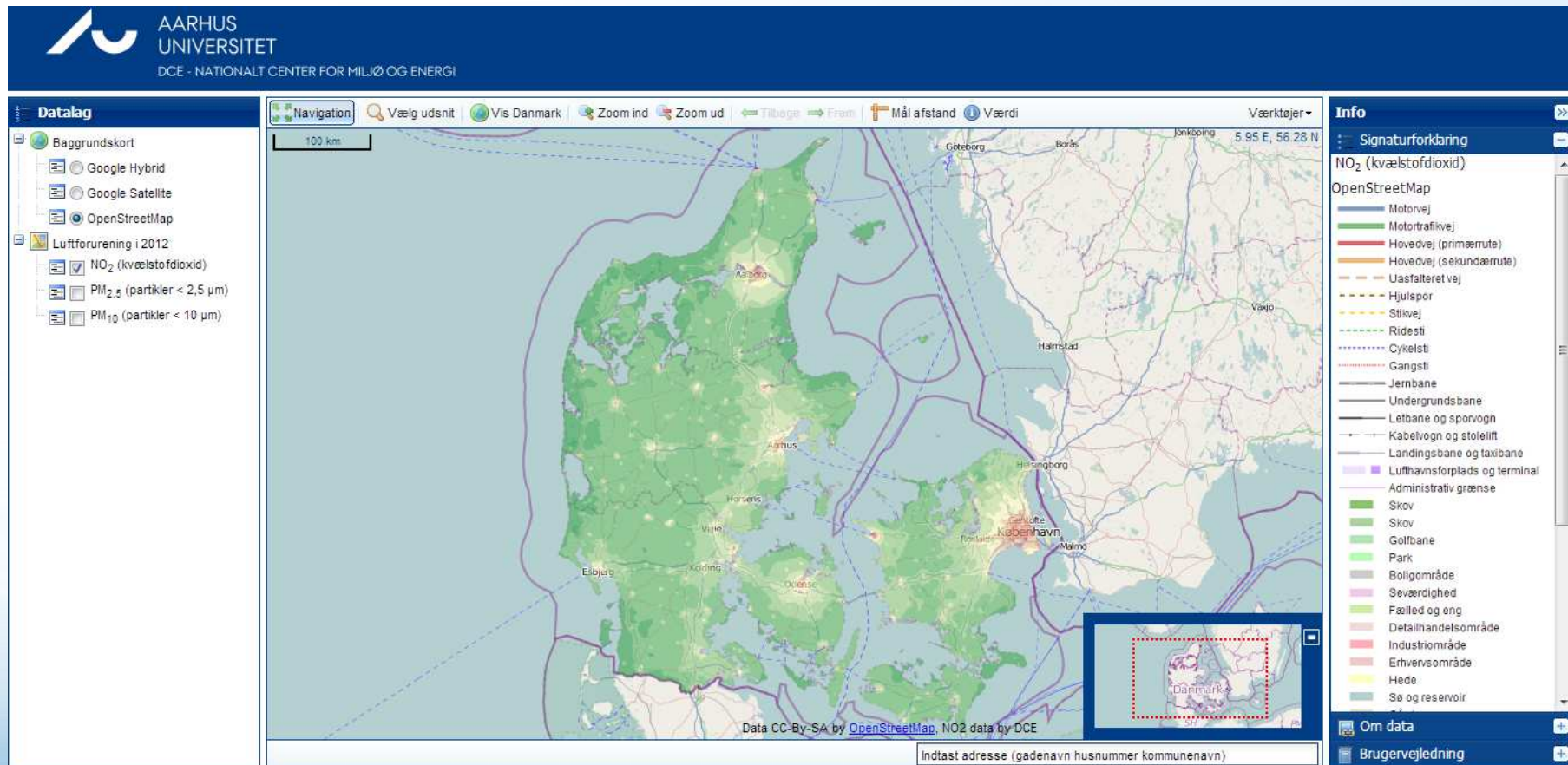
Orientation (deg): 33

Daily Traffic (veh/day): 22000

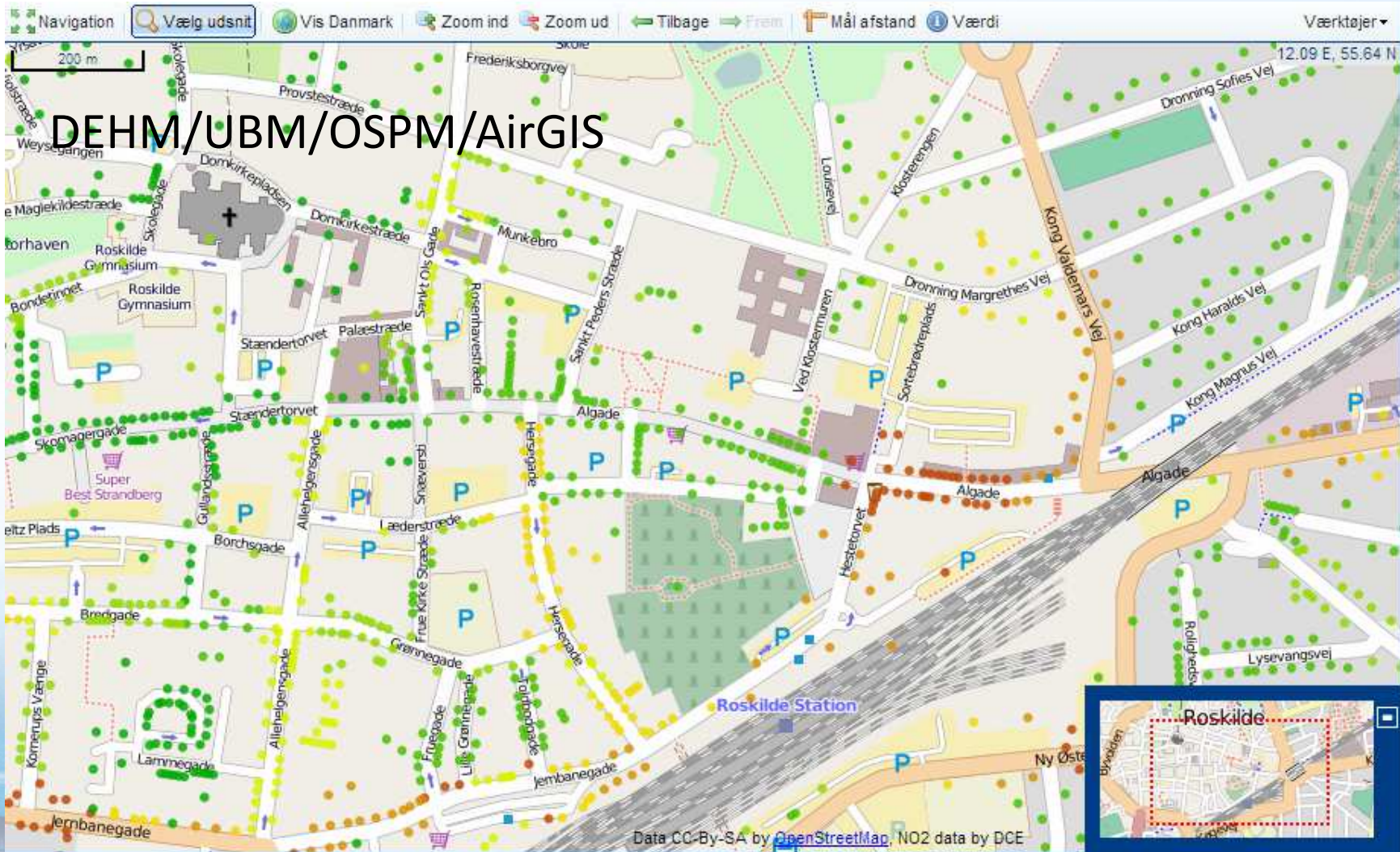
Vehicle Speed (km/h): 22

Start OSPM with selected options

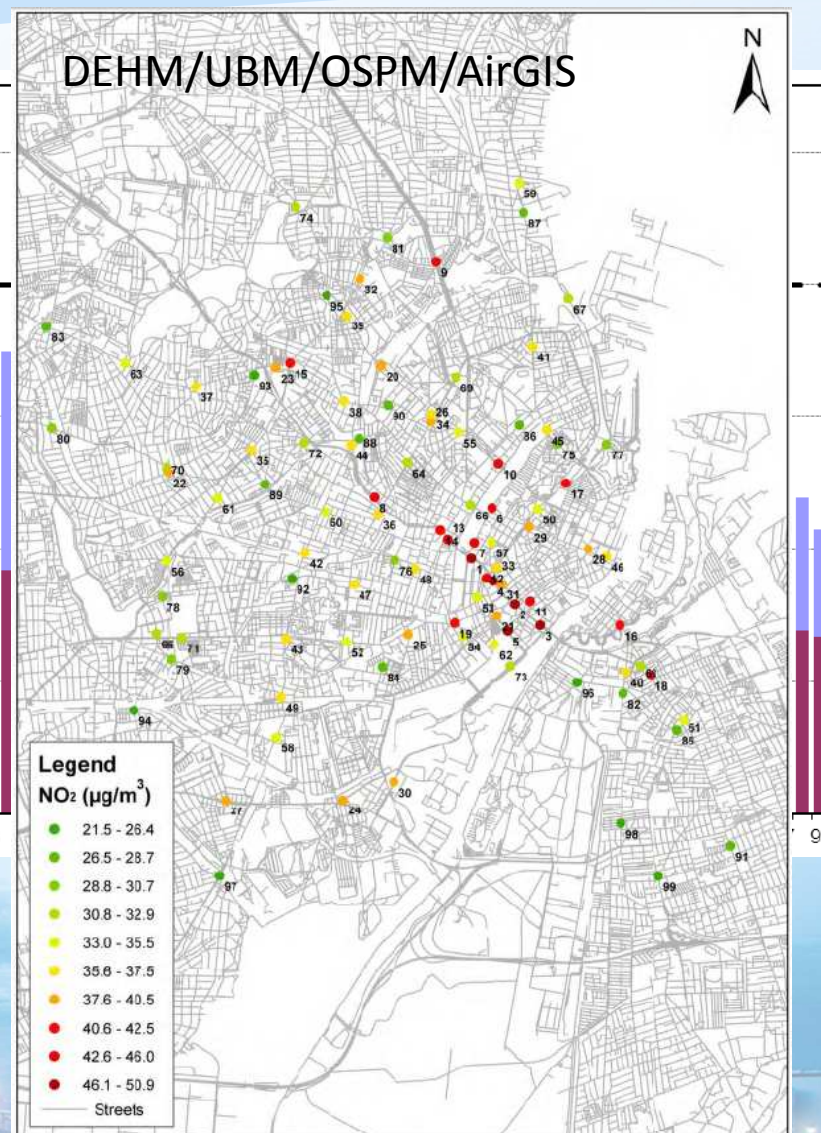
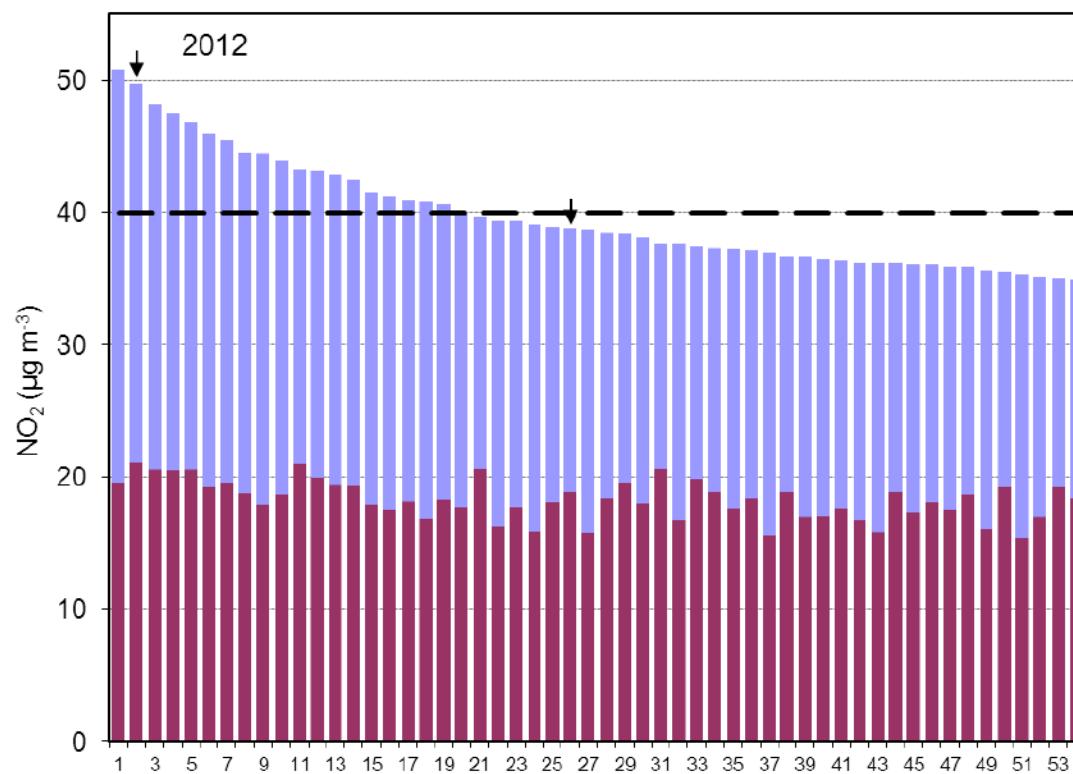
# Website for Air Quality at Your Street



## Street concentrations of $\text{NO}_2$



# *NO<sub>2</sub> exceedances in Copenhagen 2012*

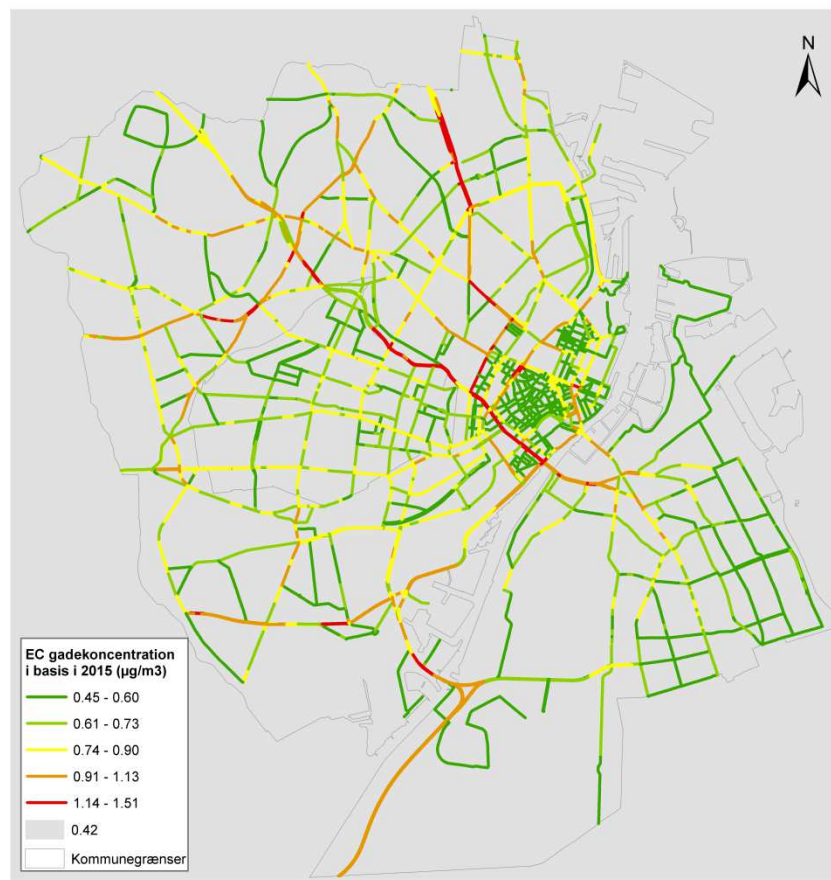


(Ellermann et al. 2013)

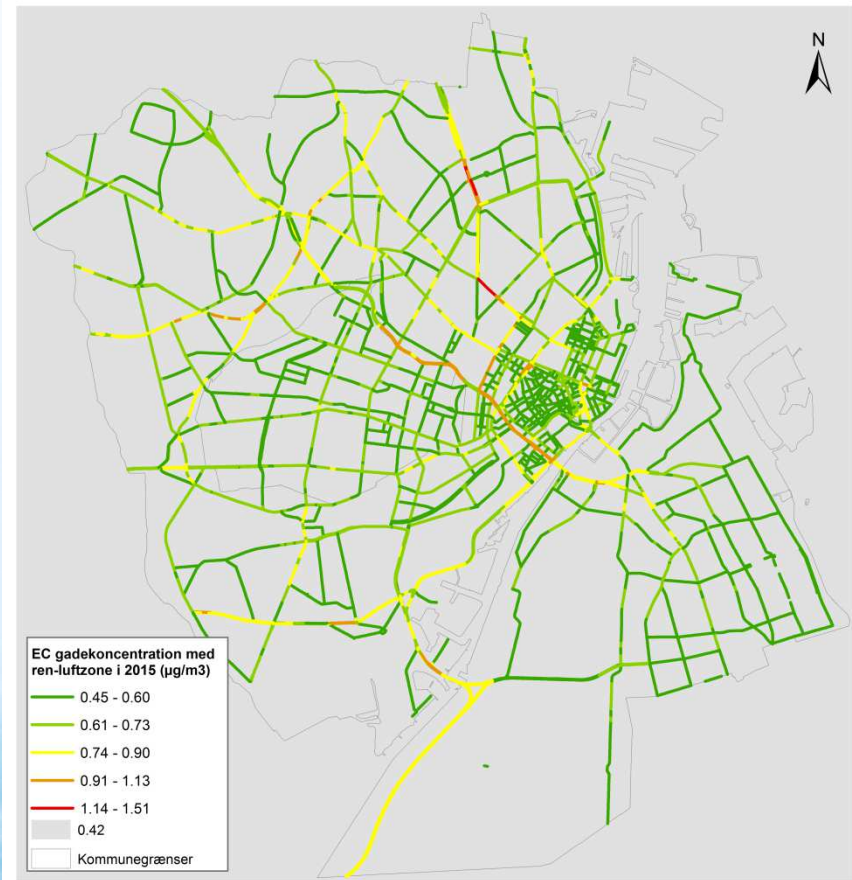
# Impacts of proposed LEZ to EC concentrations in CPH

UBM/OSPM/AirGIS

Reference in 2015



Proposed Berlin scenario in 2015



(Jensen & Ketzel 2014)

Berlin scenario: Diesel-dreven passenger cars and vans  $\leq$  Euro 3 and petrol-dreven passenger cars and vans  $\leq$  Euro 0 are banned in LEZ

# THOR-AirPAS overview:

**THOR-AirPAS Air Pollution Assessment System**  
Setup for Denmark Funen, years 2000 - 2012

**DEHM - Regional background and meteorology**

Open DEHM file in TextPad      DEHM file:

**SPREAD - Urban Emissions**

Show Transport Emi.      Transport emissions: Funen\_Transport.csv  
Show Area Emi.      Other area emissions: Funen\_Area.csv  
Show Point Emi.      Point source emissions: Funen\_Point.csv

**UBM - Urban Background Model**

Grid or Rec\_val:   
Edit Rec\_val

**Run UBM**

StartDate: 01-01-2009 00h  
EndDate: 31-01-2009 23h  
RunName: Rec1month\_p1  
FolderName: Funen25June

Export of UBM Emissions (Sum of Transport and Area or Point including Scaling)

Export (T.+A.) as polygon shape      Open in TextPad  
Export Point Emi. as shape file

Export of UBM concentration results (averages only)

Export as GIS-polygon shp file      Open in TextPad  
Export as GIS-point shp file

**OSPM - Operational Street Pollution model**

OSPM Project Name:   
ProjPathName (as in UBM):

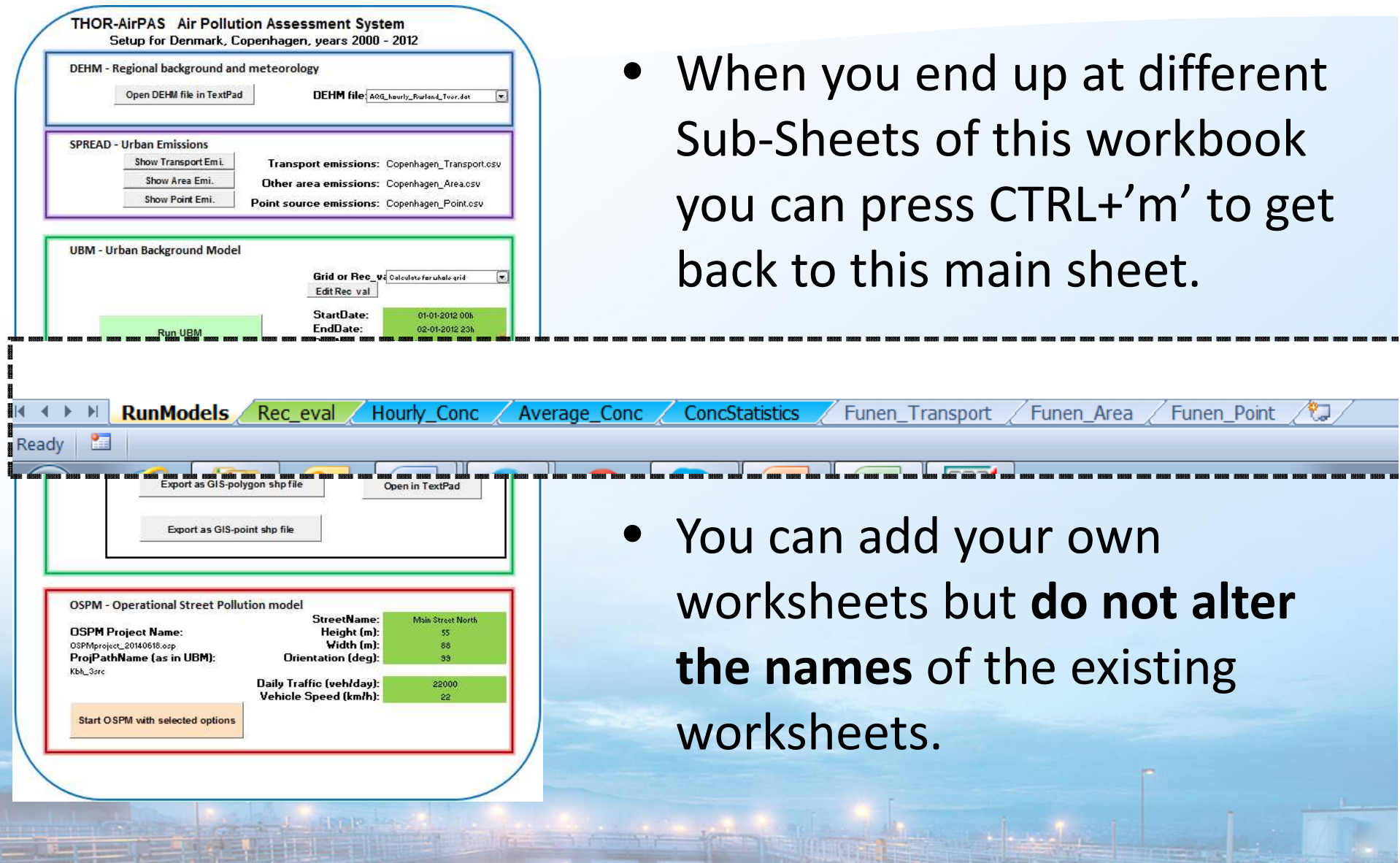
StreetName:   
Height (m):   
Width (m):   
Orientation (deg):

Daily Traffic (veh/day):   
Vehicle Speed (km/h):

**Start OSPM with selected options**

- **ReadMe / Getting Started:**
- You may change the green highlighted cells (basic use) or the yellow cells (advanced options).
- You may select options from the drop-down lists and press the various buttons.

# THOR-AirPAS overview:



- When you end up at different Sub-Sheets of this workbook you can press CTRL+'m' to get back to this main sheet.
- You can add your own worksheets but **do not alter the names** of the existing worksheets.

# DEHM + SPREAD menu

**DEHM - Regional background and meteorology**  

Open DEHM file in TextPad

DEHM file: AQG\_hourly\_Rusland\_Tver.dat

AQG\_hourly\_Armenien\_Yerevan.dat

AQG\_hourly\_Danmark\_cph.dat

AQG\_hourly\_Azerbaijan\_Sumgait.dat

AQG\_hourly\_Belarus\_Novopolotsk.dat

AQG\_hourly\_Georgien\_Batumi.dat

AQG\_hourly\_Moldova\_Chisinau.dat

AQG\_hourly\_Rusland\_Tver.dat

AQG\_hourly\_Ukraine\_Kiev.dat

**SPREAD - Urban Emissions**  

Show Transport Emi.

Show Area Emi.

Show Point Emi.

Transport em  
Other area emissions: Copenhagen\_Area.csv  
Point source emissions: Copenhagen\_Point.csv

- Select regional time series
- Display various types of emissions



# UBM menu

**UBM - Urban Background Model**

**Grid or Rec\_val:** calculate only for receptors in Rec\_eval ▼

Edit Rec\_val

Run UBM

**StartDate:** 01-01-2009 00h  
**EndDate:** 31-01-2009 23h  
**RunName:** Rec1month\_p1  
**FolderName:** Funen25June

**Export of UBM Emissions (Sum of Transport and Area or Point including Scaling)**

Export (T.+A.) as polygon shape

Open in TextPad

Export Point Emi. as shape file

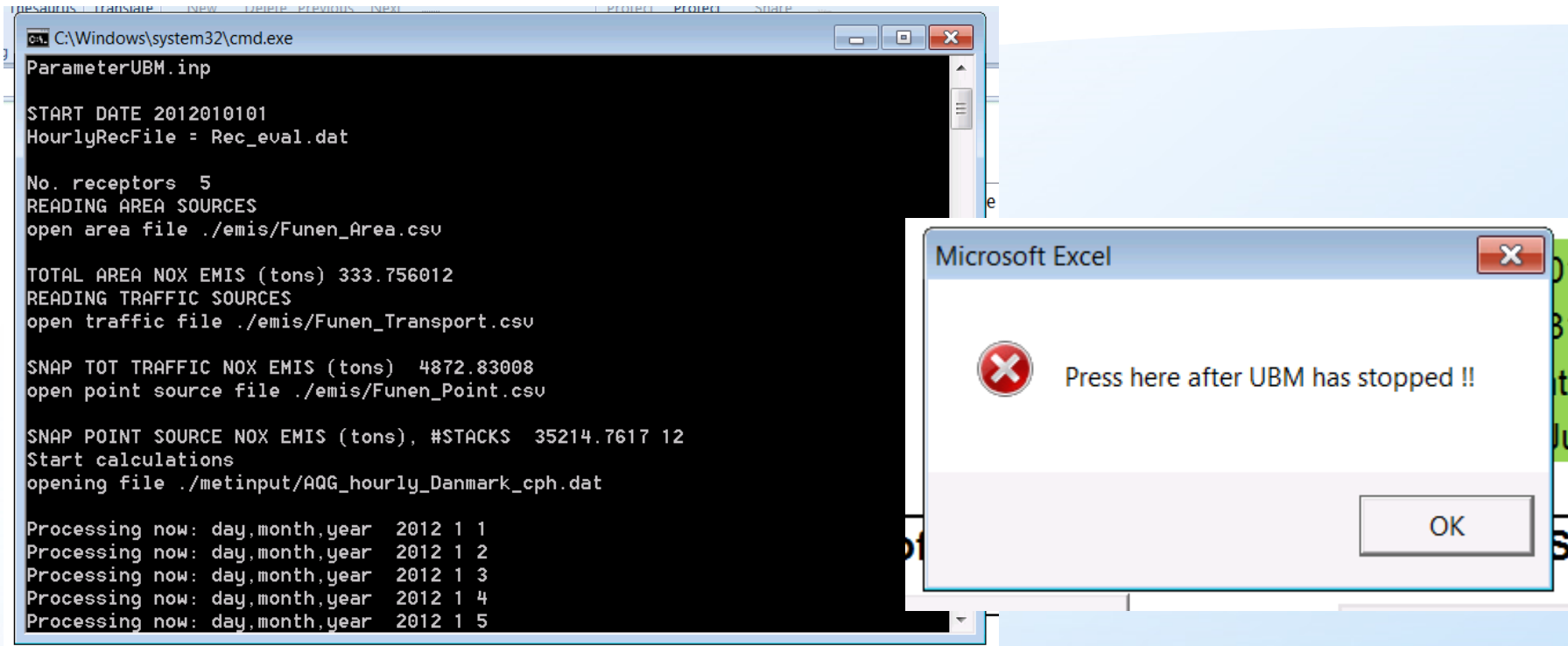
**Export of UBM concentration results (averages only)**

Export as GIS-polygon shp file

Open in TextPad

Export as GIS-point shp file

# Running UBM



- **Important !**  
After starting UBM by pressing "RunUBM" a black **Command Prompt Window** will open where UBM is running.
- During the running of UBM the actual date in the processing is displayed. You need to wait a few minutes (depending on the number of receptor points and calculation period).
- The black window will close after the run and you need to confirm this in a message box. The resulting files (**Average\_Conc** and **Hourly\_Conc**) will be read back to EXCEL!!

# *UBM advanced options:*

## **ADVANCED UBM Options**

**EMISSIONS** - Calibration and Regulation factors; 1.0=no regulation

<b>NOx</b>	<b>SO2</b>	<b>CO</b>	<b>TSP</b>	<b>PM10</b>	<b>PM2.5</b>	<b>SNAP sector</b>
1.0	1.0	1.0	1.0	1.0	1.0	SNAP 01 COMBUSTION IN ENERGY AND TRANSF. INDUSTRIES
1.0	1.0	1.0	1.0	1.0	1.0	SNAP 02 NON-INDUSTRIAL COMBUSTION PLANTS
1.0	1.0	1.0	1.0	1.0	1.0	SNAP 03 COMBUSTION IN MANUFACTURING INDUSTRY
1.0	1.0	1.0	1.0	1.0	1.0	SNAP 04 PRODUCTION PROCESSES
1.0	1.0	1.0	1.0	1.0	1.0	SNAP 05 EXTR. AND DISTR. OF FOSSIL FUELS
1.0	1.0	1.0	1.0	1.0	1.0	SNAP 06 SOLVENT AND OTHER PRODUCT USE
1.0	1.0	1.0	1.0	1.0	1.0	SNAP 07 ROAD TRANSPORT
1.0	1.0	1.0	1.0	1.0	1.0	SNAP 08 OTHER MOBILE SOURCES AND MACHINERY
1.0	1.0	1.0	1.0	1.0	1.0	SNAP 09 WASTE TREATMENT AND DISPOSAL
1.0	1.0	1.0	1.0	1.0	1.0	SNAP 10 AGRICULTURE



# *OSPM menu within THOR- AirPAS*

## **OSPM - Operational Street Pollution model**

**OSPM Project Name:**

OSPMproject\_20140618.osp

**ProjPathName (as in UBM):**

Kbh\_3src

**StreetName:**

Main Street North

**Height (m):**

23

**Width (m):**

20

**Orientation (deg):**

120

**Daily Traffic (veh/day):**

22000

**Vehicle Speed (km/h):**

45

**Start OSPM with selected options**



# OSPM calculation Window

WinOSPM Calculation [C:\THOR\_AirPAS\Project\_USER\Kbh\_3src\OSPMproject\_20140618.osp]

File Project View Tools Settings

New Open Save **Street** Trf.File V.List F.List Units Traffic Vehicles Fuels Results

TrafEdit EmiFact Graphics

Denmark Start Special

Scenario Year: [2013] 99.0%

%CAT

Trf.File: C:\...\Data\Traffic\National\DK\Type\_C.trf

V.List File: C:\...\DK\Vehicles\DK12\_2013mil\_MZ\_F

F.List File: C:\...\DK\Fuels\_1999\_ELFC\_PN.tif

Average Daily Traffic: 22000

Travel Speed (km/h): 45

City Size (inhabitants): Non applicable

Cond.File: (none)

Street Data

Name	Main Street North
Height	23 m
Width	20 m
Orientation	120 deg.

Concentration Units

	Input	Output
NOX	µg/m³	µg/m³
NO	µg/m³	µg/m³
NO2	µg/m³	µg/m³
O3	µg/m³	µg/m³
CO	µg/m³	µg/m³
Benzene	µg/m³	µg/m³
PM10	µg/m³	µg/m³
PM2.5	µg/m³	µg/m³

Start/End Dates

Auto Start Date: dd-mm-yy hh

Auto End Date: dd-mm-yy hh

Emitted Compounds

NOX  
CO  
Benzene  
PNumber  
PM10NonExh

Input Files

Hourly Input Files

☒ C:\THOR\_AirPAS\UBM\_urban\output\2012010101\_hourly

Average Diurnal Traffic File

☒ .Type\_C.trf

Output Files

Hourly Output Files

☒ C:\THOR\_AirPAS\Project\_USER\Kbh\_3src\OSPM\_Hourly

Statistics and other

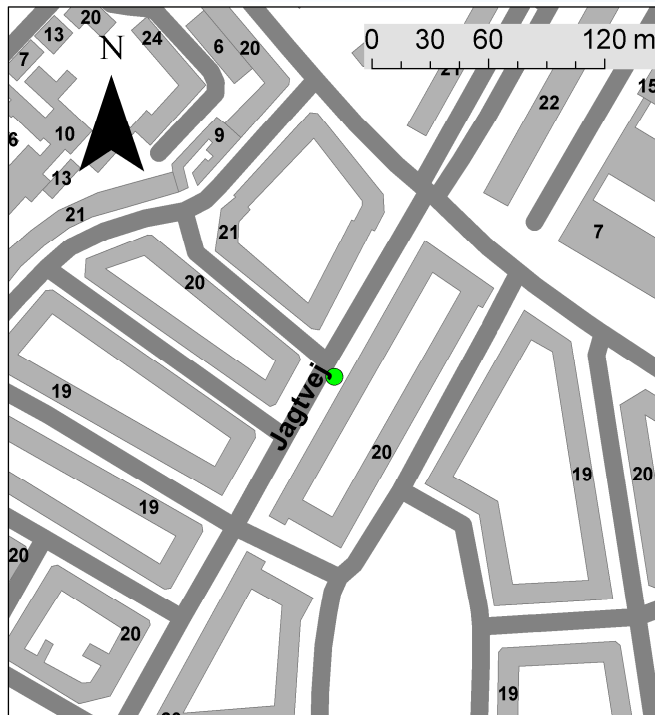
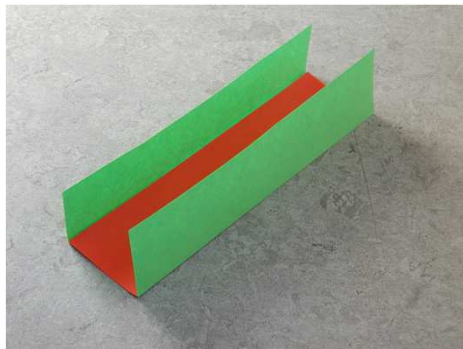
☒ C:\THOR\_AirPAS\Project\_USER\Kbh\_3src\OSPM\_StatOu

View/Format

Add File Remove File Change File

Help Stop Continue Pause **Run**

# Street Configuration



Street Configuration [untitled]

File Edit Graph

**Street Geometry**

Default Height (m)	Width (m)	Length 1 (m)	Length 2 (m)	Orientation (deg)
18	25	70	50	30

**Street Name**

Example Street

Receptor Height (m)

☒ Receptor 1  
☒ Receptor 2

General Building Height (m), estimated by OSPM

**Wind Sectors with Building Height Exceptions**

	1	2	3	4	5	6	7	8	9	10	11	12
Lower Bound (deg)	45	215	325									
Upper Bound (deg)	55	230	330									
Height (m)	0	25	0									
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Reset OK Cancel Help

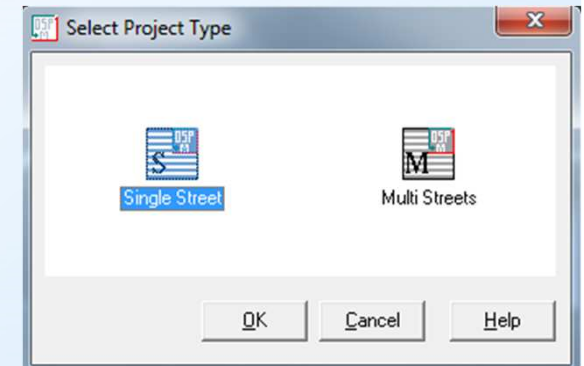
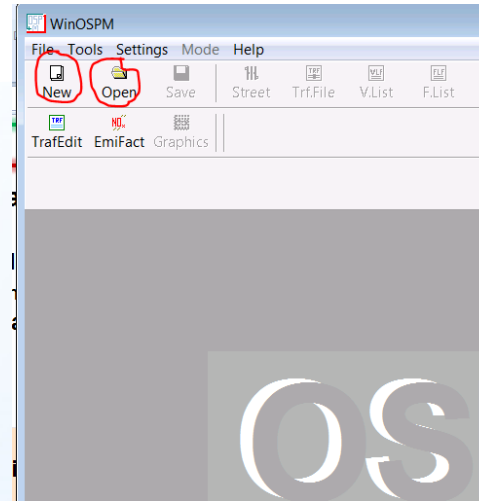
**Diagram:** A circular diagram showing a street layout with two receptors (Rec. 1 and Rec. 2) and two lengths (Length 1 and Length 2). A scale bar indicates 20 m. The diagram also shows a height vector and a dashed circle.

**Controls:** AutoRedraw (checked), ReDraw, Lower Bound (green line), Upper Bound (blue line).



# 3 ways to start a OSPM project

- New empty Project:



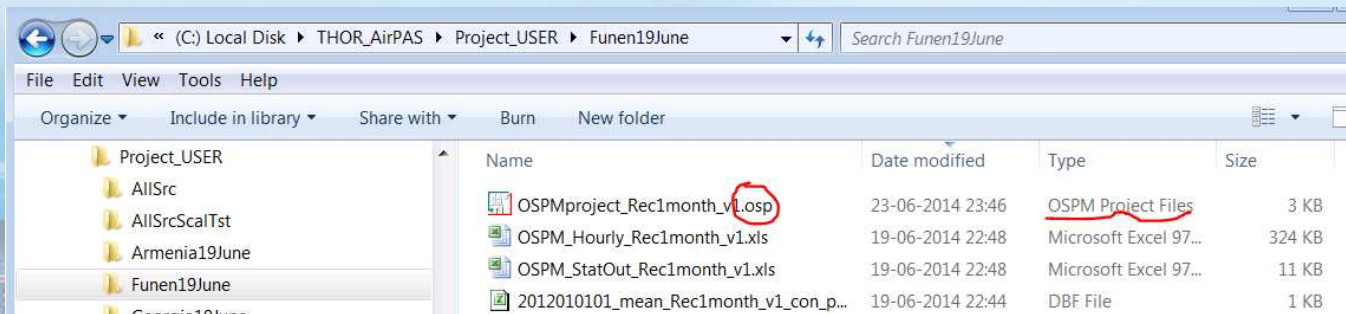
- Via THOR-AirPAS:

**OSPM - Operational Street Pollution model**

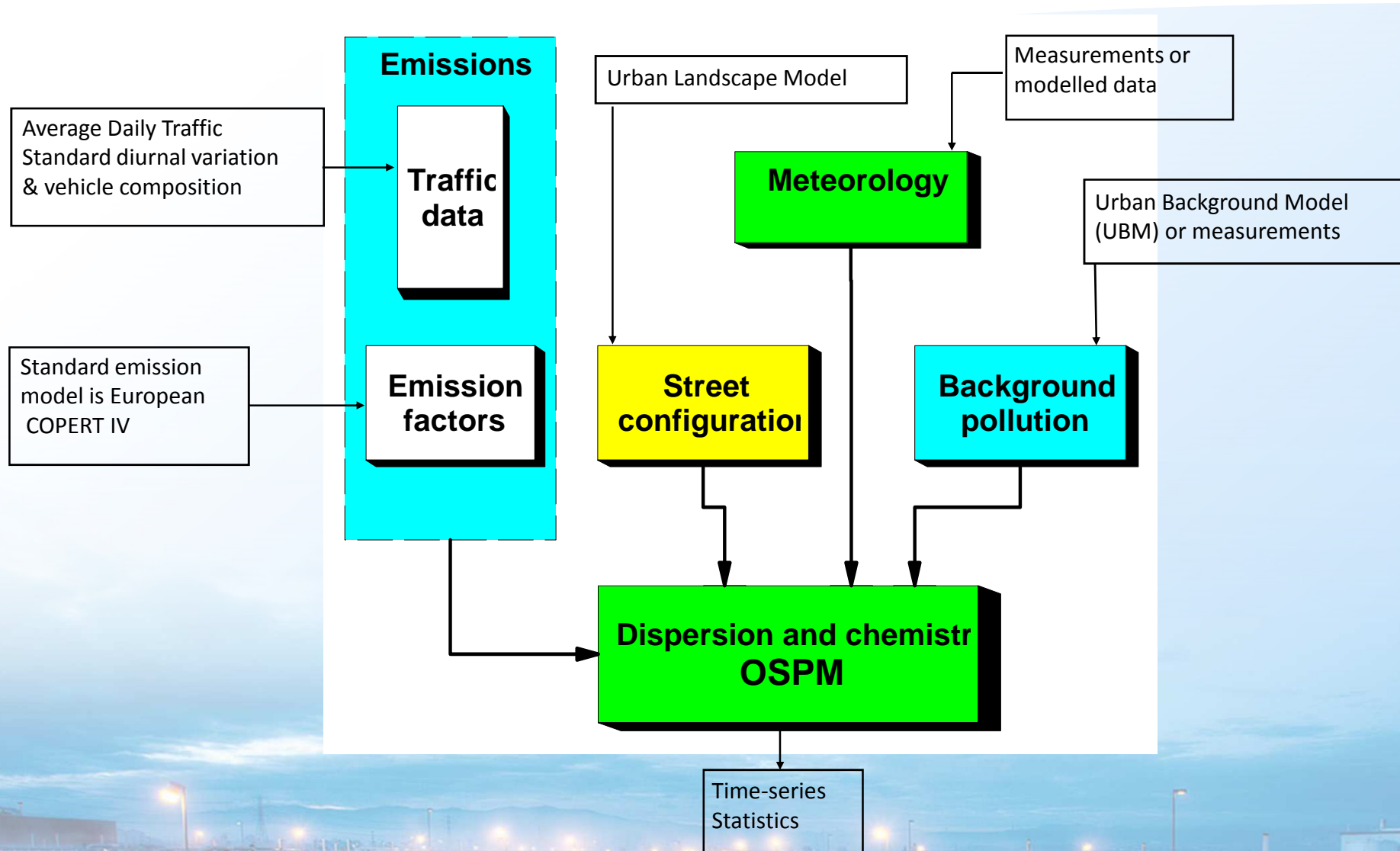
<b>OSPM Project Name:</b> OSPMproject_20140618.osp	<b>StreetName:</b> Main Street North
<b>ProjPathName (as in UBM):</b> Kbh_3src	<b>Height (m):</b> 23
	<b>Width (m):</b> 20
	<b>Orientation (deg):</b> 120
	<b>Daily Traffic (veh/day):</b> 22000
	<b>Vehicle Speed (km/h):</b> 45

**Start OSPM with selected options**

- Via File Explorer:

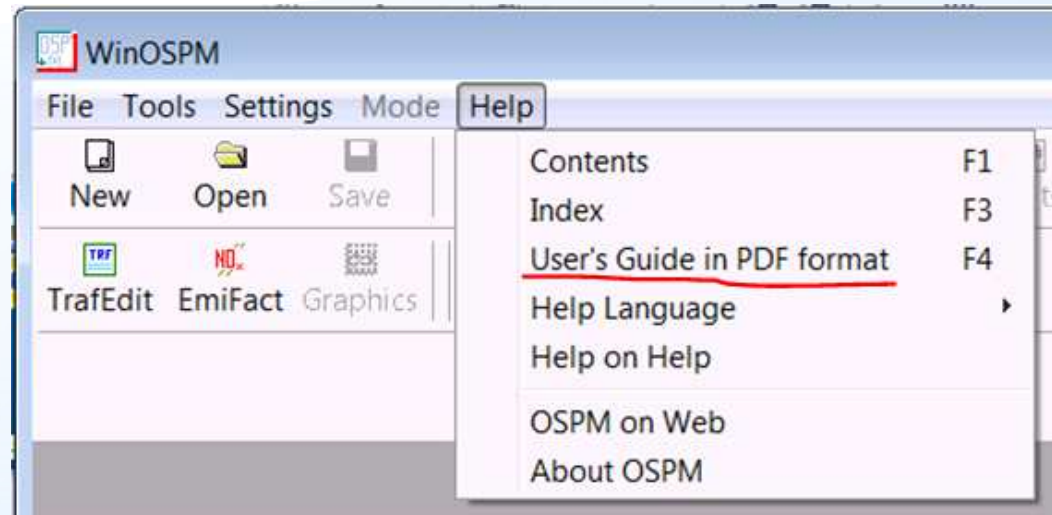


# *Input & Output of the OSPM model*



# *OSPM – further reading*

- User Manual:



- OSPM Web Page: [www.au.dk/OSPM](http://www.au.dk/OSPM)



# Спасибо За Внимание!



**MWH**

**CENN**  
Chemical Environmental Noise Network



**GOPA**  
WORLDWIDE CONSULTANTS

