Progress in Nordic-EECCA cooperation regarding IAM in Belarus & Russian Federation

TFIAM 47
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Current cooperation projects - background

2008 – 2014
Focus on: GAINS in-data verification and modelling
Financed by: Sida, Swedish EPA (cooperation programs between the Ministries of Environment and the Swedish EPA), partly by the Nordic Council of Ministers (NCM).

The results are presented at:

- TFIAM, TFEIP, EGTEI
- Congress Atmosphere (St. Petersburg)
- Project meetings with participation of relevant Ministries and other authorities
- www.rusaco.se

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Current cooperation projects financed by NCM

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RUSSIAN FEDERATION
2015-2018

SYKE
Finlands miljöcentral

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SRI ATMOSPHERE

Meteorologisk institutt
150 år

REPUBLIC OF BELARUS
2016-2018

SYKE
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Development of PM2.5 and black carbon emission inventories and GAINS modelling in Belarus – sharing Nordic experience and strengthening cooperation

The purpose of the project is to stimulate decision-makers in Belarus to prioritize abatement measures aimed at black carbon in their efforts to reduce emissions of PM2.5, as encouraged in the Gothenburg protocol.

Two project parts :

- (2016) Emission inventories
- (2017) GAINS modelling

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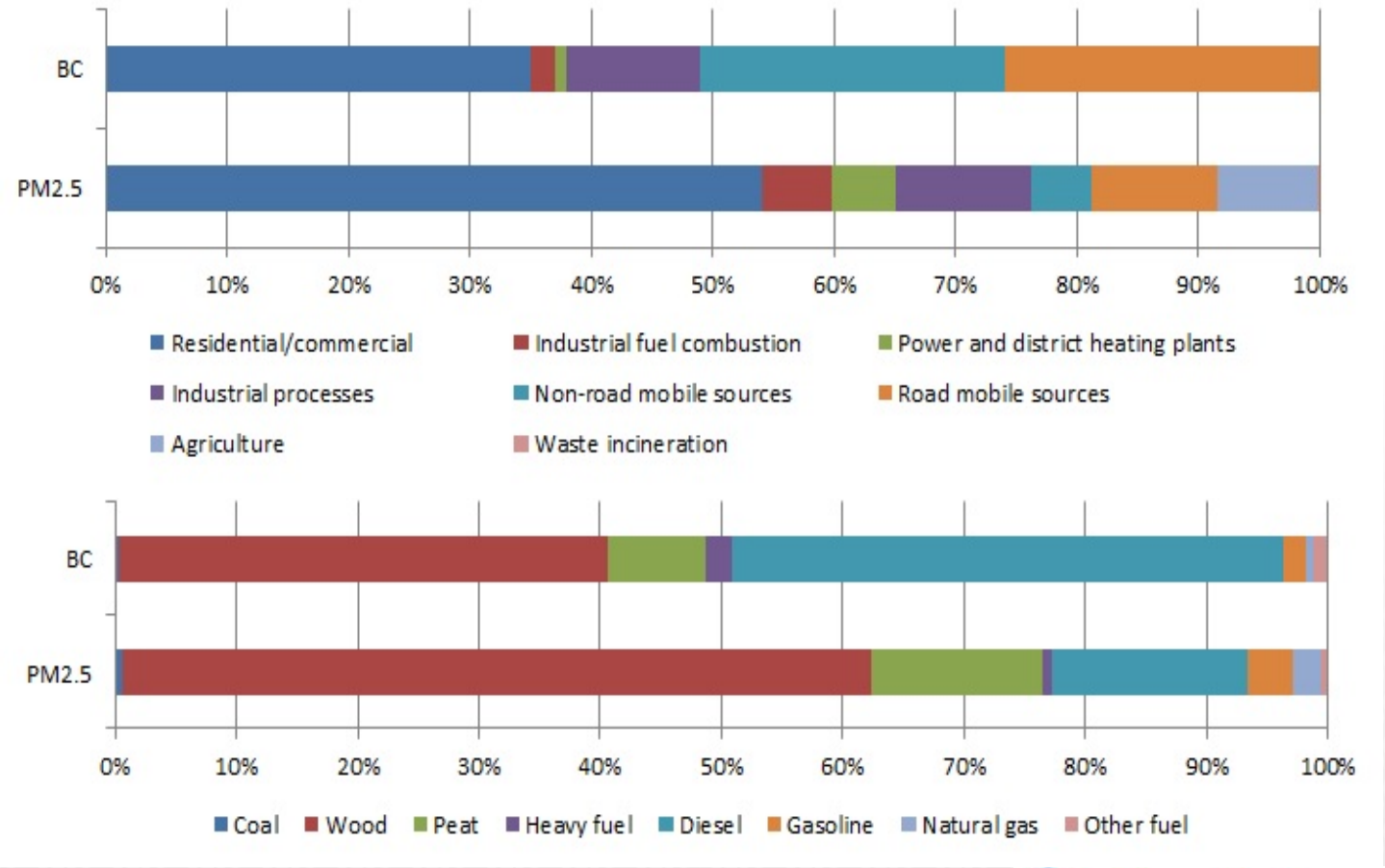
Belarus – emission inventories, PM2.5 and BC

Distribution of particle emissions in 2014 by sectors and fuels



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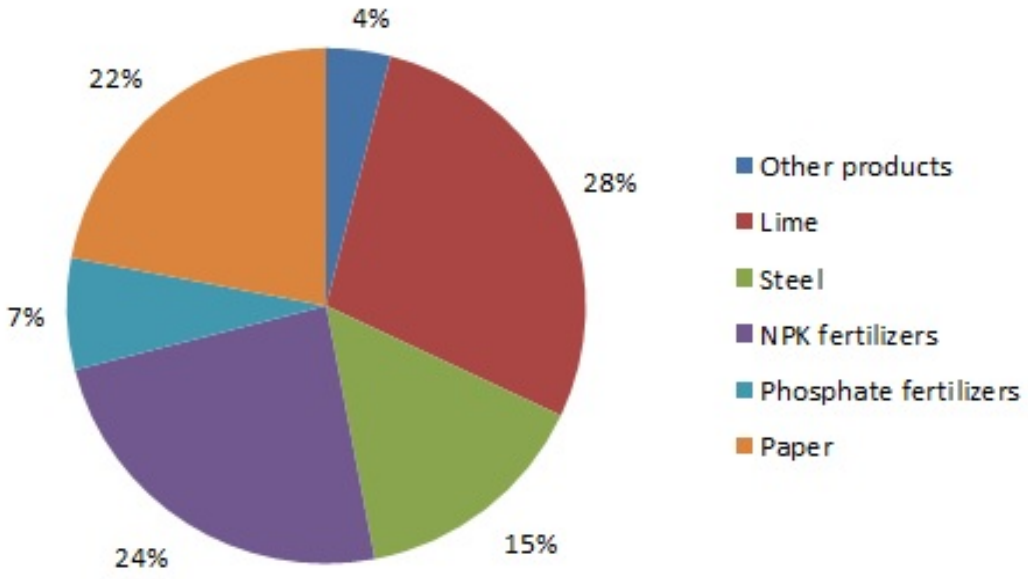
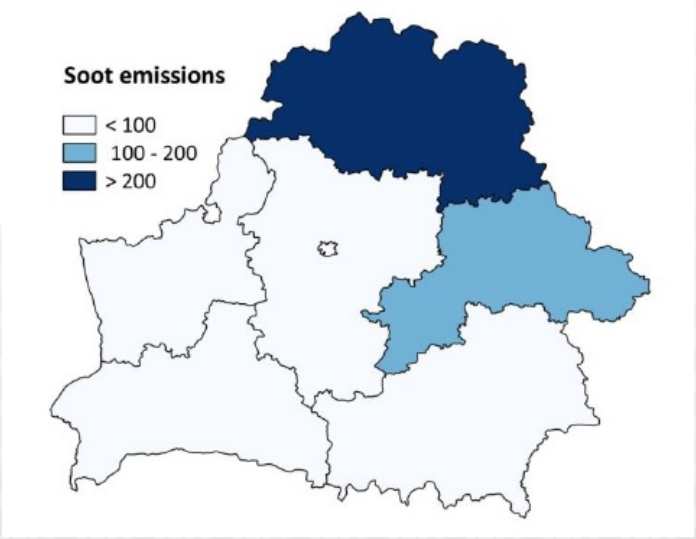
Belarus – emission inventories, PM2.5 and BC

BC industrial process emissions in 2014

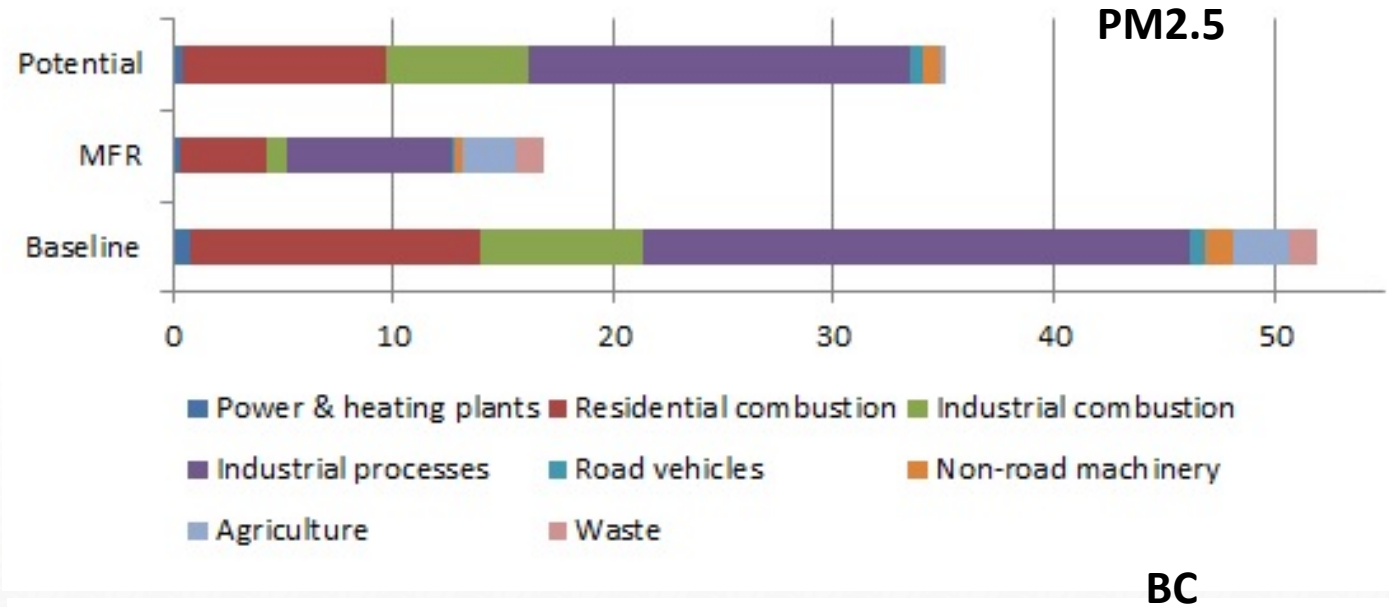


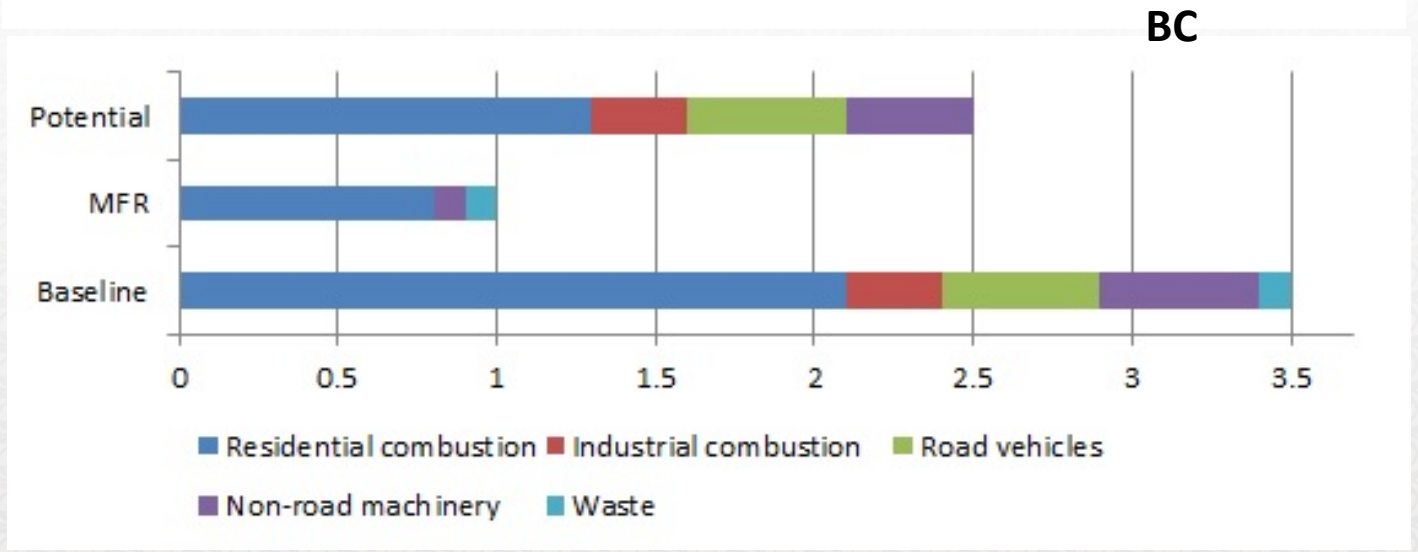
Spatial distribution
of reported soot emissions, t
2013



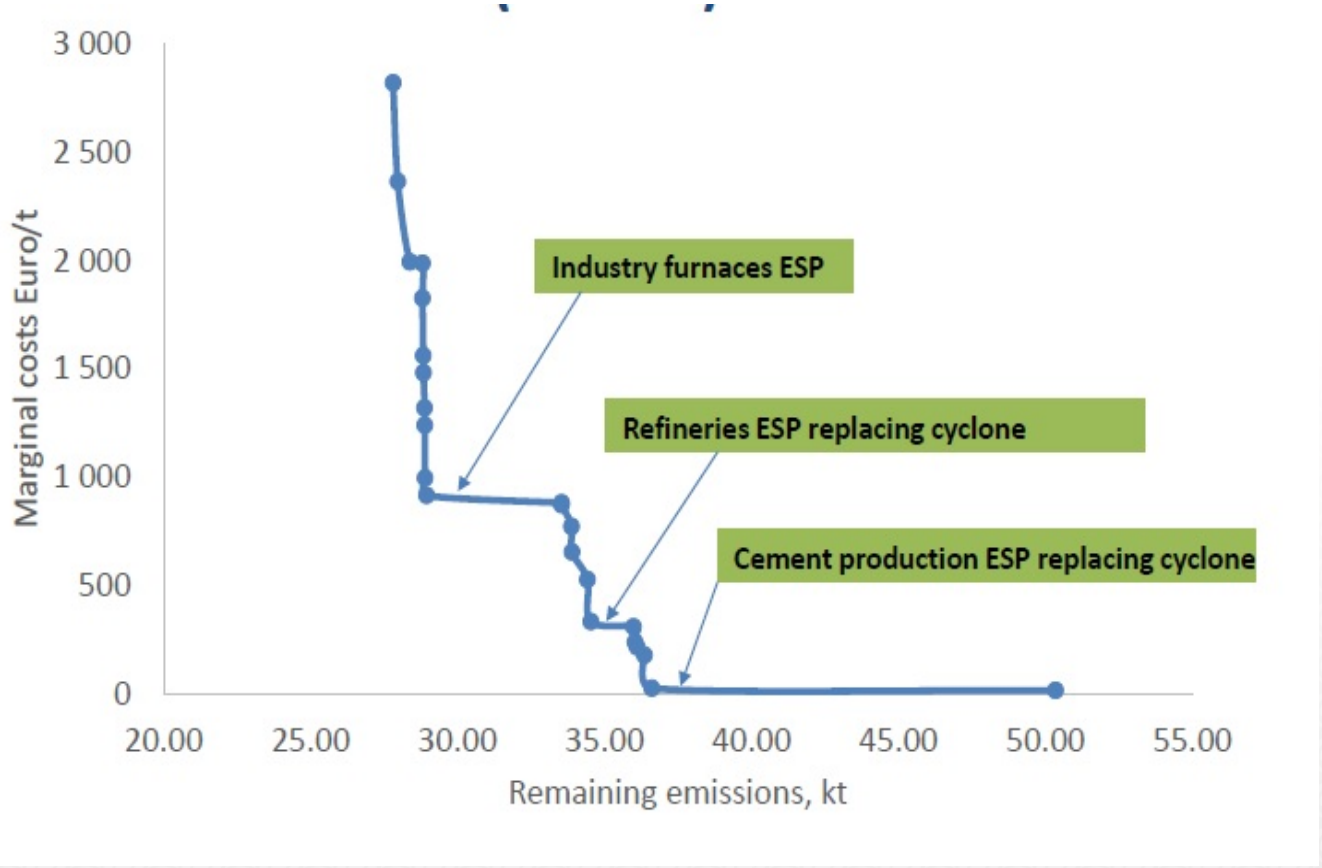
Belarus – IAM (GAINS), PM2.5 and BC

Emissions in 2030 according to the baseline and MFR scenarios + emission reduction potential, kt





Belarus – IAM (GAINS) PM2.5 and BC



Fragment of the marginal costs curve for PM2.5 – measures with high emission reduction potential at low cost

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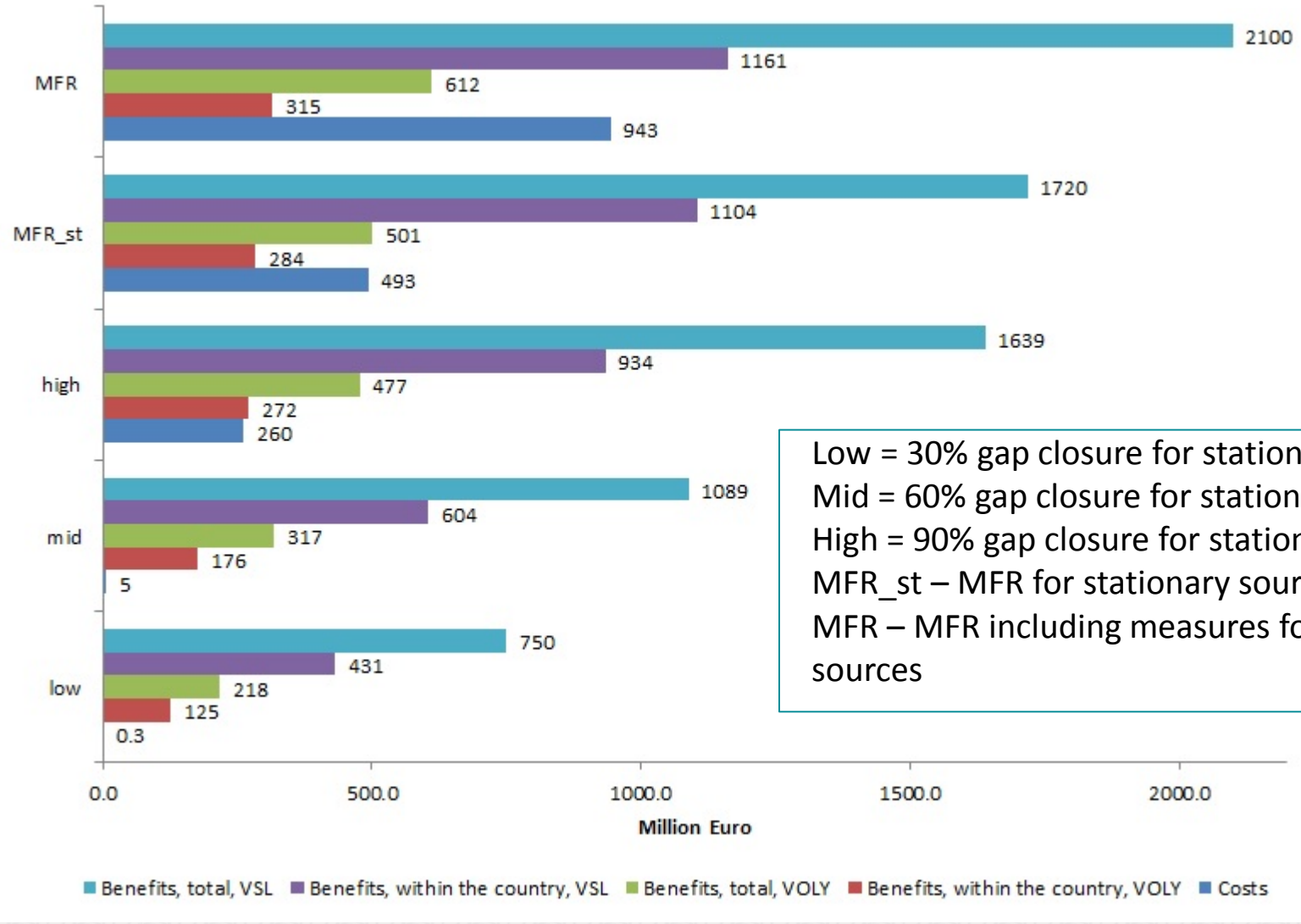
Belarus – IAM (GAINS), PM2.5 and BC



Low = 30% gap closure for stationary sources
Mid = 60% gap closure for stationary sources
High = 90% gap closure for stationary sources
MFR_st – MFR for stationary sources only
MFR – MFR including measures for mobile sources

Belarus cooperation project – Summary of the analysis

- Revision of the PM2.5 emission inventory (EMEP /EEA Guidebook)
- First inventory of BC emissions
- Assessment of the emission reduction potentials for PM2.5 and BC in 2030
- Identification of the cost-effective reduction measures for particles
- Cost-benefit analysis
- Assessment of trans-boundary effects
- Test runs with alternative (Guidebook-based) EF

It's important to remember that for better assessment of the emission reduction potential and relevant measures/instruments at the national and regional levels even other options, not explicitly included in the GAINS model measure database, should be considered, such as:

- Fuel substitution
- Development of infrastructure for "mobility" (e.g. bicycle tracks)
- Economic instruments, including those aimed at behavioural changes (emission-related taxes, subsidies, systems encouraging public transportation use etc.)

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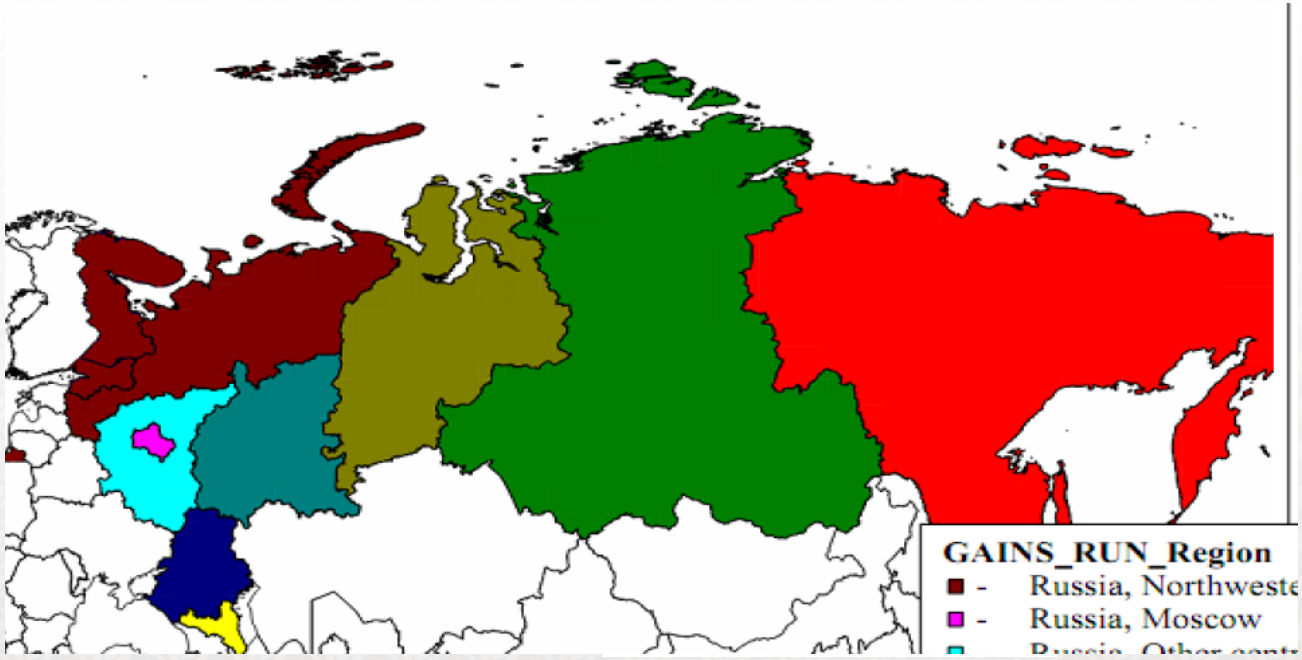
Development of GAINS and EMEP modelling in the Russian Federation: further developments at the regional level

The purpose of the project is promoting and facilitating more active use of EMEP and GAINS Russia models by national experts in the Russian Federation, both in the international context and as a basis for developing internal Russian air pollution abatement strategies at the federal and regional levels.

GAINS modelling:
Updated activity data set for the base year (2010) based on region-specific national statistical data- for all sectors and regions



Russian Federation – latest GAINS modelling results

Emissions of main pollutants by GAINS Russia regions, kt, 2010

	NOx	SO2	NMVOC	NH3	PM2.5	TSP
Moscow	272	66	274	45	21	106
Other central	489	309	433	17	151	417
North-West	490	491	461	82	124	262
Volga	908	340	1049	281	175	431
Caucasus	241	87	297	102	71	166
South	83	10	131	66	20	48
Ural	856	2021	921	59	238.	490
Siberia	576	1749	329	143	447	1705
Far East	217	276	99	28	88	380
TOTAL ETR	**2482**	**1303**	**2646**	**746**	**562**	**1430**
TOTAL ETR, as reported to EMEP[2]	**2434**	**1341**	**2669**	**786**	**429**	**1269**
TOTAL Russia	4131	5349	3995	976	1335	4004

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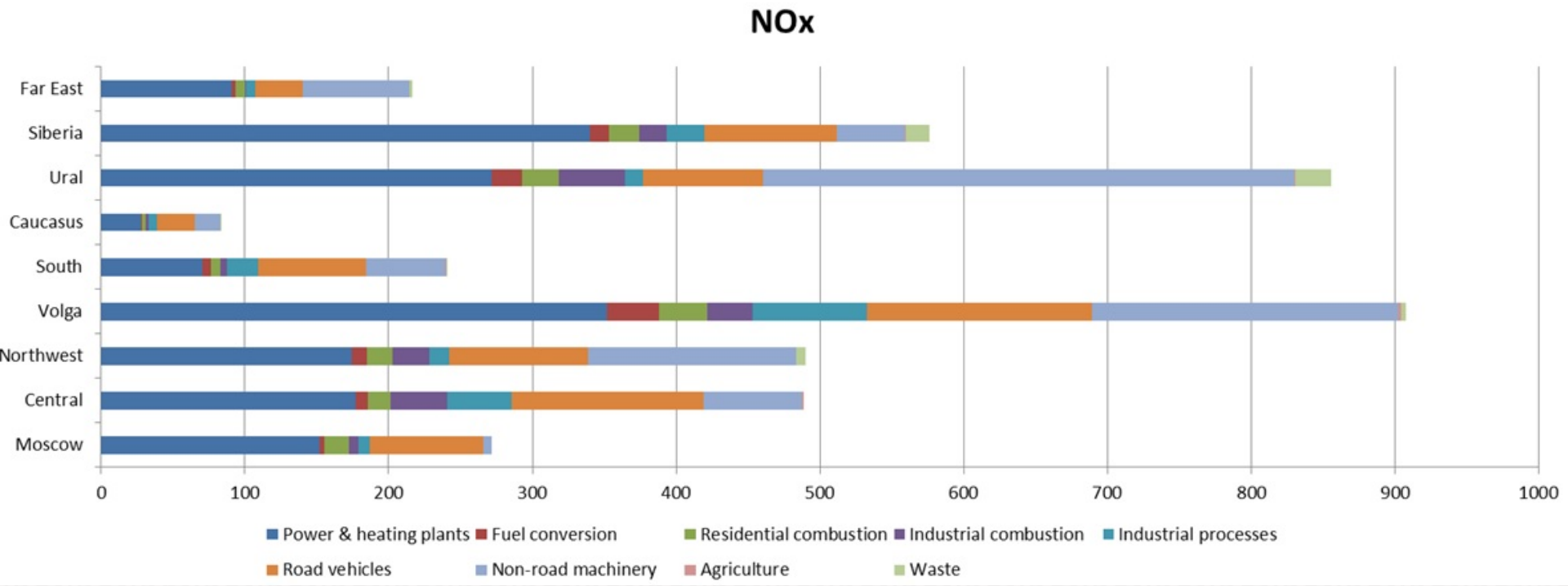
Russian Federation – latest GAINS modelling results

Emissions by regions and sectors 2010 (kt), example for NOx



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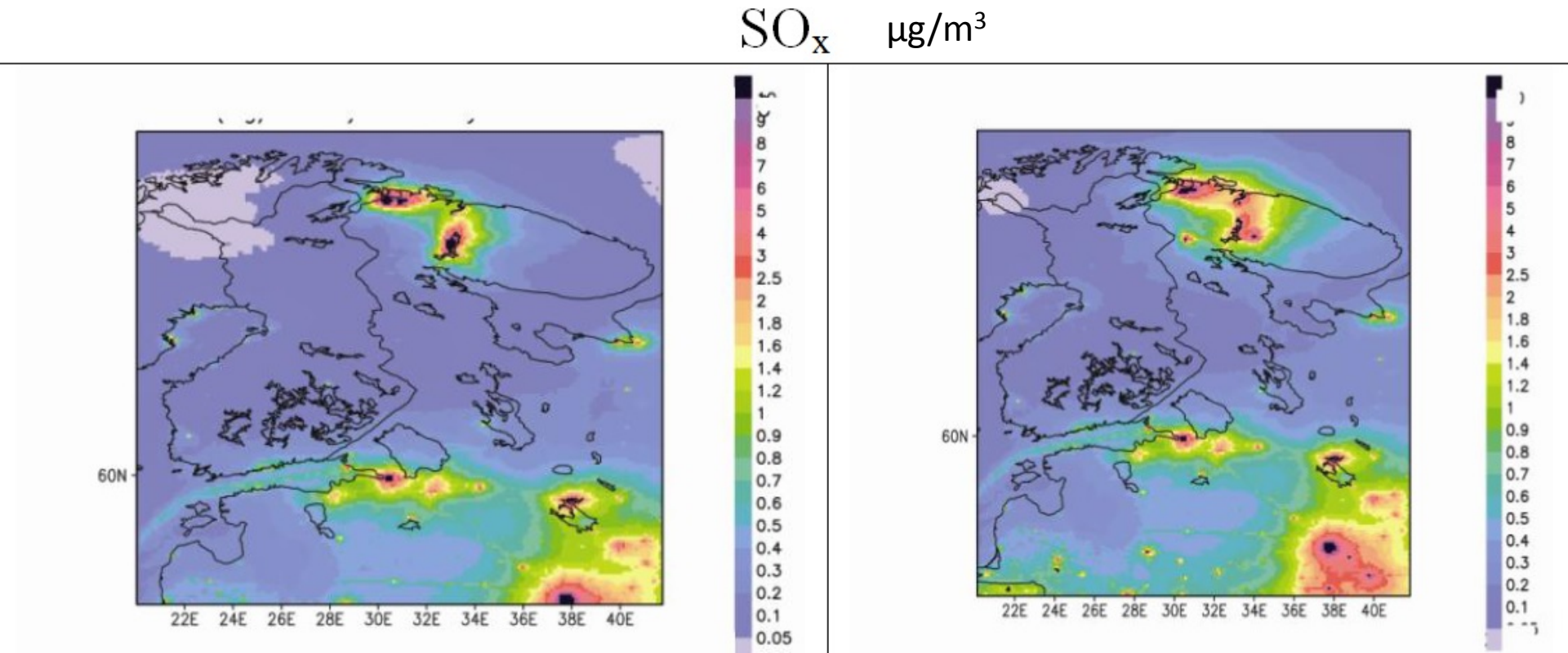
Russian Federation – EMEP analysis

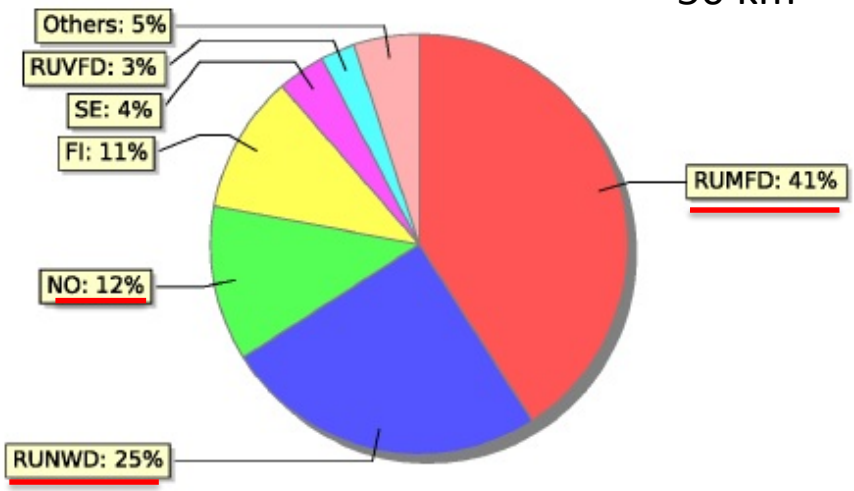
Impact of the improved input data (gridded emissions) on modelling results: annual average ground-level SOx concentration according to TNO-INERIS data (left) and national data (right)



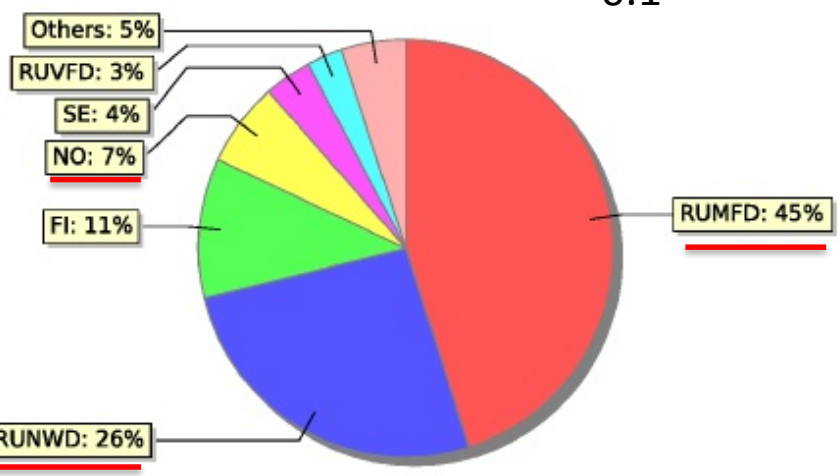
Russian Federation – EMEP analysis

Impact of resolution on modelling of trans-boundary pollution: SOx deposition distribution by regions from emissions in Murmansk region. 5% of deposition is allocated either to Russia or to Norway, depending on resolution. One large point source is located very close to the border, and when 50 km resolution is used, both this source and a part of Norway are in the same cell. The effects are instantly spread within a cell, and larger part of deposion is allocated to Norway. When fine resolution is used, the distribution is more affected by chosen physical and meteorological modelling parameters, and the results are more accurate.

50 km



0.1°



Russian Federation – EMEP analysis

Impact of resolution on modelling of trans-boundary pollution: particles (input into annual mean concentrations from 15% emission reduction in Murmansk). Contributions from Murmansk emissions calculated on 50 km are higher in the region itself and the closest neighbouring countries/regions compared to those calculated at 0.1 ° – the work on analysis and interpretation of results is on-going. Long-distance transport effects (particles are more likely to be found further from a source region if a large emission source is close to a border)

Concentrations, ng/m^3	PM10		PM2.5	
	PS50	EMEP01	PS50	EMEP01
Murmansk	110.8	99.7	103.2	92.4
Finland	19.9	17.3	19.4	16.8
North-West FD	12.2	11.6	11.9	11.3
Rest of Russia	10.7	9.2	9.7	8.8
Norway	9.2	6.7	8.9	6.5
Sweden	6.2	5.5	6.1	5.4
Central FD	3.5	3.5	3.4	3.4
Volga FD	2.7	2.5	2.6	2.4
South FD	0.9	0.8	0.8	0.7

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Russian Federation – EMEP modelling/analysis results

Development of the **methodological and technical base and further capacity building** by working with pilot the region at resolution 0.1°:

- model parametrisation (meteo-data)
- grid emissions
- regional fractions
- trans-boundary pollution

Improvements in the input data

- Analysis of the CEIP gridded data for the Russian Federation
- National data for Murmansk region in resolution 0.1°

Analysis of the impact of **improved input data** on the modelling results

Analysis if the impact of **higher resolution** on the modelling results

Building the **network** and exchanging data and experience

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Thank you for your attention!

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