

Carbon Emissions Projections for Russia: baseline vs. policy estimates

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Outline

- Motivation
- Coverage
- Calibration
- Scenarios
- Results





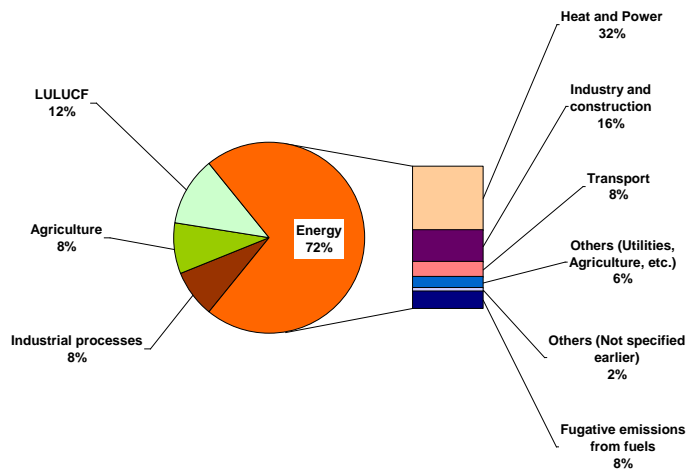
Motivation

- Official point of view in Russia: “CO2 emissions will reach 1990 level by 2030” (Concept of LR development, MED 2008)
- Current CO2-emission projections in Russia come from IO-models, econometric models, experts estimates
- Apply bottom-up analysis to CO2-emissions projections in Russia

Coverage of GHG emissions ~ 72%



GHG Emission in Russia, 2006 (UNFCCC)





RU-TIMES model

Previous model:

- Heat and Power sectors (Lugovoy O., 2008)

Current model extensions:

- Industry (Petroleum refinery, Ferrous metallurgy)
- Construction (Cement production)
- Transport sector



Calibration of RU-TIMES

- Heat and Power sectors (Lugovoy O., 2008)

ROSSTAT data

- Industry (Petroleum refinery, Metallurgical industry)
- Construction (Cement production)
- Transport sector

- all other industries: calibrated to IEA energy balance of 2005, base year techs are replicated as new technologies



Heat and Power sectors

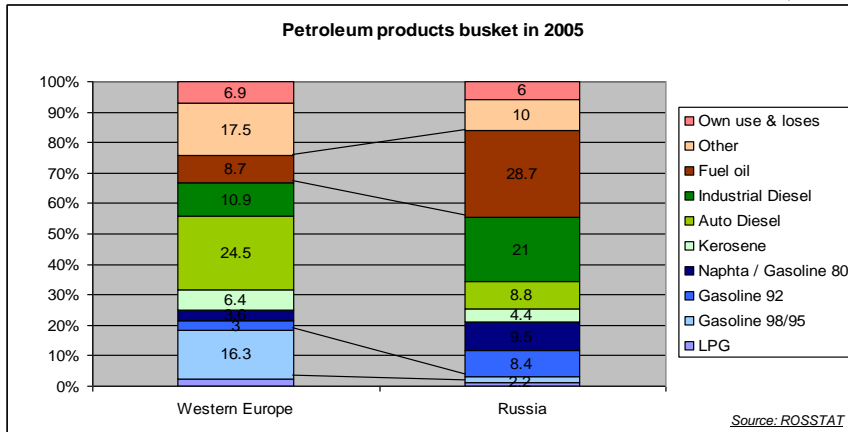
- Data by PP have been aggregated by consumed fuels
- Econometric (cross-section, Bayesian approach, symmetric regression, 2005 data) estimates:
 - **actual efficiency** of power plants, heat plants
 - actual efficiency and other parameters (CET) of combined heat and power (CHP) plants
- Calibration to energy balance (IEA)



Russian petroleum refinery

- 27 large-scale oil-processing plants
- 182 mini-plants (5% of total production)
- Production capacity ~255 mln.toe (2005)
- Utilization rate ~80%
- Obsolete equipment: average plant age > 40 years
- Depreciation of capital stock ~ 75%
- Depth of oil refining ~70% in 2005
- Secondary processes ~ 38%
- Light oil products ~ 55 %
- spatial disproportions: 23 plants in European Russia and Urals, only 3 in Siberia and 2 in the Far East
- Remoteness from both extraction sites and end-users

Refinery product mix



- Potential to increase secondary transformation and output of light oil products

Petroleum refinery targets



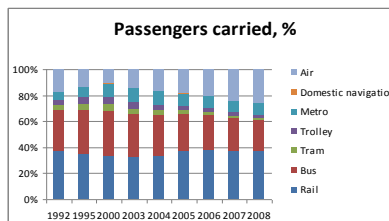
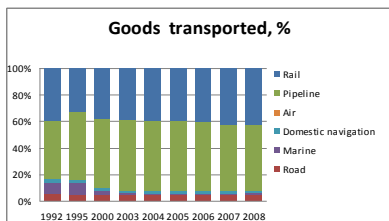
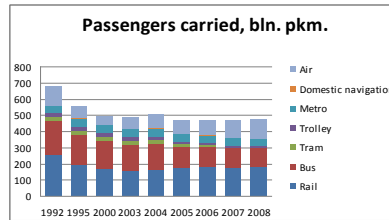
	2005	2008	2015	2020	2030
Oil refinery, mln.toe	208	237	239	260	311
Depth of oil refining, %	71	72.6	79	83	90
Investment, bln.\$			22	9	19
Fuel production, %					
Motor fuels, total	48.2	48.1	58.6	59.6	60.5
Gasoline	15.4	15.1	18.0	18.1	18.3
Diesel	28.8	29.1	34.7	35.0	35.7
Fuel oil	27.3	27.0	20.9	16.2	9.3

Source: Russian Energy Strategy 2030

- Sharp rise in new production capacities in 2010-2015
- Ex.: "Kubansky" oil-processing plant in South Russia with the depth of oil refining of 94%, announced start in 2013



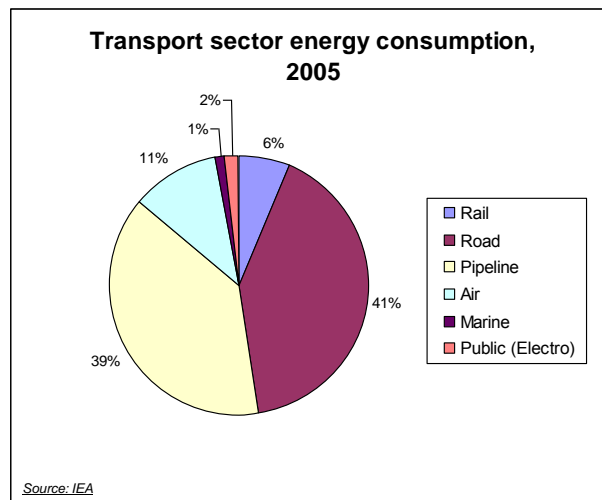
Transport sector (1)



Source: ROSSTAT

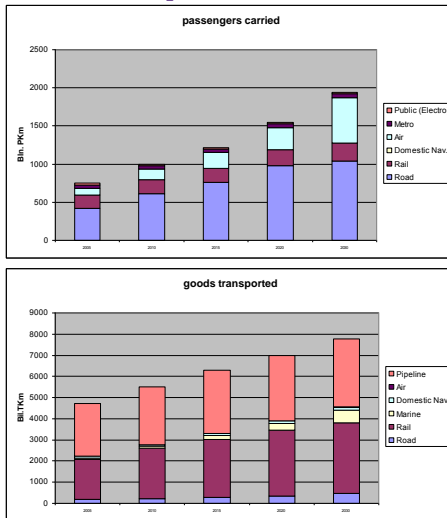


Transport sector (2)





Transport sector targets



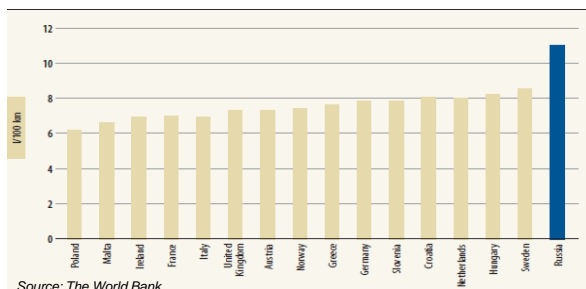
Source: Russian Transport Strategy 2030

- Pipelines: Russia's annual natural gas transportation losses range from 1 to 3 percent of all gas transported
- Potential for reduction of gas consumption by gas pipelines



Road transport targets

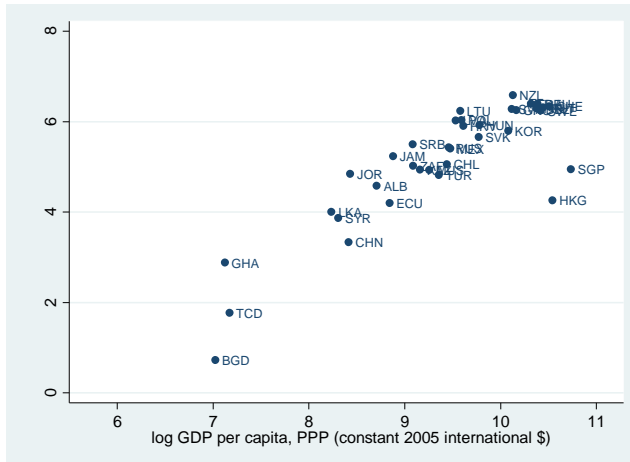
- High energy intensity compared to EU countries:
- Personal cars – 10-12 liters / 100km
- Russia's KAMAZ truck – 38 liters / 100km
- New techs – standard ETSAP technologies



Source: The World Bank



Transport demand estimates



Source: The World Bank, WDI data



Construction (cement production)

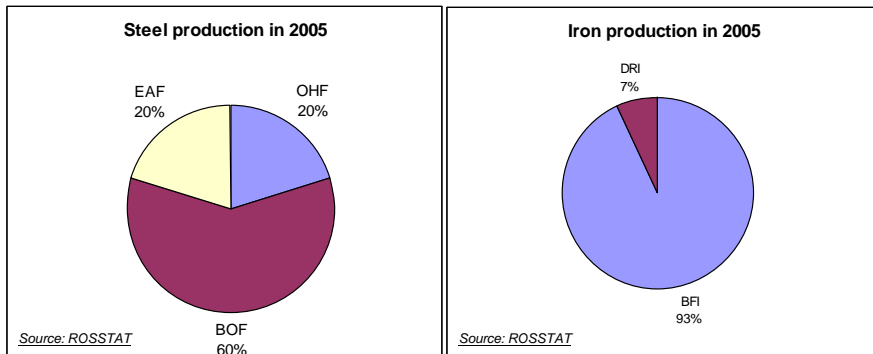
Clinker production:

- energy intensity - 6.18 PJ / mton (ROSSTAT)
- Potential: BAT – 2.9 PJ / mton

Cement production:

- energy intensity - 1.85 PJ / mton (ROSSTAT)
- Potential: BAT – 0.95 PJ / mton

Ferrous metallurgy



Ferrous metallurgy targets

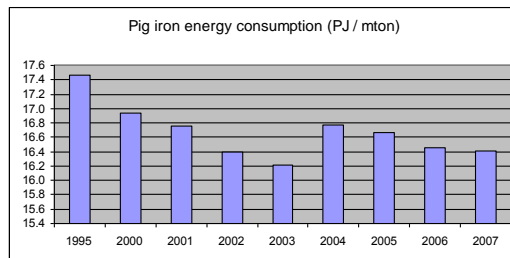


Steel production

- Open-Heath Furnaces: 11% of steel in 2009, expected to be closed in 2010s (3-4% decrease annually).
- Inputs: 35% scrap, 65% iron in 2005 (according to the strategy of metallurgical development until 2020) - scrap input share will decline due to the transition period of 1990s

Iron production

- Potential to decrease energy consumption: from current ~16 to BAT ~14 PJ / mton



Source: ROSSTAT

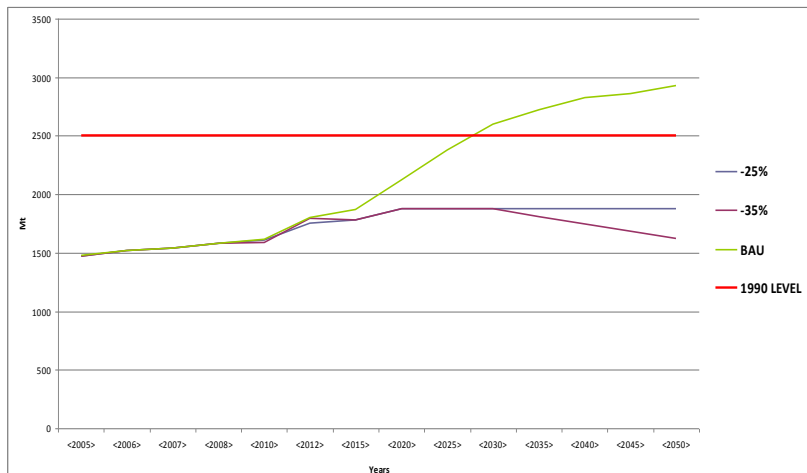


Scenarios

- Economic growth (MED, 2010):
innovative (4% average over 2010-2050), baseline
- Emission reduction policy:
 - 1) no policy, baseline (BAU)
 - 2) - 25% in 2020 from the 1990 level (BAT techs, no CCS)
 - 3) - 25% in 2020 / 2030, - 35% in 2050 from the 1990 level (BAT techs, no CCS)

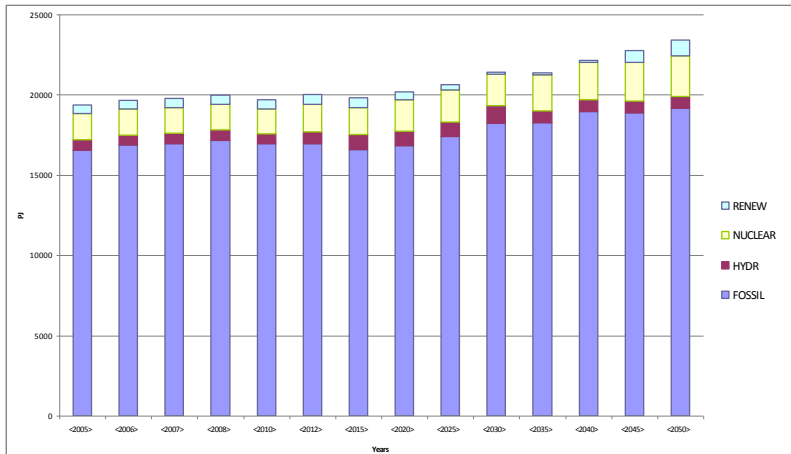


CO2 emission projections

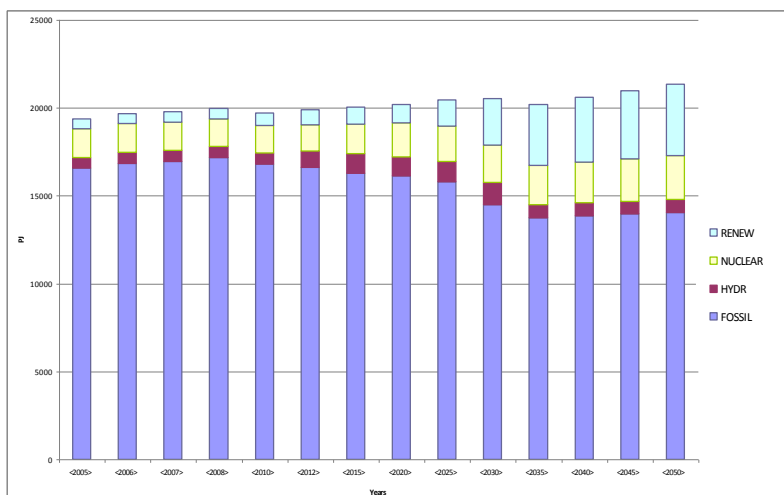




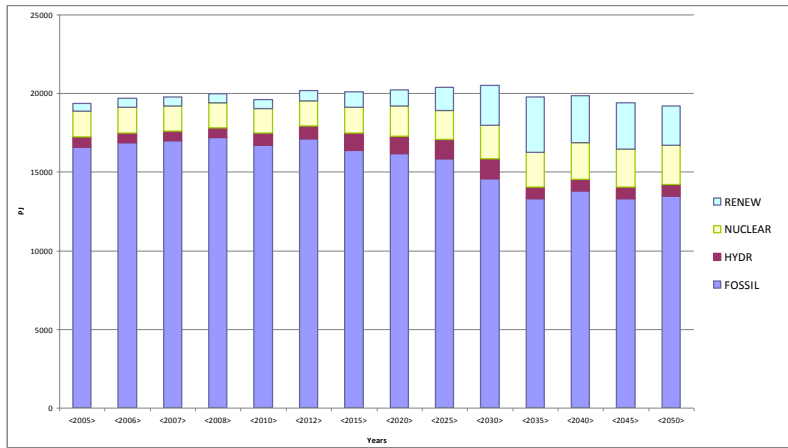
Fuel mix, BAU



Fuel mix, - 25%



Fuel mix, - 35%



Thank you!