



АНАЛИТИЧЕСКИЙ ЦЕНТР
ПРИ ПРАВИТЕЛЬСТВЕ
РОССИЙСКОЙ ФЕДЕРАЦИИ

**Energy in sustainable perspective:
descriptive V normative
Ljubljana - October 24 - 2013**

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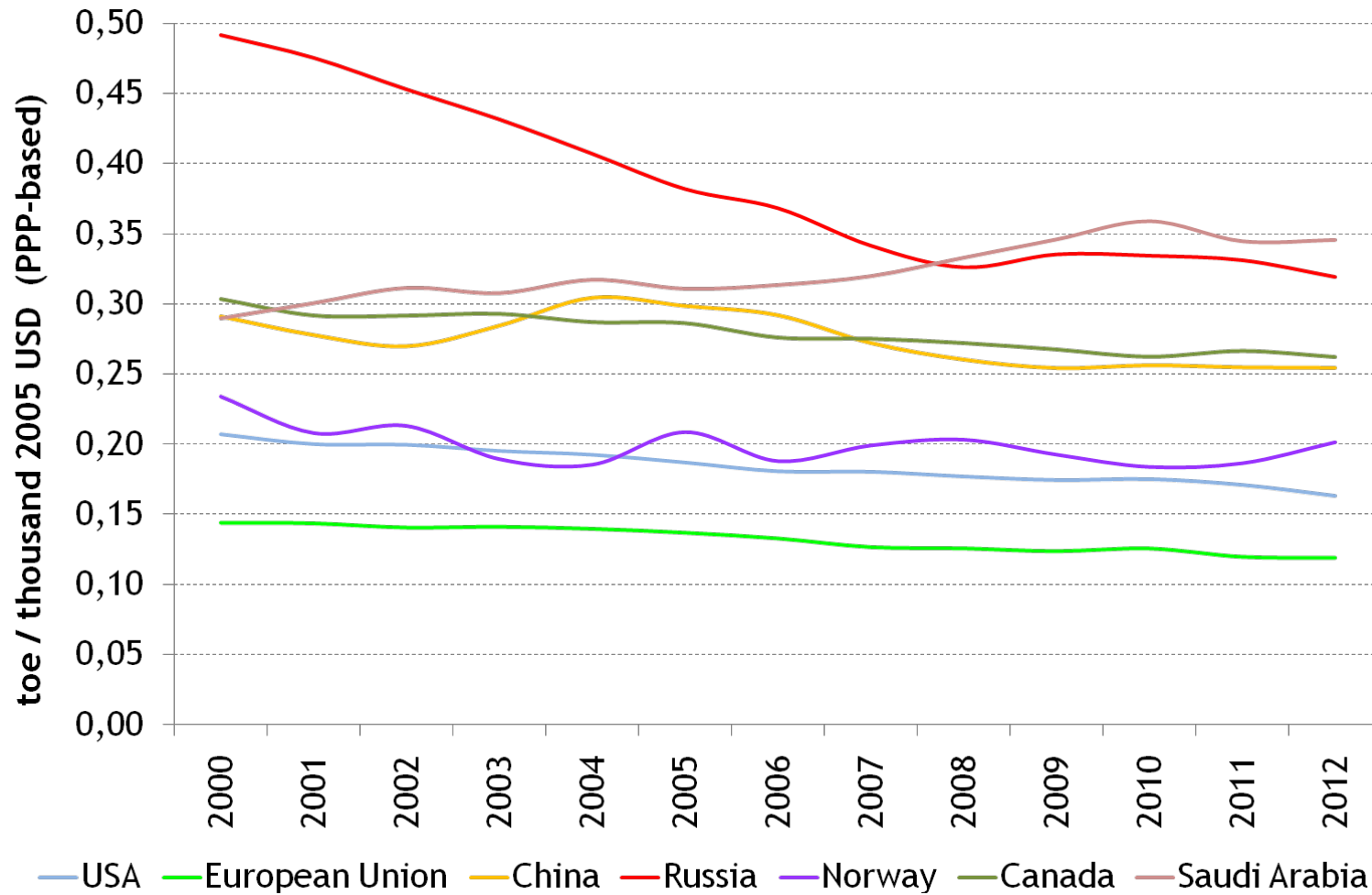
Main topics:

- Great Recession 2008-2009 and high energy prices
- Irreversibility of fixed assets and Climate problem
- European energy situation: depression is not forever, RES will come in decades
- All consumer countries seek some solution: Coal wins, RES brakes, Shale gas wins Anglo-Saxons
- Europe: forecast and scenarios...
- Forecast 2040 - elasticity of Primary Energy (by GDP) in 2010-2012 Globally are the same!
- Difficult times need new brave projects and steps ahead - to avoid long depressions



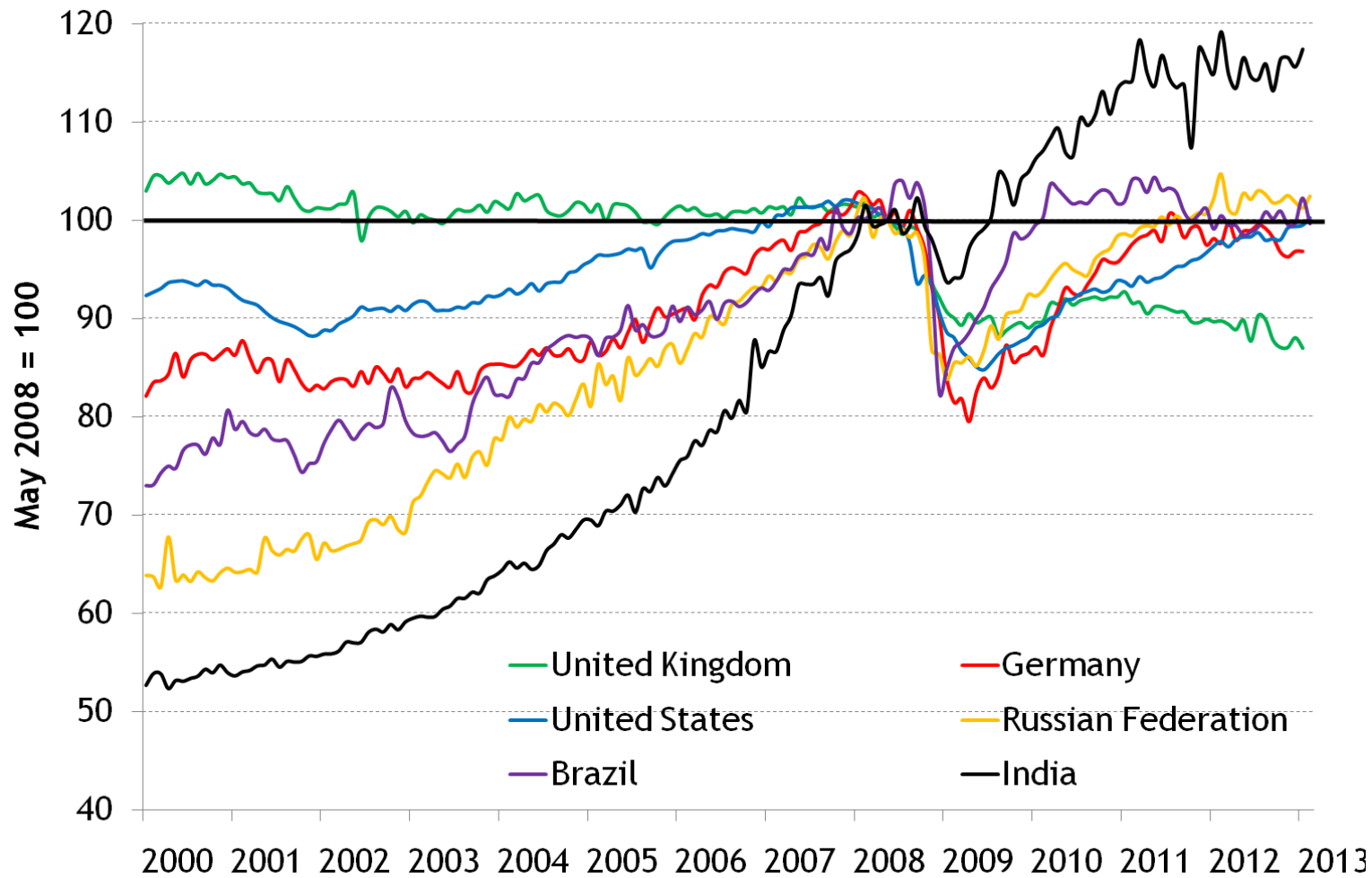
Energy intensity of GDP

2000-2012, toe / th. 2005\$ (PPP-based)



Source: World Bank, BP

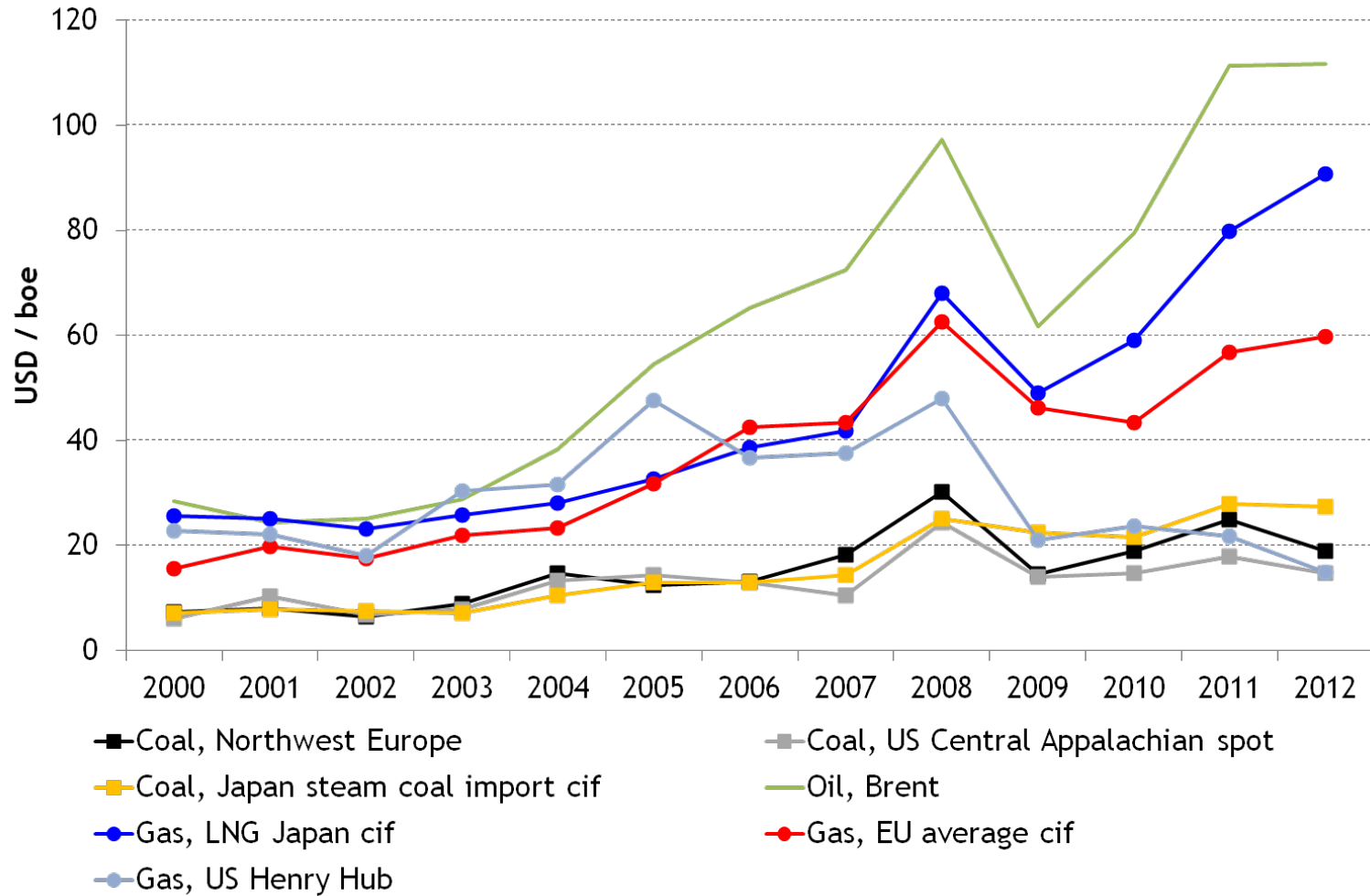
Industrial production 2000 - 2013, by country



Source: World Bank

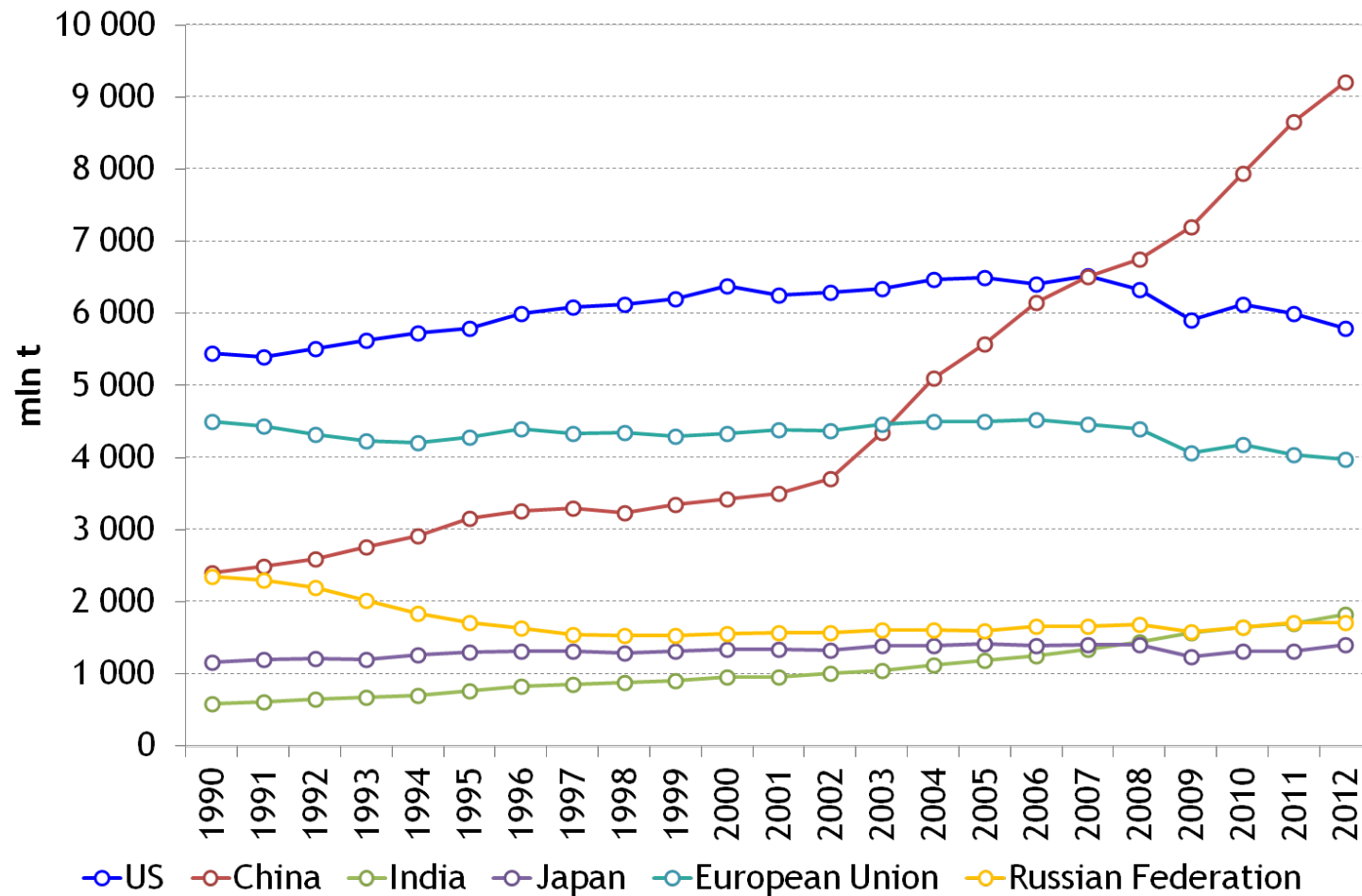
Global energy prices

2000 - 2012, \$ per boe



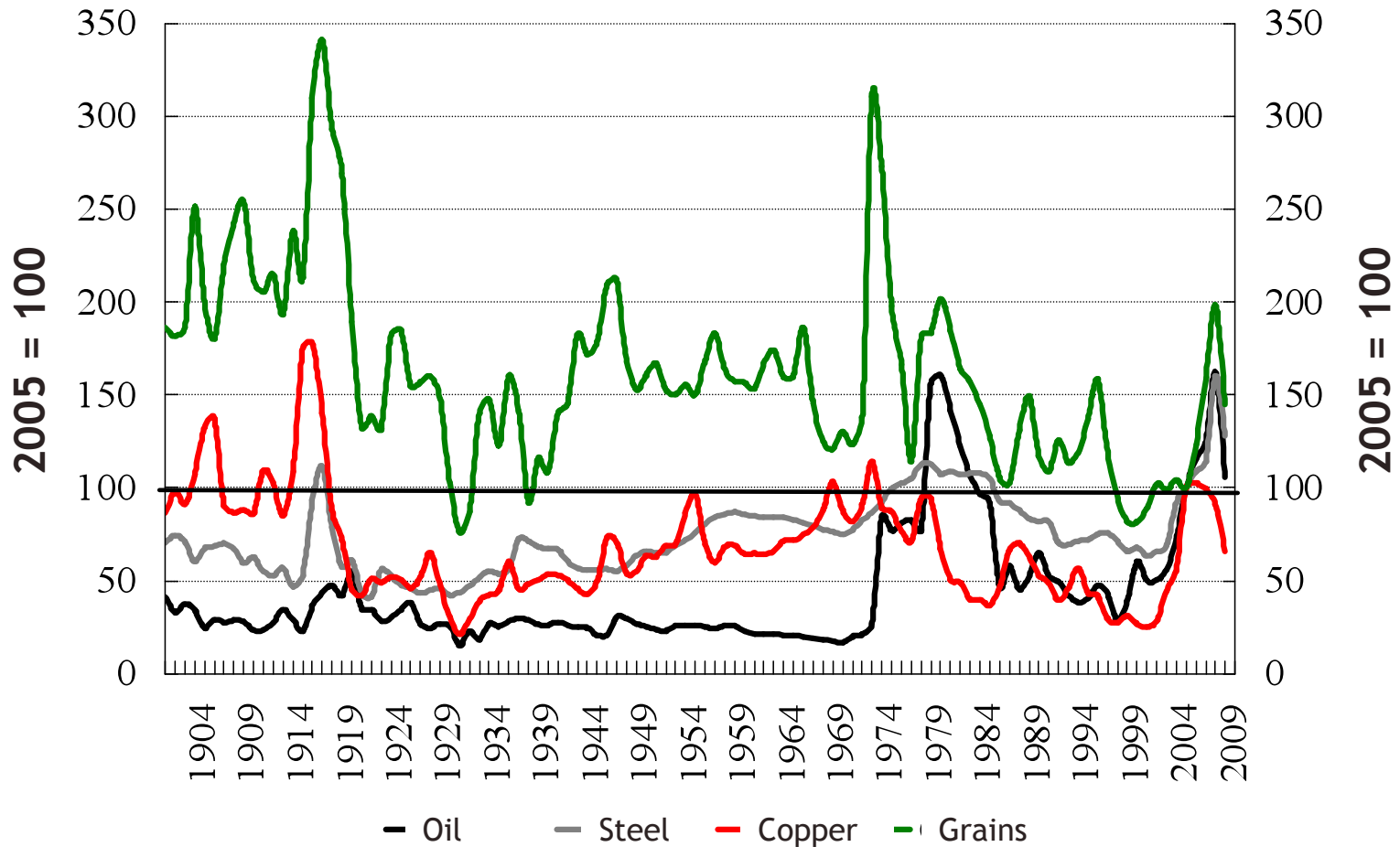
Source: BP

Global CO2 emission 1990 - 2012, by country



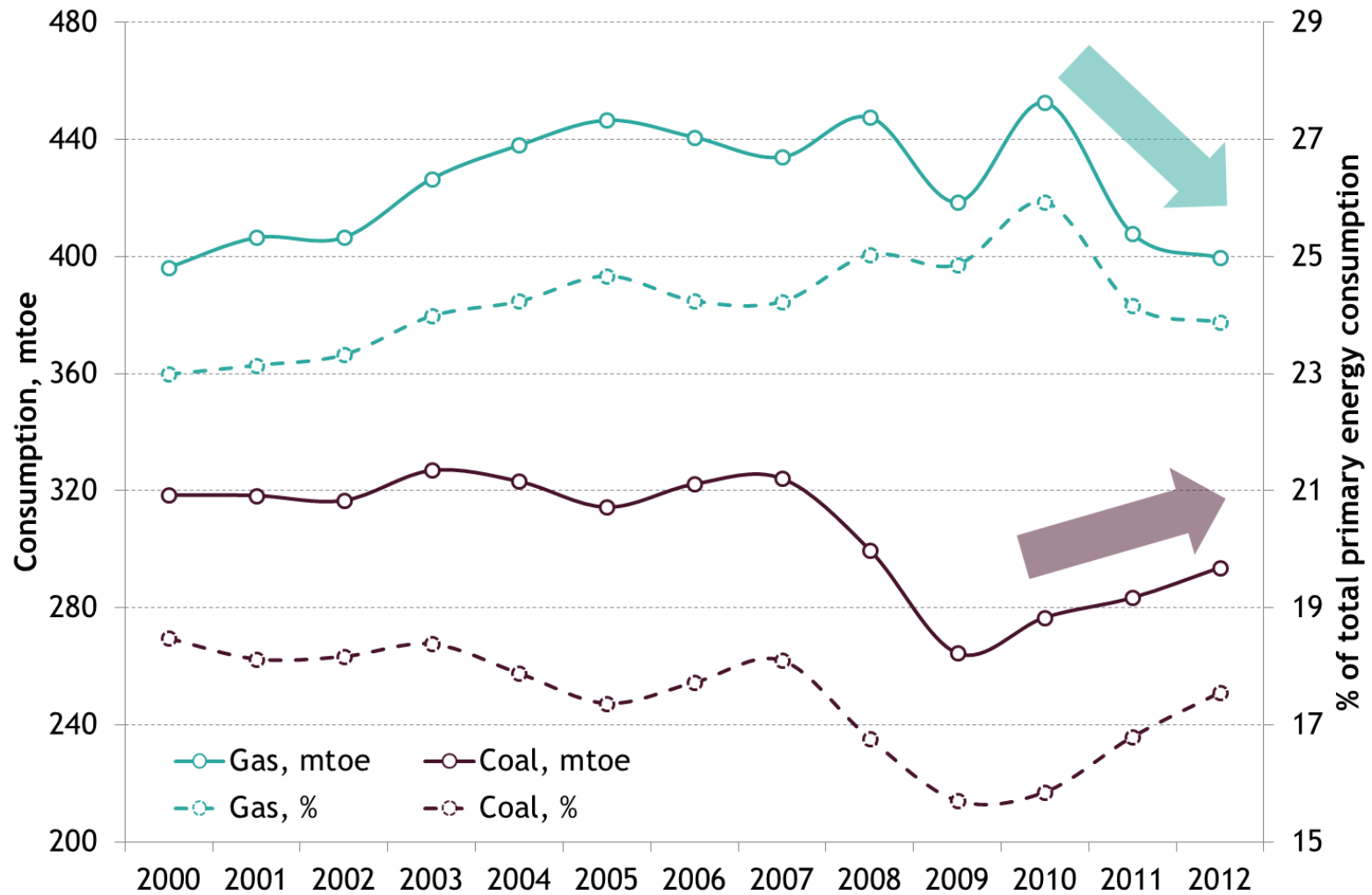
Source: BP

Dynamics of real commodity prices 1901-2010



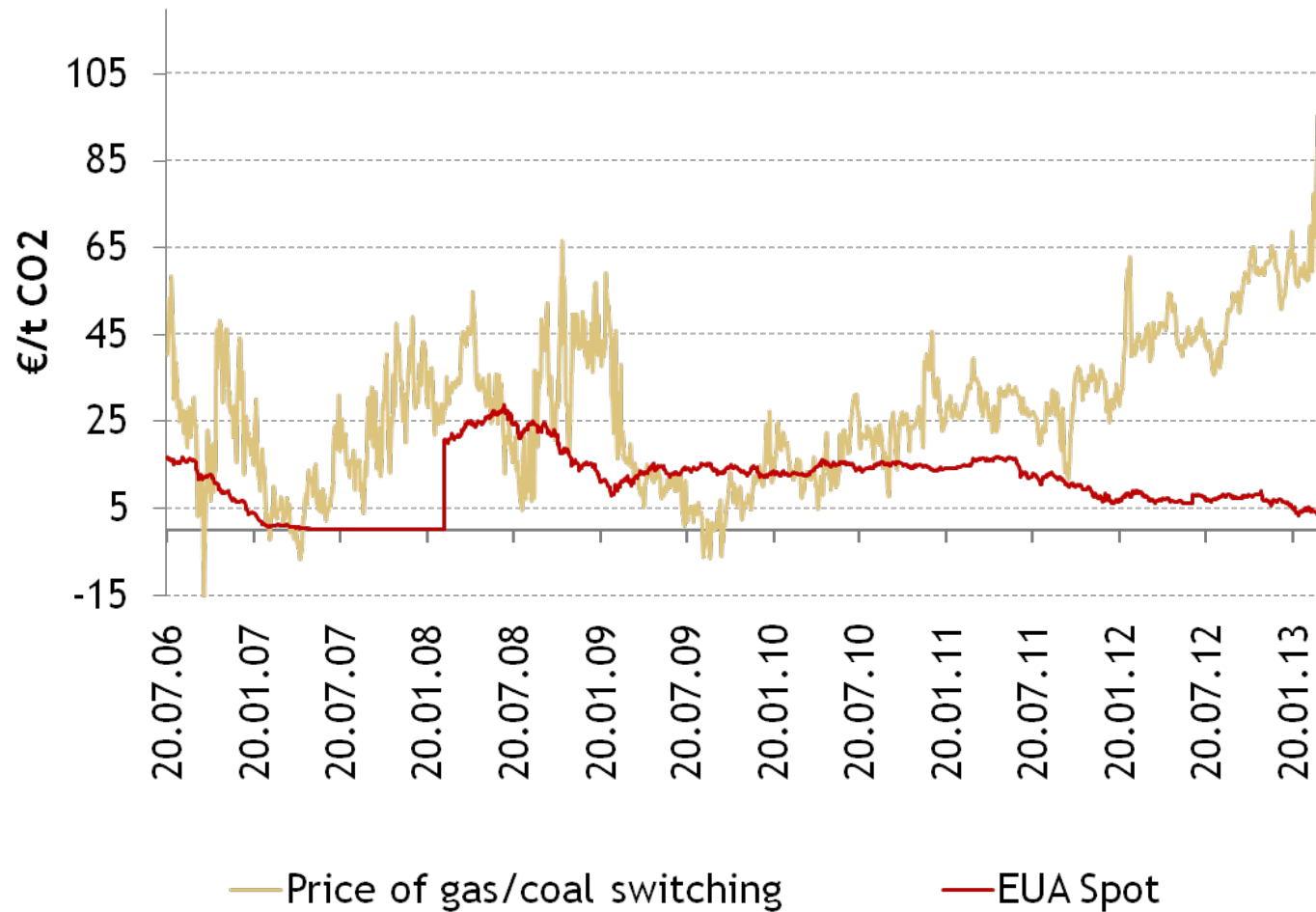
Source: OECD, World Bank, Institute for Energy and Finance

Gas-to-Coal Switching in European Union, 2010 - ...



Source: BP

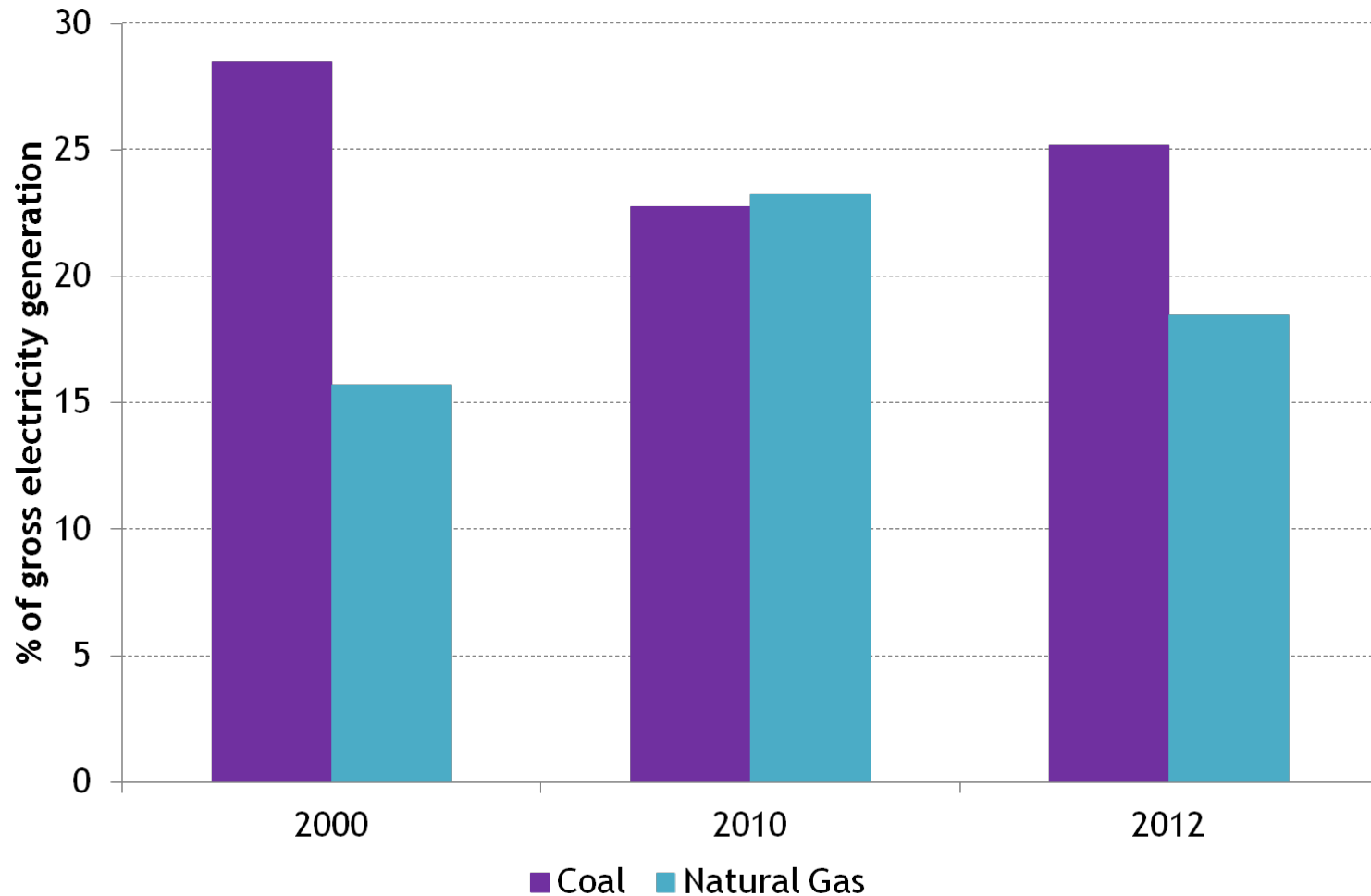
European carbon price (EUA) and price of gas/coal switching for power stations, 2006 - 2013



Source: Thomson Reuters, AC estimates

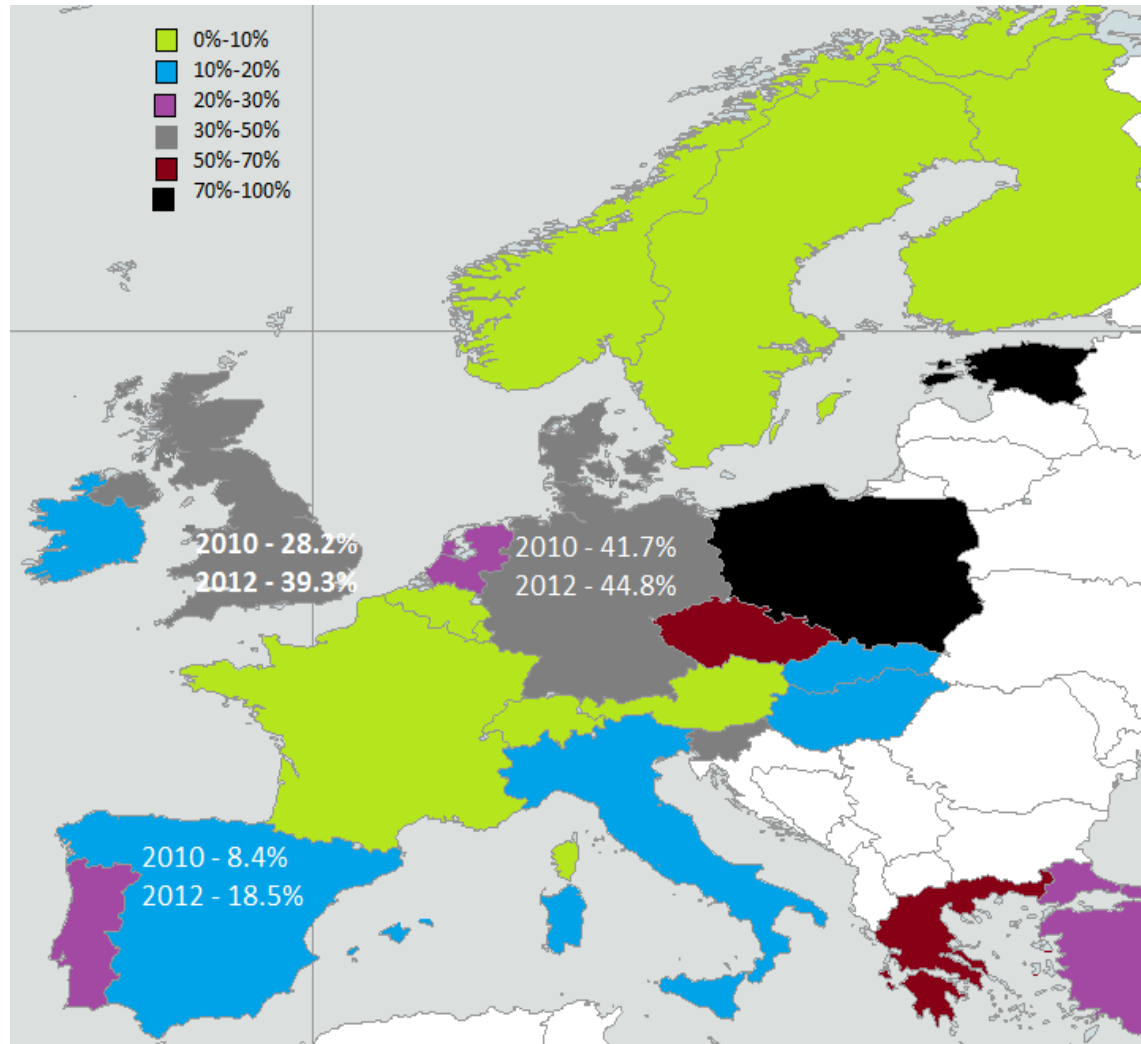
Structure of electricity generation in Europe (OECD)

2000, 2010, 2012, % of gross generation



Source: IEA

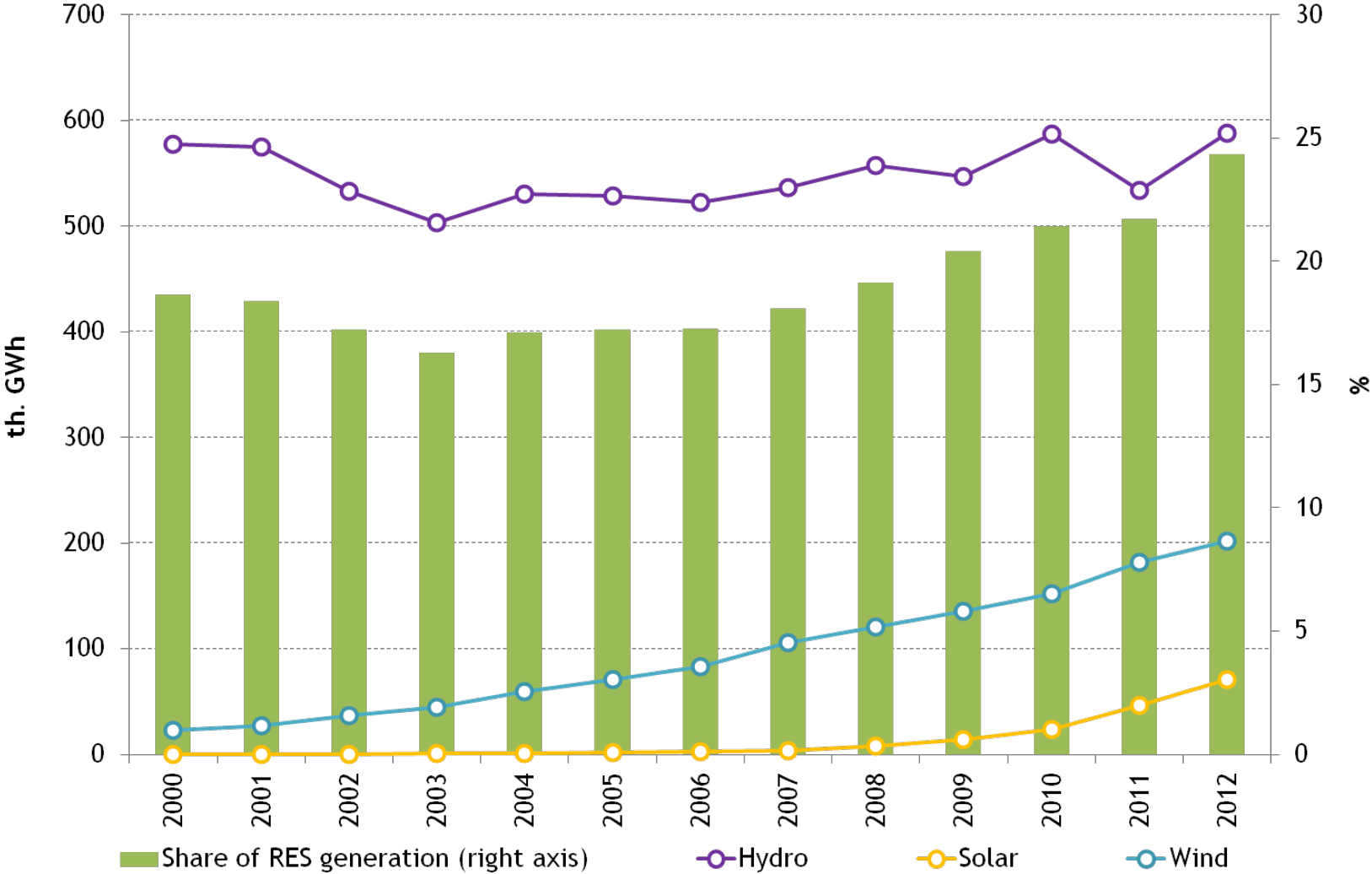
Coal-based electricity generation in Europe (OECD) 2012, share of gross generation, %



Source: IEA

RES-based (incl. hydro) electricity generation in Europe (OECD)

by source, th. GWh, and share of total, %



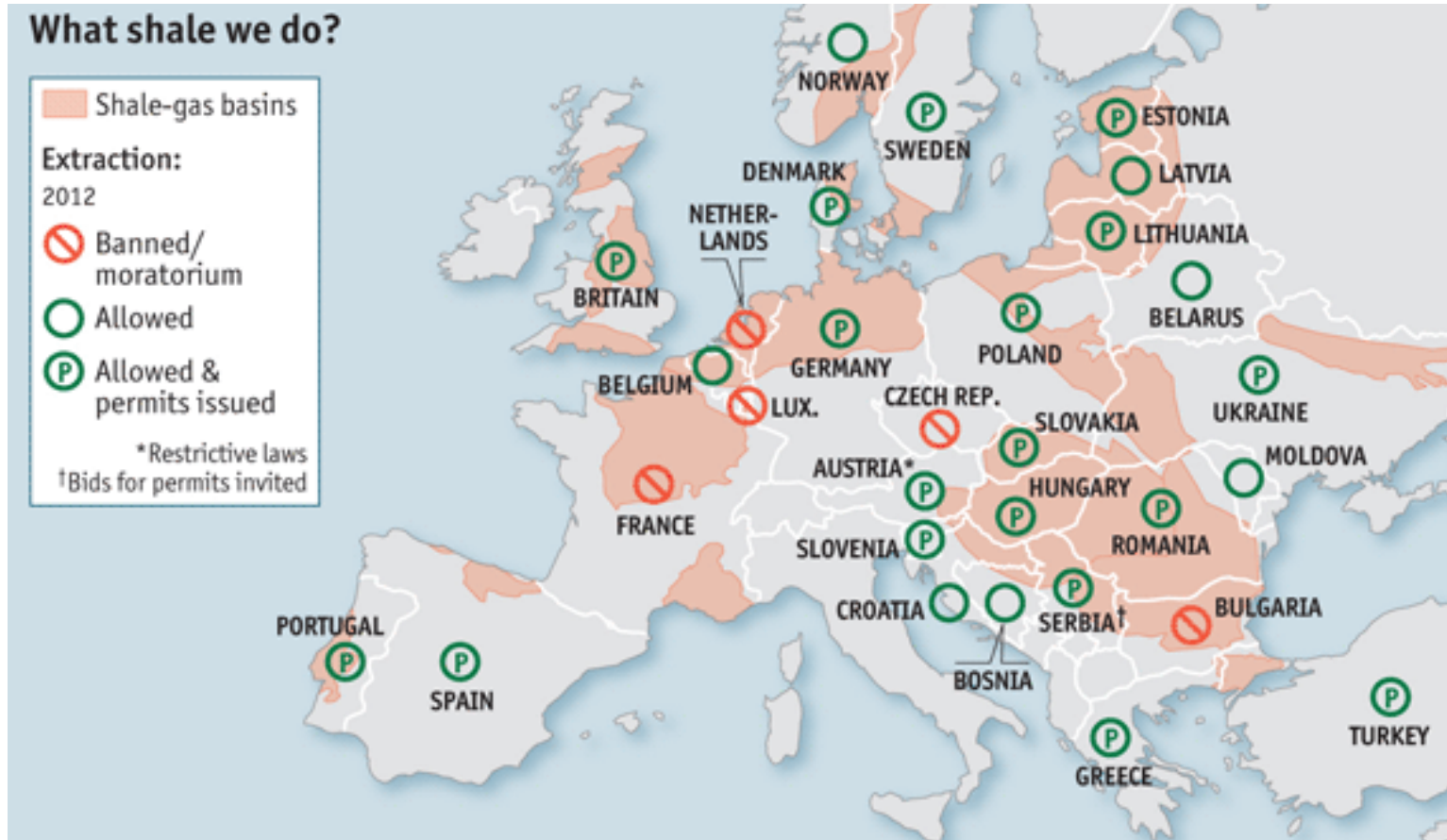
Source: IEA

Inter fuel competition these days:

- Renewables are coming but not immediately
- Coal “Renaissance” after Recession in EU
- Carbon prices down
- Unexpected turns in 2010-2013
- Shale gas has been getting its share in the USA and Australia, but slow in EU
- Debates in Europe: between gas - RES - coal
- Pragmatic economics after Recession



Fracking in EU: bans and permits, 2013



Source: The Economist

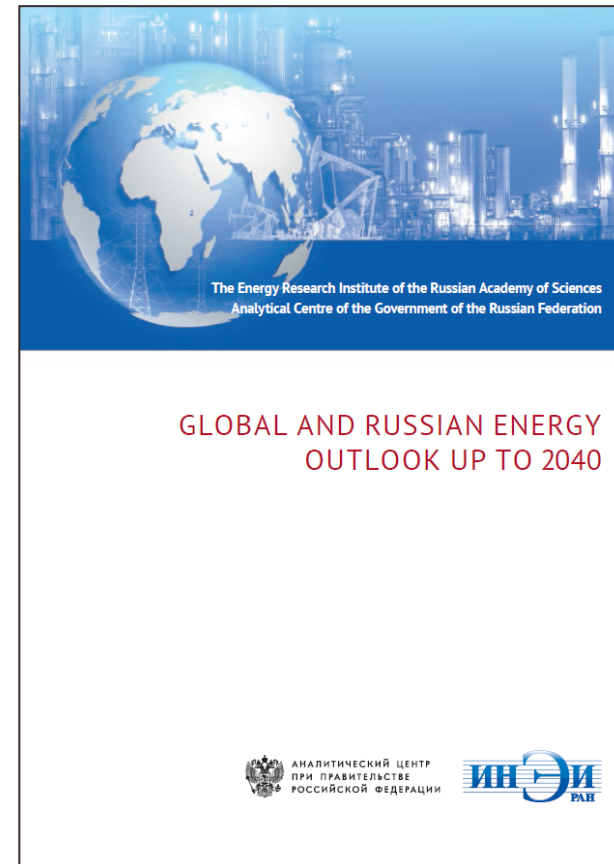
Global and Russian Energy Outlook (non official)

Co-authors:

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- Analytical Center for the Government of the Russian Federation

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GDP and primary energy consumption

average annual growth, 1986 - 2012, %

	GDP (PPP)				Primary energy consumption			
	1986-2002	2003-2008	2009	2010-2012	1986-2002	2003-2008	2009	2010-2012
<i>World</i>	3,1	4,3	-0,8	4,0	1,7	3,0	-1,1	3,3
<i>OECD</i>	2,8	2,3	-3,8	2,1	1,6	0,6	-4,8	0,5
USA	3,1	2,2	-3,5	2,3	1,6	0,2	-4,9	0,0
EU-27	2,4	2,3	-4,3	1,1	0,5	0,4	-5,8	-0,2
Japan	2,2	1,4	-5,5	1,9	1,9	0,2	-8,2	0,0
<i>Non-OECD</i>	3,6	7,4	3,2	6,4	2,0	5,7	2,4	5,7
Brazil	2,3	4,2	-0,3	3,7	3,2	4,0	-0,4	5,3
Russia*	-2,5	7,1	-7,8	4,0	-1,5	1,4	-5,2	2,3
India	5,5	8,0	8,5	6,9	5,1	6,2	8,4	5,2
China	9,5	11,3	9,2	9,2	4,2	10,6	6,7	9,2
<i>Energy consumption-to-GDP elasticity</i>								
<i>World</i>					0,56	0,69	1,35	0,83
<i>OECD</i>					0,55	0,28	1,26	0,27
<i>Non-OECD</i>					0,55	0,77	0,77	0,90

Source: BP, World Bank, IMF, OECD;
* - Russian economic growth since 1990

Oil and gas consumption

average annual growth, 1986 - 2012, %

	Oil consumption				Natural gas consumption			
	1986-2002	2003-2008	2009	2010-2012	1986-2002	2003-2008	2009	2010-2012
<i>World</i>	1,7	1,5	-1,1	1,8	2,5	3,0	-2,2	4,0
<i>OECD</i>	1,5	-0,1	-4,2	-0,3	2,6	1,6	-2,8	2,8
USA	1,4	-0,2	-3,7	-0,4	1,7	0,2	-1,6	3,6
EU-27	0,7	-0,1	-5,0	-2,7	2,5	1,6	-6,5	-1,5
Japan	1,1	-1,5	-9,3	2,1	3,8	4,3	-6,7	10,1
<i>Non-OECD</i>	1,9	3,9	2,7	4,2	2,4	4,6	-1,6	5,2
Brazil	2,9	3,1	1,2	4,4	10,7	10,0	-19,5	13,2
Russia	-3,8	1,9	-3,2	4,6	0,3	1,9	-6,3	2,2
India	6,0	4,1	5,2	4,1	11,3	7,0	23,4	2,3
China	6,4	7,1	3,5	7,5	4,9	18,6	10,1	17,1
<i>Oil/gas consumption-to-GDP elasticity</i>								
<i>World</i>	0,54	0,36	1,37	0,45	0,82	0,70	2,68	1,01
<i>OECD</i>	0,53	-0,04	1,12	-0,16	0,92	0,67	0,75	1,36
<i>Non-OECD</i>	0,55	0,53	0,86	0,66	0,69	0,62	-0,52	0,82

Source: BP, World Bank, IMF, OECD

Coal consumption & electricity generation

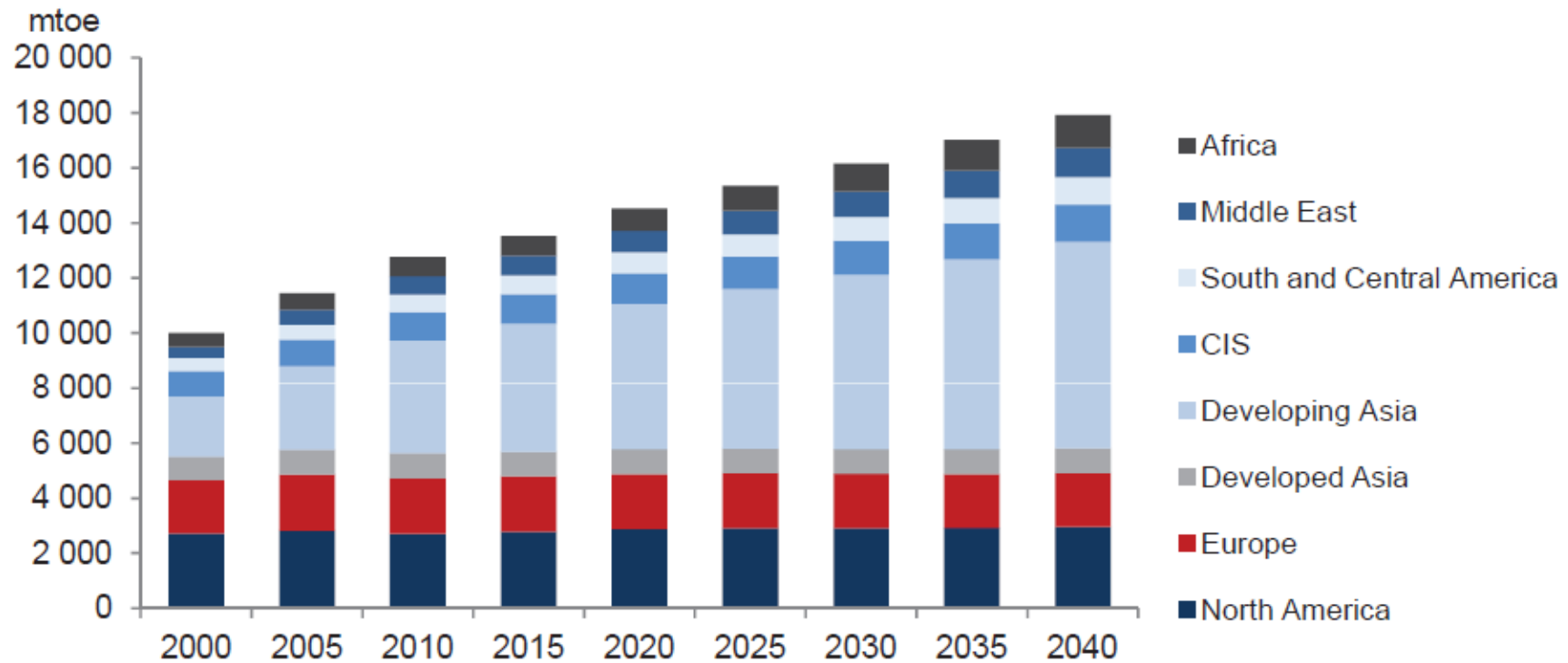
average annual growth, 1986 - 2012, %

	Coal consumption				Electricity generation			
	1986-2002	2003-2008	2009	2010-2012	1986-2002	2003-2008	2009	2010-2012
<i>World</i>	0,9	5,1	-0,5	4,8	2,9	3,8	-0,8	3,8
<i>OECD</i>	0,3	0,7	-10,4	-0,1	2,5	1,6	-4,1	1,1
USA	1,3	0,4	-12,0	-4,1	2,4	1,1	-4,1	0,9
EU-27	-2,6	-0,9	-11,8	3,6	1,8	1,2	-4,9	0,5
Japan	2,2	3,2	-15,5	4,6	2,7	1,9	-5,9	-0,4
<i>Non-OECD</i>	1,5	8,4	5,1	7,0	3,6	7,0	3,1	6,6
Brazil	0,5	2,7	-14,9	7,6	3,5	5,0	0,0	6,1
Russia	-3,7	-0,4	-8,4	0,7	-0,4	2,6	-4,5	2,4
India	4,4	7,2	9,2	5,8	7,3	5,7	5,5	6,6
China	3,5	11,1	7,4	8,4	8,5	13,1	7,1	10,0
<i>Coal/electricity-to-GDP elasticity</i>								
<i>World</i>	0,29	1,20	0,65	1,21	0,94	0,90	0,94	0,95
<i>OECD</i>	0,09	0,29	2,76	-0,04	0,88	0,67	1,09	0,51
<i>Non-OECD</i>	0,43	1,14	1,60	1,10	1,02	0,95	0,97	1,04

Source: BP, World Bank, IMF, OECD

World primary energy consumption

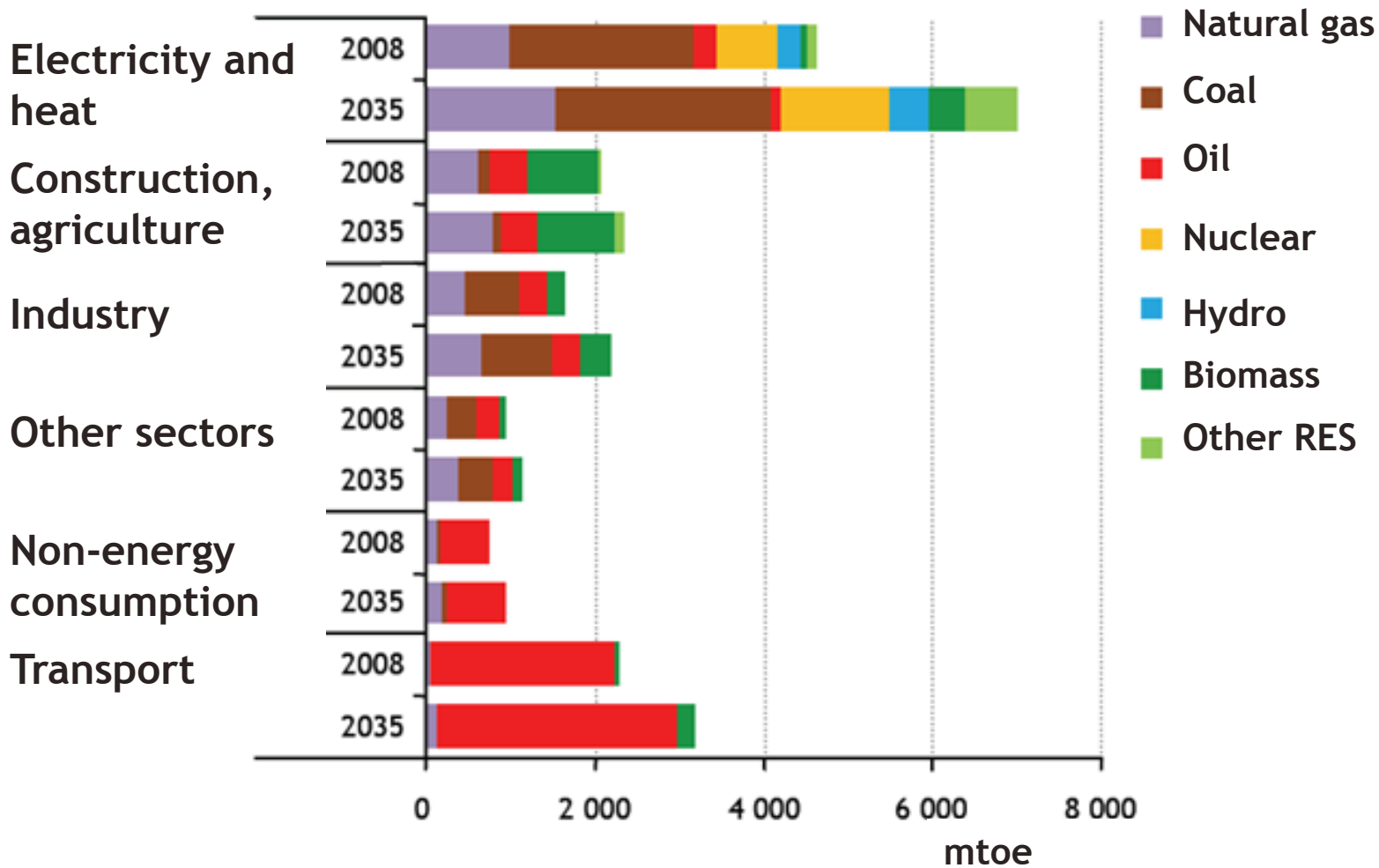
ERI RAS / AC forecast, 2010 - 2040, by region



Source: ERI RAS



Structure of global consumption of energy sources by sector, mtoe

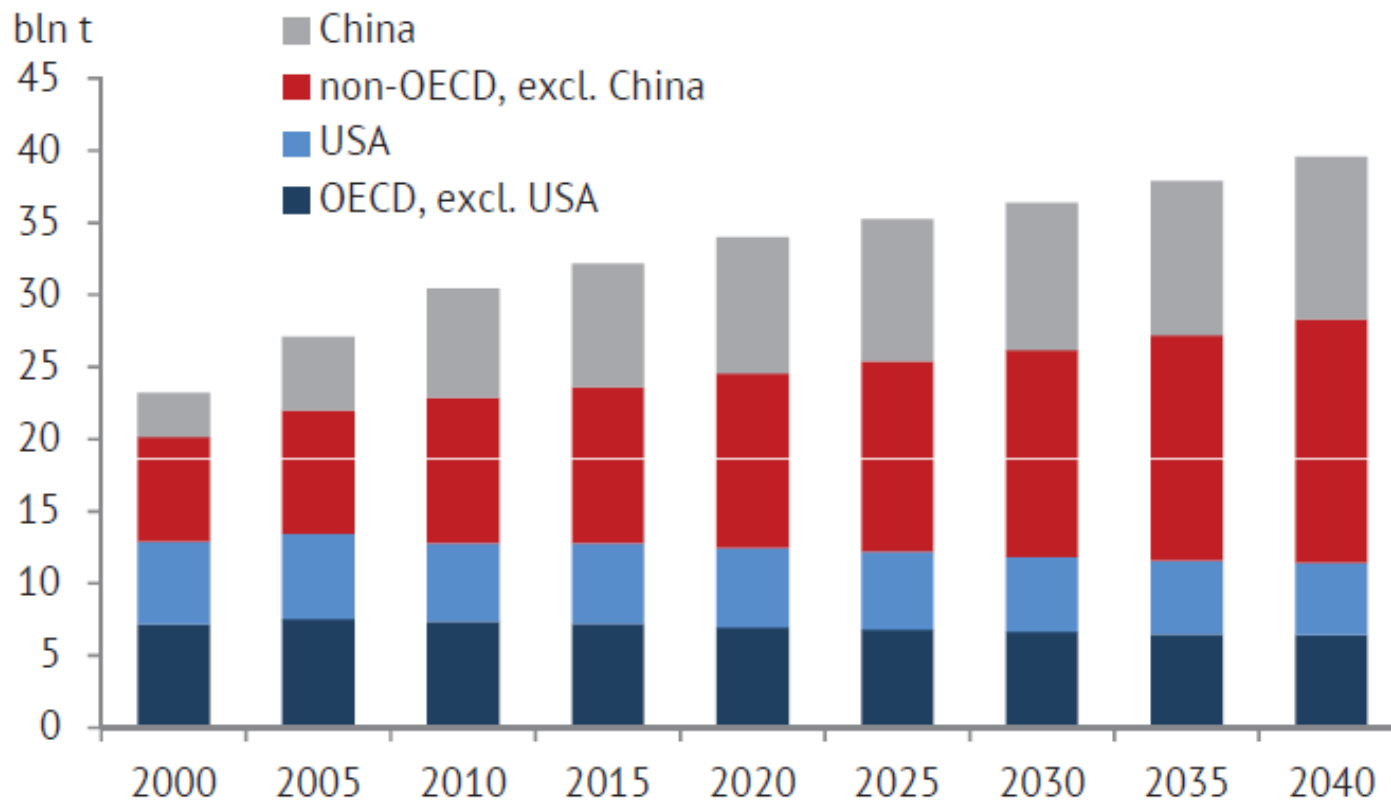


Source: IEA World Energy Outlook 2011



CO2 emissions in the world

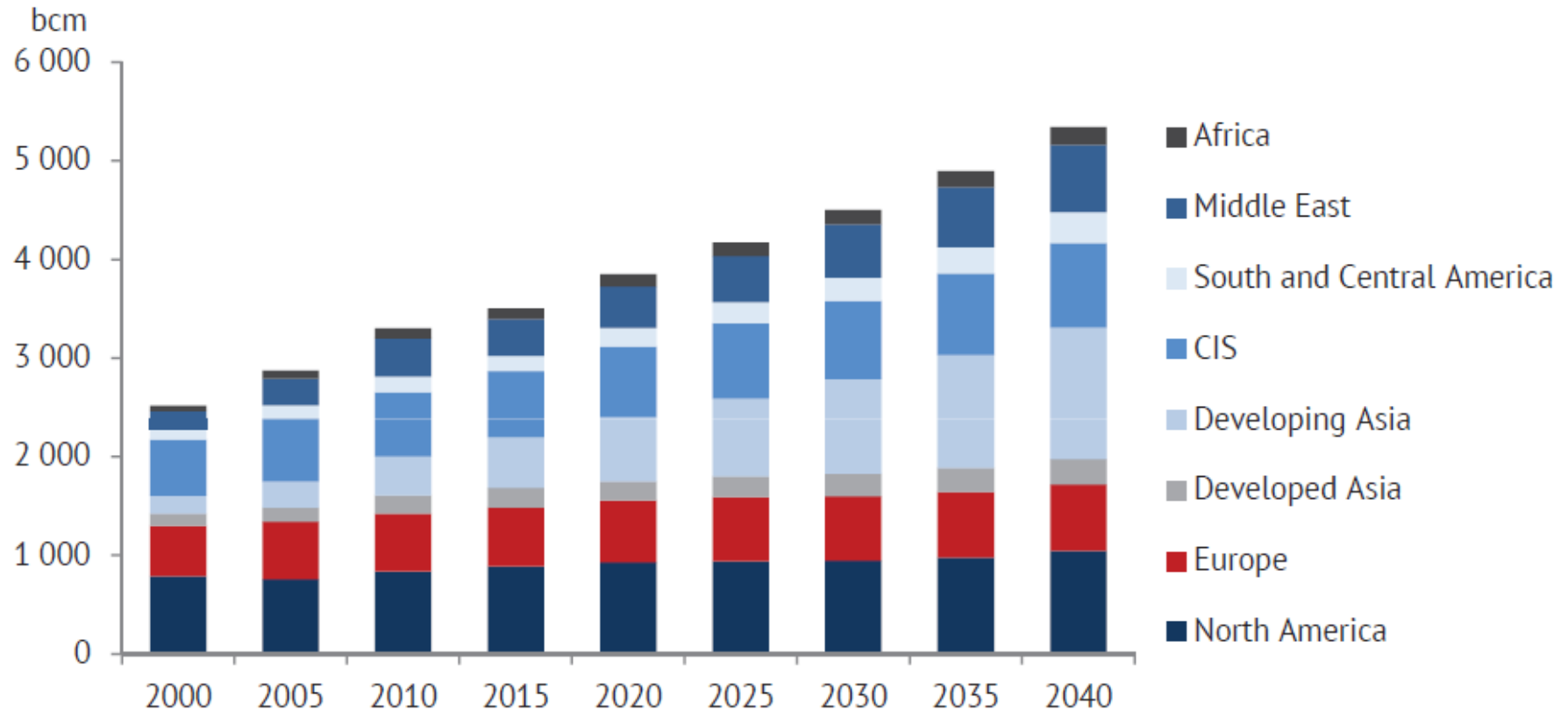
ERI RAS / AC forecast, by country group, 2010 - 2040



Source: ERI RAS

Natural gas consumption

ERI RAS / AC forecast, 2010 - 2040, by region

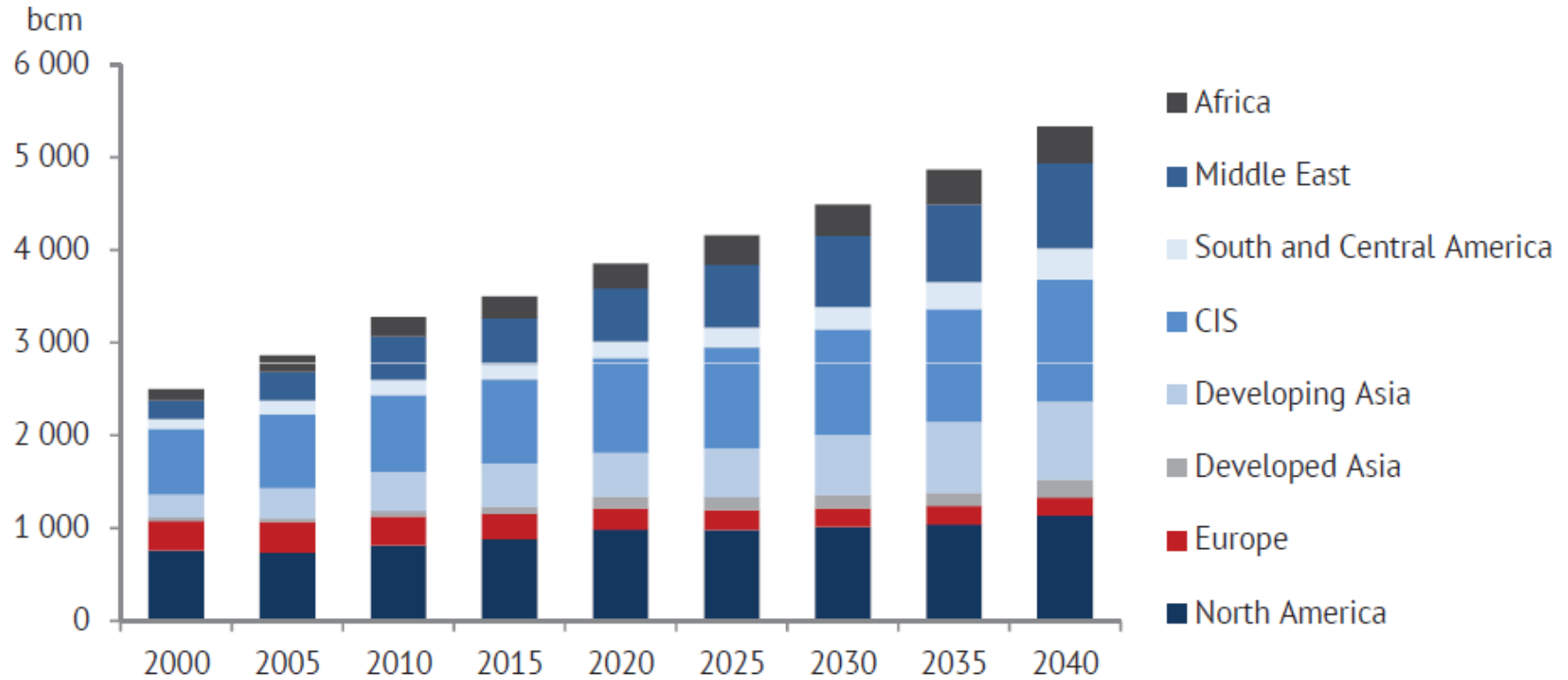


Source: ERI RAS



Natural gas production

ERI RAS / AC forecast, 2010 - 2040, by region

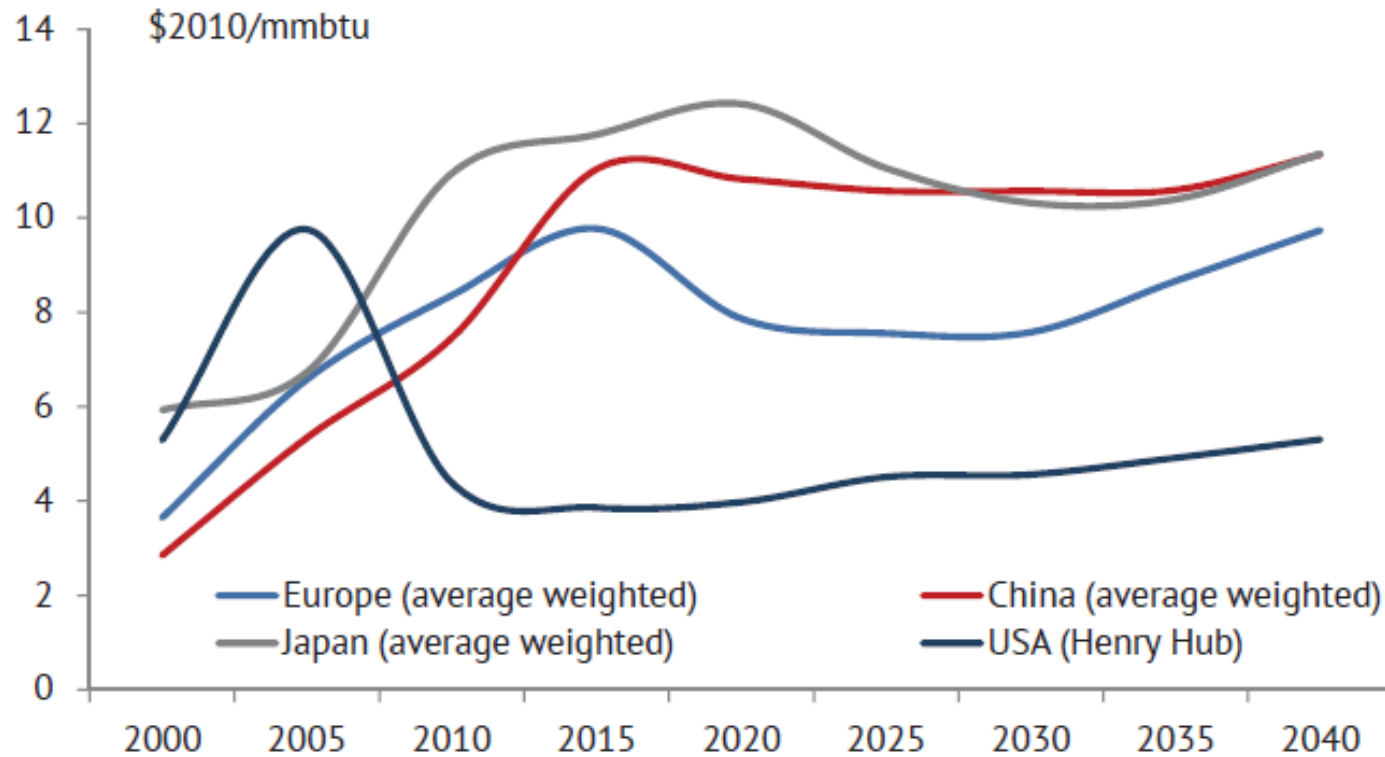


Source: ERI RAS



Weighted average price of gas

ERI RAS / AC forecast, 2010 - 2040, by regional markets

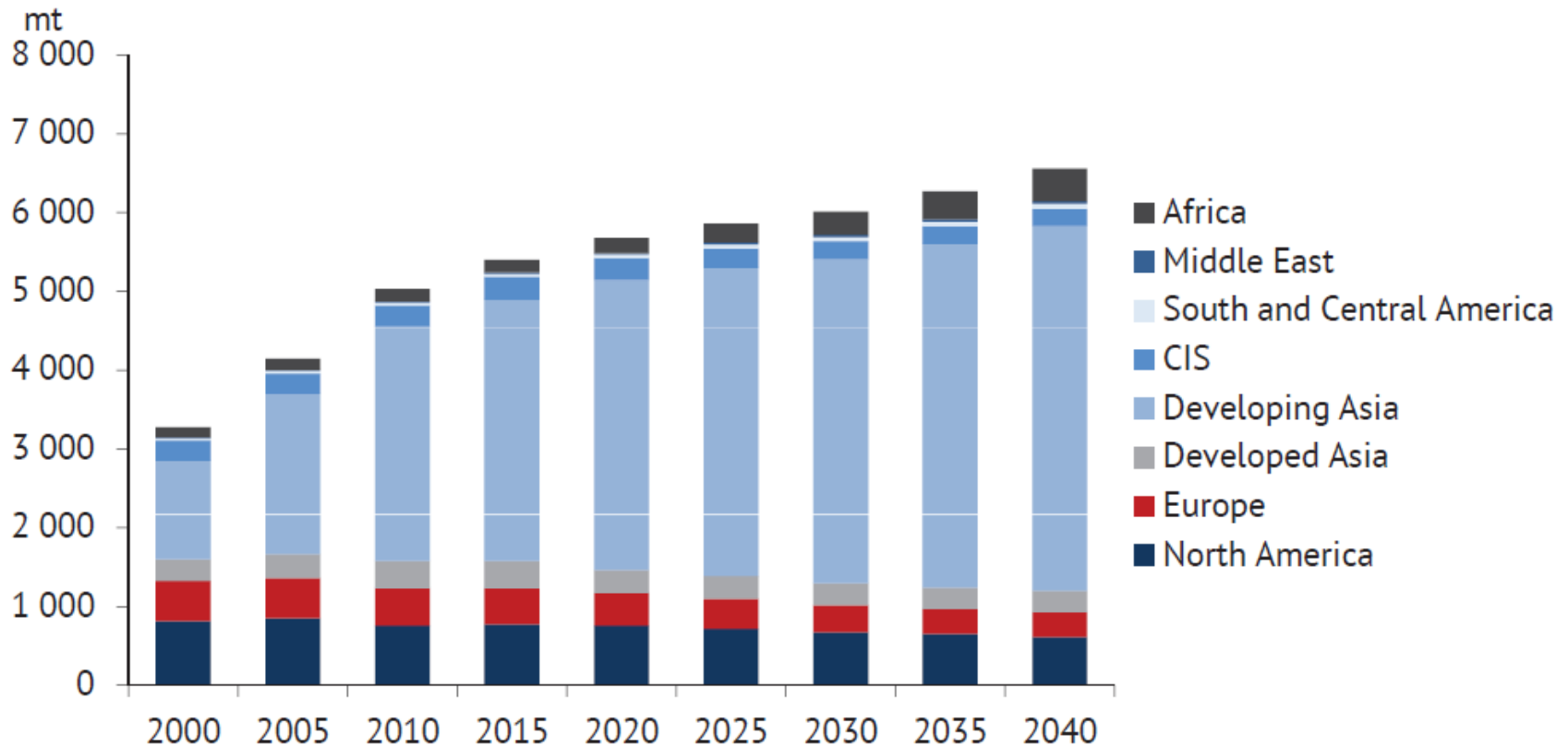


* Weighted average price between the prices of long-term contracts linked to alternative fuels, and spot prices.

Source: ERI RAS

Coal consumption

ERI RAS / AC forecast, 2010 - 2040, by region

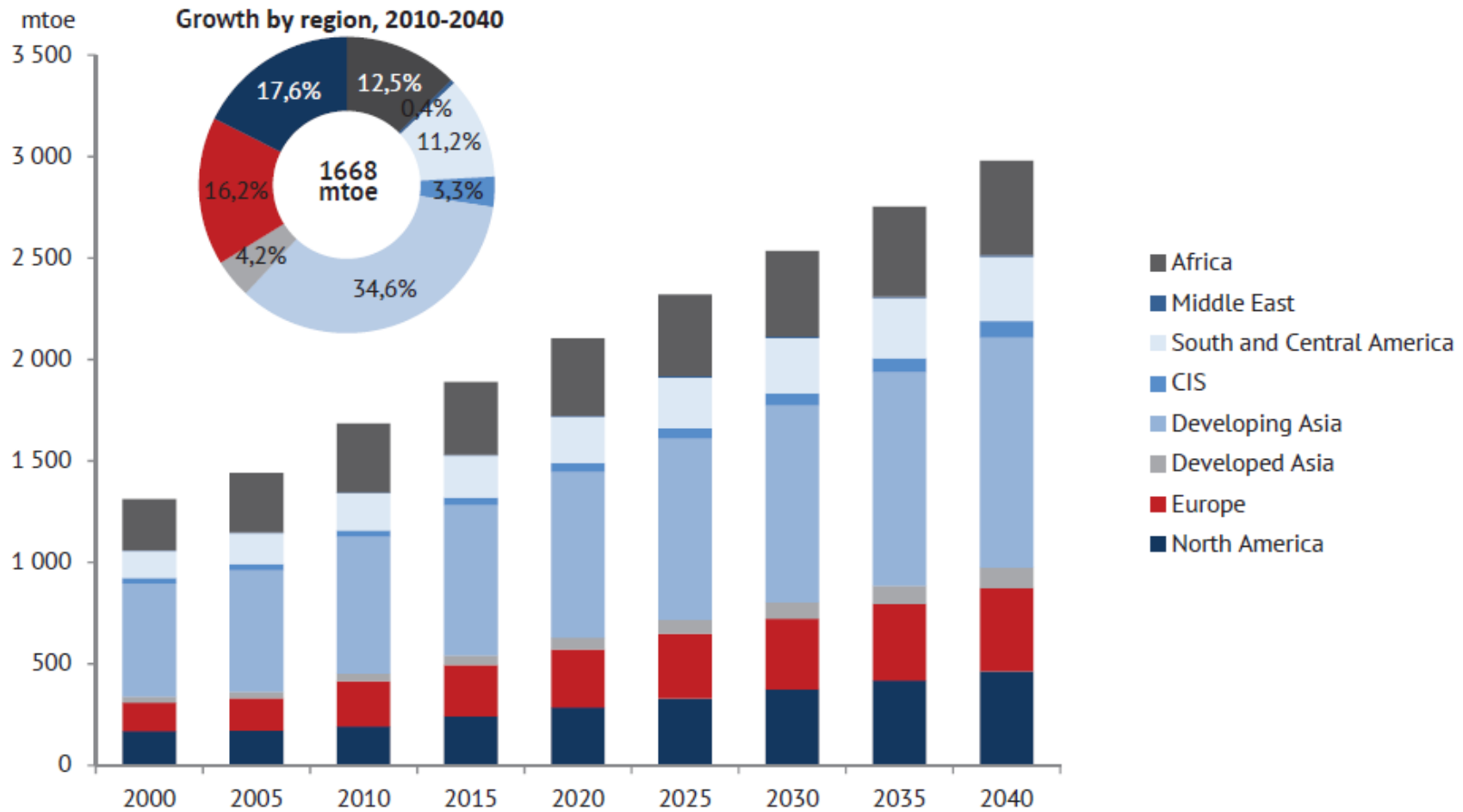


Source: ERI RAS



RES consumption

ERI RAS / AC forecast, 2010 - 2040, by region



Source: ERI RAS

