



АНАЛИТИЧЕСКИЙ ЦЕНТР
ПРИ ПРАВИТЕЛЬСТВЕ
РОССИЙСКОЙ ФЕДЕРАЦИИ

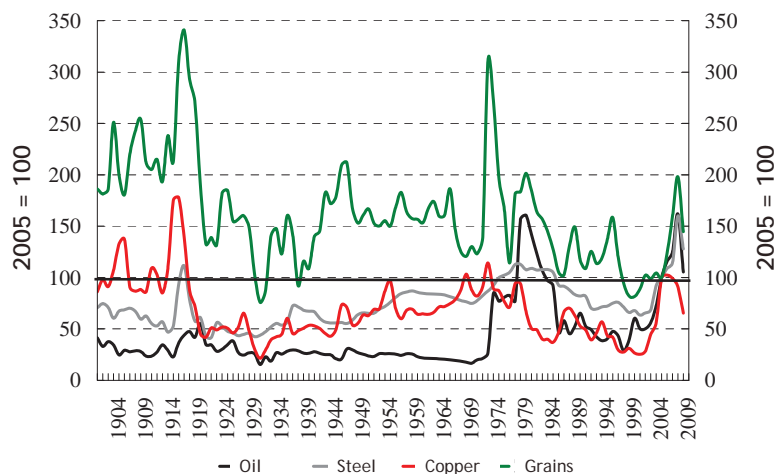
Energy and commodity markets in sustainable perspective

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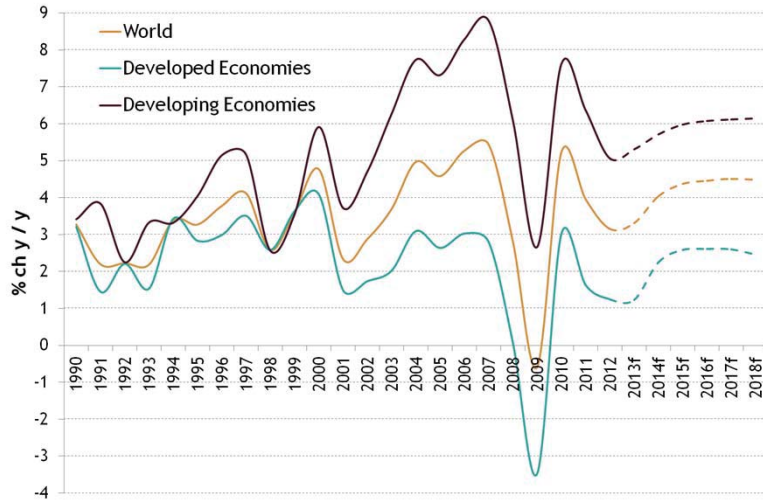
*21st OSCE Economic and Environmental Forum
Prague, Czernin Palace, September 11-13, 2013*

Dynamics of real commodity prices 1901-2010



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

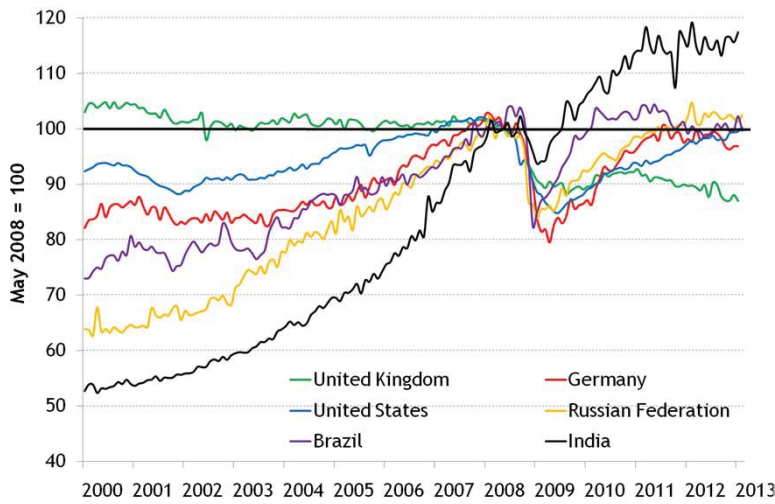
GDP growth 1990 - 2018 (IMF forecast), by country groups



Source: IMF

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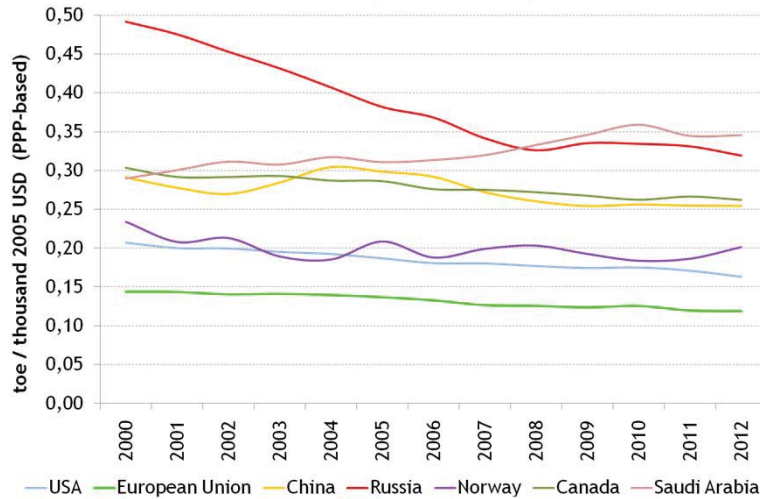
Industrial production 2000 - 2013, by country



Source: World Bank

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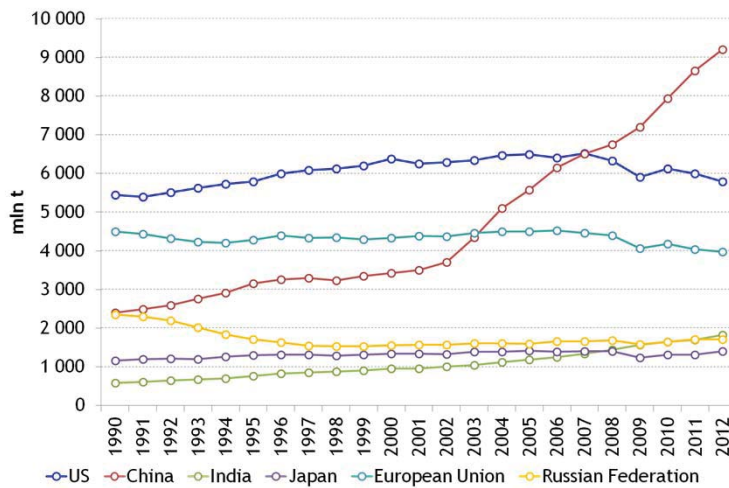
Energy intensity of GDP 2000-2012, toe / th. 2005\$ (PPP-based)



Source: World Bank, BP

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Global CO2 emission 1990 - 2012, by country



Source: BP

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Energy Perspectives till 2040

- Growth after Recession is still low in the OECD
- So far Glob is losing against Global Warming
- Elasticity are very informative
- Forecasting till 2040 - non shock approach
- Competition in reality: RES - COAL - GAS/Shale

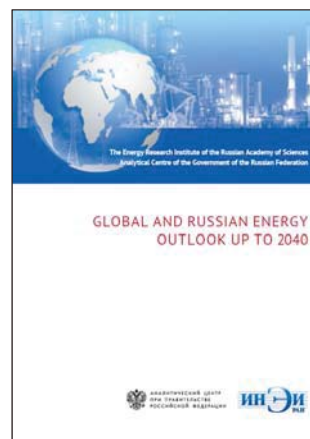
Global and Russian Energy Outlook (non official)

Co-authors:

- The Energy Research Institute of The Russian Academy of Sciences
- 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

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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

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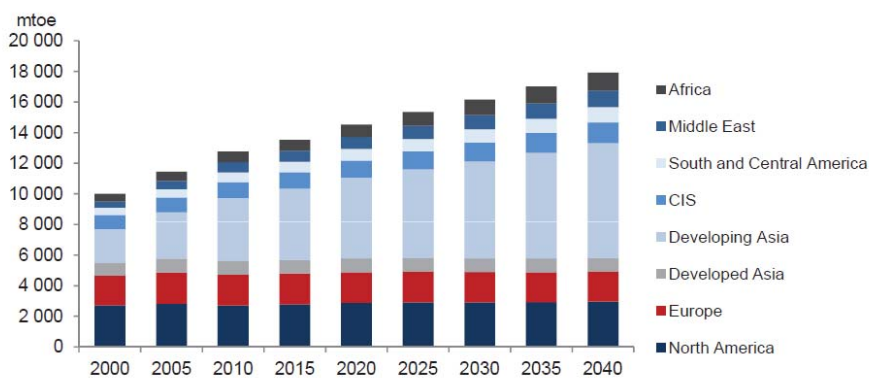
Coal consumption & electricity generation average annual growth, 1986 - 2012, %

	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

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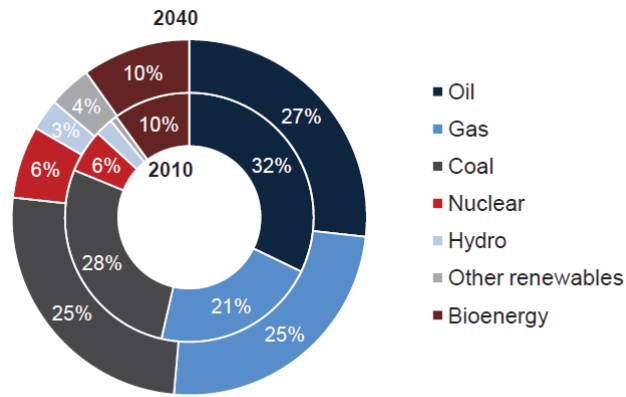
World primary energy consumption ERI RAS / AC forecast, 2010 - 2040, by region



Source: ERI RAS

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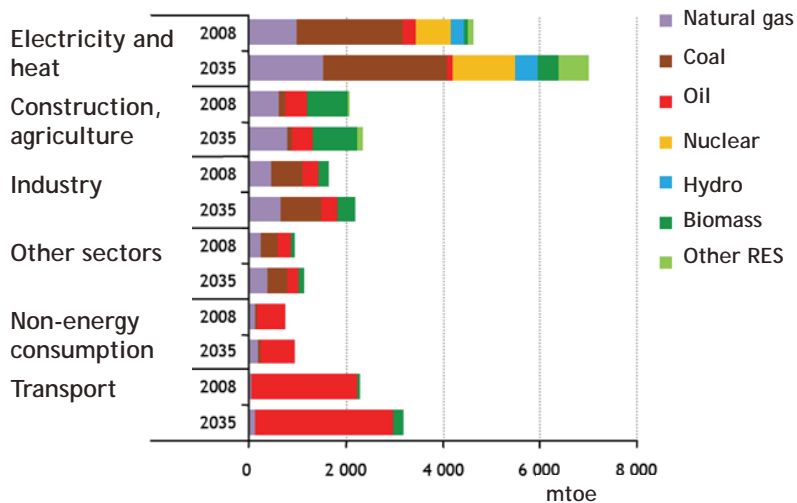
World primary energy consumption ERI RAS / AC forecast, by fuel, 2010, 2040



Source: ERI RAS



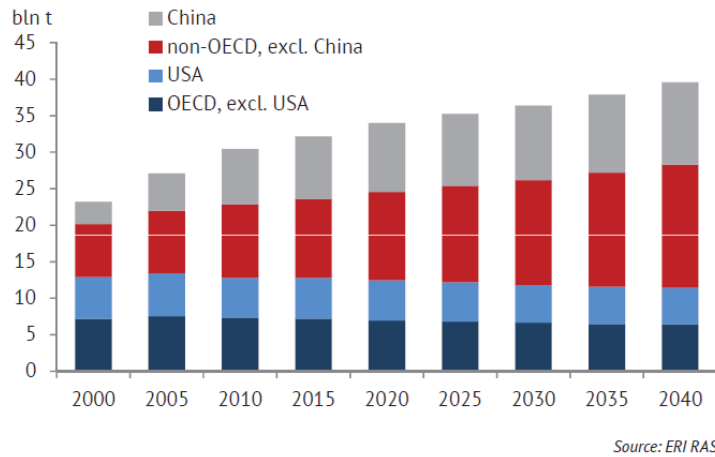
Structure of global consumption of energy sources by sector, mtoe



Source: IEA World Energy Outlook 2011

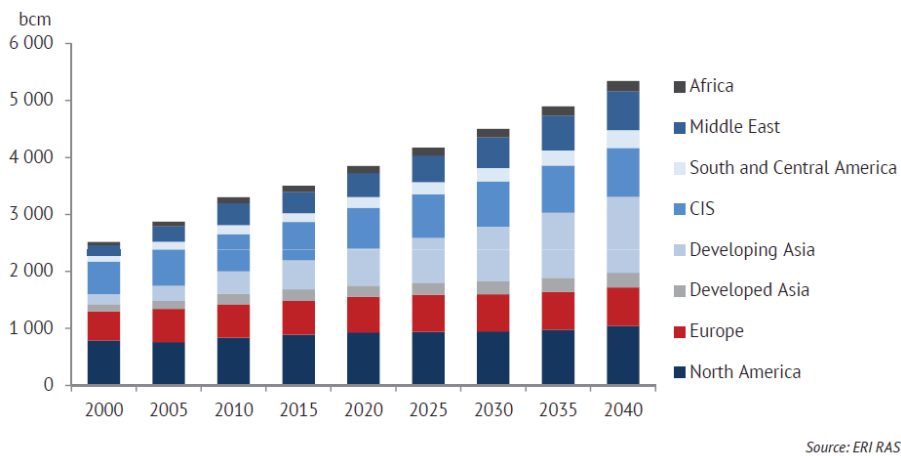


CO2 emissions in the world ERI RAS / AC forecast, by country group, 2010 - 2040



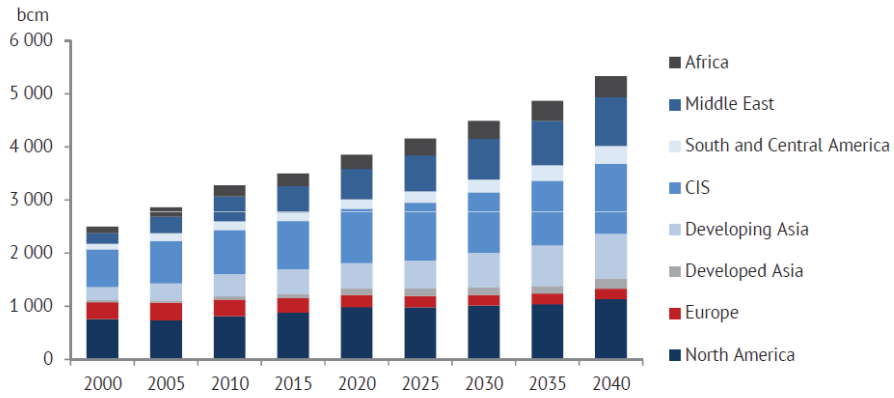
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Natural gas consumption ERI RAS / AC forecast, 2010 - 2040, by region



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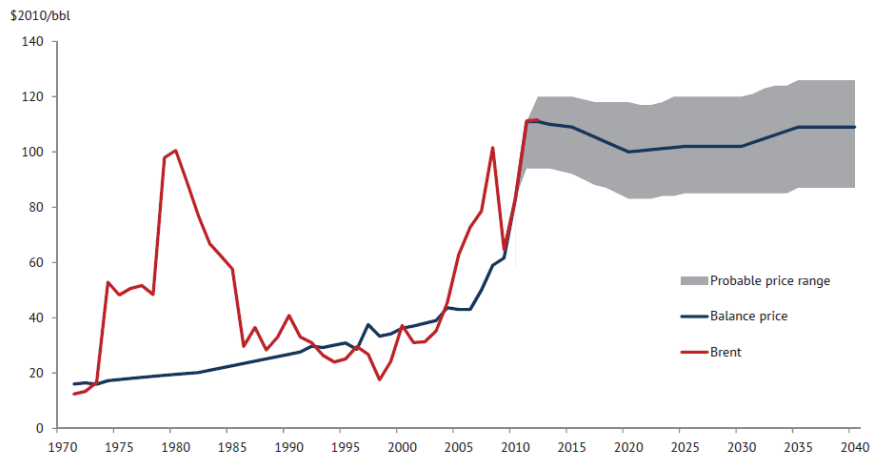
Natural gas production ERI RAS / AC forecast, 2010 - 2040, by region



Source: ERI RAS



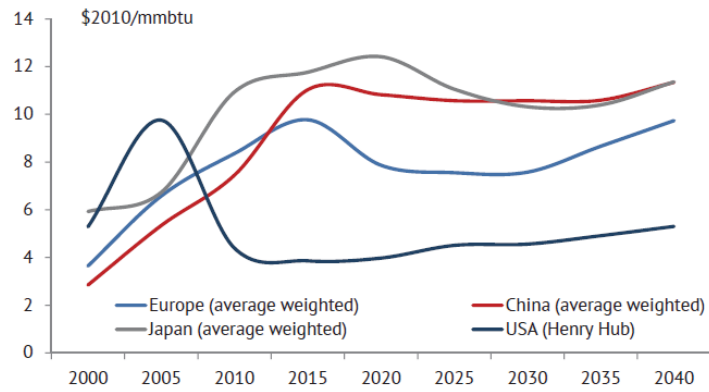
Projected price range of equilibrium oil price ERI RAS / AC forecast, 2010 - 2040, \$2010 per barrel



Source: ERI RAS



Weighted average price of gas ERI RAS / AC forecast, 2010 - 2040, by regional markets

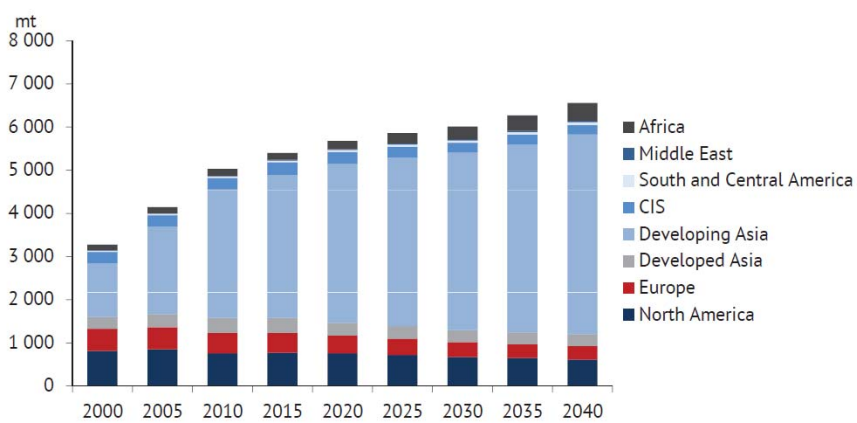


* Weighted average price between the prices of long-term contracts linked to alternative fuels, and spot prices.

Source: ERI RAS

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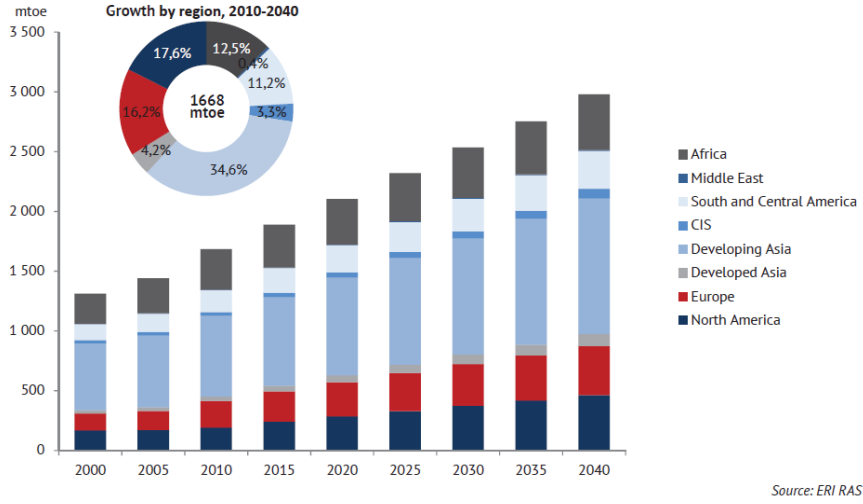
Coal consumption ERI RAS / AC forecast, 2010 - 2040, by region



Source: ERI RAS

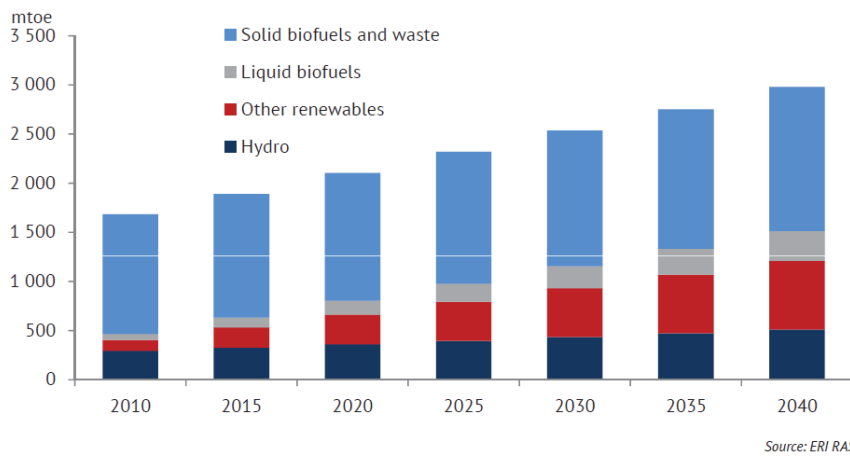
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RES consumption ERI RAS / AC forecast, 2010 - 2040, by region



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RES consumption ERI RAS / AC forecast, 2010 - 2040, by source

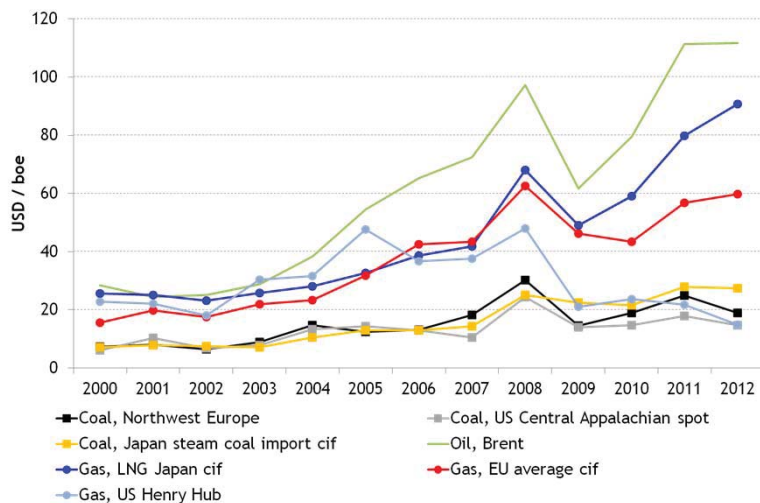


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Inter fuel competition these days

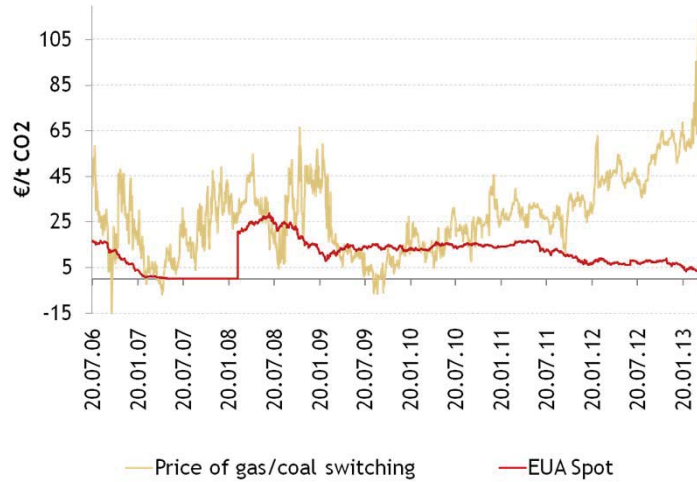
- Renewables are coming but not immediately
- Coal "Renaissance" after Recession in EU
- Carbon prices down
- Unexpected turns in 2010-2013
- Shale gas has been getting its share in the USA and Australia, but slow in EU
- Debates in Europe: between gas - RES - coal
- Pragmatic economics after Recession

Global energy prices 2000 - 2012, \$ per boe



Source: BP

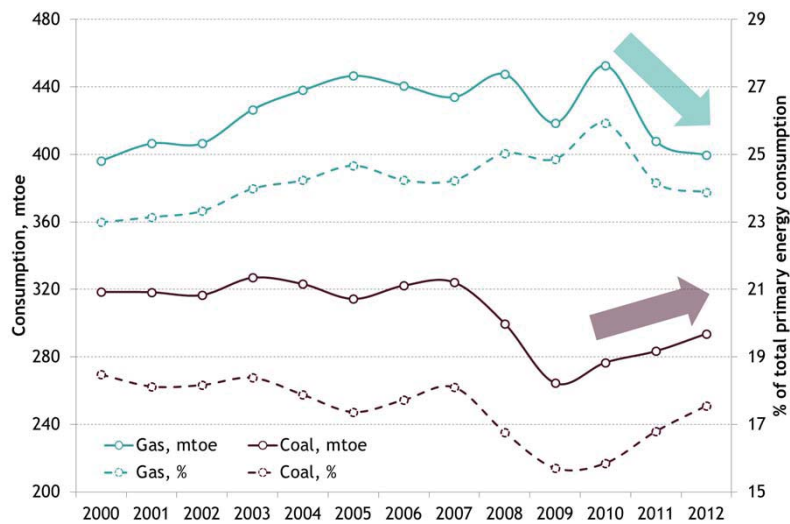
European carbon price (EUA) and price of gas/coal switching for power stations, 2006 - 2013



Source: Thomson Reuters, AC estimates

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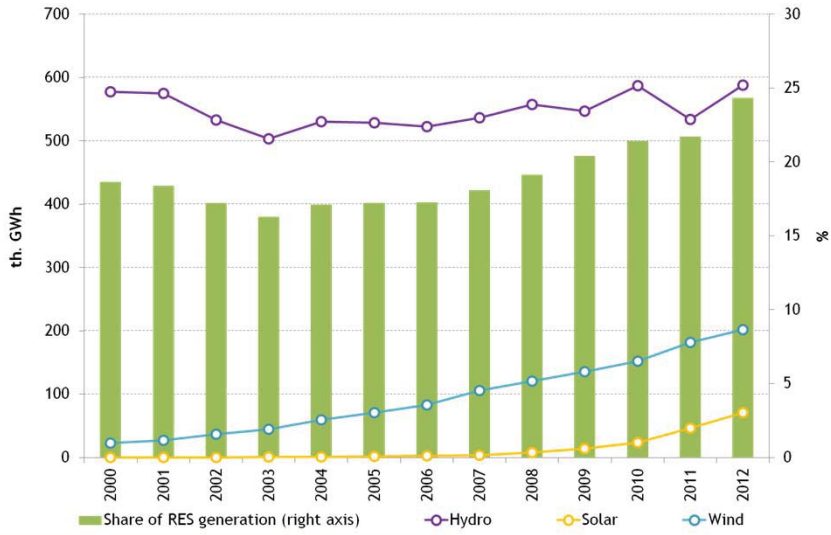
Gas-to-Coal Switching in European Union, 2010 - ...



Source: BP

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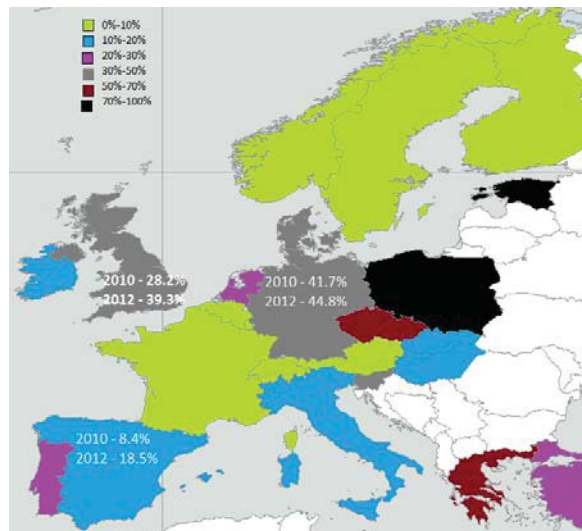
RES-based (incl. hydro) electricity generation in Europe (OECD)
by source, th. GWh, and share of total, %



Source: IEA

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

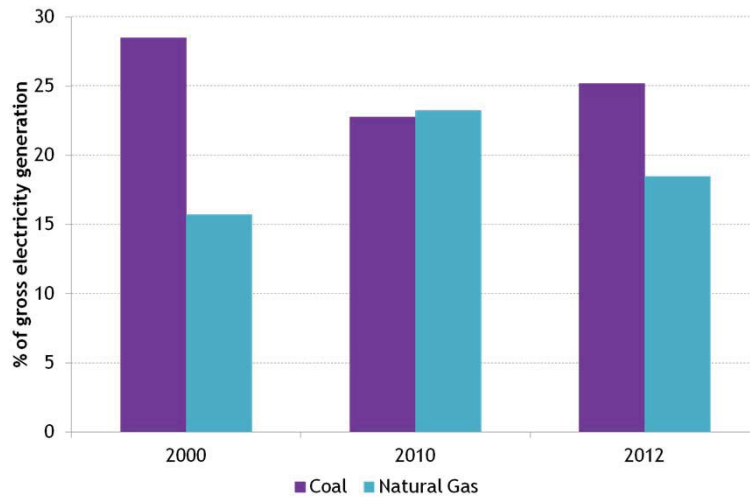


Source: IEA

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Structure of electricity generation in Europe (OECD)

2000, 2010, 2012, % of gross generation



Source: IEA

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Global prospects of shale gas : resources and costs

	Shale gas resources (US EIA, 2013), tcm	Shale gas resources (IEA, 2012), tcm	Production costs estimates, \$ per th. cm (country/author)
North America	50.5	56	115-265 (USA/IEA, 2012)
Asia Pacific	45.5 (China - 31.6)	57 (China - 36)	150-305 (China/IEA, 2012)
Latin America	40.5	33	-
MENA	28.4	34	-
Sub-Sah. Africa	11.0		-
Europe	13.3	16	190-380 (IEA, 2012), 310-390 (Oxf. Ins. for Ener. Stud., 2010)
East Europe/CIS	11.8	12	-
World	206.7	208	-

Source: US EIA, IEA, Oxford Institute for Energy Studies (Geny, 2010)

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Shale gas production in 2040

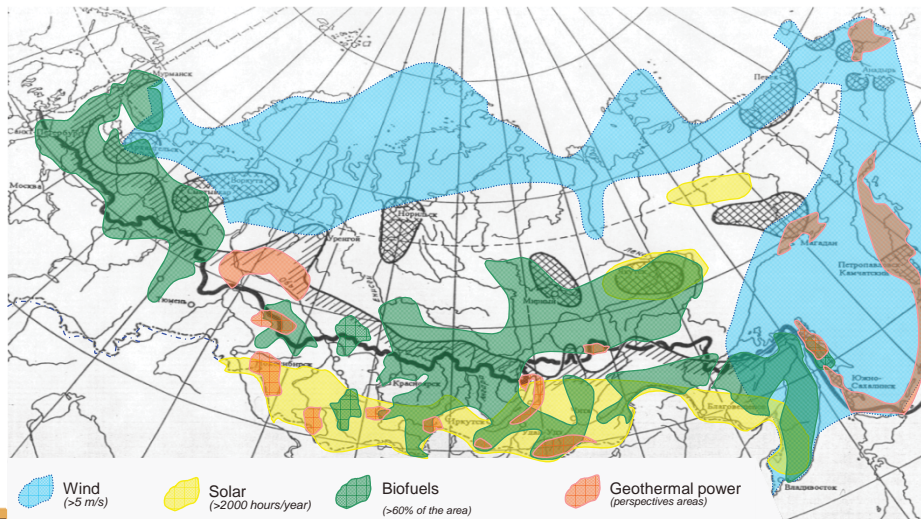
'Baseline' and 'Shale breakthrough' scenarios, ERI RAS / AC forecast



Source: ERI RAS

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Prospective areas for renewable energy development in Russia



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