

Global Economy and Global Energy

Professor Leonid Grigoryev

*Chief Advisor of the Head, Analytical Center for the Government
of the Russian Federation; Chair of Global Economy, Higher School of Economics*

12/06/13



АНАЛИТИЧЕСКИЙ ЦЕНТР
ПРИ ПРАВИТЕЛЬСТВЕ
РОССИЙСКОЙ ФЕДЕРАЦИИ



Problems

Current situation

Forecasts

Challenges on the road to 2050

- Demography: from 7 to 9,5 billion people, aging North, shift to Asia etc.
- Energy poverty and energy for growth
- Economic growth: industrialization for all...
- New Technologies and Irreversibility of Fixed Assets – Time costs and Capital costs
- Transformation of societies – and middle class consumption and life style
- Political risks of supplies along the road
- Climate change prevention – taking it seriously!
- Post Great Recession Syndrome – uncertainties of growth in EU, in China, in Russia – all styles
- Sources of Financing – Energy Investment Share in GDP

Solutions on the Road to the Future

- Sustainable development in the broad terms: social, ecology, climate
- Investing in the Future – technologies, transformation, «clean industrialization»?
- More Energy will come from: MENA + North America + Latin America + Russia + ... Reserves and prices
- Coal economy and «golden gas bridge»...
- Financing energy: 1.5% GDP globally, 6% GDP - Russia
- Energy Subsidies – problem of definition and use
- Credit Crunch, «cheap money» and infrastructure investments to catch up with long-term objectives
- No simultaneous solution to all problems without better global cooperation and common priorities

Problems



Current situation

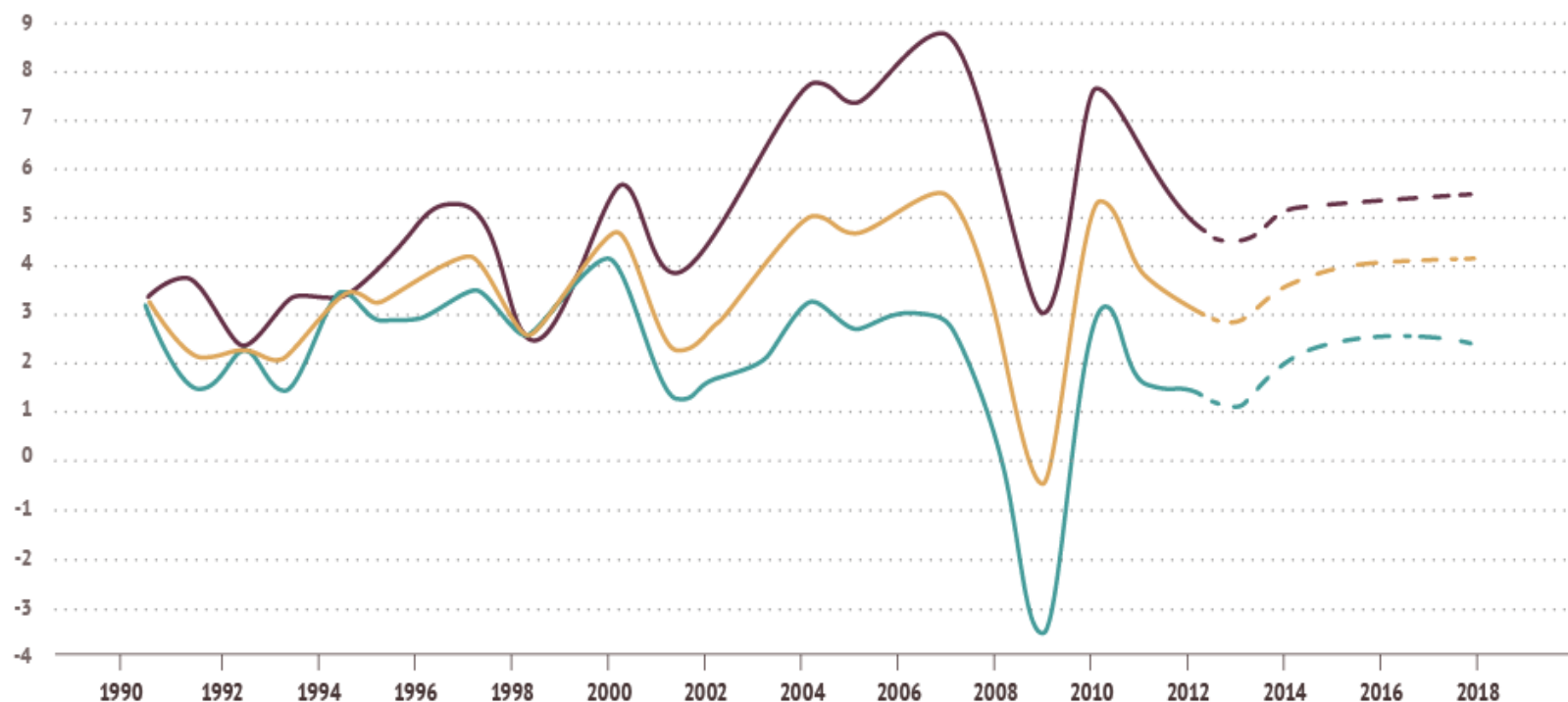
Forecasts

GDP growth

1990–2012 and IMF forecast for 2013–2018, by country groups

% change y/y

Source: IMF



World

Advanced economies

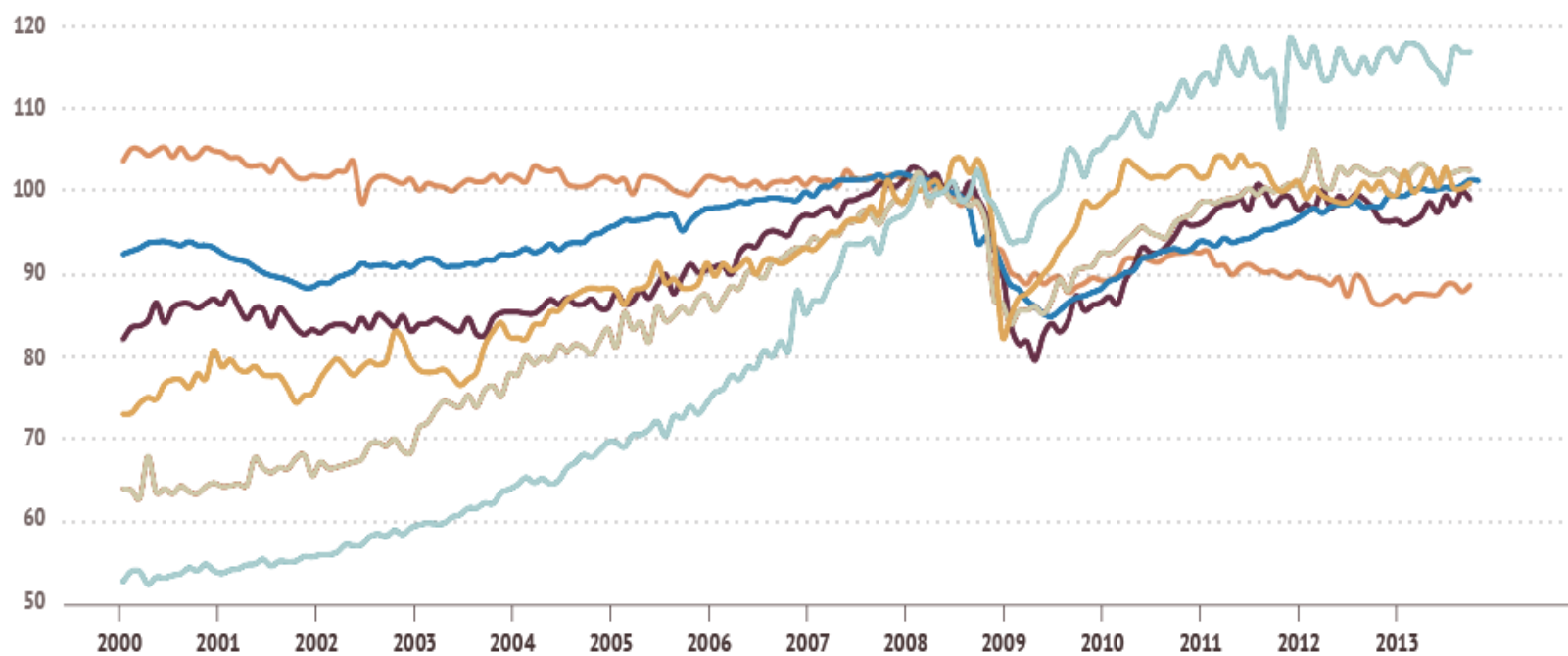
Emerging and developing economies

Industrial production

2000-2013, by country

May 2008=100

Source: World Bank



United Kingdom

Germany

Russia

United States

Brazil

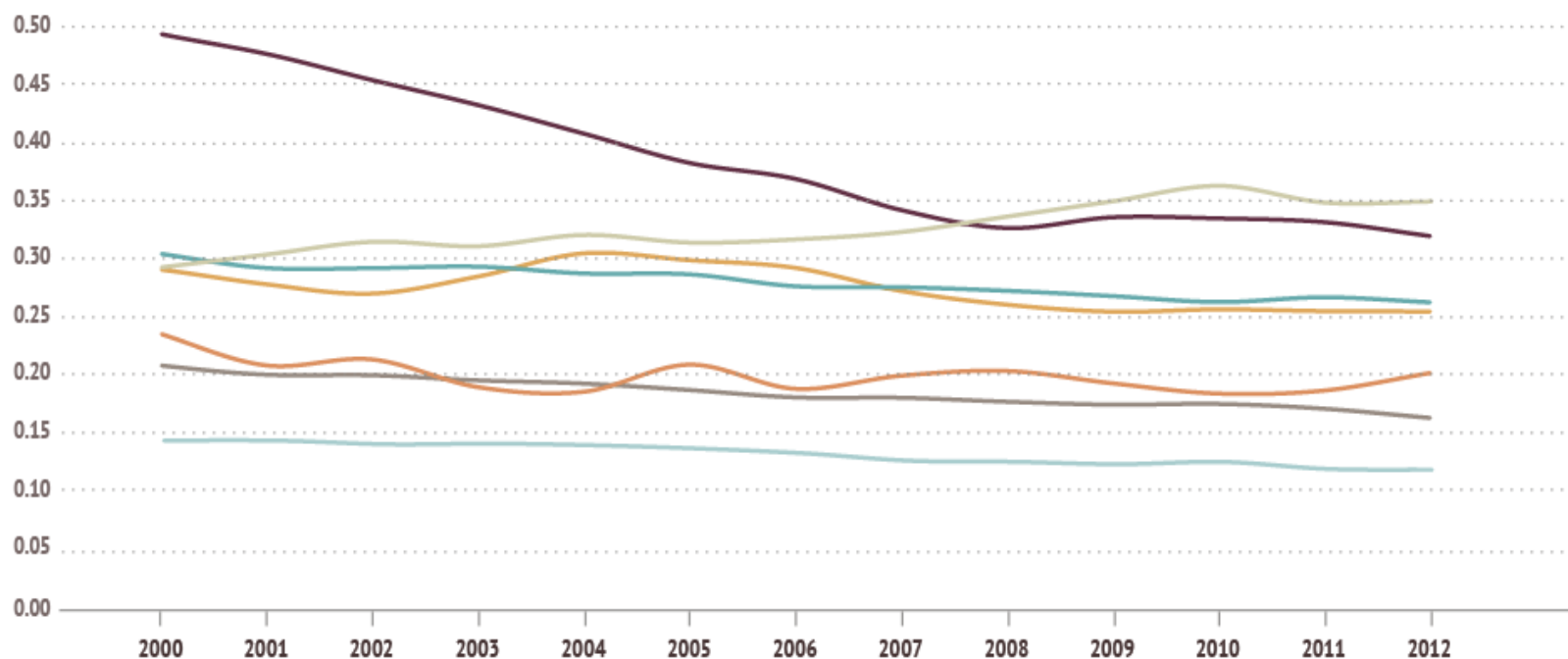
India

Energy intensity of GDP

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

toe/thousand 2005 USD (PPP-based)

Source: World Bank, BP



GDP and primary energy consumption

average annual growth rate, 1986–2012, %

Source: BP, World Bank, IMF, OECD

* Russian economic growth since 1990

	GDP (PPP)				Primary energy consumption			
	1986–2002	2003–2008	2009	2010–2012	1986–2002	2003–2008	2009	2010–2012
World	3,1	4,3	-0,8	4,0	1,7	3,0	-1,1	3,3
OECD	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
Non-OECD	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>								
World					0,56	0,69	1,35	0,83
OECD					0,55	0,28	1,26	0,27
Non-OECD					0,55	0,77	0,77	0,90

Oil and gas consumption

average annual growth rate, 1986–2012, %

Source: BP, World Bank, IMF, OECD

	Oil consumption				Natural gas consumption			
	1986–2002	2003–2008	2009	2010–2012	1986–2002	2003–2008	2009	2010–2012
World	1,7	1,5	-1,1	1,8	2,5	3,0	-2,2	4,0
OECD	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
Non-OECD	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>								
World	0,54	0,36	1,37	0,45	0,82	0,70	2,68	1,01
OECD	0,53	-0,04	1,12	-0,16	0,92	0,67	0,75	1,36
Non-OECD	0,55	0,53	0,86	0,66	0,69	0,62	-0,52	0,82

Coal consumption & electricity generation

average annual growth rate, 1986–2012, %

Source: BP, World Bank, IMF, OECD

	Coal consumption				Electricity generation			
	1986–2002	2003–2008	2009	2010–2012	1986–2002	2003–2008	2009	2010–2012
World	0,9	5,1	-0,5	4,8	2,9	3,8	-0,8	3,8
OECD	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
Non-OECD	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>								
World	0,29	1,20	0,65	1,21	0,94	0,90	0,94	0,95
OECD	0,09	0,29	2,76	-0,04	0,88	0,67	1,09	0,51
Non-OECD	0,43	1,14	1,60	1,10	1,02	0,95	0,97	1,04

Post Recession growth

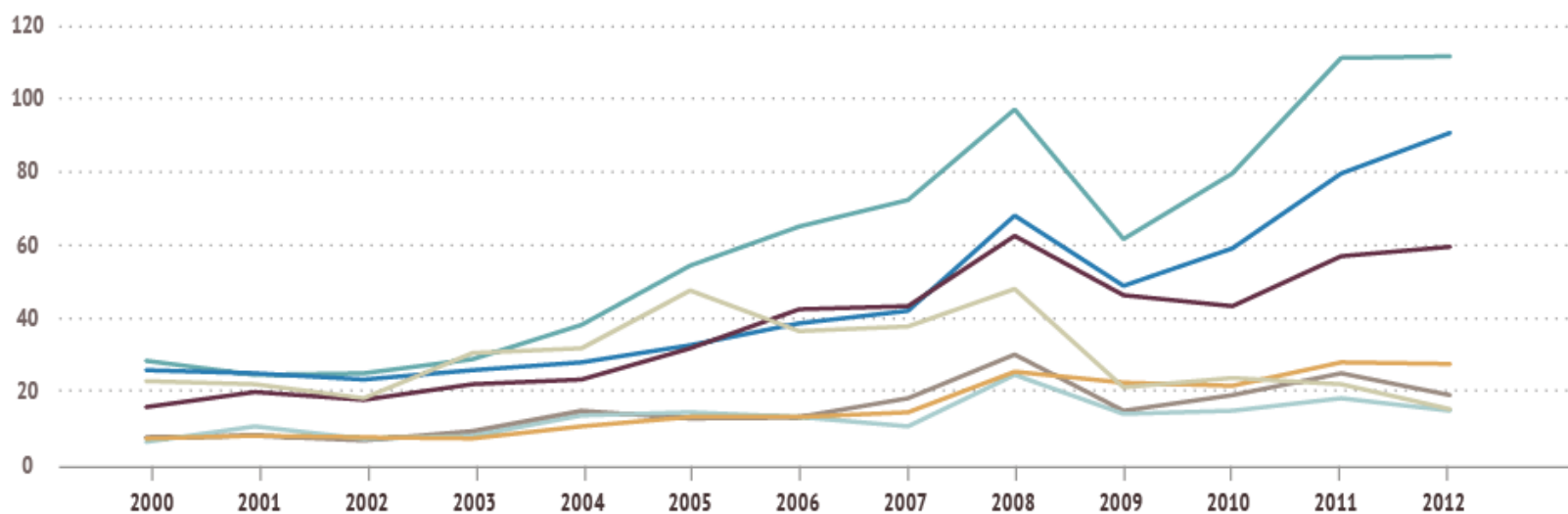
- Elasticity is high as before Recession
- OECD with flat oil consumption
- Surge in coal consumption
- Surge in gas consumption
- EU is importing coal, CO2 reduction is stepping aside in the face of depression and American competition

Global energy prices

2000-2012, \$ per boe

USD / boe

Source: BP



● Coal, Northwest Europe

● Coal, Japan steam coal import cif

● Gas, LNG Japan cif

● Gas, US Henry Hub

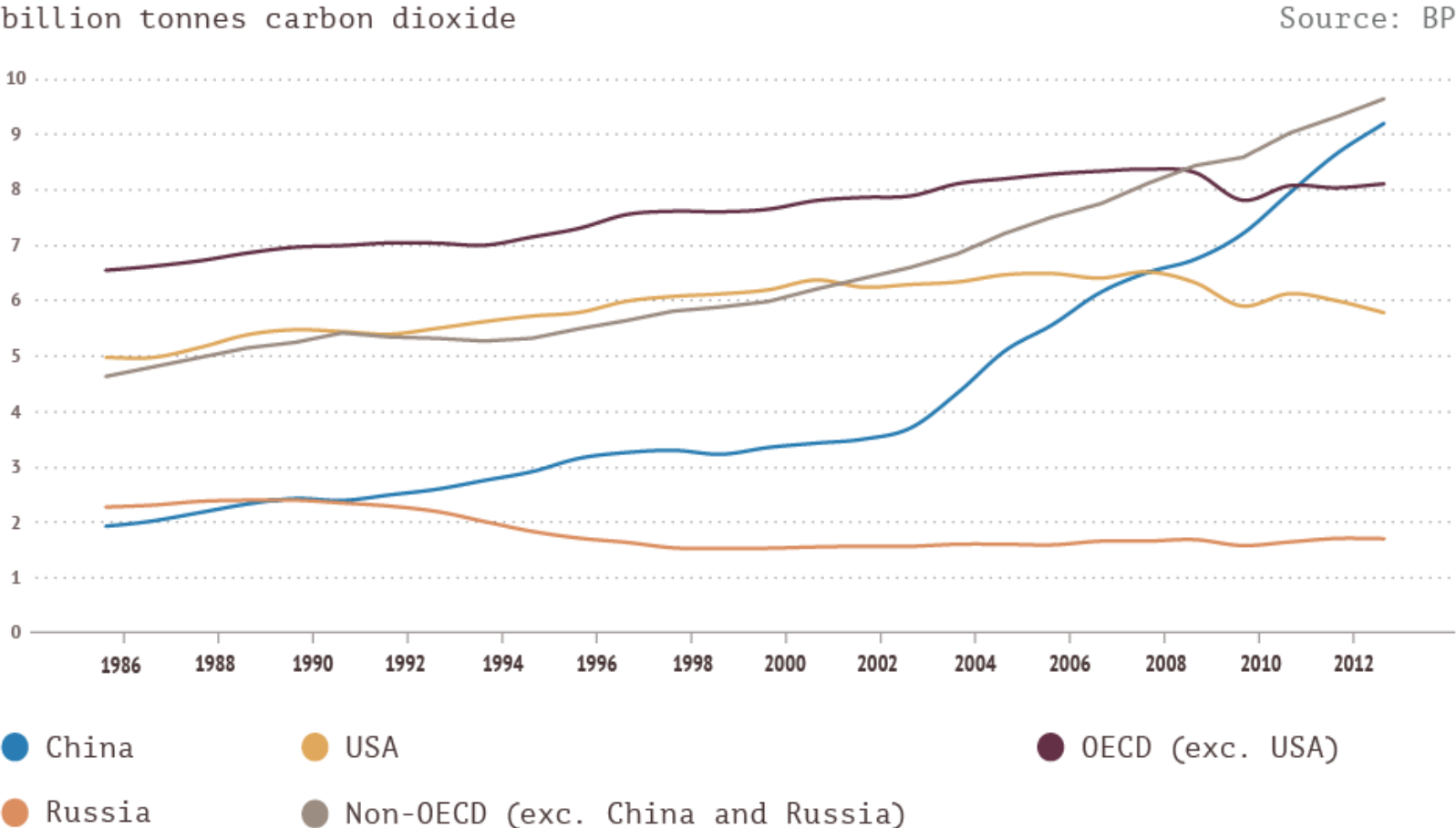
● Coal, US Central Appalachian spot

● Oil, Brent

● Gas, EU average cif

Global CO2 emission

1990-2012, by country/region

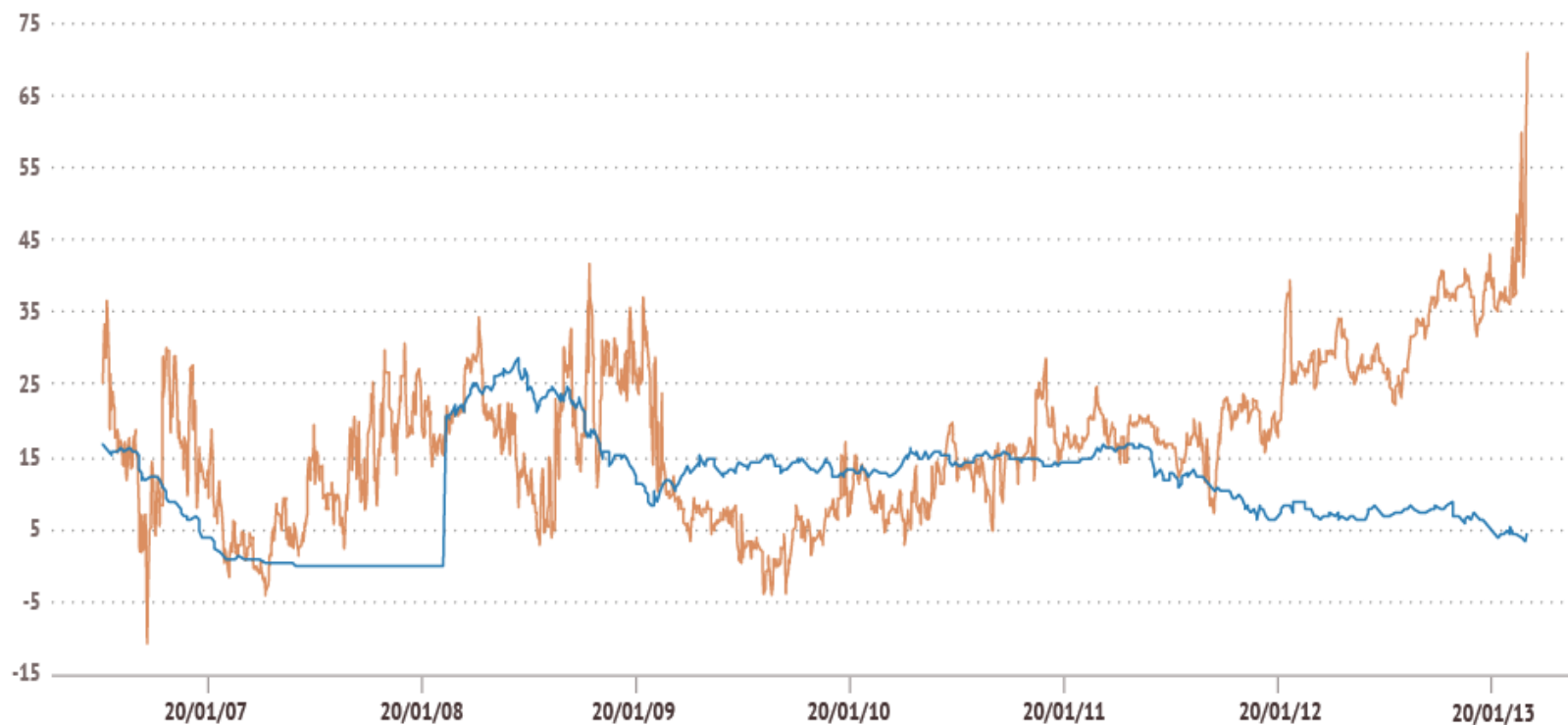


European carbon price (EUA) and price of gas/coal switching for power stations

2006-2013

€/tCO₂

Source: Thomson Reuters, AC estimates

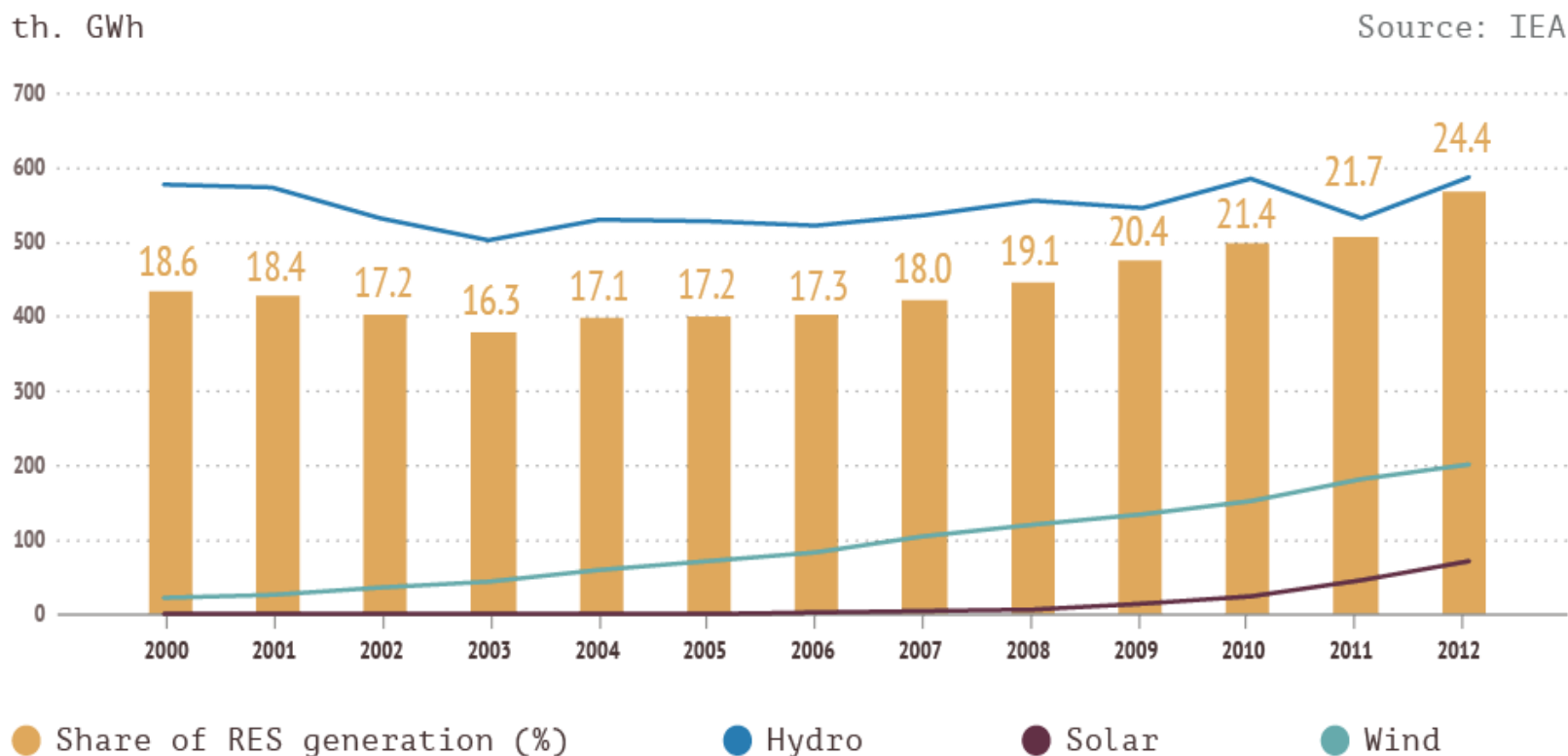


● Price of gas/coal switching

● EUA Spot

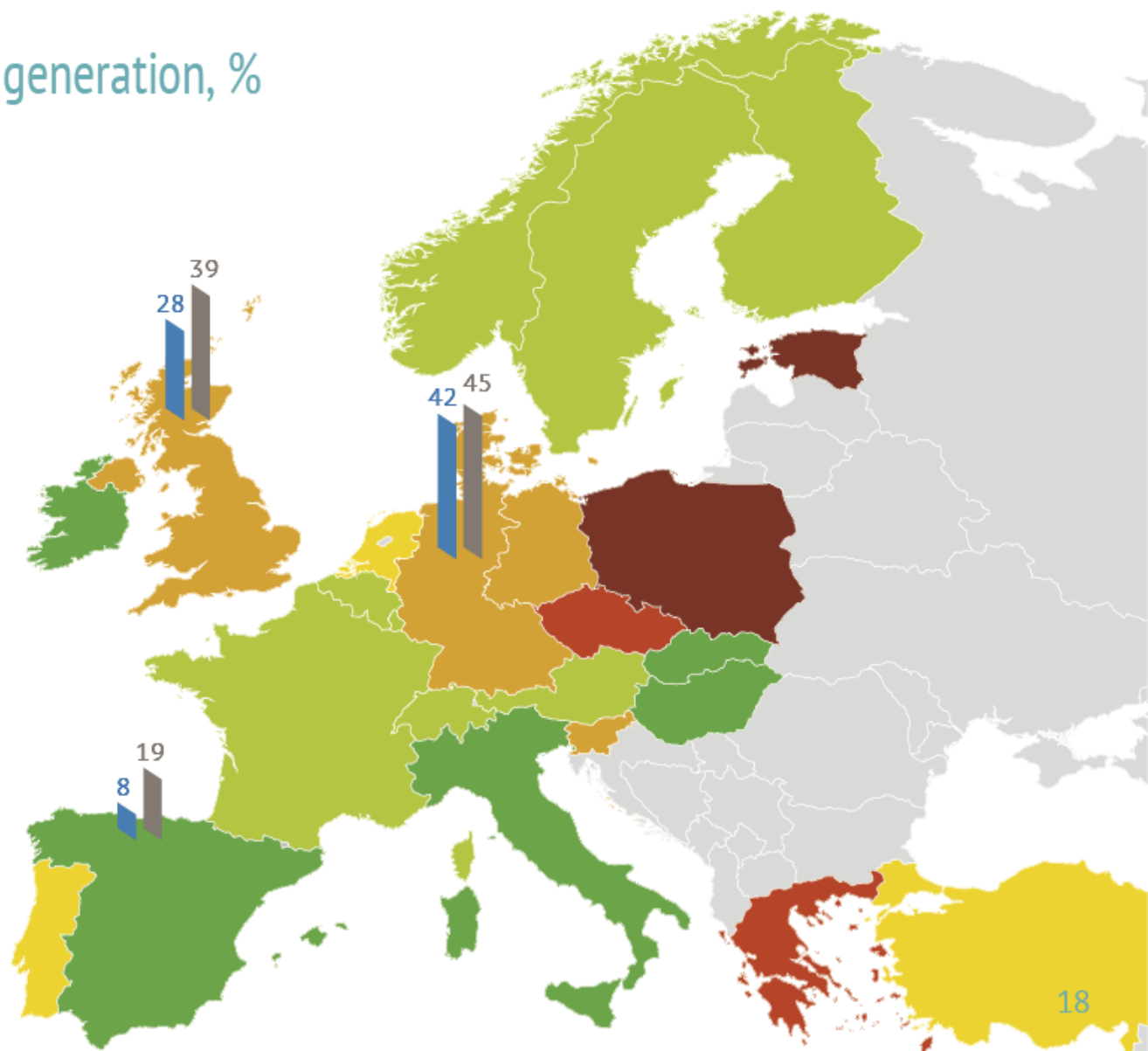
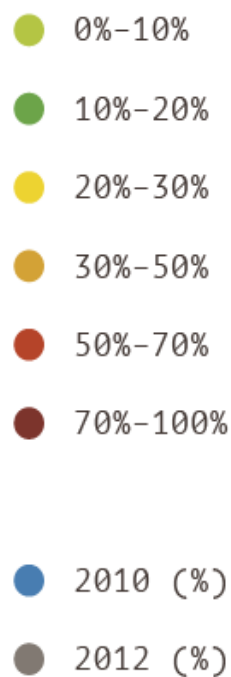
RES-based (incl. hydro) electricity generation in Europe (OECD)

by source, th. GWh, and share of RES in total generation, %



Coal-based electricity generation in Europe (OECD)

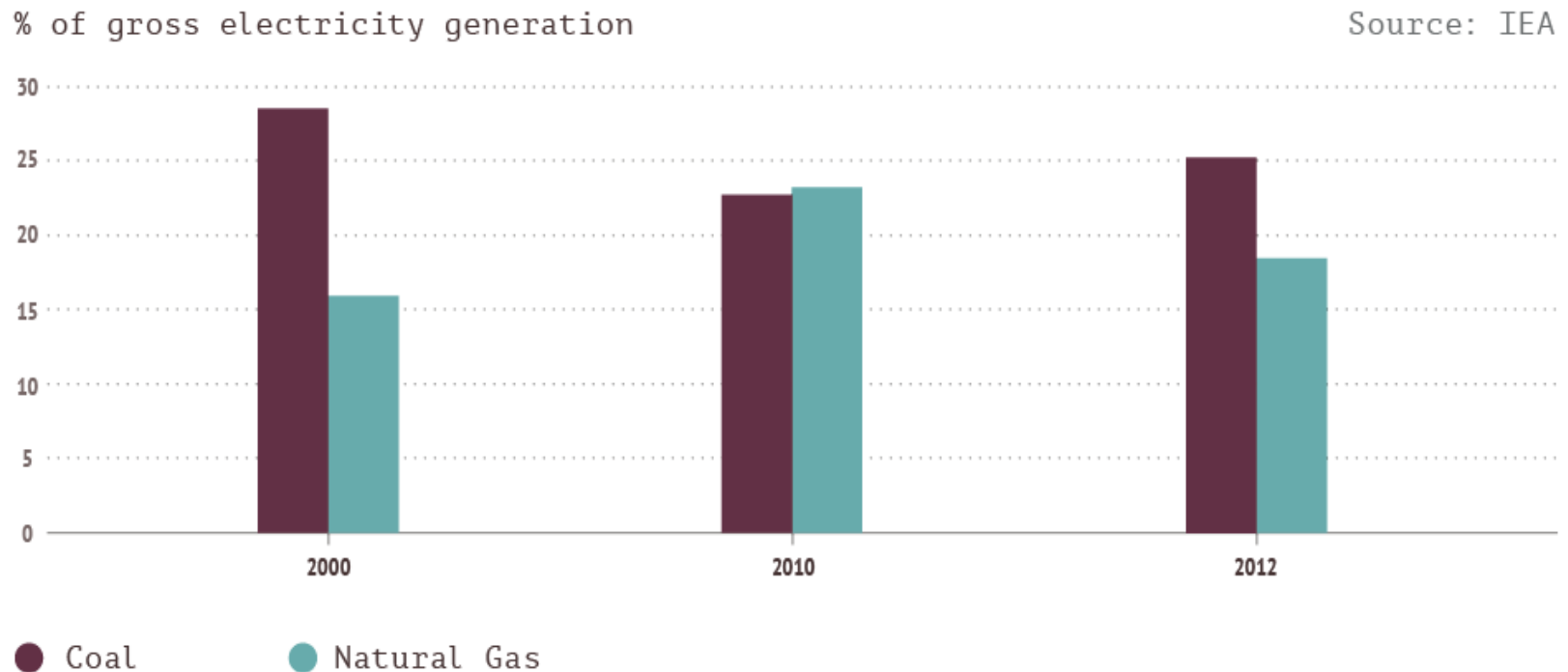
2012, share of gross generation, %



Source: IEA

Shares of coal and gas in electricity generation in Europe (OECD)

2000, 2010, 2012, % of gross generation



Problems

Current situation



Forecasts

Global and Russian Energy Outlook (non official)

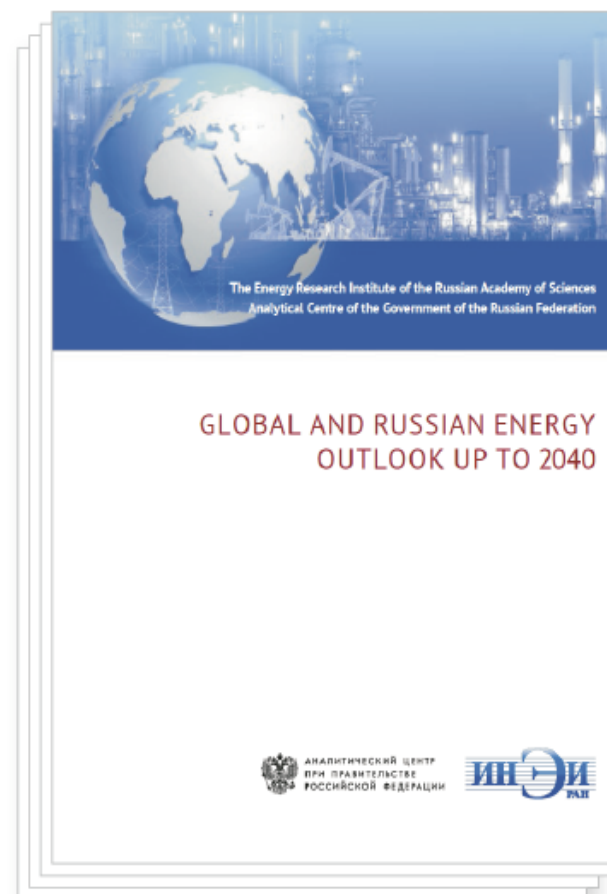
Co-authors:

- The Energy Research Institute of The Russian Academy of Sciences

www.eriras.ru

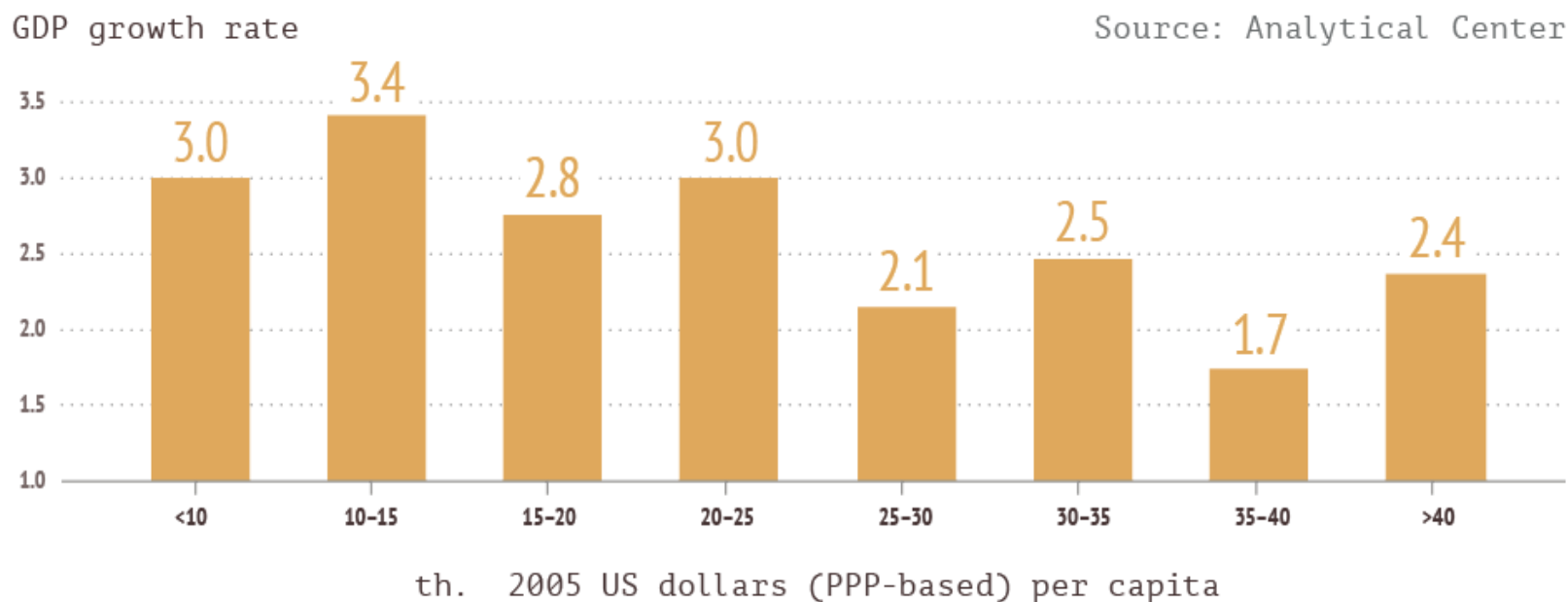
- Analytical Center for the Government of the Russian Federation

www.ac.gov.ru



Average rates of GDP growth and level of per capita GDP

annual average rate, 1980–2012, developed countries only

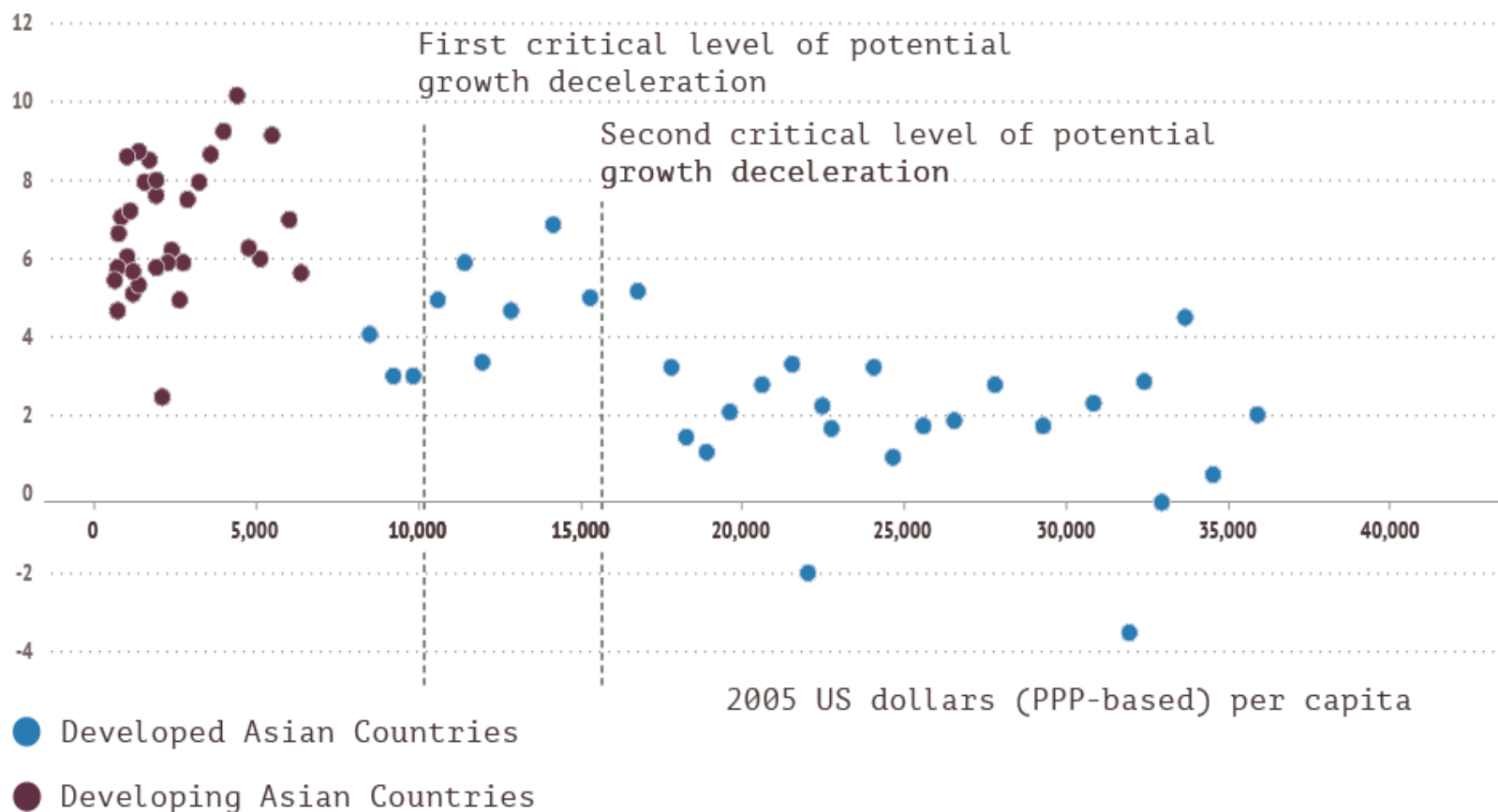


Average rates of GDP growth and level of per capita GDP

annual average rate, 1980–2012, Asian countries only

GDP growth rate

Source: Analytical Center

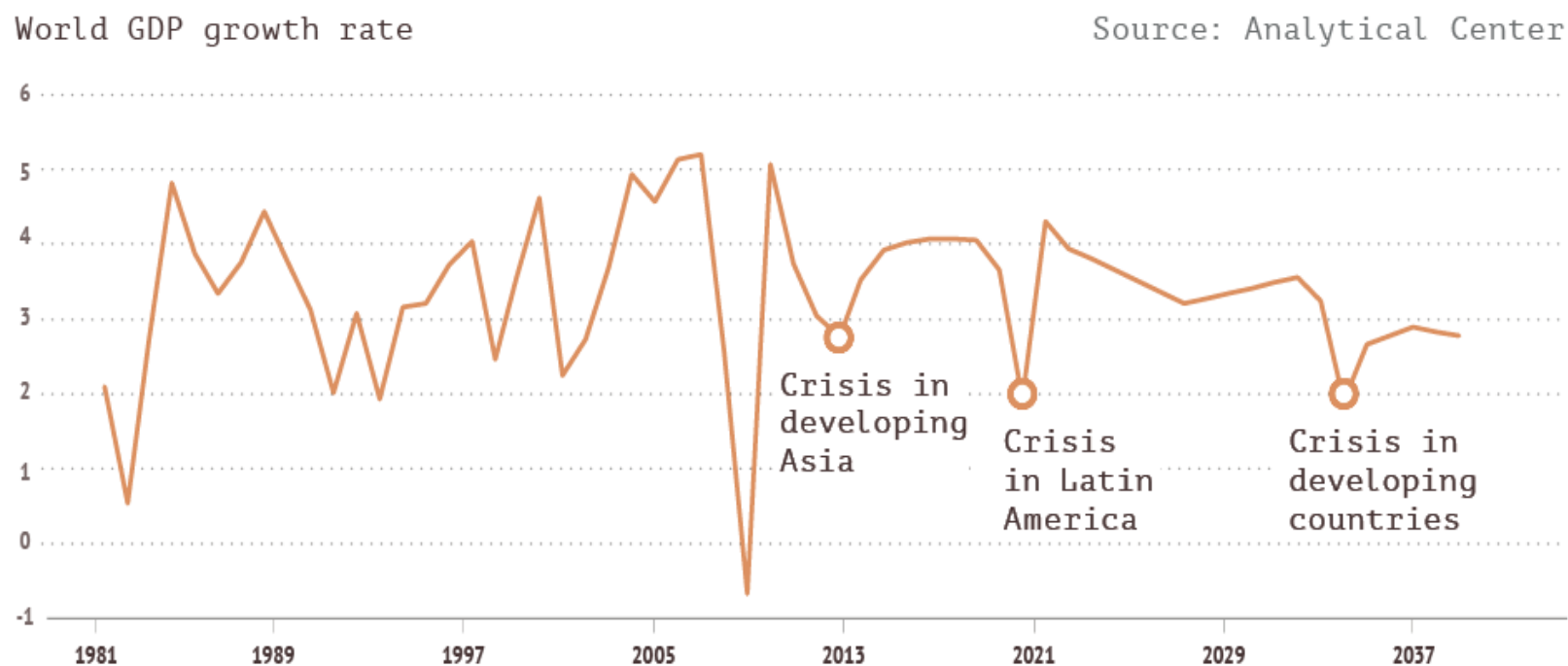


Background of Forecast

- Growth without major depressions or conflicts
- Growth cycles and possible recessions along stages of industrializations
- No perfect theories or regulations (or regulators) to prevent all financial shocks or stoppages
- China will succeed in transformation from 36% share of personal consumption in GDP up...
- USA will be reasonably healthy in spite of its domestic pessimism
- Climate change prevention – in doubt!
- Social issues or conversion of development levels were not in the focus but «in mind»

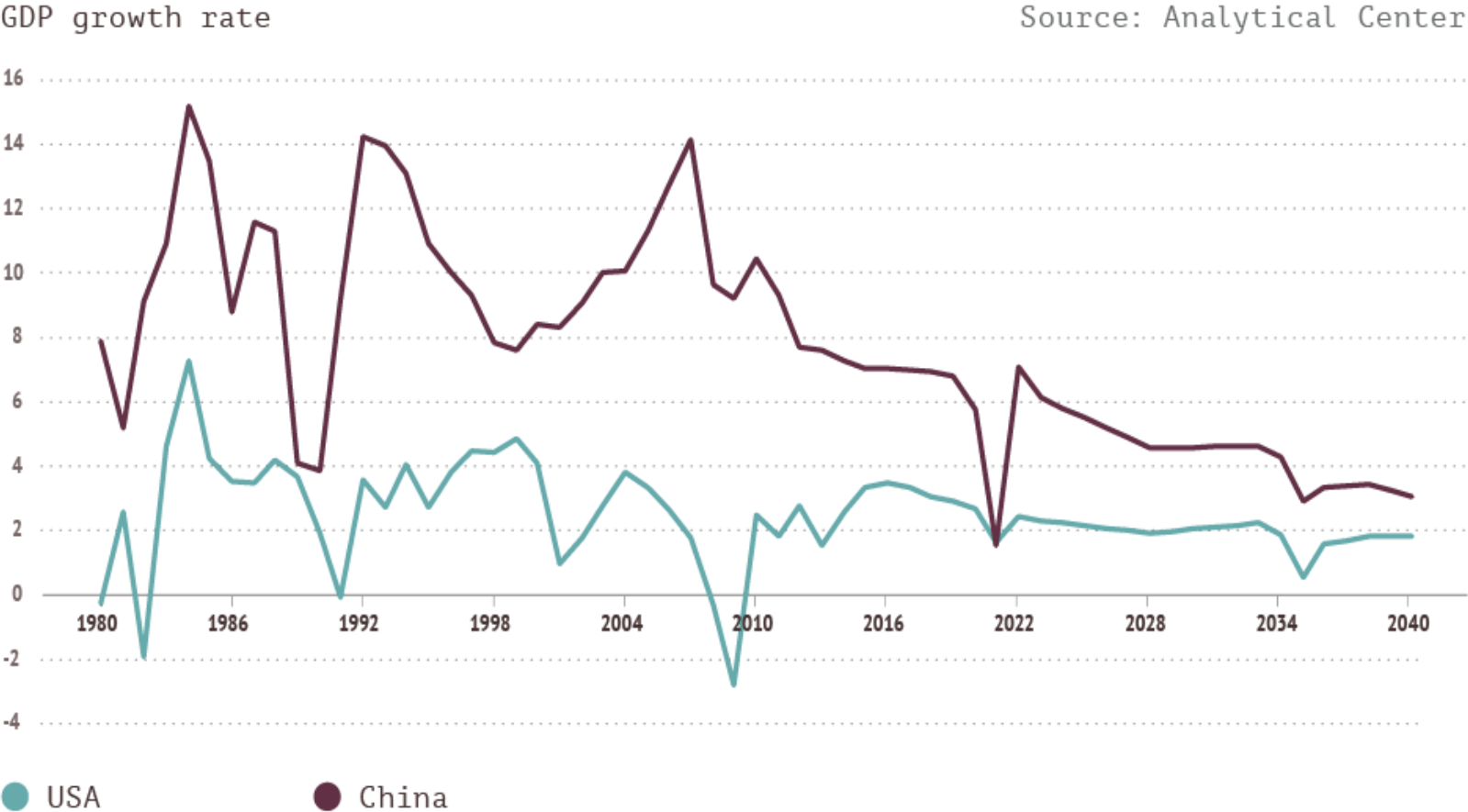
Timeline of possible (not dated!) economic crises

annual rate of global GDP growth, 1981–2012 and forecast for 2013–2040



Growth in USA and China (with imaginable crises)

annual rate of US and China GDP growth, 1980–2012 and forecast for 2013–2040

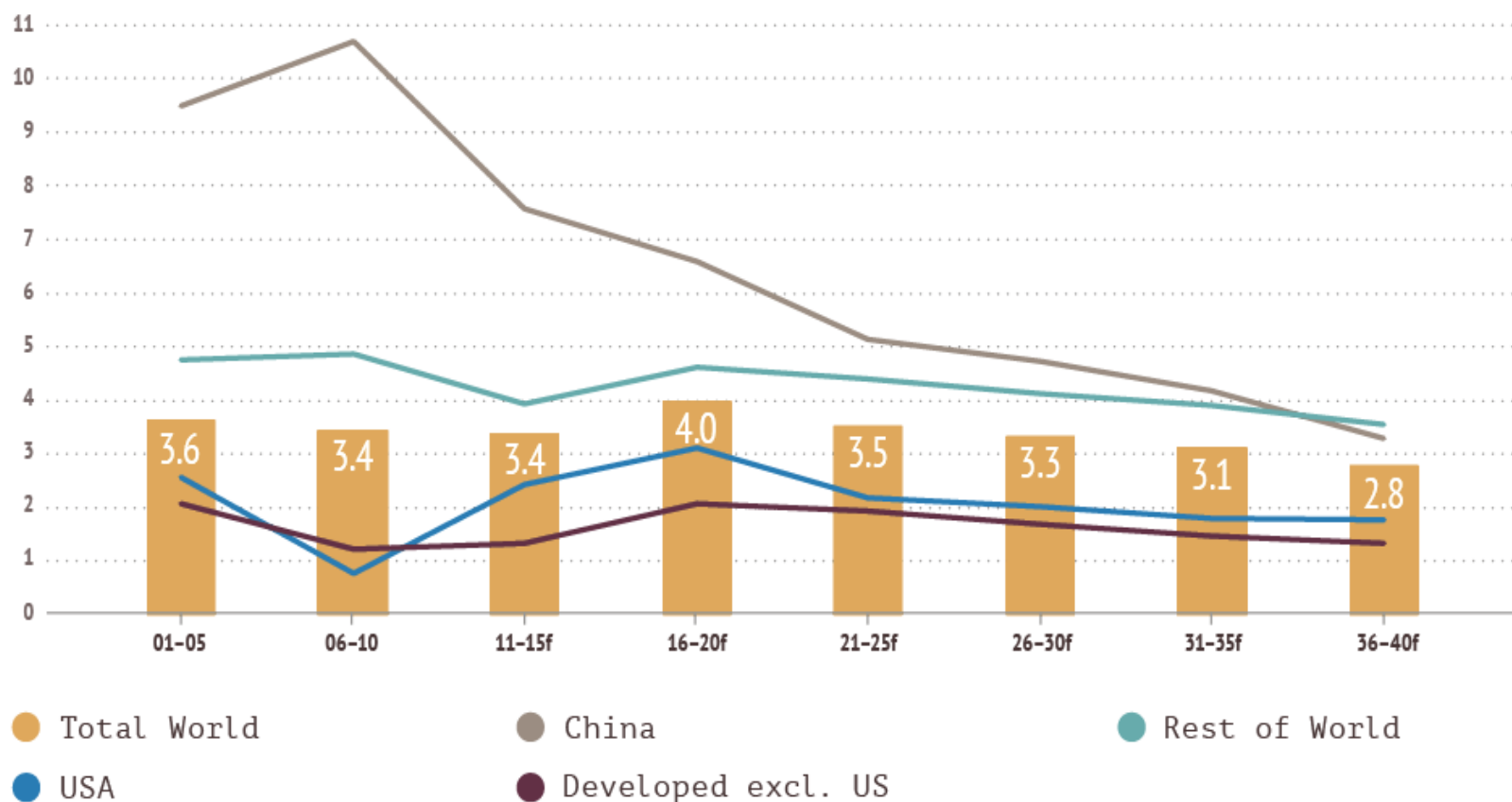


World GDP growth

annual average rate, 2000–2010 and forecast for 2010–2040

GDP growth rate

Source: Analytical Center

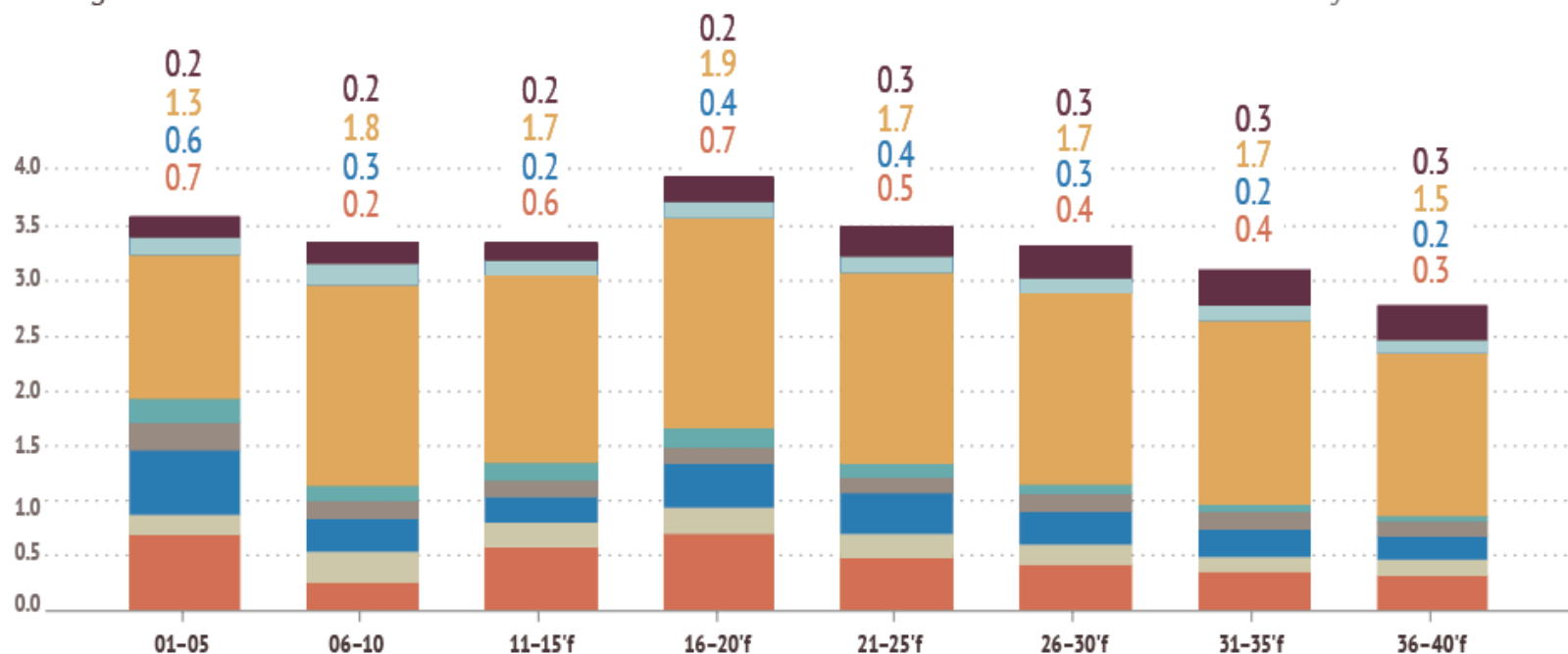


Contributions of regions to global GDP growth

annual average rate, 2000–2010 and forecast for 2010–2040

GDP growth rate

Source: Analytical Center



North America (OECD)

Europe

Developed Asia (OECD Pacific)

Middle East

South and Latin America

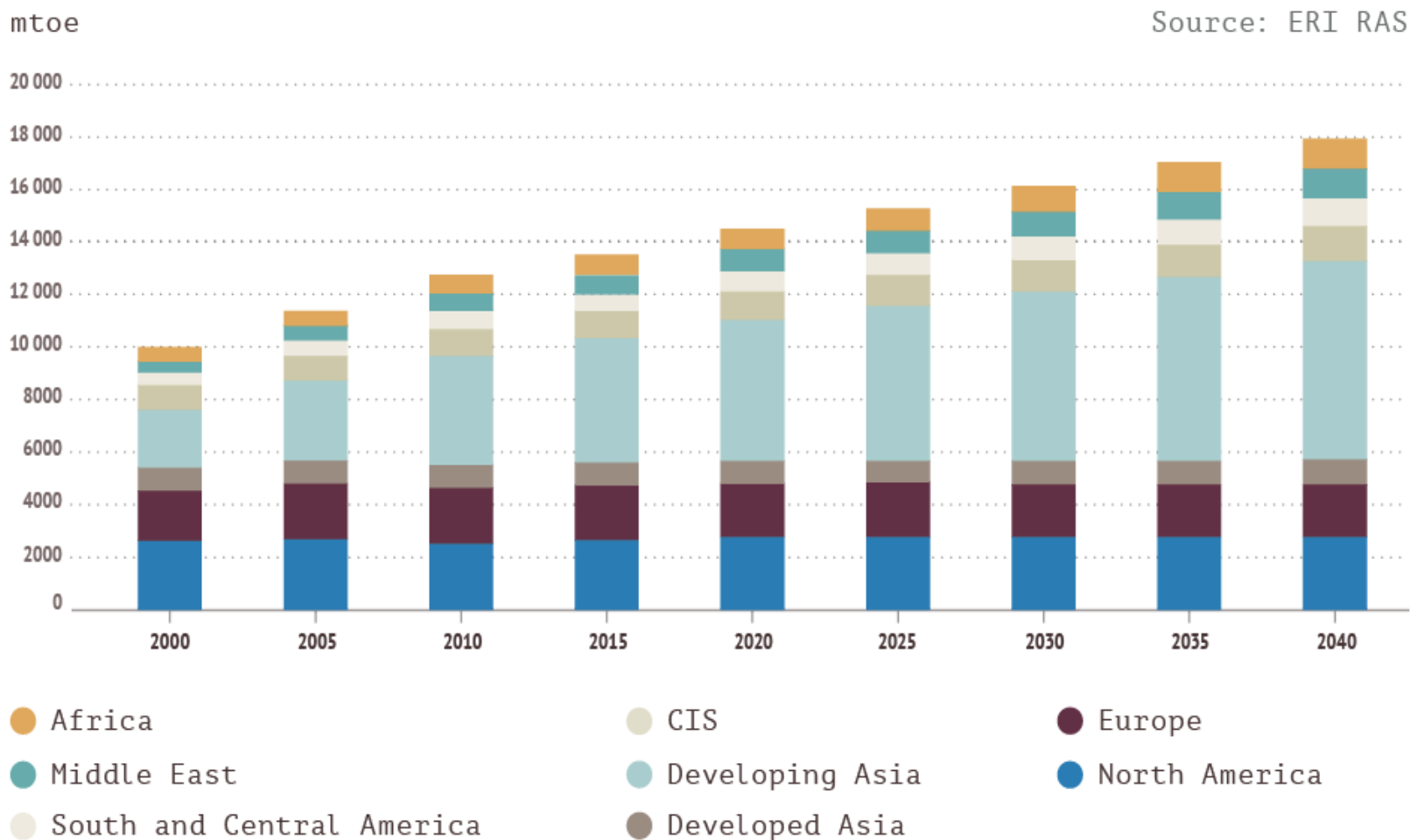
FSU

Developing Asia

Africa

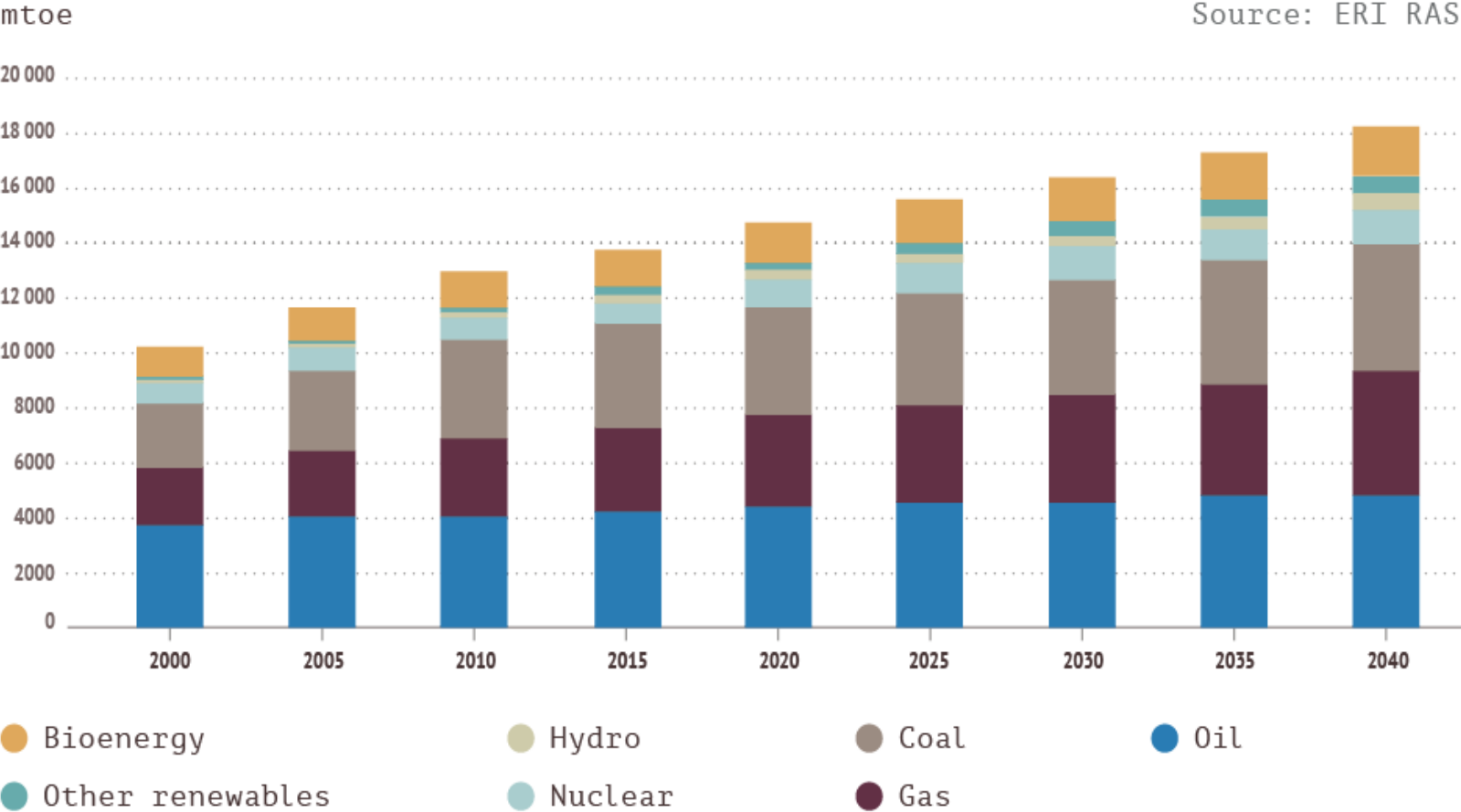
Primary energy consumption forecast

baseline scenario of ERI RAS / AC, by region, mtoe



Primary energy consumption forecast

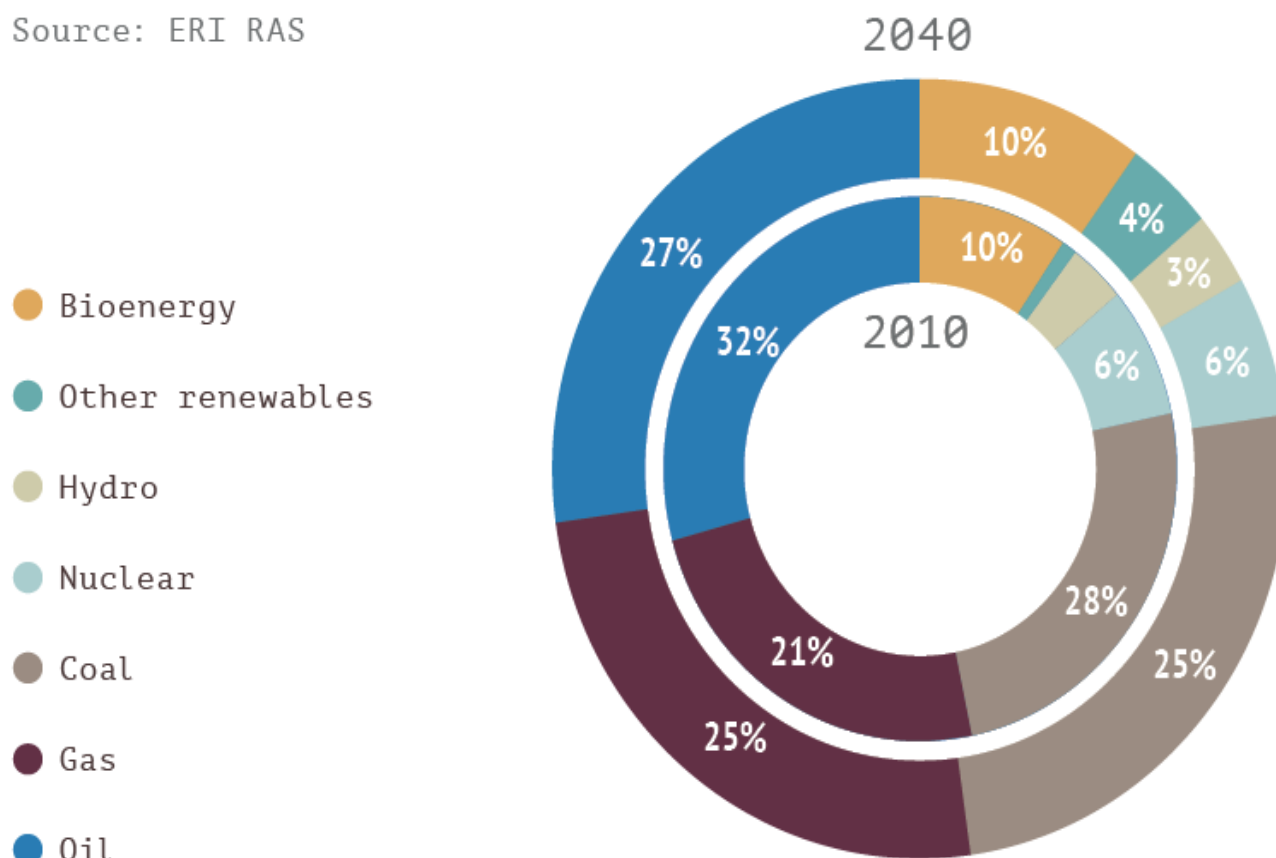
baseline scenario of ERI RAS / AC, by fuel, mtoe



Primary energy consumption forecast

baseline scenario of ERI RAS / AC, by fuel, % of total

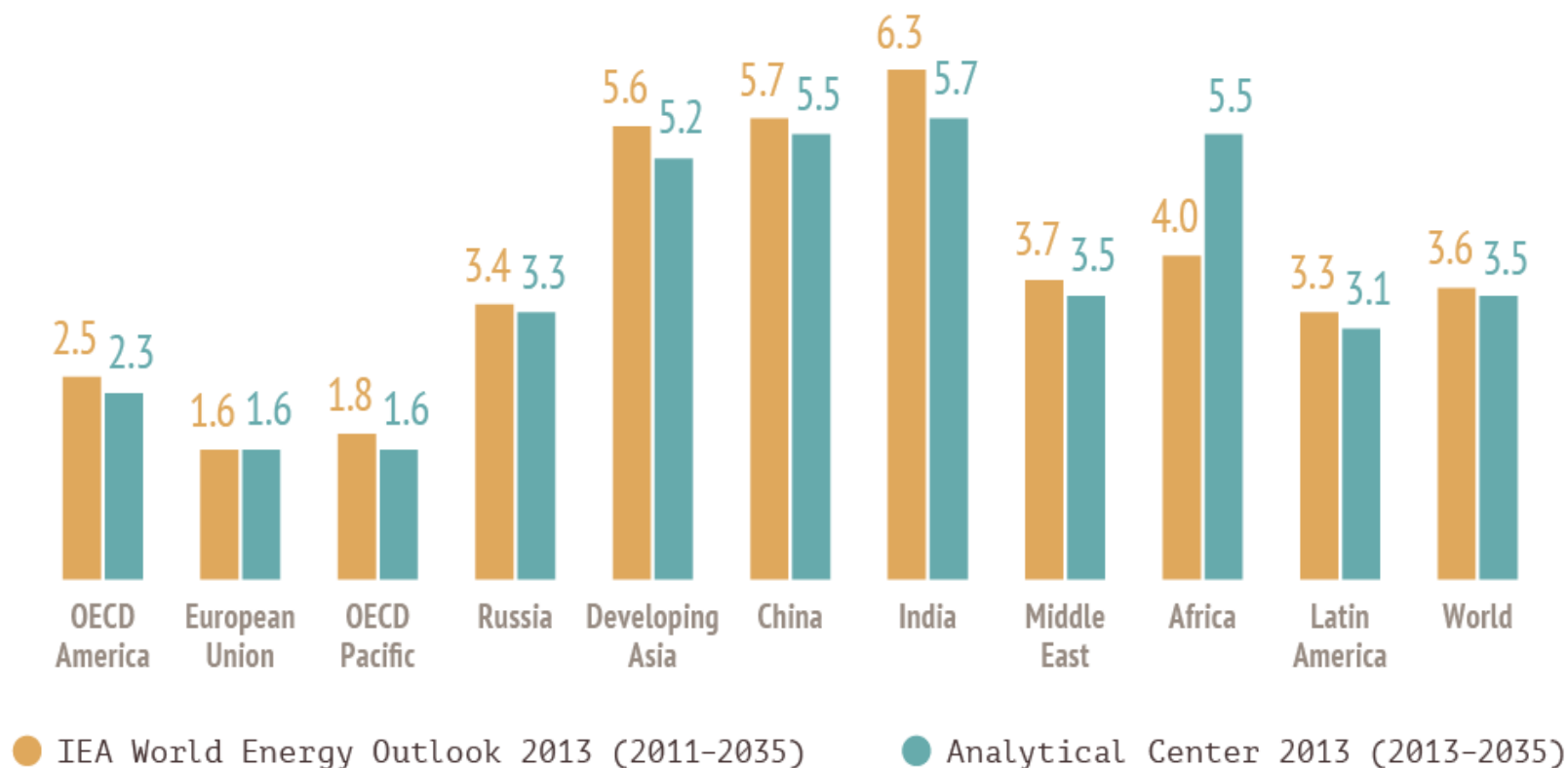
Source: ERI RAS



Comparison of IEA and AC growth forecasts

until 2035, by region, average annual rate, %

Source: Analytical Center,
IEA World Energy Outlook 2013



Problems and realities

- Mankind can not easily solve all the energy related problems
- IEA Outlook – good input for policy makers but not a set of coordinated recipes
- Political rivalries and uncertainties lead to overinvestments in some points and underinvestment in many others
- Financing of energy infrastructure on major scale will be difficult due to uncertainties
- 1,5% of Global GDP upon for decades will not be sufficient for solutions of the full set of Global problems. Global cooperation is required!

Thank you for your attention!