Lights Out?

The Outlook for Energy in Eastern Europe and Central Asia And Implications for Turkey

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Living in The Cold: The 2006 District Heating Disaster in Alchevsk

Former Ukrainian President Victor Yushchenko inspects the remains of a shattered heating system in a school in Alchevsk.

MAJOR FINDINGS

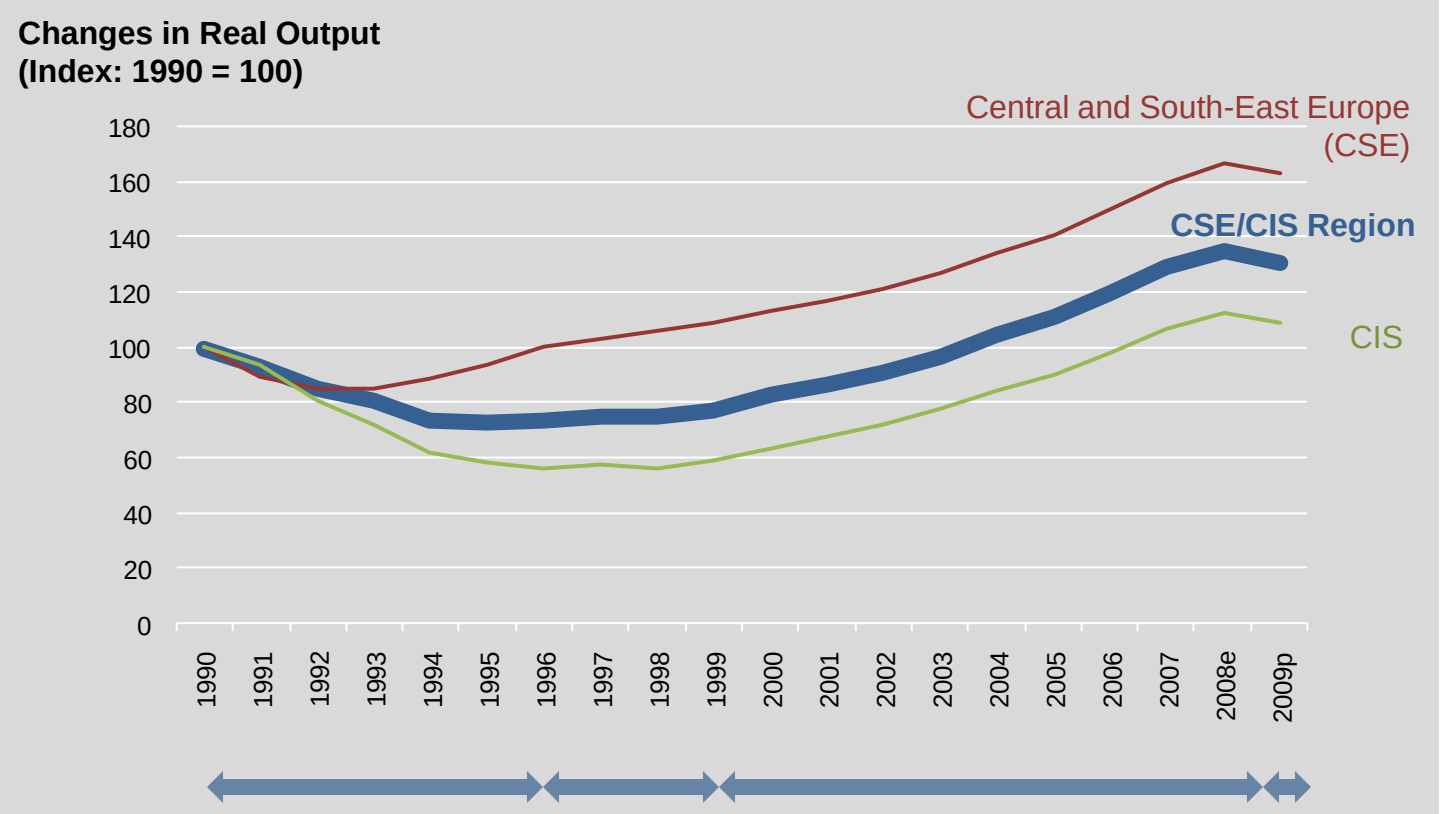
- The countries of Eastern Europe and Central Asia – the ECA region - could face an **energy crunch** within the next five to six years

- The financial crisis has created some **breathing room** and a **window of opportunity** to mitigate the impact of the anticipated crisis

- **Mitigating actions** are required both in the **demand** and **supply** side. Significant investments will be required (3% of cumulative GDP over 2010-2030) and the public sector alone won't be able to provide this level of investments

- Countries need to **take actions now** to create a **climate** that is **attractive** for investments in the sector

The Region's Transition and The Current Economic Crisis



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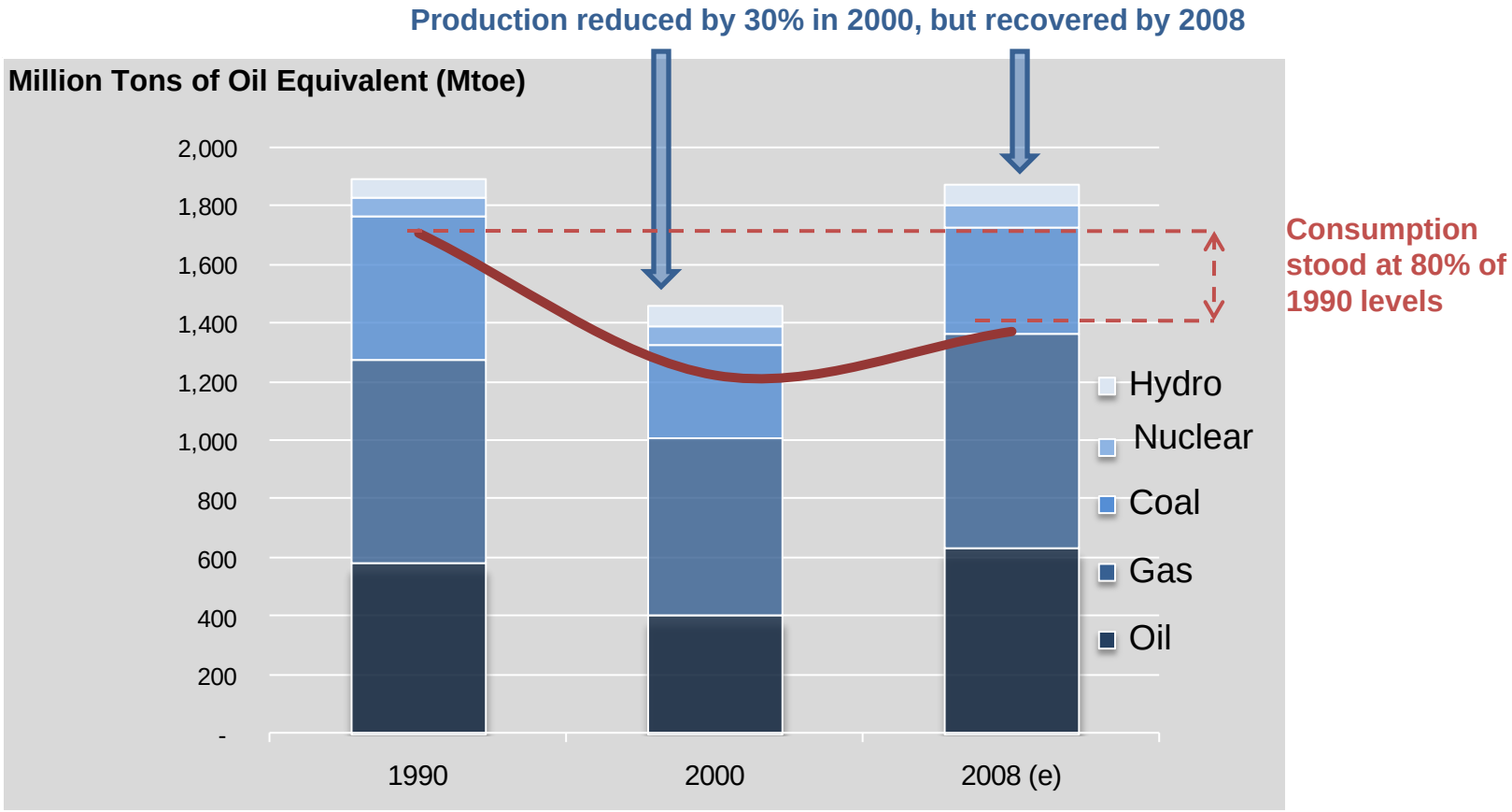
Amply Endowed with Energy Resources and Oversized Infrastructure, the CIS/ CSE Region is a Key Primary Energy Exporter



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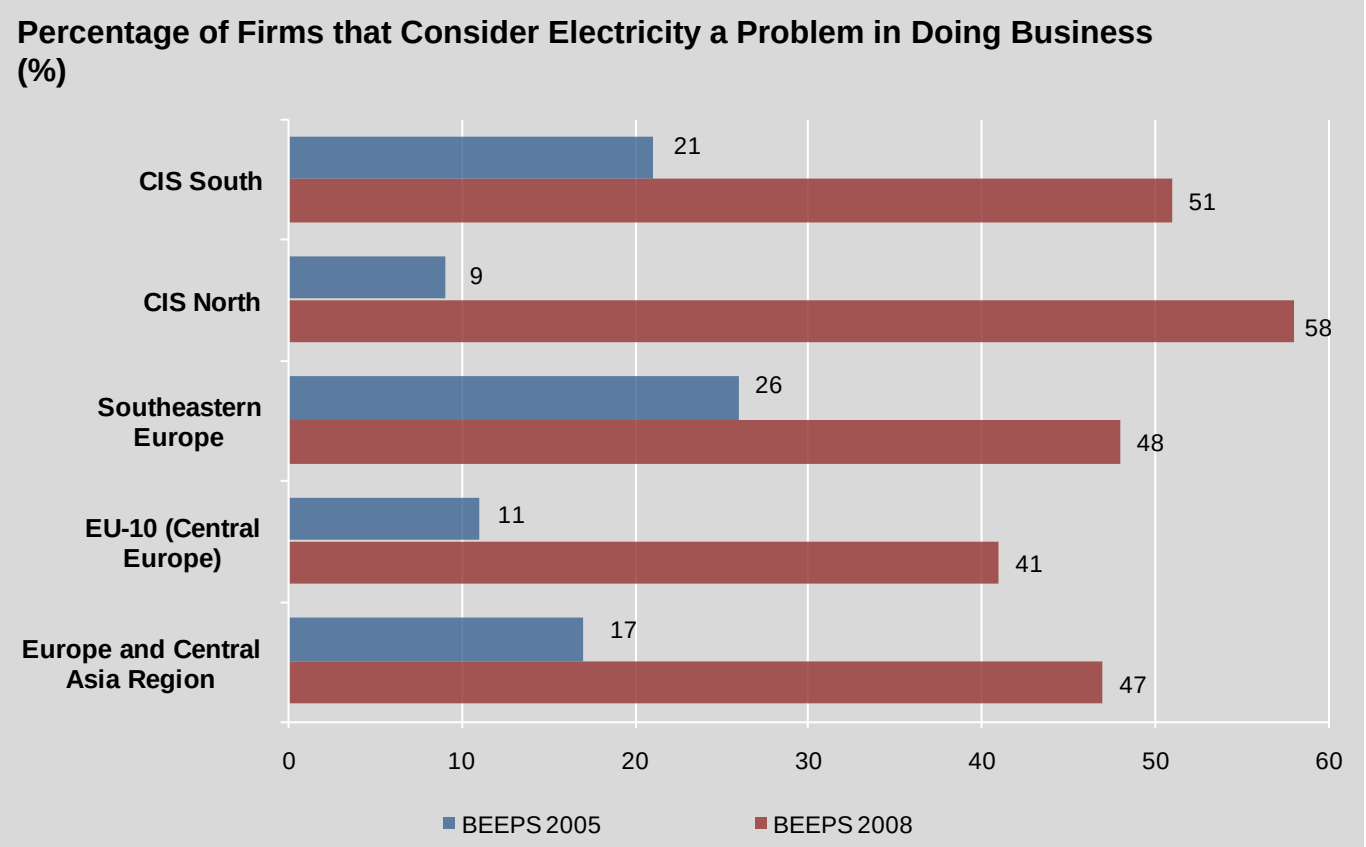
By 2008 Energy Supply Became a Constraint to Growth



Increase: 2005-2008 (%)

+30

+49

+22

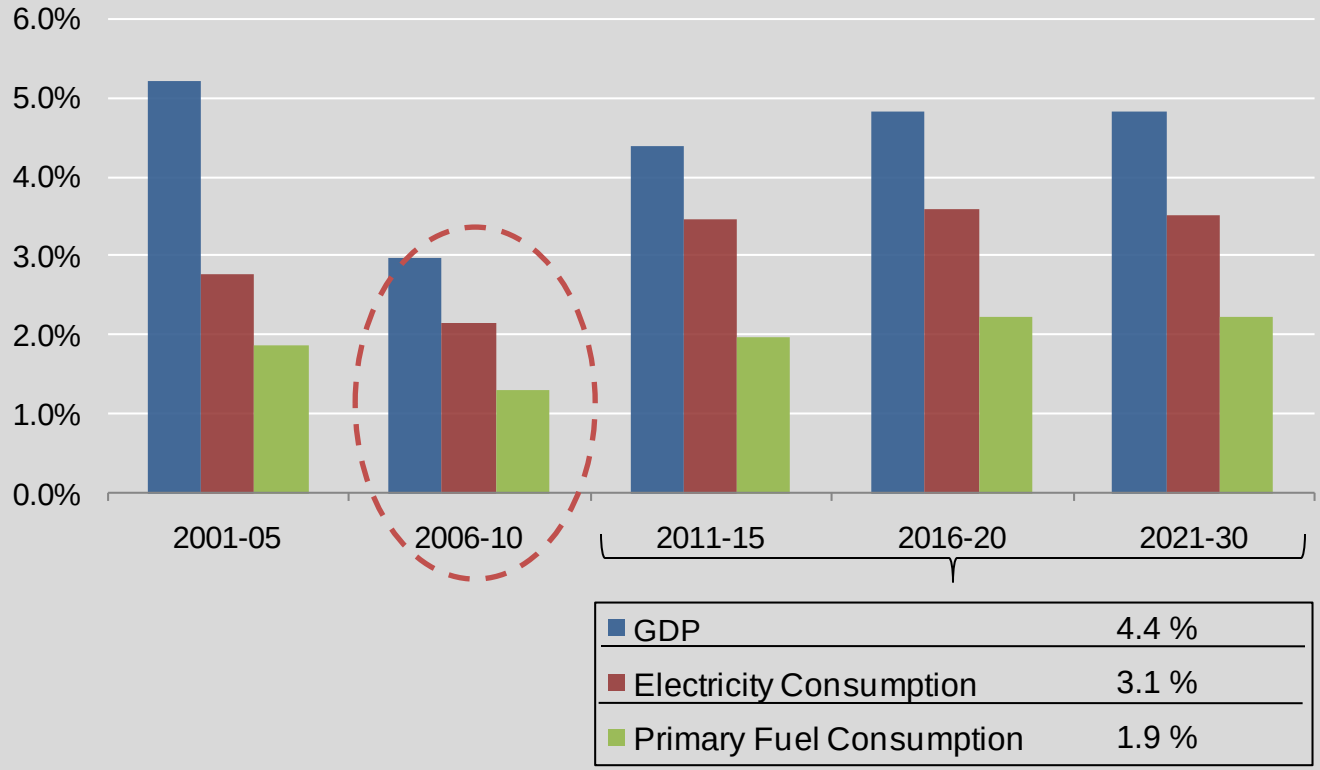
+30

+30

Source: World Bank and 2005 and 2008

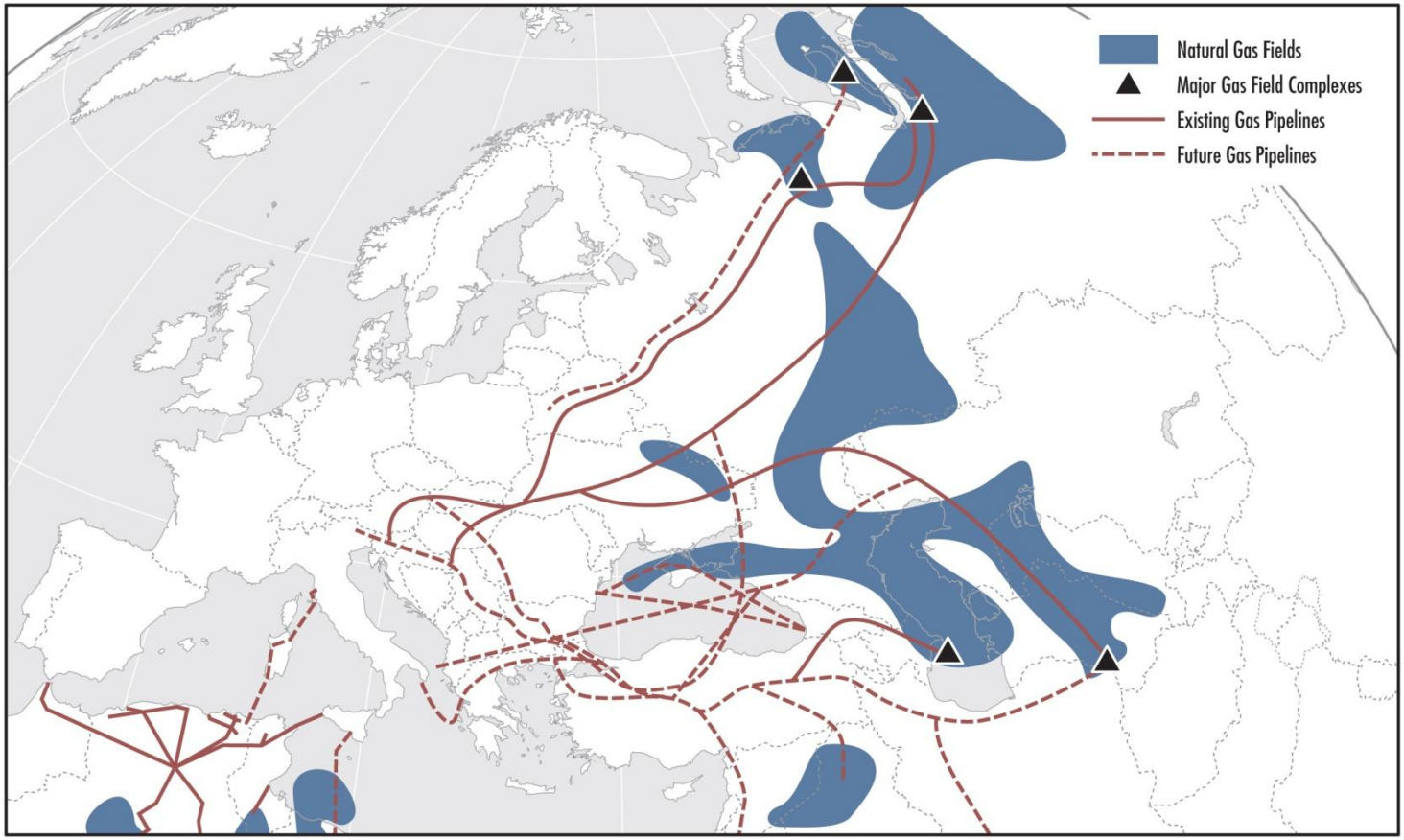
The Economic Crisis Eased Some of These Concerns, But Respite is Only Temporary

Average Annual GDP, Electricity Consumption, and Primary Fuel Consumption Growth Rate in the CIS/CSE Region, 2005–30
(%)

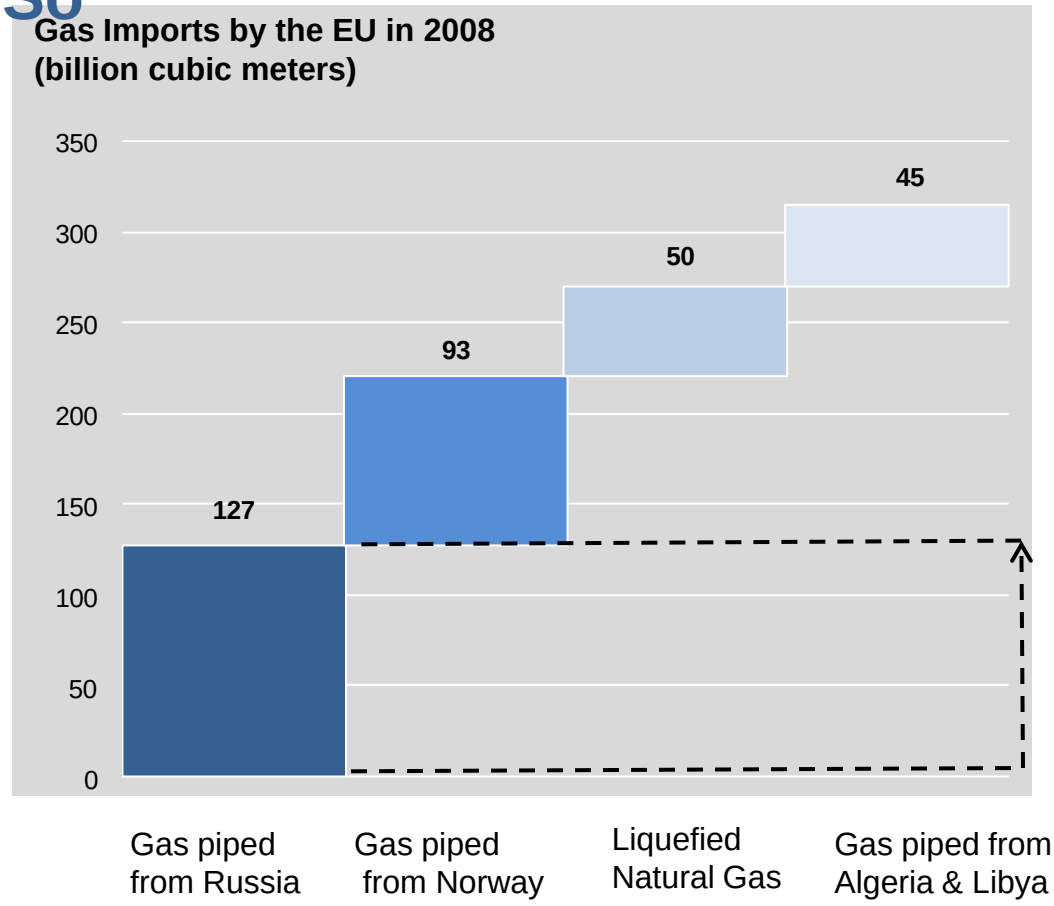


Source: World Bank staff calculations.

Where will These Additional Supplies Come From?



The Russian Federation Plays a Key Role Meeting Natural Gas Needs of the EU and Will Continue To Do So

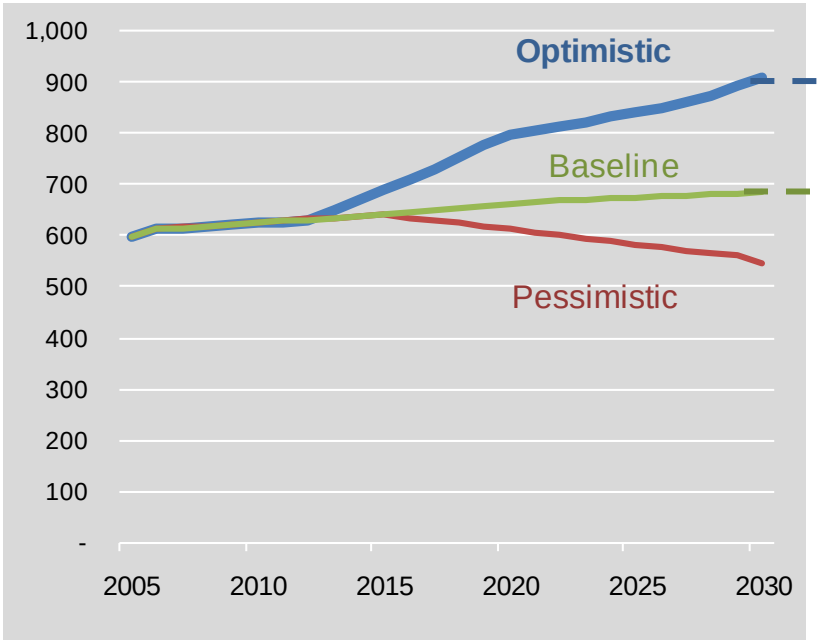


Russia's role in the EU gas sector:

- 40% of import requirements
- 25% of overall demand

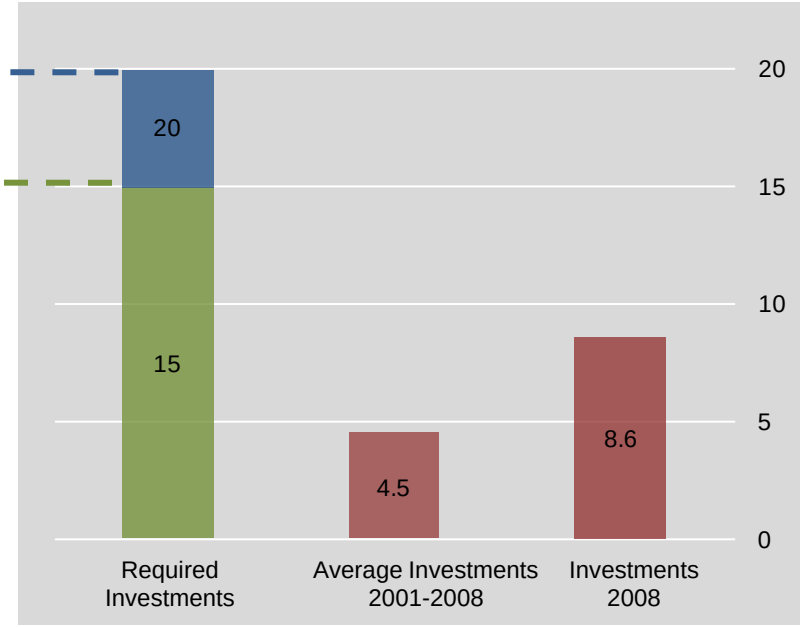
Russia has Significant Potential to Increase its Production But Investments are Still Below the Required Levels

Actual and Projected Scenarios for Natural Gas Production
(billion cubic meters)



Source: World Bank staff calculations.

Required Investments Vs. Historical Investments for Upstream Gas Exploration and Development
(billion USD a year)



Source: World Bank staff calculations and Gazprom's financial statements

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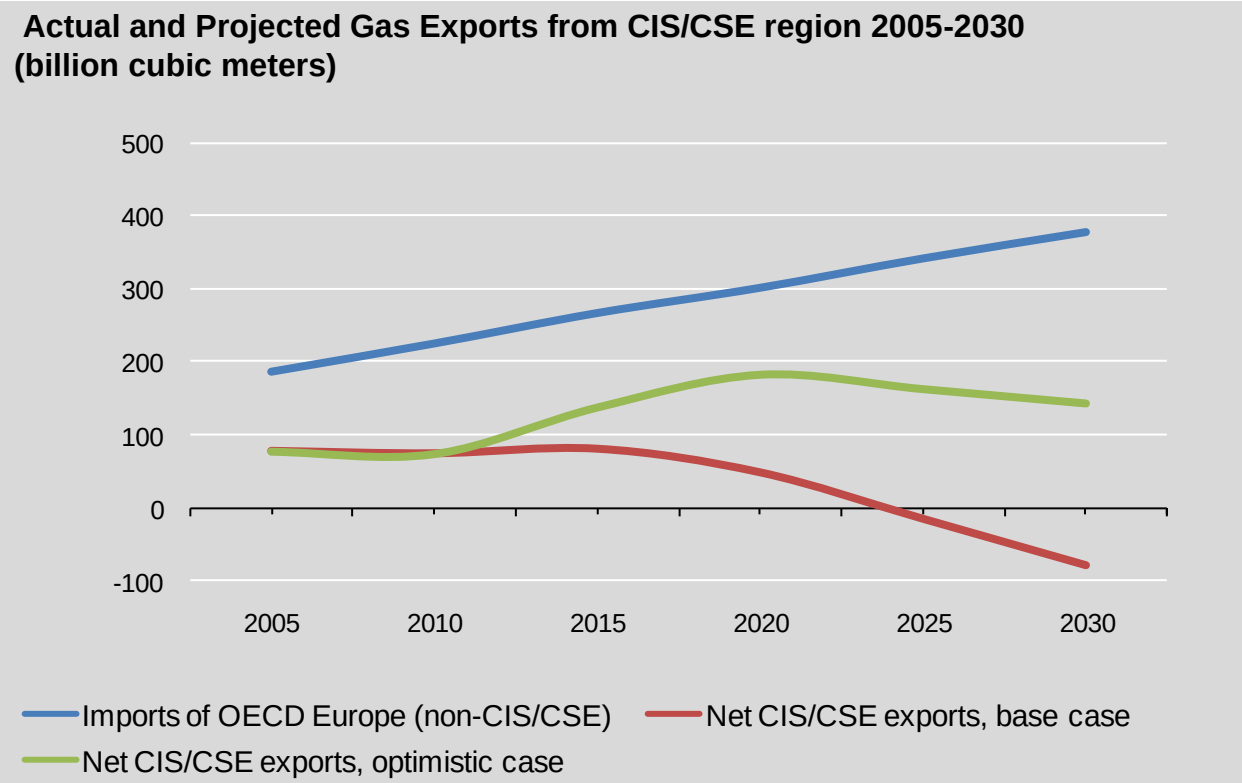
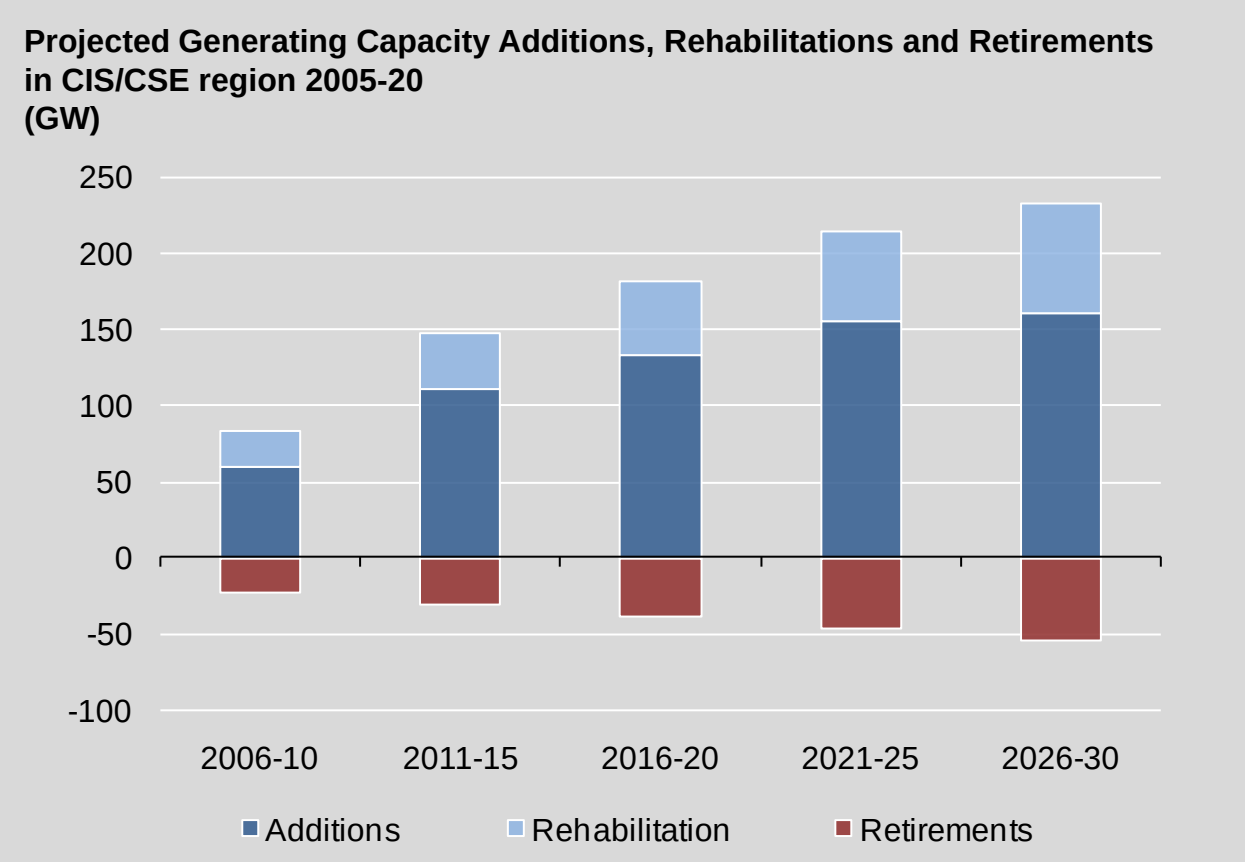
Absent Significant Investments or Actions to Limit Demand Growth…



Source: World Bank staff calculations.

The region could become a net importer of oil and gas

And the Outlook for Electricity Supply is of Even Greater Concern



Source: World Bank staff calculations

The Region will Face Significant Investment Needs Over the Next Two Decades

Projected Energy Sector Investment Needed in the CIS/CSE region by 2030 (USD billion)

Sector	Amount Required
Electricity	1,500
Crude Oil	900
Heating	500
Gas	230
Coal	150
Refining	20
Total	3,300

Source: World Bank staff calculations.

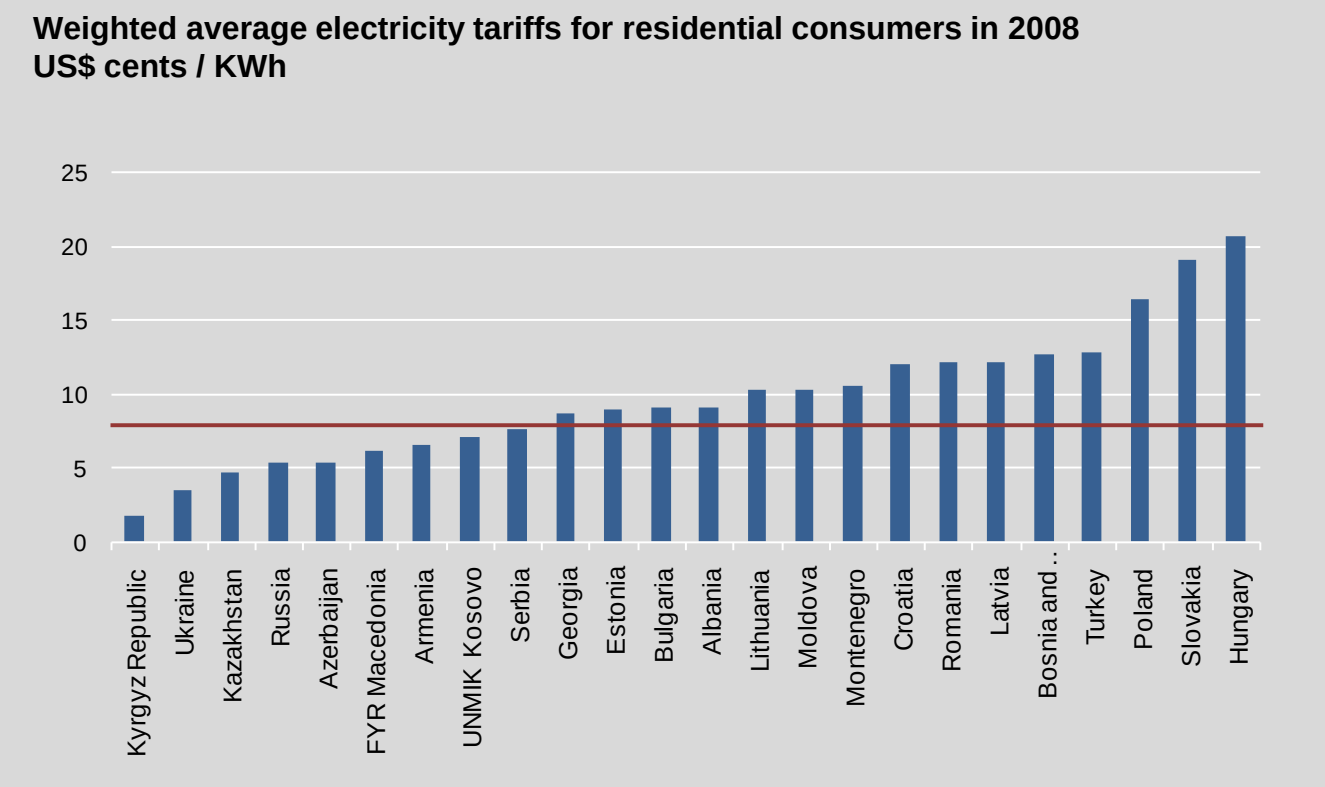
Estimated investments in the Energy Sector amount **3%** of cumulative GDP

Although the **public sector** will need to finance a portion of these investments, it **will not be able to do it alone,** the financial depth and technical know-how of the **private sector** and energy companies **will be required**

Countries Will Need to Create a Competitive Investment Climate by Adhering to 10 Key Principles

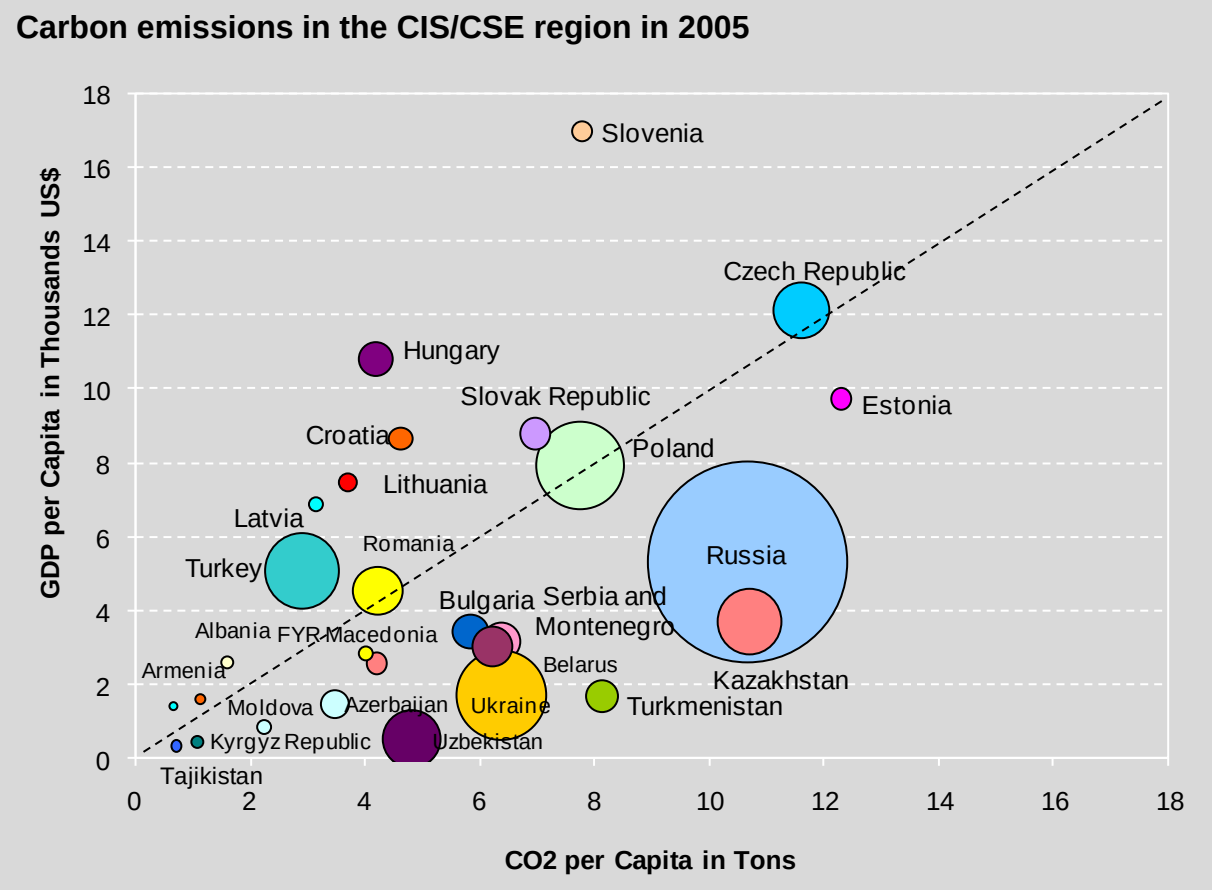
DO's	Don'ts
1. Do introduce an acceptable legal framework.	1. Don't impose a punitive or regressive tax regime.
2. Do provide supporting regulations administered by an independent and impartial regulator.	
3. Do create an environment that facilitates assured nondiscriminatory access to markets.	2. Don't interfere with the functioning of the market place.
4. Do honor internationally accepted standards.	
5. Do abide by contractual undertakings and preclude the use of an administrative bureaucracy to constrain investor activities	3. Don't discriminate among investors.
6. Do prevent monopoly abuses.	
7. Do ensure that the sector is kept free of corruption	

One of the Most Critical Elements is Ensuring the Financial and Commercial Viability of the Sector



Source: ERRA Tariff Database

…And Countries will Need to Ensure that They Will Act in an Environmentally Responsible Fashion



High carbon emissions reflect the region's:

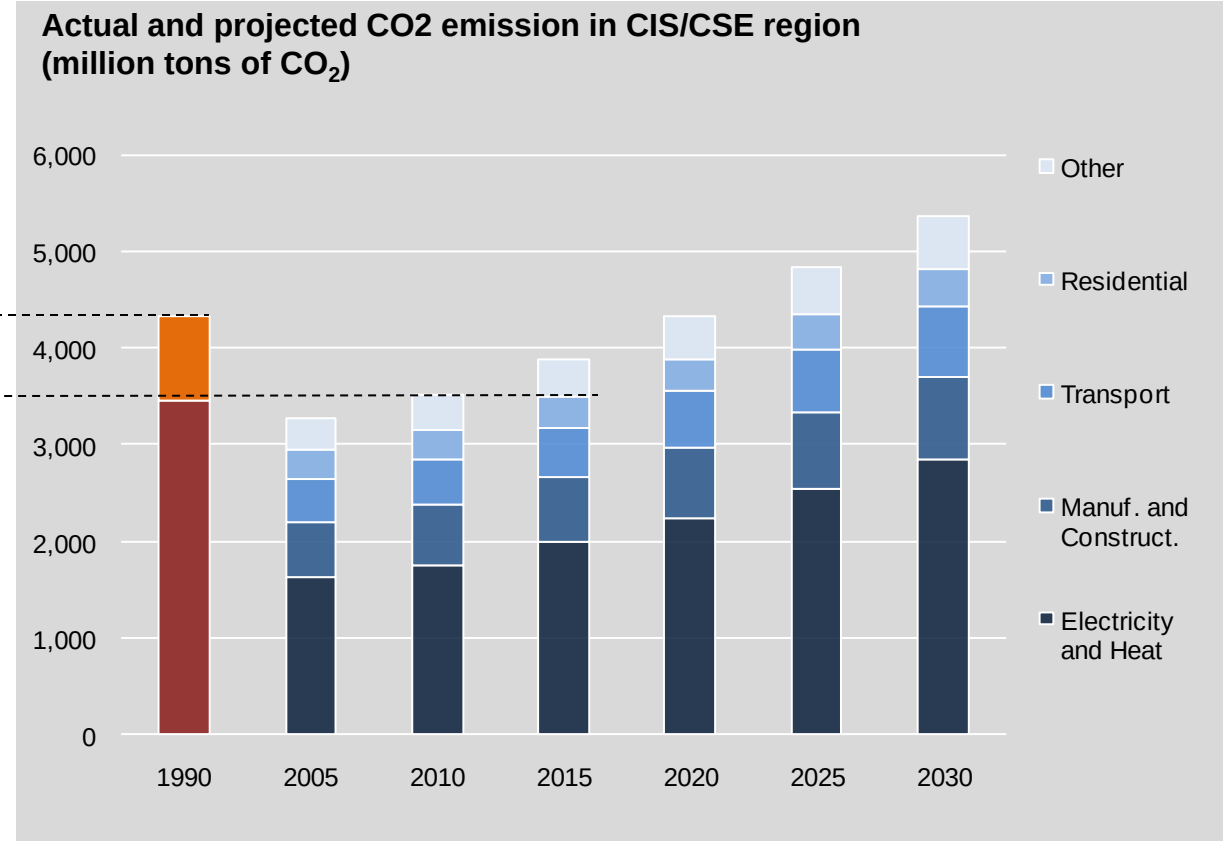
- Reliance on abundant domestic coal
- Low energy efficiency
- Outdated infrastructure

Source: World Bank World Development Indicators

Focused Efforts are Required if the Region is to Meet its Emissions Targets

CO_2 emissions in 1990

EU Target : 80% of 1990 levels by 2020



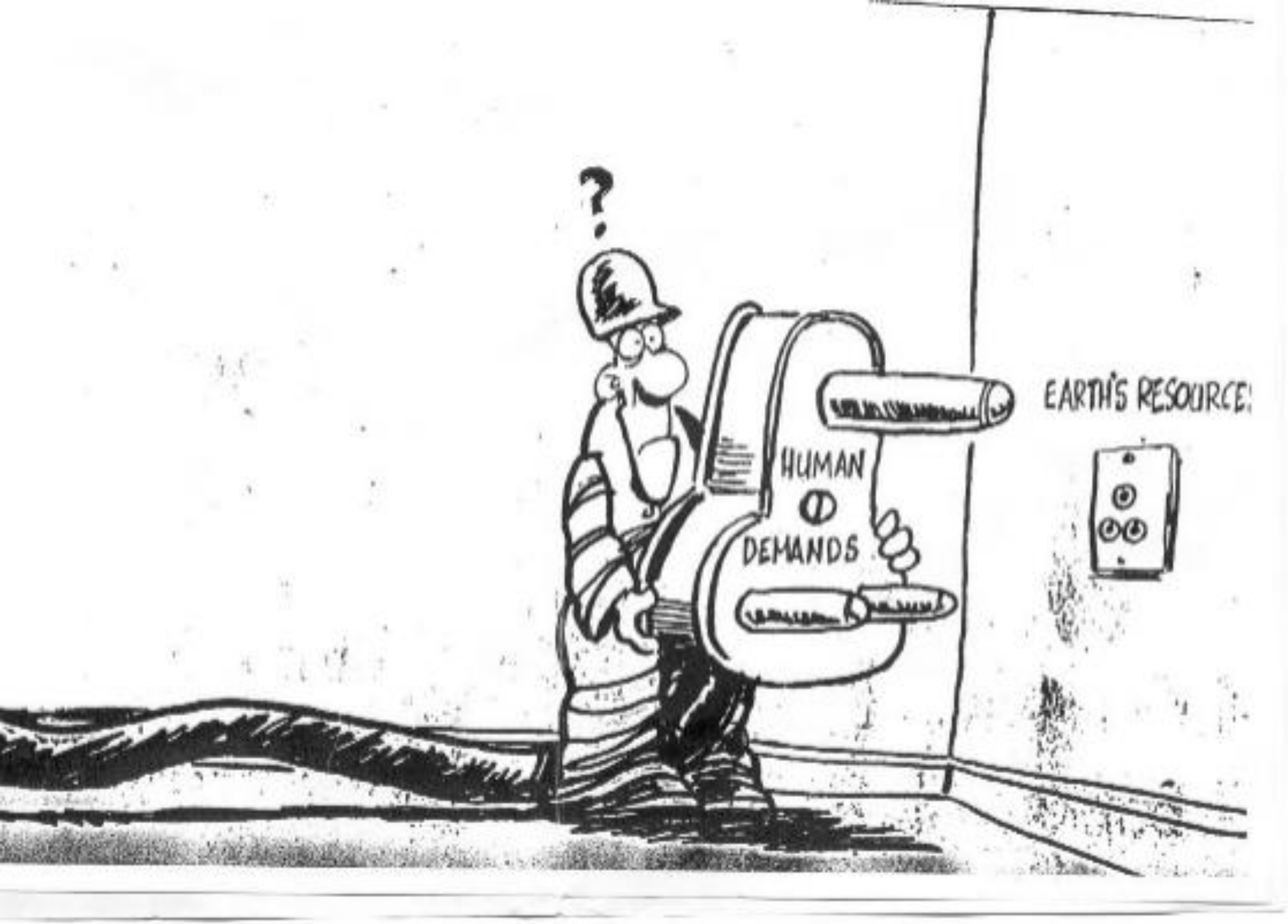
Source: World Bank staff calculations.

Energy and Environment Indicators – from "World Development Indicators, 2009 edition"

	Energy/ Capita	GDP [in PPP terms]/ energy use	Emissions/ Capita	Emission Intensity [CO2/GDP in PPP terms]	Emission Growth % 1990-2005
Turkey	**1,288**	**8.9**	**3.4**	**0.3**	**75**
Upper Middle-income Countries	2,300	4.8	5.5	0.5	-8
Euro area	3,936	7.7	8.1	0.3	2
ECA region - Eastern Europe and Central Asia	2,930	3.5	7.0	0.7	-29
World	1,820	5.2	4.5	0.5	29
Russia	4,745	2.7	10.5	0.9	-33
China	1,433	3.2	4.3	1.0	131
India	510	4.7	1.3	0.6	106
Brazil	1,184	7.3	1.7	0.2	61
Mexico	1,702	7.7	4.1	0.3	12
United States	7,768	5.5	19.5	0.5	20

IN CONCLUSION – FOR THE ECA REGION

- The region faces a potential **energy crunch**. The 2006 Winter Disaster of Alchevsk in Ukraine illustrates the **dramatic impact that losing access to energy can have** in people's lives.
- The current **economic and financial crisis** has provided some **relief** to address these potential energy constraints
- However, countries need to **act quickly** to create an **enabling environment** for investment
- At the same time, countries need to ensure that their **energy strategies** are **responsive to environmental concerns**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HUMAN
DEMANDS
EARTH'S RESOURCES

What Does All This Mean for Turkey?

- The region faces a potential **energy crunch**. Being highly dependent on energy imports, **Turkey is vulnerable**.
- Turkey's power system was reaching critically low reserve margins in 2008 and gas supply issues were also approaching. The **economic and financial crisis** has provided some **relief and more time** to address potential energy constraints.
- Turkey has created and needs to maintain an **effective enabling environment** for investment.
- Turkey needs to ensure that its **energy strategy is responsive to environmental concerns (mitigation) and that Turkey prepares effectively for the impacts of climate change (adaptation).**

Maintain a Strong Legal, Regulatory and Institutional Framework to Attract Investment

- Electricity and natural gas market laws of 2001 and amendments;
- Renewable Energy Law of 2005;
- Energy Efficiency Law of 2007 and energy efficiency regulations of 2008; and
- Energy Strategies of 2004 and 2009.

- **Energy regulator EMRA**.

- Energy pricing reforms of 2008 and the **continued application of the cost-based pricing mechanism**.

- Privatization Law and Privatization Administration.

Turkey's Enabling Environment is Effective - Private Sector is Responding

- **Nationwide Gasification Program** – reaching all provinces in 2010 – with the participation of the private sector in gas distribution under a program managed by EMRA.
- **Market-based power generation investments** (without Treasury guarantees) including renewable energy.
- **Electricity Distribution Privatization** – almost half of electricity distribution privatized and the rest to be offered by the end of 2010 in a program managed by the Privatization Administration (PA).
- **Next Step: Electricity Generation Privatization** – a program to privatize about 16,000 MW of EUAŞ thermal and hydro plants determined by the PA, EMRA and the Ministry of Energy and Natural Resources announced in March 2010.

Energy Challenges

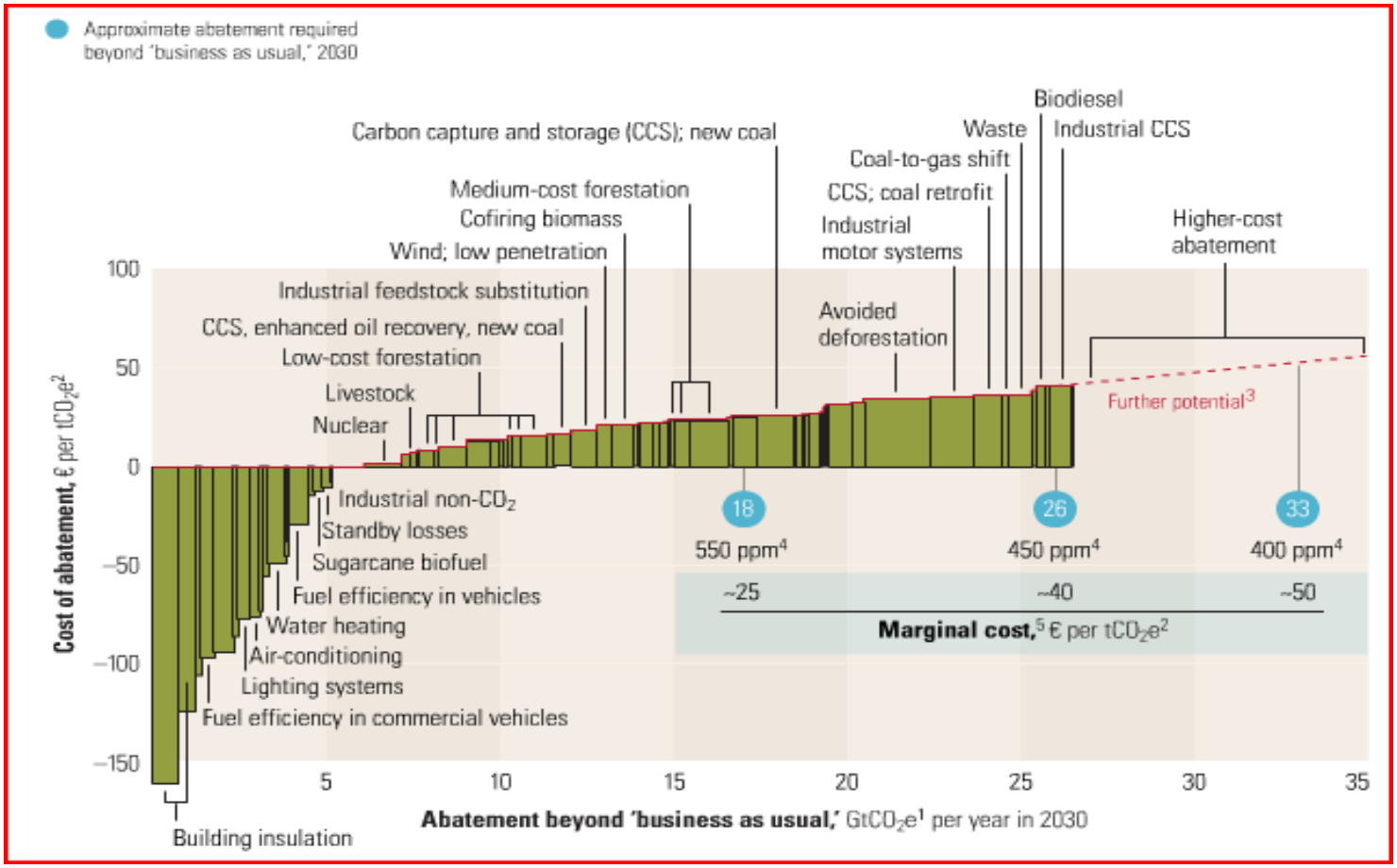
- Implementation of the electricity generation privatization program.
- Launching of a modern electricity market – Day-ahead market is scheduled to start in January 2011.
- Improving the operational capacity and financial strength of transmission system and electricity market operator TEIAŞ.
- Securing gas imports and amending the natural gas market law for gas imports and the structure of BOTAŞ.
- Sustained application of the cost-based pricing mechanism.
- Social safety net to secure energy access for poor households.

Energy/Environment Challenges

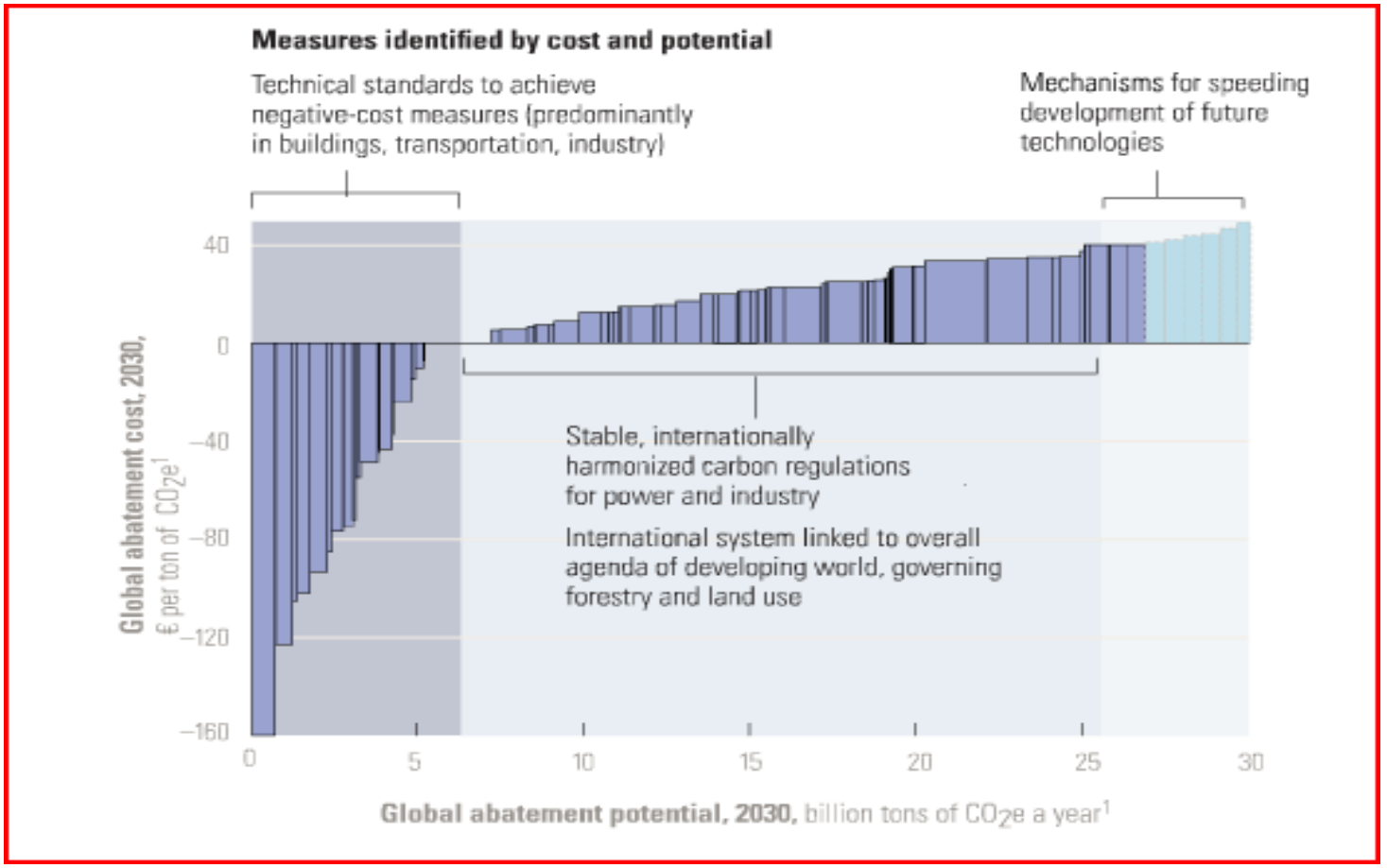
- Cleaning up electricity generation (EUAŞ privatization program), securing gas supplies, developing nuclear power, developing hydro and wind and expanding renewable energy into biomass and solar.
- Maintaining low system losses in transmission and reducing system losses in electricity distribution.
- Improving the efficiency of energy use across the economy – industries, commerce, transport, households, public buildings.

Energy security, energy efficiency and environment are directly linked and mutually reinforcing objectives.

Prioritize, Promote/Regulate "Negative-Cost" and Cost-effective Measures – chart by McKinsey, 2007



Prioritize, Promote/Regulate "Negative-Cost" and Cost-effective Measures – chart by McKinsey, 2008



Climate Change – Mitigation and Adaptation

- National Climate Change Strategy – draft released in December 2009, formal Government approval is expected soon.
- National Climate Change Action Plan – **mitigation and adaptation** in energy, transport, industry, waste, land use, and agriculture and forestry.
- Turkey is vulnerable to climate change – **adaptation** to prepare for the impacts of climate change is essential.

Turkey is one of the three countries in the ECA region most likely to experience the greatest increases in climate extremes.

Decoupling GDP-GHG emissions

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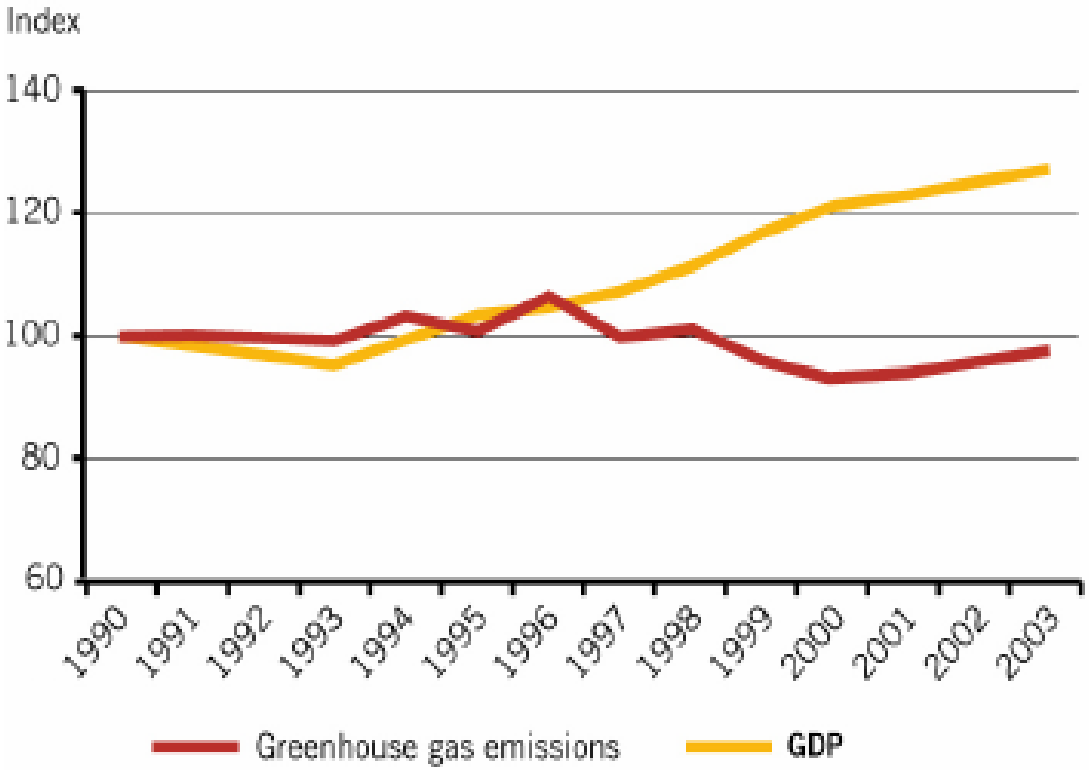


Steady increase in GDP of about 25% (1990-2003)

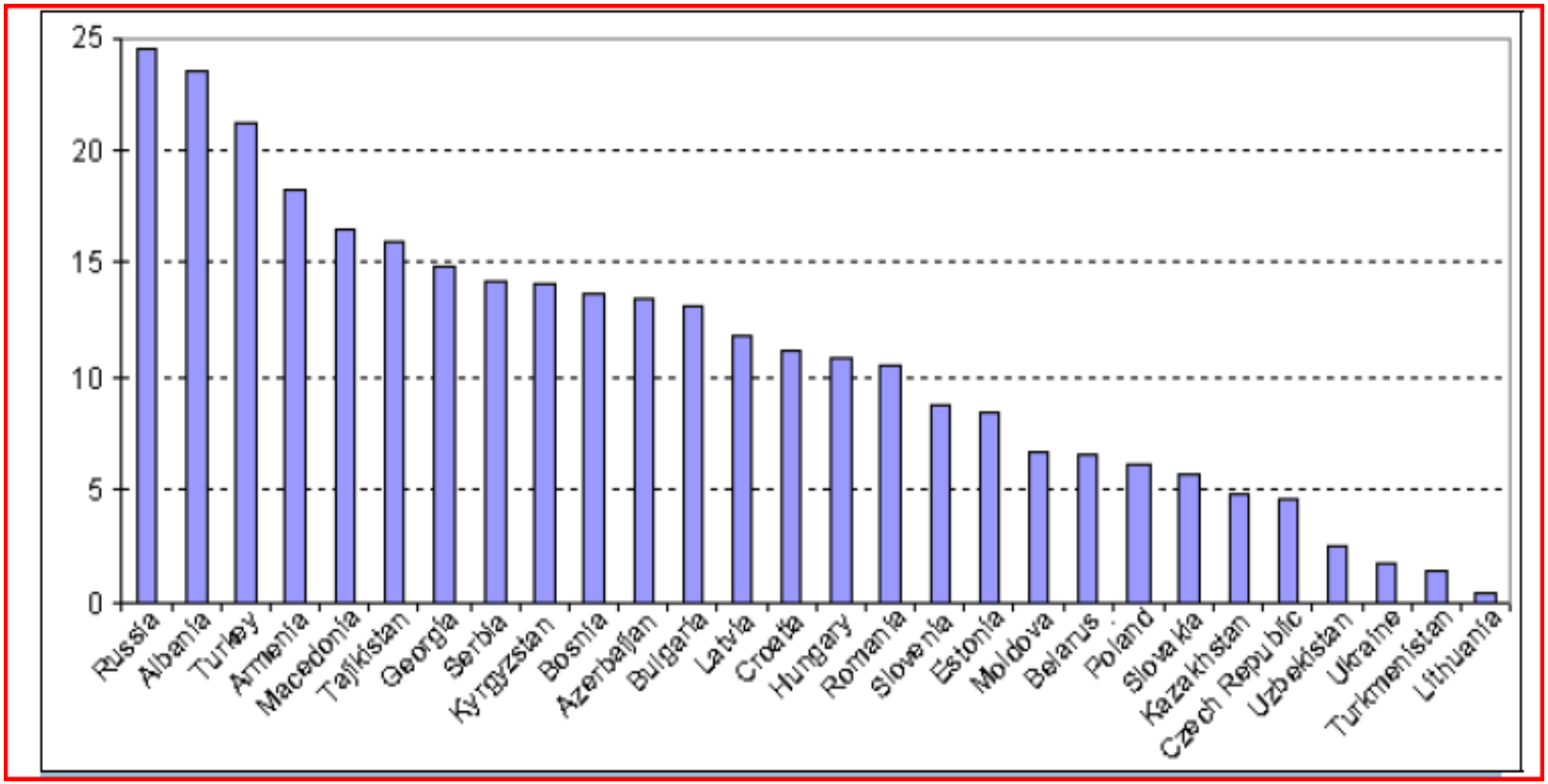
Industrial production increased by more than 50%

Average purchasing power grew by about 13%

GHG emissions decreased by 3% (1990-2003)

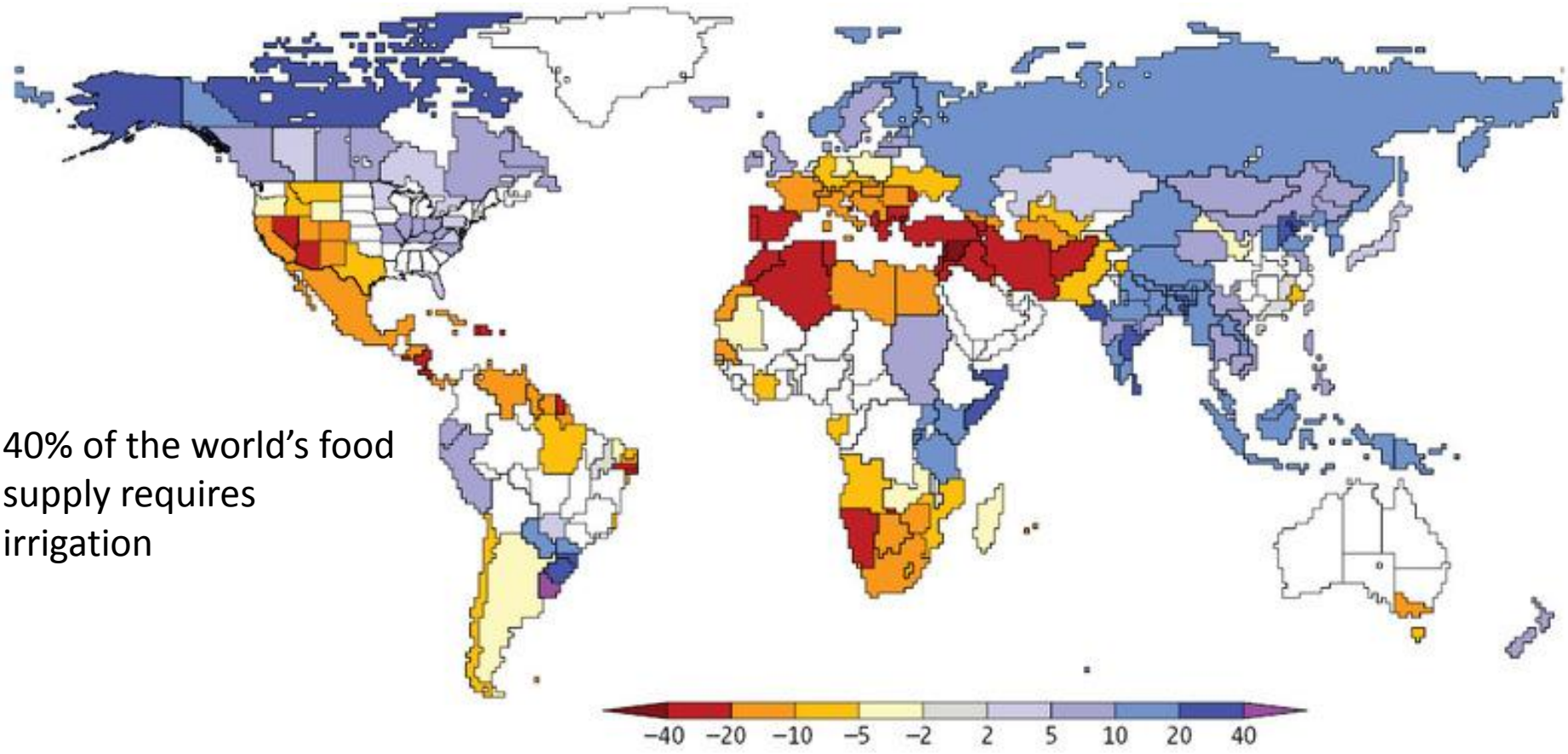
The foundation of an evolving, low-carbon, dematerialised, sustainable economic model

Turkey is Vulnerable to Climate Extremes – from "Adapting to Climate Change in the ECA Region"



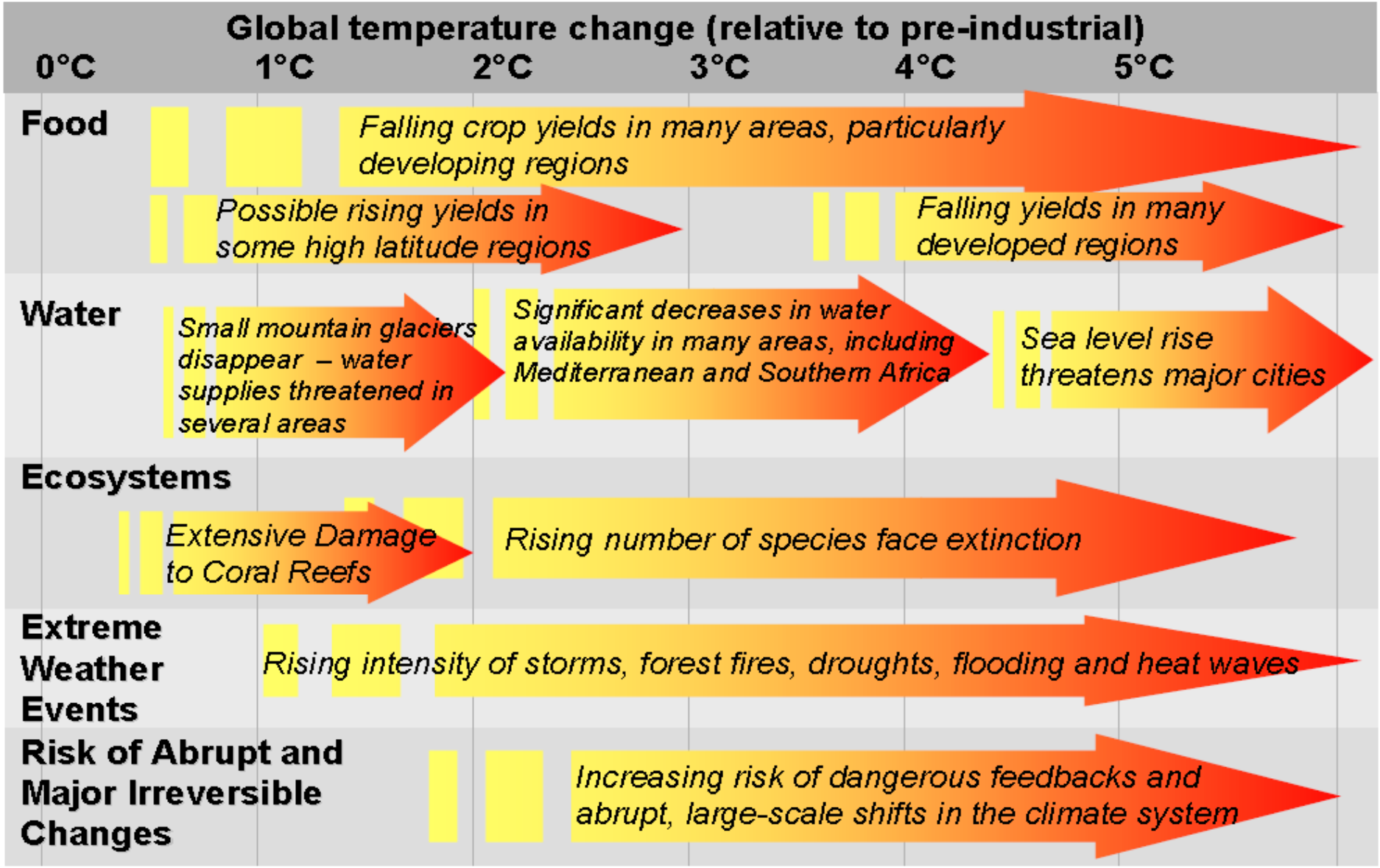
Water Changes by 2050

40% of the world's food supply requires irrigation



Human influences. Dramatic changes in runoff volume from ice-free land are projected in many parts of the world by the middle of the 21st century (relative to historical conditions from the 1900 to 1970 period). Color denotes percentage change (median value from 12 climate models). Where a country or smaller political unit is colored, 8 or more of 12 models agreed on the direction (increase versus decrease) of runoff change under the Intergovernmental Panel on Climate Change's "SRES A1B" emissions scenario.

Projected impacts of climate change



IN CONCLUSION - FOR TURKEY

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- Turkey's power system was reaching critically low reserve margins in 2008 and gas supply issues were also approaching. The **economic and financial crisis** has provided some **relief and more time** to address potential energy constraints.
- Turkey has created and needs to maintain an **enabling environment** for investment.
- Turkey needs to ensure that its **energy strategy is responsive to environmental concerns (mitigation) and that is adapts for the impacts of climate change in Turkey (adaptation).**

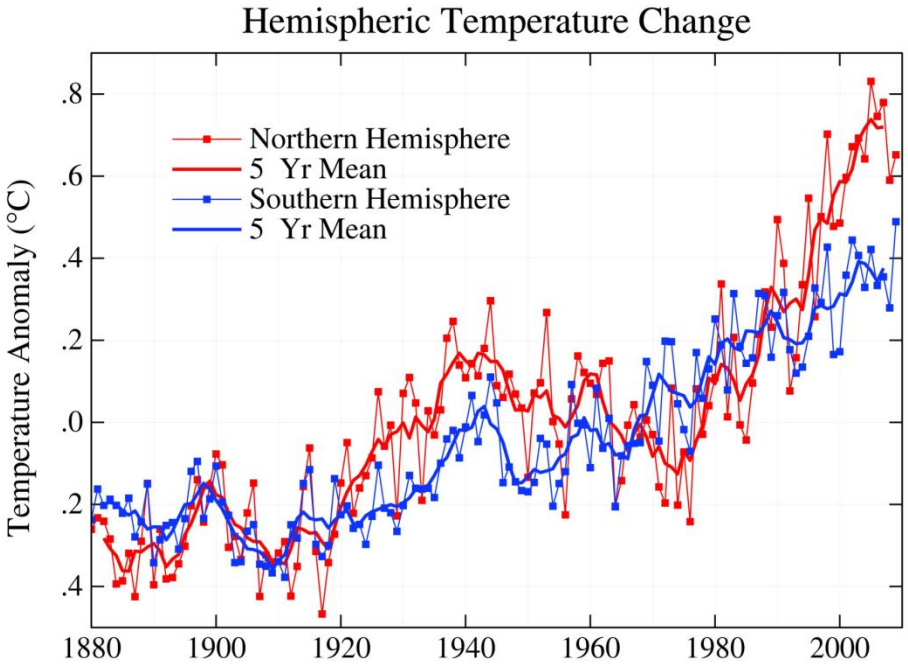
Thank You

Lights Out? – the full report is available for downloading at:

For information about the World Bank's energy work:

For information about the World Bank in Turkey:

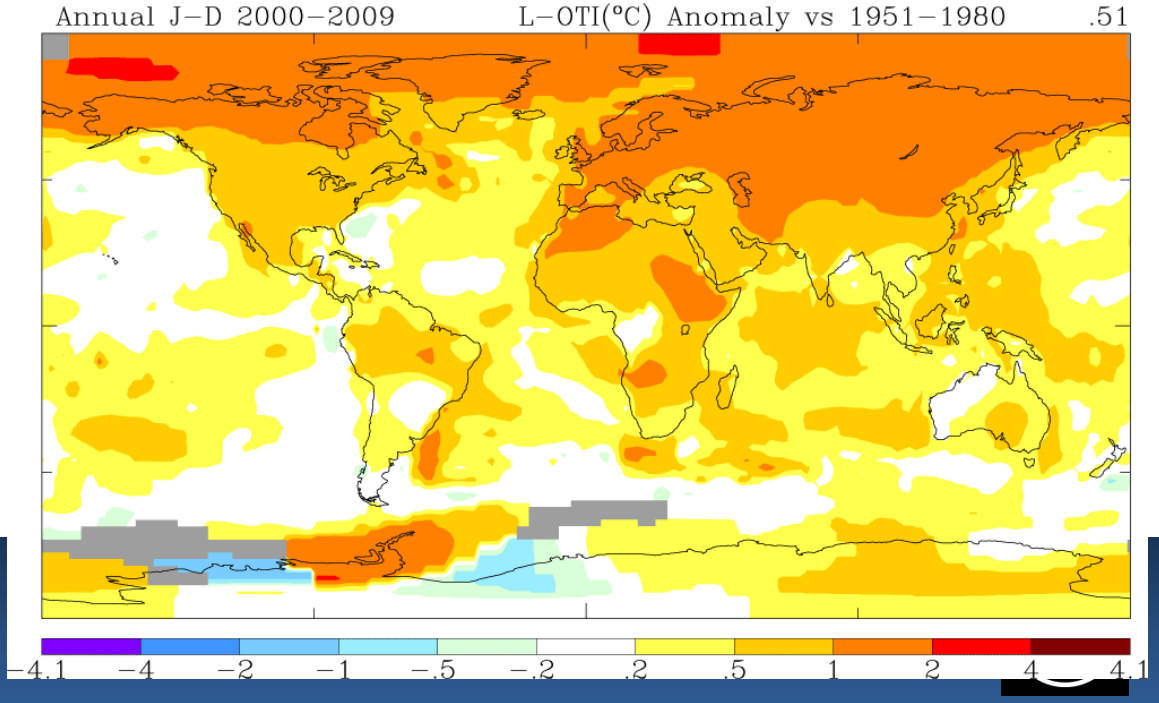
Back-up Slides – Additional Information on Climate Change



Recent temperature changes

- Increase ~0.8°C over the last century
- 14 of the 15 warmest years on record occurred since 1995
- 2009 warmest year ever in the Southern Hemisphere

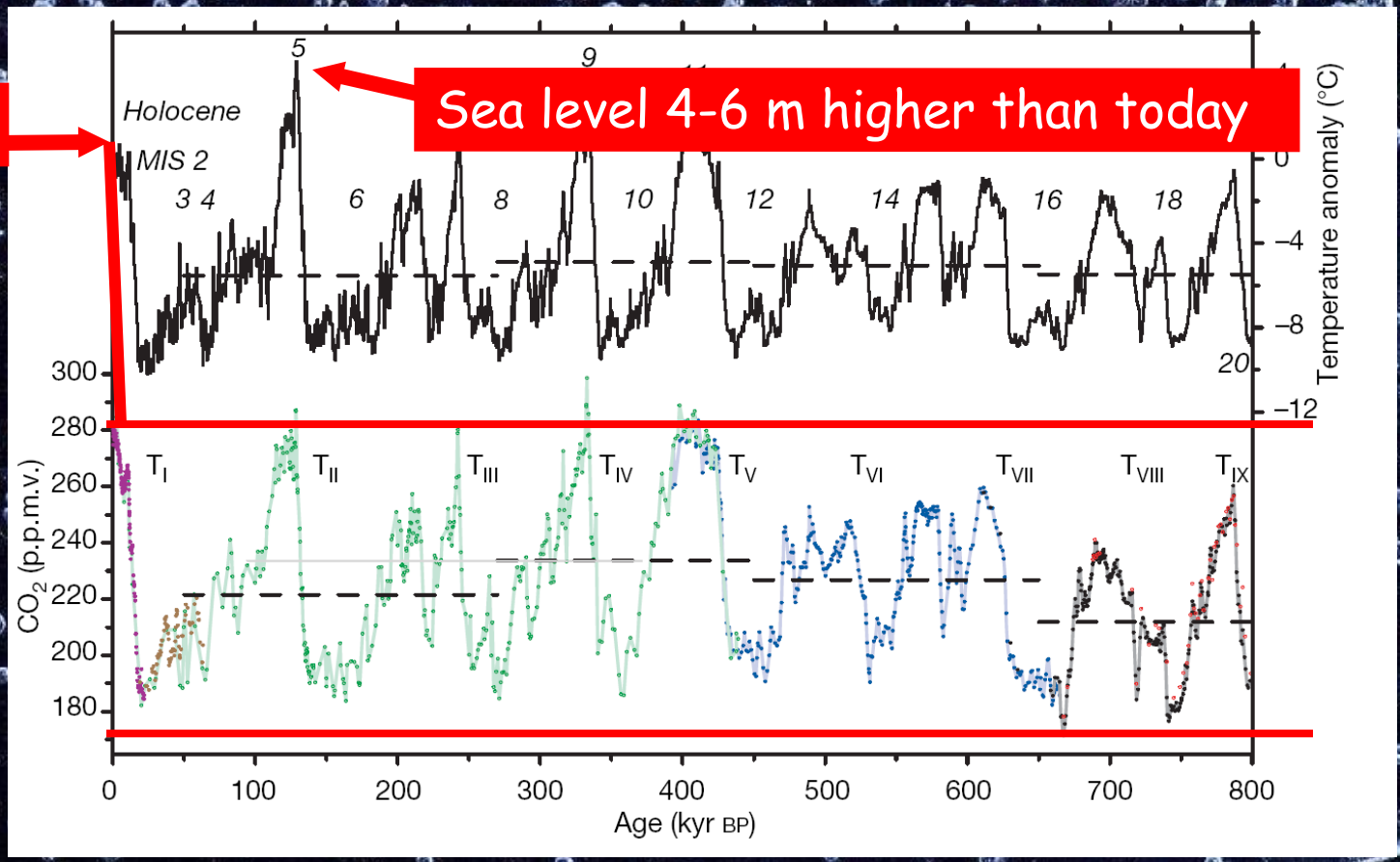
Temperature change in the last decade compared with 1951-1980 mean



Dome C
Antarctica
Ice Core

Now - 387 ppm

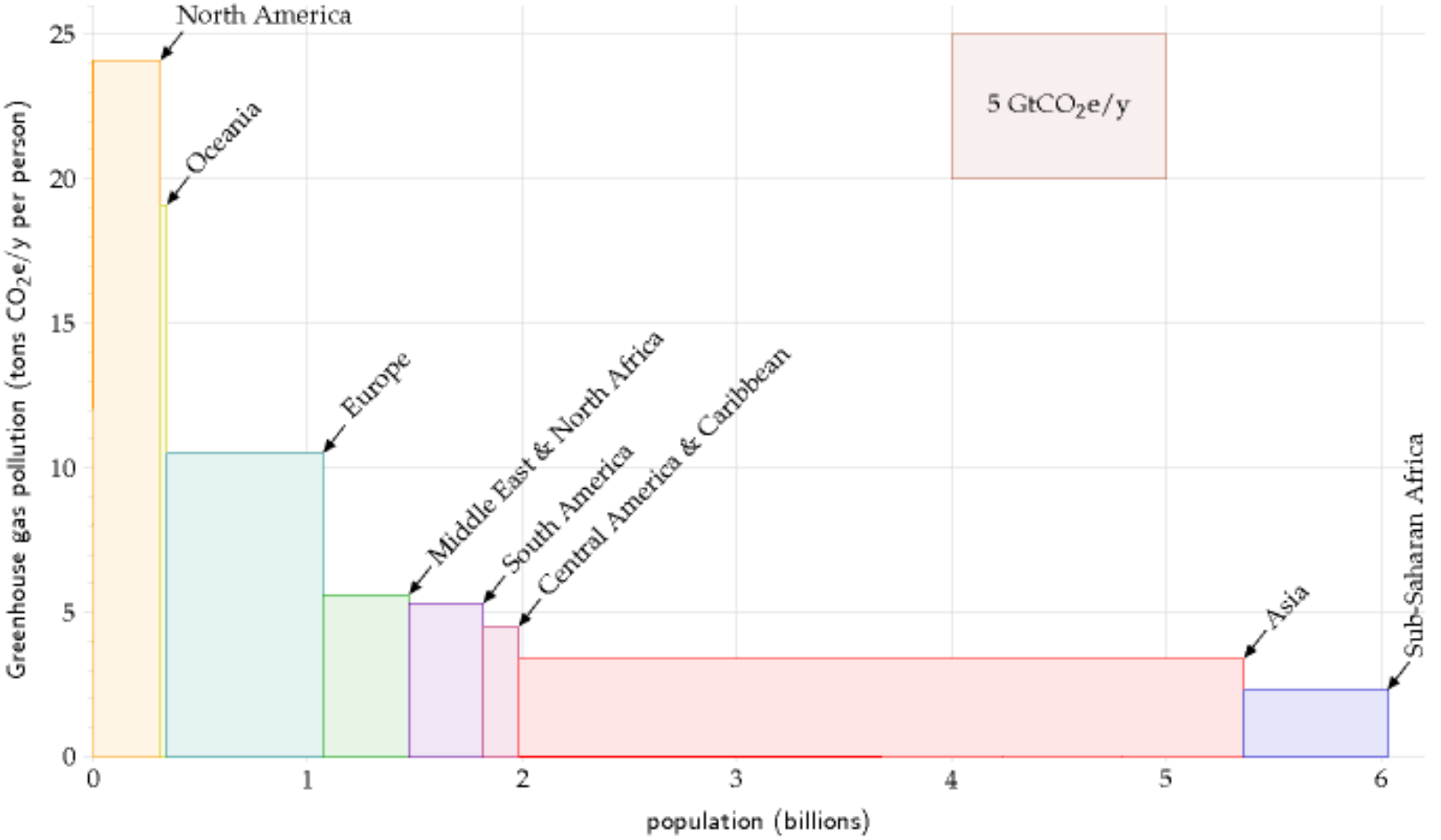
Sea level 4-6 m higher than today



Luthi et al., Nature, 15 May 2008
Siegenthaler et al., Science 2005 (EPICA gas consortium)

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

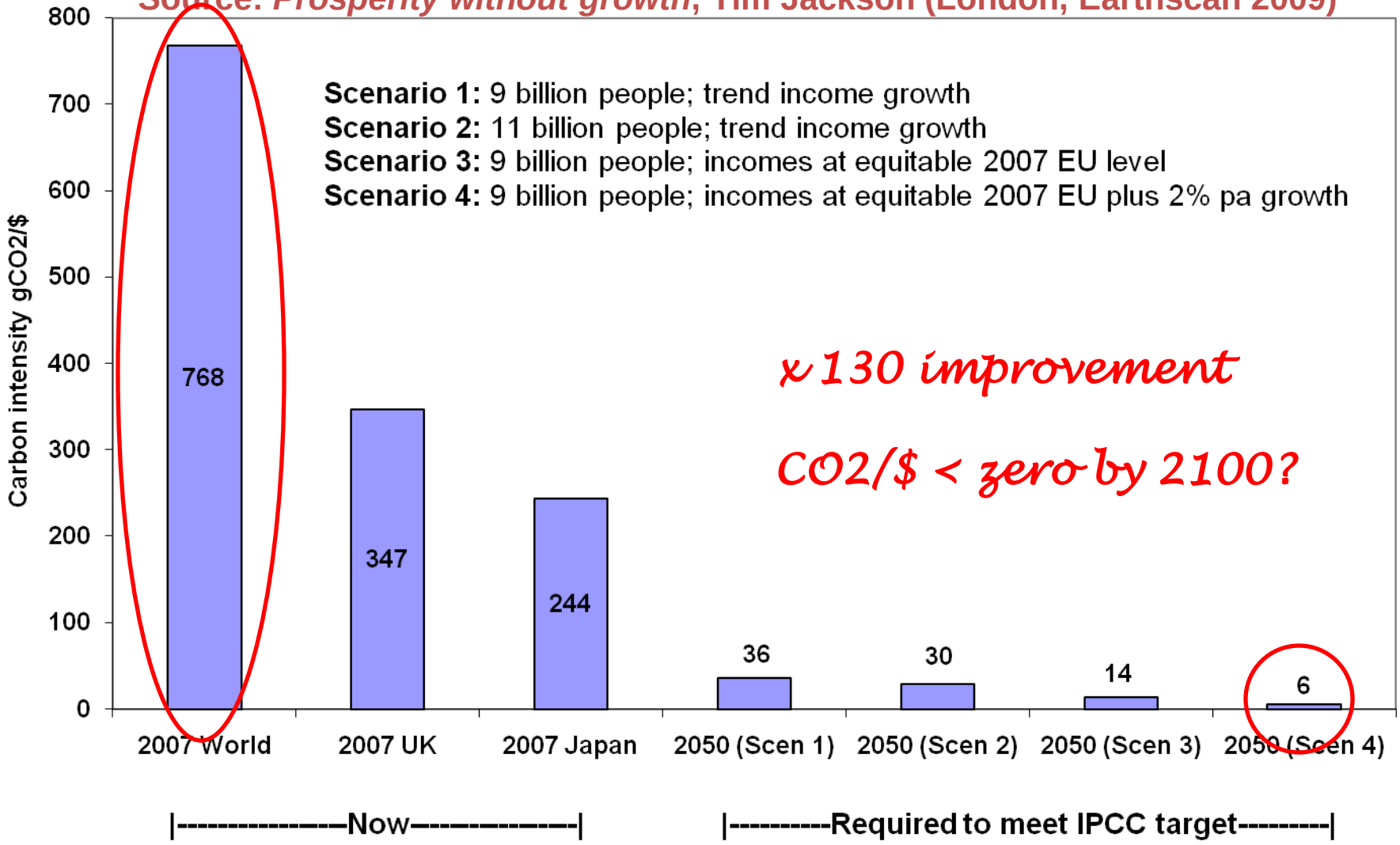
CO2 per person by Region



Source: David Mackay, 2009

The Dilemma of Growth

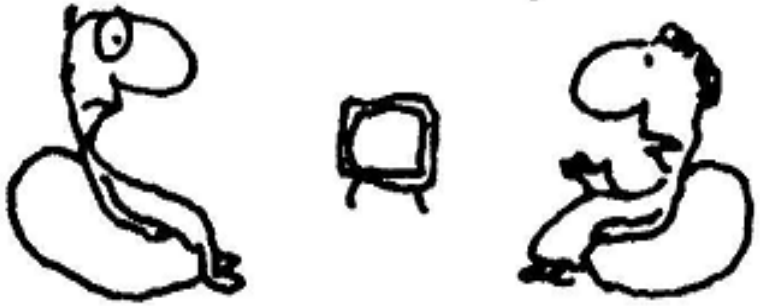
Source: *Prosperity without growth*, Tim Jackson (London, Earthscan 2009)



our way of life is being threatened by a dark force.

we must defend our way of life.

WHAT IS THIS DARK FORCE WHICH THREATENS OUR WAY OF LIFE?



it's our way of life...

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