



# Energy Union

***Energy for Europe – serving society, supporting the economy, protecting the environment***

# Tratado de Paris 1951





*"A este fin, los ministros han acordado en los siguientes objetivos: poner más ... energía abundante a un precio más barato a disposición de las economías europeas ..."*

# Tratado Euratom 1957



# First important directive

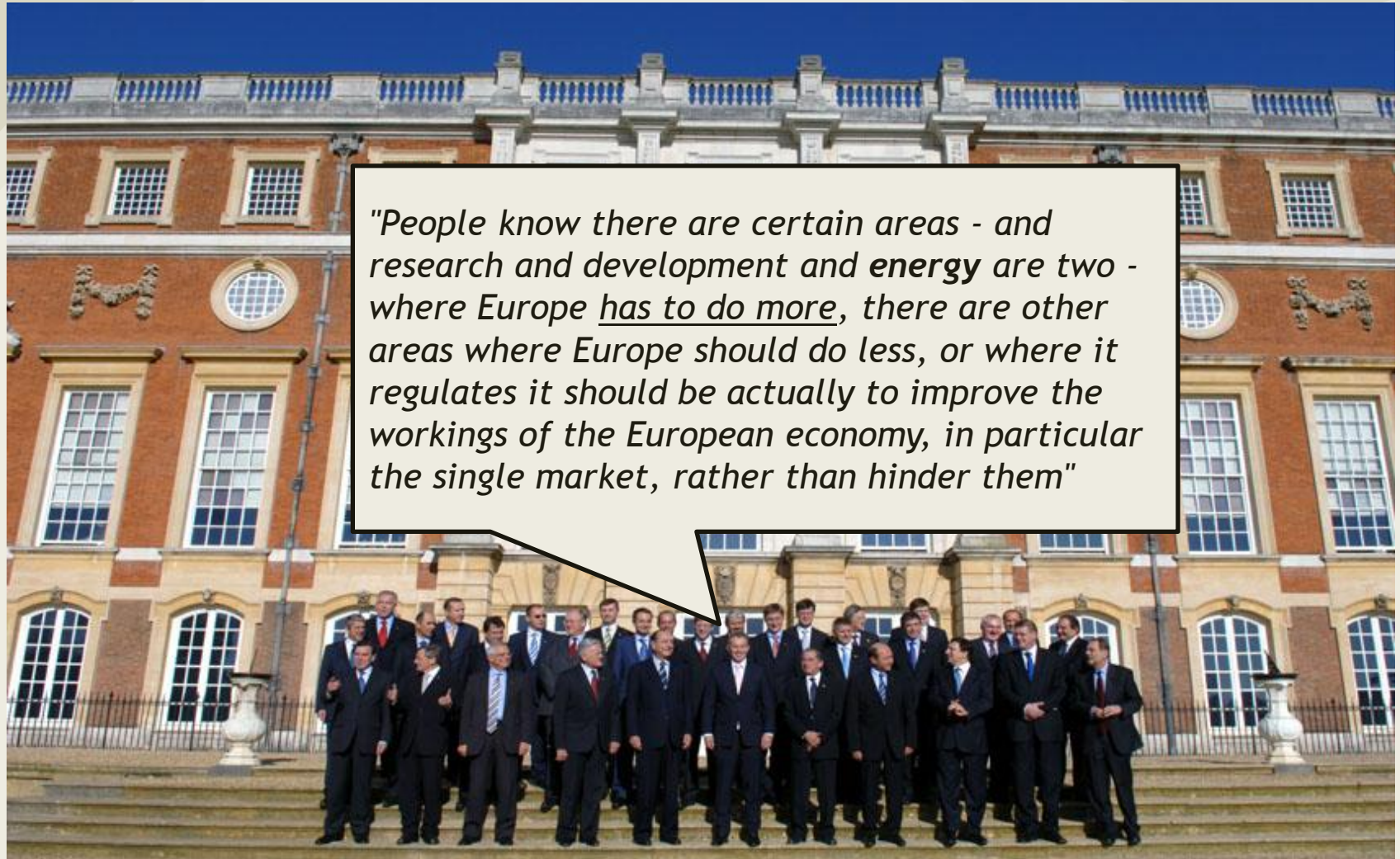
## Oil stocks directive from 1968

- Council Directive 68/414/EEC of 20 December 1968
- Recognizes the increasing dependence on foreign imports and the severity of a "difficulty" that affect security of supply.
- Without defining what was a "difficulty"
- After the crisis of 1973-1974 the international energy agency is created.
- Member States have an obligation to maintain emergency reserves equivalent to at least 90 days of net oil imports

# Energy Green Paper (2000)

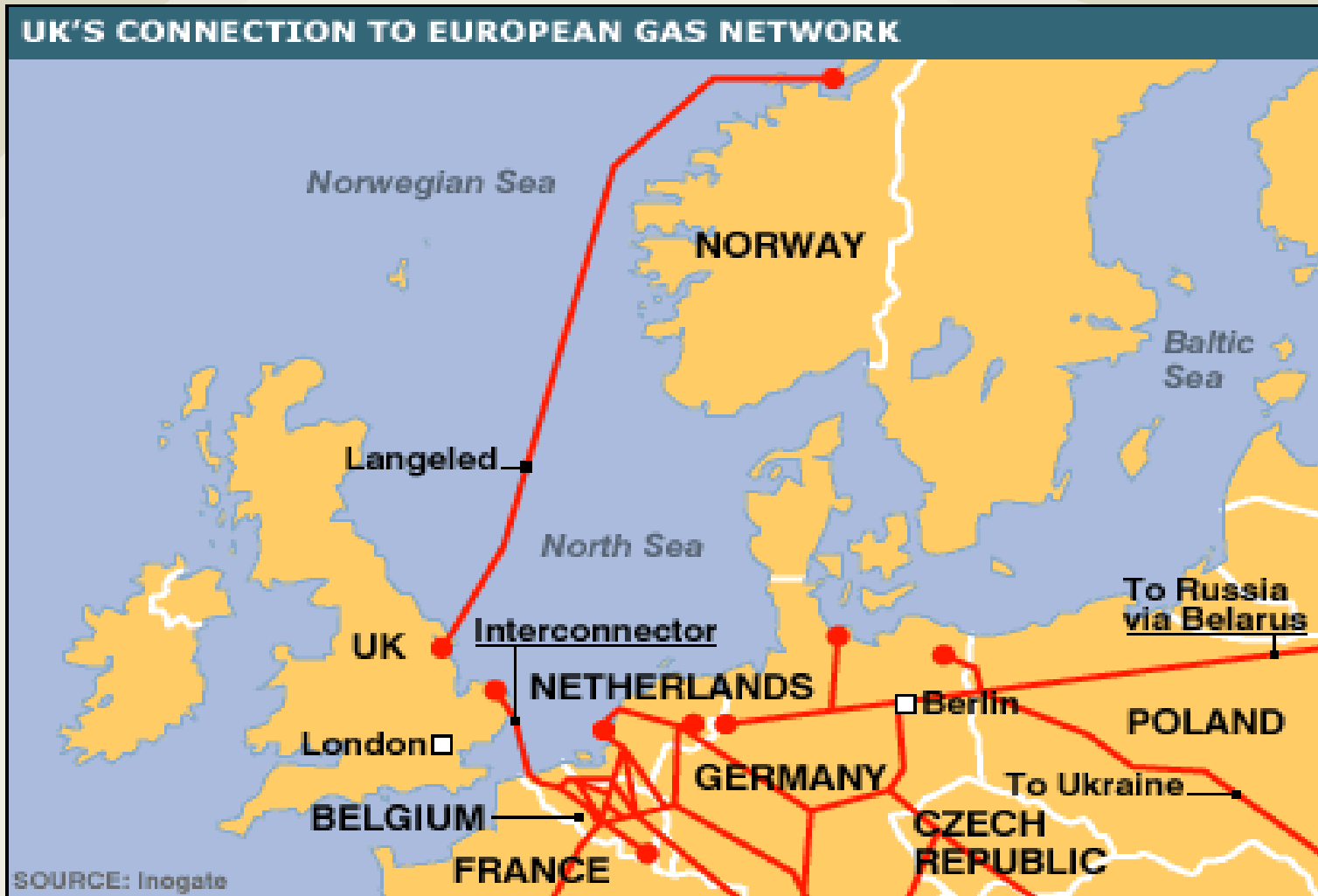


# El milagro de Hampton Court (2005)



*"People know there are certain areas - and research and development and **energy** are two - where Europe has to do more, there are other areas where Europe should do less, or where it regulates it should be actually to improve the workings of the European economy, in particular the single market, rather than hinder them"*

# Gas crisis in UK in 2005



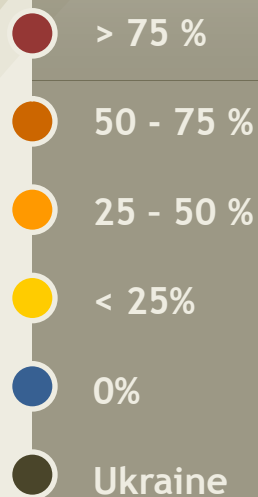
# First Ukraine gas crisis 2005-2006

## Existing and Planned Natural Gas Pipelines to Europe

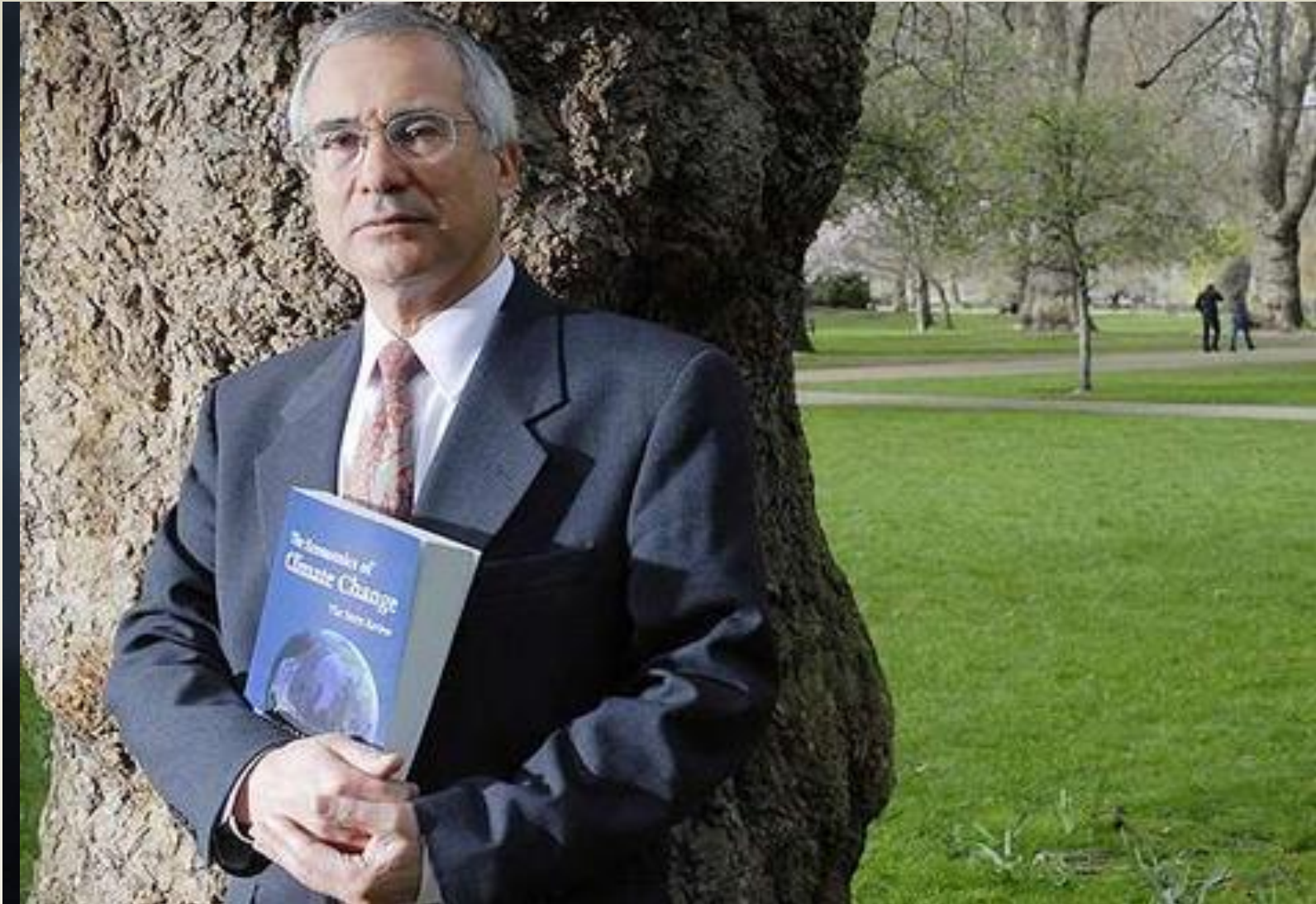


# Reduction of gas supplies

during the gas crisis in January 2009



# Climate change



# Energy in the treaty of Lisbon

- Lisbon Treaty is also the first EU Treaty to establish a legal basis to Energy (Art 194) and aims to ensure:
  - The functioning of the energy market
  - Security of Supply
  - Promote energy efficiency and energy saving
  - Promote the development of new and renewable forms of energy
  - Promote the interconnection of energy networks.

Security of supply



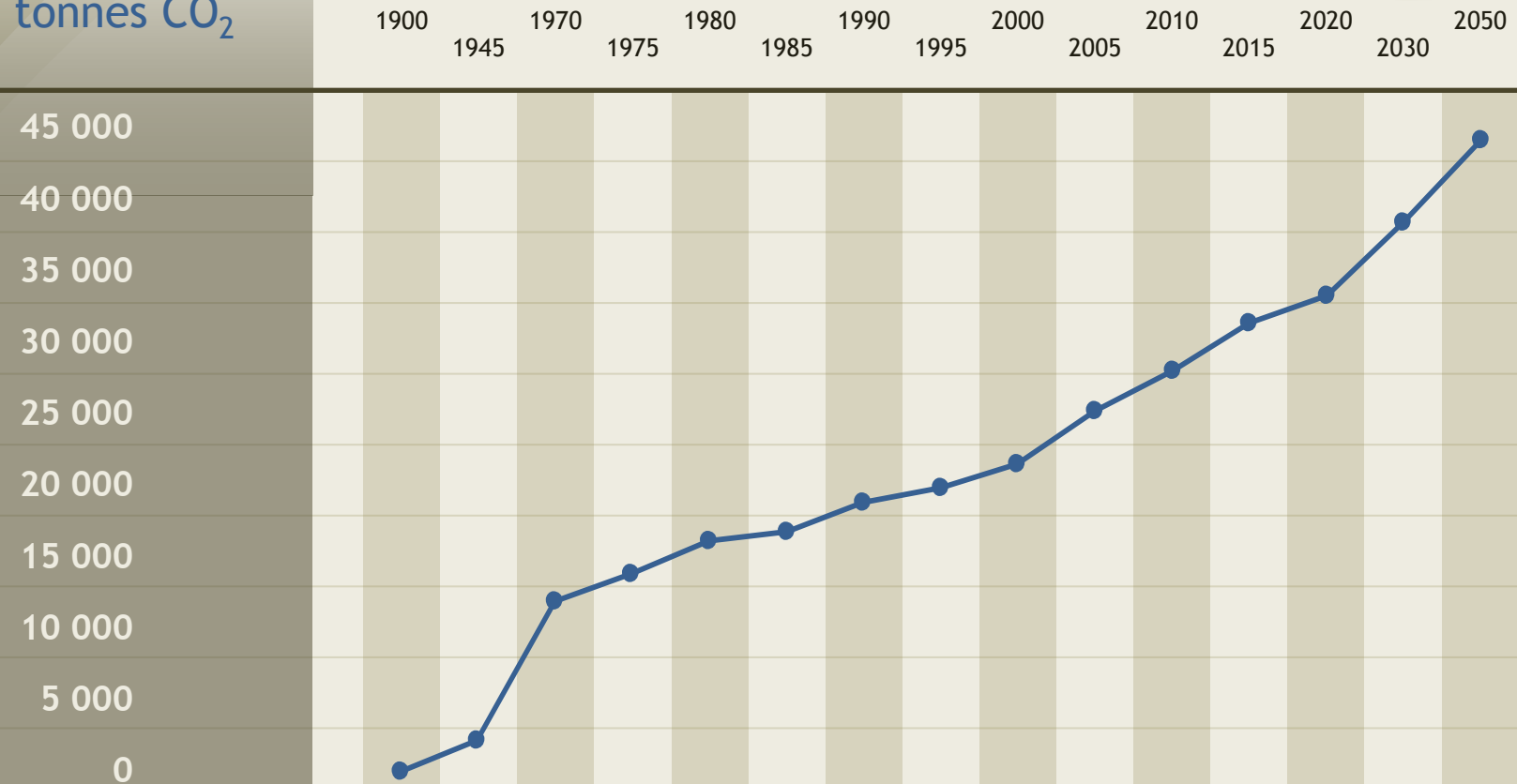
Competitiveness

Sustainability



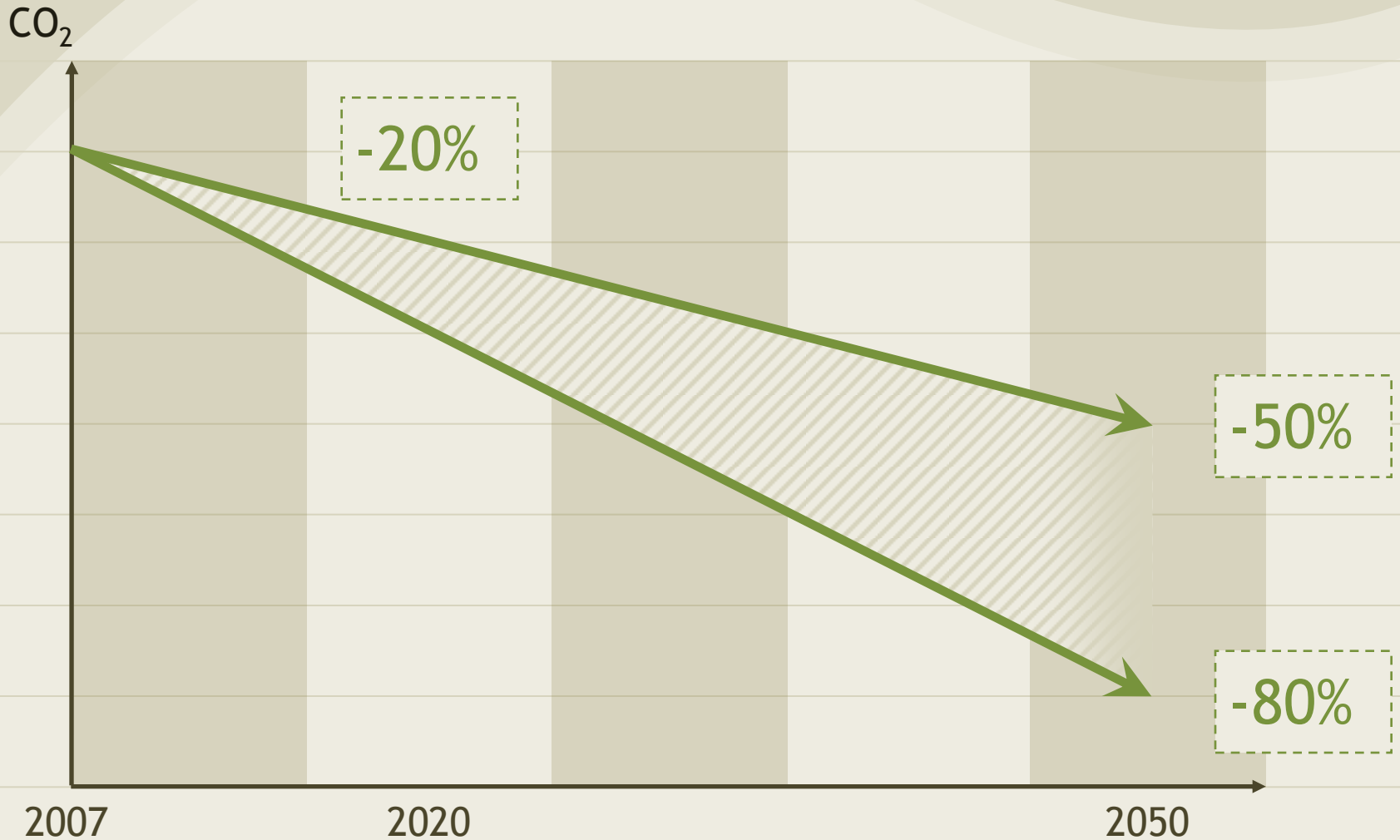
# Global CO<sub>2</sub> Emissions From Energy Consumption

Million  
tonnes CO<sub>2</sub>



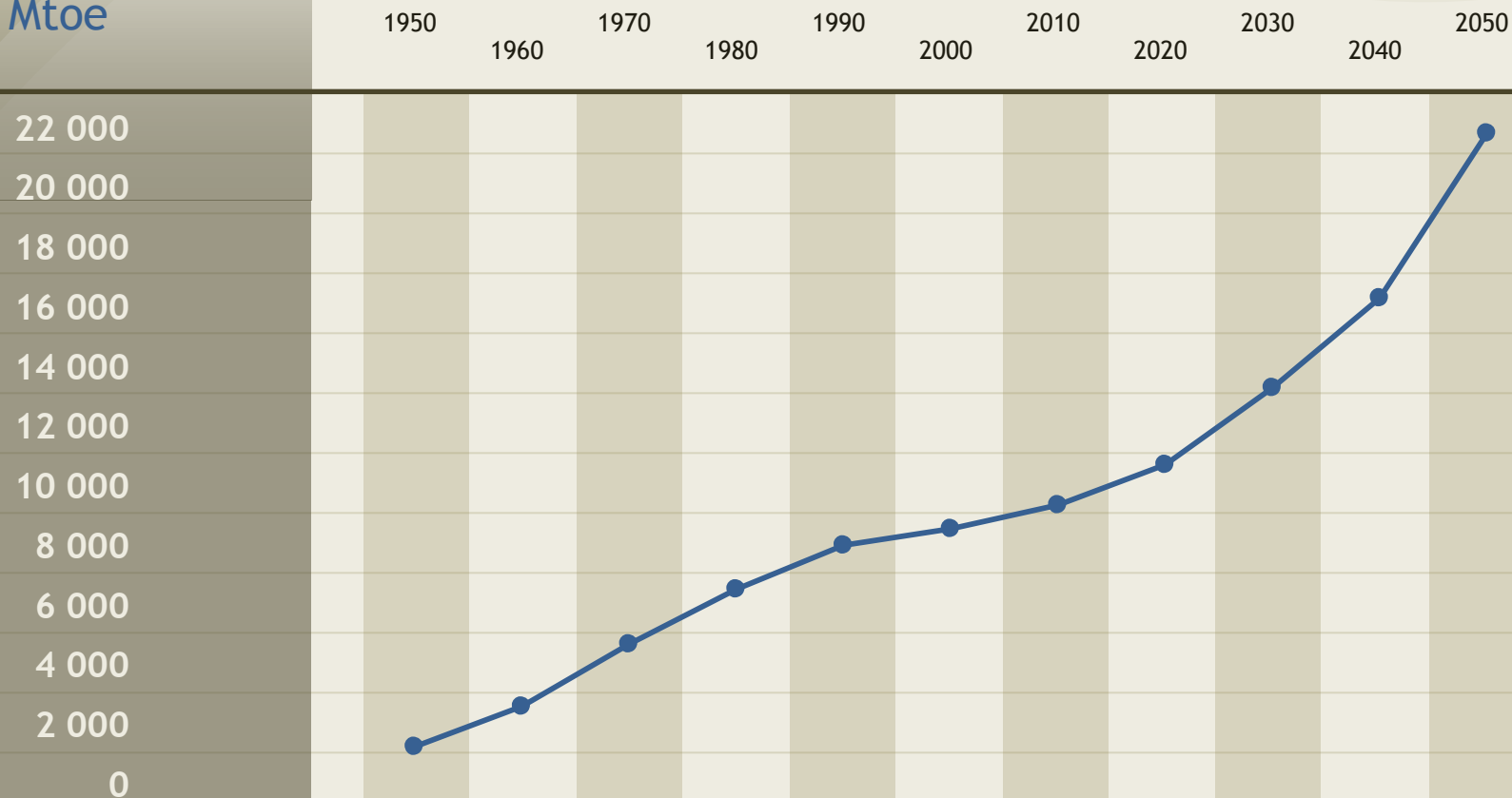
IEA: CO<sub>2</sub> emissions from fossil fuel combustion, 2006: from 1975 onwards  
Carbon dioxide information analysis center, Oak Ridge National Laboratory,  
USA: until 1970, growth rates used for linking with IEA data  
IEA: World Energy Outlook 2006  
European Commission, DG RTD, World Energy Technology Outlook - 2050  
(growth rates for extending series to 2050 and for missing years in IEA projections)

# CO<sub>2</sub> objectives for the EU



# World Energy Demand Total

Mtoe



Total

IEA statistical database 1975 - 2000; World Energy Outlook 2006; IEA World Energy Outlook 2006. BP Statistical Review of World Energy (without uncommercial energies): growth rates used for extending time series backwards for 1965 and 1970 as well as for the 2005 number. WETO-H<sub>2</sub> study (DG RTD): growth rates 2050/2030 used for extending IEA time series to 2050

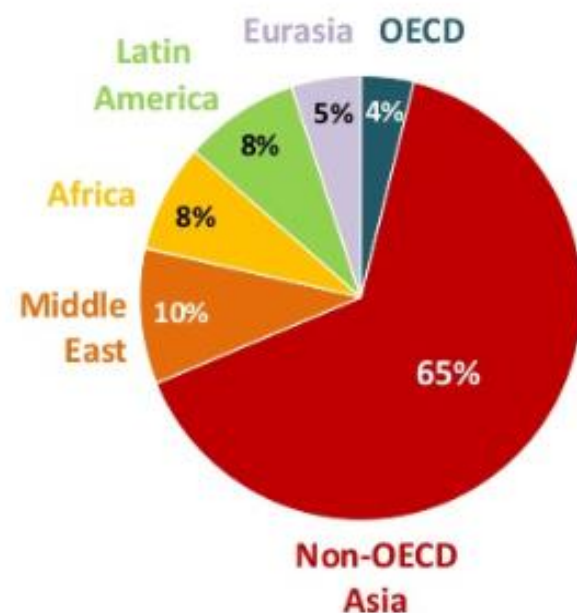
# The engine of energy demand growth moves to South Asia

WORLD  
ENERGY  
OUTLOOK  
2013

## Primary energy demand, 2035 (Mtoe)



## Share of global growth 2012-2035



*China is the main driver of increasing energy demand in the current decade, but India takes over in the 2020s as the principal source of growth*

# Population growth by region

Million people

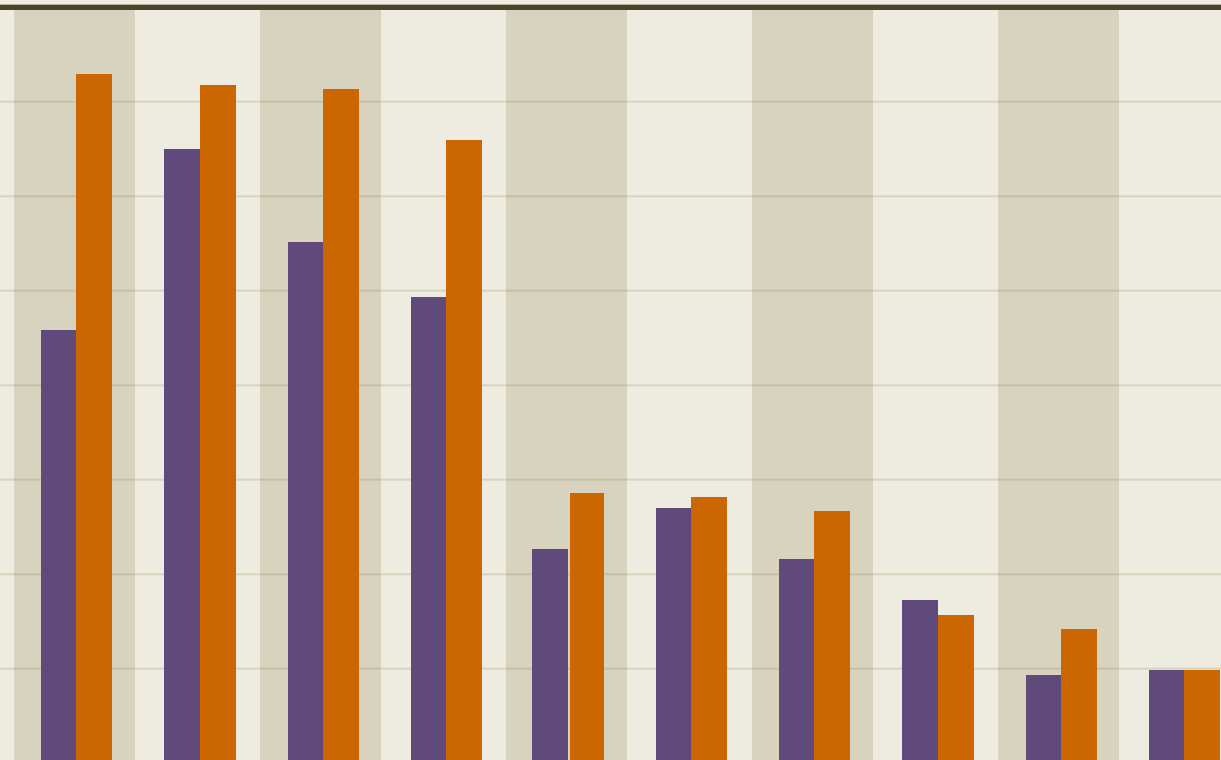
Africa China India Other Asia Latin America OECD Europe OECD North America East Europe/Eurasia Middle East OECD Pacific

1 400  
1 200  
1 000  
800  
600  
400  
200  
0

2006

2030

Source: World energy outlook 2008



# Cars projection

## Data on vehicles

Total vehicles  
(millions)

2000

2010

2020

2030

2 000  
1 900  
1 800  
1 700  
1 600  
1 500  
1 400  
1 300  
1 200  
1 100  
1 000  
900  
800  
700  
600  
500  
400  
300  
200  
100  
0

USA

Rest of  
OECD

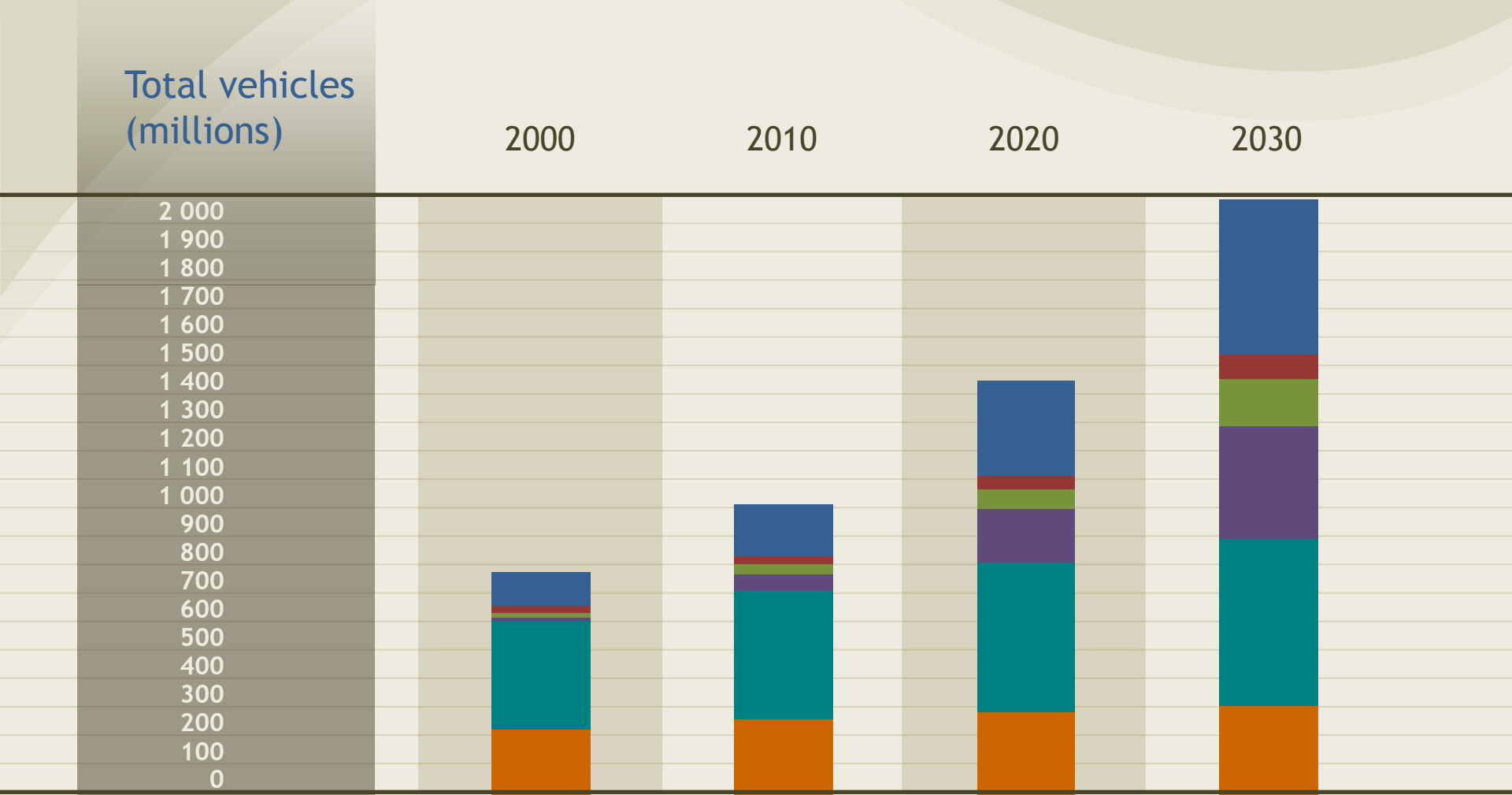
China

India

Brazil

Rest of  
World

Source: Vehicle Ownership & Income Growth, Worldwide: 1960-2030: Joyce Dargay, Dermot Gately & Martin Sommer: January 2007

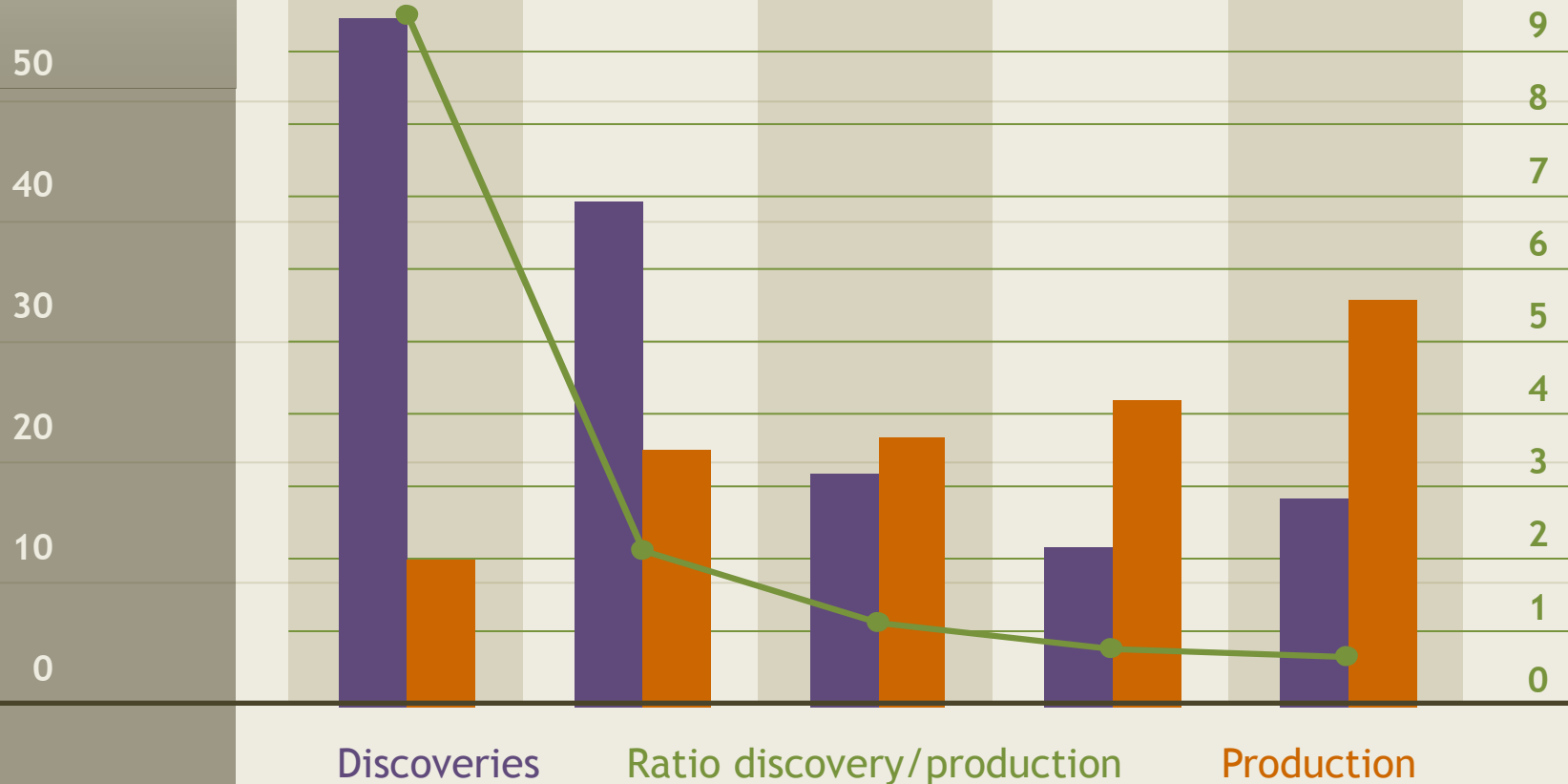


# World oil reserves

## Oil discoveries and production, 1960-2006

Billion  
barrels/year

1960-1969 1970-1979 1980-1989 1990-1999 2000-2006

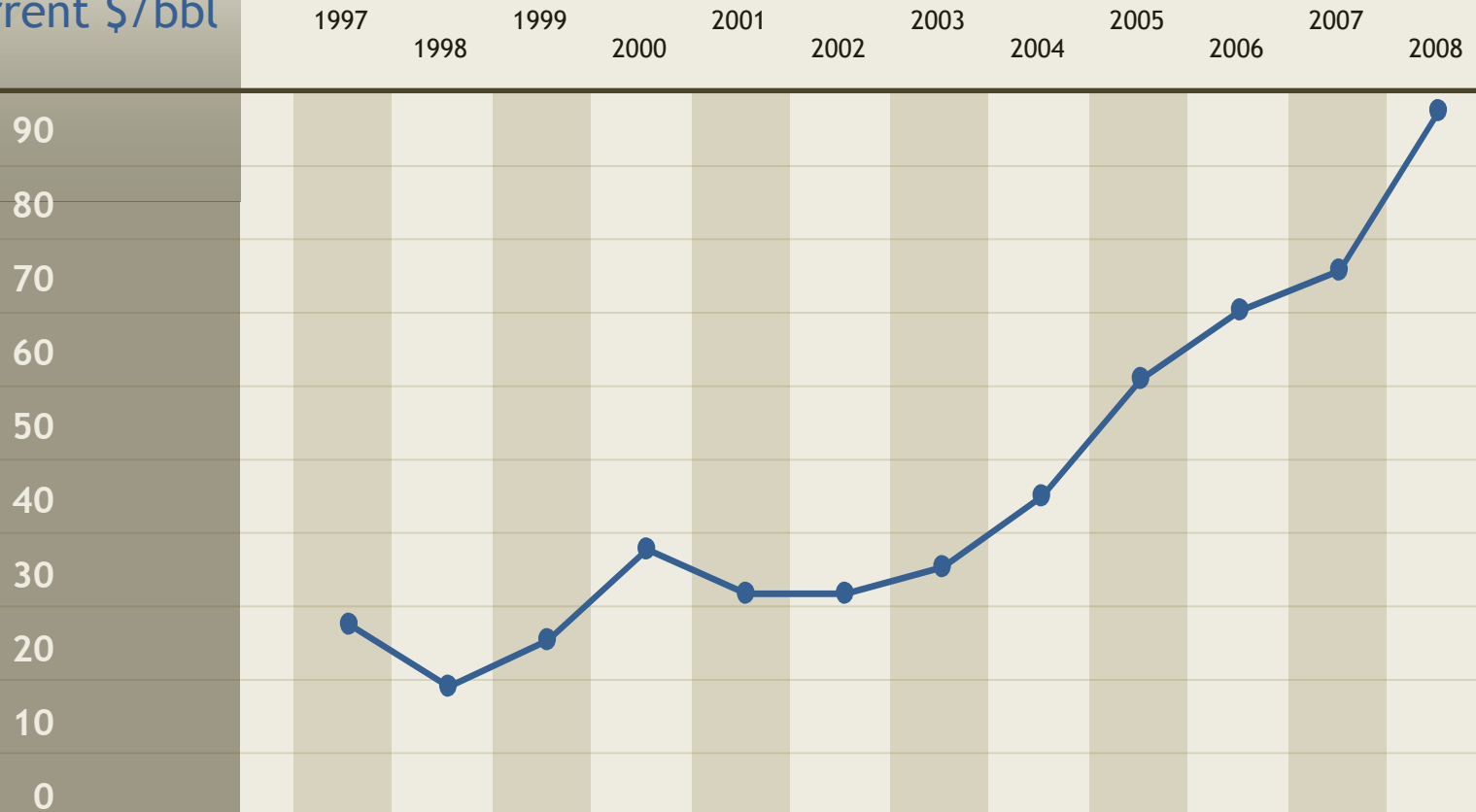


Source: World energy outlook 2008

# Crude oil prices

## Brent

Current \$/bbl



Source: BP statistical review of world energy full report 2009

# EU-27 Baseline Projection

## Import Dependency

In %

2000

2010

2020

2030

2000

2010

2020

2030

80

70

60

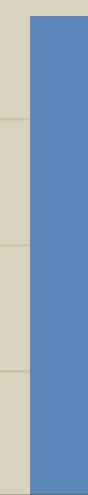
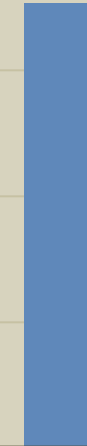
50

40

30

OIL

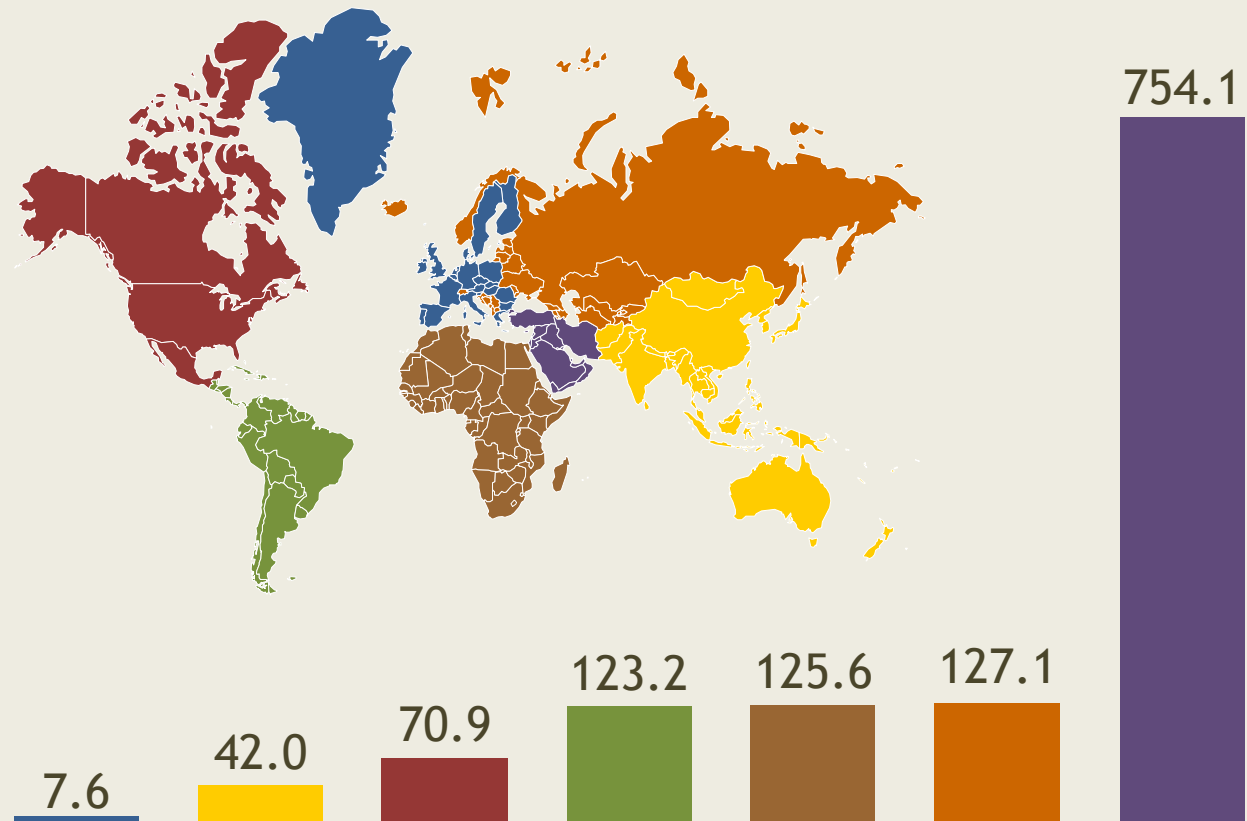
GAS



# Proven Oil Reserves (end of 2008)

Billion barrels

- European Union
- Asia Pacific
- North America
- South & Central America
- Africa
- Russia & other Eurasian countries
- Middle East

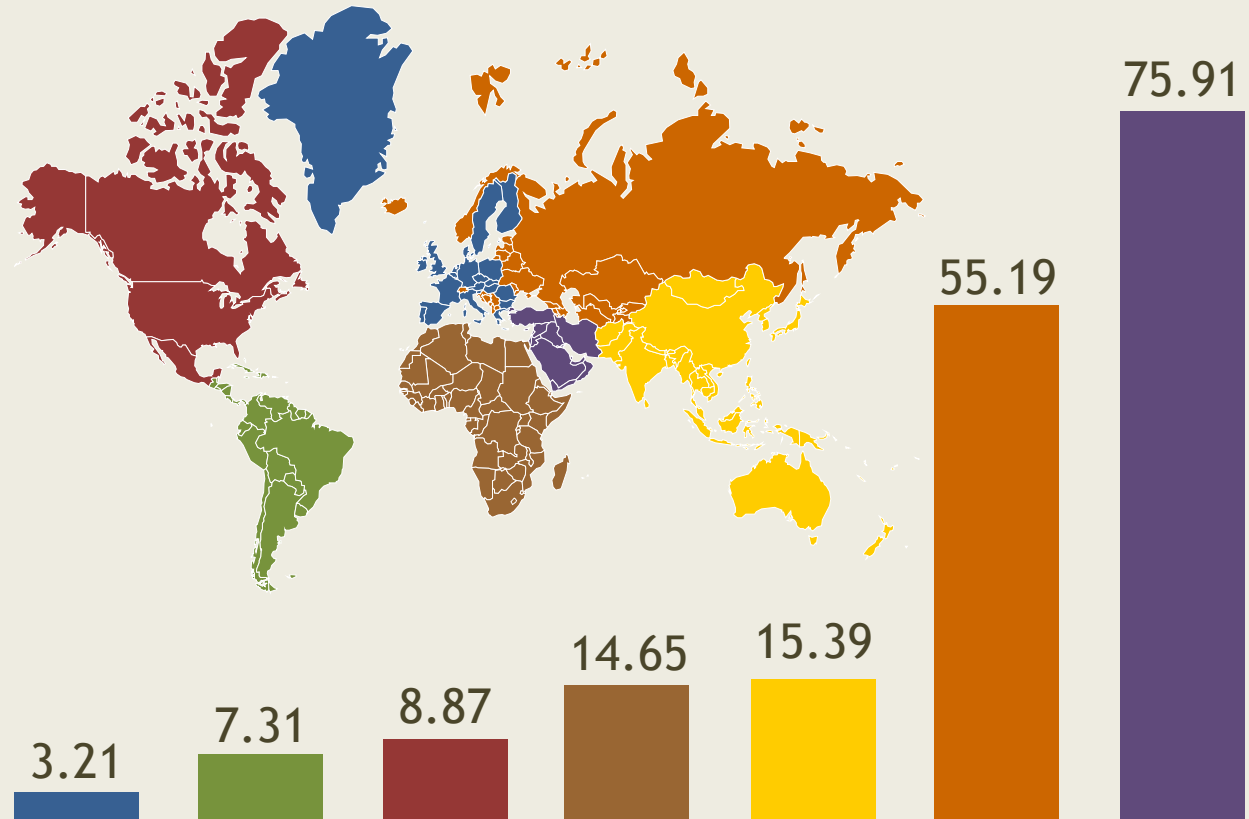


Source: BP statistical review of world energy full report 2009

# Proven Gas Reserves (end of 2008)



Trillion  
cubic metres

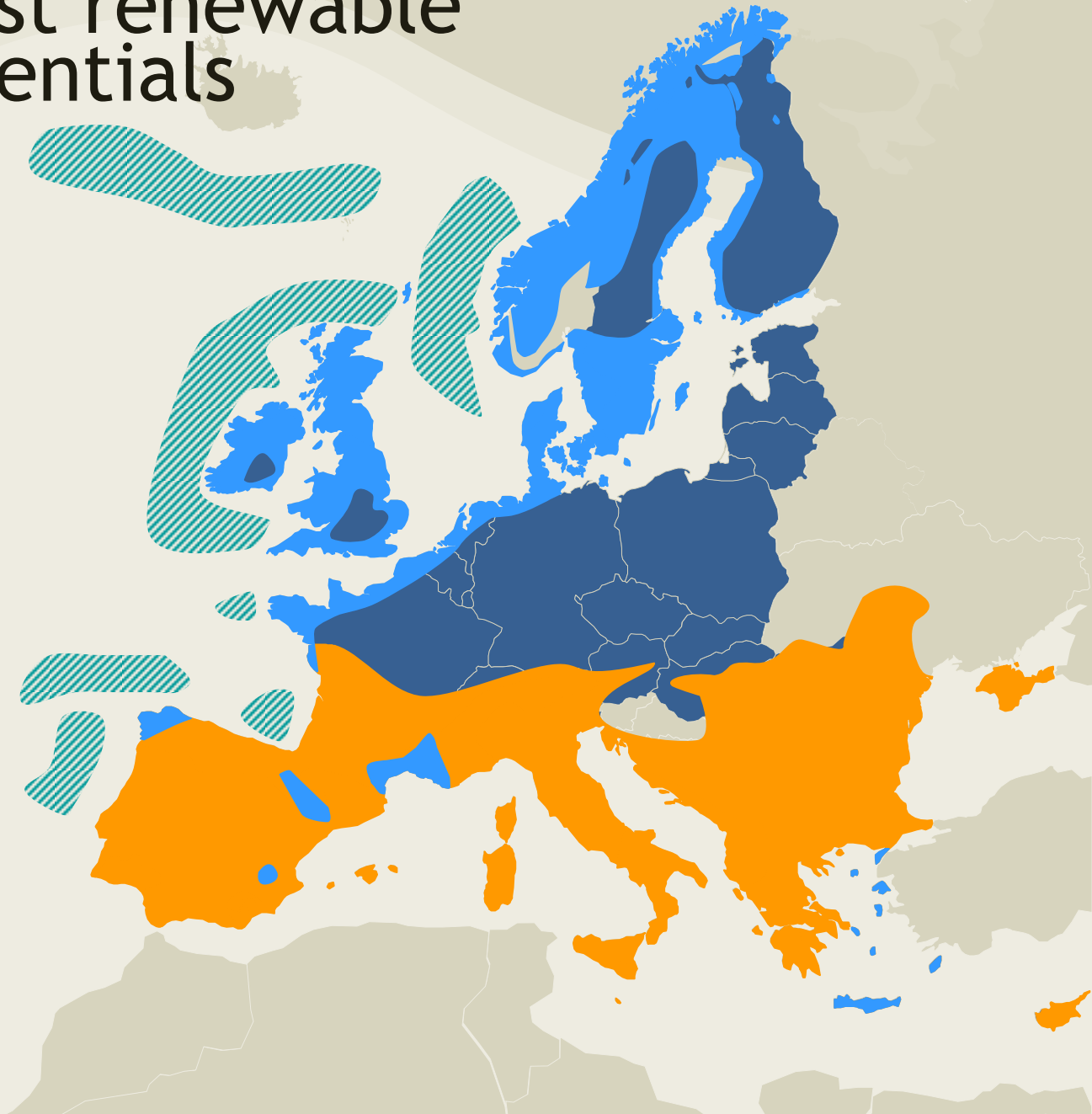
- European Union
- Asia Pacific
- North America
- South & Central America
- Africa
- Russia & other Eurasian countries
- Middle East



Source: BP statistical review of world energy full report 2009

# EU strongest renewable energy potentials

- Wind Energy Onshore 
- Solar Energy 
- Wave Energy 



Simplified Map

# Wind Potentials

ONSHORE



OFFSHORE



Strongest potential



Very high potential



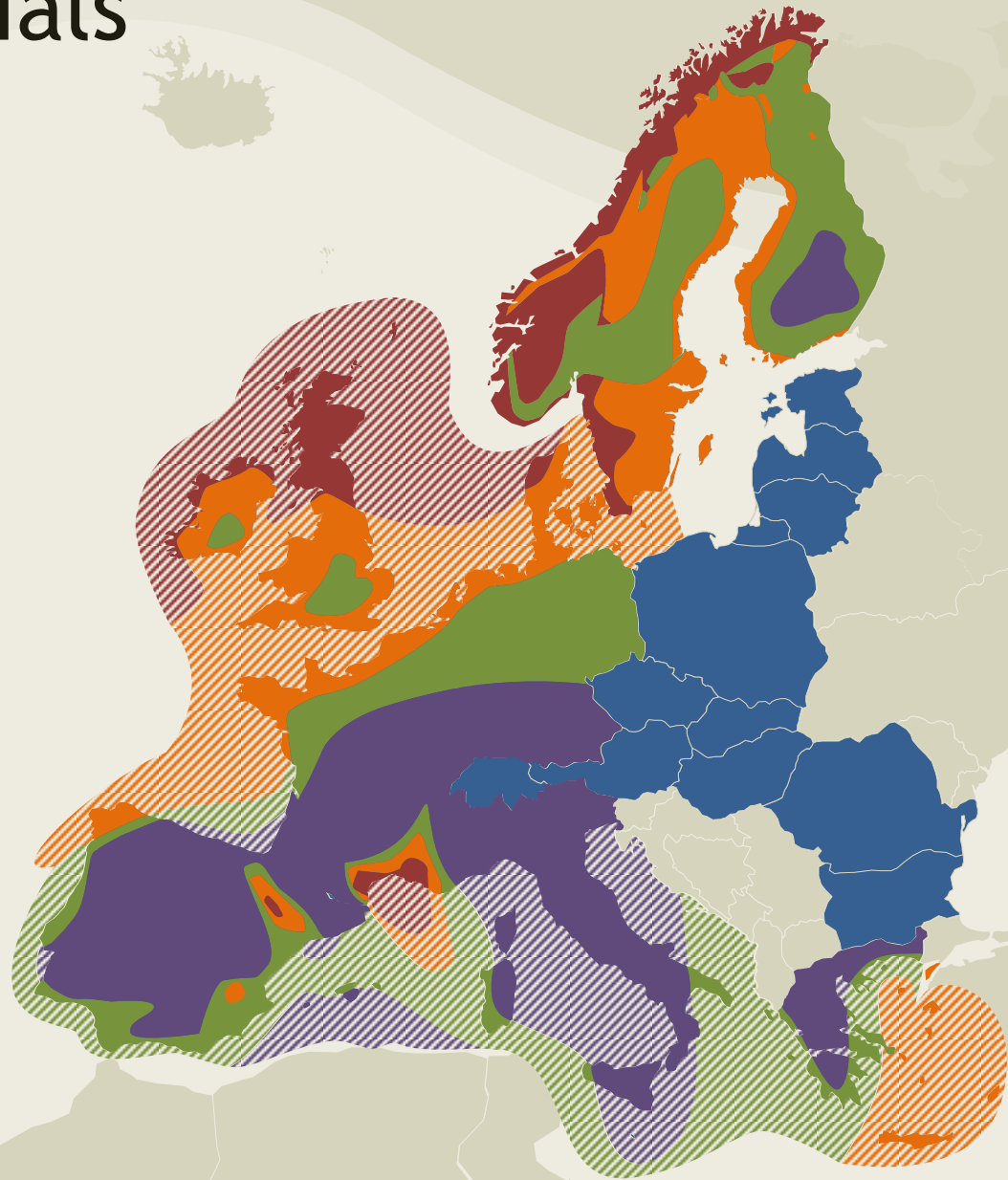
High/medium potential



Medium/low potential






No consolidated data available

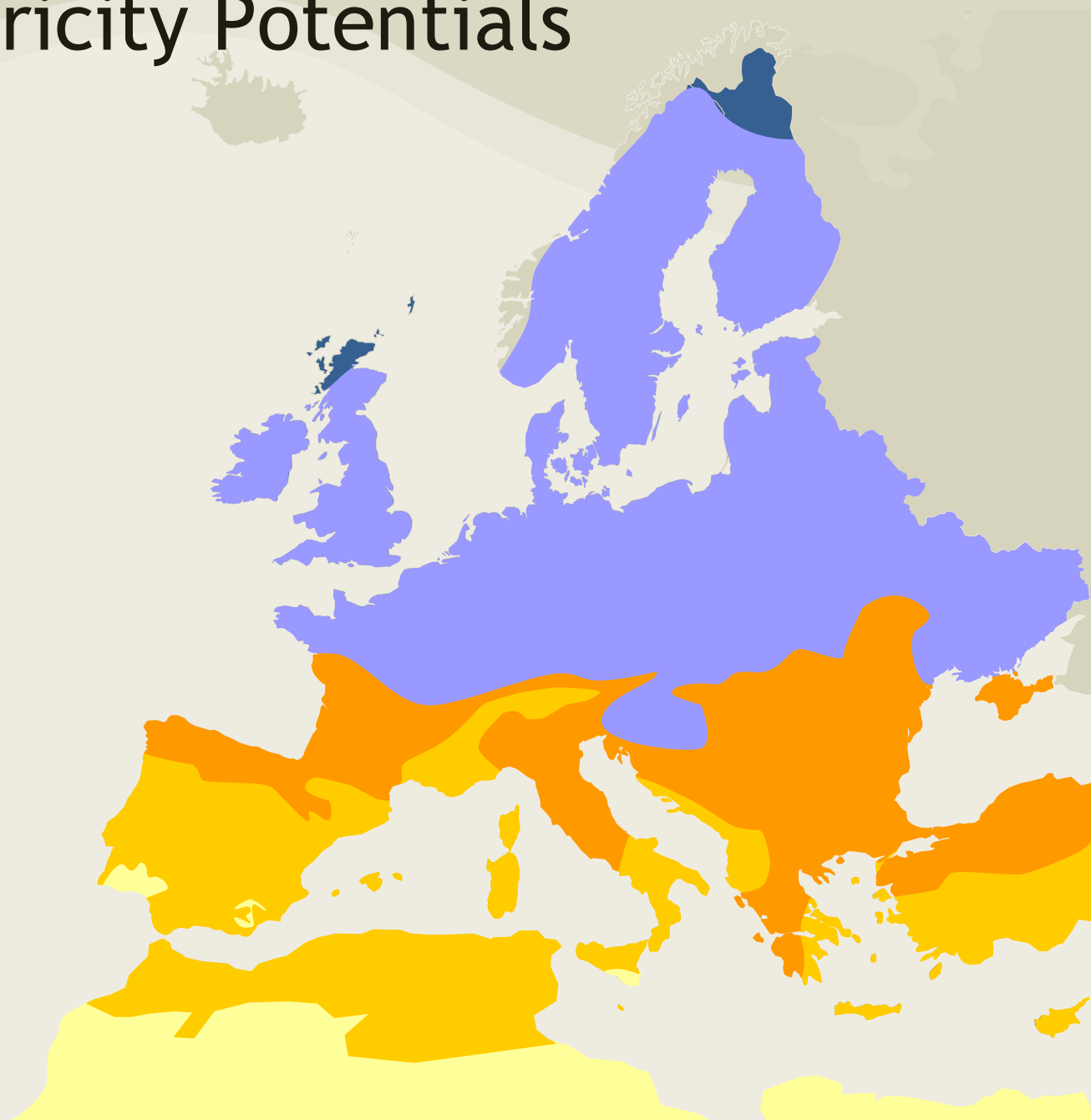


Simplified map based on  
Risø National Laboratory,  
Denmark, 1989

# Solar Electricity Potentials



-  Very low potential
-  Low/medium potential
-  Medium/high potential
-  Very high potential
-  Strongest potential + Concentrating Solar Power opportunities



Simplified map based on EU Joint Research Center, 2006

# 20 major RES leading companies

## Wind power

- Vestas AG
- Siemens Wind Power A/S
- Gamesa
- Enercon GmbH
- Nordex AG

## Fuel cell

- ACTA
- Ceres Power Holdings plc
- ITM Power
- Abengoa Bioenergy
- D1 OILS
- Energidalen

## Solar energy

- Conergy AG
- SolarWorld AG
- Solon AG
- Q-Cells AG
- ErSol AG

## Hydro Power

- Andritz AG
- Voith Siemens  
Hydro Power Generation
- Pelamis Wave Power Ltd.
- Marine Current Turbines Ltd.

## Geothermal power

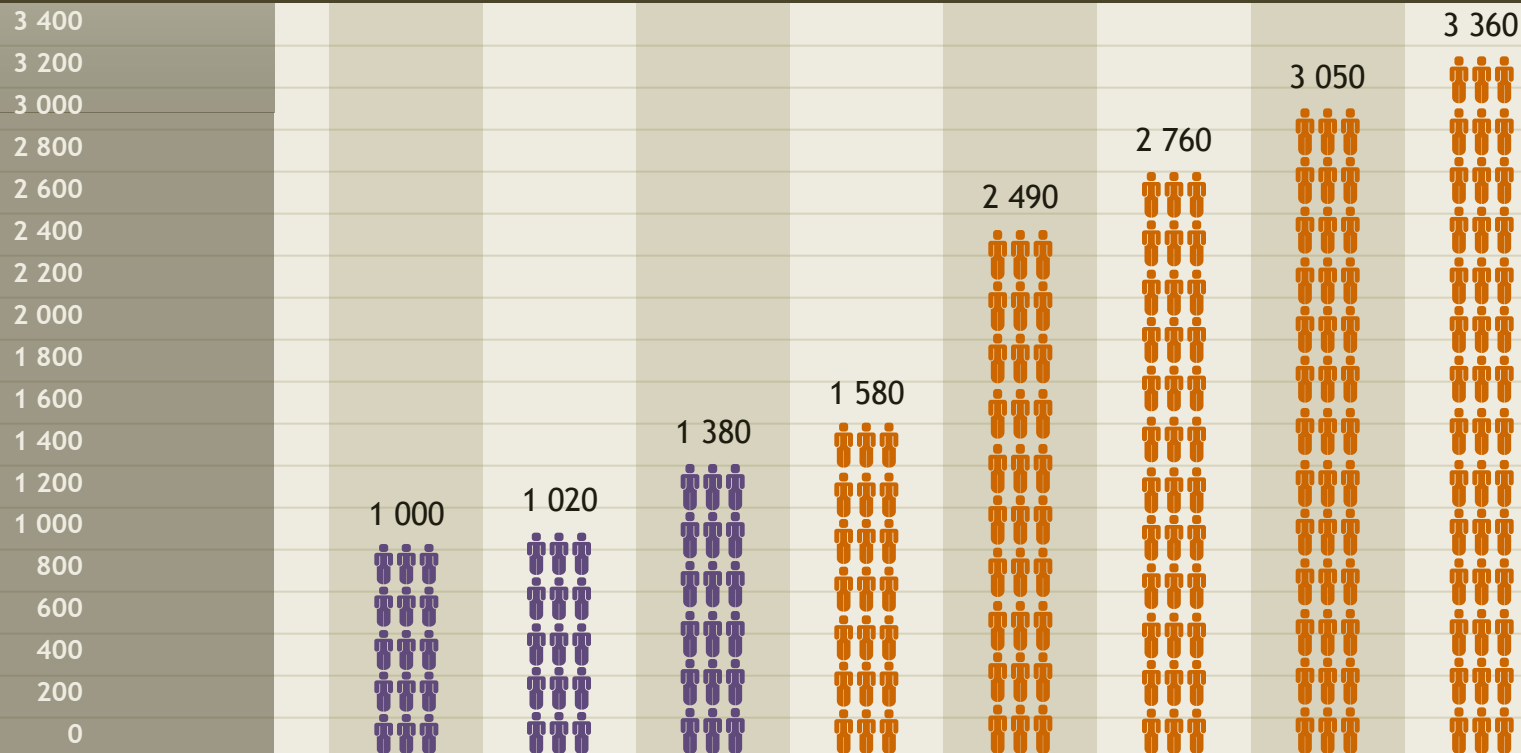
- Eco Systems Ireland

# Forecast of gross employment in the renewables sector in EU-27

## Accelerated deployment policy with moderate export share

Thousand employees

1995 2000 2005 2010 2015 2020 2025 2030



Past impacts Accelerated deployment policy with moderate export share (ADP-ME)

The impact of renewable energy policy on economic growth and employment in the EU  
[http://ec.europa.eu/energy/renewables/studies/doc/renewables/2009\\_employ\\_res\\_summary.pdf](http://ec.europa.eu/energy/renewables/studies/doc/renewables/2009_employ_res_summary.pdf)



A low Carbon Future

Increasing Import  
Dependency



The image is a composite. In the foreground, there are two large white wind turbines with three blades each, set against a blue sky. In the background, there is a complex industrial refinery with numerous tall distillation columns and piping. A stylized rainbow with multiple bands of color (red, orange, yellow, green, blue, purple) is superimposed over the sky. A white, hand-drawn rectangular box with a black outline is positioned horizontally across the middle of the image, containing the text "A new Industrial Revolution" in a white, bold, sans-serif font with a black drop shadow.

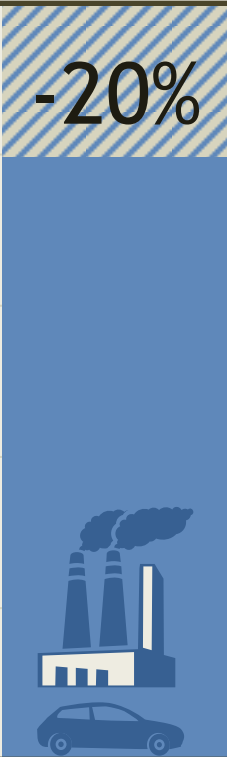
**A new Industrial Revolution**

# The 20-20-20 EU policy

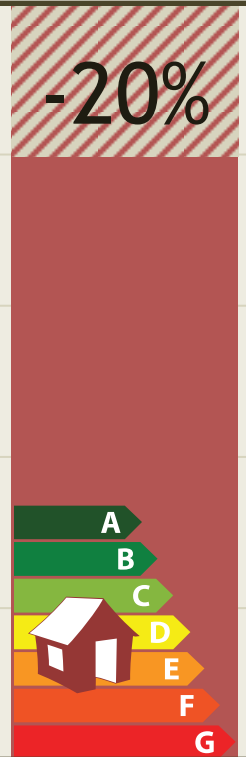
By 2020

100%

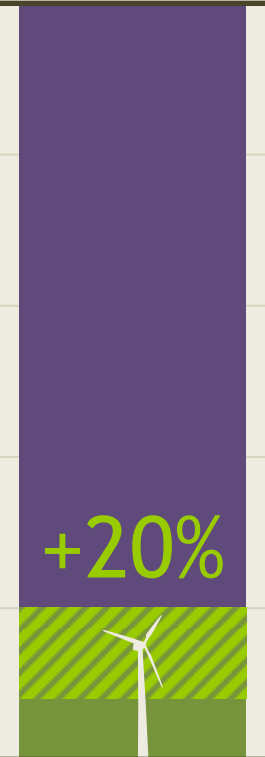
Greenhouse gas levels



Energy consumption



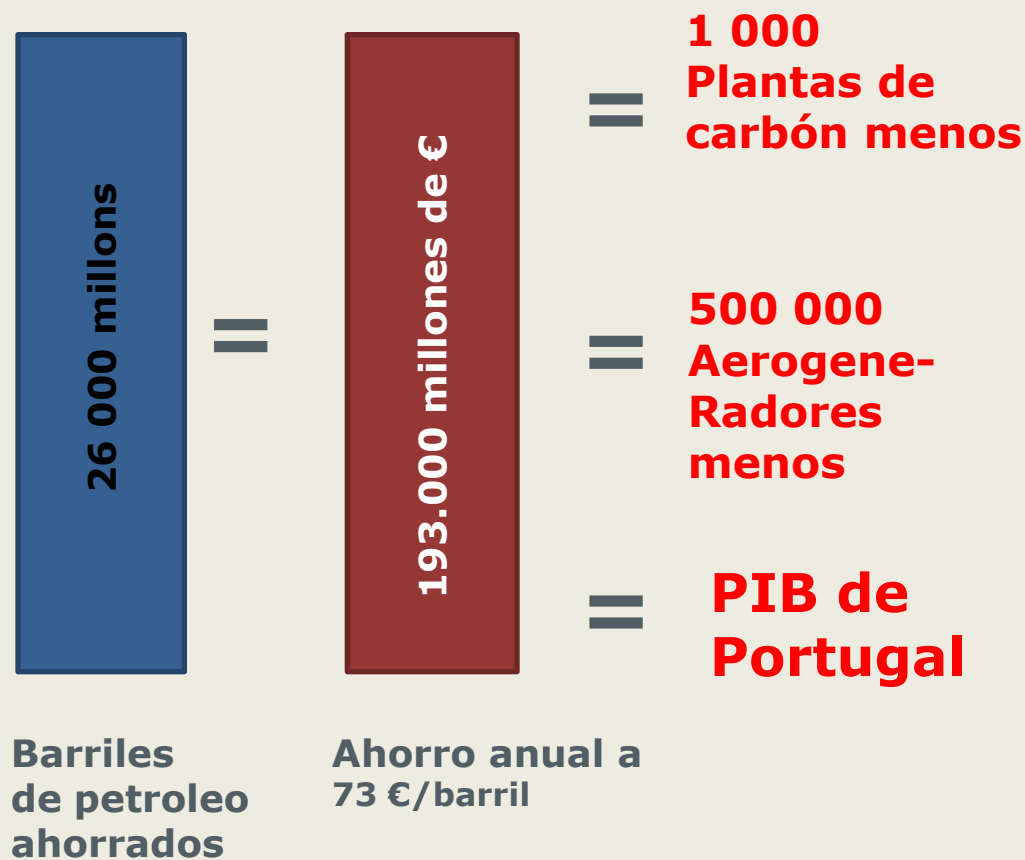
Renewables in energy mix



8.5%

# Beneficios de la eficiencia energética

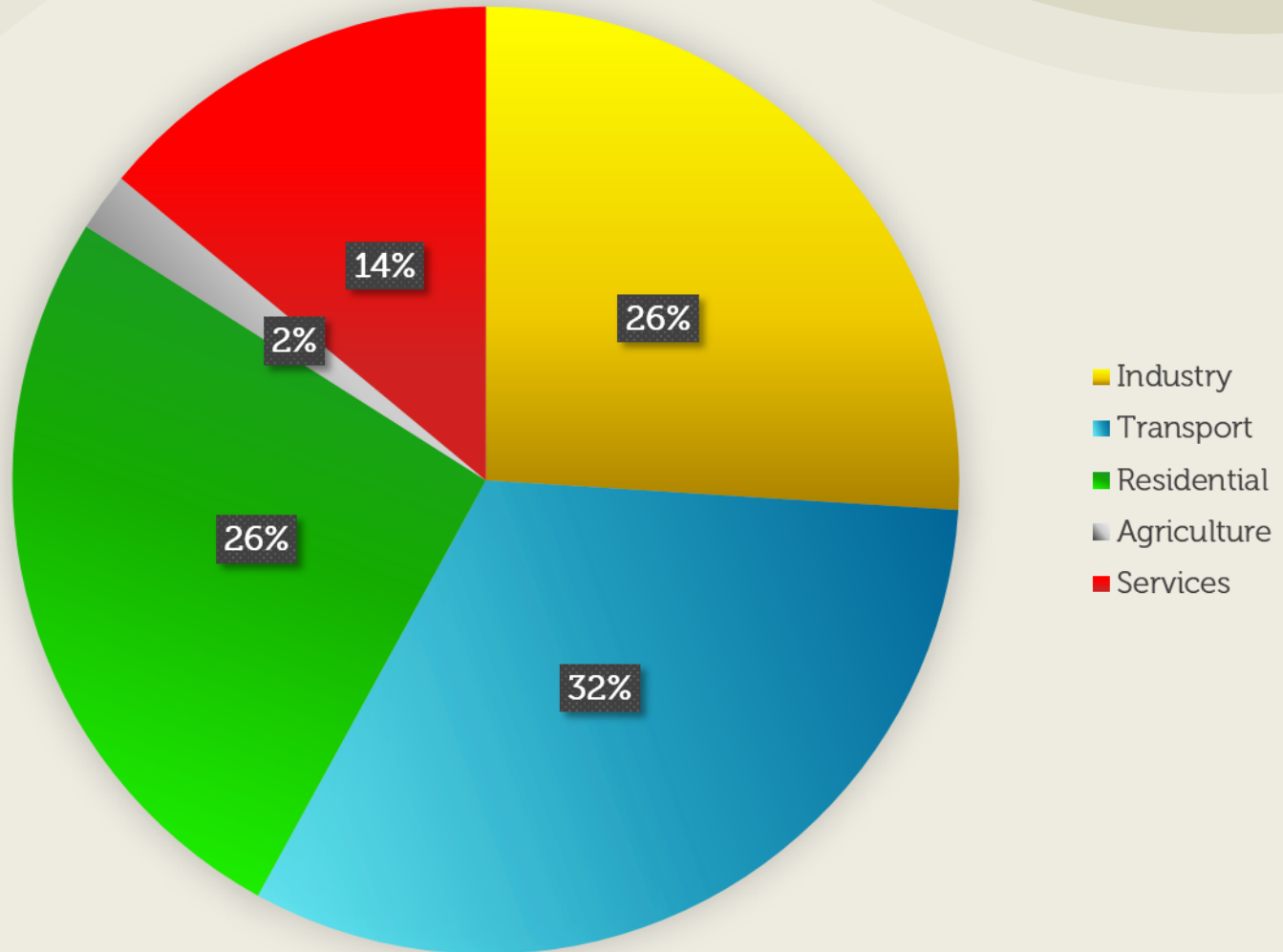
Si se alcanza el objetivo del 20% para el 2020



# Final energy demand by sector

EU-27

Energy Consumption by Sector in 2012



# Energy efficiency: Delivering the 20% target

## Key areas with the highest potential for energy savings

- Products
- Buildings and services
- Transport
- Energy transformation
- Financing
- Energy behaviour
- International partnerships

# Energy using products (EuP)

Planning eco-design and labelling measures (update 1 July 2009)	Committee vote	Commission adoption
Eco-design of standby	Jul 2008	Dec 2008
Eco-design of simple set top boxes	Sep 2008	Jan 2009
Eco-design of tertiary sector Lighting (street and office)	Sep 2008	Feb 2009
Eco-design of external power supplies	Oct 2008	Feb 2009
Eco-design of domestic lighting	Dec 2008	Mar 2009
Eco-design of circulators	Mar 2009	Jul 2009
Eco-design of electric motors	Mar 2009	Jul 2009
Eco-design and labelling of water heaters	Mar 2010	Jul 2010
Eco-design and labelling of washing machines	Mar 2010	Jul 2010
Eco-design and labelling of dishwashers	Mar 2010	Jul 2010

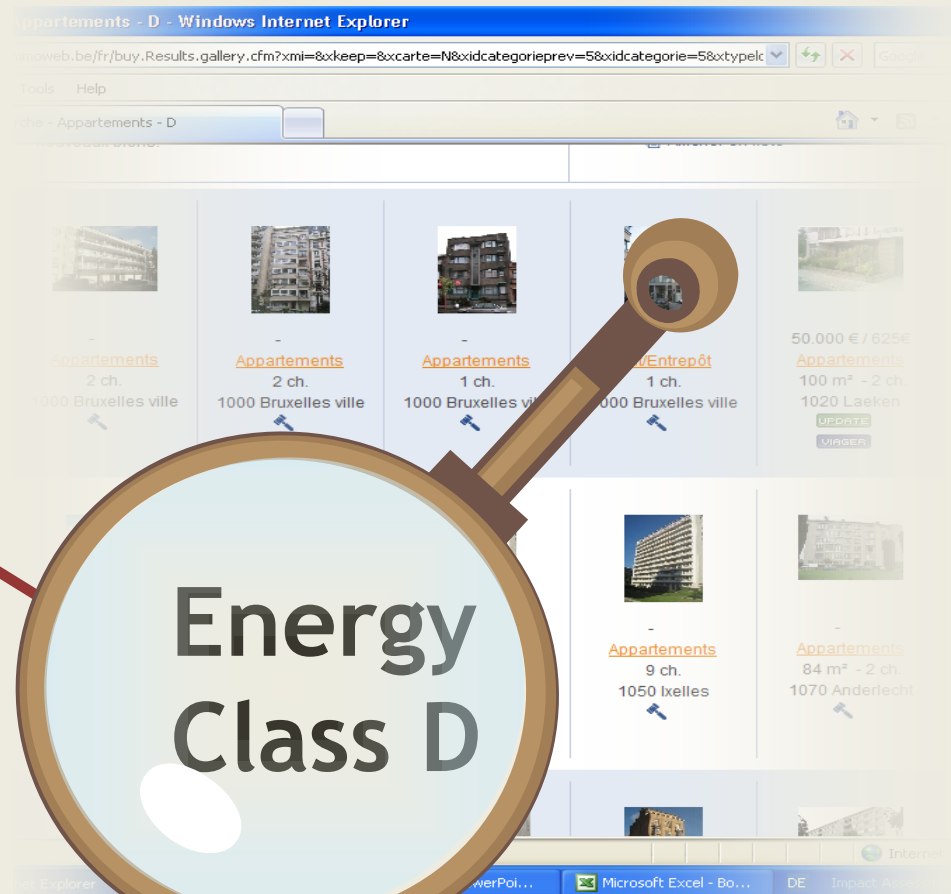
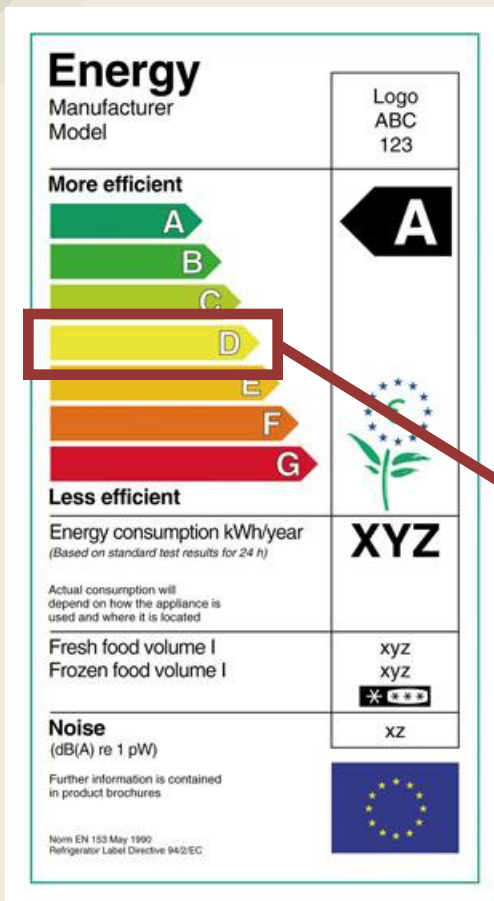
# Energy using products (EuP)

Planning eco-design and labelling measures (update 1 July 2009)	Committee vote	Commission adoption
Eco-design and labelling of domestic refrigerators and freezers	Mar 2010	Jul 2010
Eco-design of TVs	Mar 2009	Jul 2009
Labelling of TVs	Mar 2010	Jul 2010
Eco-design of personal computers	Feb 2010	Jun 2010
Eco-design of imaging equipment (copiers, printers, faxes, scanners...)	Feb 2010	Jun 2010
Eco-design and labelling of boilers	Mar 2010	Jul 2010
Eco-design of air-conditioning	Mar 2010	Jul 2010
Amended Directive on the labelling of domestic lamps	Apr 2010	Sep 2010



# EPBD recast: What shall happen?

## Energy Performance Certificate



# Buildings: EPBD recast



# Recast of the Energy Performance of Buildings Directive (EPBD)

- Scope extended to smaller buildings in case of major renovation
- Administrative burden kept to a minimum
- Energy performance certificate to become an effective tool in the real estate market
- Stimulating higher market uptake of low or zero energy housing
- Introducing a tool to benchmark national/regional building codes

# Energy Performance Certificate

## Energieprestatie certificaat

**Energieprestatie utiliteitsbouw**  
Berekening conform NEN 2916:2001

energieprestatie van de gebouw

klasse

Q<sub>pres,tot</sub>/Q<sub>pres,totaal</sub>

vervalende energieprestatieberekening	Q <sub>pres,tot</sub>	Q <sub>pres,totaal</sub>
verwarming	41.142.822 MJ	30.721.311 MJ
verlichting	1.084.723 MJ	1.084.723 MJ
waterverwarmen	2.664.830 MJ	2.664.830 MJ
koelen	1.773.572 MJ	1.773.572 MJ
ventilatie	1.345.215 MJ	1.345.215 MJ
verlating	28.945.841 MJ	28.945.841 MJ
verlating	-33.981.484 MJ	-33.981.484 MJ
comp. PV-panelen	71.290.829 MJ	71.290.829 MJ
comp. Wk	34.097.849 MJ	34.097.849 MJ
totaal		

**Gegevens van het gebouw:**  
Berlaymont gebouw te Brussel

- Beschouwd gebruiksovervlakken:
  - Kantoorfunctie: 34.771,50 m<sup>2</sup>
  - Bijeenkomstfunctie overige: 24.191,10 m<sup>2</sup>
  - Gemeenschappelijke ruimten: 64.339,20 m<sup>2</sup>
- De parkeerplaats, archiefkelders en het station zijn in overeenstemming met NEN 2916:2001 en het bouwbesluit, buiten beschouwing gelaten.

**Aanbevelingen tot verbetering van de energieprestatie:**  
niet van toepassing

## ENERGIEPASS

Projektbezeichnung: EU-Kommissions-Gebäude Berlaymont | Erstellt am: 16. Dezember 2004

**Gesamtbewertung Primärenergiebedarf**

Dieses Gebäude: 218 kWh/m<sup>2</sup>a

Energieeffizientes Klimatisiertes Verwaltungsgebäude | Durchschnittliches Klimatisiertes Verwaltungsgebäude

Gebäudetyp / Nutzungsart	Klimatisiertes Verwaltungsgebäude
Adresse	Rue de la Loi, B-1040 Brüssel
Nutzer	Europäische Kommission
Baujahr Gebäude	1967 / 2004
Baujahr Anlagentechnik	2004
Nettogrundfläche	170.721 m <sup>2</sup>
Energiepass erstellt mit	DIN V 18599

**Nutzer:** Europäische Kommission, Rue de la Loi B-1049 Brüssel

**Aussteller:** Fraunhofer-Institut für Bauphysik, Nobelstraße 12 D-70569 Stuttgart

## Energieausweis

Gebäudeart: Klimatisiertes Verwaltungsgebäude | Erbaut: 1967 / 2004

Standort: PLZ: B-1040 | Ort: Brüssel | Grundst. Nr.: | KG: |

Eigentümer/Errichter: Europäische Union | Adresse: Rue de la Loi B-1040 Brüssel

**Spezifischer Heizwärmebedarf:** 63 kWh/m<sup>2</sup>a

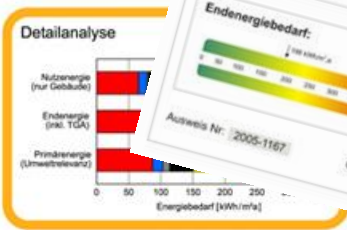
Heizwärmebedarf: 63 kWh/m<sup>2</sup>a  
Heizenergiebedarf: 131 kWh/m<sup>2</sup>a  
Beleuchtung: 18 kWh/m<sup>2</sup>a

Kühlwärmebedarf: 13 kWh/m<sup>2</sup>a  
Kühlenergiebedarf: 19 kWh/m<sup>2</sup>a  
Lüftung: 17 kWh/m<sup>2</sup>a

Endenergiebedarf: 198 kWh/m<sup>2</sup>a  
CO<sub>2</sub>-Emissionen: 19 t/m<sup>2</sup>a

**Aussteller:** Institut für Wärmetechnik (IWT), Technische Universität Graz, Inffeldgasse 25/B A-8010 Graz, www.iwt.tugraz.at

Ausweis Nr.: 2005-1167 | Gültigkeit: 2015 | Datum: 02.05.2005 | Unterschrift: [Signature]



# New energy efficiency directive (2012)

- Quantifies 1 483 Mtoe max primary energy consumption or 1 086 final.
- Indicative national energy efficiency targets.
- Efficiency obligations schemes or other targeted policy measures to drive energy efficiency improvements in households, industries and transport sectors;
- Smart metering to empower consumers to better manage their consumption.
- Obligatory energy audit for big companies and incentives for.
- Annual renovation of 3% of public buildings.
- Efficiency in energy generation.



# 2030

**FRAMEWORK**for**CLIMATE&ENERGY**

#EU2030

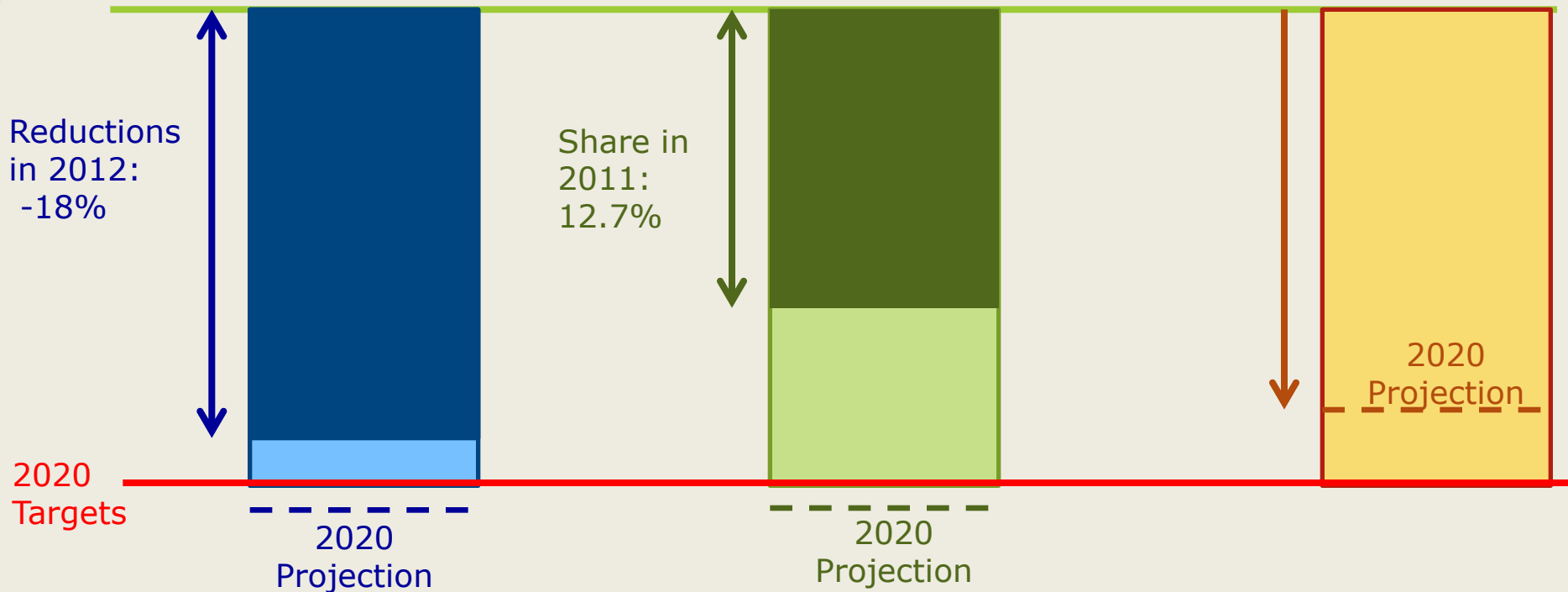
# 1. Climate and energy: where do we stand?

- Progress towards the 2020 goals

Reduce Greenhouse Gas  
Emissions levels by 20%

Increase share of  
Renewables to 20%

Reduce energy consumption  
by 20%



# 1. Climate and energy: where do we stand?

- Main changes

Renewable energy saw rapid cost decreases  
Technologies are gradually becoming competitive

Impact of the financial crisis  
Fall in private investment, tight financing conditions

Fukushima

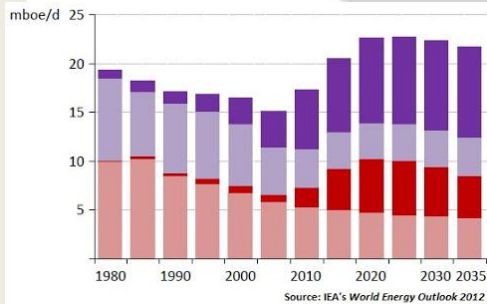


Some countries phase out nuclear power production

Rising demand  
-> rising prices

By 2030, world economy set to double and energy demand to rise by 1/3

Shale gas  
US oil and gas production

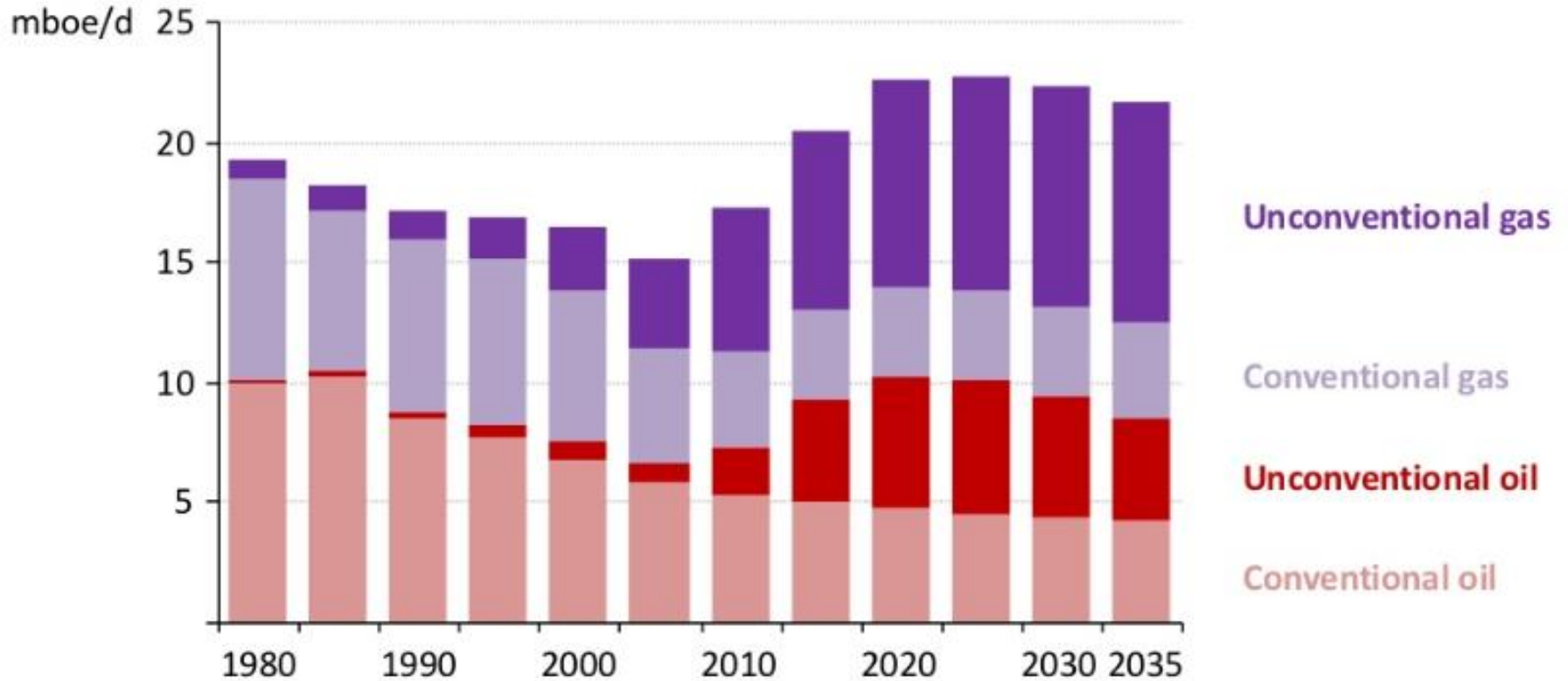


Unconventional gas  
Unconventional oil  
Conventional gas  
Conventional oil

# A United States oil & gas transformation

WORLD  
ENERGY  
OUTLOOK  
2013

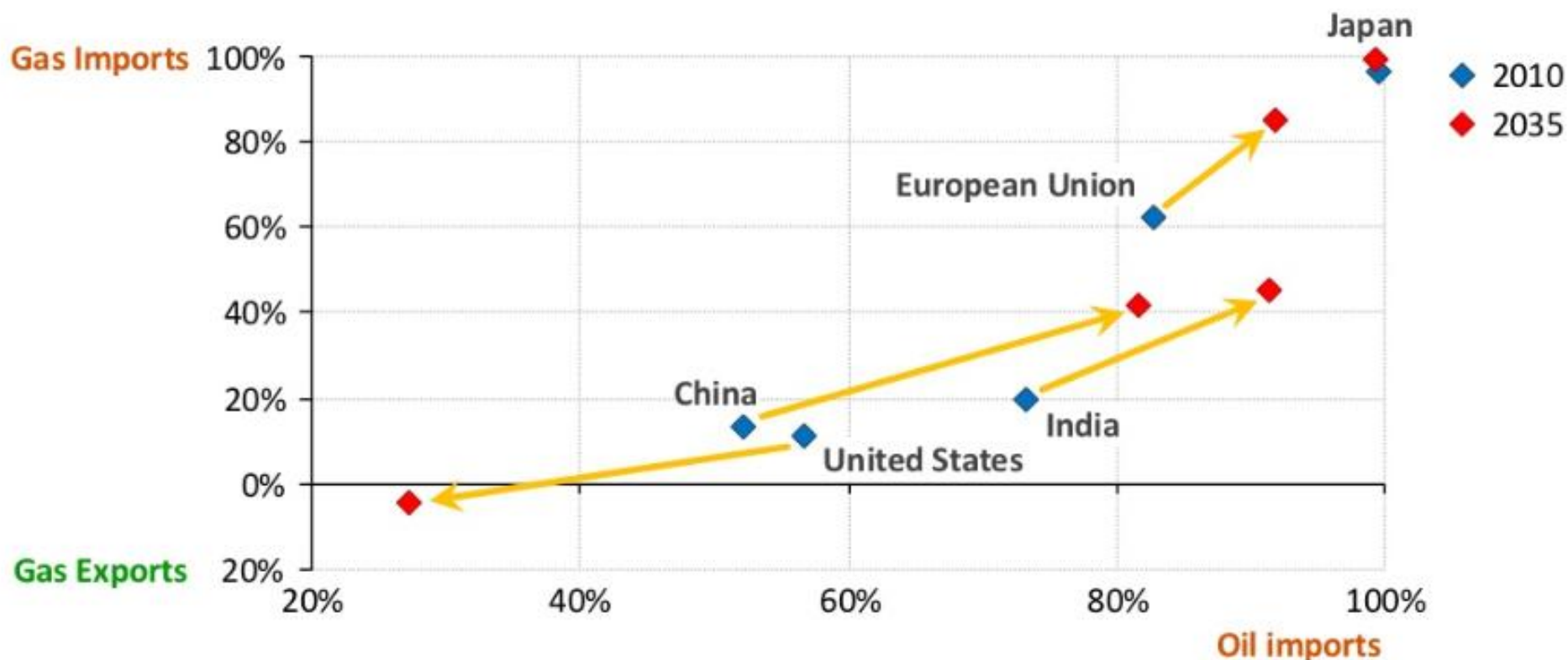
## US oil and gas production



*The surge in unconventional oil & gas production has implications well beyond the United States*

# Different trends in oil & gas import dependency

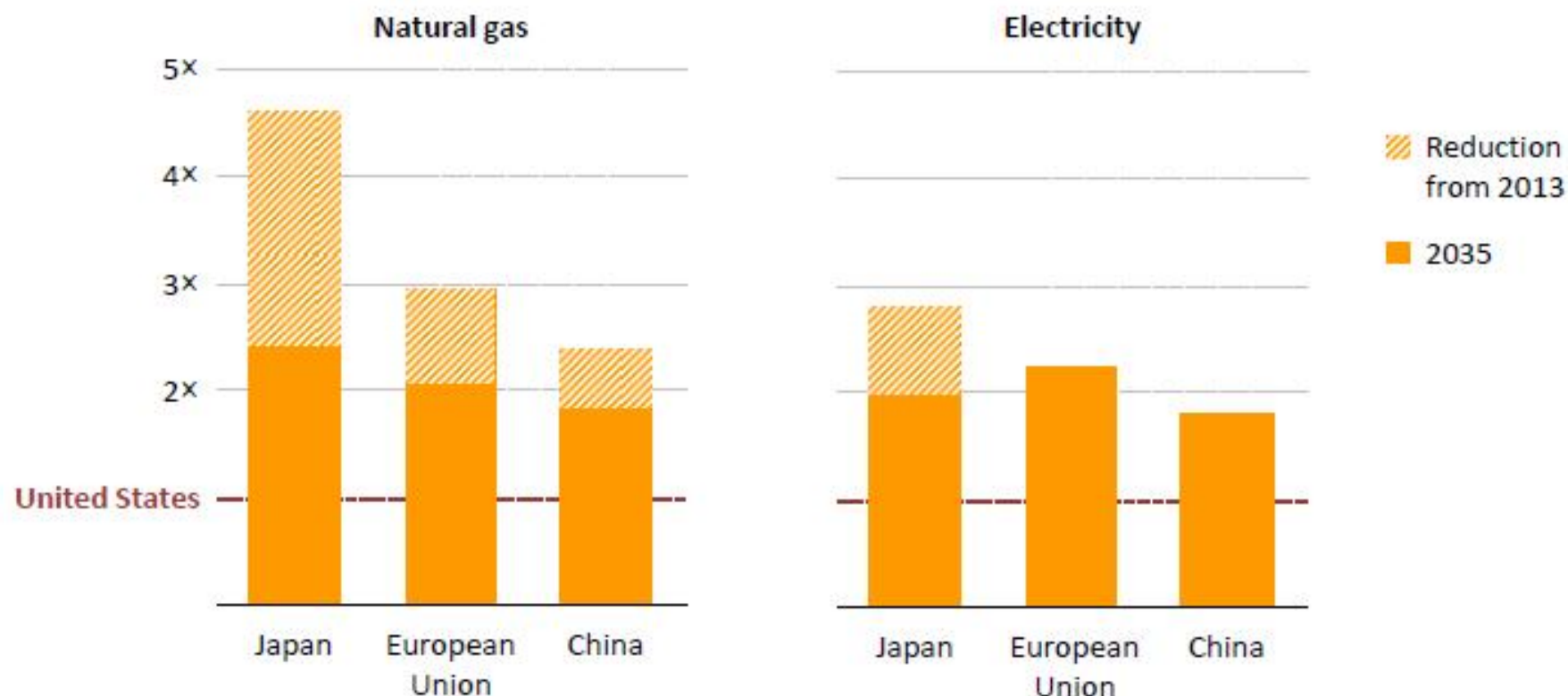
## Net oil & gas import dependency in selected countries



*While dependence on imported oil & gas rises in many countries, the United States swims against the tide*

# Who has the energy to compete?

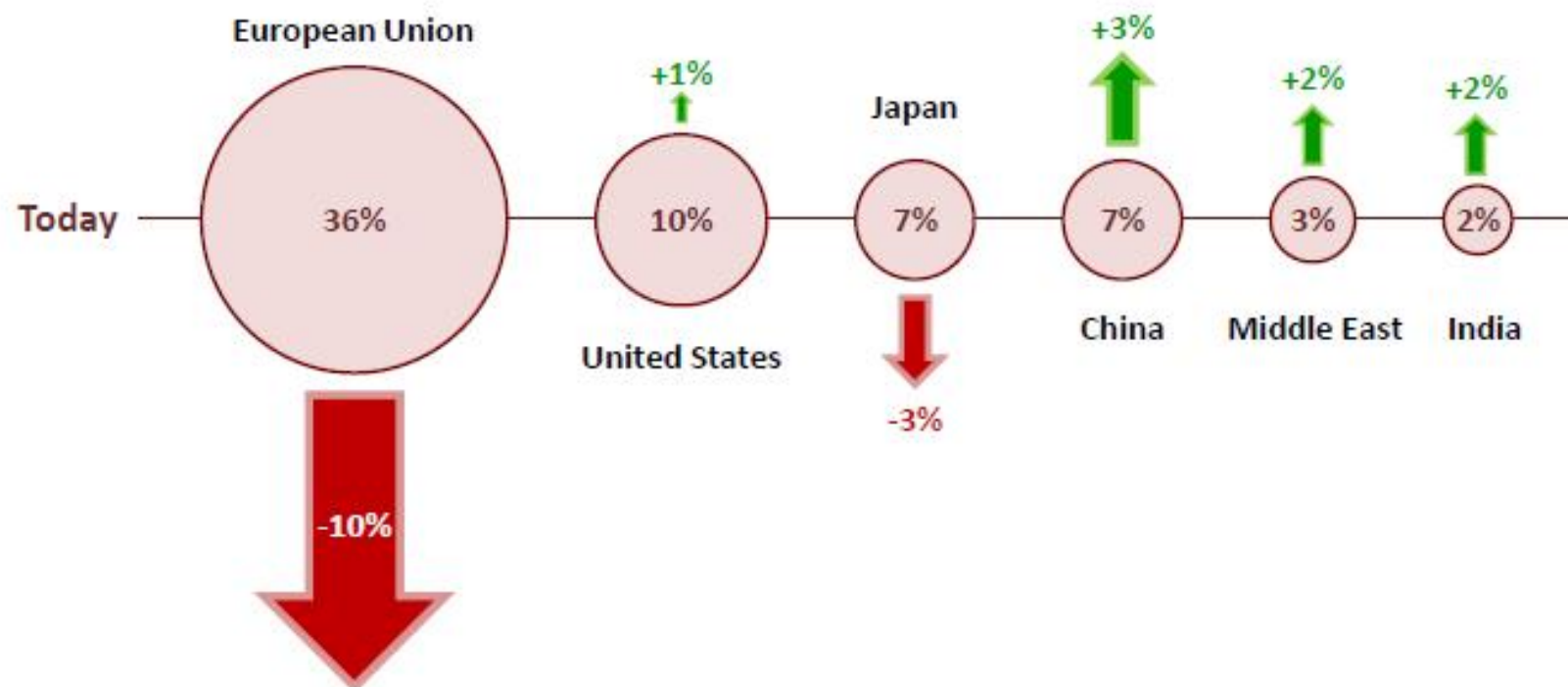
## Ratio of industrial energy prices relative to the United States



*Regional differences in natural gas prices narrow from today's very high levels but remain large through to 2035; electricity price differentials also persist*

# An energy boost to the economy?

## Share of global export market for energy-intensive goods



*The US, together with key emerging economies, increases its export market share for energy-intensive goods, while the EU and Japan see a sharp decline*

# 1. Climate and energy: where do we stand?

- Prices and costs

In the EU:

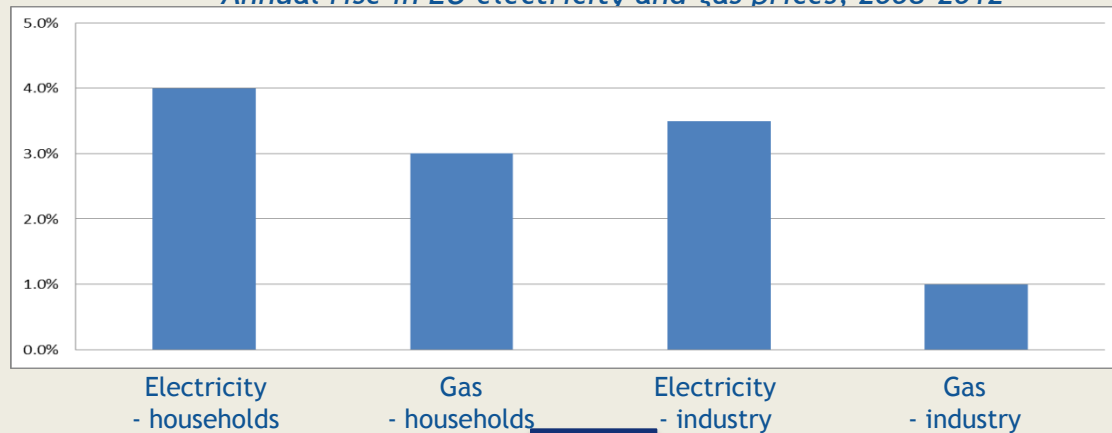
- Wholesale prices have been stable or low
- Retail prices have risen, often above inflation, mainly driven by:
  - taxes and levies, network costs and energy supply costs.

Elsewhere:

- Prices (especially gas) have fallen.

Europe needs to contain energy costs to remain competitive.

*Annual rise in EU electricity and gas prices, 2008-2012*



# 1. Climate and energy: where do we stand?

- Prices and costs
  - Minimise network costs with best practice
  - Complete the internal (wholesale and retail) market: competition brings cost savings
  - Switch energy supplier
  - Use more energy efficient products and processes
  - Keep (energy financed) energy and climate policies cost effective
  - Ultimately, protect vulnerable households and exposed industries

## 2. Why a new framework for 2030?

**Reducing Greenhouse Gas Emissions  
(GHG) cost-effectively**  
2050 objective: -80% to -95% GHG

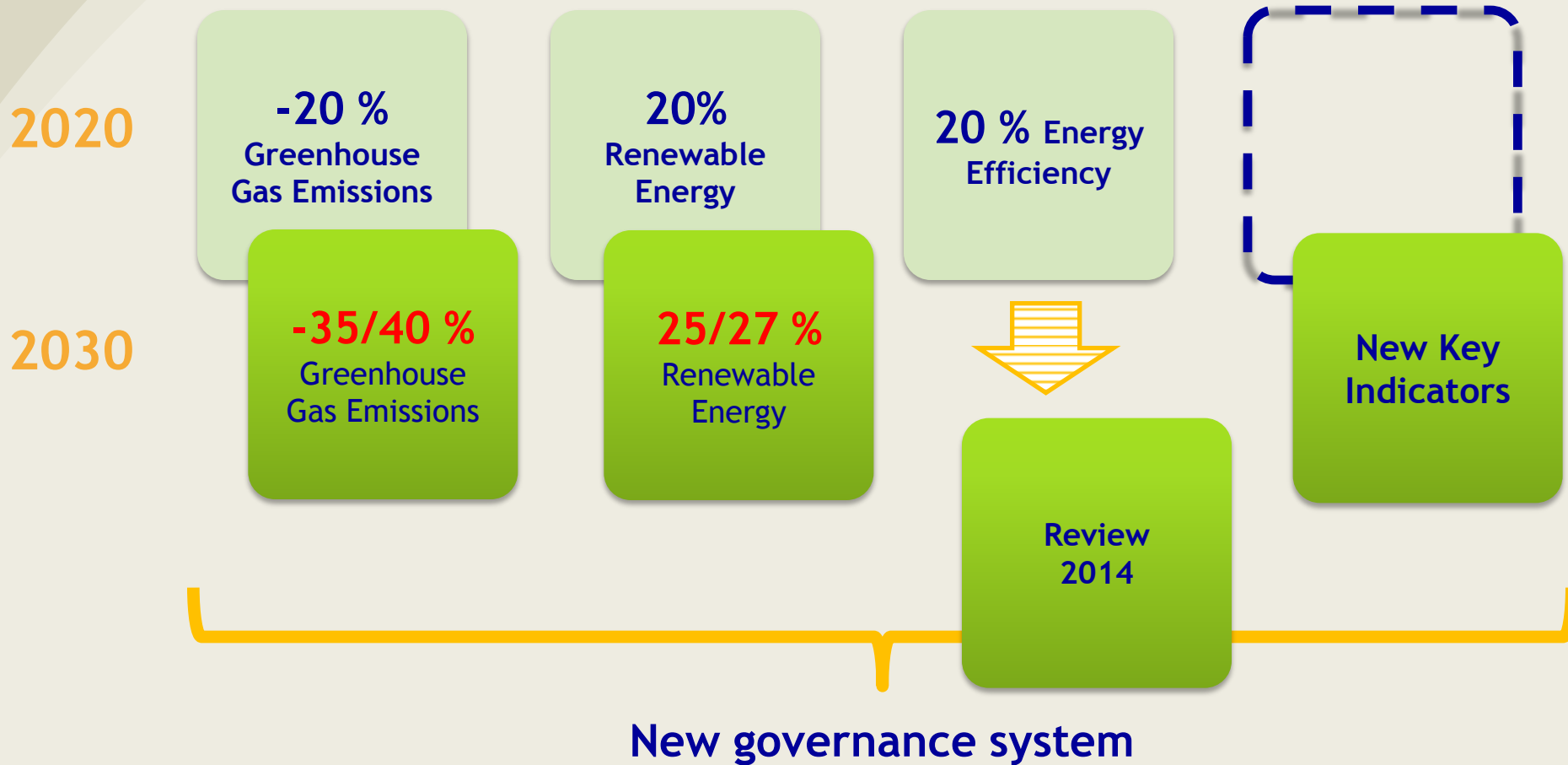
**Security of EU energy supplies**

EU oil and gas imports:  
€ 400 billion per year

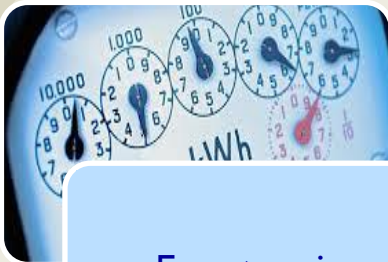
EU contribution to 2015  
international climate  
agreement

**Competitive energy and new  
growth and jobs**  
Eco-industry already employs 4.2  
million

### 3. How it works



### 3. How it works



Energy price  
differentials



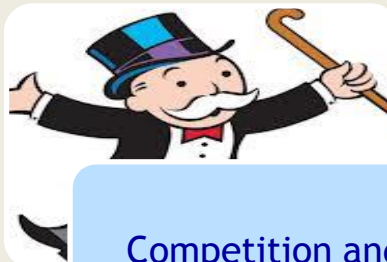
Diversification  
imports,  
share of indigenous  
energy



Smart grids &  
connectors between  
Member States



Intra-EU coupling  
energy markets



Competition and  
market  
concentration



Technological  
innovation

### 3. How it works

• New Governance system  
National plans for competitive, secure and sustainable energy

Commission develops **detailed guidance**

Member States prepare plans based on **an iterative process**

**Commission assesses** Member States' plans and commitments

Include domestic objectives on:

- non-ETS GHG emissions
- renewable energy
- energy savings
- energy security
- ....

## 4. Main challenges...

### Energy costs

- **Increasing** in any event: renew **ageing** energy system, rising fossil **fuel prices**, adherence to **existing policies**

### Additional **investments** to achieve 2030 framework

- Shift away from **fuel expenditure** towards investments, additional **€ 38 billion** investment/year 2011-2030 compared to the reference scenario

### Differences between Member States

- Future discussion will have to be centred on how to ensure an **equitable burden sharing** affordable for all

« *I want to reform and reorganise  
Europe's energy policy  
in a new European Energy Union.* »

**Jean-Claude Juncker**



# The Energy Union

## Where we want to go:

Secure, sustainable, competitive, affordable energy for every European

## What this means:

Energy security, solidarity and trust  
A fully integrated internal EU-wide energy market  
Energy efficiency as an energy source in its own right  
Transition to a low-carbon society  
Research, innovation and competitiveness

## How we want to reach it:





# Our vision of an Energy Union

True **solidarity and trust**; speaking with **one voice** in global affairs

An **integrated**, continent-wide energy system

Sustainable, **low-carbon** and climate-friendly economy

Strong, innovative and **competitive** European economy

**Citizens** taking ownership of the energy transition

# 1 Energy Security, solidarity and trust

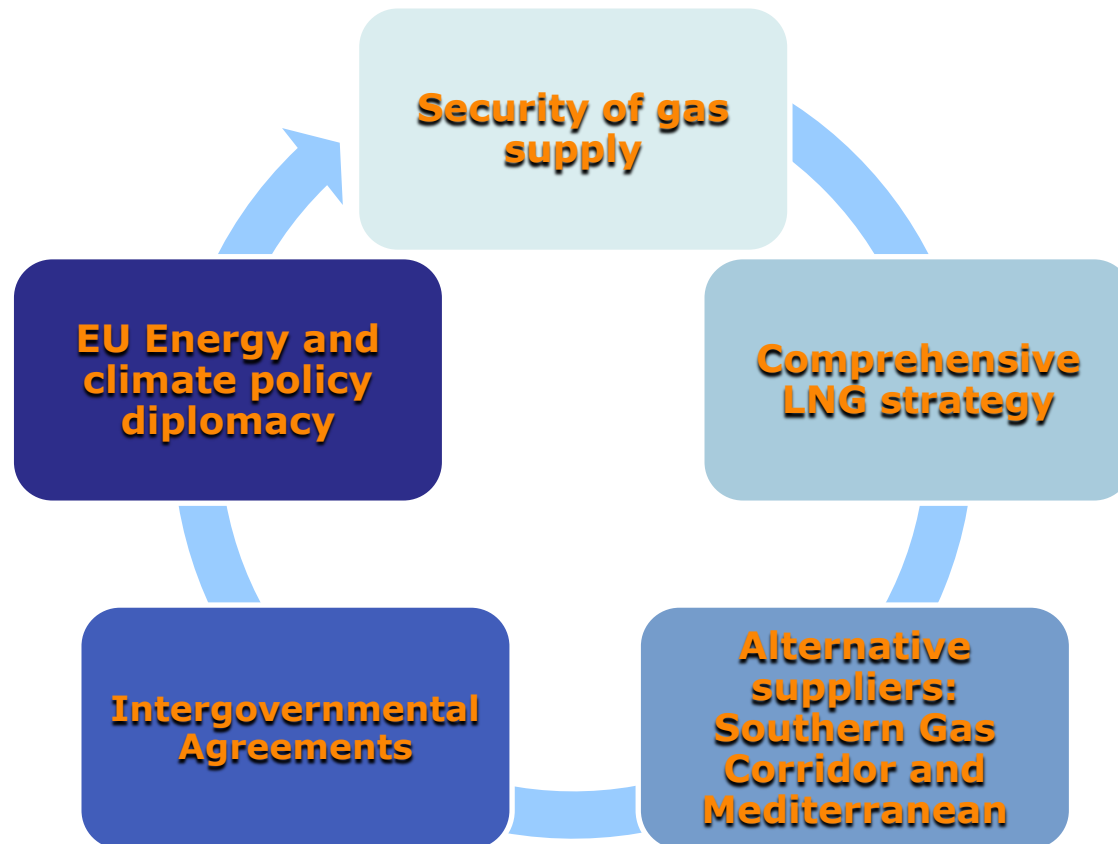


We have to **diversify** energy supply

This means an increased variety of sources, suppliers and routes; increasing transparency on gas supply; working together on security of supply and developing a stronger European role in global energy markets.

# Energy Security, solidarity and trust

## Concrete actions

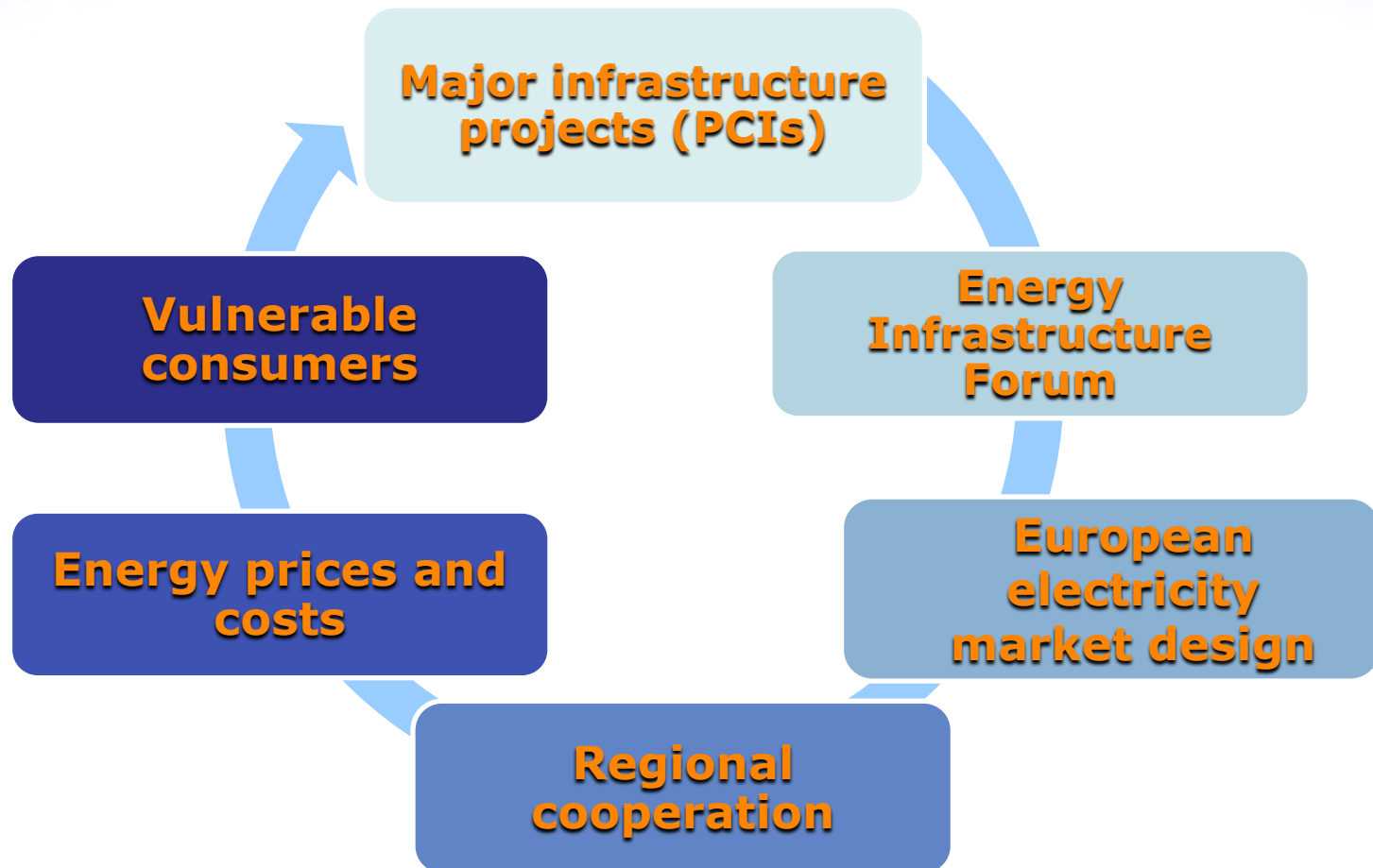


## 2 A fully-integrated internal energy market

**Energy should flow freely across  
the EU – without any technical  
or regulatory barriers**

# A fully-integrated internal energy market

## Concrete actions



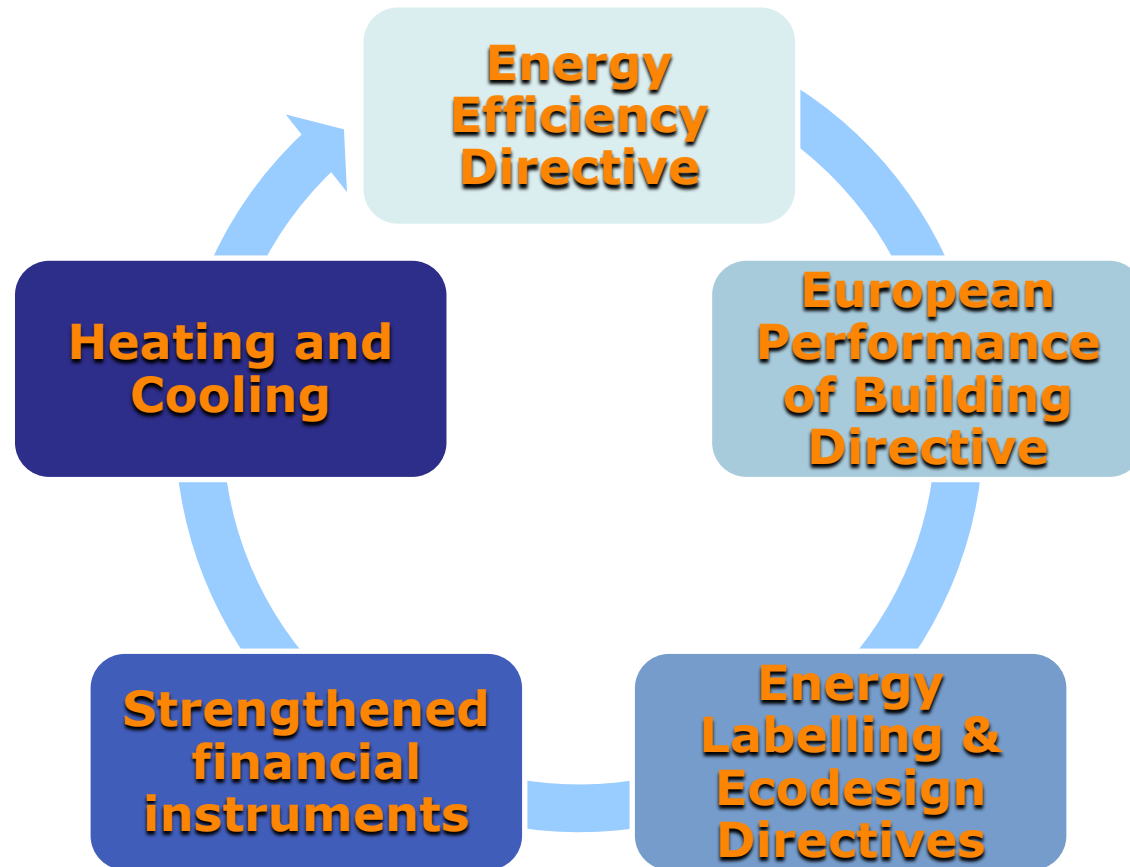
# 3 Energy efficiency



**Rethink energy efficiency as an energy source in its own right**

# Energy efficiency

## Concrete actions



# 4 Decarbonisation of the Economy



An **ambitious climate policy** is an  
integral part of our **Energy Union**

# Decarbonisation of the Economy

## Concrete actions



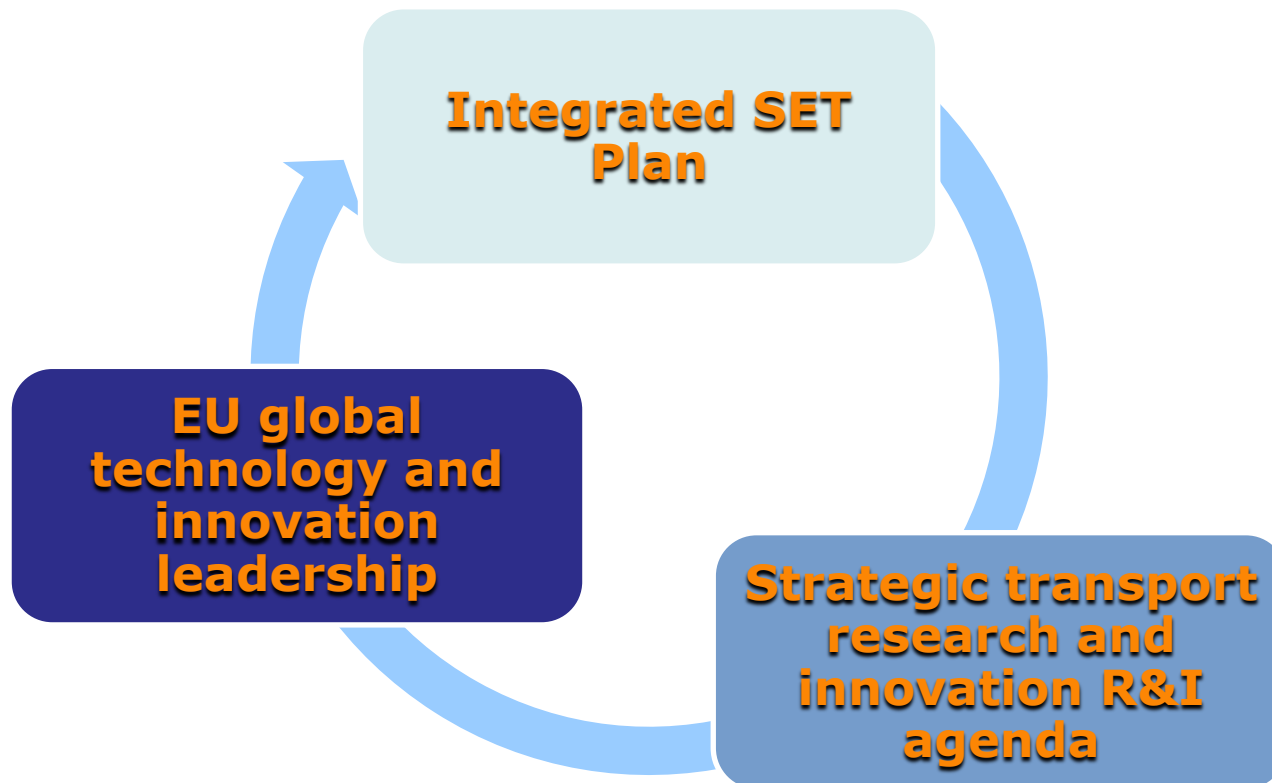
# 5 Research, innovation And competitiveness



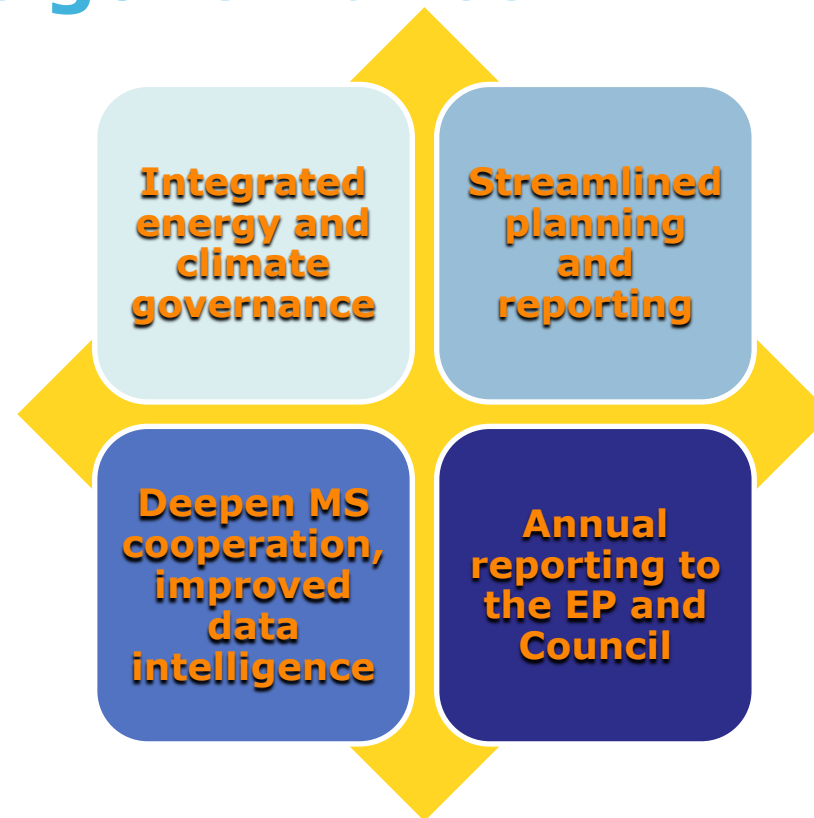
**Developing EU technological  
leadership in low carbon  
technologies**

# Research, innovation and competitiveness

## Concrete actions



# Delivering the Energy Union: A dynamic governance





**#EnergyUnion**

**@Energy4Europe**