



WORLD ENERGY OUTLOOK

World Energy Outlook 2013

London, 12 November

The world energy scene today

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- **Some long-held tenets of the energy sector are being rewritten**
 - *Countries are switching roles: importers are becoming exporters...*
 - *... and exporters are among the major sources of growing demand*
 - *New supply options reshape ideas about distribution of resources*
- **But long-term solutions to global challenges remain scarce**
 - *Renewed focus on energy efficiency, but CO₂ emissions continue to rise*
 - *Fossil-fuel subsidies increased to \$544 billion in 2012*
 - *1.3 billion people lack electricity, 2.6 billion lack clean cooking facilities*
- **Energy prices add to the pressure on policymakers**
 - *Sustained period of high oil prices without parallel in market history*
 - *Large, persistent regional price differences for gas & electricity*

Orientation for a fast-changing energy world

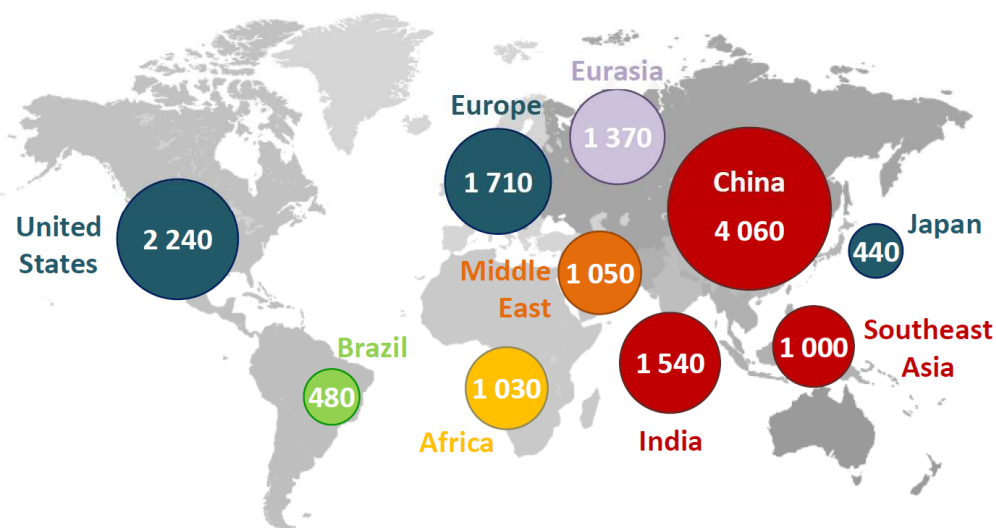
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- **China, then India, drive the growing dominance of Asia in global energy demand & trade**
- **Technology is opening up new oil resources, but the Middle East remains central to the longer-term outlook**
- **Regional price gaps & concerns over competitiveness are here to stay, but there are ways to react – with efficiency first in line**
- **The transition to a more efficient, low-carbon energy sector is more difficult in tough economic times, but no less urgent**

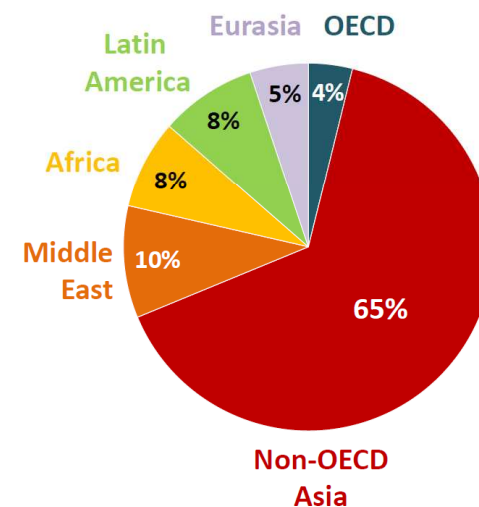
The engine of energy demand growth moves to South Asia

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Primary energy demand, 2035 (Mtoe)

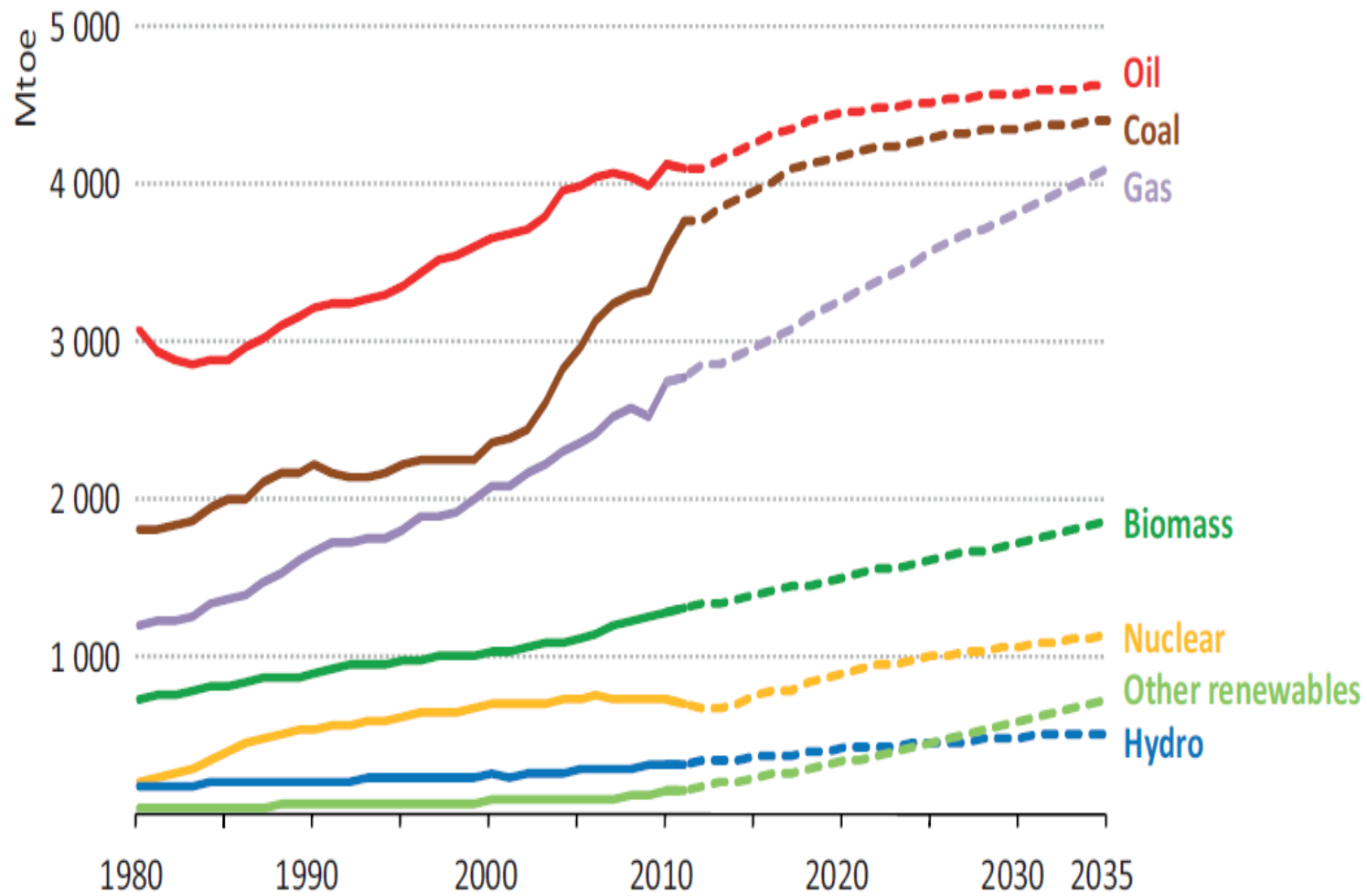


Share of global growth 2012-2035



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

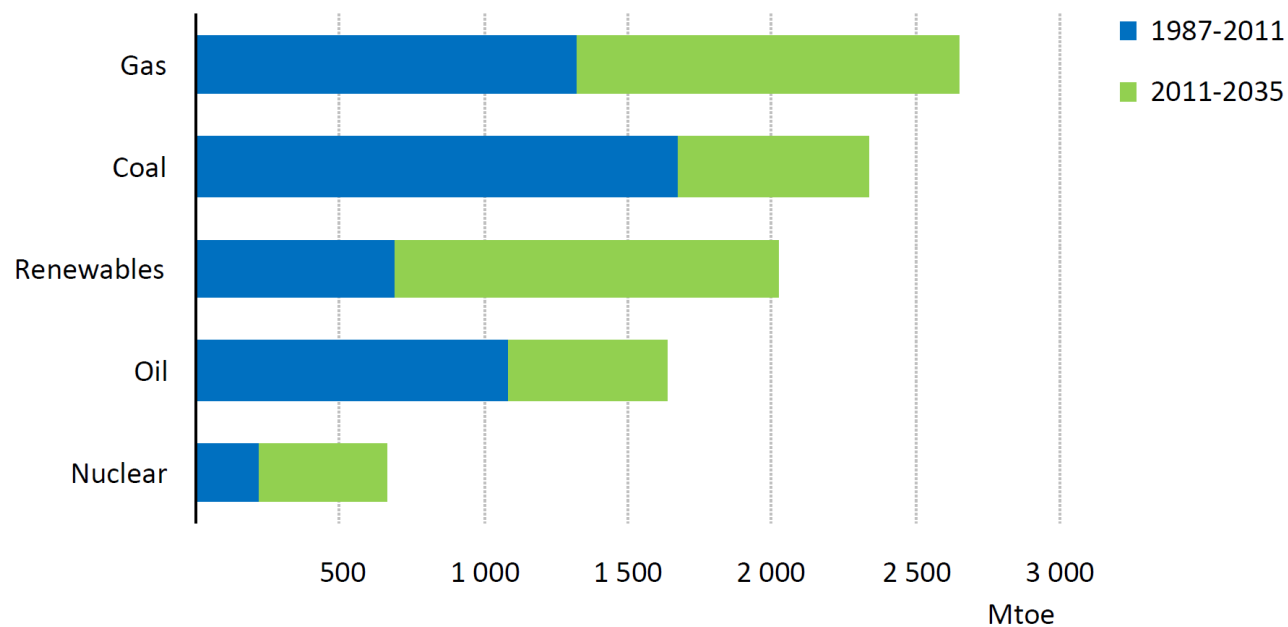
World primary energy demand by fuel. NPS



A mix that is slow to change

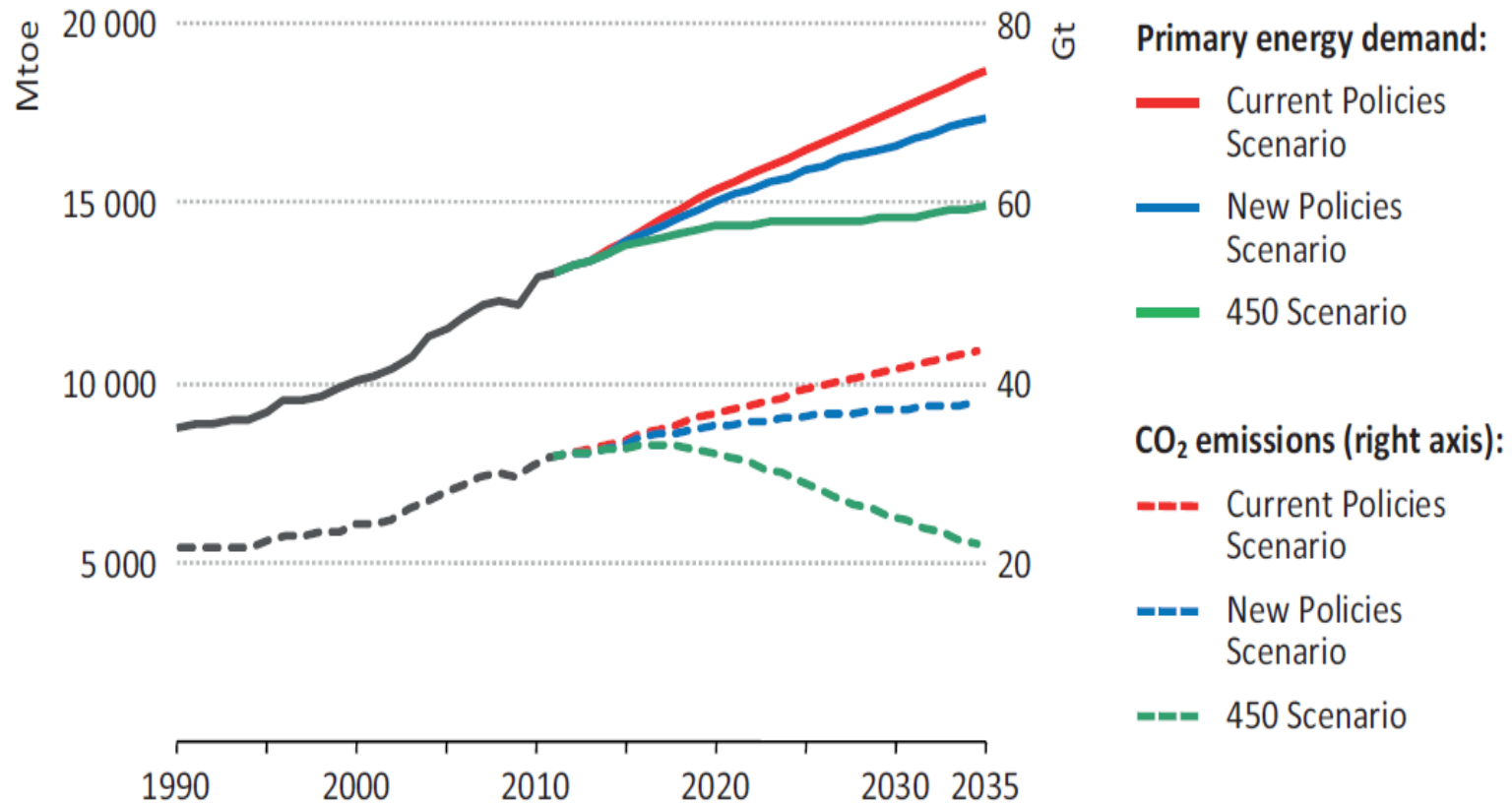
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Growth in total primary energy demand



Today's share of fossil fuels in the global mix, at 82%, is the same as it was 25 years ago; the strong rise of renewables only reduces this to around 75% in 2035

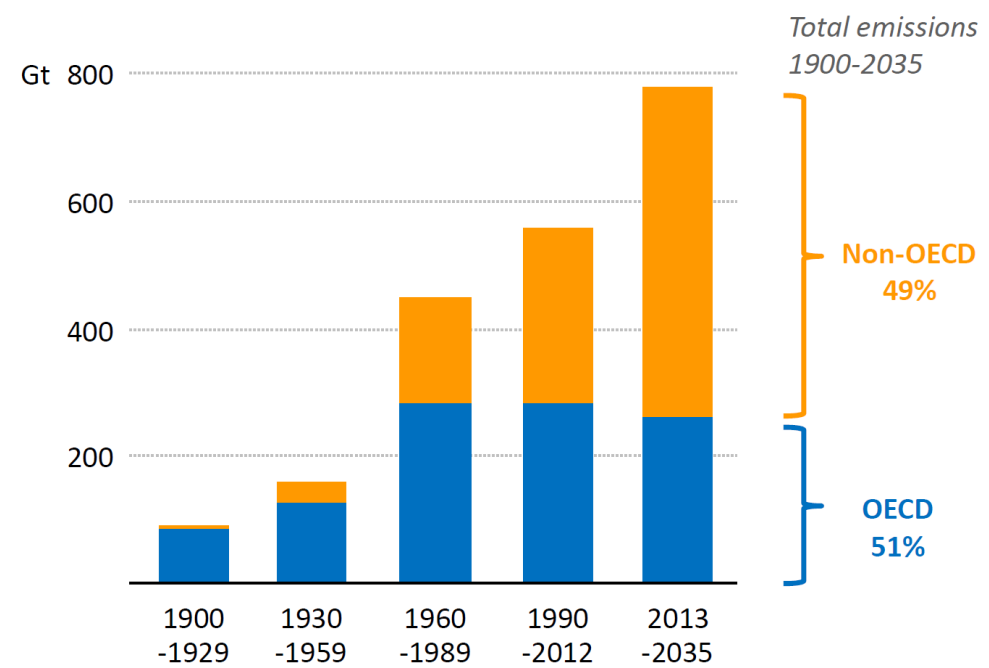
World primary energy demand and related CO₂ emissions by scenario



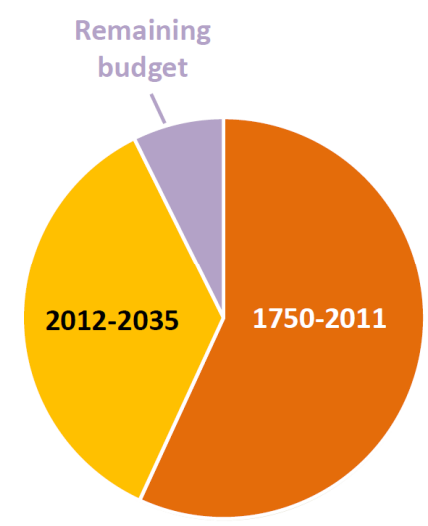
Note: Mtoe = Million tonnes of oil equivalent; Gt = gigatonnes.

Emissions off track in the run-up to the 2015 climate summit in France

Cumulative energy-related CO₂ emissions

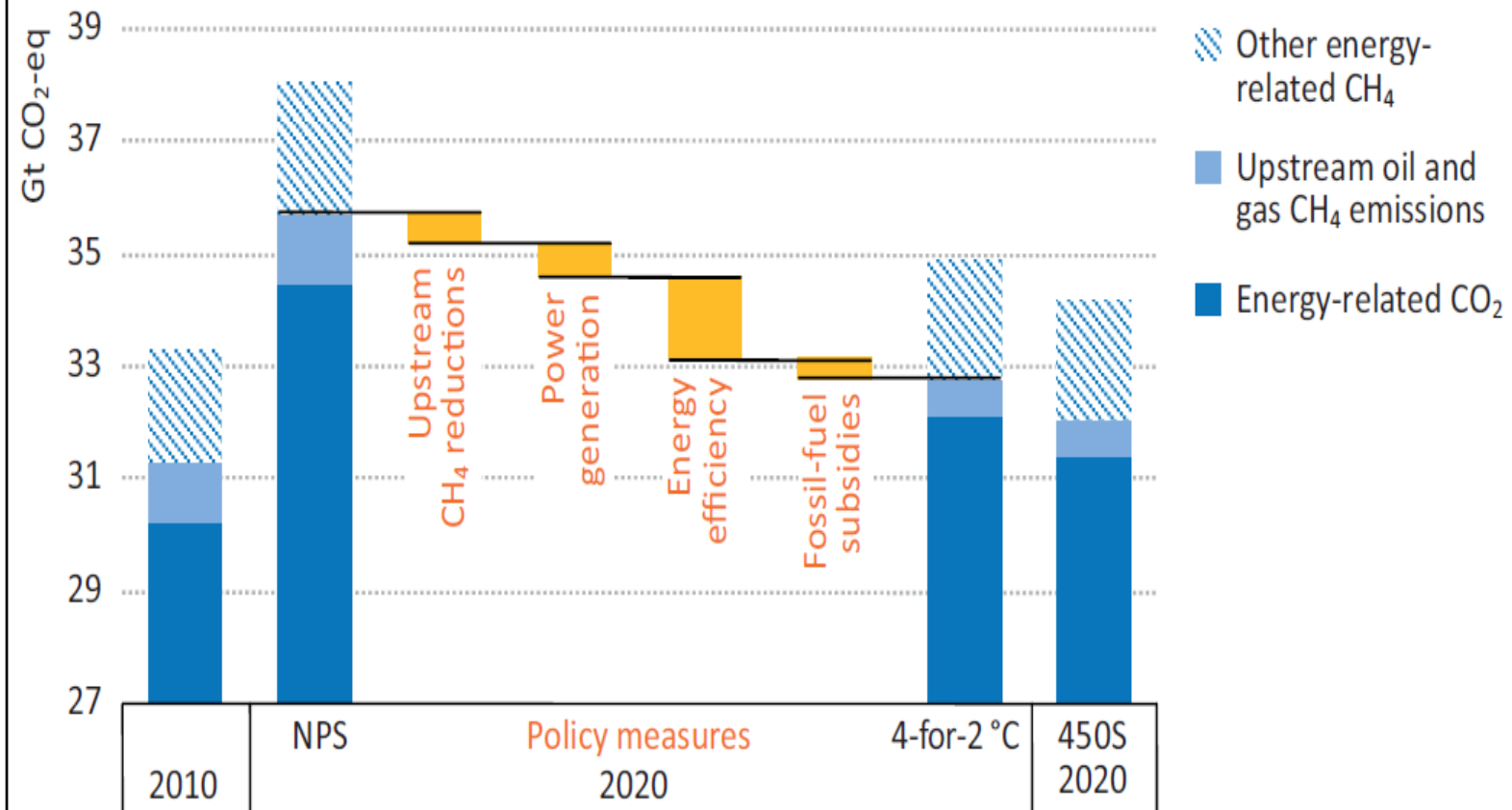


'Carbon budget' for 2 °C



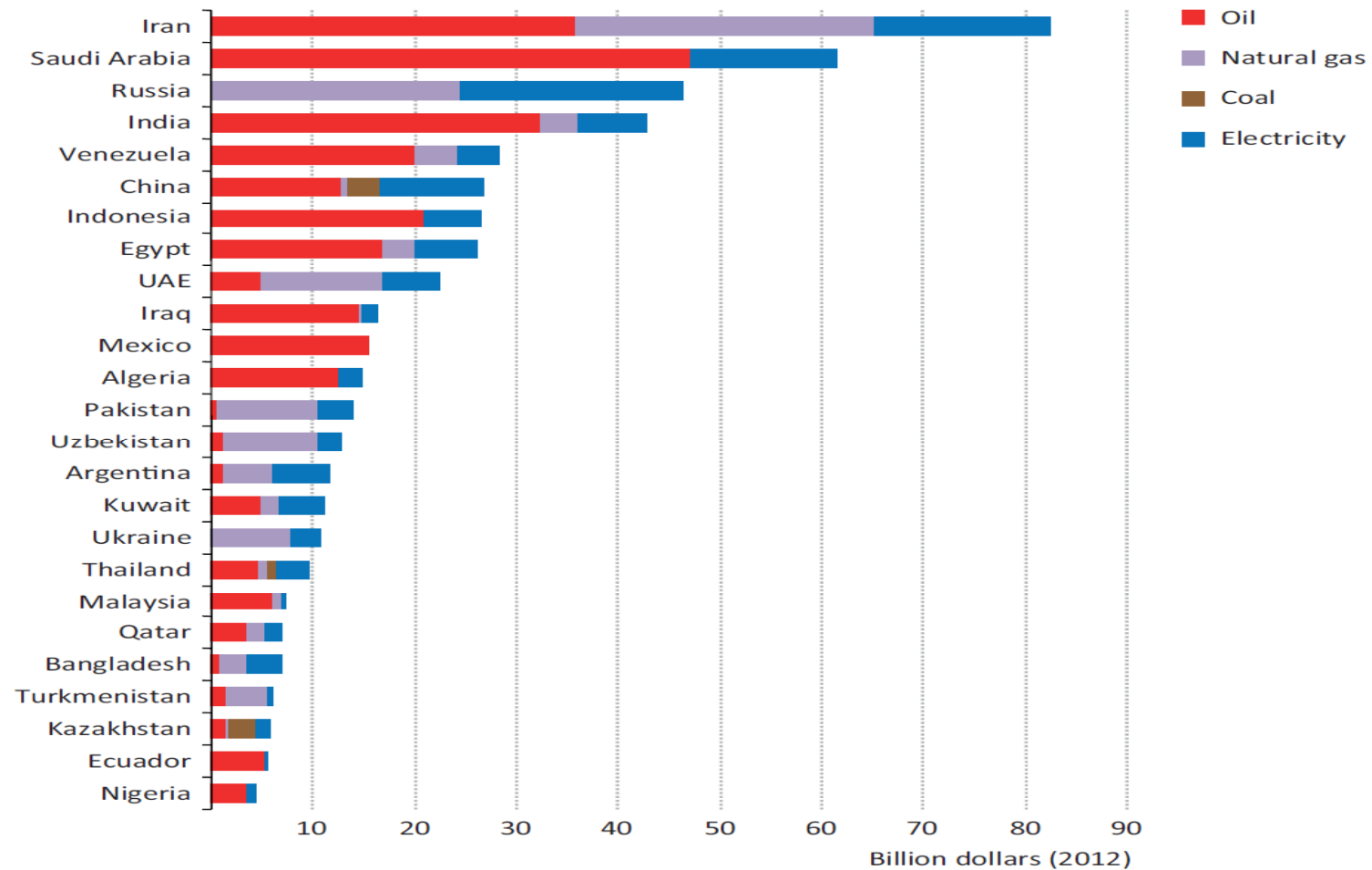
Non-OECD countries account for a rising share of emissions, although 2035 per capita levels are only half of OECD; the 2 °C 'carbon budget' is being spent much too quickly

Change in world energy-related CO₂ emissions by policy measure in the 4-for-2 °C Scenario



Note: NPS = New Policies Scenario; 450S = 450 Scenario. Source: IEA (2013a).

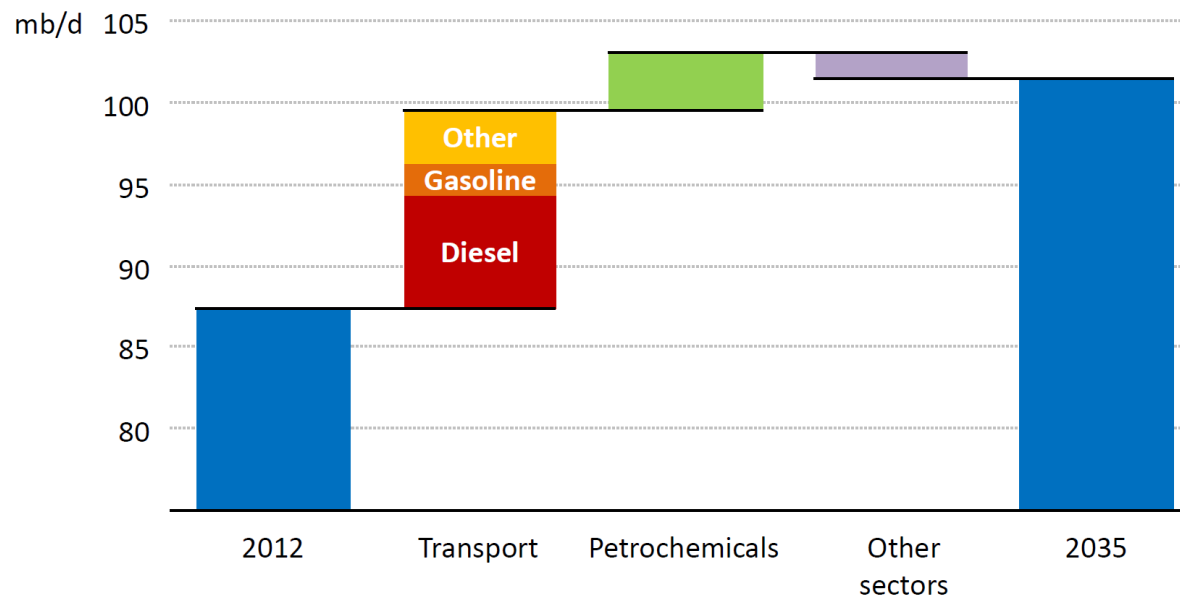
Economic value of fossil-fuel consumption subsidies by fuel for top 25 countries, 2012



Oil use grows, but in a narrowing set of markets

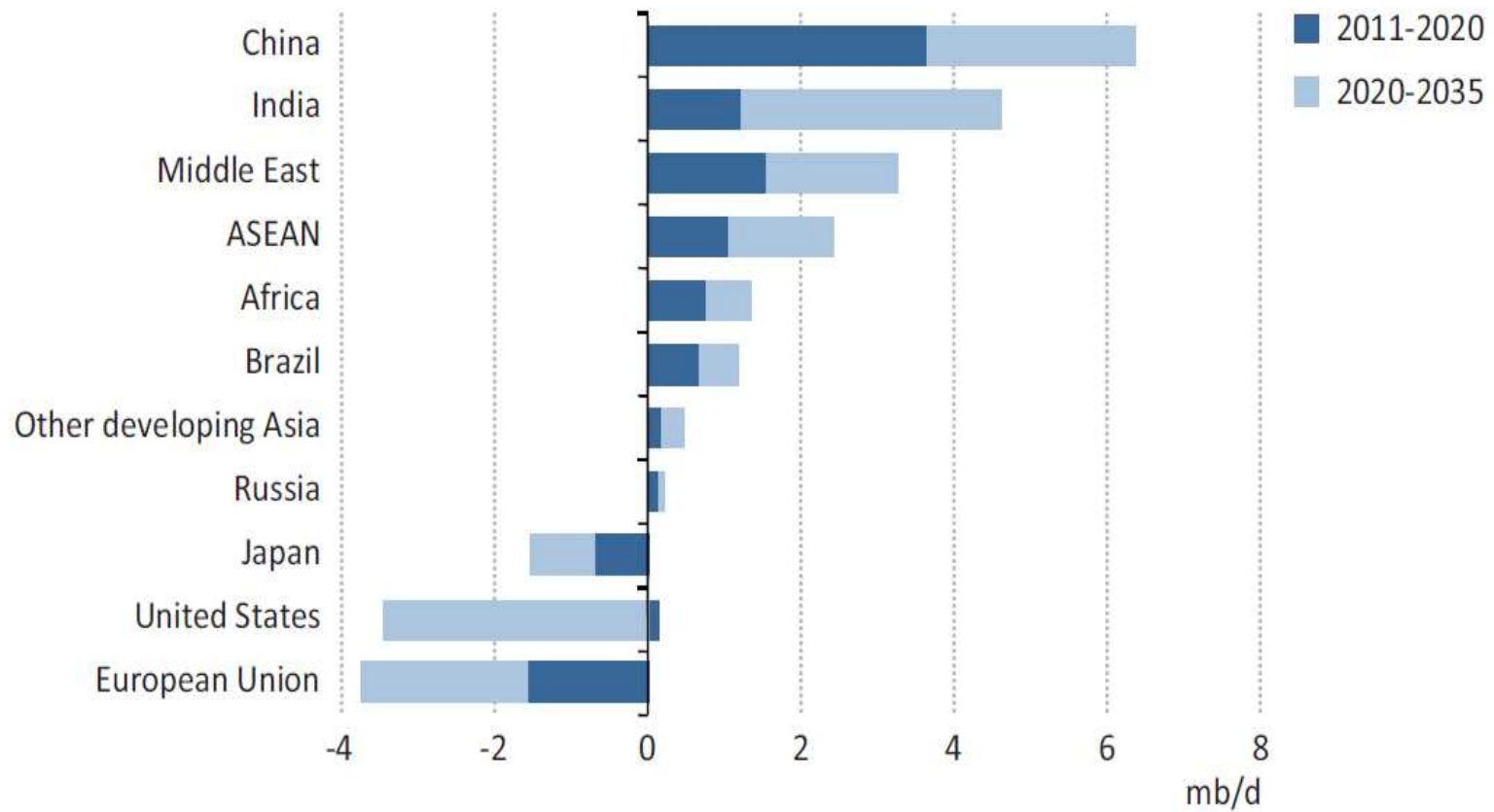
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Oil demand by sector



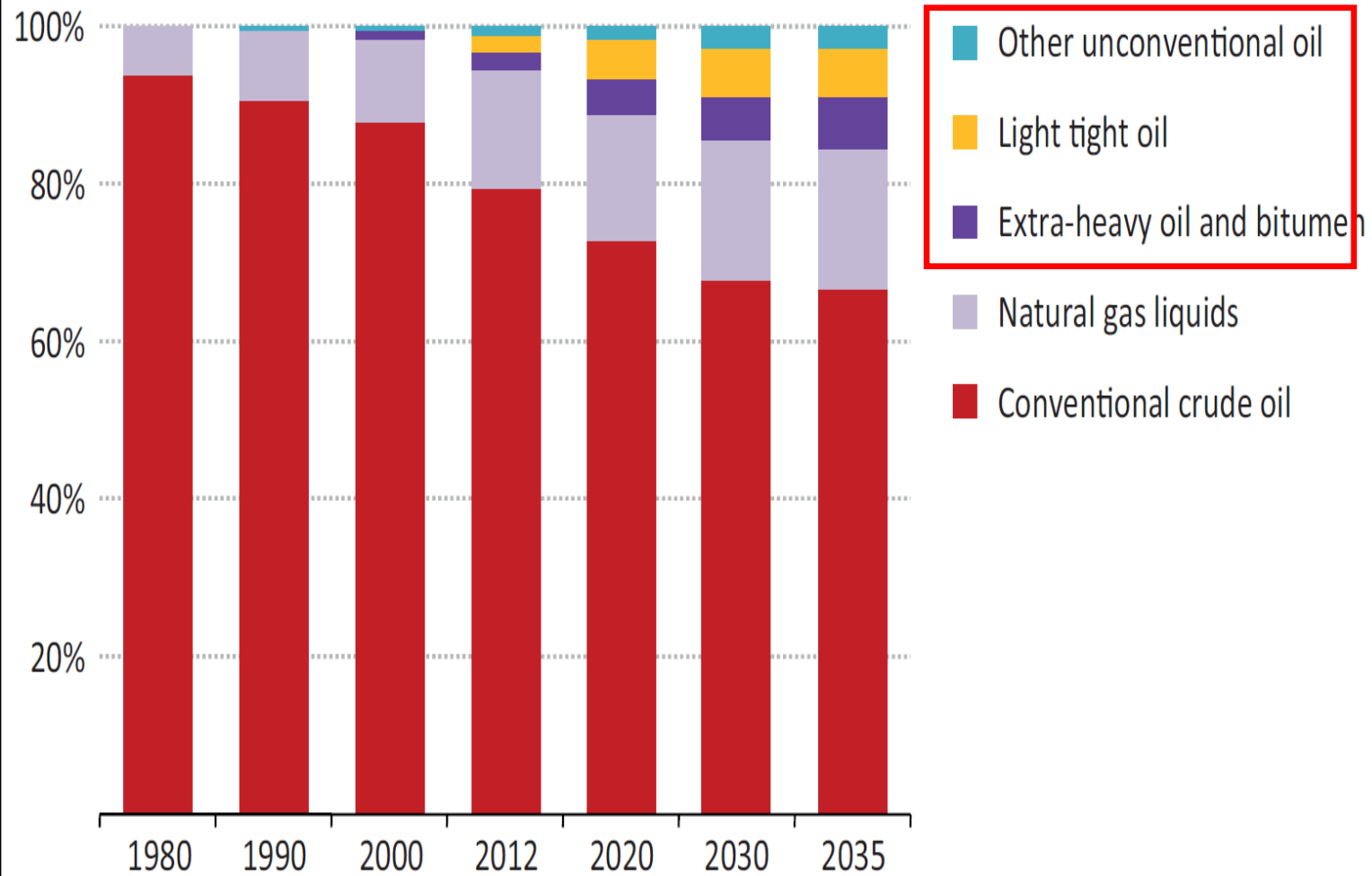
China becomes the largest consumer of oil by 2030, as OECD oil use drops; demand is concentrated in transport, where diesel use surges by 5.5 mb/d, & petrochemicals

Change in oil demand in selected regions, NPS

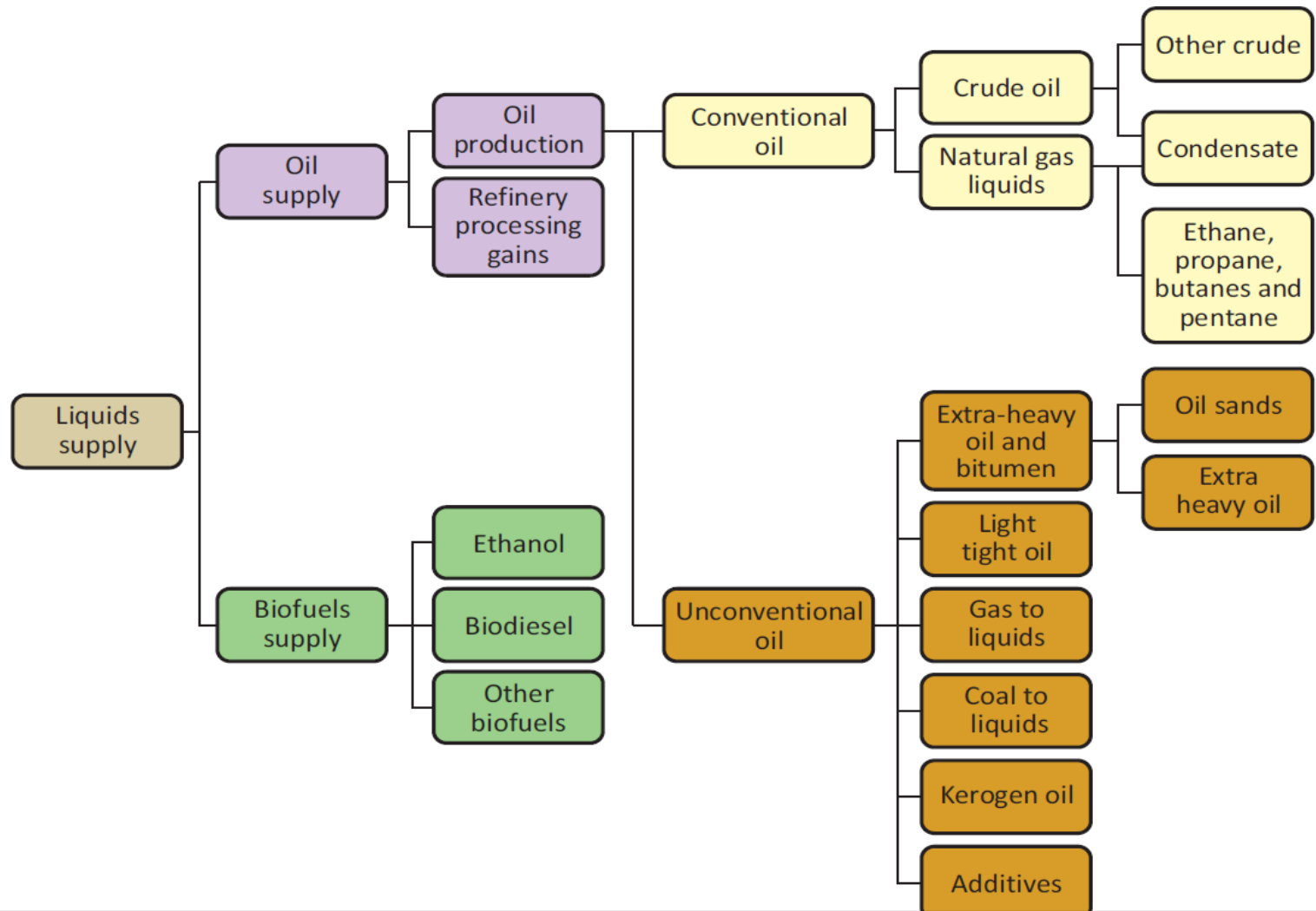


Producción mundial de petróleo por tipo 1980-2035

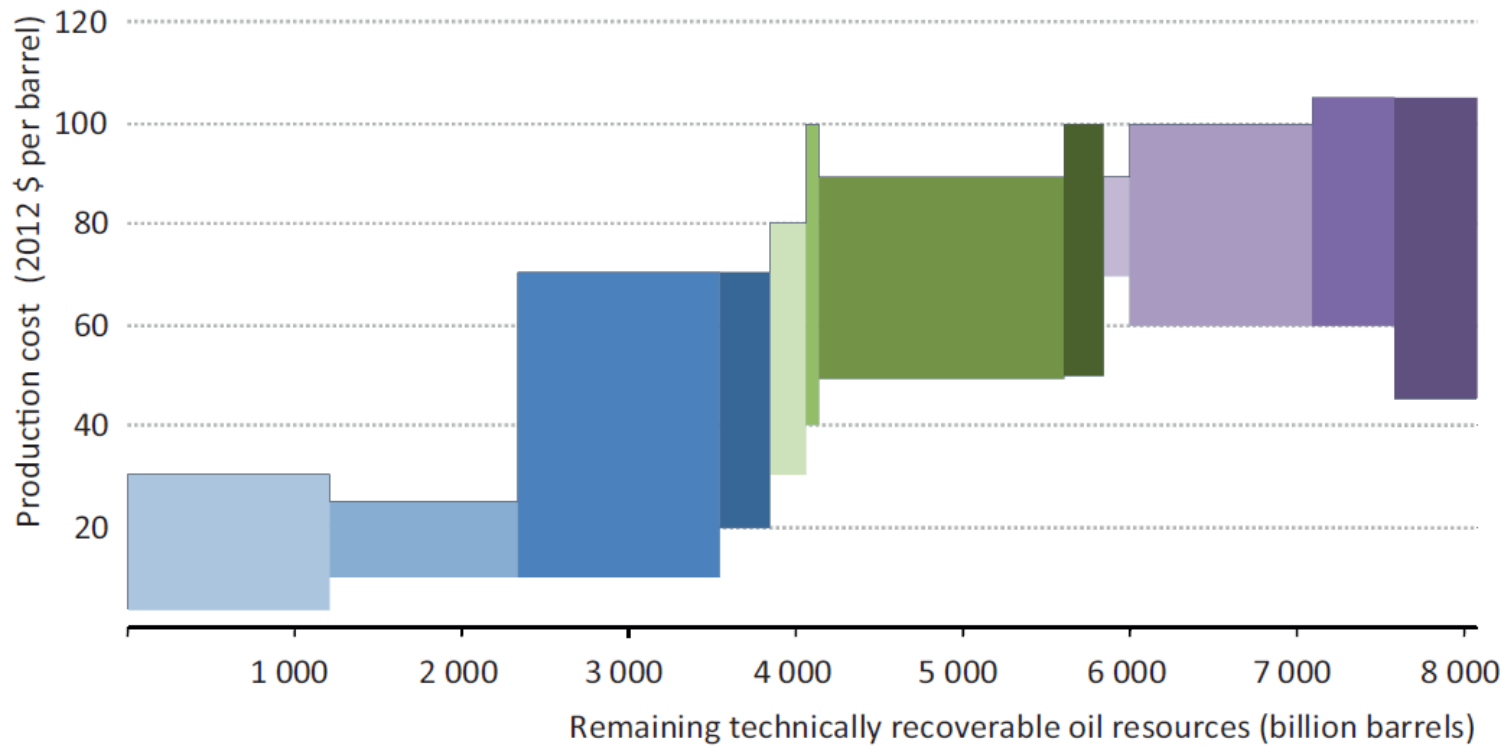
El mundo necesitará más y más petróleo no convencional



Classification of liquids fuels

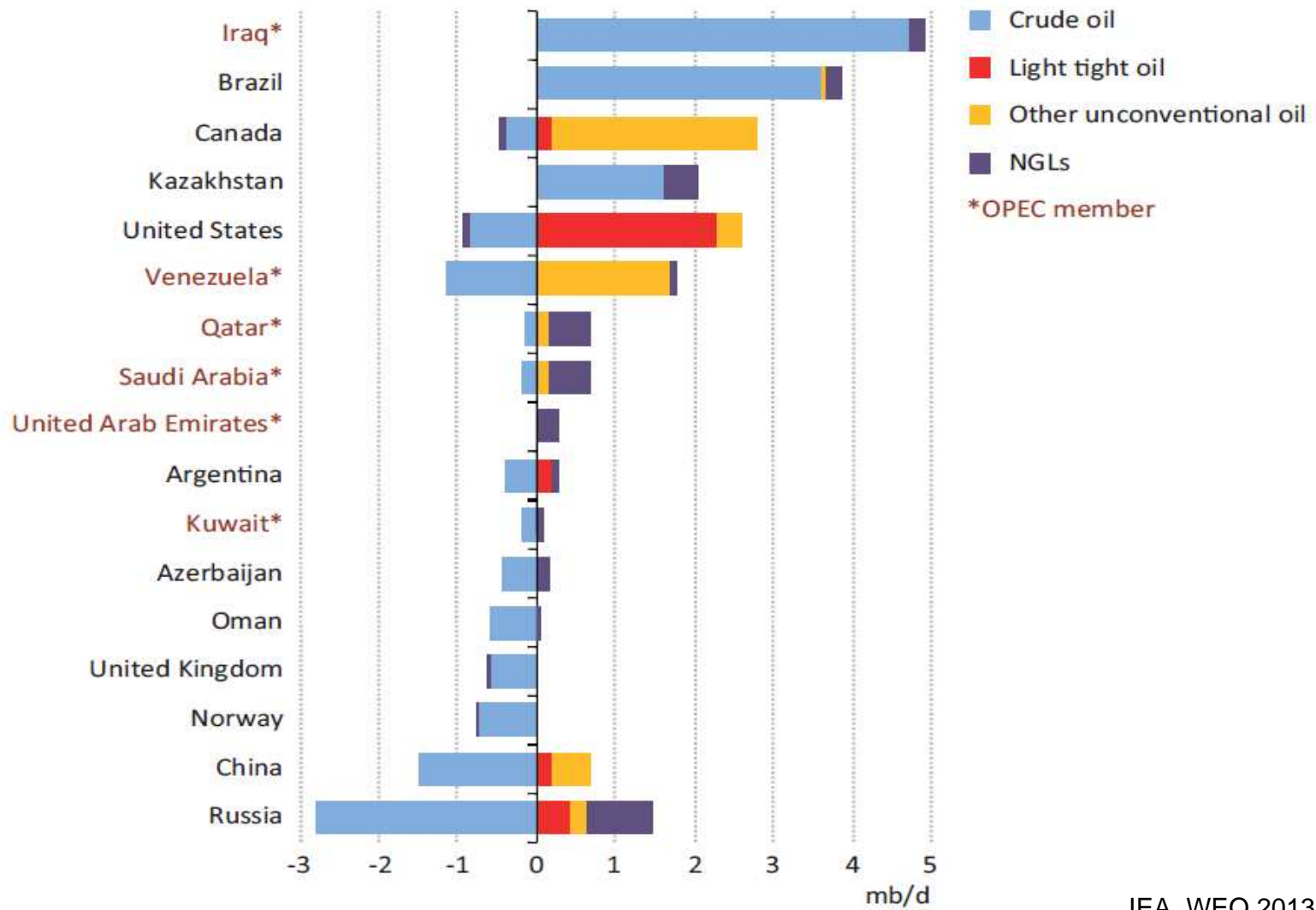


Supply costs of liquids fuels

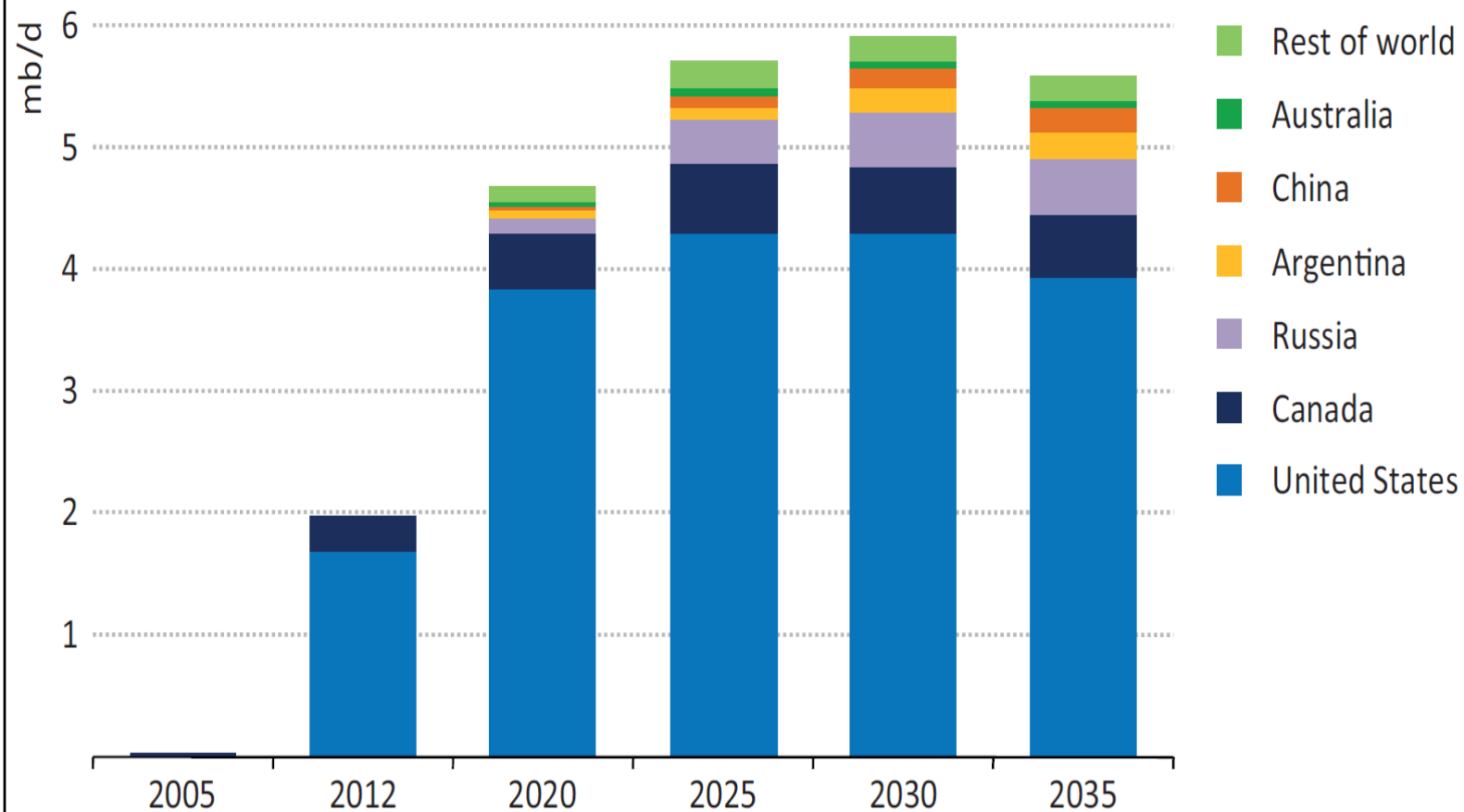


Source: *Resources to Reserves* (IEA, 2013).

Quien es quien en el mundo del petróleo, 2012-2035



Producción de LTO, 2005-2035, Pierde fuele a partir de la década de los treinta

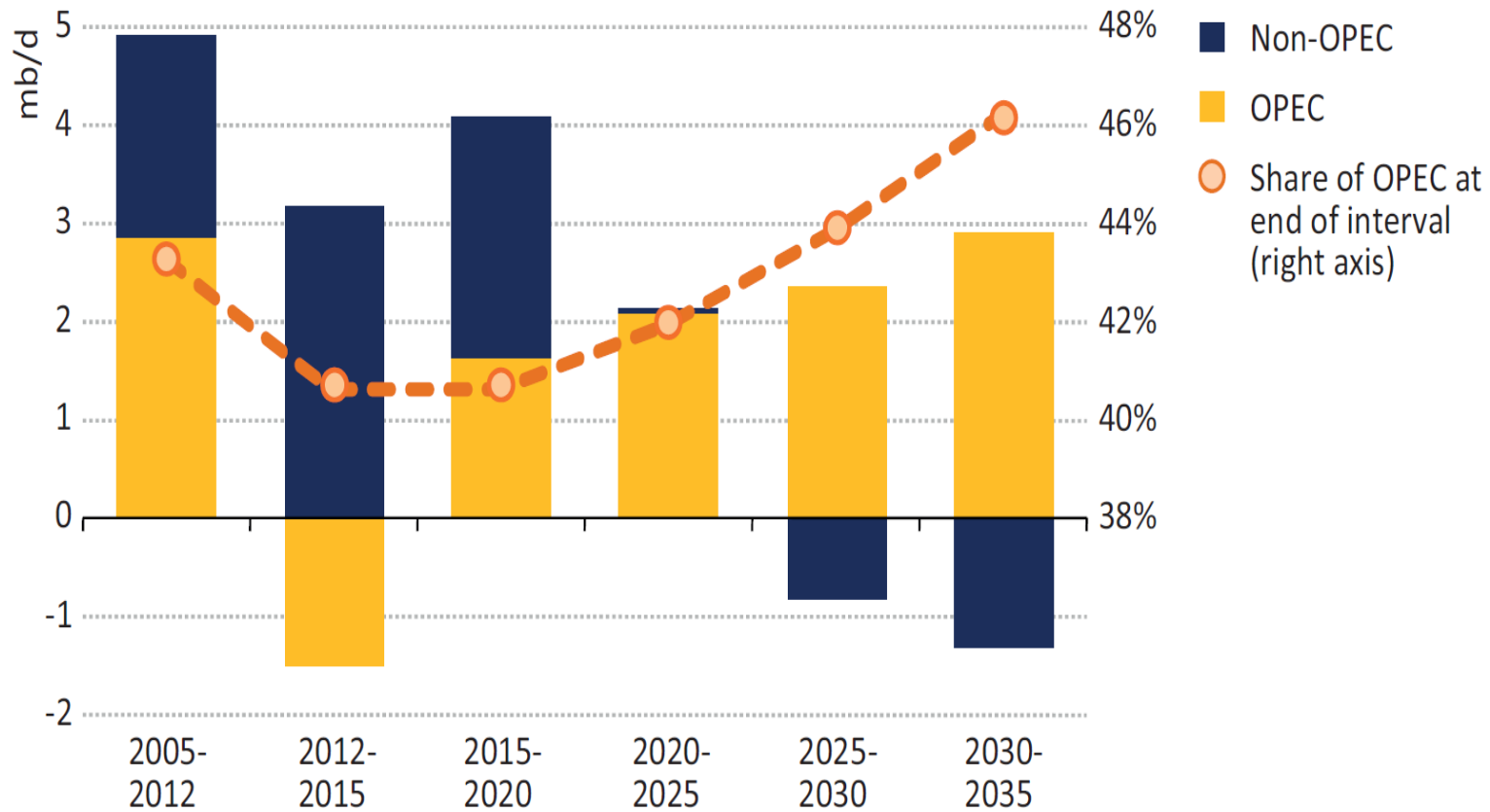


Sources: IEA databases and analysis; Rystad Energy AS.

IEA, WEO 2013

Cambios en la producción de petróleo: OPEP vs no-OPEP

La OPEP retoma el control del mercado a partir de 2025



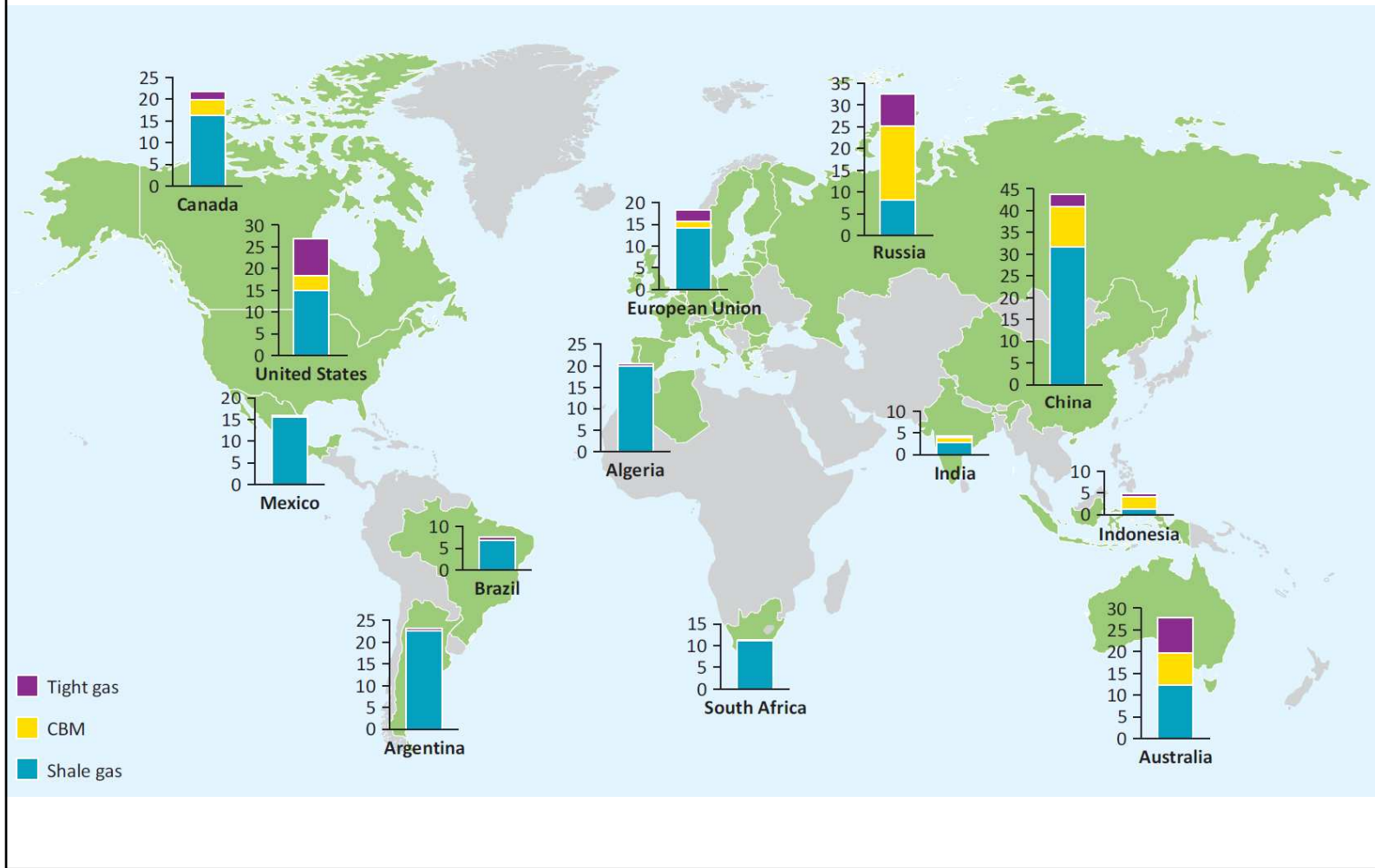
Note: Share of OPEC is for the end of the interval shown, *i.e.* for 2012 in the first column, for 2015 in the second, and so on.

Fossil fuel import prices by scenario (dollars per unit)

	Unit	2012	New Policies Scenario					Current Policies Scenario				450 Scenario			
			2020	2025	2030	2035	2020	2025	2030	2035	2020	2025	2030	2035	
Real terms (2012 prices)															
IEA crude oil imports	barrel	109	113	116	121	128	120	127	136	145	110	107	104	100	
Natural gas															
United States	MBtu	2.7	5.1	5.6	6.0	6.8	5.2	5.8	6.2	6.9	4.8	5.4	5.7	5.9	
Europe imports	MBtu	11.7	11.9	12.0	12.3	12.7	12.4	12.9	13.4	14.0	11.5	11.0	10.2	9.5	
Japan imports	MBtu	16.9	14.2	14.2	14.4	14.9	14.7	15.2	15.9	16.7	13.4	12.8	12.2	11.7	
OECD steam coal imports	tonne	99	106	109	110	110	112	116	118	120	101	95	86	75	
Nominal terms															
IEA crude oil imports	barrel	109	136	156	183	216	144	171	205	245	132	144	157	169	
Natural gas															
United States	MBtu	2.7	6.1	7.5	9.1	11.6	6.2	7.7	9.3	11.7	5.8	7.2	8.6	10.0	
Europe imports	MBtu	11.7	14.2	16.1	18.5	21.5	14.9	17.3	20.2	23.6	13.8	14.7	15.4	16.0	
Japan imports	MBtu	16.9	17.1	19.1	21.7	25.1	17.7	20.4	24.0	28.2	16.1	17.2	18.4	19.7	
OECD steam coal imports	tonne	99	127	146	165	186	134	155	178	202	121	128	129	127	

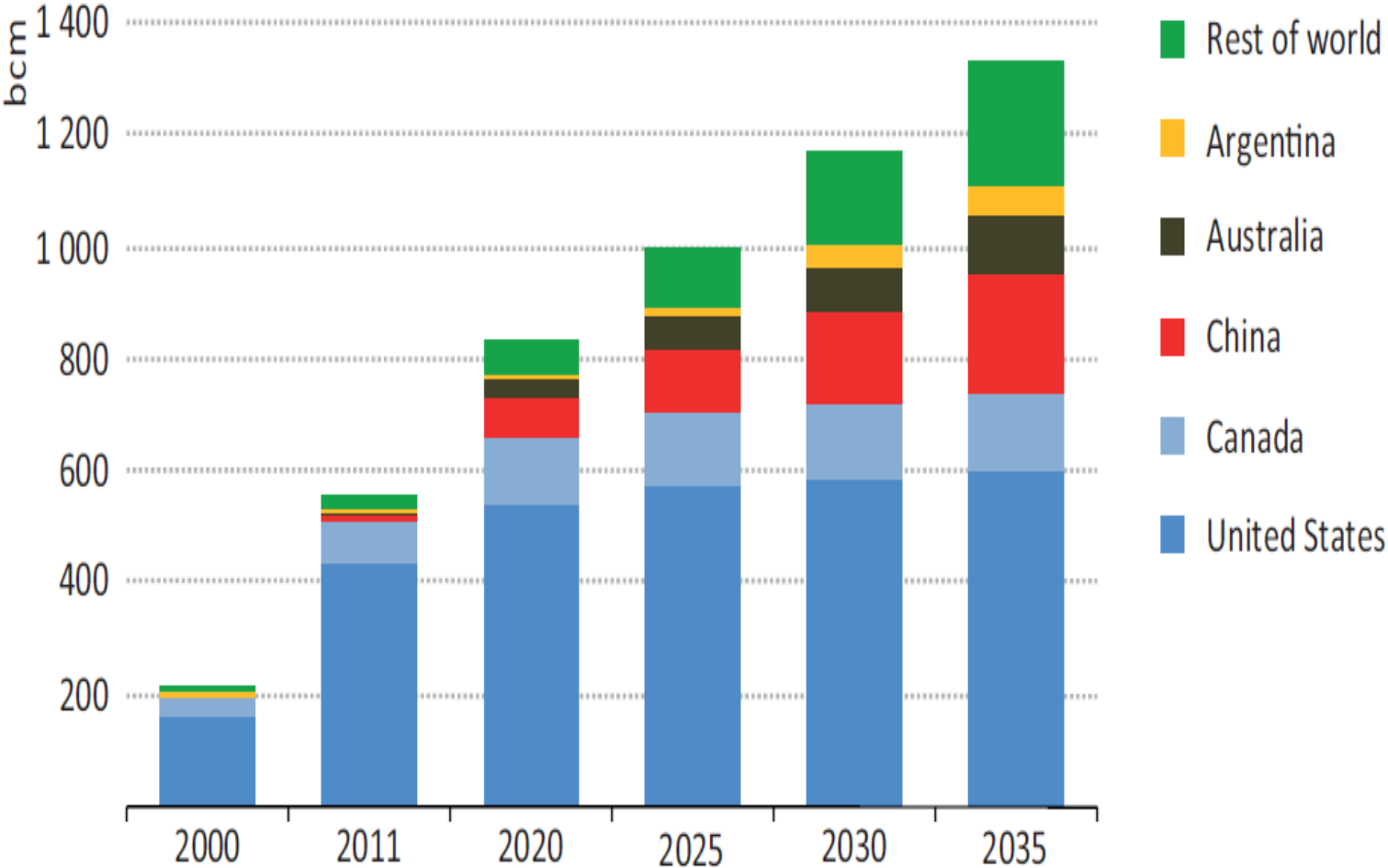
Notes: Gas prices are weighted averages expressed on a gross calorific-value basis. All prices are for bulk supplies exclusive of tax. The US price reflects the wholesale price prevailing on the domestic market. Nominal prices assume inflation of 2.3% per year from 2012.

Remaining unconventional gas resources in selected regions, end-2012 (tcm)



Producción de gas no convencional, 2000-2035

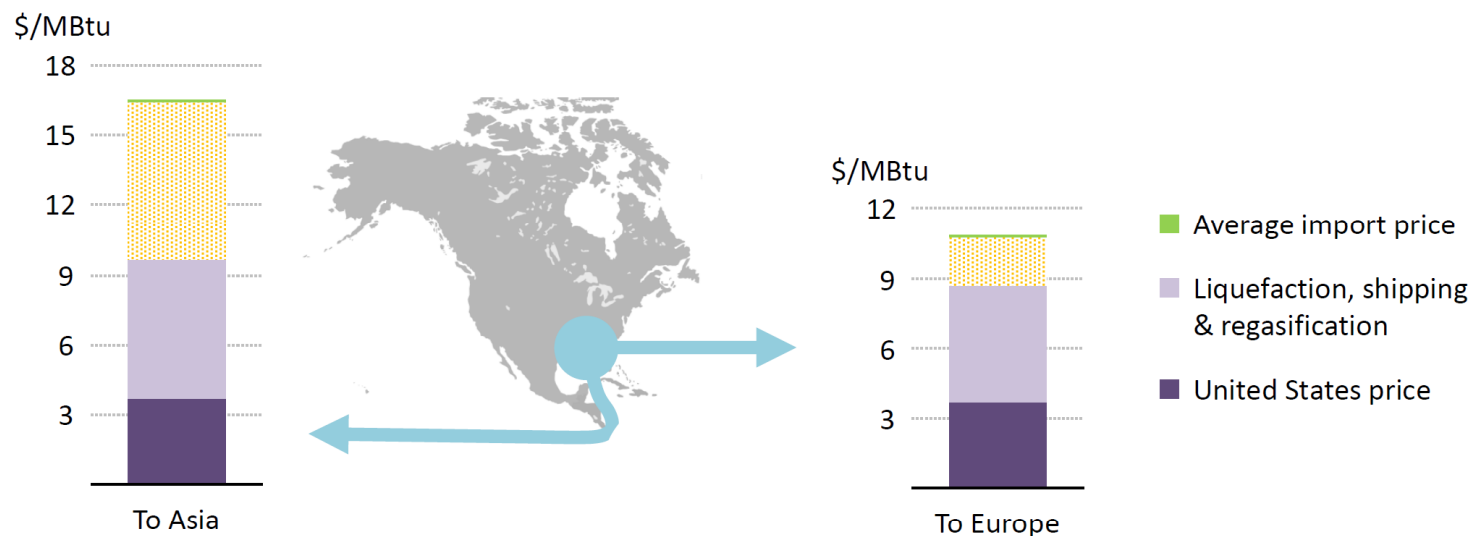
La edad dorada del gas natural



LNG from the United States can shake up gas markets

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Indicative economics of LNG export from the US Gulf Coast (at current prices)



New LNG supplies accelerate movement towards a more interconnected global market, but high costs of transport between regions mean no single global gas price

Fossil fuel import prices by scenario (dollars per unit)

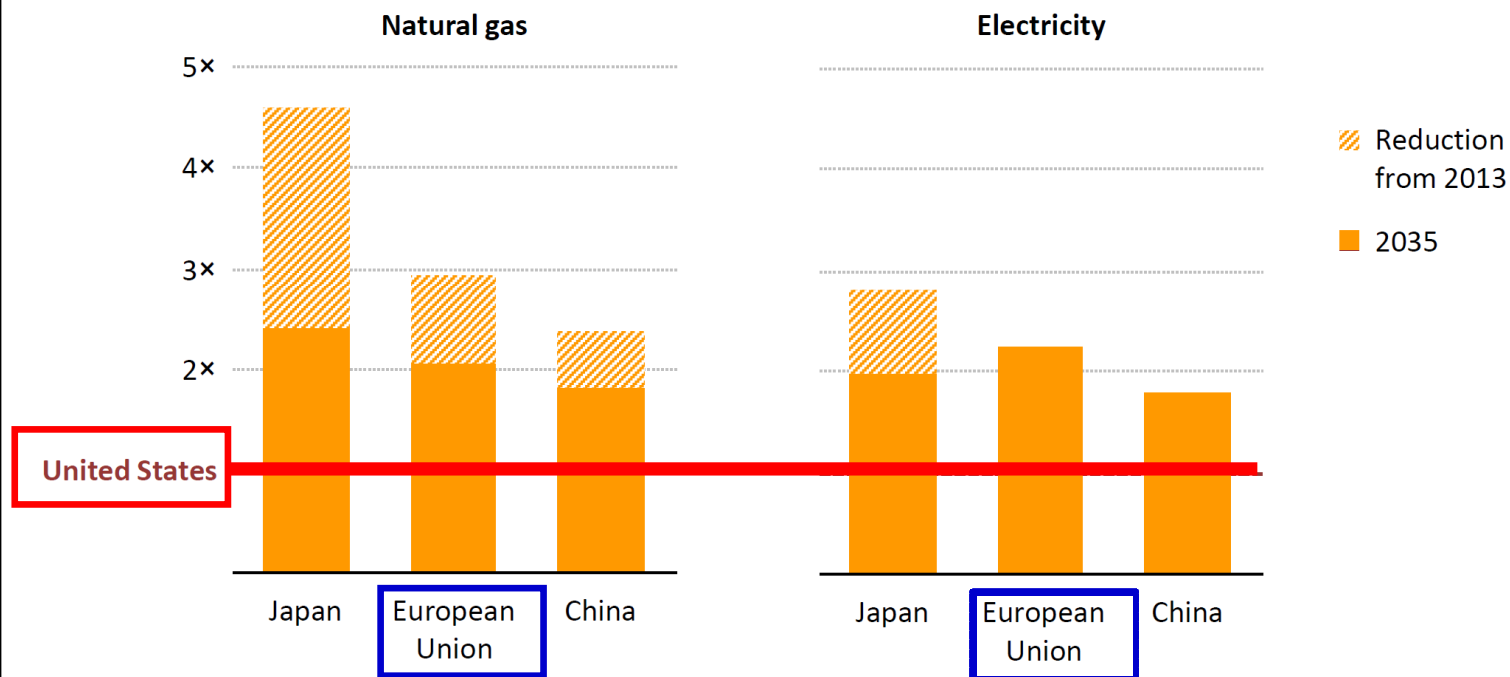
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United States	MBtu	2.7	5.1	5.6	6.0	6.8	5.2	5.8	6.2	6.9	4.8	5.4	5.7	5.9	
Europe imports	MBtu	11.7	11.9	12.0	12.3	12.7	12.4	12.9	13.4	14.0	11.5	11.0	10.2	9.5	
Japan imports	MBtu	16.9	14.2	14.2	14.4	14.9	14.7	15.2	15.9	16.7	13.4	12.8	12.2	11.7	
OECD steam coal imports	tonne	99	106	109	110	110	112	116	118	120	101	95	86	75	
Nominal terms															
IEA crude oil imports	barrel	109	136	156	183	216	144	171	205	245	132	144	157	169	
Natural gas															
United States	MBtu	2.7	6.1	7.5	9.1	11.6	6.2	7.7	9.3	11.7	5.8	7.2	8.6	10.0	
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Notes: Gas prices are weighted averages expressed on a gross calorific-value basis. All prices are for bulk supplies exclusive of tax. The US price reflects the wholesale price prevailing on the domestic market. Nominal prices assume inflation of 2.3% per year from 2012.

Who has the energy to compete?

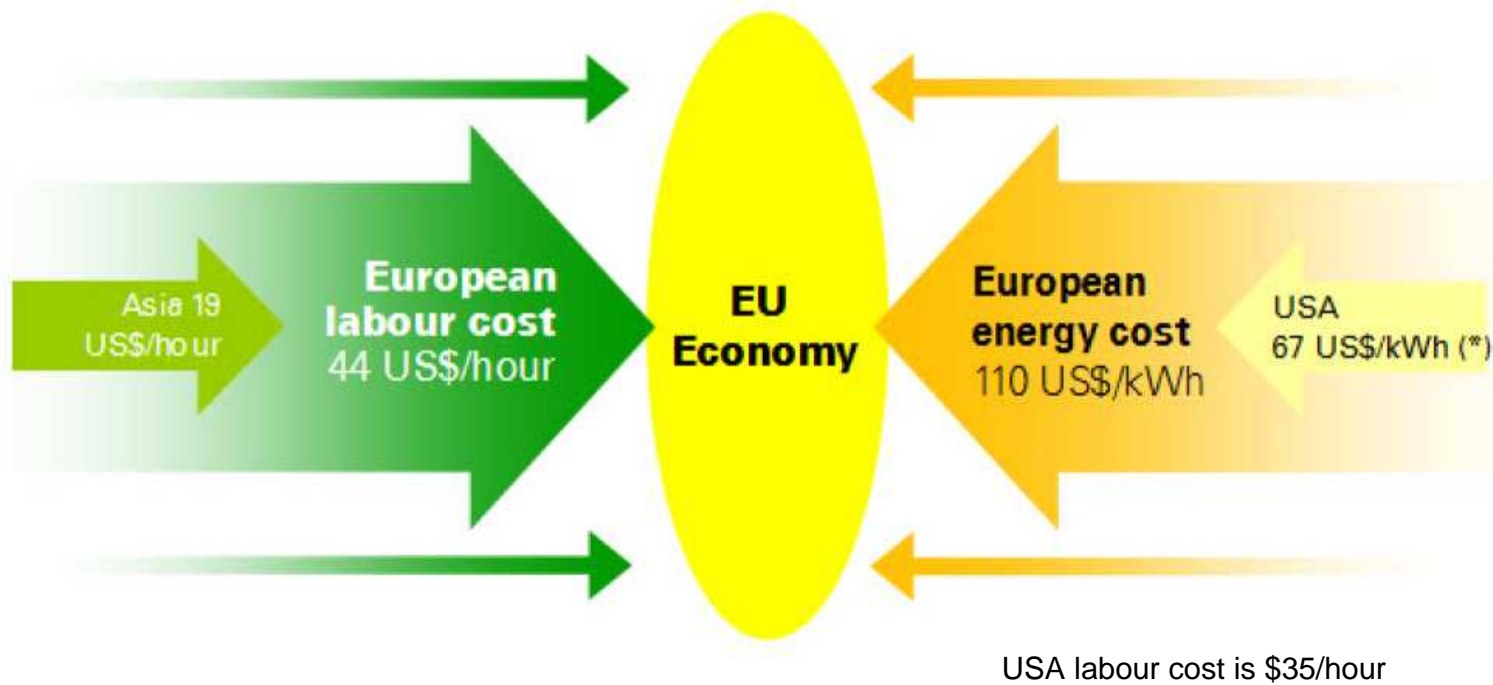
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Ratio of industrial energy prices relative to the United States



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

Impacto de los altos costes laborales y energéticos sobre la economía de la UE

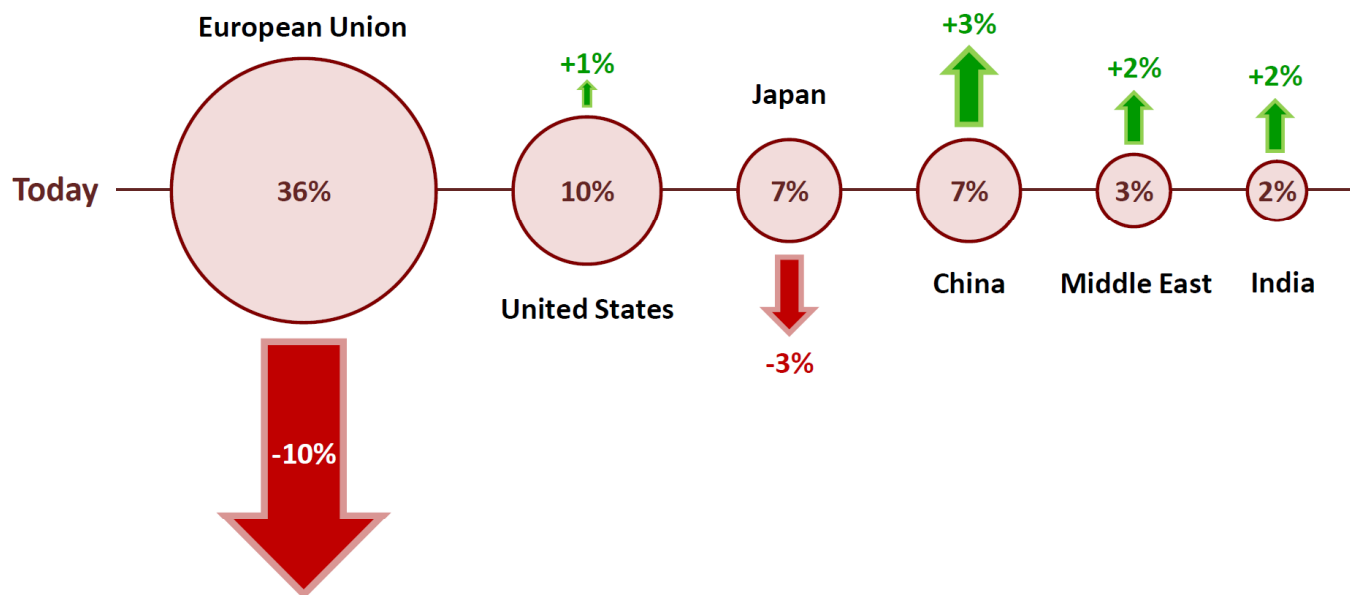


Energy for Europe-time to reflect, I. Conn, BP Group, Managing Director, 29-XI-2013

An energy boost to the economy?

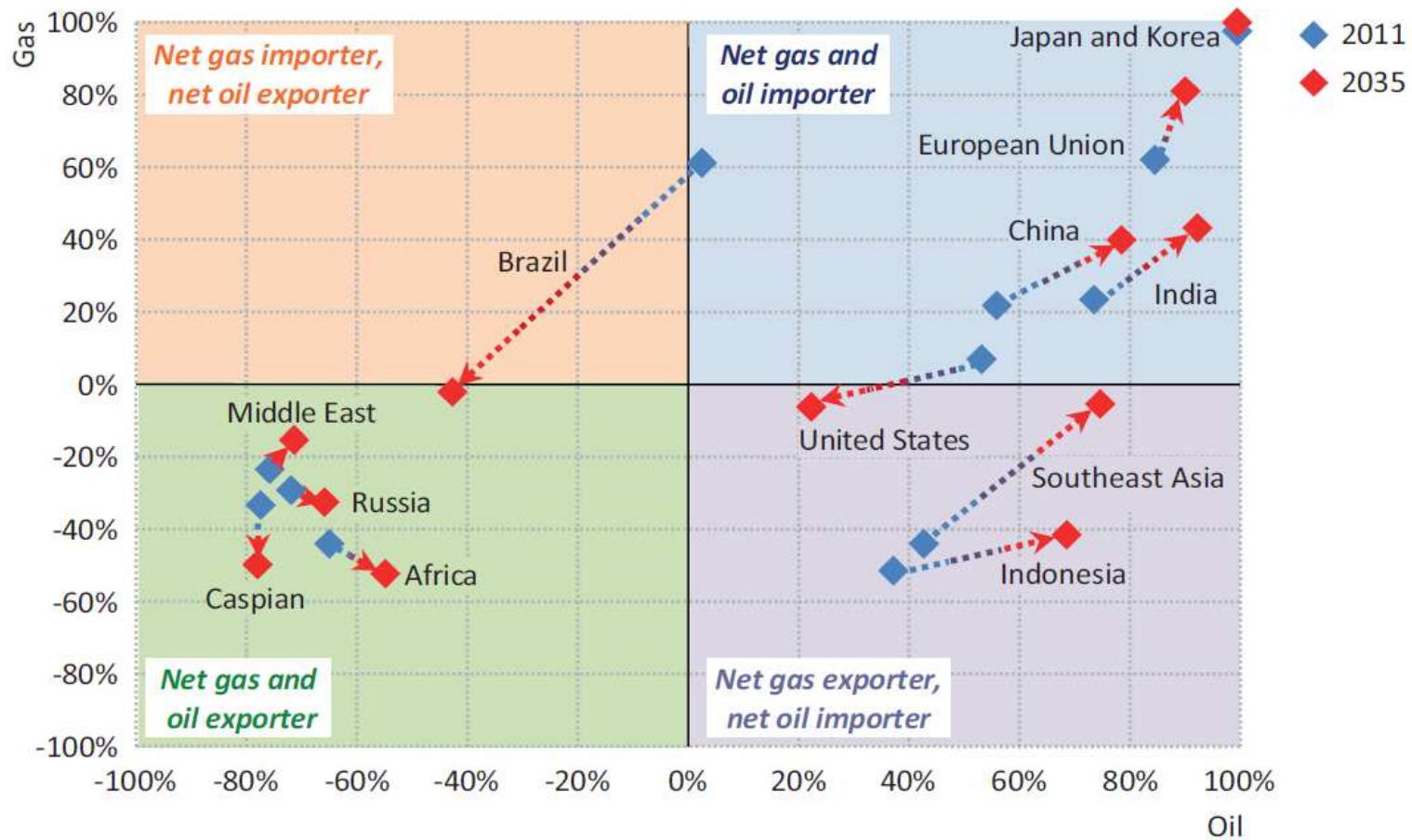
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Share of global export market for energy-intensive goods



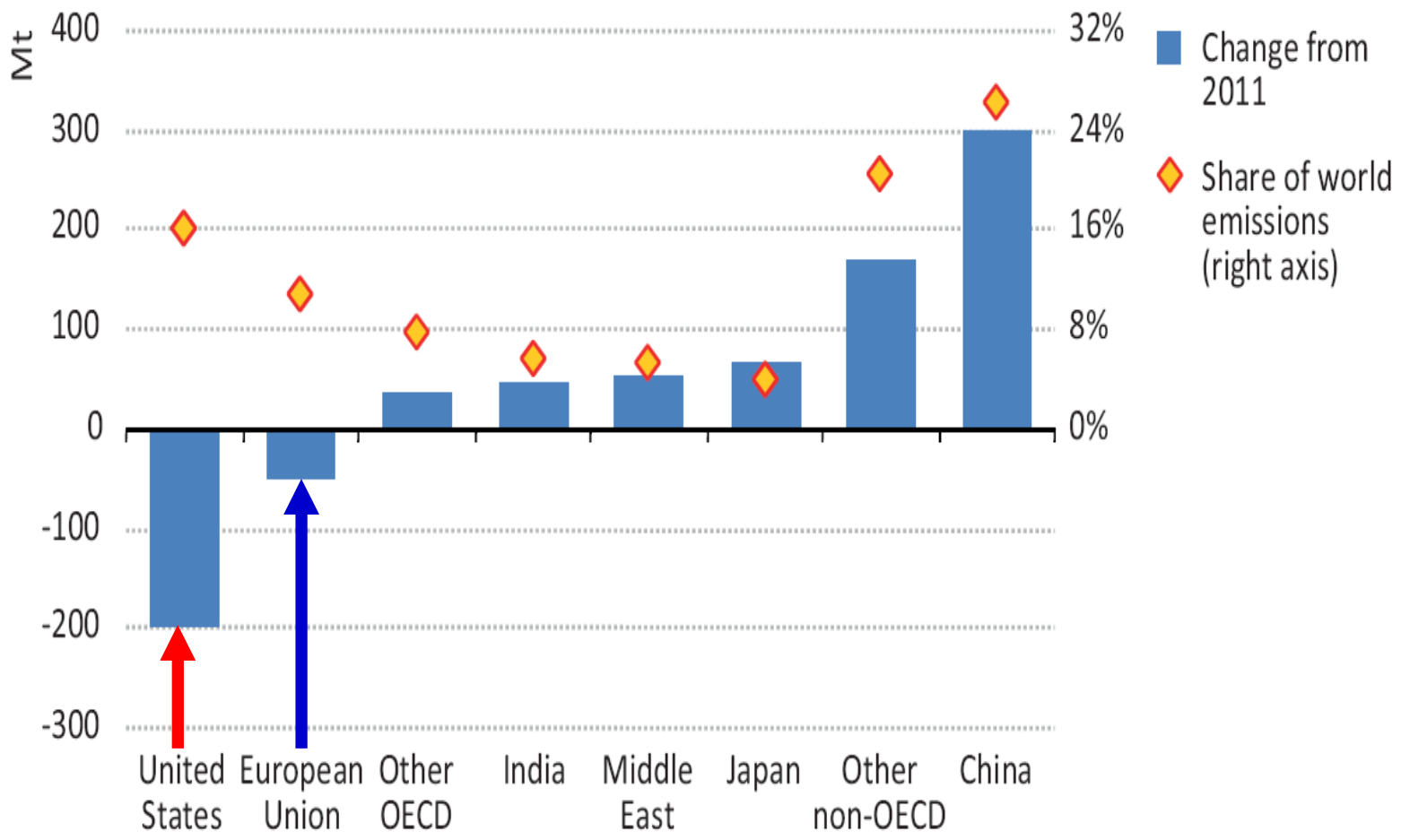
The US, together with key emerging economies, increases its export market share for energy-intensive goods, while the EU and Japan see a sharp decline

Net oil and gas import/export shares in selected regions, NPS



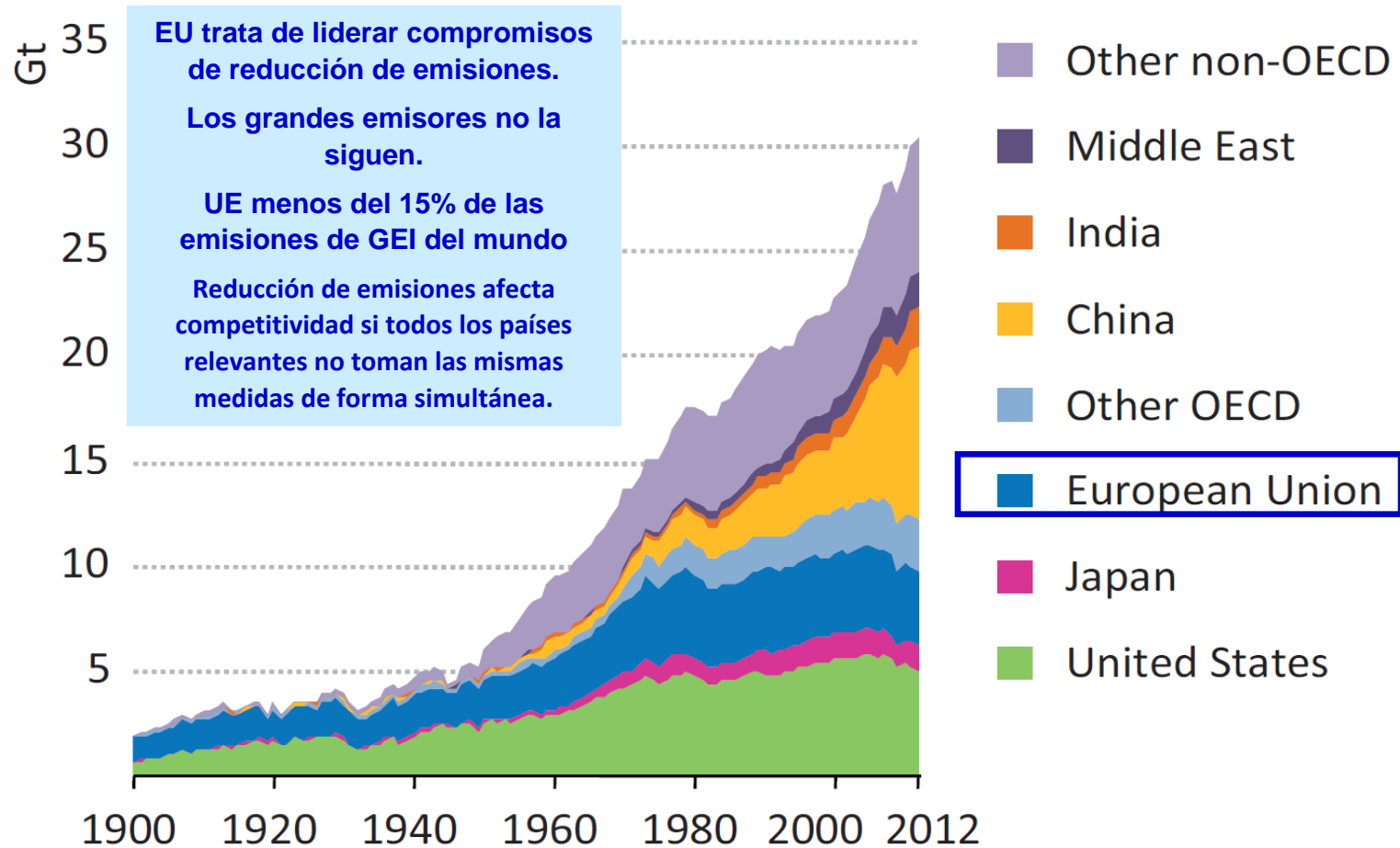
Notes: Import shares for each fuel are calculated as net imports divided by primary demand. Export shares are calculated as net exports divided by production. A negative number indicates net exports. Southeast Asia, *i.e.* the ASEAN region, includes Indonesia.

2011-2012: emisiones de CO₂ La UE peor que los EE.UU.



Redrawing the Energy-Climate Map, IEA June 2013

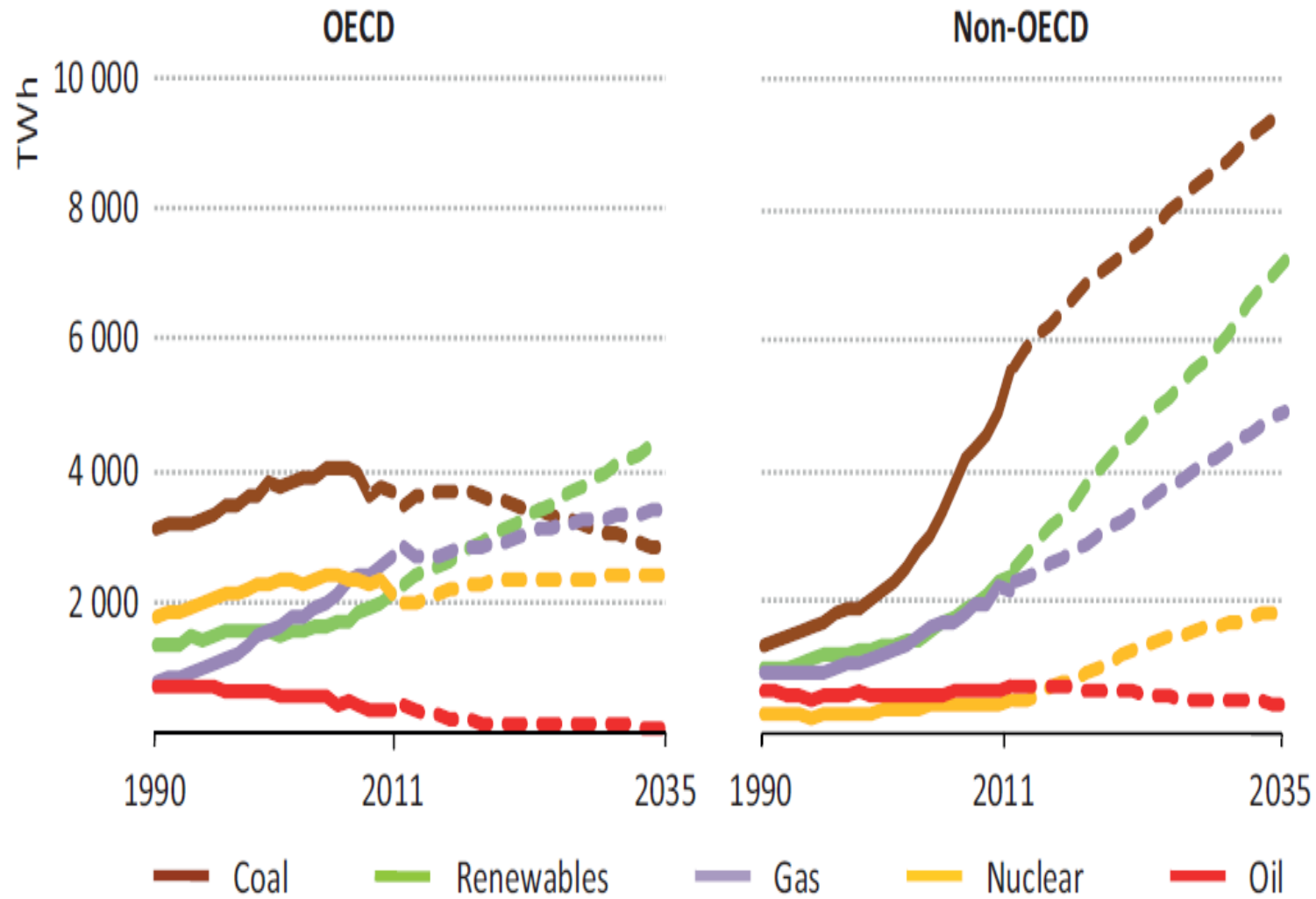
Emisiones de CO₂ relacionadas con la energía UE: la soledad del corredor de fondo



Sources: IEA databases and analysis; Boden *et al.*, (2013).

IEA, 2013

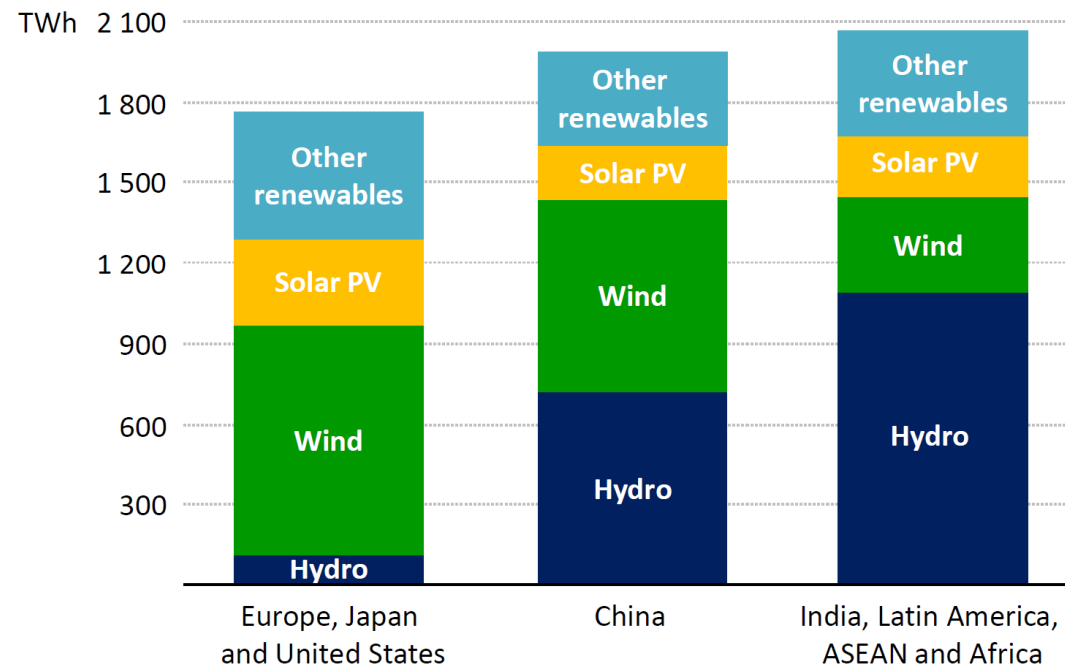
Electricity generation by source in the New Policies Scenario



Renewables power up around the world

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Growth in electricity generation from renewable sources, 2011-2035

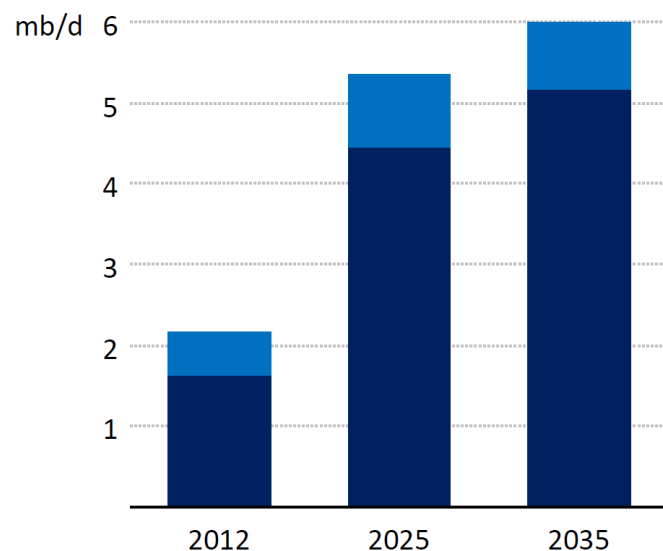


The expansion of non-hydro renewables depends on subsidies that more than double to 2035; additions of wind & solar have implications for power market design & costs

Brazil cuts a distinctive profile

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Brazil oil production



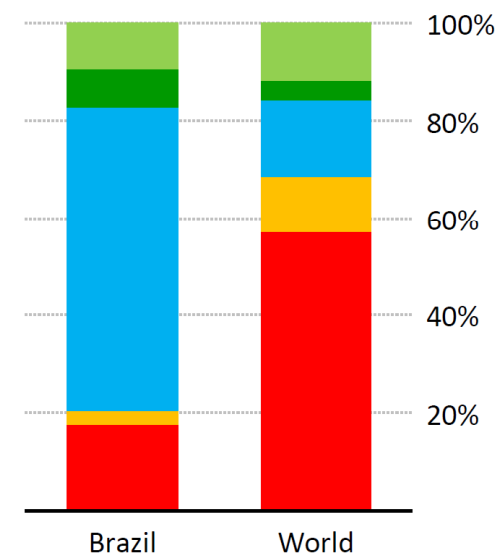
Oil production:

- Other
- Deepwater

Electricity generation:

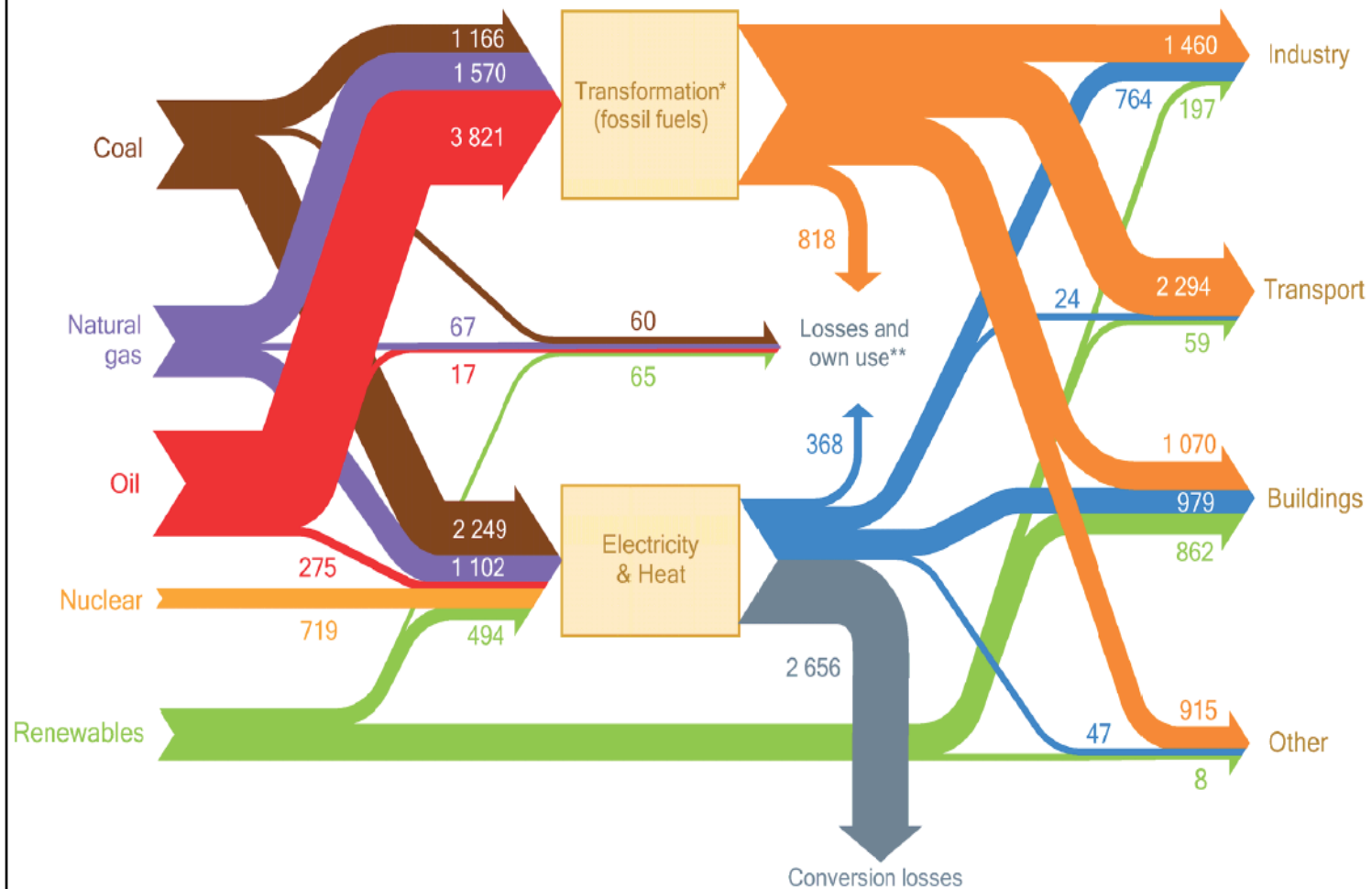
- Other renewables
- Bioenergy
- Hydropower
- Nuclear
- Fossil fuels

Electricity mix by fuel, 2035



Complex deepwater projects see Brazil joining the top ranks of global oil producers, while the domestic power mix remains one of the least carbon-intensive in the world

The global energy system 2010, (Mtoe)



* Transformation of fossil fuels from primary energy into a form that can be used in the final consuming sectors. ** Includes losses and fuel consumed in oil and gas production, transformation losses and own use, generation lost or consumed in the process of electricity production, and transmission and distribution losses.