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Energy and the environment: what's the challenge?

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British Academy debate, London

22nd September 2015

Questions and answers

- What is the climate change challenge?
- What is the climate change challenge for energy?

  => decarbonise power sector first

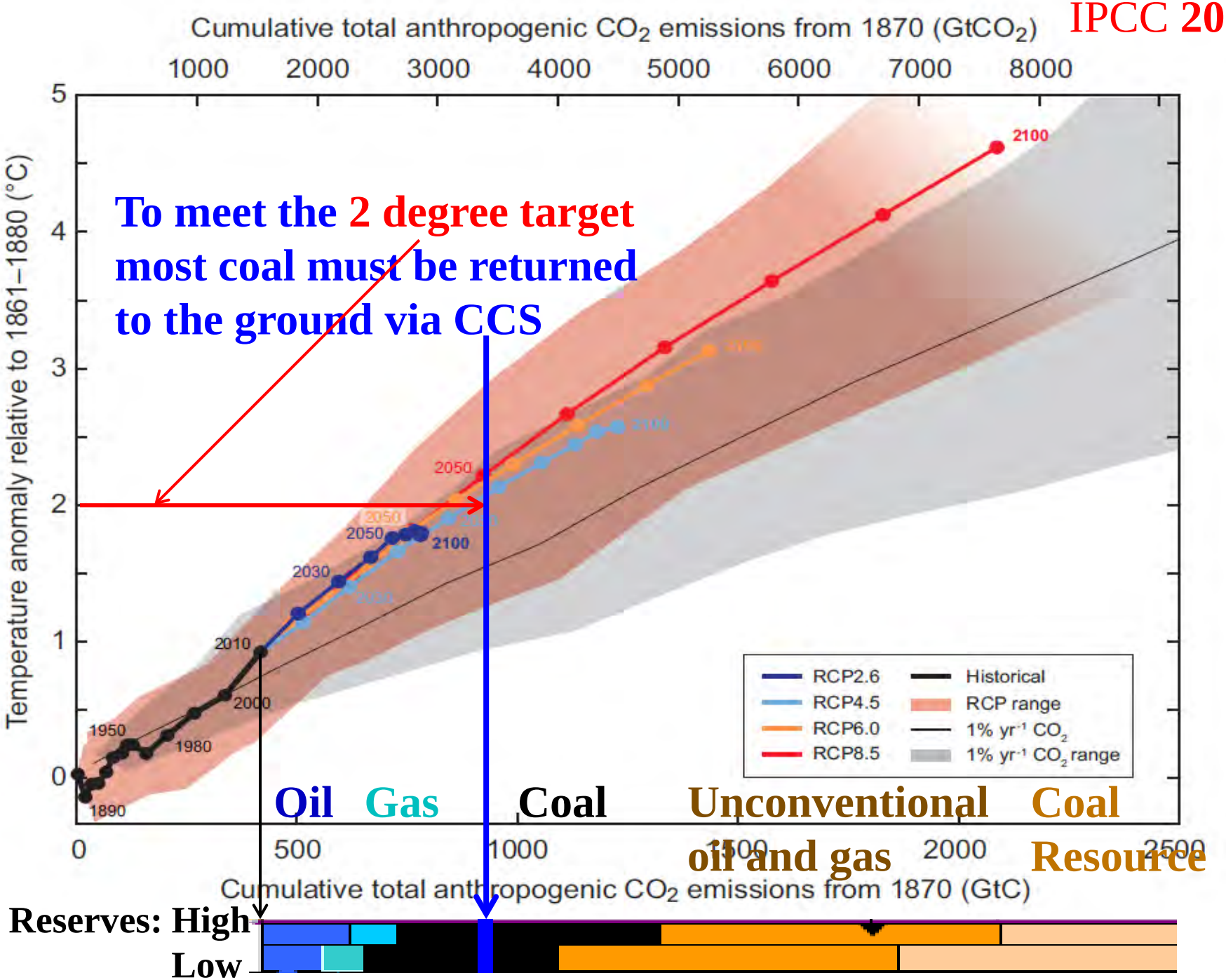
- How do we meet future world energy demand sustainably?

  => RDD&D to drive down low-C costs

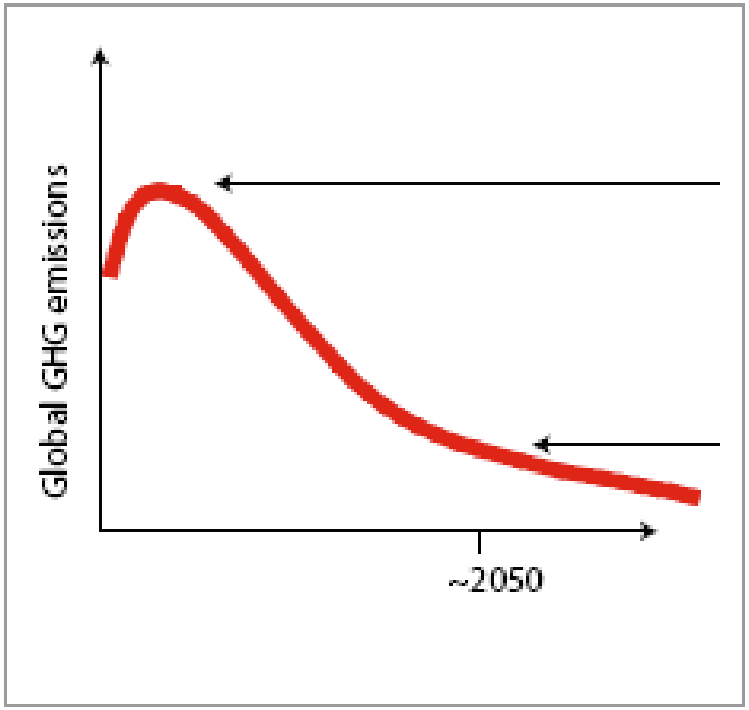
- The message on discount rates

  => Public funds to investment in low-C; general taxation to fund climate change policies

IPCC **2013**

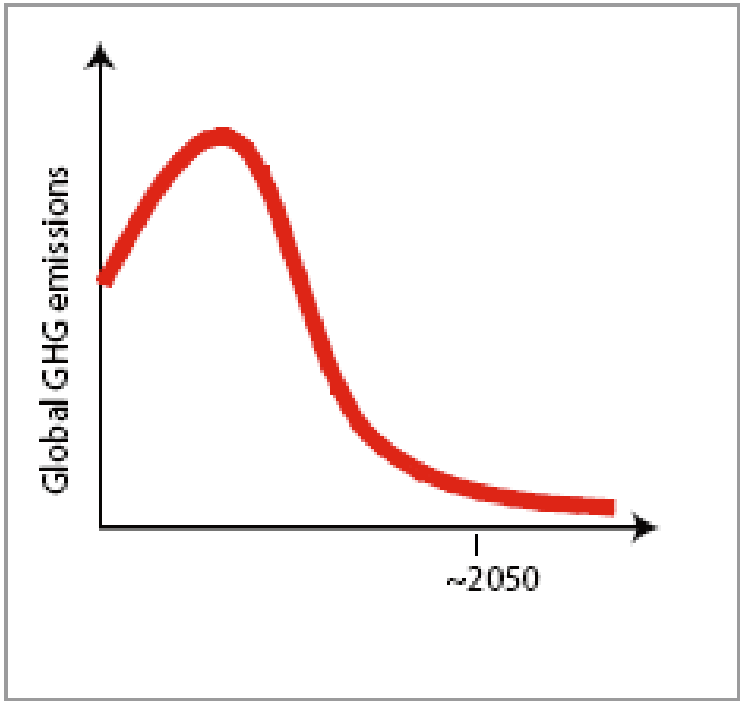

Cumulative total anthropogenic CO_2 emissions from 1870 ($GtCO_2$)
1000
2000
3000
4000
5000
6000
7000
8000
Temperature anomaly relative to 1861–1880 (°C)
0
1
2
3
4
5
To meet the 2 degree target
most coal must be returned
to the ground via CCS
1890
1950
1980
2000
2010
2030
2050
2100
RCP2.6
RCP4.5
RCP6.0
RCP8.5
Historical
RCP range
1% yr⁻¹ CO_2
1% yr⁻¹ CO_2 range
Oil
Gas
Coal
Unconventional
oil and gas
Coal
Resource
0
500
1000
1500
2000
2500
Cumulative total anthropogenic CO_2 emissions from 1870 (GtC)
Reserves: High
Low

Total cumulative emissions determines global warming



Lower peak

Gradual reduction after peak



Higher / later peak

Faster reduction after peak

- Delaying peak requires a faster subsequent decline
- peak should be before 2020

Source: ENEP Emissions Gap Report 2010

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Decarbonising power

- **Power sector** key to decarbonising economy
  - –Large, easiest, and capital **highly durable**
- •Coal-fired electricity has more than twice the GHG emissions of gas *and* far higher air pollutants
  - – gas as transition fuel to the low carbon future
  - – But there is lots of coal => **CCS a long-run priority**
- Deployment has dramatically lowered cost of wind, PV
  - – justifies **support for R&D and deployment**
- **Nuclear power** has attractions for mass deployment
  - – if we can make it safe, proliferation-proof and **cheaper**
- Adequate carbon pricing could *lower* fossil fuel *prices*

⇒ need agreements and/or border tax adjustments

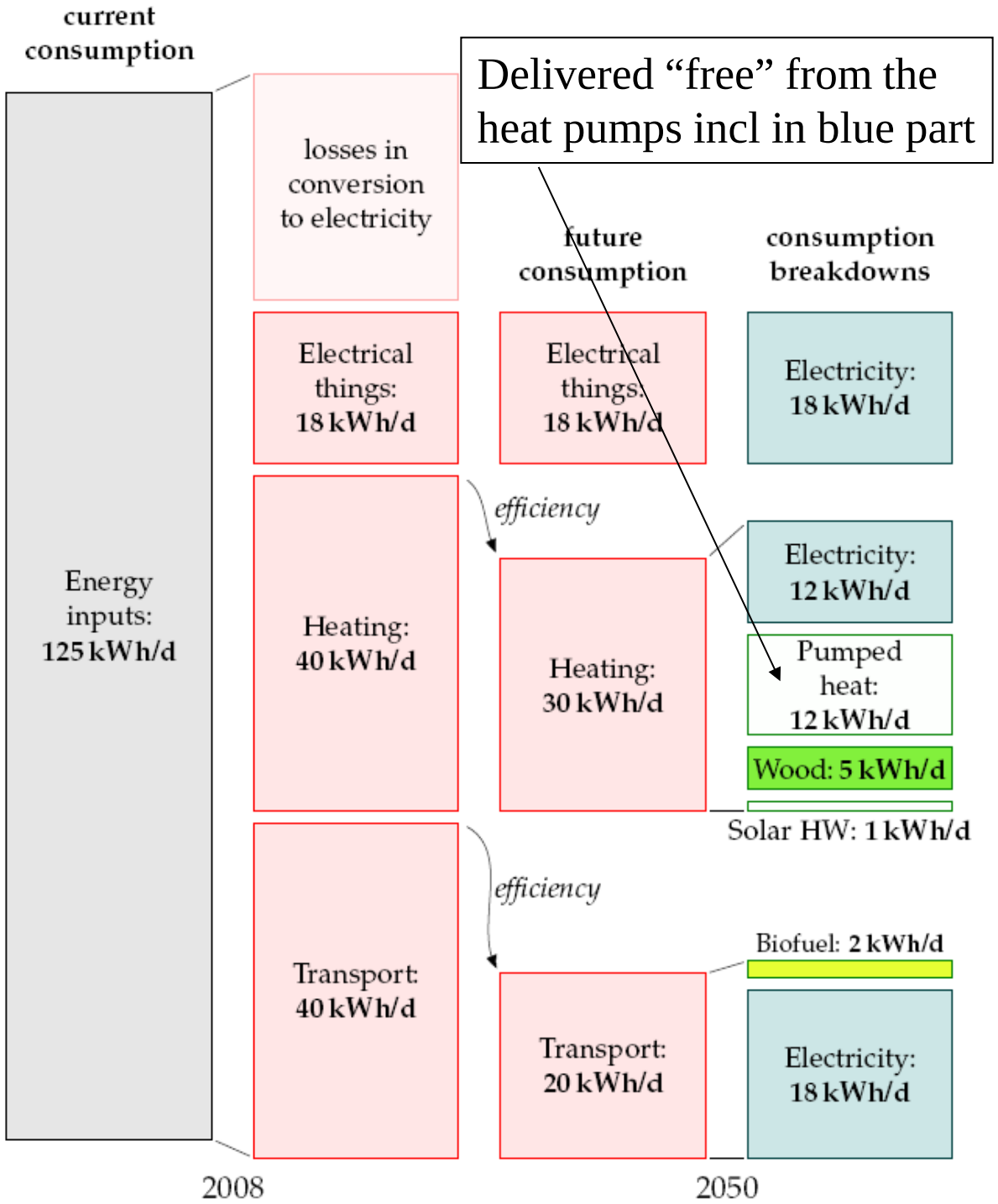
⇒ and hard to set the "right" carbon price

How to de-carbonise UK

MacKay's

http://www.withouthotair.com/

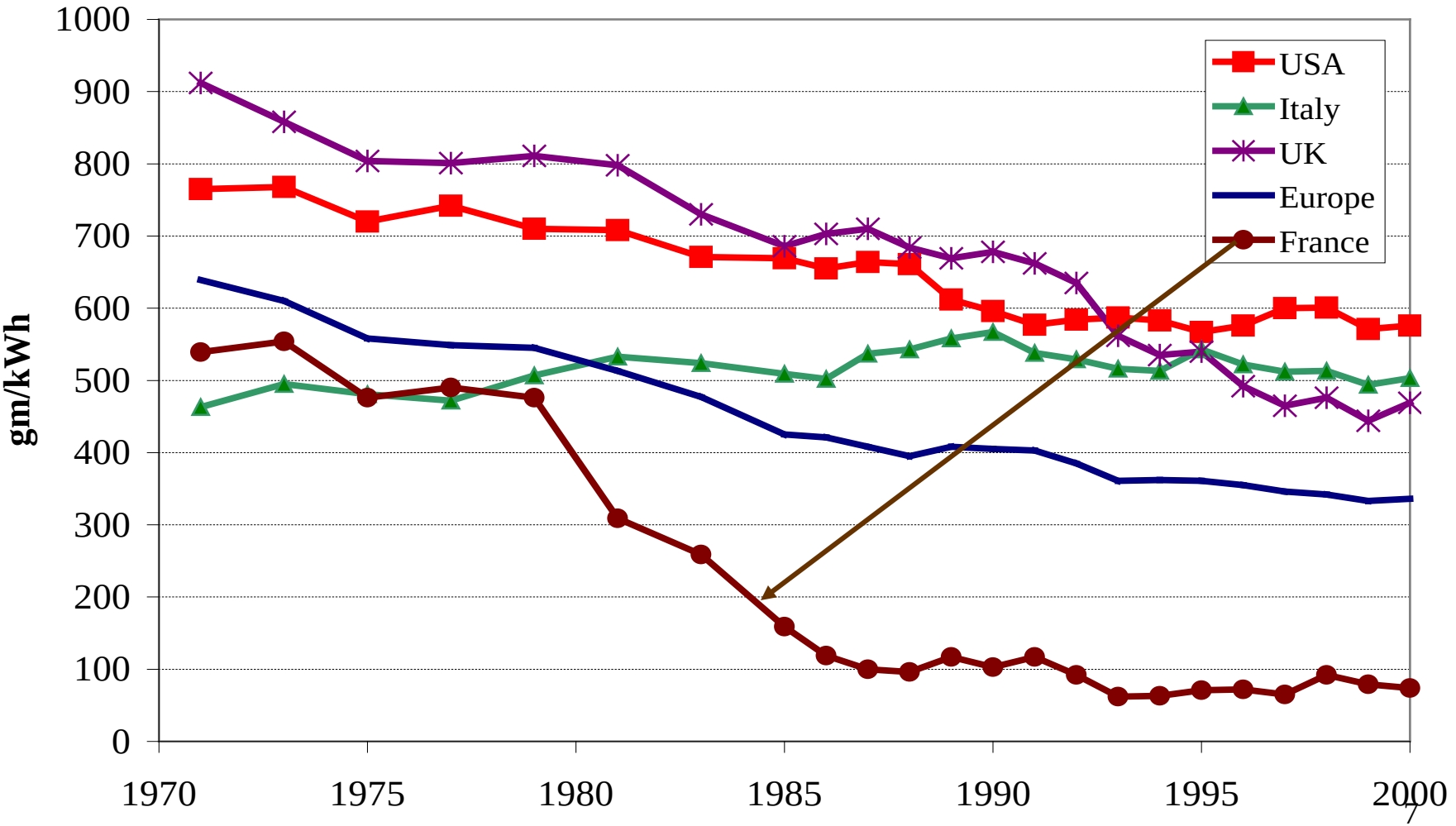
estimates indicate the large role of low-C electricity in any future low-C UK-sized Economy: figures per head per day



Rapid decarbonisation of electricity is possible

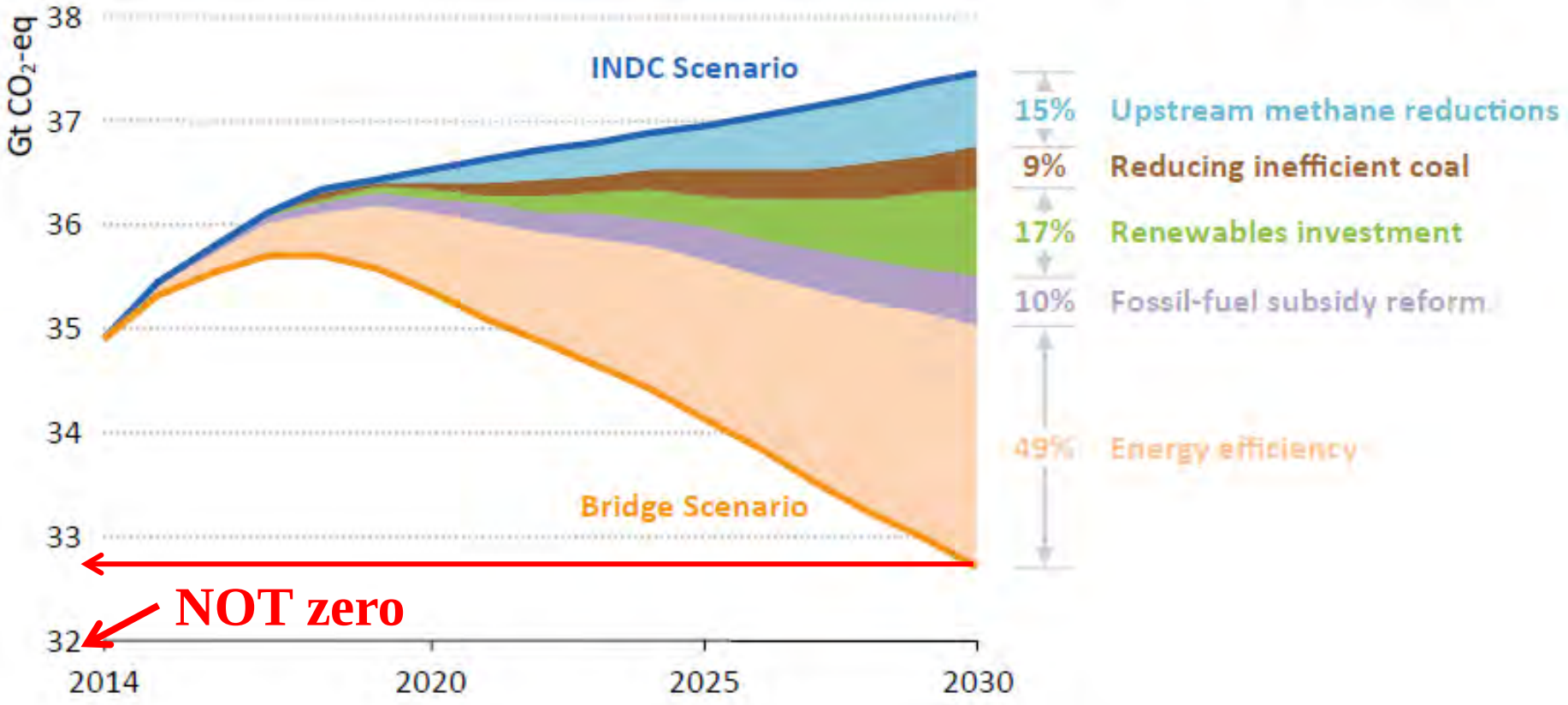
- with nuclear power

CO2 emissions per kWh 1971-2000

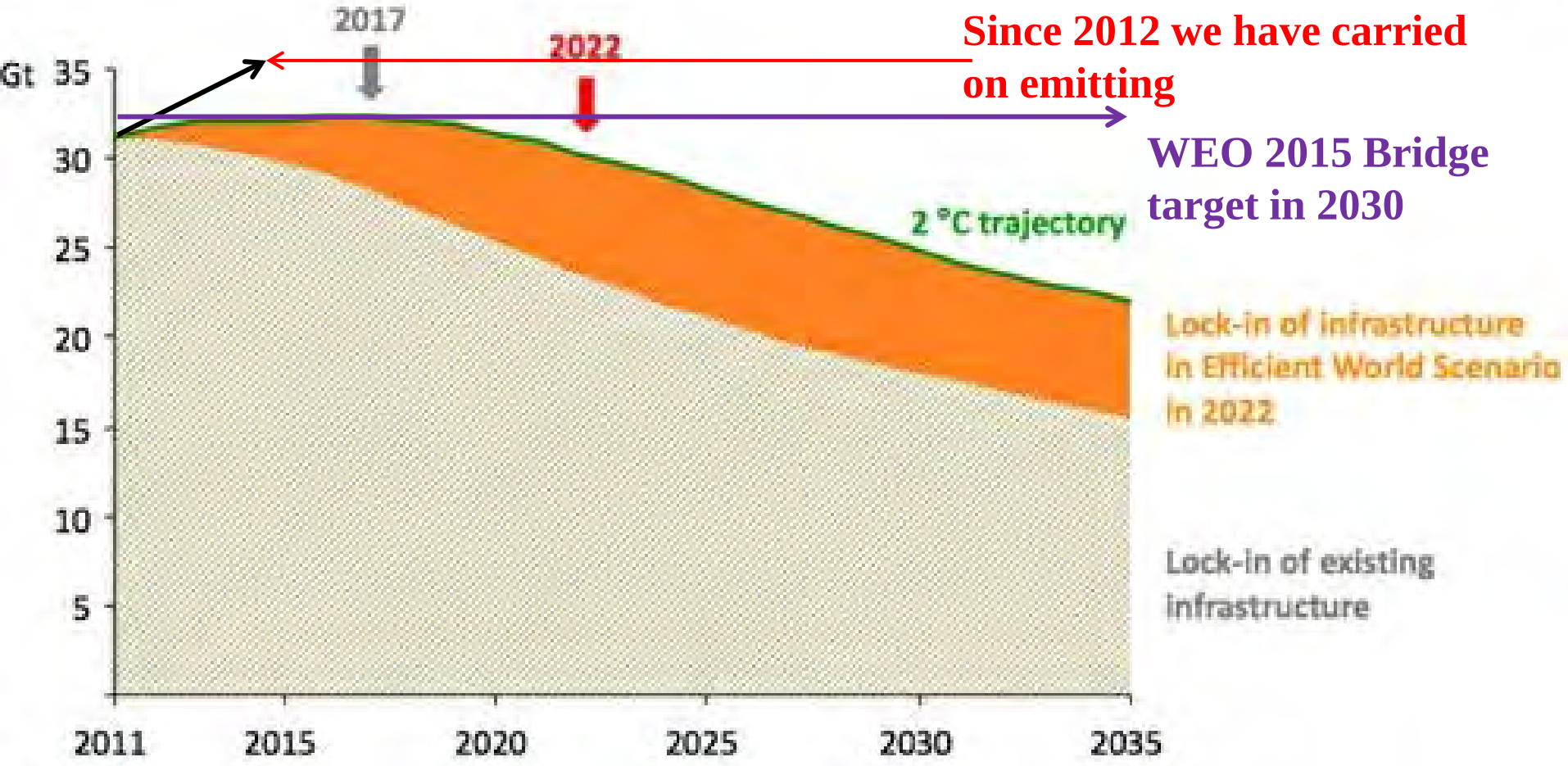


IEA WEO2015 Bridge Scenario

Figure 3.2 ▷ Global energy-related GHG emissions reduction by policy measure in the Bridge Scenario relative to the INDC Scenario

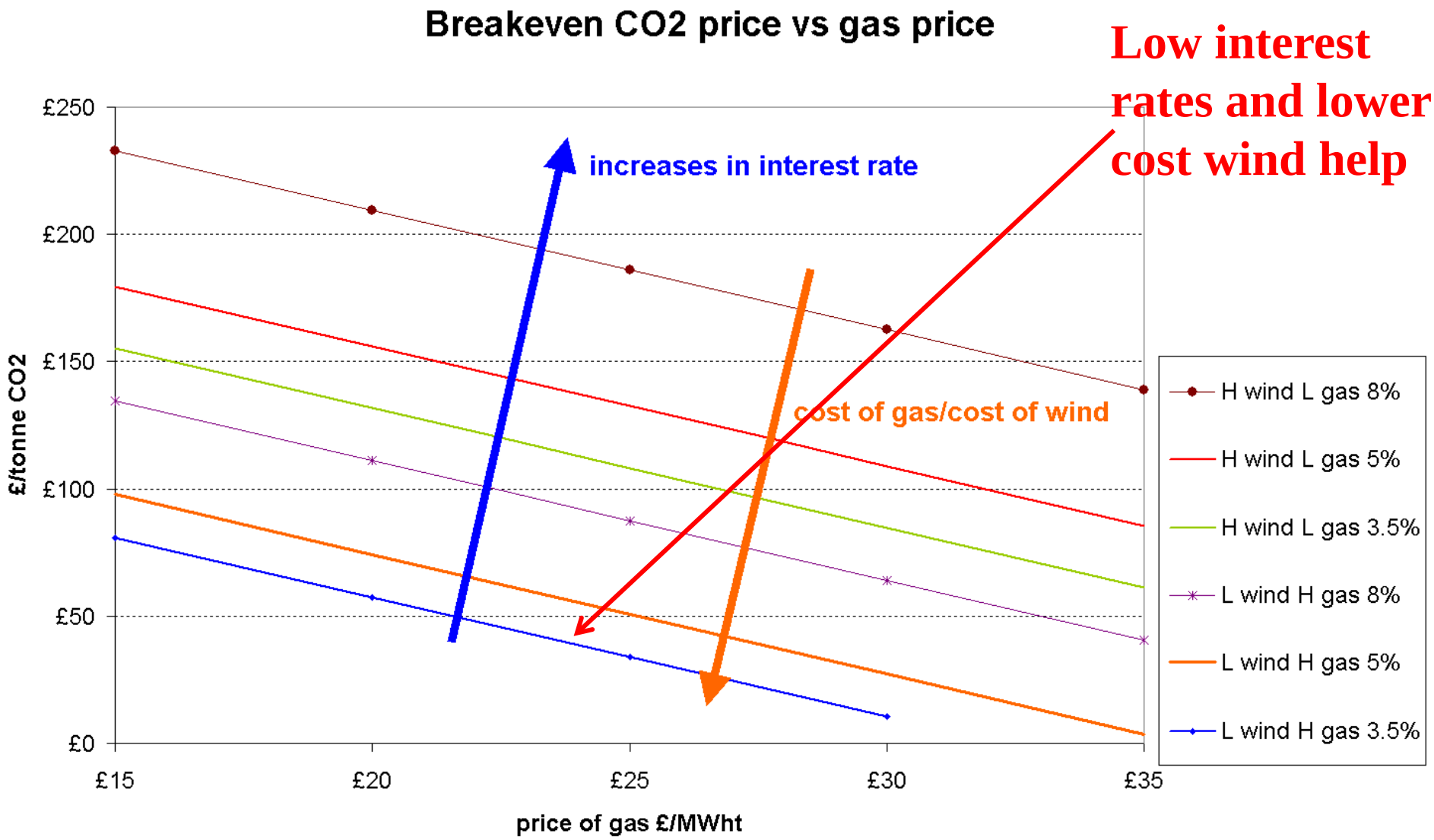


By 2012 we had already locked in to high carbon emissions from past fuel choices



Source: IEA http://www.carbonbrief.org/blog/2012/11/favourite-graphs-from-iea

Hard to set the “right” carbon price



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The power of discounting

- £1 million in 100 years discounting at 10% = £72
  - at 5% worth £7,600, **at 1.7% worth £185,000**
- Unlikely but extreme future climate change events imply **low discount rates** – Stern assumed 1.7%
- High discount rates lower prices of exhaustible resources
  - oil, gas and coal favoured
- Low discount rates favour low-carbon investments
- **The cost of public sector borrowing is low**

=> private finance for low carbon too costly

=> public finance sensible

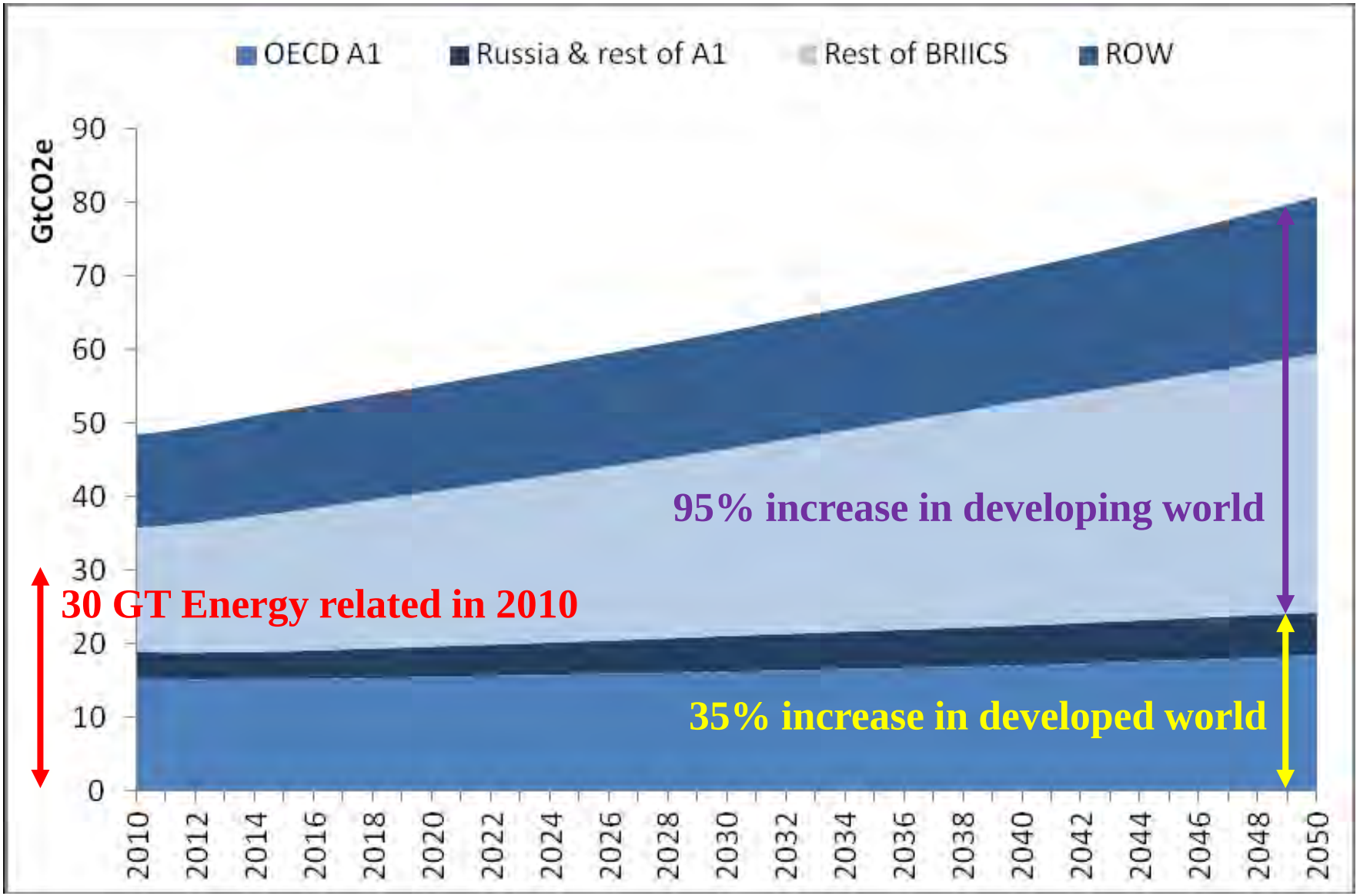
The role of public finance

- **Public sector financed** massive past power investment
- France decarbonised its electricity sector in 10 years by a mass drive to nuclear power
- NASA spent $$$ to get to the moon. Saving this planet deserves more **massive R&D**

  = Public good => should be funded from general taxes
- Public sector borrowing rates have never been lower

Public investment to decarbonise energy => public assets balancing public debt *AND* climate benefits

OECD *Baseline* GHG emissions by region



Conclusions

- The first priority is to decarbonise electricity
  - –To avoid long-term lock-in
  - –existing technology can do this **at modest cost**
- Setting a carbon price may not be enough
  - – decarbonising will **lower the price of fossil fuels**
- Developing countries need cheaper low-C options
  - ⇒ **RDD&D by rich countries critical to drive down costs**
  - ⇒ Need to avoid exporting C-intensive production
- Fund climate change policies from **general taxation**
  - – not levy charges on fuel used by poor
  - – **public funding** for low-cost finance of investment

Acronyms

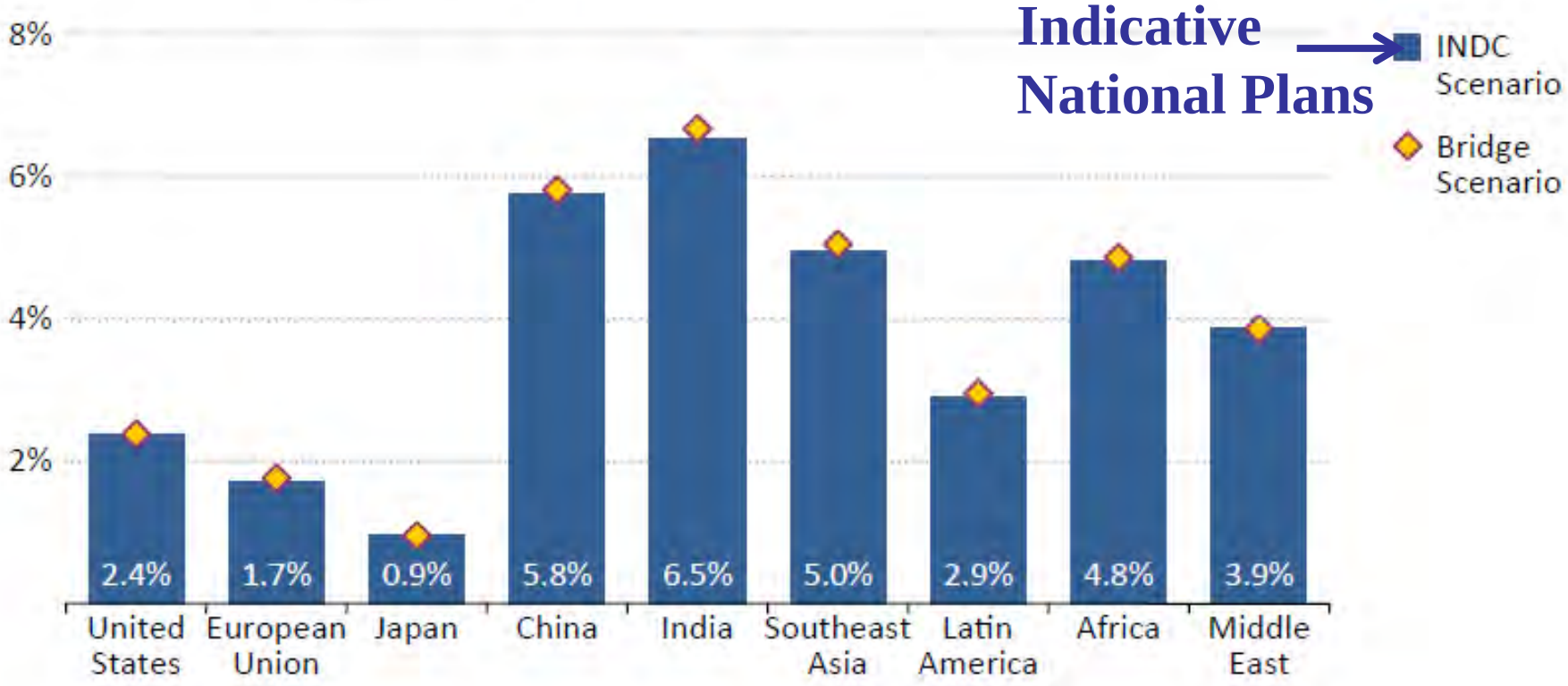
CCS	Carbon Capture and Storage
GHG	Greenhouse gases
GT	Gigatonnes (billion tonnes)
INDC	Indicative national
R&D	Research & Development
RDD&D	Research, Development Demonstration and Deployment
WEO	World Energy Outlook

Reference

IEA (2015) *Energy and Climate Change*; World Energy Outlook Special Report

Growth not sacrificed by decarbonisation

Figure 3.17 ▷ Average annual GDP growth by scenario by selected region, 2013-2030

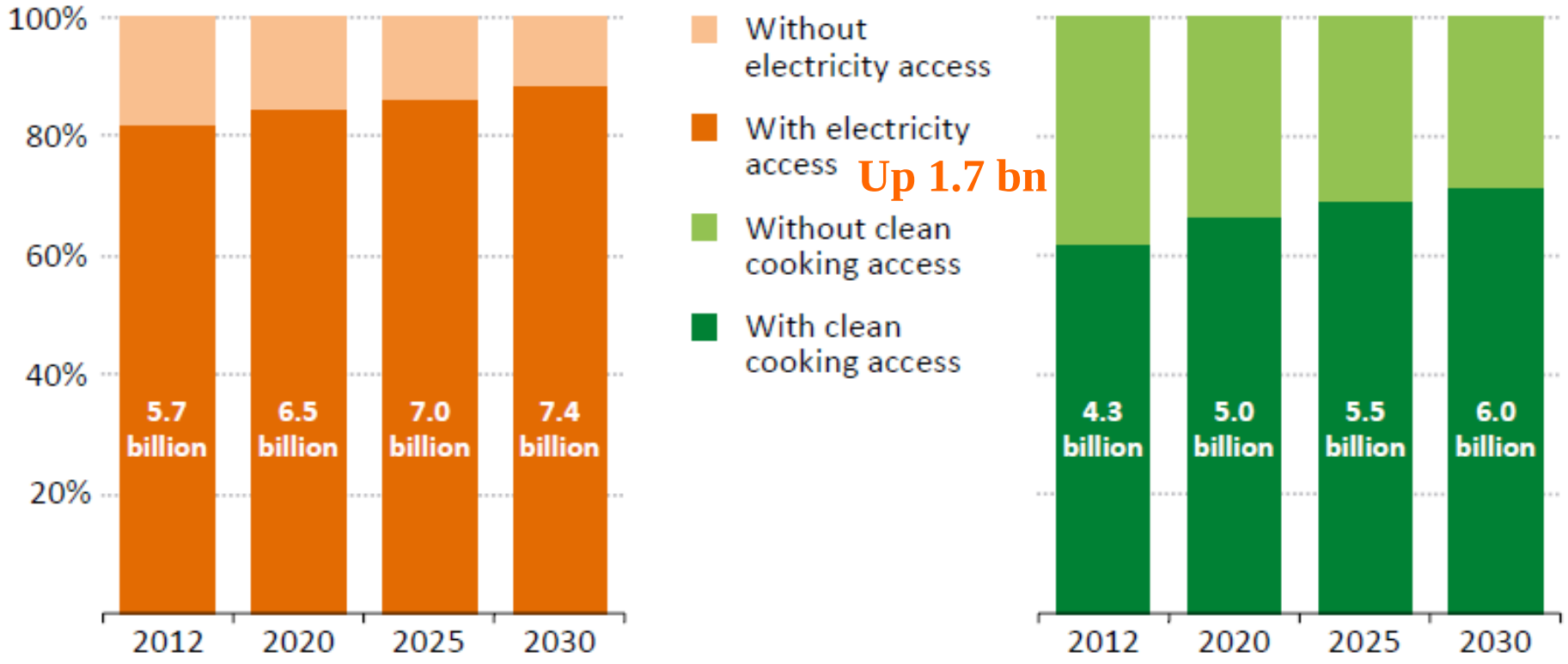


Source: OECD ENV-Linkages model. Growth rates are calculated on a PPP-basis.

IEA WEO 2015

Bridge scenario improves access modestly

Figure 3.21 ▷ Global population with and without access to electricity and clean cooking in the Bridge Scenario



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