

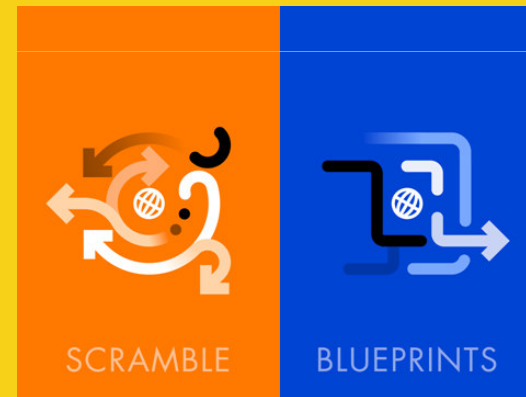


THE GLOBAL ENERGY SYSTEM & SHELL'S CONTRIBUTION

Club of Amsterdam

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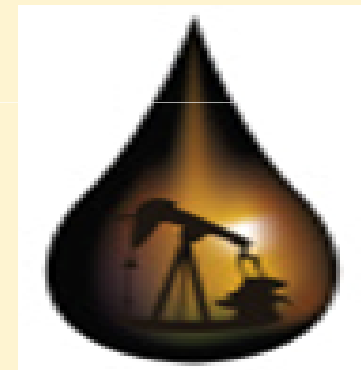
Black Gold

3 large spoonfuls of crude oil =

8 hours of human manual labour

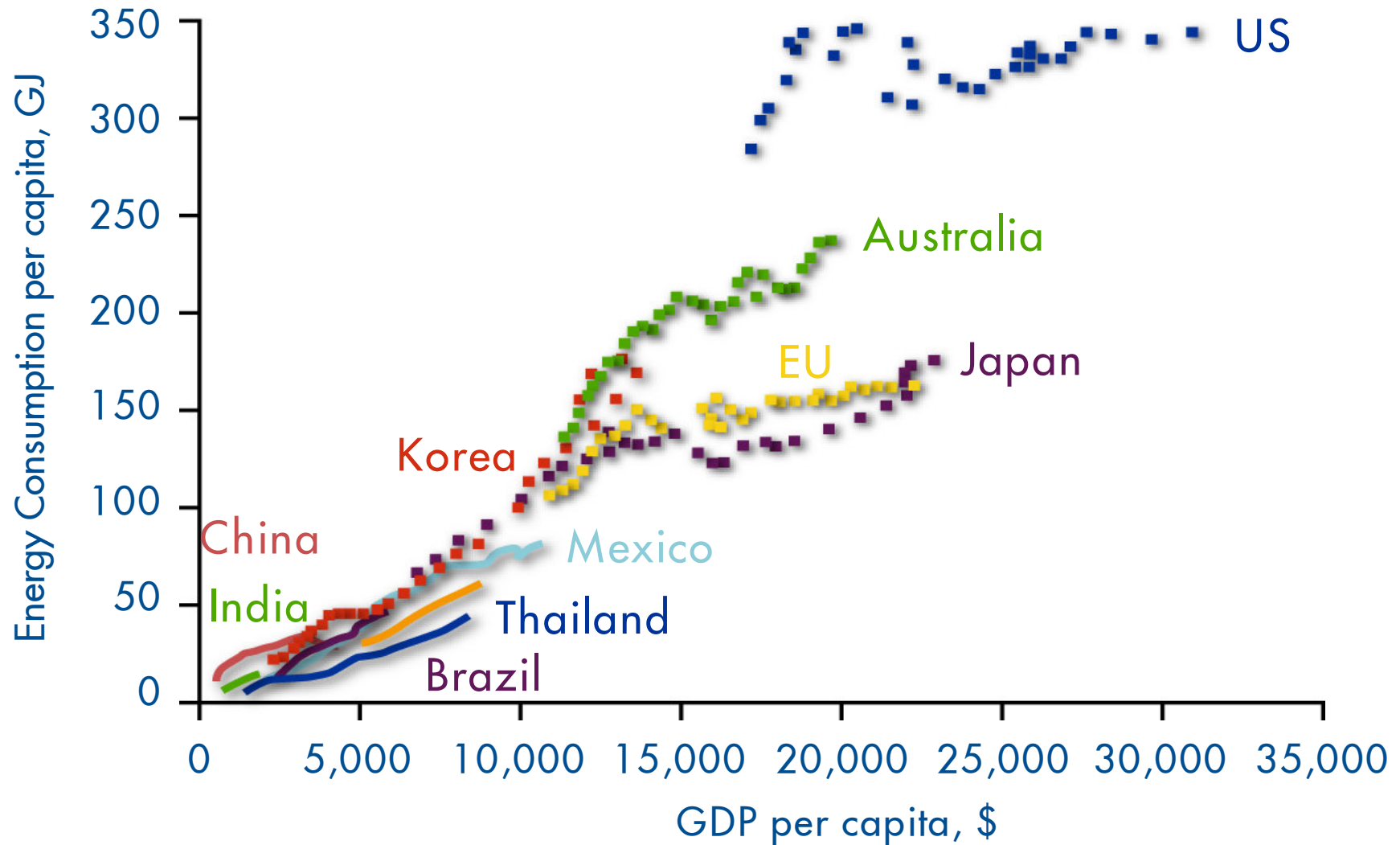
“It’s as if each of us had a team
of slaves working for us for
next to nothing.”

(Colin Campbell)



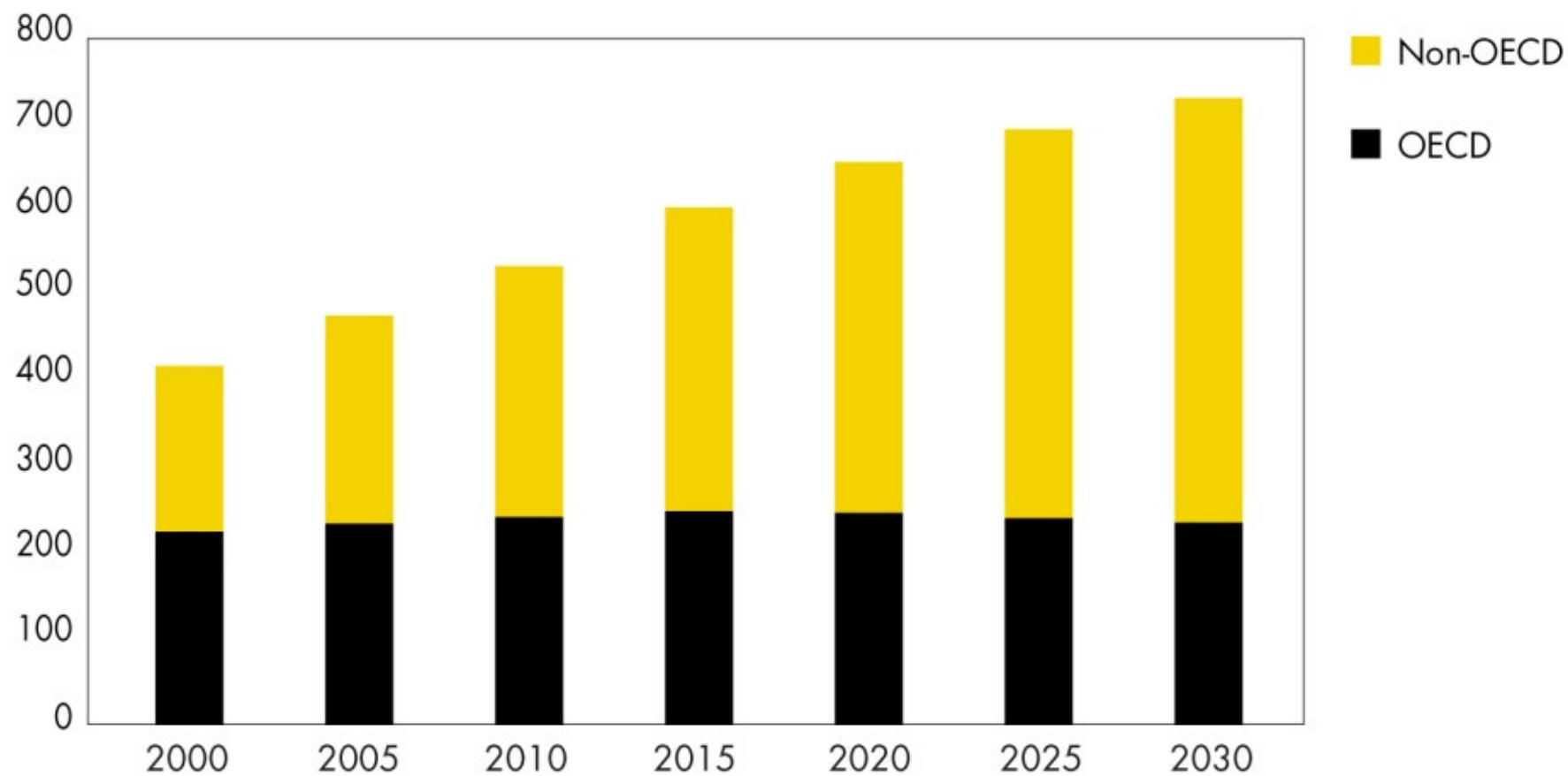
FUTURE ENERGY DEMAND

CLIMBING THE ENERGY LADDER



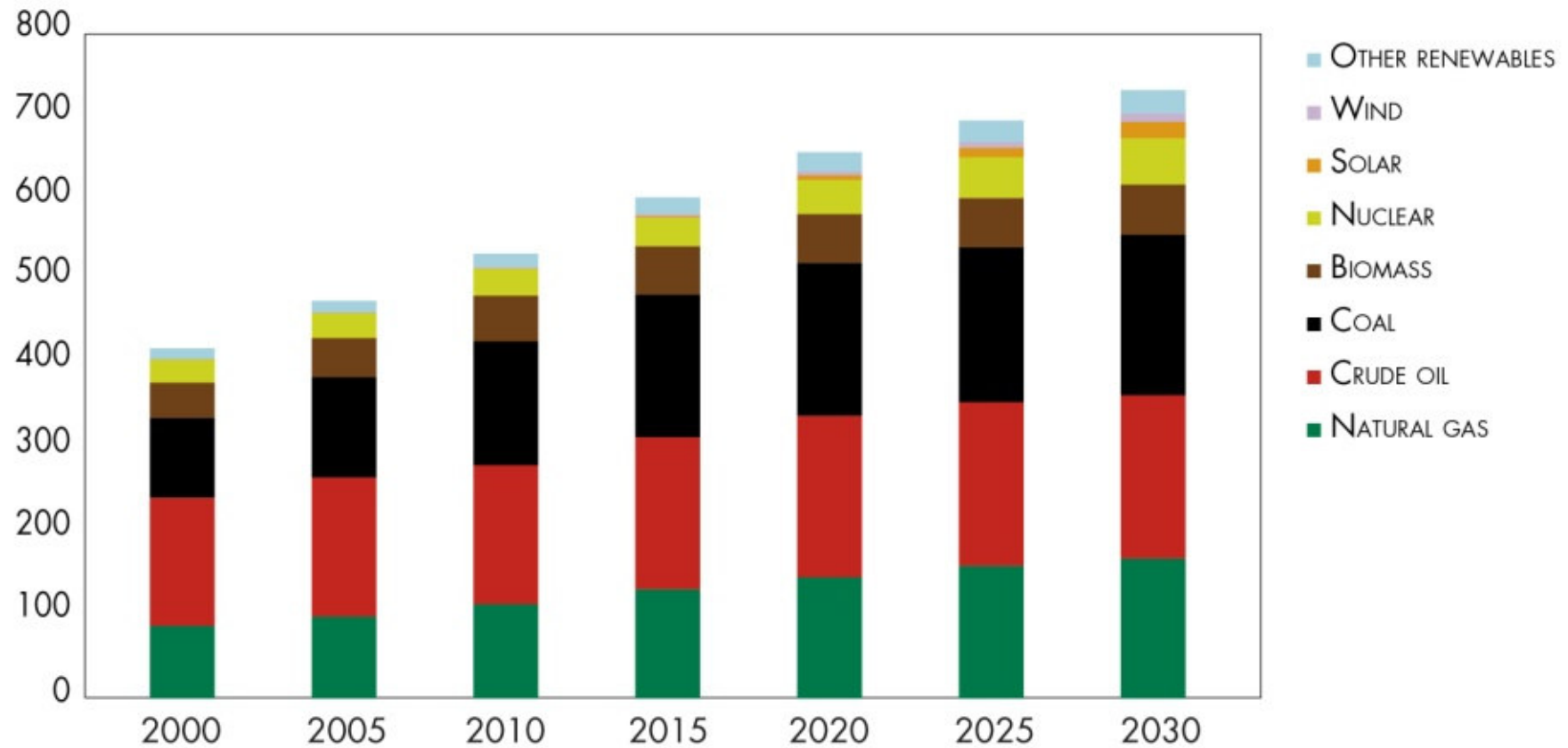
WORLD – TOTAL PRIMARY ENERGY DEMAND

EJ / year (Energy source)

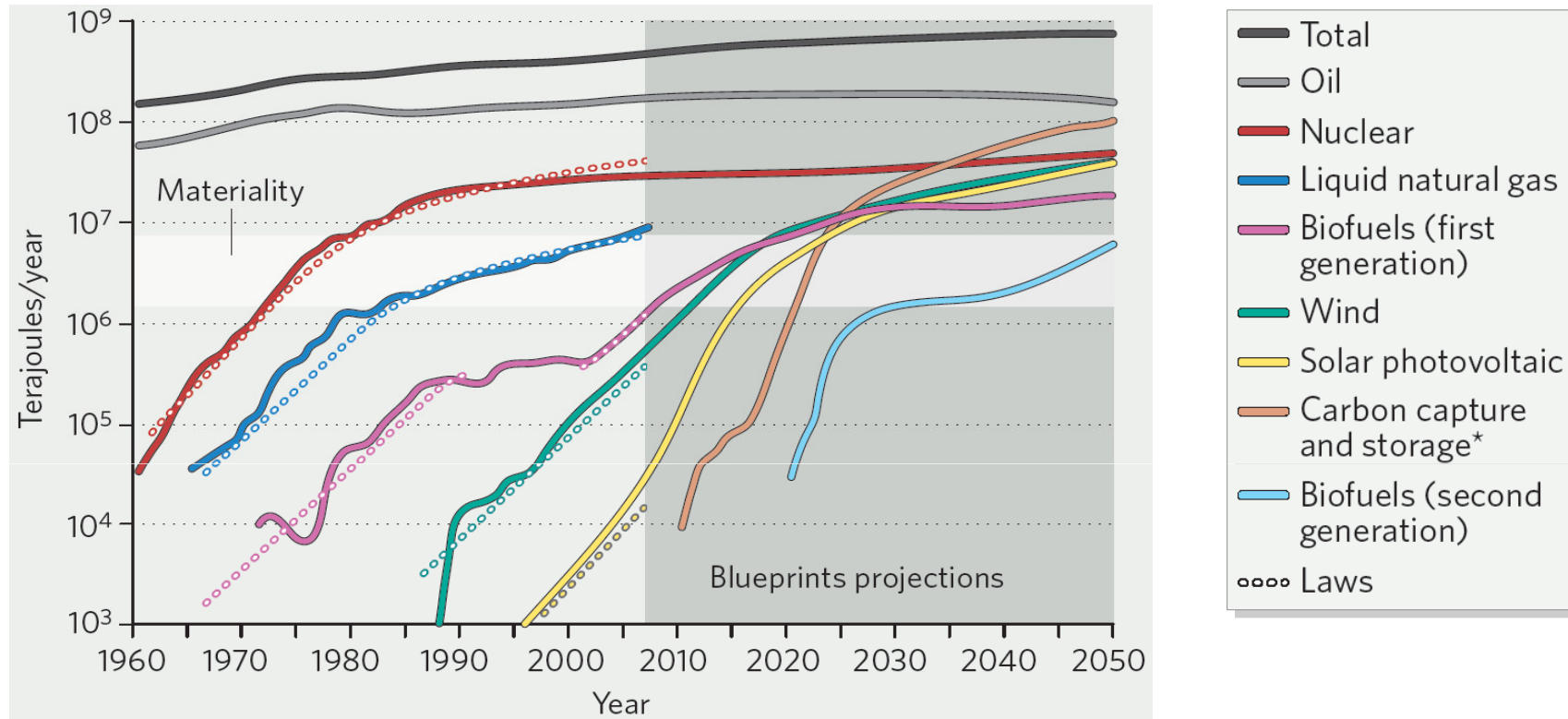


WORLD – TOTAL PRIMARY ENERGY SUPPLY

EJ Exajoules per year



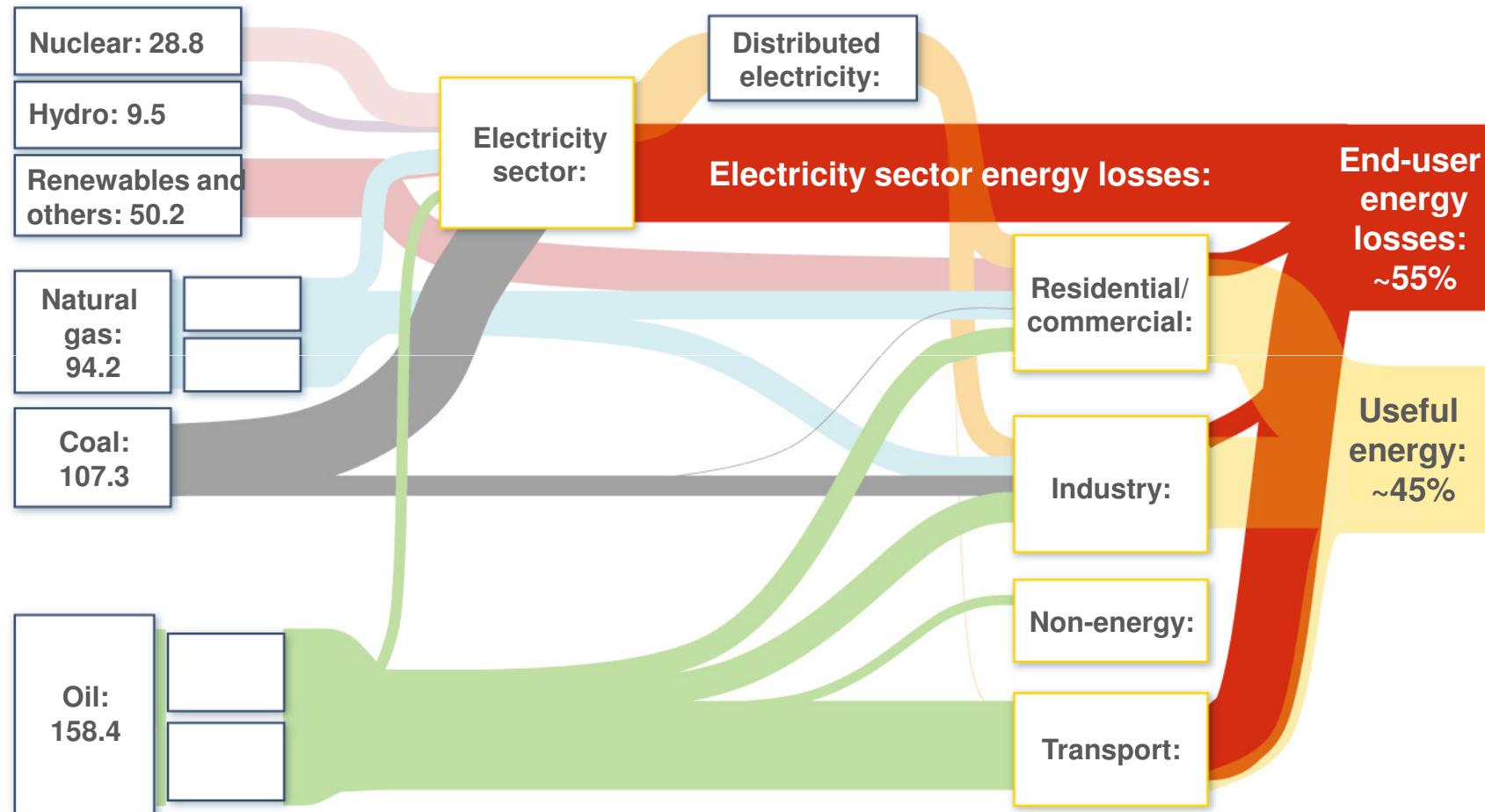
"LAWS" OF ENERGY TECHNOLOGY DEPLOYMENT



- There are physical limits to the rate at which new energy technologies can be deployed. Therefore structured government intervention is needed to drive technology change and support progress in the demonstration phase.
- All forms of energy will be needed over the long term.

THE WORLD ENERGY FLOWS

EFFICIENCY POTENTIAL



Approximate calculations based on data from IEA, plus energy balances of non-OECD countries 2002–2003

Units EJ

Energy drivers and the zone of uncertainty

2050

Underlying
demand
potential

Ordinary
demand
moderation



**Zone of extraordinary
opportunity or misery**

2000

Energy supply/
demand balance

Ordinary
supply
developments

THE ENERGY AND CO₂ CHALLENGE

ENERGY DEMAND WILL DOUBLE WHILE CO₂ IS NEARING ITS LIMIT

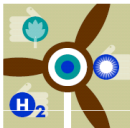
MEETING DEMAND WITH LESS CO₂

The world will need ALL options it has



Energy efficiency

AND



Renewables

AND



Nuclear

AND



CO₂ Capture and Storage

AND



Forestry

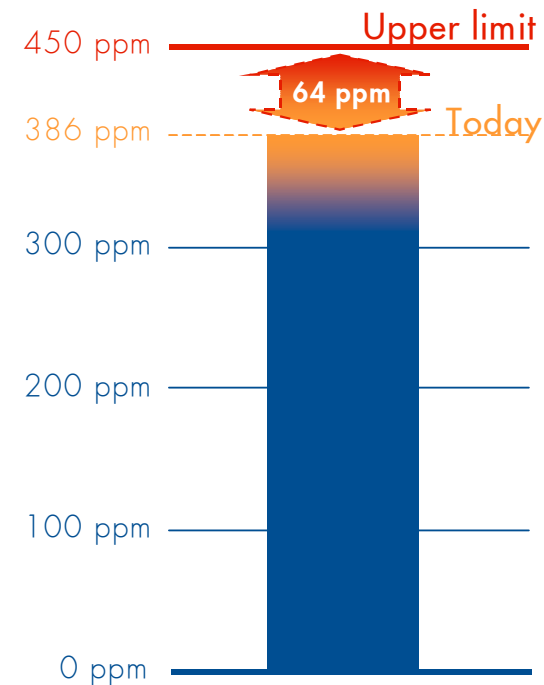
AND



Natural Gas

CO₂ CONCENTRATION IN ATMOSPHERE

Science warns of a 450 ppm upper limit



Emissions are rising at over **2 ppm** per year

HOW DO WE MOVE FORWARD?

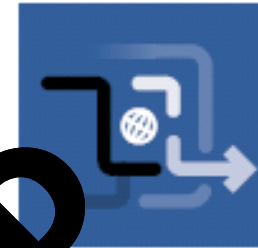
SHELL ENERGY SCENARIOS TO 2050

SCRAMBLE



Policymakers pay little attention to more efficient energy use until supplies are tight. Likewise, greenhouse gas emissions are not seriously addressed until there are major climate shocks.

BLUEPRINTS

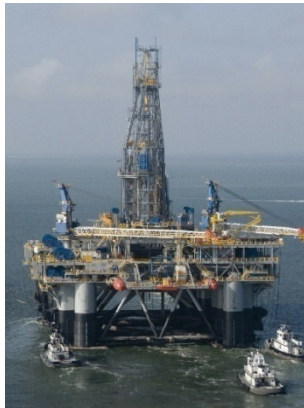


Growing local actions begin to address the challenges of economic development, energy security and environmental pollution. A price is applied to a small mass of emissions giving a huge stimulus to the development of clean energy technologies, such as carbon dioxide capture and storage, and energy efficiency measures. The result is far lower carbon dioxide emissions.

Regulatory frameworks to encourage lower CO₂ emissions are in place early.

SHELL'S RESPONSE TO THE CHALLENGE

1. Natural Gas
2. Biofuels
3. Carbon Capture and Storage (CCS)
4. Energy efficiency



Perdido, USA



Biofuels, Brazil (Sugar cane for proposed Cosan joint venture)



Carbon Capture Research, Mongstad, Norway



SEPC, Singapore (part of the global energy efficiency programme)

