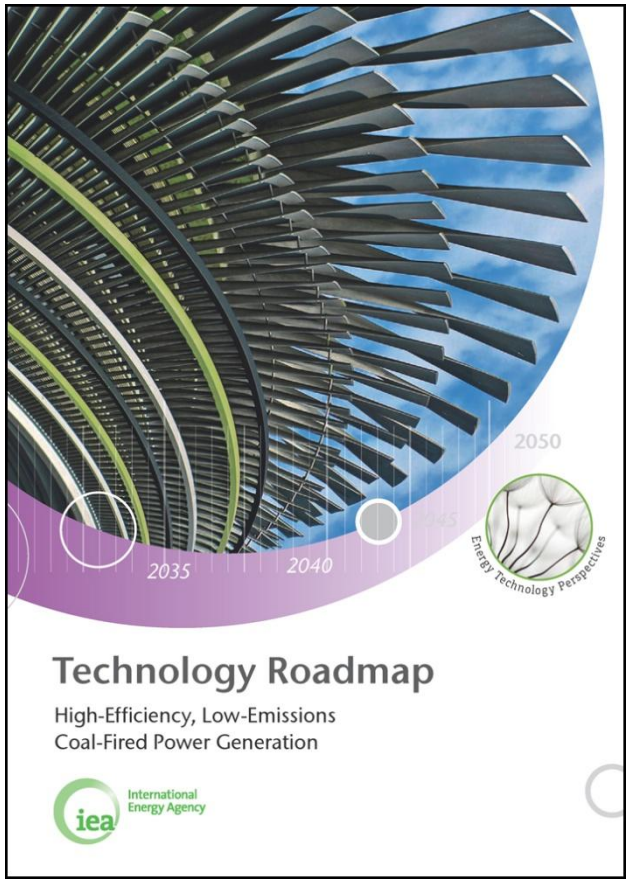
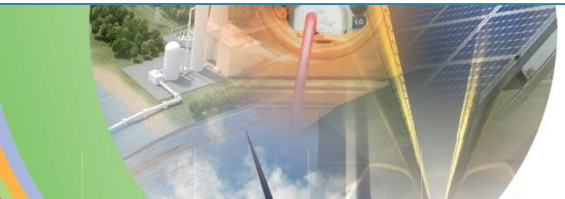
# GLOBAL OUTLOOK: KEY FINDINGS FROM RECENTLY-LAUNCHED HELE COAL ROADMAP


## Dr. Keith Burnard

**Senior Energy Analyst**
**Energy Technology Policy Division**
**International Energy Agency**


**Cleaner and more efficient coal technologies in Russia: Experts meeting**
**10 December 2012**



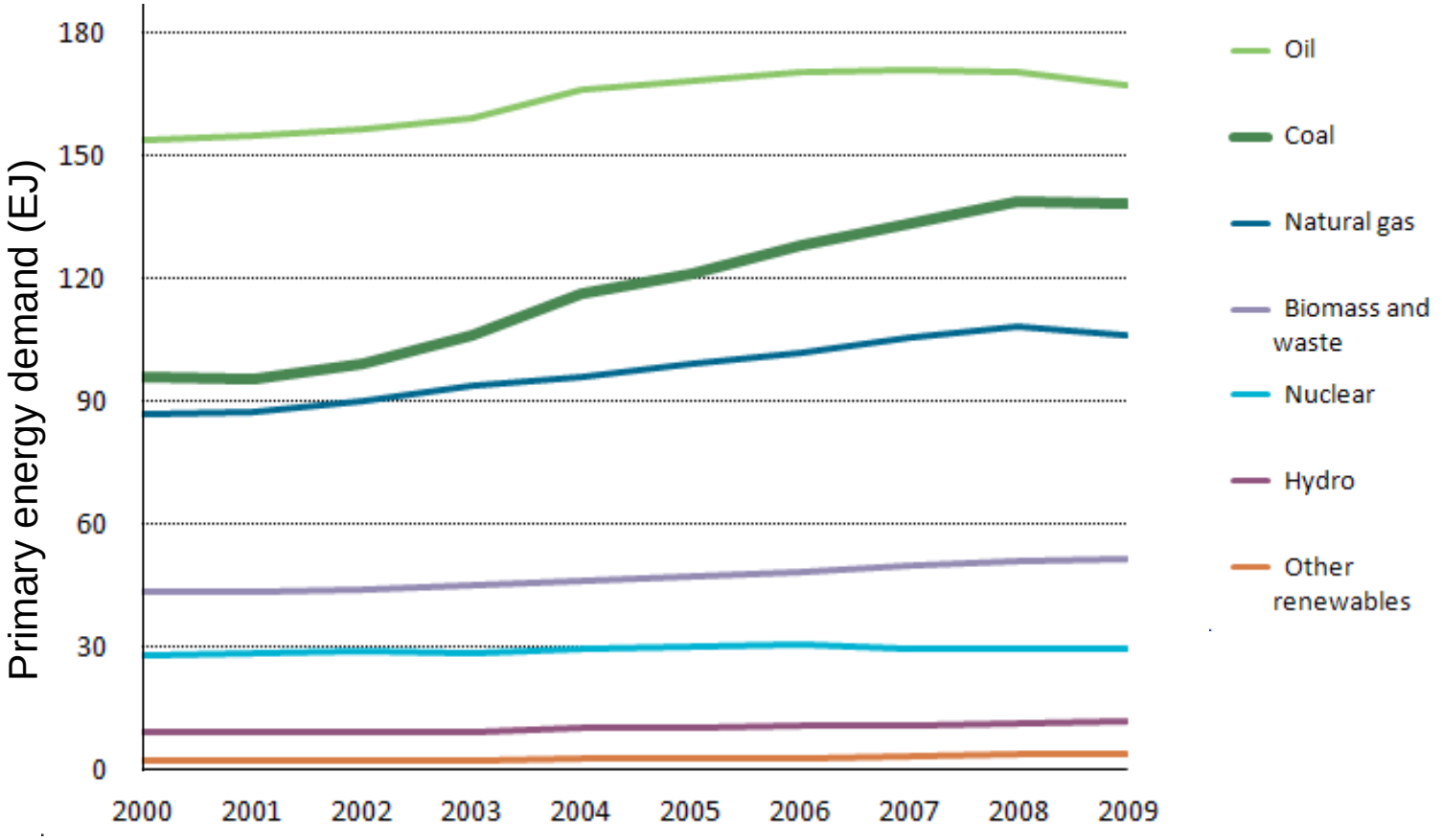
# Technology roadmaps status

**2009** **2010** **2011** **2012**


**2012 / 2013**

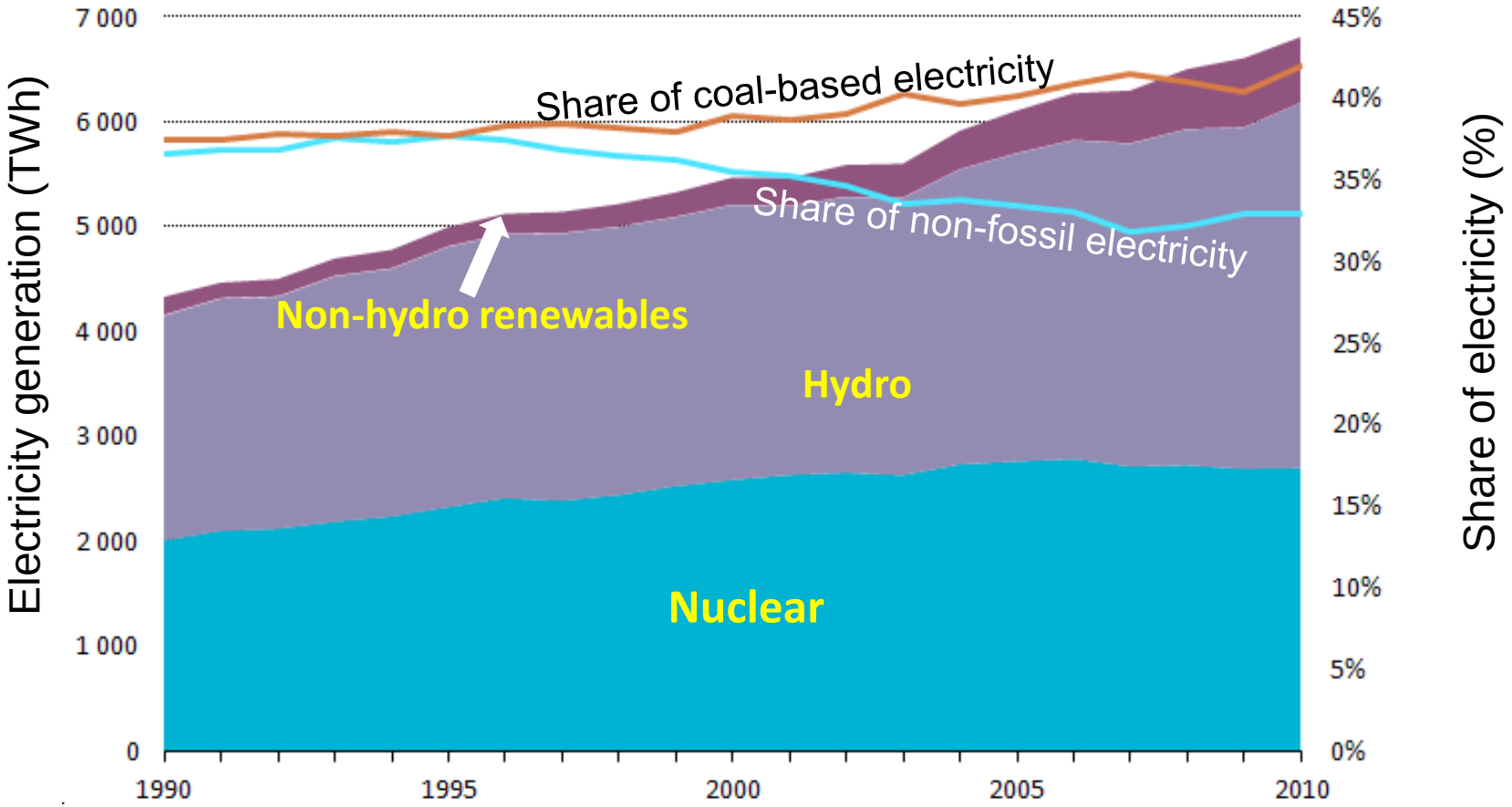
- **HELE Coal (for power)**
- **Chemical catalysis**
- **Hydropower**
- **Energy efficient building envelopes**

# Fossil fuels dominate energy demand



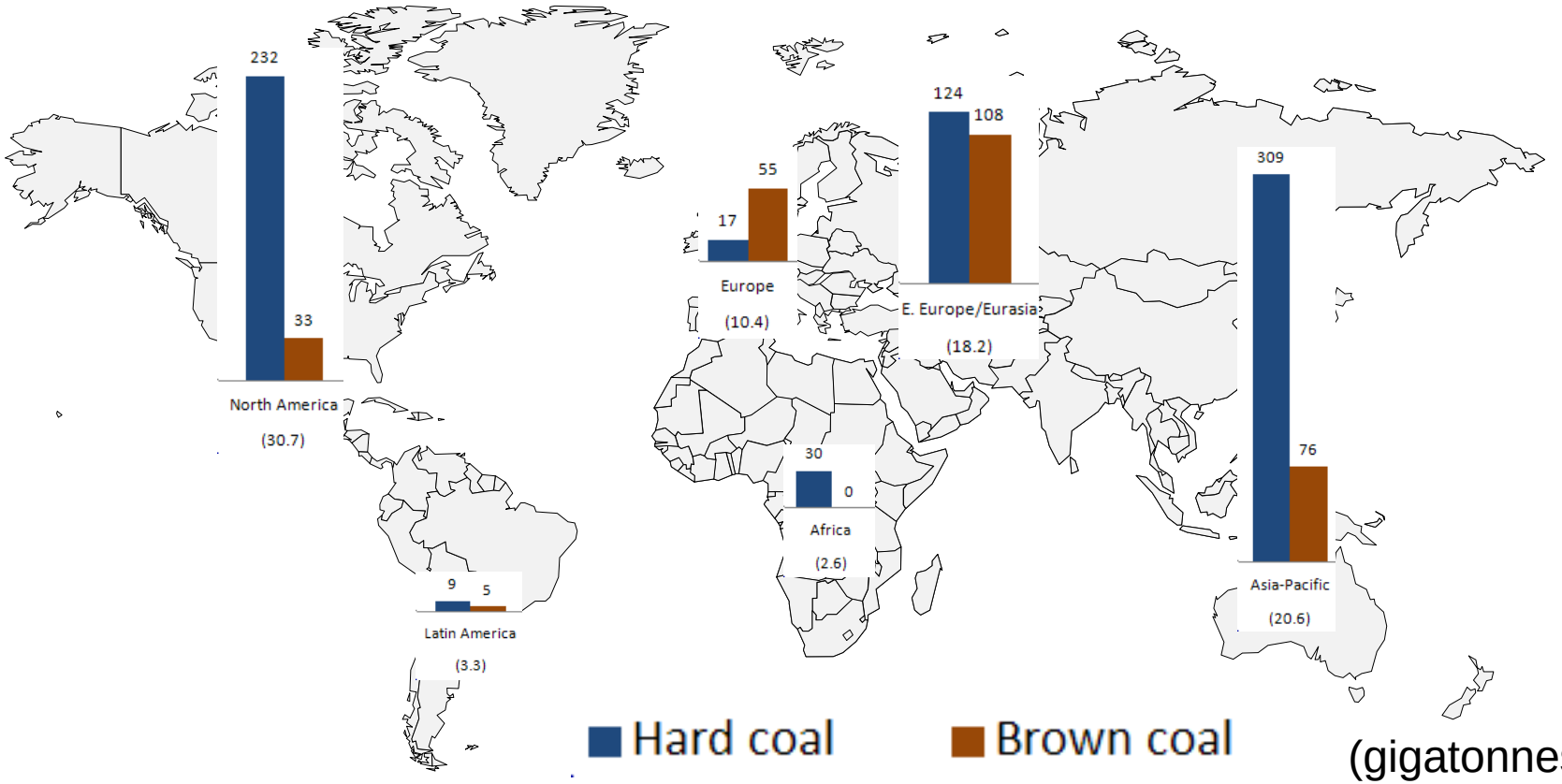

Efficiency improvement reduces specific fuel consumption and also reduces specific pollutant emissions.

# Non-fossil power generation



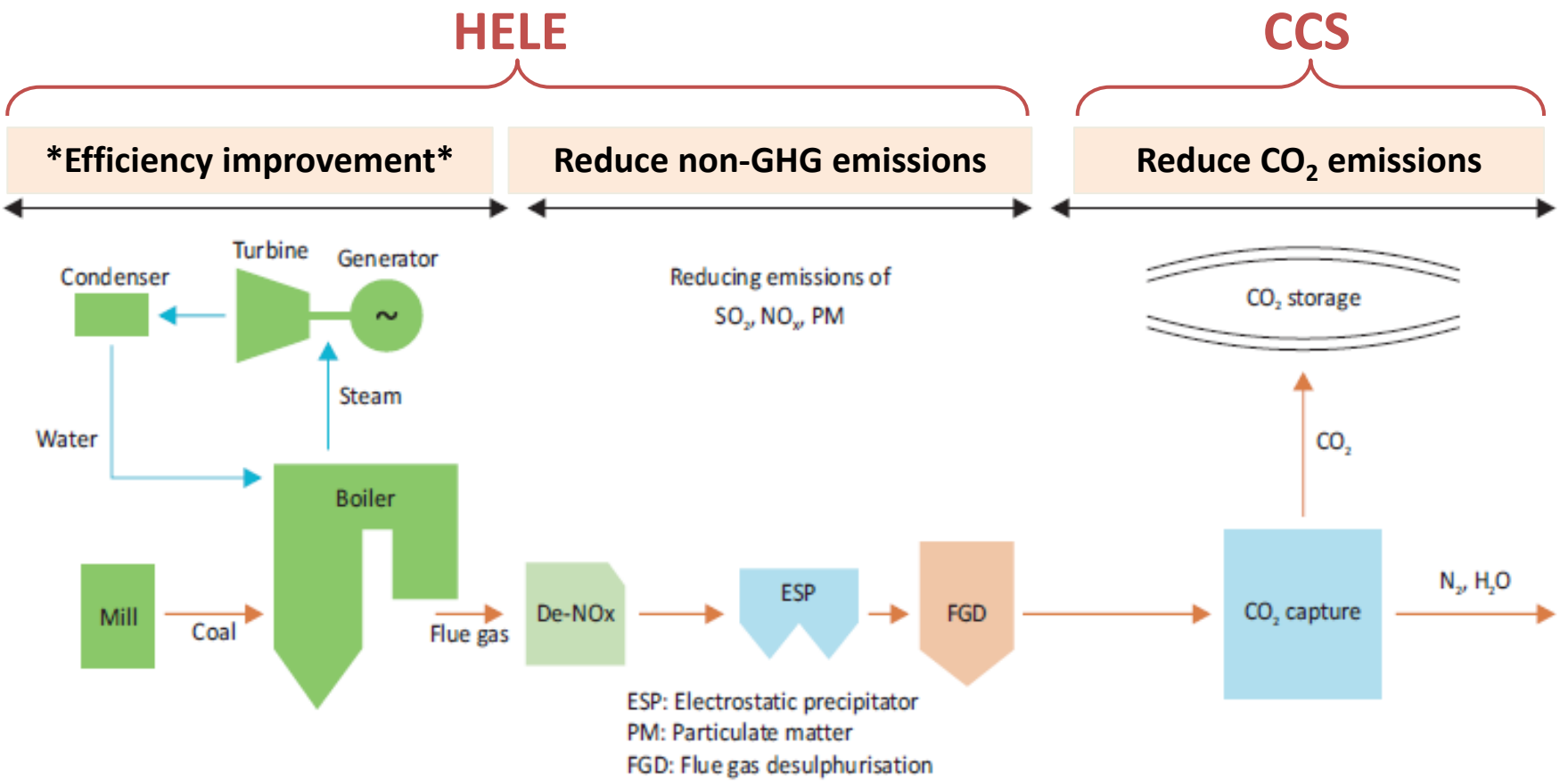

Share of non-fossil generation has failed to keep pace with the growth in generation from fossil fuels, particularly coal.

# Coal is abundant and widely available



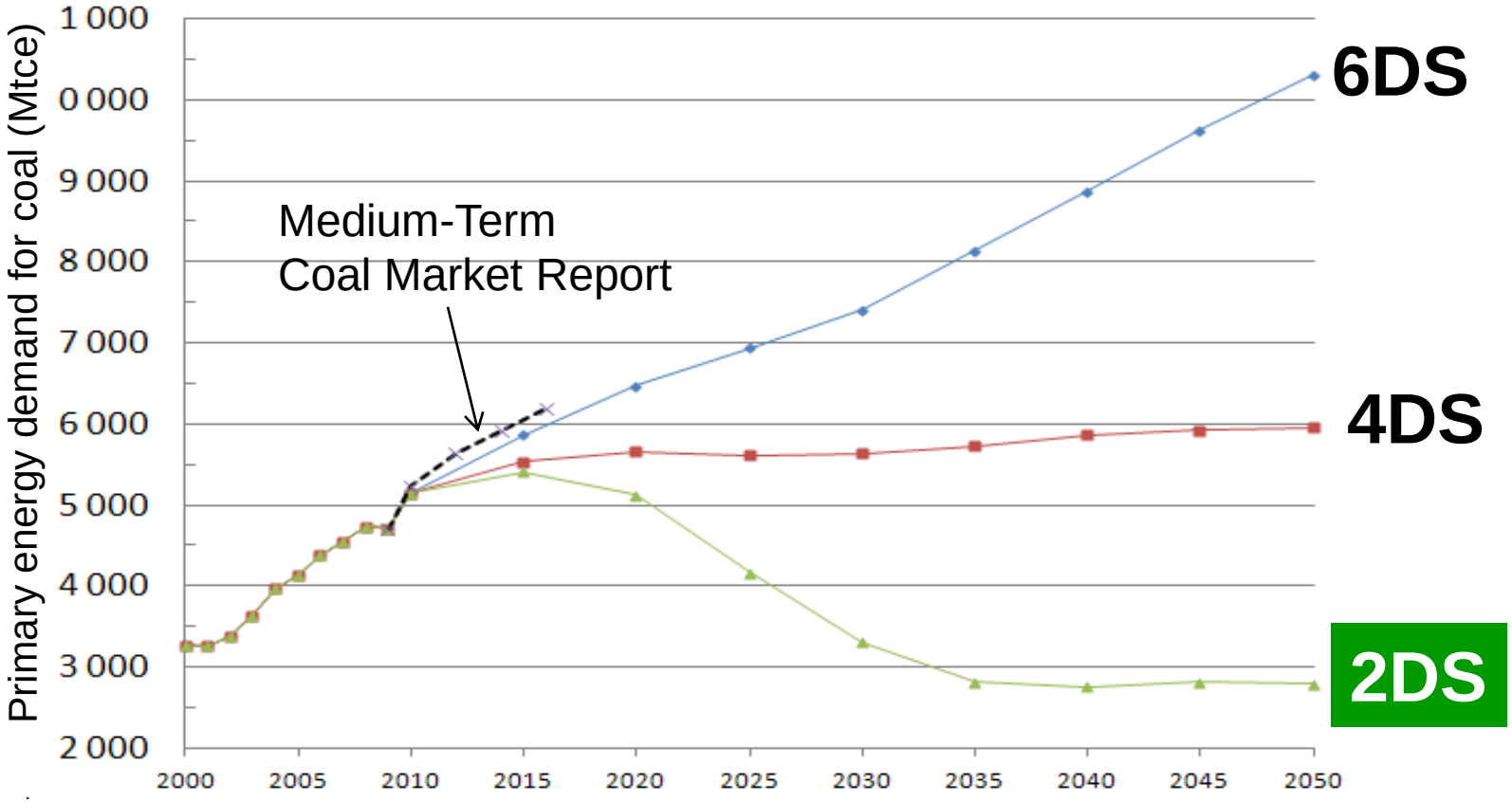

Sufficient coal reserves exist for an 150 years of generation at current consumption rates.

# What are HELE technologies?



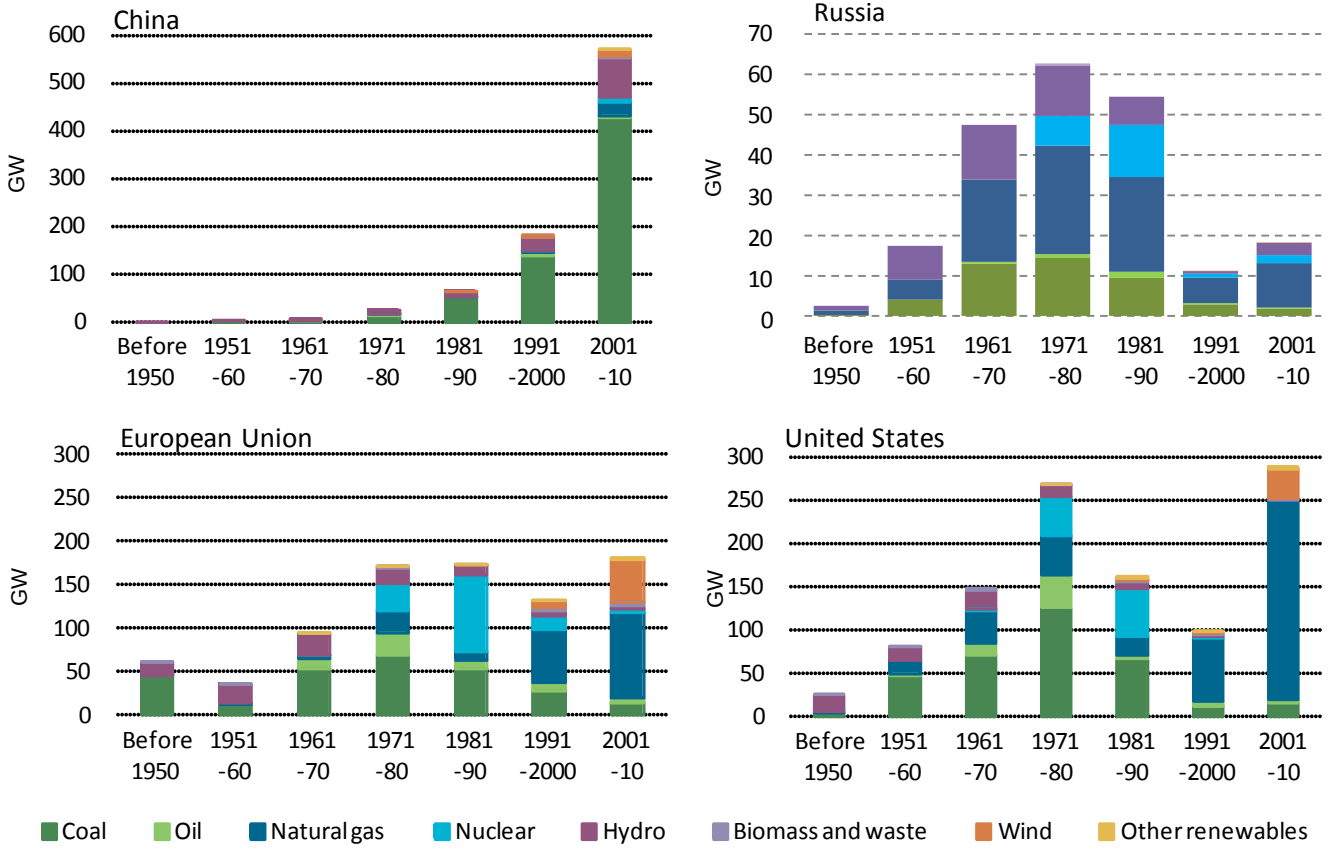

Efficiency improvement reduces specific fuel consumption and also reduces specific pollutant emissions.

# The size of the challenge is clear



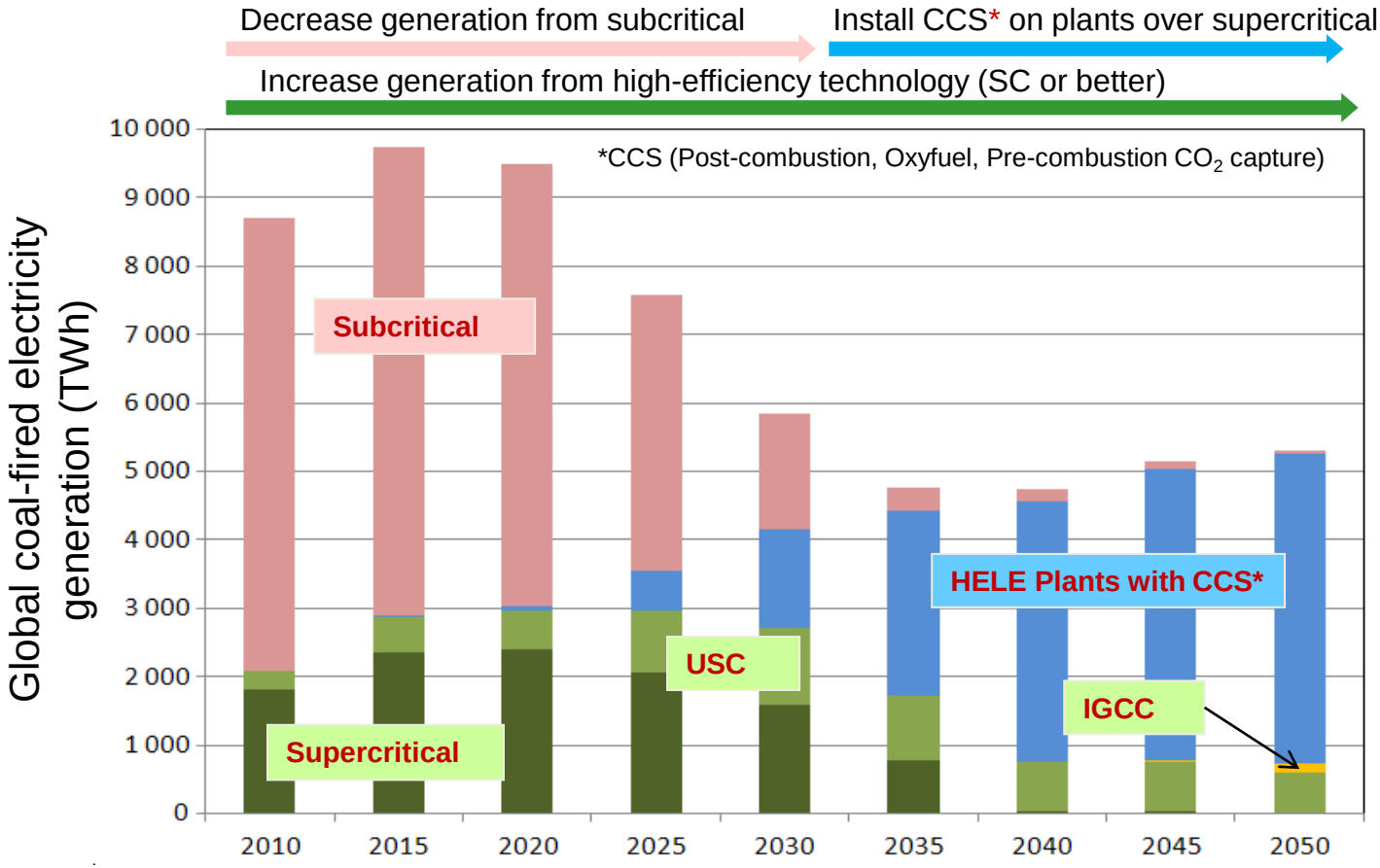

Near-term projections are <u>not</u> consistent with a low-carbon scenario

# Age distribution of existing power plants




Ageing infrastructure is the challenge in many OECD countries.
Emerging economies have a growing demand for electricity.

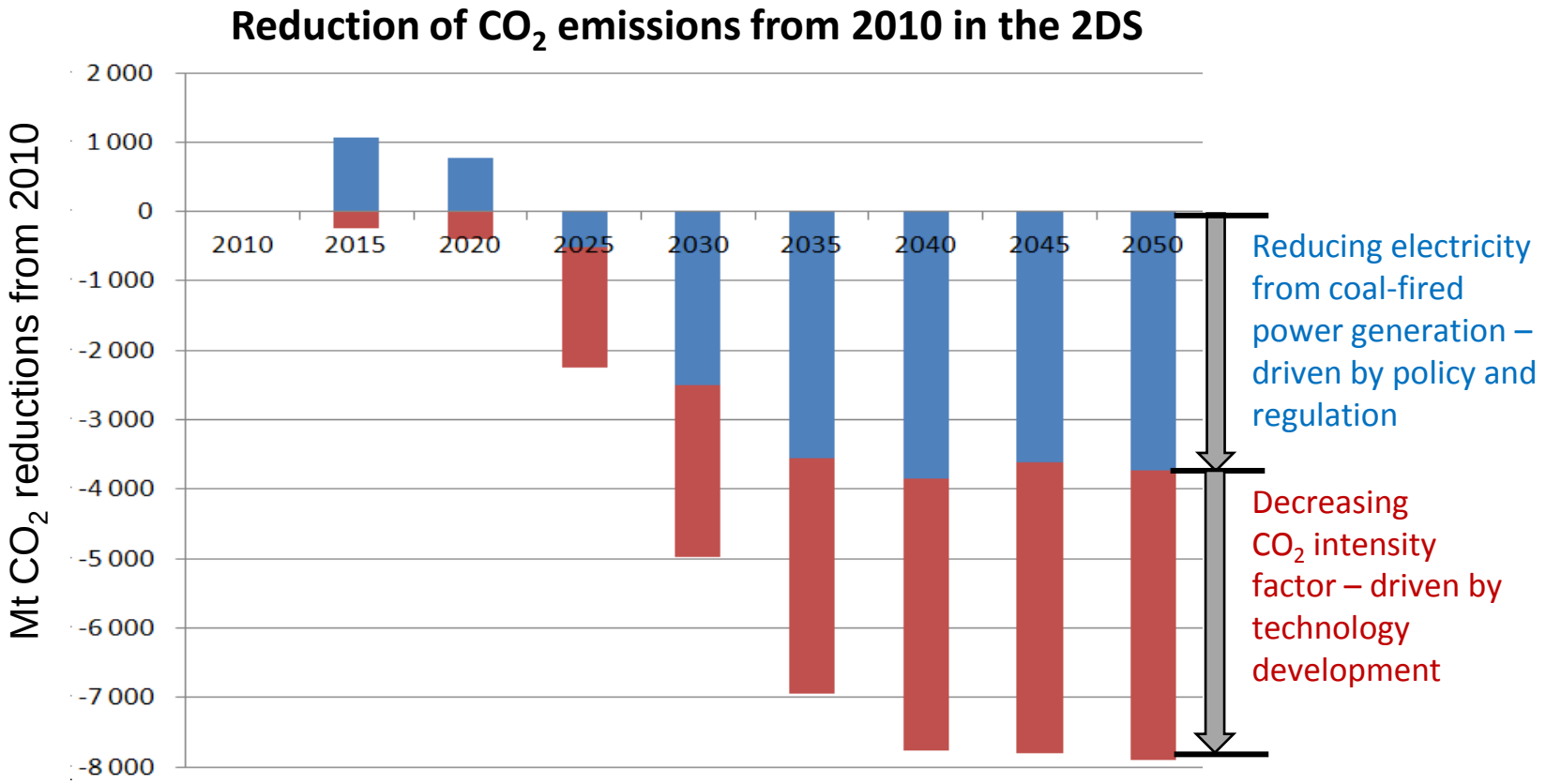
# Improve efficiency, then deploy CCS




*** CCS fitted to SC (or better) units.**

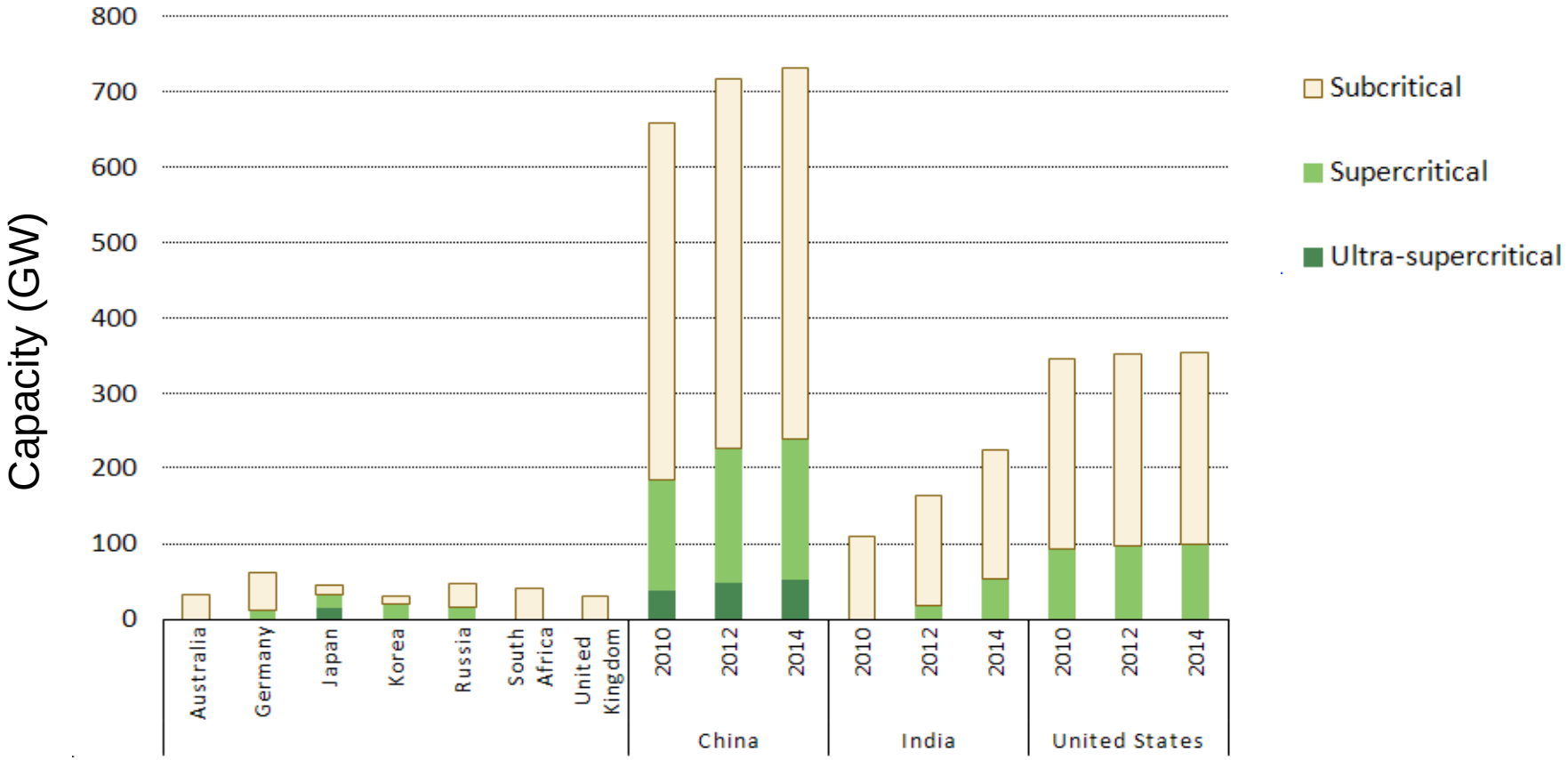
Three processes essential to achieve a low-carbon scenario

# 8 Gt $CO_2$ reduction by 2050



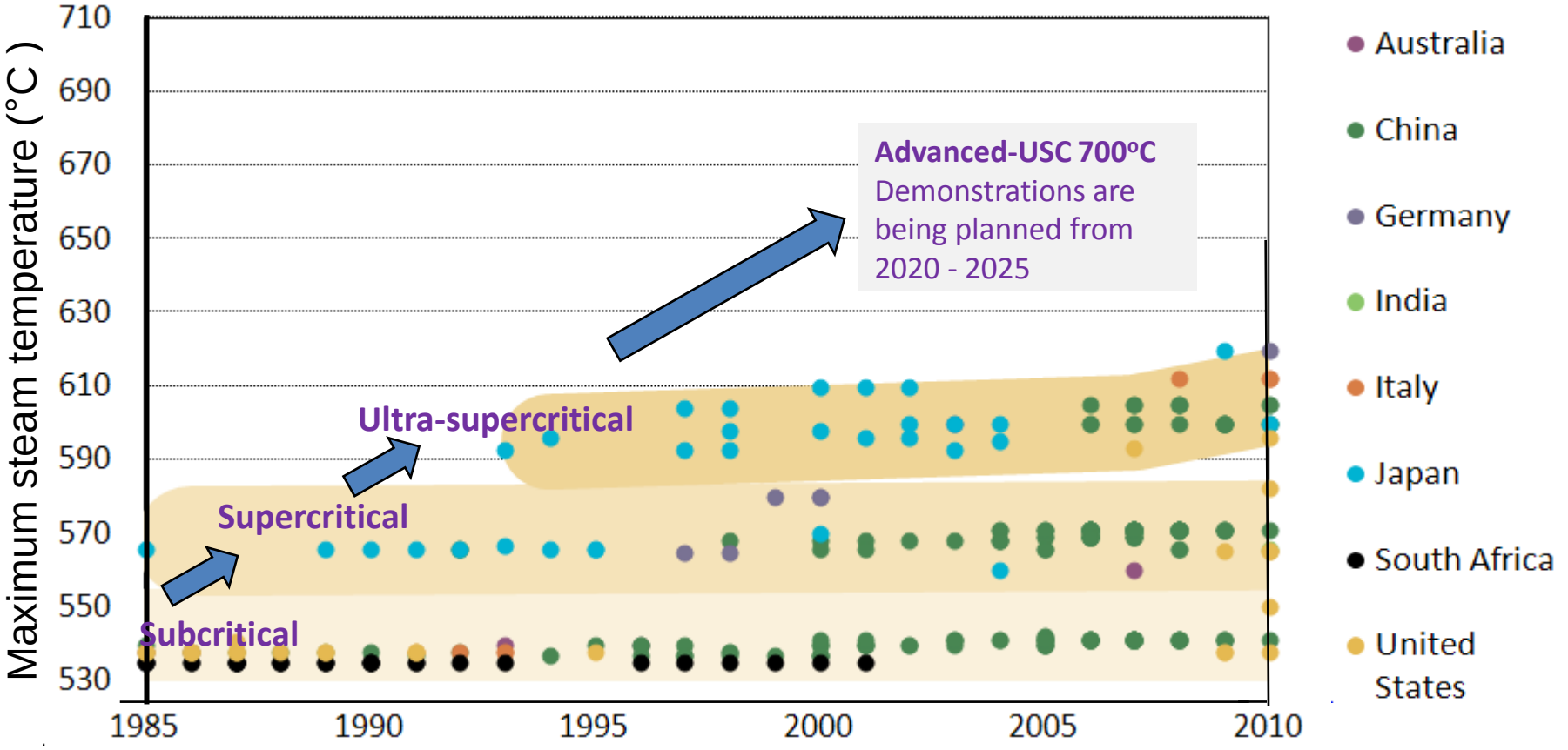

Technology improvement coupled with targeted policy and regulation are essential to realise the 2DS target in 2050.

# Best practice technology to be adopted



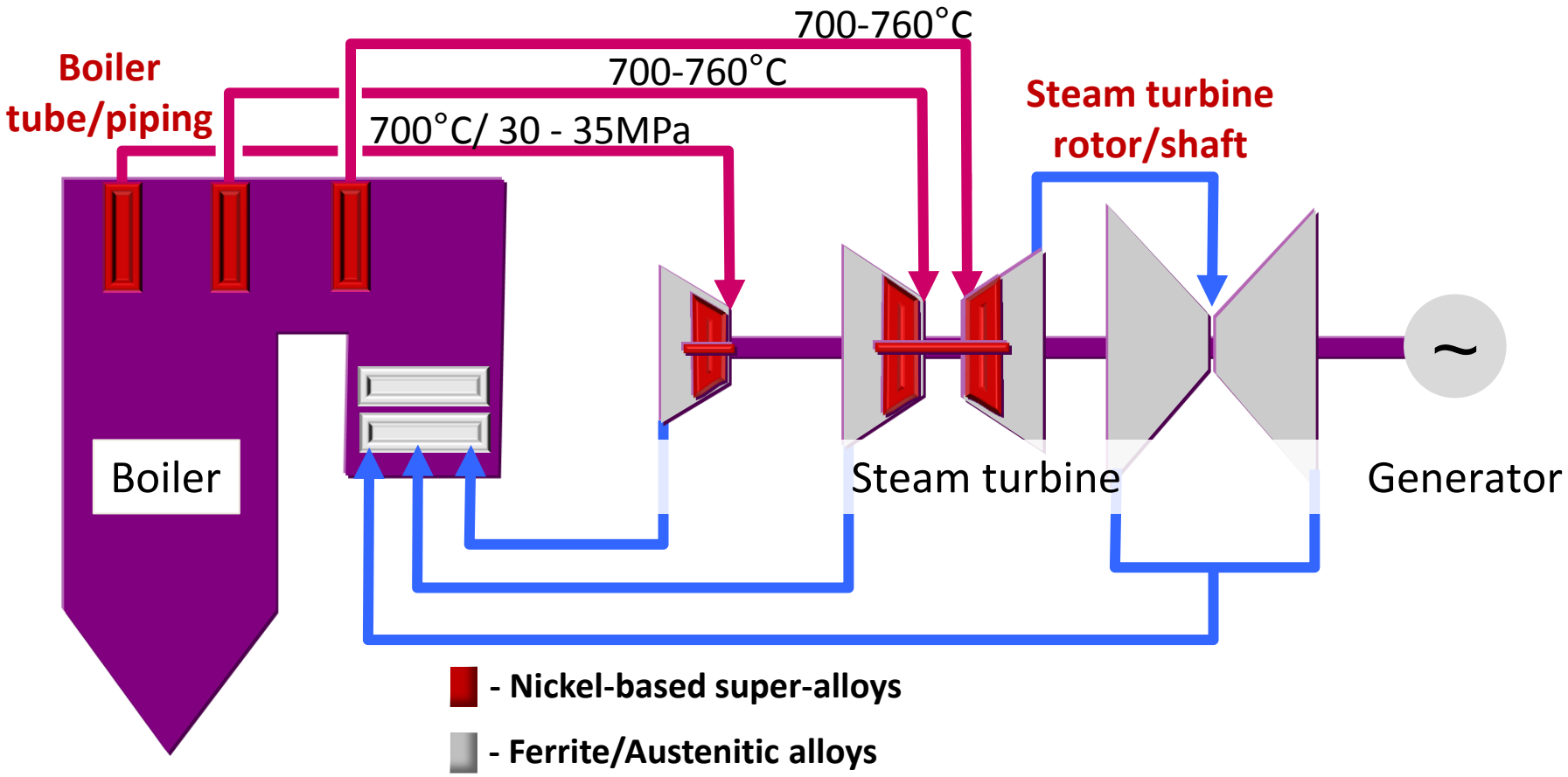

Potential for capacity growth in coal-fired power generation is seen mostly in non-OECD countries such as China and India.

# Advanced technology is essential




Ultra-supercritical plants are currently operating in various countries, particularly in China.

# The challenge of advanced USC

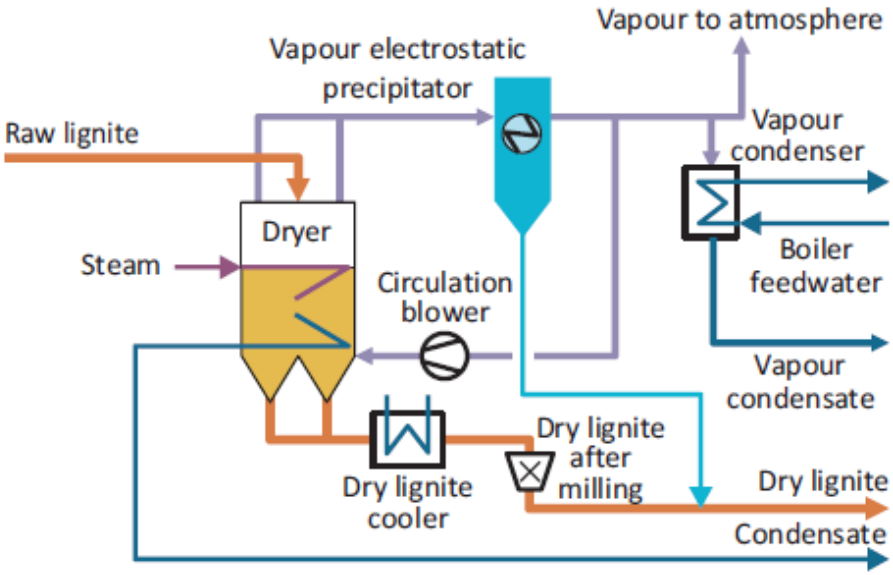



Nickel-based super-alloys will enable plant components to withstand temperatures of 700ºC and beyond.

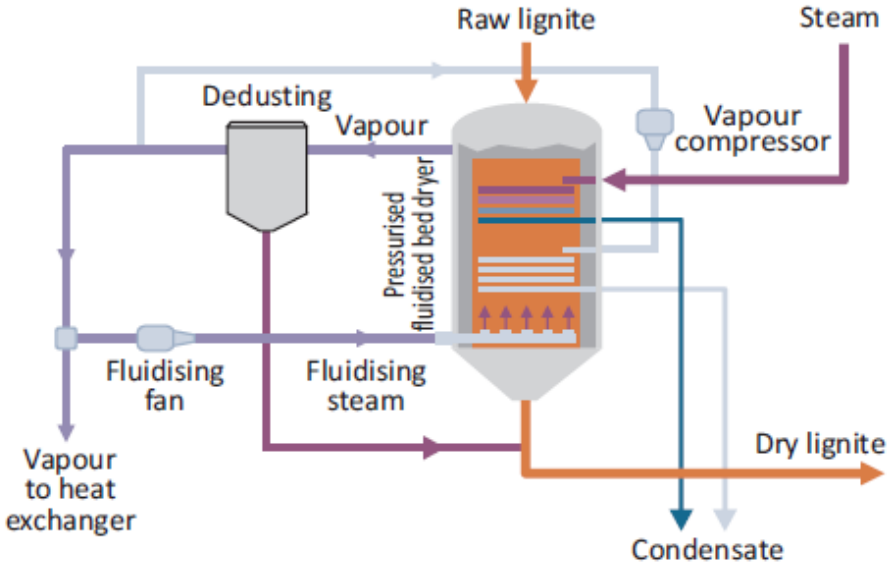
# Moisture reduction important

**Advanced lignite pre-drying in pulverised coal combustion**

**RWE Power**

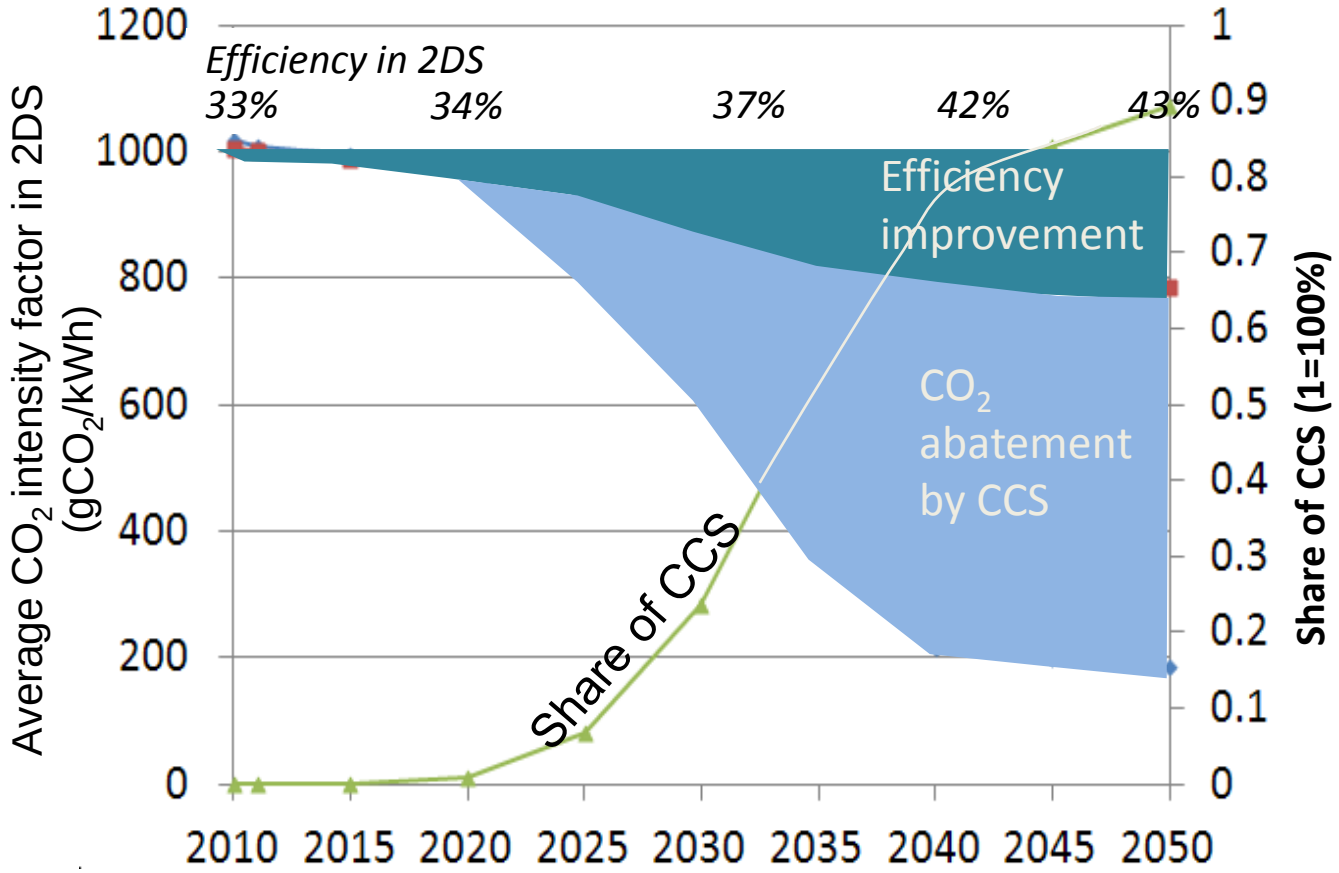



**Vattenfall**



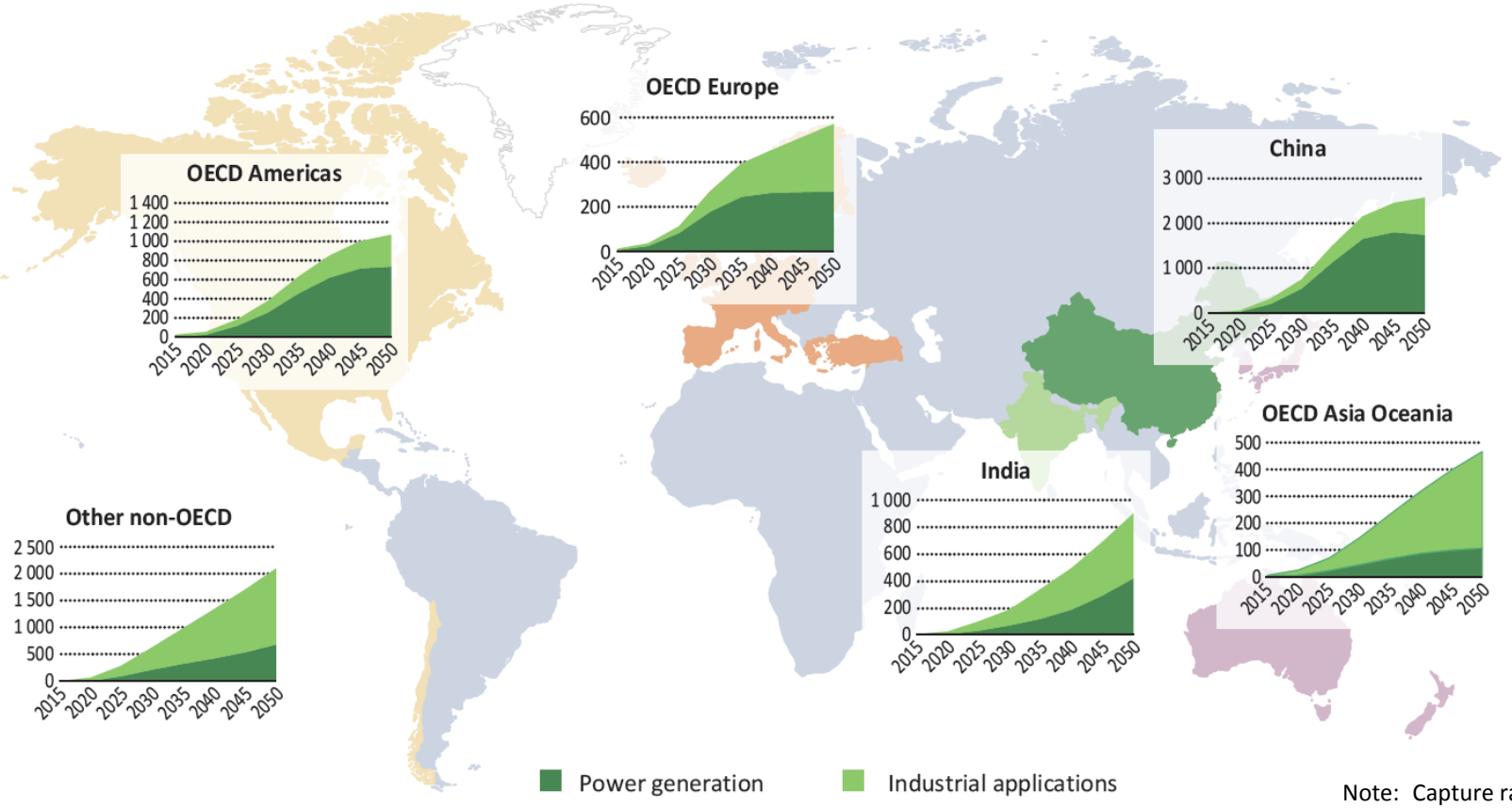

The steam cycle is optimised for maximum efficiency.

# Impact of efficiency improvement on $CO_2$ abatement




Raising efficiency significantly reduces the $CO_2$/kWh emitted.

# CCS is applied in power *and* industry

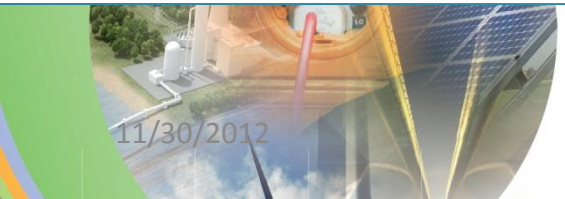



Note: Capture rates in $MtCO_2$/year

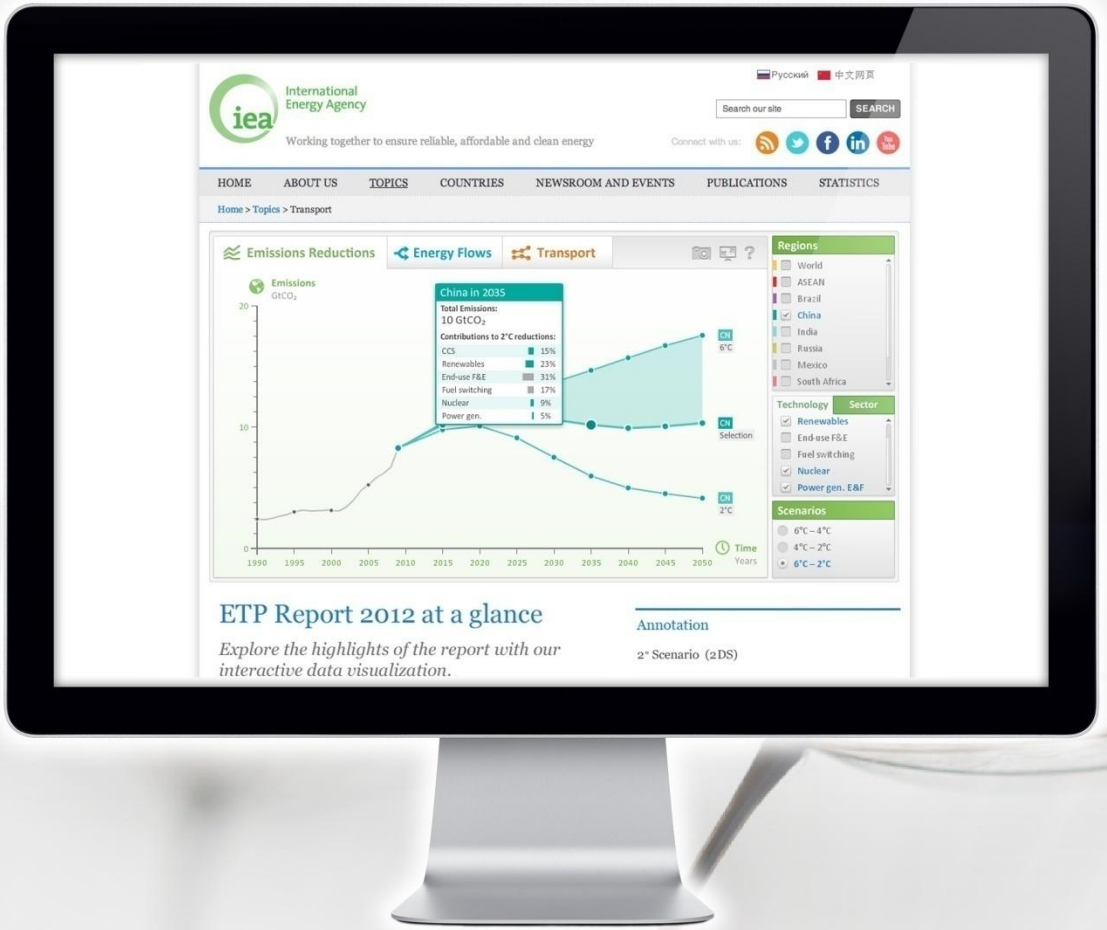
The majority of $CO_2$ is captured from power generation globally, but in some regions $CO_2$ captured from industrial applications dominates.

# Recommended actions for the near term

- By 2020, $CO_2$ emissions from coal-fired power generation must already have peaked to be consistent with the 2DS.
- Greater efficiencies must be achieved in the power generation sector.
  - Deploying supercritical and ultra-supercritical technologies, both available now, will be important.
  - Even higher efficiencies will be achieved as A-USC and more advanced IGCC become available.
- Power generation from low-grade coals, such as lignite, can be much more efficient.
- CCS must be developed and demonstrated rapidly if it is to be deployed at a scale sufficient to achieve the 2DS.



# Explore the data behind *ETP*




www.iea.org/etp