# HELE COAL TECHNOLOGY ROADMAP

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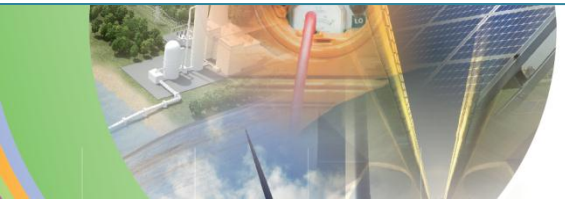
**Energy Technology Policy Division**
**International Energy Agency**

**Workshop on Advanced USC Coal-fired Power Plants**
**Vienna, Austria**
**19-20 September 2012**





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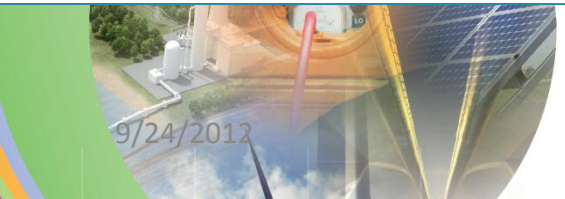
# Content of presentation

- Summary of ETP2012
- Technology Roadmaps
- **HELE Coal Technology Roadmap**
  - Coal-fired power generation today
  - **Vision for HELE coal-fired power plant**
  - Technologies for raising efficiency





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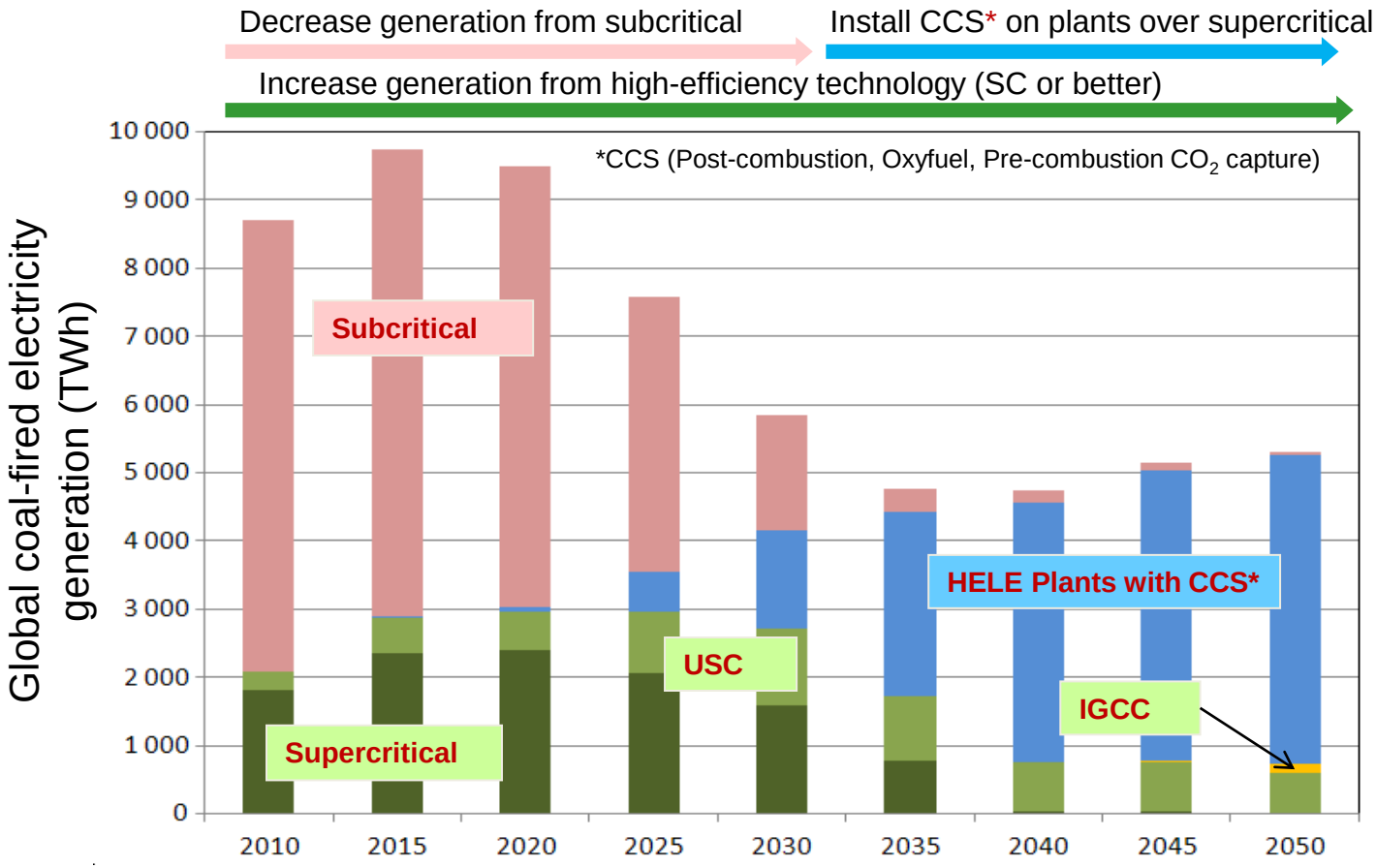
# Improve efficiency, then deploy CCS




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

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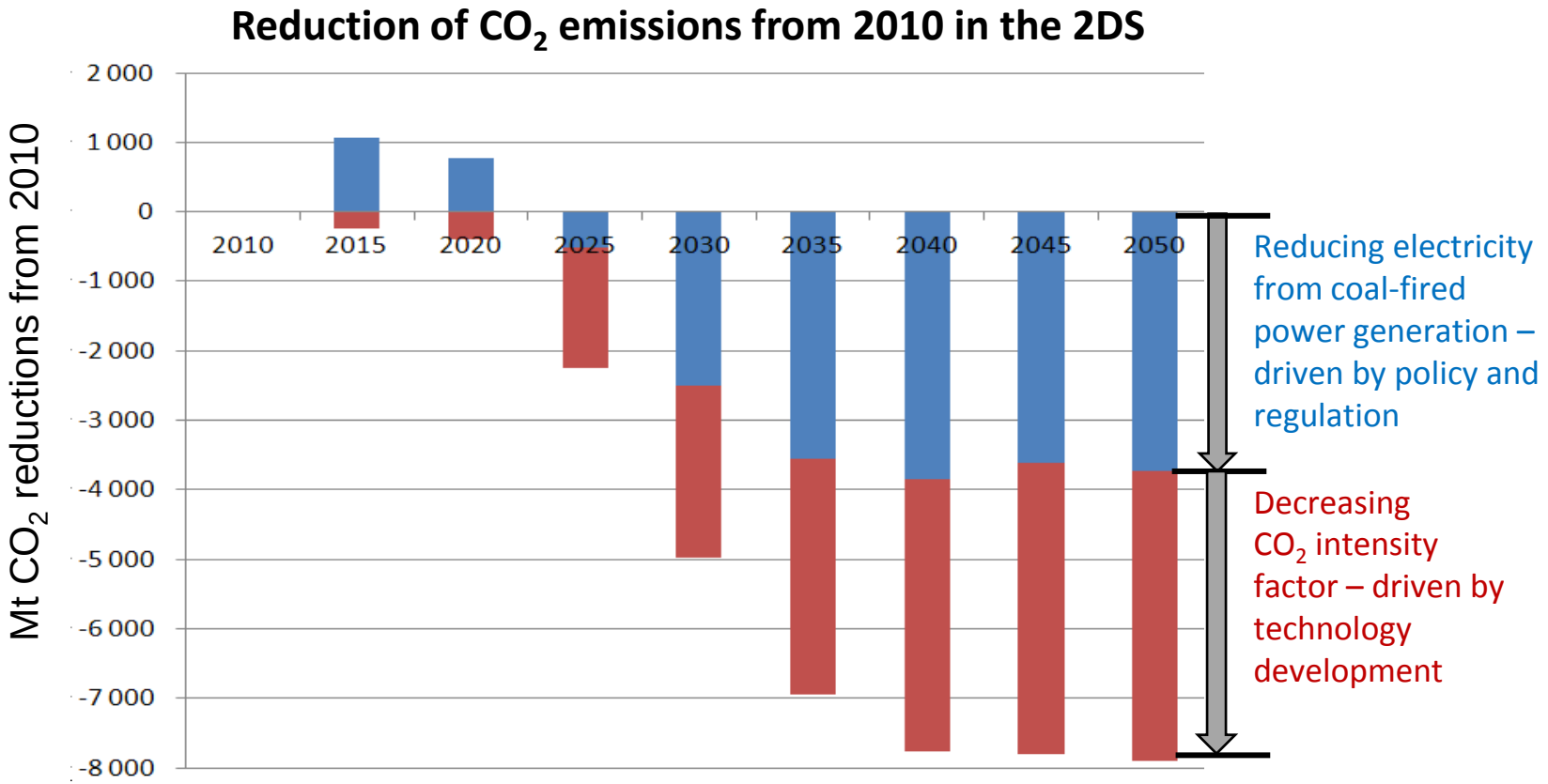
# 8 Gt $CO_2$ reduction by 2050




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



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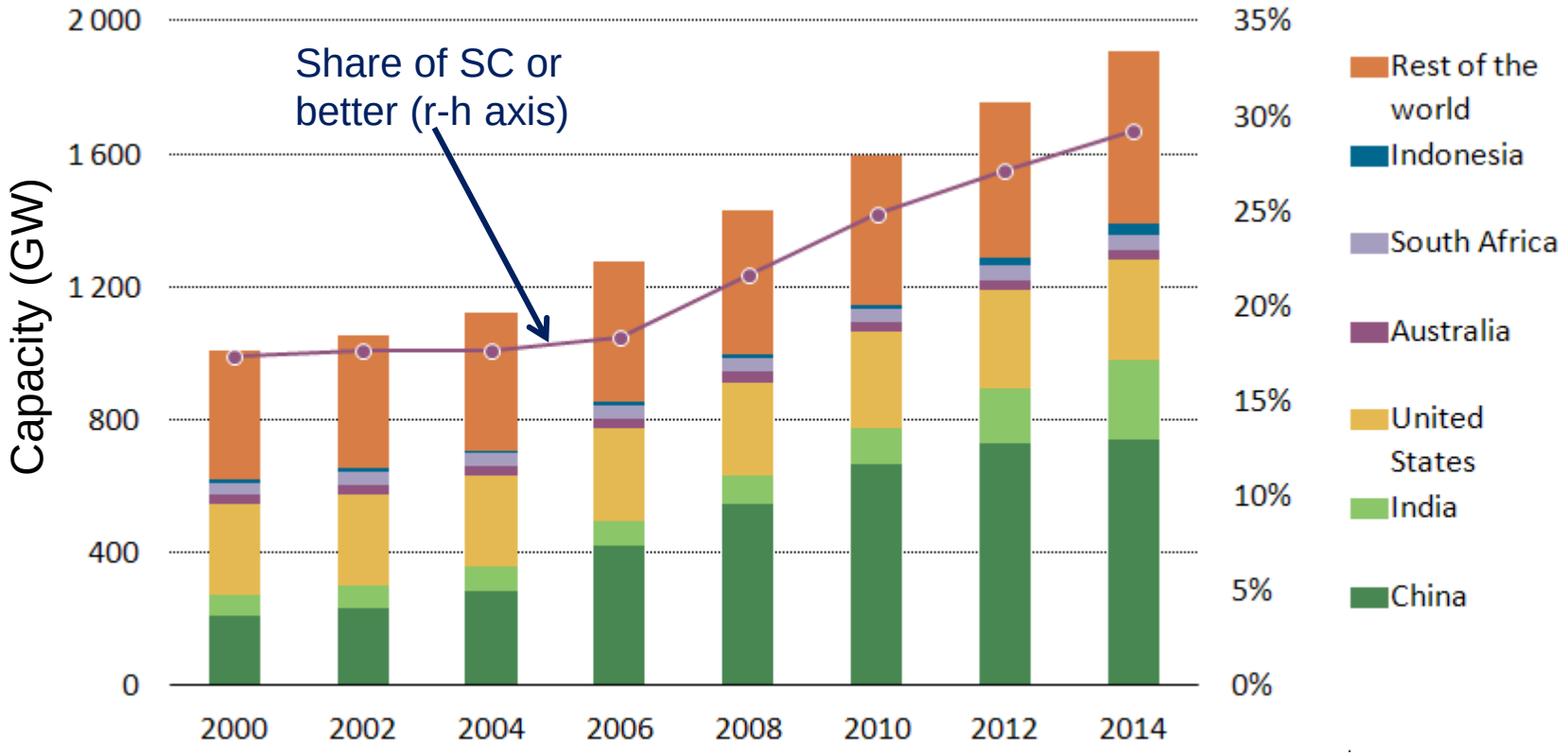
# Contribution from efficiency improvement




Efficiency improvement achieved by reducing generation from inefficient units and increasing generation from HELE units.

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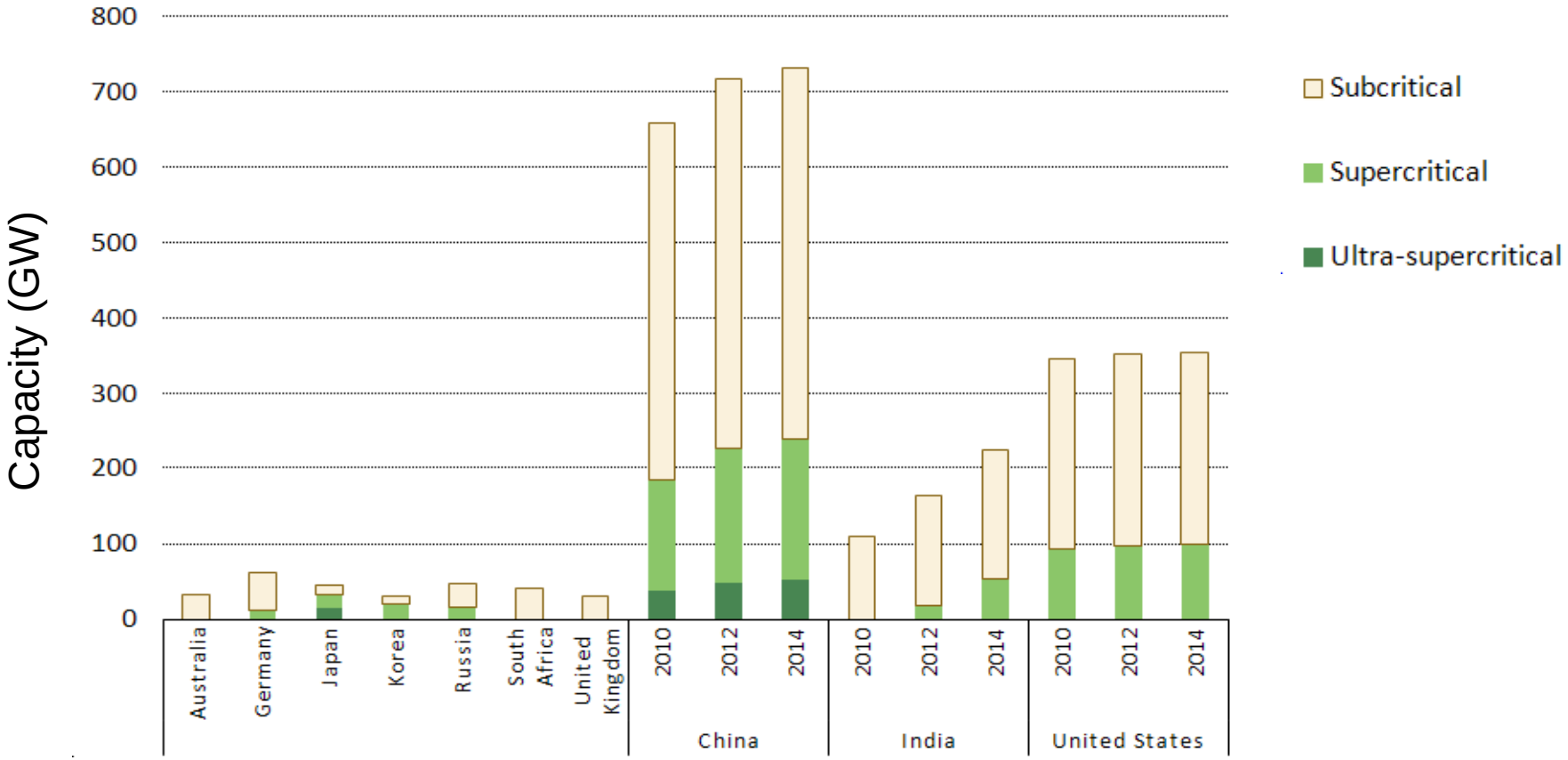
# Best practice technology to be adopted




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

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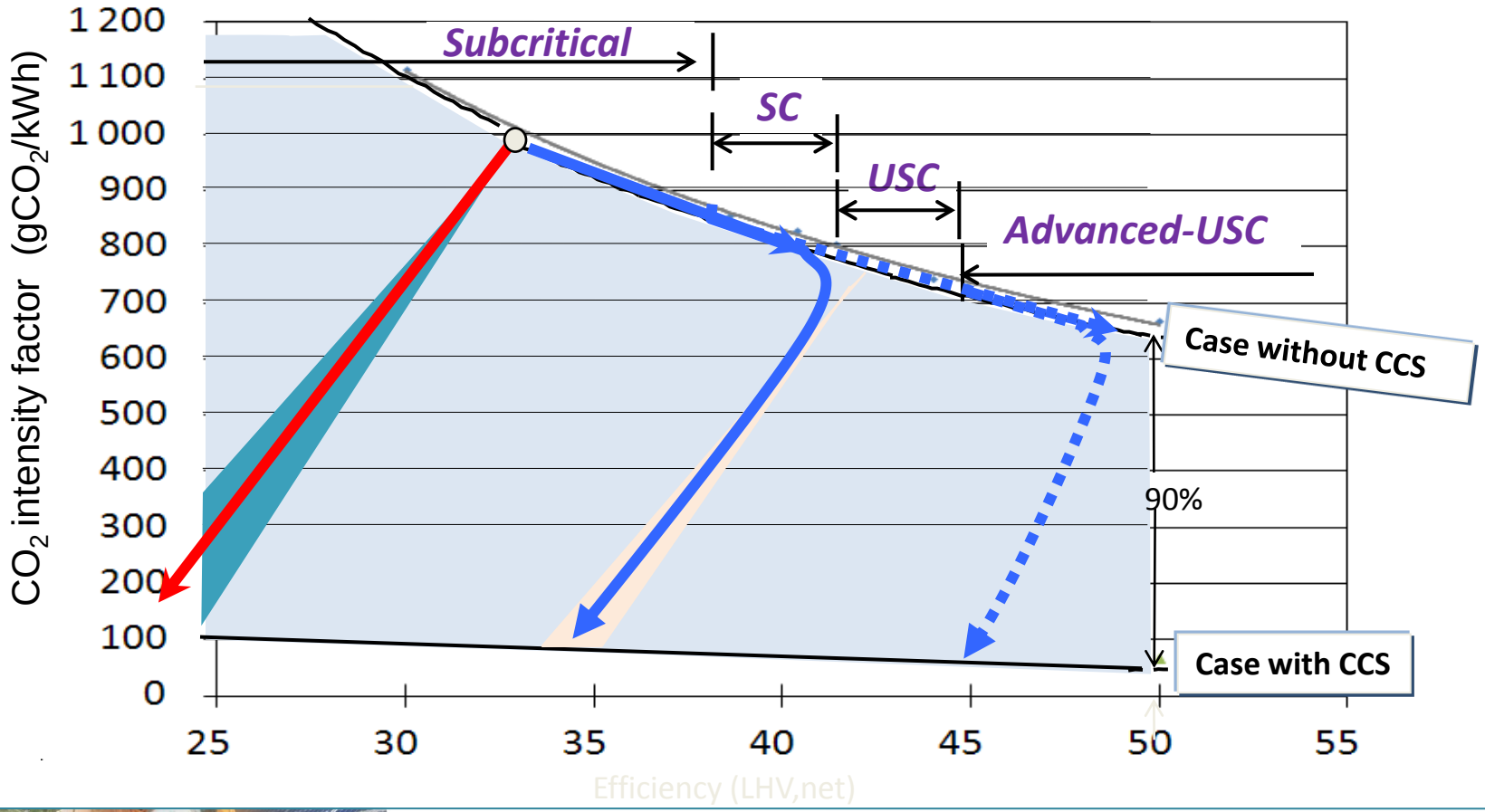
# HELE technologies reduce the $CO_2$/kWh for capture




Increasing plant efficiency is important to reduce the cost of $CO_2$ abatement.

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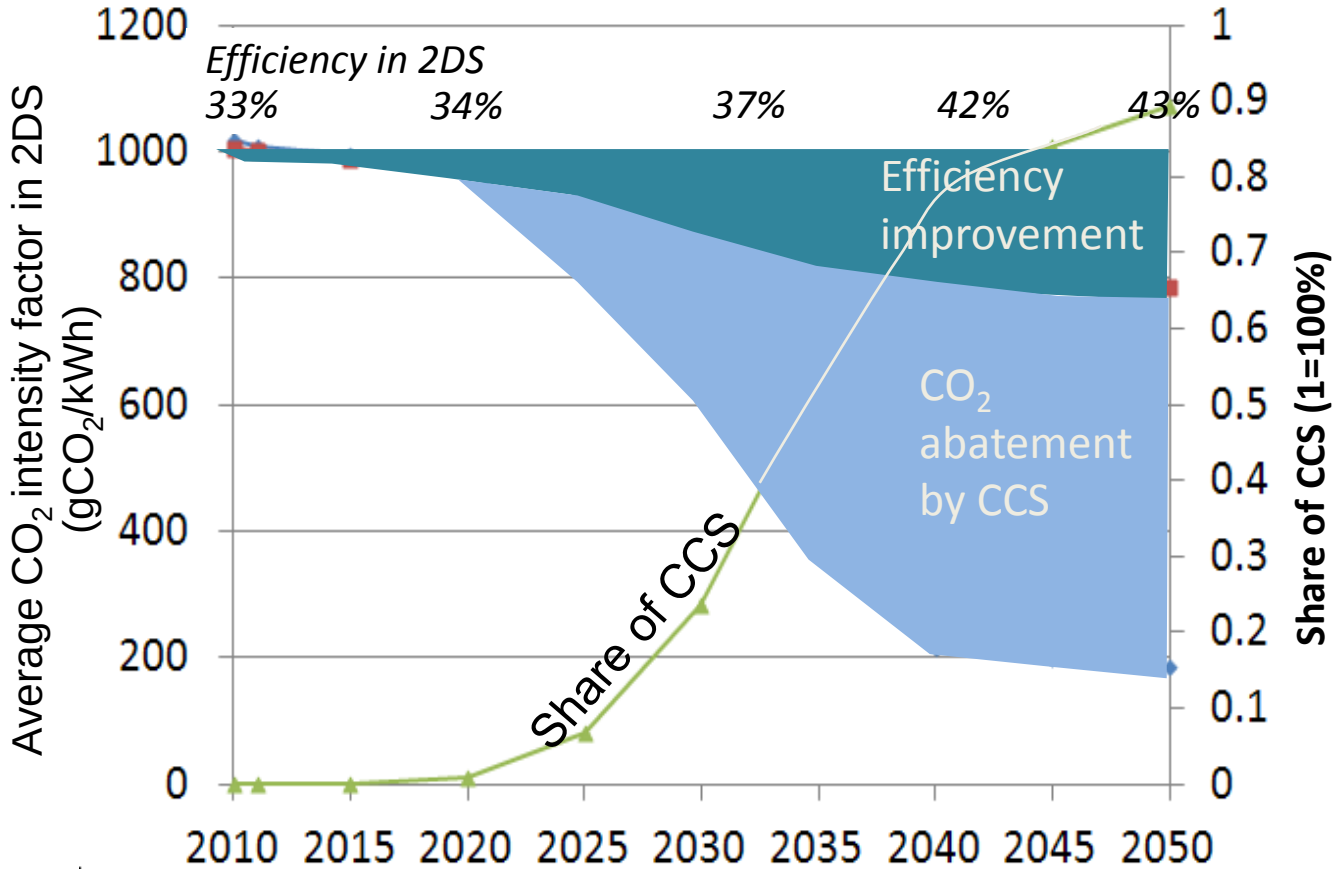
# Impact of efficiency improvement on $CO_2$ abatement




Raising efficiency significantly reduces the $CO_2$/kWh emitted

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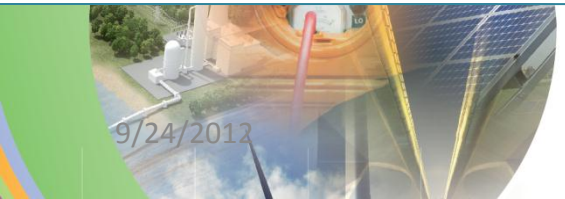



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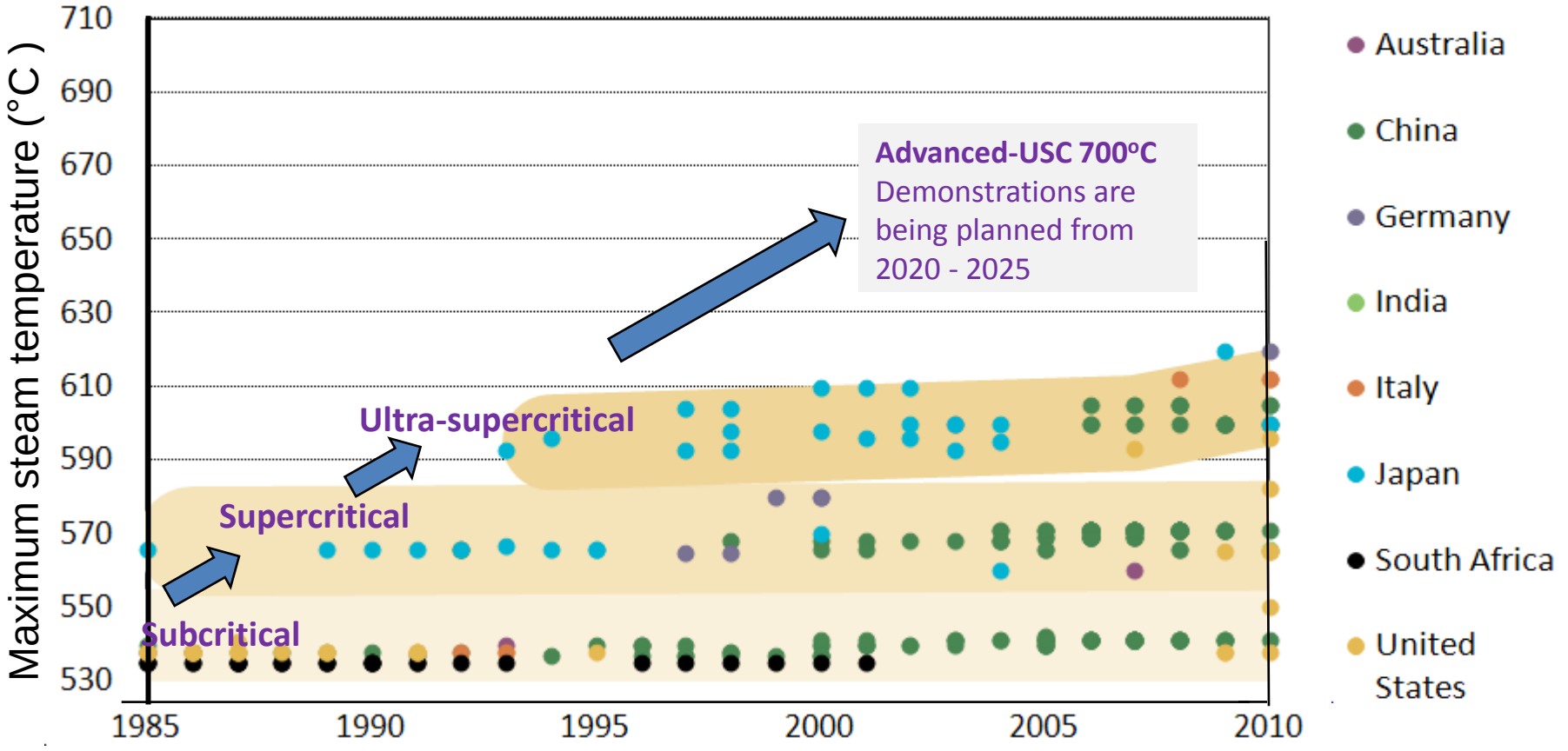
# Advanced technology is essential




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

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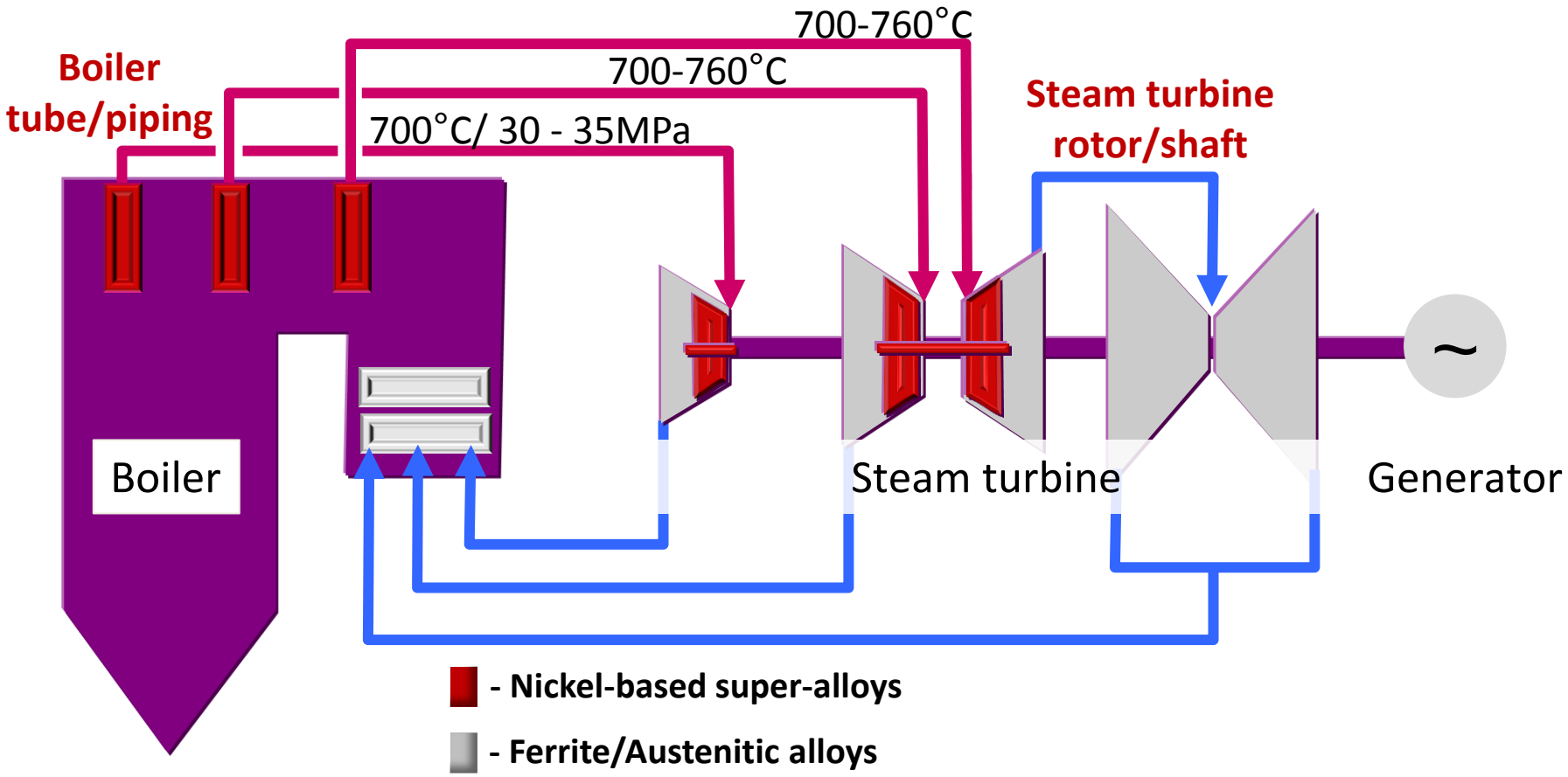
# The challenge of advanced USC




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



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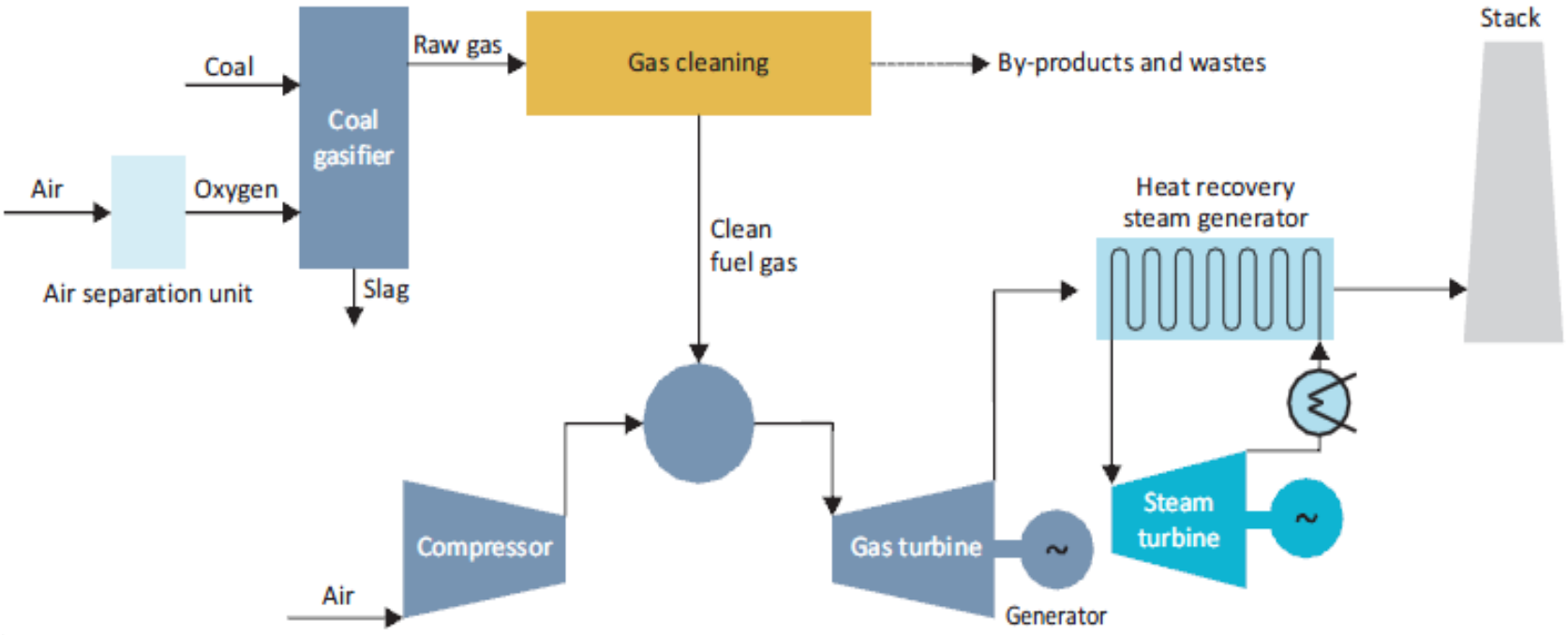
# IGCC+CCS may be cost competitive

**Integrated gasification combined cycle power generation**




With the latest 1500°C-class gas turbines, efficiencies of 50% (LHV, net) may be achievable, with cost-competitiveness will depend on sufficient numbers of plants being deployed.

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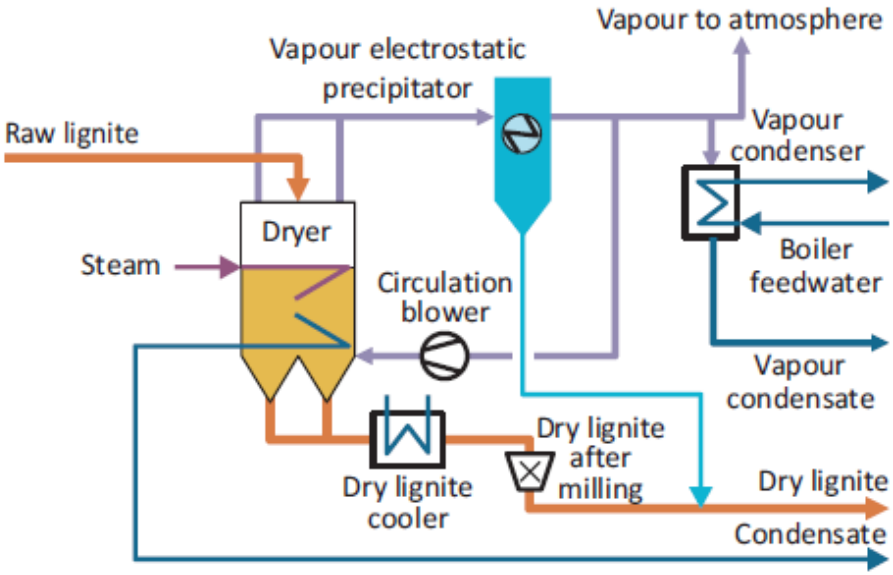
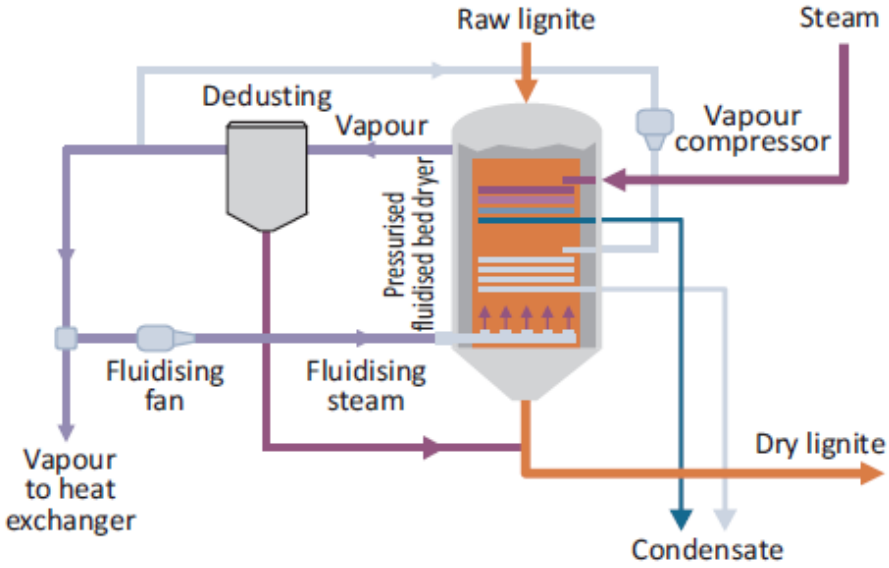
# Moisture reduction important

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

**RWE Power**




**Vattenfall**




The steam cycle is optimised for maximum efficiency.



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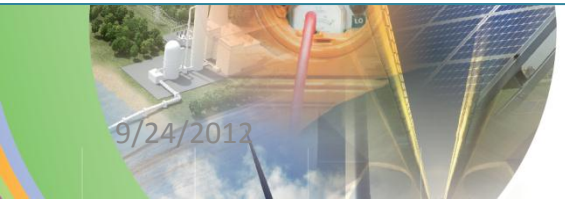
# Recommended actions for the near term

- 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.





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# Acknowledgements

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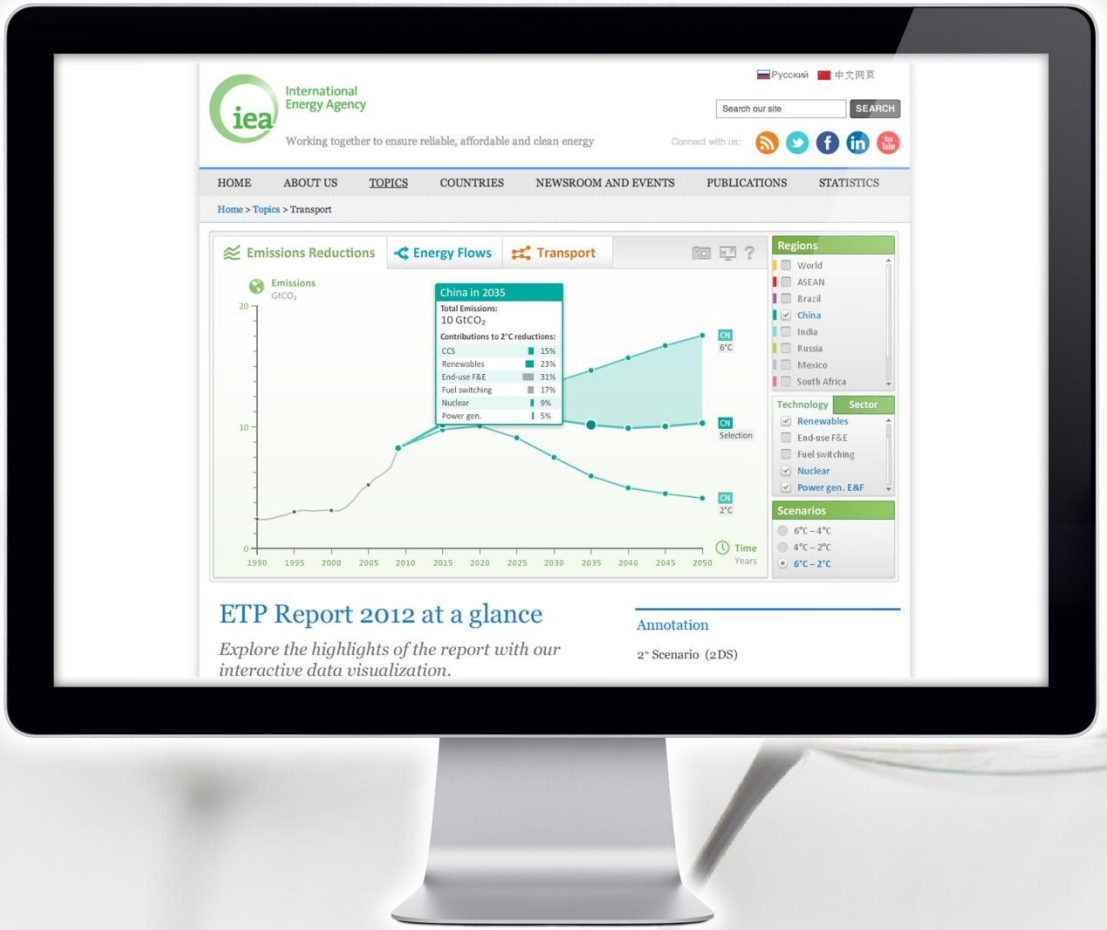


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