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Sustainable Energy:

Power & Buildings

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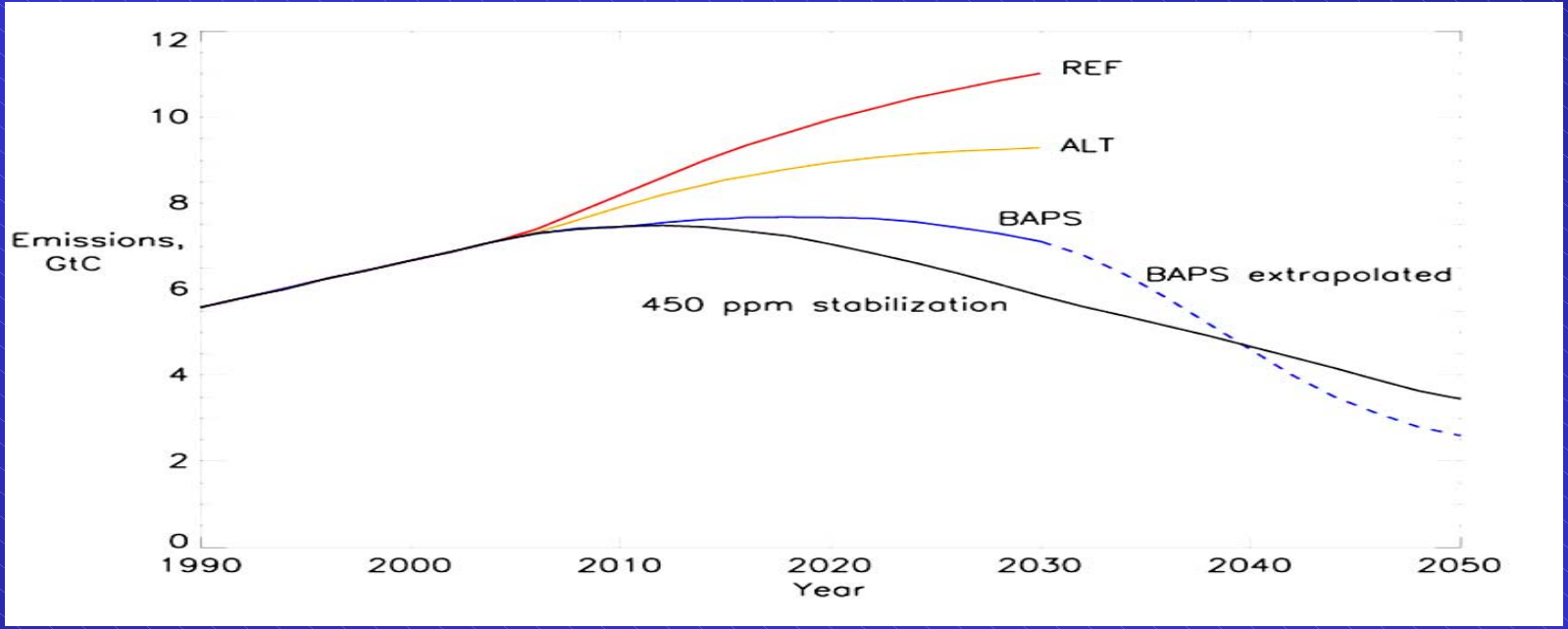
Energy scenarios

(based on IEA World Energy Outlook 2006)



Beyond Alternative Policy Scenario – implies much stronger government policies and measures needed to stabilise CO_2 concentration at 450ppm than are currently being considered (the ALT scenario) or, even more so, in current use (the REF scenario).

Actions needed

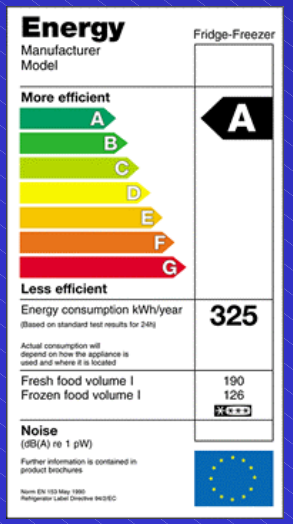
In accordance with the energy hierarchy:

1. Energy conservation & efficiency
2. Use of renewables and low carbon sources
3. Use of fossil fuels with carbon capture

Actions needed

1. Energy conservation & efficiency

- Eliminate energy wastage (esp. developed world).
- Make buildings as energy efficient as possible – construction, insulation, low energy lighting, micro-generation, CHP, tri-generation, etc. New and old.
- Use energy efficient processes and appliances.



Sustainable Energy

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Actions needed

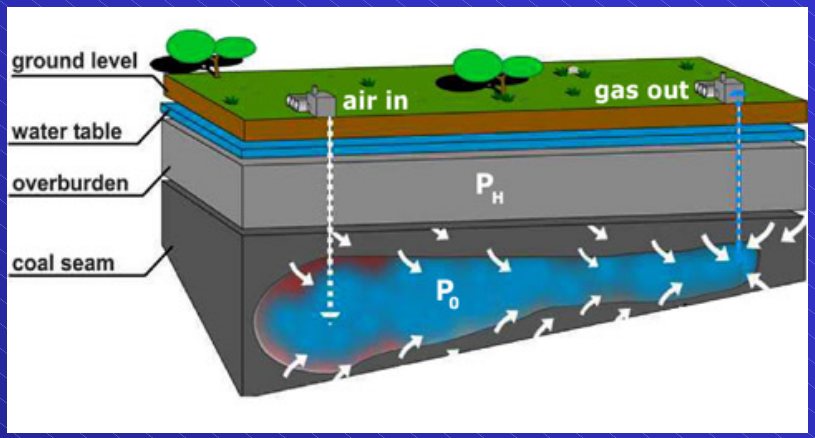
2. Use of renewables and low carbon sources

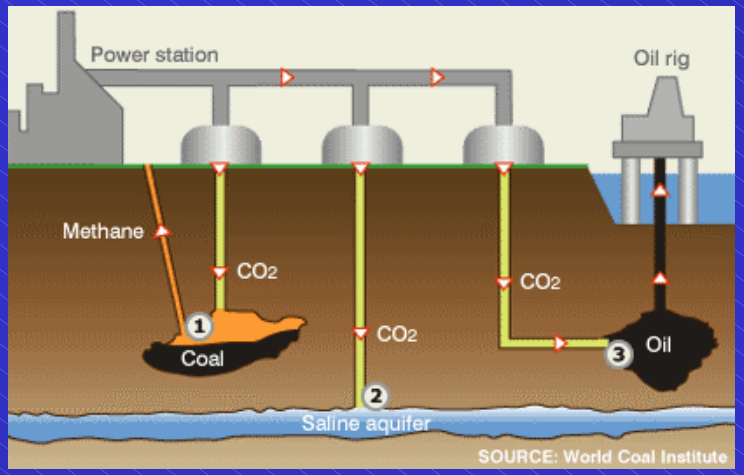
- Make full use of abundant, sustainable natural resources, including biomass, solar PV, solar thermal, wind, hydro, wave, tidal and geothermal.
- With appropriate safeguards, nuclear energy, could continue to contribute to the supply of low carbon, base-load electricity. But…

Actions needed

3. Use of fossil fuels with carbon capture

- Particularly important for coal; plentiful supplies worldwide, but high carbon content. "Clean" coal technologies include Integrated Gasification Combined Cycle (IGCC), Fluidised Bed Combustion and Underground Coal Gasification.
- CO_2 can also be used to aid methane and oil recovery.
- Sequestering of carbon absolutely crucial for new coal plant. But…





The role of technology & markets

- Stern describes Climate Change as the “greatest ever market failure”, and markets on their own can’t deliver the solutions, whatever the “carbon price”.
- Similarly, science, engineering & technology will not be enough. Demand growth has tended to outstrip efficiency gains.
- Unfortunately, even the combination of markets and technologies won’t be enough.
- What else is needed? Public engagement, political leadership and international collaboration for sustainable development.

Strategy needed

1. Economy and the environment considered together – internalize the costs.
2. Get technologies to market – invest in R, D & D. Energy storage, esp. electricity and hydrogen.
3. Consider societal impacts and optimise solutions around people.
4. Address energy security issues.
5. Support local, regional, national and international partnerships.

The role of the engineering community

- Forming partnerships
- Sharing ideas and experience
- Developing knowledge, internally and externally
- Expressing opinions
- Showing leadership
- Promoting engineering careers in sustainable energy
- Recognising achievement.

Conclusions

- Addressing the climate change challenge requires a radical new approach.
- The energy hierarchy provides a useful framework for action.
- A strategic approach is also needed, following sustainable development principles, and embracing technology, markets and people.
- The challenge is an opportunity for engineers.

Thank you for listening!

Any questions?