

# Ofgem Discussion Day

## Integrating wind

*Material from Carbon Trust Study  
and other sources*

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# Who has looked at integration issues?

- Carbon Trust/DTI study Network Study, Intermittency Module, has about 40 refs, including
  - CEGB (Two studies, plus several other papers)
  - Imperial College (Michael Grubb), Rutherford Laboratory, University of East Anglia
  - Most European Utilities, Eltra, NGT, Nordel
  - Several American Utilities, CEC, etc
- More material has appeared since

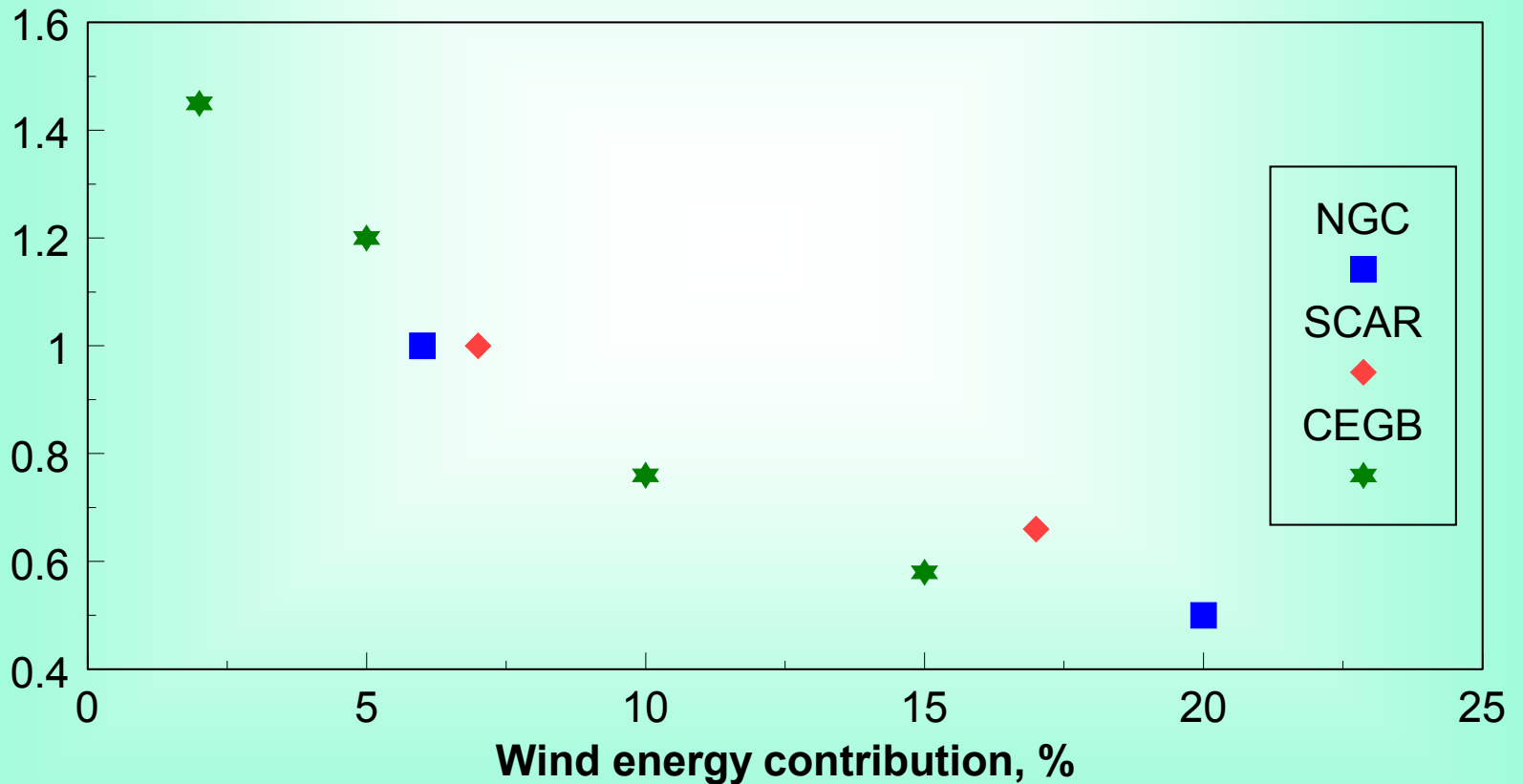
# Wind integration – conclusions

- Modest costs for extra reserve
  - Most studies yield similar results
- Capacity credits? – Yes, roughly=average power
- Problem areas?
  - May be preferable, once wind input exceeds  $\sim 10\%$ , to curtail wind output on a few occasions
- .....but wind will NEVER impose “jolts” on the system comparable with loss of a circuit of cross-channel link



# UK Capacity credits

Capacity credit/annual capacity factor



# UK capacity factors published data

- Delabole wind farm, Cornwall: 33.6%
- National Wind Power (5 farms): 36-40%
- NP Environmental Performance Review, 2000 (141 MW): 30%
- PG Environment, 1998: (2 farms) 34 & 36%
- DTI statistics, 1994-2002: Range 25-31%

# Impacts of 20% wind

Time, %

