

# International Power – Climate change mitigation

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# International Power

- Who are we?
- And What do we do?

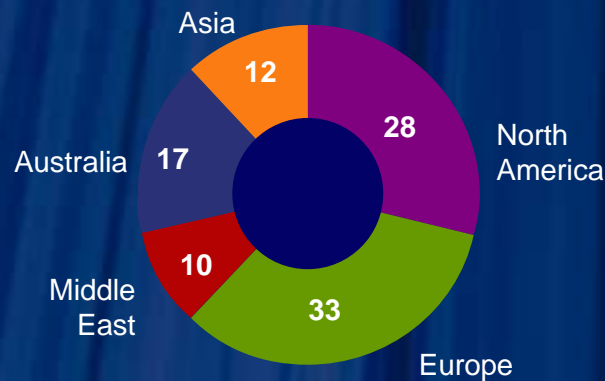
# International Power overview

- Leading global power developer and operator
- 39.9GW gross (18.9GW net) in operation across 5 core regions
  - 40 power stations, 20 countries
- Balance of contracted and merchant assets
- In depth operational experience across different fuel types and technologies
- 2006 – full year results
  - Strong growth in earnings and cash flow
    - profit from operations of £773m (€1,134m) – up 44%
    - EPS of 22.4p – up 53%
    - free cash flow of £456m (€669m) – up 60%

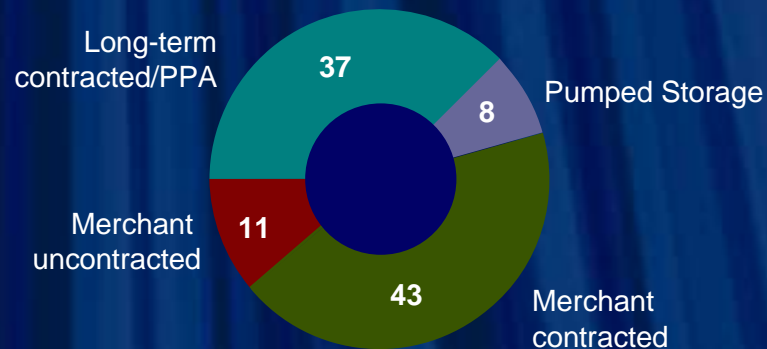
# A varied portfolio

- International scale across 5 core regions
- Technology experience across the sector
- Modern portfolio
  - 70% of IPR portfolio under 15 years old

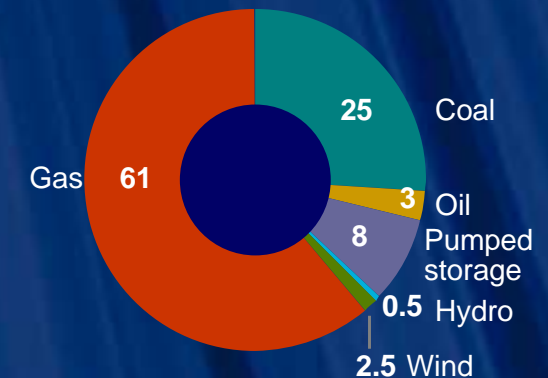
IPR portfolio by geography (%)



IPR portfolio by contract type (%)



IPR portfolio by fuel type (%)



\*As at November 2006, excluding assets under construction

# Asset portfolio



- Key**
- △ Hydro
  - Coal
  - Gas
  - ◇ Other

Note: This map shows net capacity for IPR and excludes assets under construction

<b>Gross capacity in operation</b>	32,888 MW
<b>Net capacity in operation</b>	18,935 MW
<b>Net capacity under construction</b>	657 MW

# Environmental improvements

- CO2 & CO2e reduction projects
  - efficiency improvements
  - CHP and other Cogen
  - fugitive gasses
  - carbon sinks
- Reduction of other emissions
  - SOx, NOx, particulates etc.
  - can Increase CO2 emissions
  - often in response to regulatory obligations

# IPR in the Czech Republic

- Brown coal power plants constructed in 1950's
  - subsequent conversion into district heating plants
  - substantial investment in renewal
  - use of “waste heat” significantly enhances thermal efficiency
  - heat is supplied to homes and commercial and industrial premises
  - supply heat to Prague (30%), Hradec Kralove, Pardubice and Chrudim
  - 3232 MW thermal capacity (gross)
  - fully compliant with EU norms
- Gross electrical capacity 853 MW (group)
  - circa 5% of Czech Republic's electricity
- Prague South City Connector
  - high capacity heat transmission infrastructure project
  - closed small heating plants and utilised large scale cogeneration
- Developing a 100 MWe biomass power plant on our Opatovice site
- Significant reductions in emissions

## IPR elsewhere in Europe - Mixed portfolio including gas, hard coal, pumped storage and renewables

- Levanto (Germany and France) wind portfolio of 436MW when fully constructed, displaces conventional generation
- ISAB (Italy) IGCC plant – will be a core technology for carbon capture and storage projects
- First Hydro (UK) pumped storage increases overall system efficiency and reduces spinning reserve requirements
- Mamara (Turkey) air intake reconfiguration increased output by 1.5MW with no additional fuel consumption
- Rugeley (UK) renewables co-firing
  - discontinued after incentive scheme effectively removed
- Derwent & Saltend (UK) – CHP plants supplying industrial hosts with steam
- Spanish Hydro (Spain) – 80 MW (gross) renewable power

# North American Business

Predominantly new gas fired CCGTs

- Performance monitoring and optimisation software with additional benefit of CO<sub>2</sub> reduction
- EcoElectrica (LNG fired CCGT) has significantly higher thermal efficiency than other plants in Puerto Rico, displaced small, old, polluting (SO<sub>x</sub> and NO<sub>x</sub>) and high emission plant
  - uses waste heat from power plant to re-gassify LNG
  - uses LNG to cool air fed into the GT, improving GT thermal efficiency

# Middle Eastern Business

Predominantly a desalination and CHP business

- Hidd (Bahrain), Ras Laffan B (Qatar), Shuweihat (UAE) and Umm Al Nar (UAE) are CHP plants that use waste heat from electricity production to produce desalinated water (330 MIGD gross in operation and 105 MIGD under construction)
- Tihama (Saudi Arabia) CHP plants at 4 oil refineries that replace conventional boilers producing 4.5m lbs/hr of process steam and providing 1,074 MW (gross) electricity
- Al Kamil (Oman) 285 MW OCGT
  - stopped venting CH<sub>4</sub> to atmosphere saving 14,000 T CO<sub>2</sub>e
  - improved turbine efficiency, reducing annual CO<sub>2</sub> production by 16,000 T

# Australian Business

Mixed portfolio with brown coal, CCGTs, renewables and peaking plants

- Hazelwood - old 1600 MW brown coal plant
  - reduced carbon intensity by 7.8%, saving 1.4 MT CO<sub>2</sub> annually
  - major capital programme on Unit 1 will improve thermal efficiency by 6 %.
    - Boiler conversion to use 50% pre-dried coal (RWE technology)
    - Boiler feed heater modifications to improve cycle efficiency
    - Turbine upgrade
  - 25 T/day commercial carbon capture plant
- Loy Yang B - modern 1010 MW brown coal plant
  - Unit 1 turbine upgrade saves 38,000 T CO<sub>2</sub> annually
  - air leakage reduction saves 35,000 T CO<sub>2</sub> annually
  - electrostatic precipitator upgrade saves 9,000 T CO<sub>2</sub> annually
- Canunda, 46MW wind farm

# Asian Business

Coal, oil and gas fired plants

- KAPCO (Pakistan) achieved significant efficiency improvements simply by instigating good maintenance practices (eg routine turbine blade washing)
- Pluak Daeng (Thailand) conventional CCGT converted to CHP plant
  - waste heat powers a cooling system
  - improves plant efficiency
  - displaced traditional electrically powered chillers at factories in local business park

# CDM Projects

- Clean Development Mechanism (CDM)
  - included in Kyoto Convention
- Investment in biofuels company (BioX)
  - developing fugitive gas (CH<sub>4</sub>) reduction projects on Malaysian and Indonesian palm oil plantations
  - target avoiding 3- 4 MT CO<sub>2</sub>e annually
- Also independently pursuing opportunities
  - within IPR's portfolio
  - projects that are independent of IPR ownership
  - presence in local markets is a major plus

# Other Carbon Initiatives

- Renewable energy projects
  - BioX is developing power plants that use sustainable palm oil as fuel
  - Rugeley (UK) has co-fired with wood pellets but now discontinued after effective removal of incentive scheme
- Carbon sinks
  - Hazelwood and Massachusetts power plants have funded reforestation projects
- Off-site mitigation projects
  - Massachusetts plants have funded energy efficiency measures in local community

# CO2 reduction - Conclusions

- Opportunities mainly plant age dependent
- Small but worthwhile increments can be achieved
- CDM/JI provides further incentives

**LOOK AND YOU WILL FIND!**