Benefits of Aero-derivative Technology in Supporting Renewable Power Generation

UTSR Workshop - 03 October 2012

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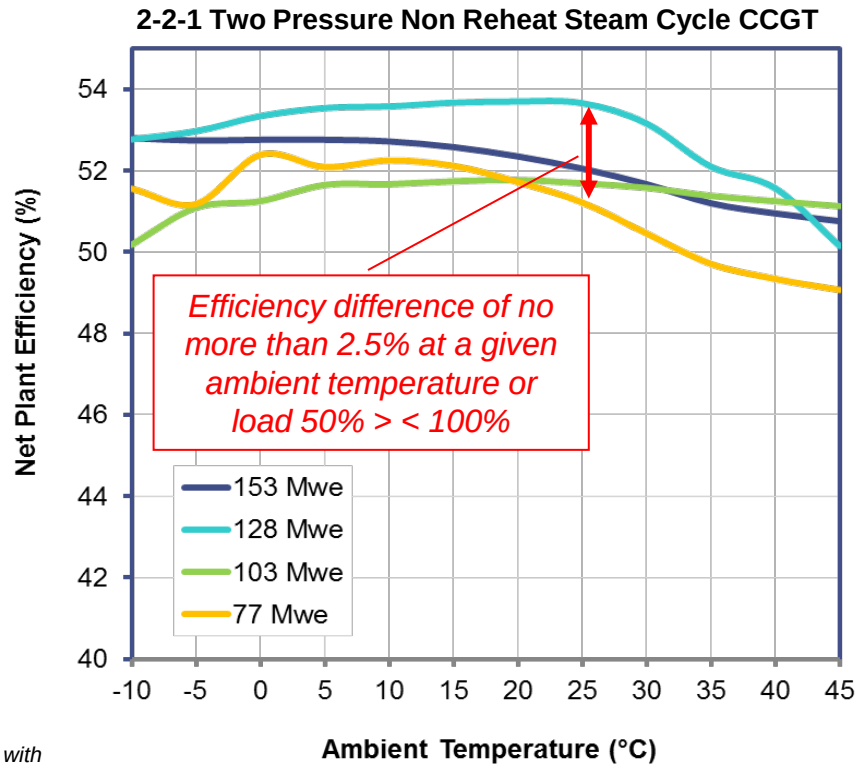
Changing Global Energy Market

- **Volatile market due to:**
  - Environmental Legislation driving to lowering of emissions and GHG output
  - Energy Efficiency Regulations
  - Retirement of capacity
  - Renewable Energy Drive
  - Developing Markets and Global Competition for Fuels
- **These changes are driving the way we generate and trade electricity**

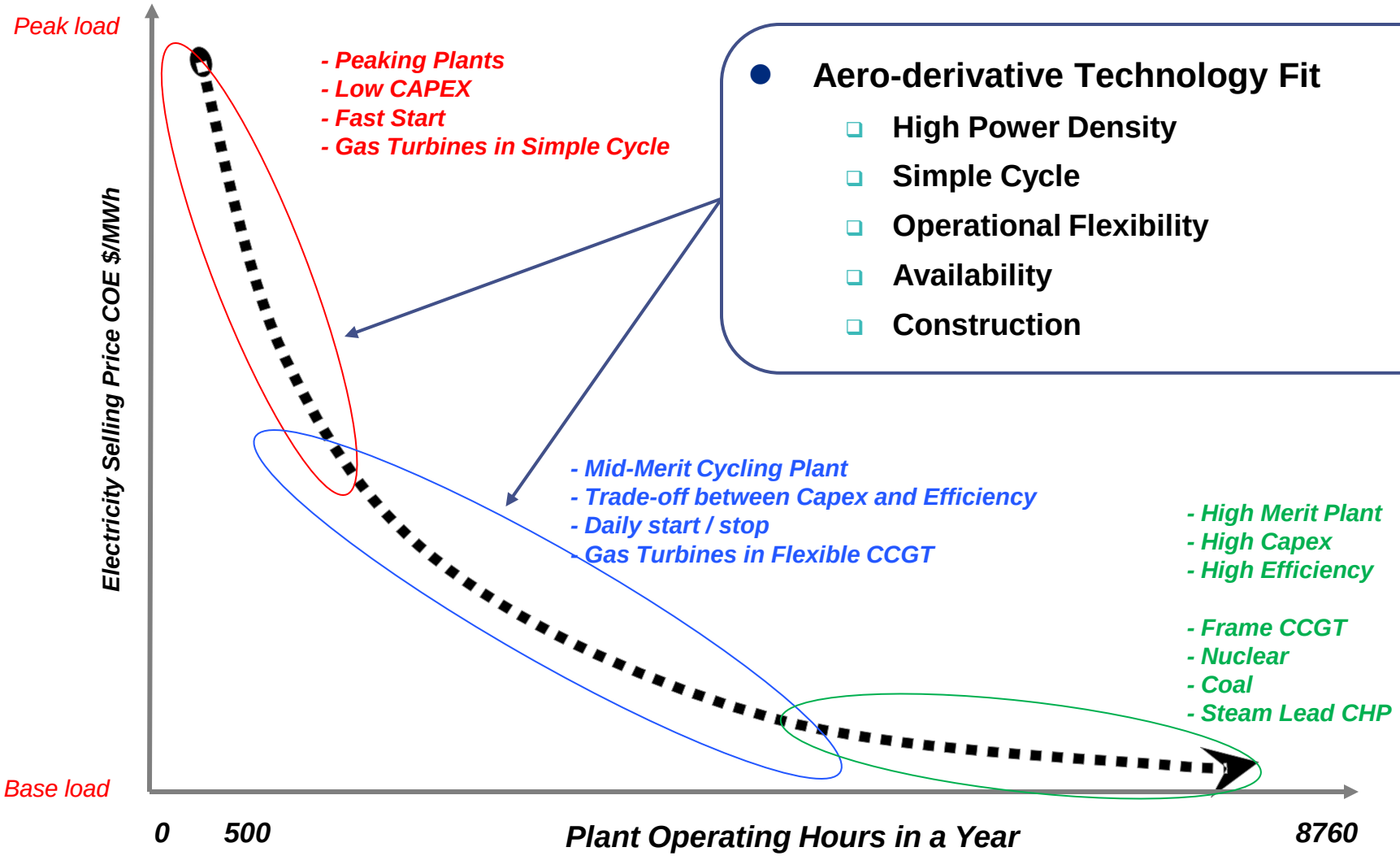
Aeroderivative Gas Turbines

- **Key attributes derived from aero heritage**
  - **High Power Density**
  - **Simple Cycle Efficiency**
  - **Operational Flexibility**
    - Fast Start
    - Flexible Combined Cycle
    - Cycling
  - **Availability**
  - **Construction**



Assumptions for CCGT; Based on Trent 60 DLE ISI generating set; Once Through Steam Generator Boilers with Dearating Condenser; Typical pipeline quality natural gas fuel; Standard CC installation Losses at sea level with maximum wet bulb < 32C; Supplementary Firing (<600C) as required; Site Net Performance includes typical Auxiliary Power and Site Transformer Losses

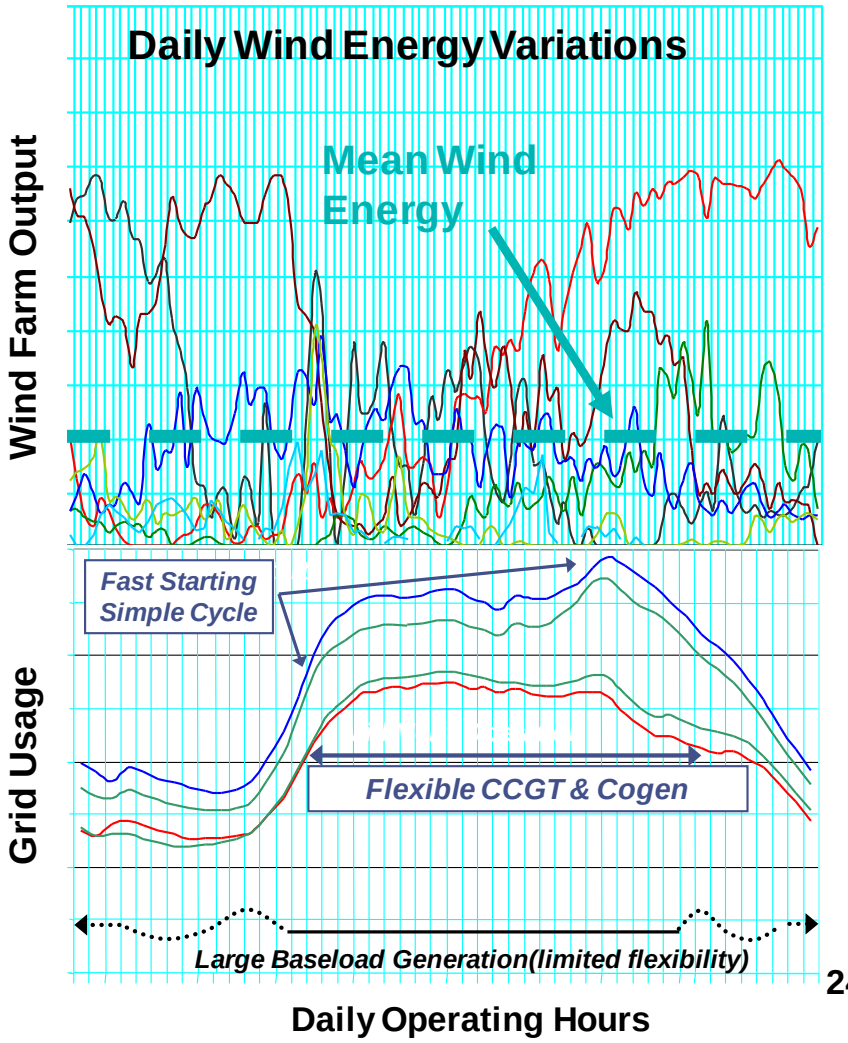
Plant Configuration for Load Duration Curve



- **Aero-derivative Technology Fit**
  - High Power Density
  - Simple Cycle
  - Operational Flexibility
  - Availability
  - Construction

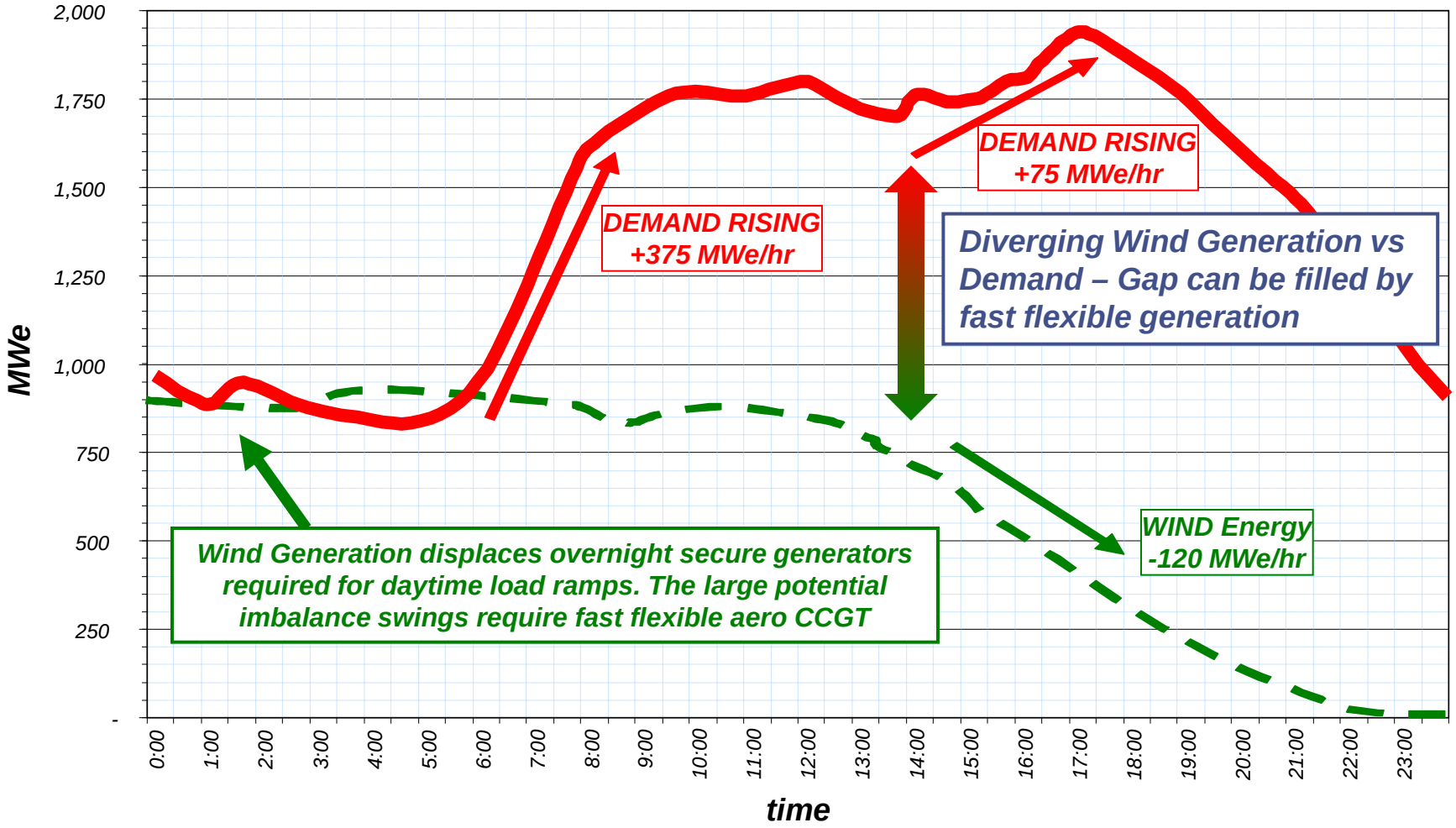
Electricity Distribution Systems

- Example of renewable (wind) distributed power generation
- Challenge for a Grid Operator is to keep a system in balance in real time with the volatile generation supply and forward energy contracts for electricity supply
- This creates the need for fast start up, flexible and reliable forms of power generation to cope with the system dynamics



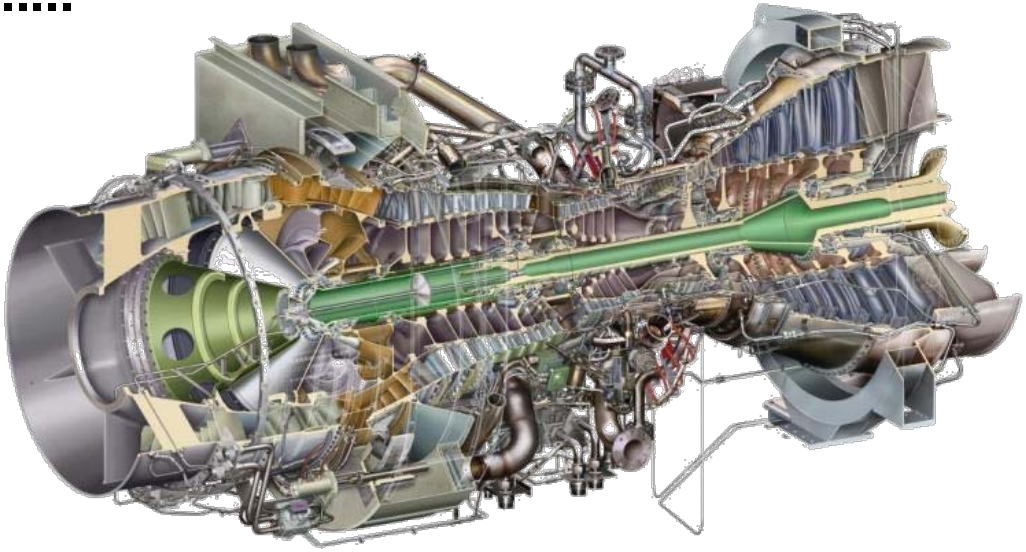
Renewable Generation on Distribution Grid

Example of one 24 hour Trading Period



Summary

- **Changing market dynamics is driving changes in the way we generate and trade electricity**
- **Aero-derivative gas turbine flexibility is very complimentary to renewable generation**
- **Continuous improvements.....**
  - Power output
  - Efficiency
  - Operational Flexibility
  - Environmental



Thank You