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WÄRTSILÄ CAPITAL MARKETS DAY

The Technology Enabler

Christoph Vitzthum

Group Vice President, Head of Wärtsilä Power Plants



Agenda

1. Fuelling Power Plants of the Future

2. From Black Box to Crystal Ball

The Energy Discussion

Climate change

- Climate change is being recognised as a fact
- Focus is changing from local emissions to global emissions
- General public wants energy sector to solve the emissions problems with TECHNOLOGY
- Electricity price is going to rise due to higher requirements for emission abatement

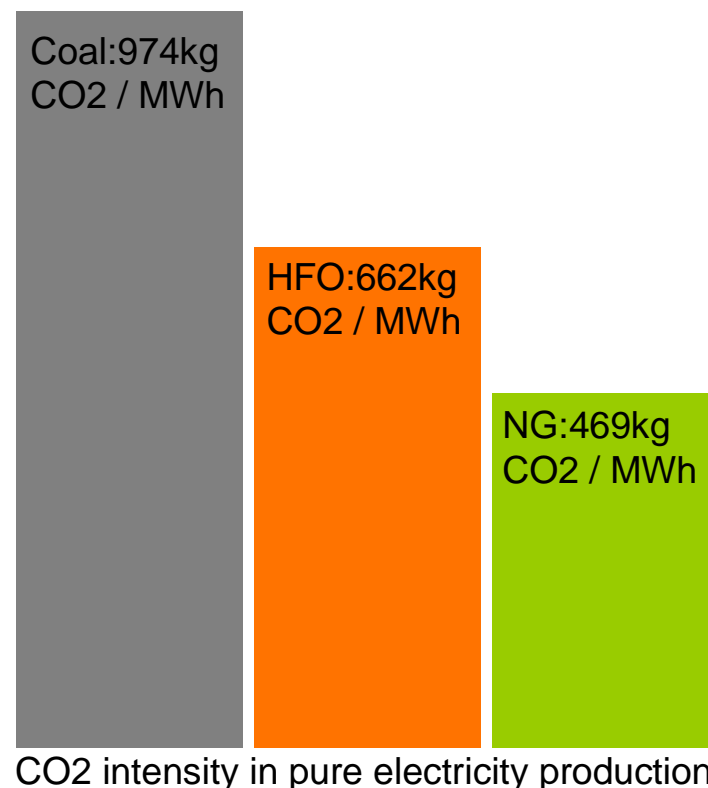
Availability of Fuels

- Many names but same subject
 - Sustainable development
 - Independence from oil
 - Domestic energy supplies
- Availability problem is highlighted by the fact that energy consumption is rising at the same times as the sources are diminishing
- Primary energy prices will rise due to availability issues

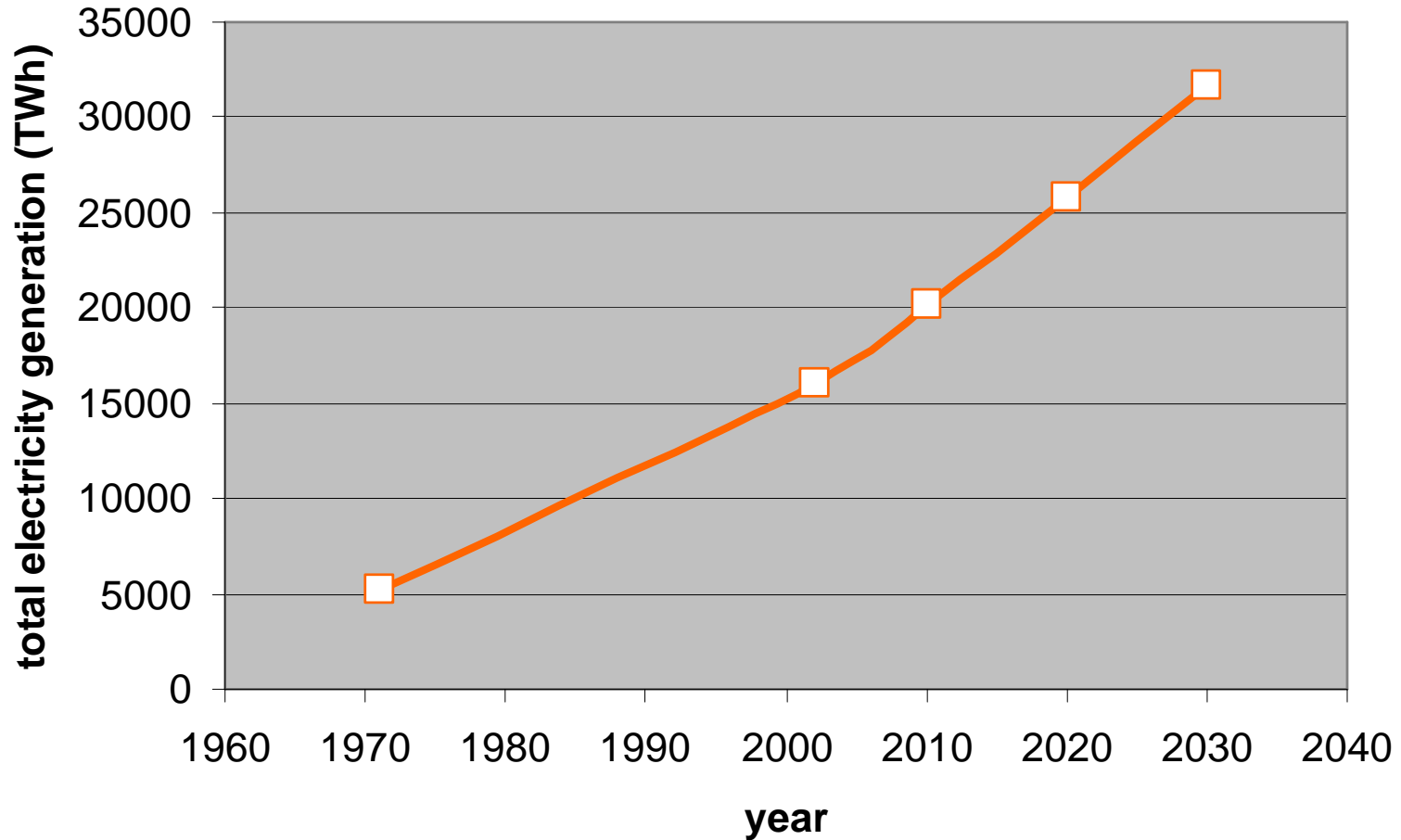
Natural gas – Oil – Coal: CO2 Comparison

Greenhouse emissions

- Burning fuel releases energy through the breaking of chemical bonds when fuels react with oxygen.
- In fossil fuels CO2 intensity depends on hydrogen – carbon ratio
 - The more hydrogen, the better
 - Methane (NG) C:H = 1 : 4
 - HFO C:H = 1 : 2.1
 - Coal C:H = 1 : ~1
- Oil & Gas benefit from higher conversion efficiency in pure electricity production
 - Coal is turned to electricity through steam cycle which typically yields 36-38% efficiency
 - Reciprocating engines typically yield 43-45% net electrical efficiency with oil or gas



Forecasted Growth in Global Electricity Use



Wärtsilä Products for the Future

Fuel flexibility

- The ability to use fuels which are available
- The ability to use of low cost fuels
- The ability to convert from one fuel to another
- To have backup fuel capability
- Efficient use of fossil fuels
- Technology enabler for renewable fuels

High electrical efficiency

- Sustainable power generation must have high efficiency because the share of electricity in energy consumption is increasing

Competitive capital cost

- Standardized solutions
- Modularity

Emission compliance

- Compliance with all relevant standards

Reliability & Availability

- Tried and tested solutions



Wärtsilä means Fuel Flexibility

Solid Biomass

Wood based - steam cycle

Renewable power,
Europe/Kyoto

Liquid Biofuels (LBF)

Base load power, Europe/Kyoto

Natural gas (NG)

Base load power, power islands, grid stability services,
compressor drives

Associated gas (AG)

Oil field power, eliminates the need for flaring in oil fields

Light Fuel Oil (LFO)

Stand by & emergency power

Crude Oil (CRO)

Oil field power, Oil pipeline pump sets

Heavy Fuel Oil (HFO)

Base load plants, Power Islands, Back-up power

Fuel Water Emulsions (FEW)

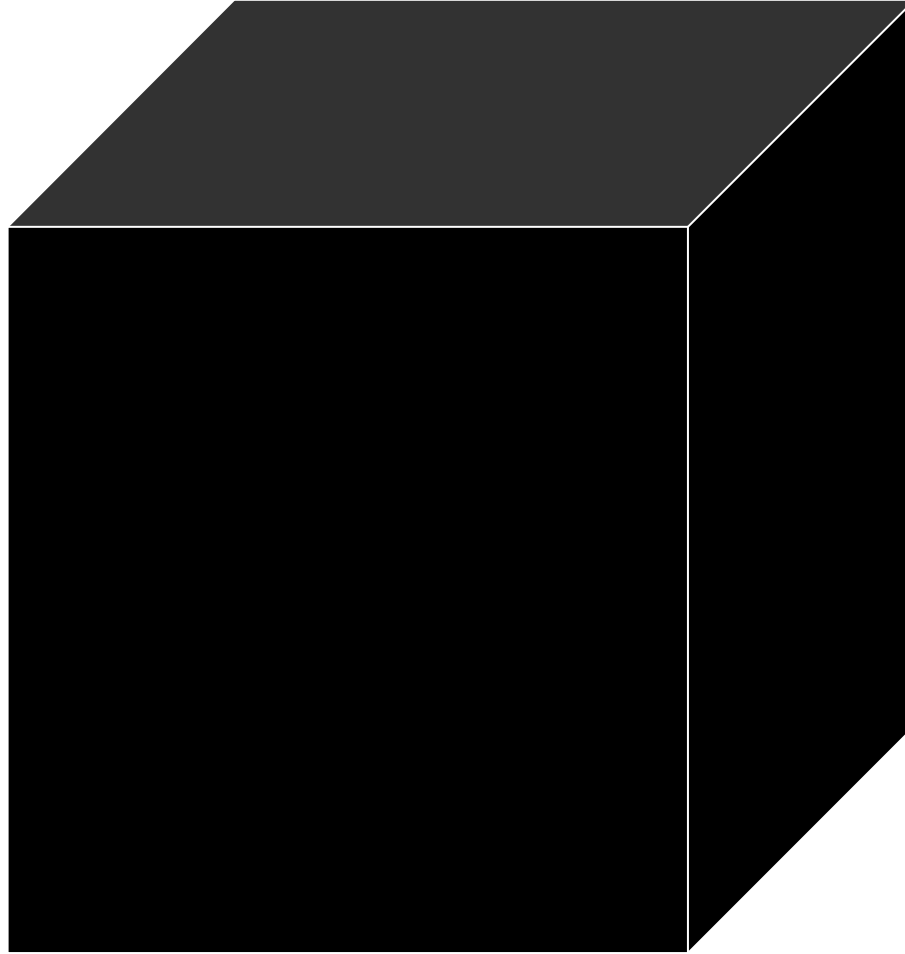
Oil sands, Oil refinery power based on process residue

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Power Plants: A Black Box?



Poised for Growth

- Business fundamentals strong
- Product Matching Market Needs – Now and in the Future
 - Fuel Flexibility
 - High Efficiency
 - Low environmental impact
 - Competitive cost
 - Tried and tested concepts
- Services package clear differentiator
 - Local Presence Globally
 - Understanding of Customers' Business
 - Project execution, including planning, site works, erection, logistics
 - Lifecycle management
 - Development and Financial Services
 - Operations and Management



Grid Stability & Peaking

- Transition from industrial to services economy
- Increasing interest in renewables increasing instability
- Deregulated markets create increased need for stability services
- Difficulty in installing new transmission
- Increasing demand for high reliability and quality
- Independence from grid instability problems



Flexible Baseload Power

- Population growth
- Economic growth
- Baseload efficiency combined with peaking power flexibility
- Fuel flexibility
- Modular expansion as demand increases
- Grids weak or non-existent



Industrial Self Generation

- Difficulty in installing new transmission
- Increasing demand for high reliability and quality
- Independence from grid instability problems

Planning

- Utilities have traditionally been poor at planning for future power needs
- Problem accentuated in smaller range of power generation

However

- Market, regulatory and environmental demands are increasing
- Fuel supply and security issues are increasing

- Forces better planning
- Leads to better predictability

VISION 2020 for Power Generation

Clean Energy

- Energy without measurable impact locally or globally

Sustainable source of energy

- Available or Renewable source of energy
- Highest efficiency

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emissions sustainable

