Power – energy efficiency opportunities

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Power
– Big potential for energy efficiency

Source: IEA. Possible scenario in 2035 if we act on both implemented and announced policies.
Power market

- Thermal power
  - Coal
  - Liquid fuel
  - Natural gas

- Green power
  - Hydro
  - Geo thermal
  - Solar
  - Wind
  - Biomass

- Nuclear power

70%
20%
10%
# Thermal Power Plants

Efficiency opportunities drive investments

<table>
<thead>
<tr>
<th></th>
<th>Engine &amp; turbine efficiency</th>
<th>Combined with waste heat recovery and steam turbine</th>
<th>Combined with waste heat recovery utilizing steam/water directly</th>
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</thead>
<tbody>
<tr>
<td><strong>Engines</strong></td>
<td>~45%</td>
<td>50-60%</td>
<td>up to 90%</td>
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<tr>
<td>(Diesel Power)</td>
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<tr>
<td><strong>Turbines</strong></td>
<td>35-40%</td>
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<tr>
<td>(Liquid Fuel, Natural Gas)</td>
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Diesel power
Waste heat recovery
– Diesel power

- Waste heat recovery from engines’ exhaust gas
- Producing steam or hot water for e.g.: turbine, process, heating & cleaning.
Market development
– Diesel power & waste heat recovery

No. of engines sold, >3,5 MW, continuous operation
– Yearly average, 5 year rolling

WHR market penetration, %
– Yearly average, 5 year rolling

Source: Diesel & Gas Turbine Worldwide, Alfa Laval analysis
Turbines
Waste heat recovery
– Applying WHR to gas turbines

- Exhaust gas outlet
- Cooling water
- Lube oil-, generator- and transformer cooling
- Transformer oil cleaning
- Moatti fuel oil filter
- Fuel treatment
- Fuel oil heater

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Waste heat recovery
– Applying WHR to gas turbines

Steam or hot water

Waste heat recovery unit

Exhaust gas outlet

Fuel oil heater

Fuel treatment

Moatti fuel oil filter

Cooling water

Lube oil-, generator- and transformer cooling

Transformer oil cleaning
Market potential

>1,200 gas turbines sold per year

- Good product fit: 500
- Too large gas turbines: 200
- Too small gas turbines: 550

- Min. 50% of new gas turbines equipped with WHRU
- ~ 250 WHRU per year with good product fit
Power is a growing market with large energy efficiency opportunities

Through acquisition we have added waste heat recovery to our portfolio

We take the new waste heat recovery units to established Alfa Laval markets