

Appendix A

Table A1.

- Energy: Small-scale CHP

<p>1) Range of unit size and project size [MWe/MWth]</p> <p>2) Nominal efficiency</p> <p> <i>i) For electricity generation only [%]</i></p> <p> <i>ii) For combined heat and power [%]</i></p> <p>3) Efficiency at partial load</p> <p>4) Flexibility towards fuel, fuel resource availability, plant siting and infrastructures (e.g. cooling water needs, high voltage, grid gas pipes, etc.)</p> <p>5) Flexibility towards exploitation:</p> <p> <i>i) Cold start [minutes from 0% to 90% of nominal power]</i></p> <p> <i>ii) Warm/lukewarm start [minutes from 0% to 90% of nominal power]</i></p> <p> <i>iii) Uncontrollable variation in load [% from nominal power]</i></p> <p>Total energetic score</p>	<p>Gas/CCGT/LNB – DH (New site) 58/58</p> <p>88</p> <p>Heat market of town 30000-50000 inhabitants</p>	<p>Gas engine/SCR 2x5.5/2x6</p> <p>82</p> <p>Heat market in industry or small town/village</p>	<p>Gas engine/SCR - Industrial 0.526/0.633</p> <p>86.3</p> <p>Industrial demand</p>
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- Ecology and resource use:

<p>1) Exhaust [average in lifetime, including construction &</p>			
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<p>transport]:</p> <ul style="list-style-type: none"> i) CO_2 [kg/kWh_{electricity}] ii) SO_2 [kg/kWh_{electricity}] iii) NO_x [kg/kWh_{electricity}] iv) PM_{10} [kg/kWh_{electricity}] v) $NMVOC$ [kg/kWh_{electricity}] vi) <i>Methane</i> [kg/kWh_{electricity}] vii) N_2O [kg/kWh_{electricity}] viii) C_{14} [kg/kWh_{electricity}] ix) <i>Heavy metals [most important ones, g/kWh_{electricity}]</i> <p>2) Thermal exhaust [TJ/GWh_{electricity}]</p> <ul style="list-style-type: none"> i) <i>Into air</i> ii) <i>Into water source</i> <p>3) Liquid waste</p> <ul style="list-style-type: none"> i) <i>Total liquid waste [kg/kWh_{electricity}]</i> ii) <i>Total nitrogen into water source [kg/kWh_{electricity}]</i> iii) <i>Total phosphor into water source [kg/kWh_{electricity}]</i> iv) <i>Total chlorides into water source [kg/kWh_{electricity}]</i> v) <i>Total sulfates into water source [kg/kWh_{electricity}]</i> vi) <i>Others (KMnO₄, iron, organic materials, solid materials)[Separately]</i> <p>4) Solid waste [tons/MWh_{electricity}]</p> <ul style="list-style-type: none"> i) <i>Flue dust</i> ii) <i>Slurry</i> iii) <i>Hazardous waste</i> iv) <i>Radioactive waste</i> v) <i>Other solid waste</i> <p>5) Safety and health impacts</p> <ul style="list-style-type: none"> i) <i>Population affected by worst perceived accident during operation [nr of persons]</i> ii) <i>Number of deaths over the fuel cycle</i> 	<p>Total:</p>	<p>Total:</p>	<p>Total:</p>
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<p><i>[persons/MWh_{electricity}]</i></p> <p>iii) <i>Other effects</i></p> <p>6) Visual impact and noise</p> <p>7) Footprint and use of resources</p> <p>i) <i>Primary material moved for construction [kg/kW_p of nominal power]</i></p> <p>ii) <i>Secondary material moved for construction [kg/kW_p of nominal power]</i></p> <p>iii) <i>Main materials uses for construction (five) [kg/kW_p of nominal power]</i></p> <p>iv) <i>Primarily material moved for usage e.g. fuel [tons/MWh_{electricity}]</i></p> <p>v) <i>Secondary material moved for usage e.g. fuel [tons/MWh_{electricity}]</i></p> <p>vi) <i>Critical materials in construction and usage (materials that may become a limiting factor for the technology) [kg/kW_p of nominal power]</i></p> <p>Total ecological score</p>	<p>1.</p> <p>2.</p> <p>3.</p> <p>4.</p> <p>5.</p>	<p>1.</p> <p>2.</p> <p>3.</p> <p>4.</p> <p>5.</p>	<p>1</p> <p>2.</p> <p>3.</p> <p>4.</p> <p>5.</p>
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- Economy (without subsidies, price level for 2003):

<p>1) Investment cost [euro/kWe]</p> <p>2) Availability [hours per year]</p> <p>3) Operational time [hours of nominal power/year]</p> <p>4) Reliability [%]</p> <p>5) Economic lifetime [years]</p> <p>6) Construction time [years]</p>	<p>1362</p> <p>20</p> <p>n.a</p>	<p>636</p> <p>25</p> <p>n.a.</p>	<p>1483</p> <p>20</p> <p>n.a.</p>
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7) Fuel cost [euro/GJ]			
8) Operation and Maintenance (O&M) cost [euro/MWh _{electricity}]	7.7	7.6	23.7
9) Waste handling and dismantling [euro/ MWh _{electricity}]			
Total economic score			
Source	OECD/NEA/IEA 2005, DNK-CHP3	OECD/NEA/IEA 2005, DNK-CHP3	OECD/NEA/IEA 2005, CHE-CHP2