

## Appendix A

**Table A1.**

- Energy: Lignite IGCC with CCS

	Current	2010	2020	2030
1) Range of unit size and project size [MW]		425	425	425
2) Nominal efficiency				
<i>i) For electricity generation only [%]</i>		43	46	47
<i>ii) For combined heat and power [%]</i>				
3) Efficiency at partial load				
4) Flexibility towards fuel, fuel resource availability, plant siting and infrastructures (e.g. cooling water needs, high voltage, grid gas pipes, etc.)				
5) Flexibility towards exploitation:				
<i>i) Cold start [minutes from 0% to 90% of nominal power]</i>				
<i>ii) Warm/lukewarm start [minutes from 0% to 90% of nominal power]</i>				
<i>iii) Uncontrollable variation in load [% from nominal power]</i>				
<b>Total energetic score</b>				

- Ecology and resource use:

1) Exhaust, direct for operation [kg/kWh] / indirect				
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for construction and dismantling [kg/kW]:				
i) $CO_2$ [kg/kWh <sub>electricity</sub> ] / [kg/kW]	0.139649 /	0.130845 /	0.127325 /	
ii) $SO_2$ [kg/kWh <sub>electricity</sub> ]	0.003252 0.000823 /	0.003252 0.000771 /	0.003252 0.000749 /	
iii) $NO_x$ [kg/kWh <sub>electricity</sub> ]	0.000005 0.000520 /	0.000005 0.000488 /	0.000005 0.000477 /	
iv) $PM_{10}$ [kg/kWh <sub>electricity</sub> ]	0.000010 0.000109 /	0.000010 0.000106 /	0.000010 0.000103 /	
v) $NM VOC$ [kg/kWh <sub>electricity</sub> ]	0.000028 0.000016 /	0.000028 0.000016 /	0.000028 0.000016 /	
vi) <i>Methane</i> [kg/kWh <sub>electricity</sub> ]	0.000001 0.000046 /	0.000001 0.000043 /	0.000001 0.000042 /	
vii) $N_2O$ [kg/kWh <sub>electricity</sub> ]	0.000004 0.000031 /	0.000004 0.000028 /	0.000004 0.000027 /	
viii) $C_{14}$ [kg/kWh <sub>electricity</sub> ]	0.000000 0.000051 /	0.000000 0.000049 /	0.000000 0.000047 /	
ix) <i>Heavy metals [most important ones, g/kWh<sub>electricity</sub>]</i>	0.000006	0.000006	0.000006	
2) Thermal exhaust [TJ/GWh <sub>electricity</sub> ]				
i) <i>Into air</i>	0.327024	0.286632	0.252288	
ii) <i>Into water source</i>	<b>1.4203400</b>	<b>1.2739200</b>	<b>1.0979200</b>	
3) Liquid waste, direct for operation [kg/kWh] / indirect for construction and dismantling [kg/kW]:				
i) <i>Total liquid waste</i> [kg/kWh <sub>electricity</sub> ]				
ii) <i>Total nitrogen into water source</i>	0.000000	0.000000	0.000000	

		/	/	/
		0.000000	0.000000	0.000000
iii) Total phosphor into water source [kg/kWh <sub>electricity</sub> ]				
iv) Total chlorides into water source [kg/kWh <sub>electricity</sub> ]		0.000103	0.000102	0.000102
v) Total sulfates into water source [kg/kWh <sub>electricity</sub> ]		/	/	/
vi) Others (KMnO <sub>4</sub> , iron, organic materials, solid materials)[ <i>Separately</i> ]		0.000006	0.000006	0.000006
		0.000865	0.000822	0.000784
		/	/	/
		0.000005	0.000005	0.000005
		Iron:	Iron:	Iron:
		0.000213	0.000200	0.000188
		/	/	/
		0.000001	0.000001	0.000001
4) Solid waste [tons/MWh <sub>electricity</sub> ]				
i) Flue dust				
ii) Slurry		<b>0.0229925</b>	<b>0.0211311</b>	<b>0.0194471</b>
iii) Hazardous waste		Waste Oil:	Waste Oil:	Waste Oil:
		<b>0.0000173</b>	<b>0.0000173</b>	<b>0.0000173</b>
iv) Radioactive waste				
v) Other solid waste				
5) Safety and health impacts	Total:	Total:	Total:	Total:
i) Population affected by worst perceived accident during operation [nr of persons]				
ii) Number of deaths over the fuel cycle [persons/MWh <sub>electricity</sub> ]				
iii) Other effects				
6) Visual impact and noise				
7) Footprint and use of resources				
i) Primary material moved for construction [kg/kW <sub>p</sub> of nominal power]				
ii) Secondary material moved for construction [kg/kW <sub>p</sub> of nominal power]				

<p>iii) <i>Main materials uses for construction (five)</i>  <i>[kg/kW<sub>p</sub> of nominal power]</i></p> <p>iv) <i>Primarily material moved for usage e.g. fuel</i>  <i>[tons/ MWh<sub>electricity</sub>]</i></p> <p>v) <i>Secondary material moved for usage e.g. fuel</i>  <i>[tons/ MWh<sub>electricity</sub>]</i></p> <p>vi) <i>Critical materials in construction and usage</i>  <i>(materials that may become a limiting factor</i>  <i>for the technology) [kg/kW<sub>p</sub> of nominal</i>  <i>power]</i></p> <p><b>Total ecological score</b></p>		<p>Iron: 106310  Aluminum: 2114  Concrete: 724724  Copper: 3144</p>	<p>Iron: 106310  Aluminum: 2114  Concrete: 749936  Copper: 3287</p>	<p>Iron: 106310  Aluminum: 2114  Concrete: 732751  Copper: 3235</p>
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- Economy (without subsidies, price level for 2003):

<p>1) Investment cost [euro/MW]</p> <p>2) Availability [hours per year]</p> <p>3) Operational time [hours of nominal power/year]</p> <p>4) Reliability [%]</p> <p>5) Technical life span [years]</p> <p>6) Construction time [years]</p> <p>7) Fuel cost [euro/MJ]</p> <p>8) Operation and Maintenance (O&amp;M) cost  [euro/MWh<sub>electricity</sub>]</p> <p>9) Waste handling and dismantling [euro/  MWh<sub>electricity</sub>]</p> <p><b>Total economic score</b></p>		<p>1400.9</p> <p>7500</p> <p>35</p> <p>4</p> <p>3.832260</p> <p>0.214260</p>	<p>1385.6</p> <p>7500</p> <p>35</p> <p>4</p> <p>3.822521</p> <p>0.214260</p>	<p>1380.5</p> <p>7500</p> <p>35</p> <p>4</p> <p>3.812782</p> <p>0.214260</p>
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