

Appendix A

Table A1.

- Energy: Lignite, IGCC

	Current	2010	2020	2030
1) Range of unit size and project size [MW]	450	450	450	450
2) Nominal efficiency				
<i>i) For electricity generation only [%]</i>	46.5	49.0	52.0	52.5
<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>				
Total energetic score				

- Ecology and resource use:

1) Exhaust, direct for operation [kg/kWh] / indirect				
--	--	--	--	--

for construction and dismantling [kg/kW]:				
i) CO_2 [kg/kWh _{electricity}] / [kg/kW]	0.886222 /	0.841271 /	0.793067 /	0.785572 /
ii) SO_2 [kg/kWh _{electricity}]	0.003076 0.000779 /	0.003076 0.000740 /	0.003076 0.000699 /	0.003076 0.000693 /
iii) NO_x [kg/kWh _{electricity}]	0.000005 0.000483 /	0.000005 0.000461 /	0.000005 0.000436 /	0.000005 0.000432 /
iv) PM_{10} [kg/kWh _{electricity}]	0.000009 0.000044 /	0.000009 0.000041 /	0.000009 0.000039 /	0.000009 0.000039 /
v) $NMVOC$ [kg/kWh _{electricity}]	0.000027 0.000013 /	0.000027 0.000013 /	0.000027 0.000013 /	0.000027 0.000013 /
vi) <i>Methane</i> [kg/kWh _{electricity}]	0.000001 0.000154 /	0.000001 0.000147 /	0.000001 0.000140 /	0.000001 0.000138 /
vii) N_2O [kg/kWh _{electricity}]	0.000003 0.000027 /	0.000003 0.000026 /	0.000003 0.000025 /	0.000003 0.000025 /
viii) C_{14} [kg/kWh _{electricity}]	0.000000 0.000051 /	0.000000 0.000049 /	0.000000 0.000048 /	0.000000 0.000048 /
ix) <i>Heavy metals [most important ones, g/kWh_{electricity}]</i>	0.000006	0.000006	0.000006	0.000006
2) Thermal exhaust [TJ/GWh _{electricity}]				
i) <i>Into air</i>	0.266153	0.239957	0.212038	0.207713
ii) <i>Into water source</i>	1.1582574	1.0442574	0.9227574	0.9039347
3) Liquid waste, direct for operation [kg/kWh] / indirect for construction and dismantling [kg/kW]:				
i) <i>Total liquid waste</i> [kg/kWh _{electricity}]				
ii) <i>Total nitrogen into water source</i>	0.000000	0.000000	0.000000	0.000000

	<i>[kg/kWh_{electricity}]</i>	/	/	/	/
		0.000000	0.000000	0.000000	0.000000
iii)	<i>Total phosphor into water source</i>				
	<i>[kg/kWh_{electricity}]</i>				
iv)	<i>Total chlorides into water source</i>	0.000262	0.000262	0.000261	0.000261
	<i>[kg/kWh_{electricity}]</i>	/	/	/	/
		0.000005	0.000005	0.000005	0.000005
v)	<i>Total sulfates into water source</i>	0.000809	0.000777	0.000744	0.000739
	<i>[kg/kWh_{electricity}]</i>	/	/	/	/
		0.000005	0.000005	0.000005	0.000005
vi)	<i>Others (KMnO₄, iron, organic materials, solid materials)[Separately]</i>	Iron:	Iron:	Iron:	Iron:
		0.000198	0.000188	0.000178	0.000176
		/	/	/	/
		0.000001	0.000001	0.000001	0.000001
4)	<i>Solid waste [tons/MWh_{electricity}]</i>				
i)	<i>Flue dust</i>				
ii)	<i>Slurry</i>	0.0248346	0.0244898	0.0230769	0.0228571
iii)	<i>Hazardous waste</i>	Waste oil:	Waste oil:	Waste oil:	Waste oil:
		0.0000163	0.0000163	0.0000163	0.0000163
iv)	<i>Radioactive waste</i>				
v)	<i>Other solid waste</i>				
5)	<i>Safety and health impacts</i>	Total:	Total:	Total:	Total:
i)	<i>Population affected by worst perceived accident during operation [nr of persons]</i>				
ii)	<i>Number of deaths over the fuel cycle [persons/MWh_{electricity}]</i>				
iii)	<i>Other effects</i>				
6)	<i>Visual impact and noise</i>				
7)	<i>Footprint and use of resources</i>				
i)	<i>Primary material moved for construction [kg/kW_p of nominal power]</i>				
ii)	<i>Secondary material moved for construction</i>				

<p><i>[kg/kW_p of nominal power</i></p> <p>iii) <i>Main materials uses for construction (five)</i> <i>[kg/kW_p of nominal power]</i></p> <p>iv) <i>Primarily material moved for usage e.g. fuel</i> <i>[tons/ MWh_{electricity}]</i></p> <p>v) <i>Secondary material moved for usage e.g. fuel</i> <i>[tons/ MWh_{electricity}]</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_p of nominal</i> <i>power]</i></p> <p>Total ecological score</p>	<p>Iron: 101067 Aluminum: 2114 Concrete: 698997 Copper: 2317</p>	<p>Iron: 101067 Aluminum: 2114 Concrete: 698997 Copper: 2317</p>	<p>Iron: 101067 Aluminum: 2114 Concrete: 698997 Copper: 2317</p>	<p>Iron: 101067 Aluminum: 2114 Concrete: 698997 Copper: 2317</p>
--	--	--	--	--

- Economy (without subsidies, price level for 2003):

1) Investment cost [euro/MW]		1124.8	1,114.6	1,099.3
2) Availability [hours per year]				
3) Operational time [hours of nominal power/year]	7500	7500	7500	7500
4) Reliability [%]				
5) Technical life span [years]	35	35	35	35
6) Construction time [years]	4	4	4	4
7) Fuel cost [euro/MJ]				
8) Operation and Maintenance (O&M) cost [euro/MWh _{electricity}]		10.3	10.1	9.9
9) Waste handling and dismantling [euro/ MWh _{electricity}]		6.8	6.8	6.8
Total economic score				

