APPENDICES

APPENDIX A

SYNTHETIC FUEL PLANT DETAIL

Table A1: Number of Modules and Capacities

No.	Name	Mod.	Capacity In	(From)	Capacity Out	(To)
1	Coal Processing	14	140 ton/h Coal	(-)	94,5 ton/h Coal (Coarse) 45,5 ton/h Coal (Fine)	(No. 4) (No. 3)
2	Water Treatment	2	2555 ton/h Water 595 ton/h Recycled water	(-) (No. 4,6,7)	3150 ton/h Water	(No. 3)
3	Steam	9	399 ton/h Water 60,9 ton/h Coal (Fine)	(No. 2) (No. 1)	378 ton/h Steam	(No. 4) (No. 6-A, -C) (No. 7)
4	Gas Production	40	25,9 ton/h Steam 5530 nm^3/h Oxygen 25,45 ton/h Coal (Coarse)	(No. 3) (No. 6-C) (No. 1)	39900 nm^3/h Raw gas	(No. 5)
5	Temperature Regulation	8	210000 nm^3/h Raw gas	(No. 4)	210000 nm^3/h Raw gas 134,4 m^3/h Gas-water	(No. 8) (No. 13-A)
6-A 6-B 6-C	Oxygen-A Oxygen-B Oxygen-C	6 6 7	105 ton/h Steam 269500 nm^3/h Air 46900 nm^3/h Oxygen 35 ton/h Steam	(No. 3) (No. 6-A) (No. 6-B) (No. 3)	269500 nm^3/h Air 46900 nm^3/h Oxygen 46900 nm^3/h Oxygen	(No. 6-B) (No. 6-C) (No. 4) (No. 12)
6E-A 6E-B 6E-C	Oxygen Extra-A Oxygen Extra-B Oxygen Extra-C	1 1 1	24,5 MW Electricity 262010 nm^3/h Air 51800 nm^3/h Oxygen 9,8 MW Electricity	(-) (No. 6E-A) (No. 6E-B) (-)	262010 nm^3/h Air 51800 nm^3/h Oxygen 51800 nm^3/h Oxygen	(No. 6E-B) (No. 6E-C) (No. 4) (No. 12)
7	Electricity Generation	4	178,5 ton/h Steam	(No. 3)	42 MW Electricity	(-)
8	Plant(I)	4	365000 nm^3/h Raw gas	(No. 5)	255500 nm^3/h Pure gas	(No. 9-A)
9-A	Plant(II)-A	8	217000 nm^3/h Pure gas (Feedback H_2 (Feedback recycled gas	(No. 8) (No. 11)) (No. 12))	69440 nm^3/h Residue gas 70 m^3/h Chemical product	(No. 9-B) (No. 14)
9-B	Plant(II)-B	2	404250 nm^3/h Residue gas	(No. 9-A)	404250 nm^3/h Residue gas	(No. 10)
10	Plant(III)	2	280000 nm^3/h Residue gas	(No. 9-B)	241500 nm^3/h Down gas	(No. 11)

No.	Name	Mod.	Capacity In	(From)	Capacity Out	(To)
11	Division Process	2	241500 nm^3/h Down gas	(No. 10)	98000 nm^3/h H_2	(No. 9-A)
					84000 nm^3/h CH_4	(No. 12)
					7350 nm^3/h C_2	(No. 18)
					3850 nm^3/h C_2	(No. 19)
					77 m^3/h Condensate	(No. 20)
12	Recycling	8	24500 nm^3/h CH_4	(No. 11)	64750 nm^3/h Recycled gas	(No. 9-A)
			11200 nm^3/h Oxygen	(No. 6-C)		
	Tank		(1000 m^3 Gas-water)		(2000 m^3 Gas-water)	
13-A	Plant(IV)-A	4	245 m^3/h Gas-water	(No. 5)	5,95 m^3/h NH_3	(No. 13-B)
					1,05 m^3/h Tar acid	(-)
13-B	Plant(IV)-B	2	11,9 m^3/h NH_3	(No. 13-A)	11,9 m^3/h NH_3	(No. 13-C)
13-C	Plant(IV)-C	1	23,8 m^3/h NH_3	(No. 13-B)	23,8 m^3/h NH_3	(-)
14	Sub(I)	2	280 m^3/h Chemical product	(No. 9-A)	3,75% Alcohol	(No. 15)
					2,5% Carbonyl	(No. 16)
15	Sub(II)	1	21 m^3/h Alcohol	(No. 14)	70% Ethanol	(-)
					30% Propanol	(-)
16	Sub(III)	1	14 m^3/h Carbonyl	(No. 14)	47,62% Acetone	(-)
					28,57% MEK	(-)
					19,05% Aldehyde	(No. 17)
					4,65% Methanol	(-)
17	Sub(IV)	1	2,8 m^3/h Aldehyde	(No. 16)	50% Heavy aldehyde	(-)
					37% N–Butanol	(-)
18	Sub(V)	1	16800 nm^3/h C_2	(No. 11)	40% Ethane	(-)
					0,076% Ethylene	(-)
19	Sub(VI)	1	12600 nm^3/h C_2	(No. 11)	40% Ethane	(-)
					0,06% Petrol	(-)
					0,04% Butene	(-)
20	Plant(V)	8	20 m^3/h Condensate	(No. 11)	6 m^3/h C_5C_6	(-)
					6,24 m^3/h Petrol	(-)
					6,24 m^3/h Diesel	(-)
					0,8 m^3/h C_3	(-)
					0,8 m^3/h Heavy polymer	(-)
					1,2 m^3/h C_4	(-)

Where:

No. : The plant identification number.

Mod. : The number of modules in the plant.

(-) : The external input or output.

Notes:

a) The solid phase capacities are given in tons per hour (ton/h) - except for water and steam where traditionally the capacities are always given in ton/h.

b) The liquid phase capacities are given in cubic metres per hour (m^3/h).

c) The gas phase capacities are given in normalised cubic metres per hour (nm^3/h).

d) Because the temperatures and pressures (and therefore the volumes) of gases differ at different points in the process, the volumes of gases are represented as volumes that are numerically normalised to a standard temperature and pressure. This normalisation makes it possible to compare the volumes of gases at different points in the process.

e) The plant (or plants) from which input (singular or multiple) is received and the plant (or plants) to which output (singular or multiple) is sent are indicated in brackets in Columns 4 and 5 respectively.

f) The two modules in the Water Treatment plant are arranged and connected in series and therefore the input and output capacities are given for the whole Water Treatment plant and not for a single module as per the convention that is followed for the other plants. The two values that are given for the input and output capacities incorporate the recycled water from the Gas Production, Oxygen and Electricity Generation plants and therefore the input and output capacities do not represent the conversion ratio of the Water Treatment plant as per the convention that is followed for the other plants. It is obvious that the conversion ratio of the Water Treatment plant is one (1) because the water is only filtered and demineralised and therefore the input and output throughput values of the Water Treatment plant are always exactly the same. However, the constant feedback of 595 ton/h of recycled water implies that water is only taken from the external source if the demand for water is such that the output throughput of the Water Treatment plant exceeds 595 ton/h of water.

g) The values that are given for the minimum and maximum volumes of the tank at Plant(IV) differ from the rest of the values in Columns 4 and 5 respectively because they represent volumes and not rates of flow.

* * *

Table A2: Service Schedules and Failure Characteristics

No.	Name	Service Schedule		Failure Characteristics			
		Cycle Time (hour)	Service Time (hour)	MTBF - Failure Rate Reciprocal (hour)	Repair Time (hour)		
					Mi.	Mo.	Ma.
1	Coal Processing	168 1176 10080	1 2 336	336	6	8	12
2	Water Treatment	-	-	-	-	-	-
3	Steam	1344	34	2880	24	120	168
4	Gas Production	-	-	960	3	16	25
5	Temperature Regulation	(2/"phase") 34560	408	5760	2	3	8
6-A	Oxygen-A	1440	24	1080	1	2	10
6-B	Oxygen-B	17280	336	8640	16	24	30
6-C	Oxygen-C	1440	24	840	1	1	8
6E-A	Oxygen Extra-A	(1/"phase") 8640	336	-	-	-	-
6E-B	Oxygen Extra-B	(1/"phase") 8640	336	-	-	-	-
6E-C	Oxygen Extra-C	(1/"phase") 8640	336	1234	0,5	12	24
7	Electricity Generation	34560	720	1440	0,25	1	3
8	Plant(I)	(2/"phase") 17280	408	8640	1	6	24
9-A	Plant(II)-A	720 2880 10080	24 120 360	11520	168	168	168
9-B	Plant(II)-B	(1/"phase") 17280	360	17280	1	1	5
10	Plant(III)	-	-	8640	6	8	24
11	Division Process	-	-	8640	1	18	48
12	Recycling	4320	216	-	-	-	-
13-A	Plant(IV)-A	-	-	34560	0,5	0,5	3
13-B	Plant(IV)-B	-	-	17280	2	3	10
13-C	Plant(IV)-C	-	-	34560	18	24	30
14	Sub(I)	-	-	-	-	-	-
15	Sub(II)	-	-	-	-	-	-
16	Sub(III)	-	-	-	-	-	-
17	Sub(IV)	-	-	-	-	-	-
18	Sub(V)	-	-	-	-	-	-

No.	Name	Service Schedule		Failure Characteristics			
		Cycle Time (hour)	Service Time (hour)	MTBF - Failure Rate Reciprocal (hour)	Repair Time (hour)		
					Mi.	Mo.	Ma.
19	Sub(VI)	-	-	-	-	-	-
20	Plant(V)	-	-	5317	300	336	408

Where:

No. : The plant identification number.

MTBF : The Mean Time Between Failure of the modules (hour).

Mi. : The minimum value of the triangular distribution.

Mo. : The mode value of the triangular distribution.

Ma. : The maximum value of the triangular distribution.

Notes:

a) The service cycles assume a 24-hour day, a 7-day week, a 30-day month and a 360-day year (see Appendix L for a detailed discussion about the simulation model year).

b) The plants that are subject to "phase" services as well as the number of modules that are serviced during each "phase" service are indicated.

c) The MTBF values (reciprocals of the failure rates) of the modules are given because it is easier to understand and conceptualise than the small numerical values of the failure rates and because the MTBF values represent the mean values of the exponential distributions that are used to model the failure rates of the modules (see Section 1.2).

d) The repair times are represented by three values that define the triangular distributions that are used to model the repair times of the modules (see Section 1.2).

e) The repair time of Plant(II)-A is a constant repair time.

* * * * *

APPENDIX B

SYNTHETIC FUEL PLANT RULES OF OPERATION

a) The Synthetic Fuel plant always strives to maintain the maximum possible rate of production or throughput.

b) Only the smaller plants that form part of the main-gas-cycle can act as "bottlenecks" that influence the rate of production or throughput of the Synthetic Fuel plant. The main-gas-cycle comprises the following smaller plants: Coal Processing, Steam, Gas Production, Temperature Regulation, Oxygen-A, -B and -C, Plant(I), Plant(II)-A and -B, Plant(III), Division Process and Recycling. These smaller plants determine the throughput of the Synthetic Fuel plant. The throughput of the Synthetic Fuel plant is constantly adjusted to coincide with the maximum possible throughput of the specific smaller plant that act as the "bottleneck" at that specific moment in time. The Water Treatment plant actually forms part of the main-gas-cycle, but it is not considered for inclusion in the aforementioned list, because it can never act as a "bottleneck" that influences the throughput (see Point f) for an explanation). The smaller plants in the aforementioned list are sometimes referred to as the "heart " of the Synthetic Fuel plant.

c) The Electricity Generation plant, Plant(IV), Plant(V) and Sub(I) to Sub(VI) do not form part of the main-gas-cycle and therefore they do not influence the throughput of the Synthetic Fuel plant. They are sometimes referred to as the peripheral plants. The final products of the Synthetic Fuel plant are generated by the peripheral plants.

d) If Plant(IV), Plant(V) and Sub(I) to Sub(VI) do not have the capacity to process the throughput at their respective positions in the Synthetic Fuel plant, then the portions of the throughput that cannot be processed are flared. The flares at Plant(IV) and Plant(V) are called Flare-A and Flare-B respectively and the flares at Sub(I) to Sub(VI) are numbered progressively from Flare-C1 to Flare-C6.

e) The Coal Processing plant separates the coal from the mines into coarse and fine coal with sieves. Coarse coal is supplied to the Gas Production plant and fine coal to the Steam plant. The ratio of this division is determined by the composition of the coal from the mines. The division ratio changes over time but it is assumed to be a fixed ratio of 67,5% coarse coal to 32,5% fine coal for the sake of this document. For the system description of the Synthetic Fuel plant that is provided in Section 1.2, this specific division ratio implies that the "bottleneck" capacity of the Coal Processing plant is determined by its capacity to supply coarse coal to the Gas Production plant and not by its capacity to

supply fine coal to the Steam plant. It therefore logically follows that there is an oversupply of fine coal to the Steam plant in this instance. This oversupply of fine coal to the Steam plant is diverted to slimes dams. If the system description or division ratio changes, the whole situation could be reversed and fine coal might then be recovered from the slimes dams to bolster the capacity of the Coal Processing plant to supply fine coal to the Steam plant. (It is assumed that the external source of coal from the mines is unlimited.)

f) The Water Treatment plant can never act as a "bottleneck" in the main-gas-cycle because there is always enough water (adequate capacity). When a breakdown occurs at the Water Treatment plant only the quality of the water that is supplied to the Steam plant is affected. The capacity of the Water Treatment plant is not affected. Water is also recycled from the Gas Production, Oxygen and Electricity Generation plants. Water is only taken from the external source if the demand for water is such that it cannot be satisfied by the recycled water. (It is assumed that the external source of water is unlimited.)

g) The output of the Steam plant is divided between three of the smaller plants. Steam is supplied to the Gas Production, Oxygen and Electricity Generation plants. Steam will only be supplied to the Electricity Generation plant once the Gas Production and Oxygen plants have been supplied. The primary function of the Steam plant is to supply steam to the Gas Production and Oxygen plants and the secondary function is to supply steam to the Electricity Generation plant. The ratio of steam that is supplied to the Gas Production plant to steam that is supplied to the Oxygen plant is referred to as the steam-division-ratio. The steam-division-ratio is a fixed ratio for a specific system description.

h) The raw gas output capacity of each gasifier in the Gas Production plant is actually 39200 nm^3/h. An electrical fan delivers an additional output capacity of 28000 nm^3/h from the piping of the Gas Production plant. The operators of the Synthetic Fuel plant claim that the additional output capacity of 28000 nm^3/h is always available, independent of the throughput of the Synthetic Fuel plant. This assumption is highly questionable because at the extreme of 0% throughput the additional output capacity obviously cannot be 28000 nm^3/h. (If any additional output capacity is available at 0% throughput, it will be contradictory to the laws of conservation of mass and energy.) It therefore seems prudent to allocate the additional output capacity of 28000 nm^3/h evenly to the 40 gasifiers and that leads to an output capacity of 39900 nm^3/h for each gasifier. This concept spreads the additional output capacity evenly over the total possible range of the throughput of the Synthetic Fuel plant.

i) The output of the Oxygen plant is divided between two of the smaller plants. Oxygen is

supplied to both the Gas Production and Recycling plants. The ratio of oxygen that is supplied to the Gas Production plant to oxygen that is supplied to the Recycling plant is referred to as the oxygen-division-ratio. The oxygen-division-ratio is a fixed ratio for a specific system description.

j) The Electricity Generation plant generates in-house electricity for the Synthetic Fuel plant to alleviate its dependence on the national electricity network. Point g) indicates that steam is only supplied to the Electricity Generation plant once the Gas Production and Oxygen plants have been supplied. In the instance where the Electricity Generation plant cannot operate at full capacity due to a shortage of steam or services and failures of modules, additional electricity is drawn from the national network to make up for the shortfall.

k) Plant(II)-A receives input from three other plants. Plant(II)-A receives pure gas directly from Plant(I), H_2 from the Division Process plant and recycled gas from the Recycling plant. From the Division Process plant there is a direct feedback-loop to Plant(II)-A and there is also an indirect feedback-loop from the Division Process plant through the Recycling plant to Plant(II)-A. The primary input of Plant(II)-A is the pure gas from Plant(I) and it is supplemented by the secondary input that consists of the H_2 and recycled gas from the Division Process and Recycling plants respectively. The volumes of H_2 and recycled gas that are supplied to Plant(II)-A obviously depends on the volume of pure gas that is supplied to Plant(II)-A from Plant(I). The ratio of the pure gas to the pure gas plus the H_2 and the recycled gas is referred to as the gas-feedback-loop-fraction. The gas-feedback-loop-fraction assumes a fixed value for a specific system description.

l) The only tank in the Synthetic Fuel plant is situated directly in front of Plant(IV) where it is used to buffer the flow of gas-water between the Temperature Regulation plant and Plant(IV). The minimum and maximum allowable volumes of gas-water in the tank are specified. If the maximum allowable volume of gas-water in the tank is surpassed, all addition gas-water is flared and if the minimum allowable volume of gas-water is reached, the processing capacity of Plant(IV) is curtailed to maintain at least the minimum allowable volume of gas-water in the tank.

* * * * *

APPENDIX C

PSCALC.IN
(Governing Parameters Determination Input File)

```
GOVERNING PARAMETERS CALCULATION INPUT
COAL PROCESSING
14                  94.5
STEAM
 9                 378.0
GAS PRODUCTION
40        25.9    39900.0
        5530.0
         25.45
TEMPERATURE REGULATION
 8    210000.0   210000.0
OXYGEN-A
 6       105.0   269500.0
OXYGEN-B
 6    269500.0    46900.0
OXYGEN-C
 7     46900.0    46900.0
          35.0
PLANT(I)
 4    365000.0   255500.0
PLANT(II)-A
 8    217000.0    69440.0
PLANT(II)-B
 2    404250.0   404250.0
PLANT(III)
 2    280000.0   241500.0
DIVISION PROCESS
 2    241500.0    98000.0
                  84000.0
RECYCLING
 8     24500.0    64750.0
       11200.0
```

* * * * *

APPENDIX D

PSCALC.OUT

(Governing Parameters Determination Output File)

```
GOVERNING PARAMETERS CALCULATION OUTPUT
   FO08A    FI09AA     FI10A     FI11A     FI12A     FO12A
  725961.   725961.   232307.   200365.    69692.   184187.
  725961.   991455.   317265.   273641.    95180.   251546.
  725961.  1088550.   348336.   300440.   104501.   276181.
  725961.  1124059.   359699.   310240.   107910.   285190.
  725961.  1137045.   363854.   313824.   109156.   288485.
  725961.  1141794.   365374.   315135.   109612.   289689.
  725961.  1143531.   365930.   315615.   109779.   290130.
  725961.  1144166.   366133.   315790.   109840.   290291.
  725961.  1144398.   366207.   315854.   109862.   290350.
  725961.  1144483.   366235.   315877.   109870.   290372.
  725961.  1144514.   366245.   315886.   109873.   290380.
  725961.  1144526.   366248.   315889.   109874.   290383.
  725961.  1144530.   366250.   315890.   109875.   290384.
  725961.  1144531.   366250.   315891.   109875.   290384.
  725961.  1144532.   366250.   315891.   109875.   290384.
  725961.  1144532.   366250.   315891.   109875.   290384.
GAS-FEEDBACK-LOOP-FRACTION
   .634286
  1.576576
OXYGEN-DIV-RATIO (GAS PRODUCTION - RECYCLING)
   .741043   .258957
  1.349449  3.861647
STEAM-DIV-RATIO (GAS PRODUCTION - OXYGEN)
   .537612   .462388
  1.860077  2.162687
FRACTION METHOD PARAMETER SET
COAL PROCESSING
   931.253
STEAM
  1762.830
GAS PRODUCTION
 1460000.0
TEMPERATURE REGULATION
 1460000.0
OXYGEN-A
 1569088.9
OXYGEN-B
  273062.2
```

```
OXYGEN-C
  273062.2
PLANT(I)
 1022000.0
PLANT(II)-A
  515603.6
PLANT(II)-B
  515603.6
PLANT(III)
  444708.1
DIVISION PROCESS
  180461.2
RECYCLING
  408800.0
```

* * * * *

APPENDIX E

SERVIC.DAT

(Arena Simulation Model Service Schedules Input File)

```
Servic.dat
Coal Processing
   84    168      1
  588   1176      2
 5040  10080    336
Steam
  672   1344     34
Temperature Regulation
 1440  34560    408
Oxygen-A
  720   1440     24
Oxygen-B
 8640  17280    336
Oxygen-C
  720   1440     24
Electricity Generation
17280  34560    720
Plant(I)
 1440  17280    408
Plant(II)-A
  360    720     24
 1440   2880    120
 5040  10080    360
Plant(II)-B
 1440  17280    360
Recycling
 2160   4320    216
Oxygen Extra-A
 1440   8640    336
Oxygen Extra-B
 1440   8640    336
Oxygen Extra-C
 1440   8640    336
```

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APPENDIX F

PRIORI.WKS
(Arena Simulation Model "Bottleneck" Identification Output File)

(See next page for landscape view)

* * * * *

Priori.wks

1	0.000000	0.000000	0.016531	0.000000	1.494756	0.318729	0.020431	2.427662	4.597664	0.004999	0.063465	0.312036	0.000000
2	0.000000	0.000000	0.080944	0.000000	1.646589	0.134029	0.036776	2.494213	3.637738	0.007499	0.052887	0.222127	0.000000
3	0.000000	0.000000	0.013707	0.000000	1.694225	0.297208	0.031600	2.395833	4.964954	0.012498	0.237993	0.163951	0.000000
4	0.000000	0.000000	0.060130	0.000000	1.504276	0.035142	0.017162	2.442130	4.336630	0.000000	0.259148	0.111064	0.000000
5	0.000000	0.000000	0.003555	0.000000	1.560866	0.121771	0.017162	2.447917	5.857306	0.004999	0.174528	0.306747	0.000000
6	0.000000	0.000000	0.009622	0.006342	1.705564	0.071918	0.031873	2.595486	4.460826	0.007499	0.047599	0.000000	0.000000
7	0.002007	0.000000	0.017895	0.000000	1.362671	0.258252	0.059659	2.528935	5.300241	0.000000	0.021155	0.396655	0.000000
8	0.004015	0.000000	0.026327	0.000000	1.754510	0.148740	0.059659	2.395833	3.997820	0.017497	0.174528	0.449543	0.000000
9	0.007025	0.000000	0.043076	0.000000	1.578558	0.204313	0.050206	2.447917	4.229393	0.019997	0.216838	0.195683	0.000000
10	0.000000	0.000000	0.057169	0.001585	1.811497	0.331805	0.040045	2.662037	3.700619	0.000000	0.306747	0.100486	0.000000
11	0.000000	0.000000	0.028354	0.000000	1.469134	0.195323	0.021249	2.392940	4.398884	0.007499	0.195683	0.095197	0.000000
12	0.000000	0.000000	0.128139	0.000000	1.787642	0.211669	0.044132	2.549190	4.326427	0.017497	0.095197	0.116352	0.000000
13	0.000000	0.000000	0.015787	0.000000	1.622955	0.156913	0.026969	2.624421	4.674228	0.007499	0.153373	0.121641	0.000000
14	0.010036	0.000000	0.034011	0.000000	1.579640	0.125040	0.015528	2.471065	4.024167	0.000000	0.042310	0.222127	0.000000
15	0.000000	0.000000	0.111107	0.000000	1.736597	0.259069	0.031873	2.459491	3.899594	0.019997	0.179817	0.105775	0.000000
16	0.001004	0.000000	0.025837	0.000000	1.524553	0.439682	0.026152	2.485532	4.876162	0.017497	0.280303	0.179817	0.000000
17	0.000000	0.000000	0.030626	0.000000	1.638726	0.180613	0.026152	2.459491	4.083803	0.009998	0.312036	0.174528	0.000000
18	0.000000	0.000000	0.002575	0.000000	1.646523	0.204313	0.016345	2.523148	3.520856	0.007499	0.179817	0.301458	0.000000
19	0.004015	0.000000	0.083122	0.000000	1.679765	0.179796	0.017162	2.427662	4.172465	0.000000	0.058176	0.153373	0.000000
20	0.006022	0.000000	0.002993	0.000000	1.676209	0.254983	0.033044	2.581019	4.282333	0.000000	0.206261	0.137507	0.000000

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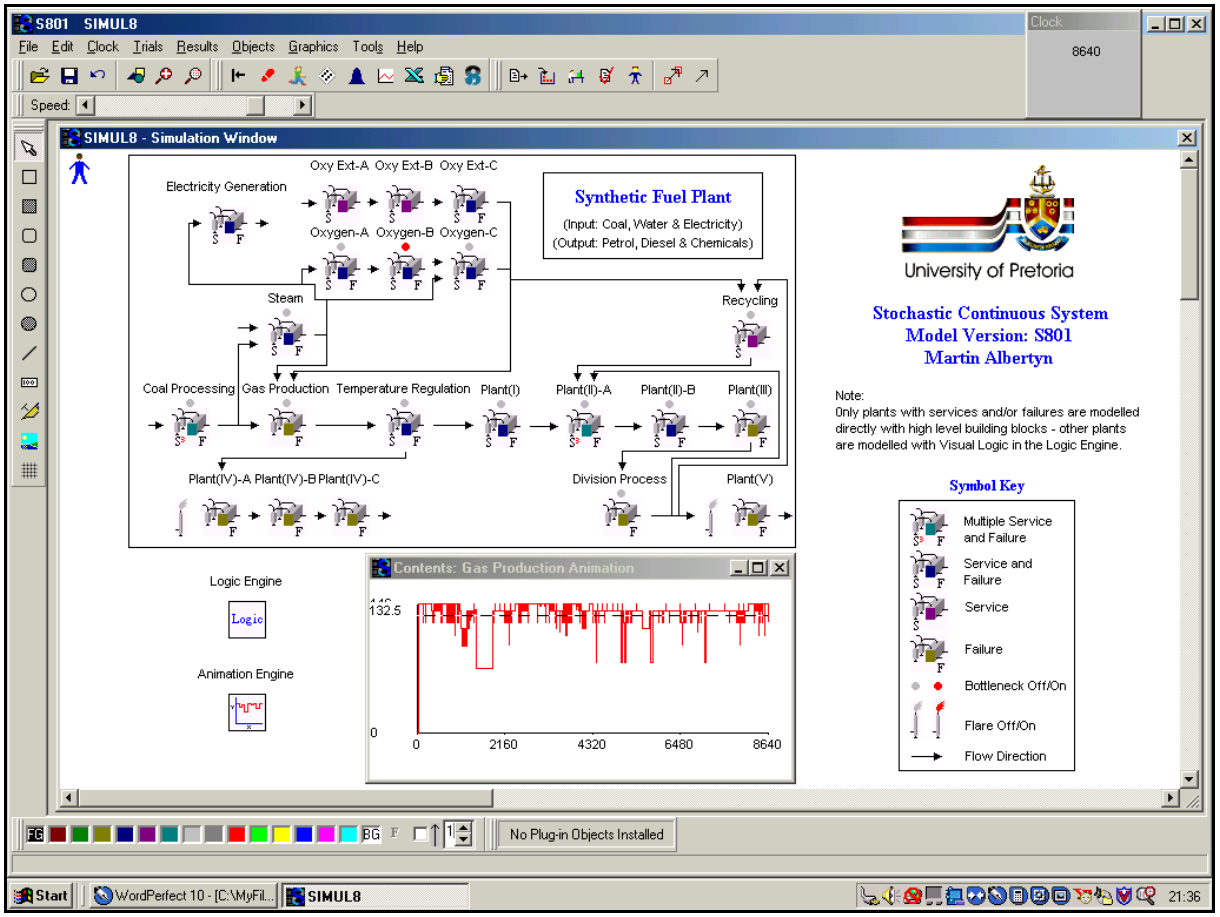
APPENDIX G

SIMULATION WINDOW OF THE HIGHER HIERARCHICAL LEVEL (Simul8 Simulation Model)



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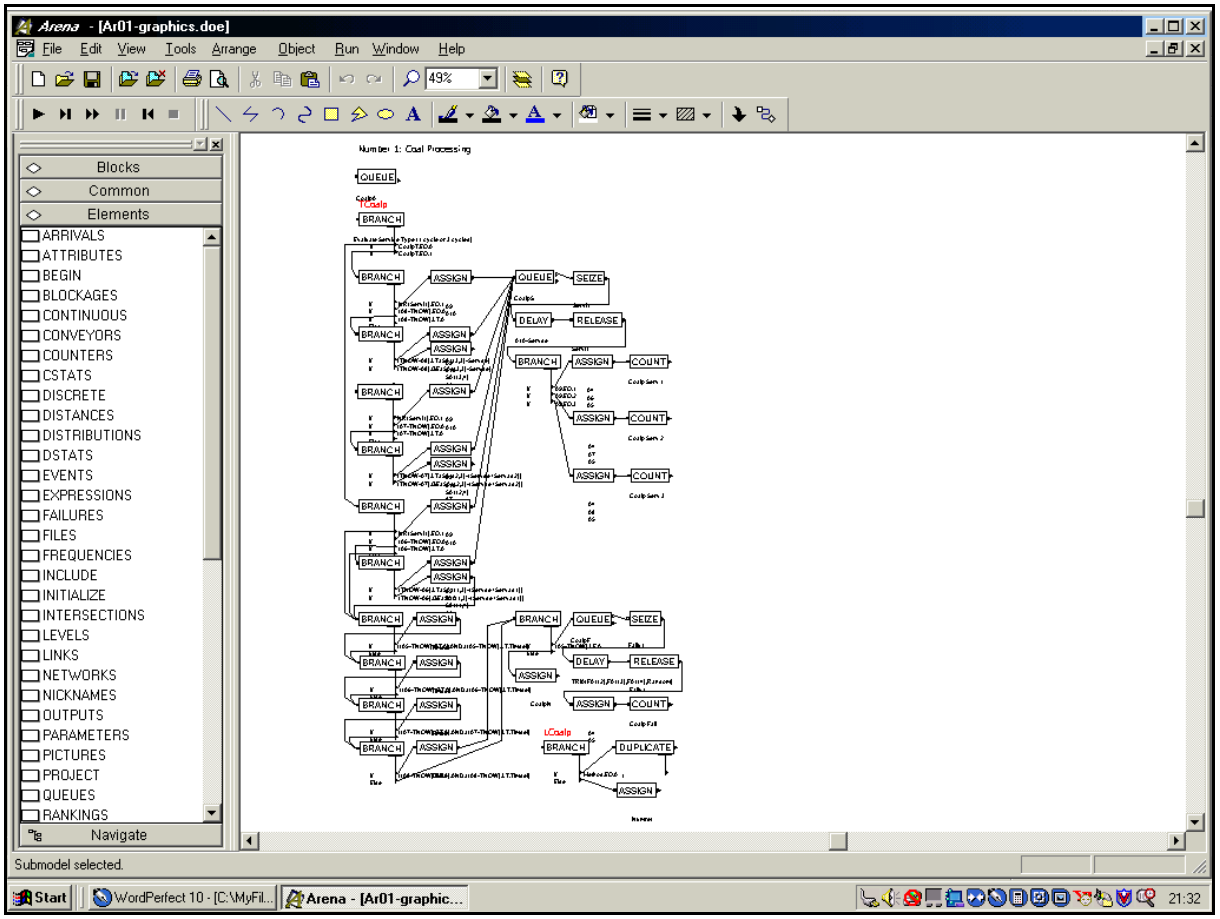
APPENDIX H

SIMULATION WINDOW OF THE LOWER HIERARCHICAL LEVEL (Arena Simulation Model - Example No.1)



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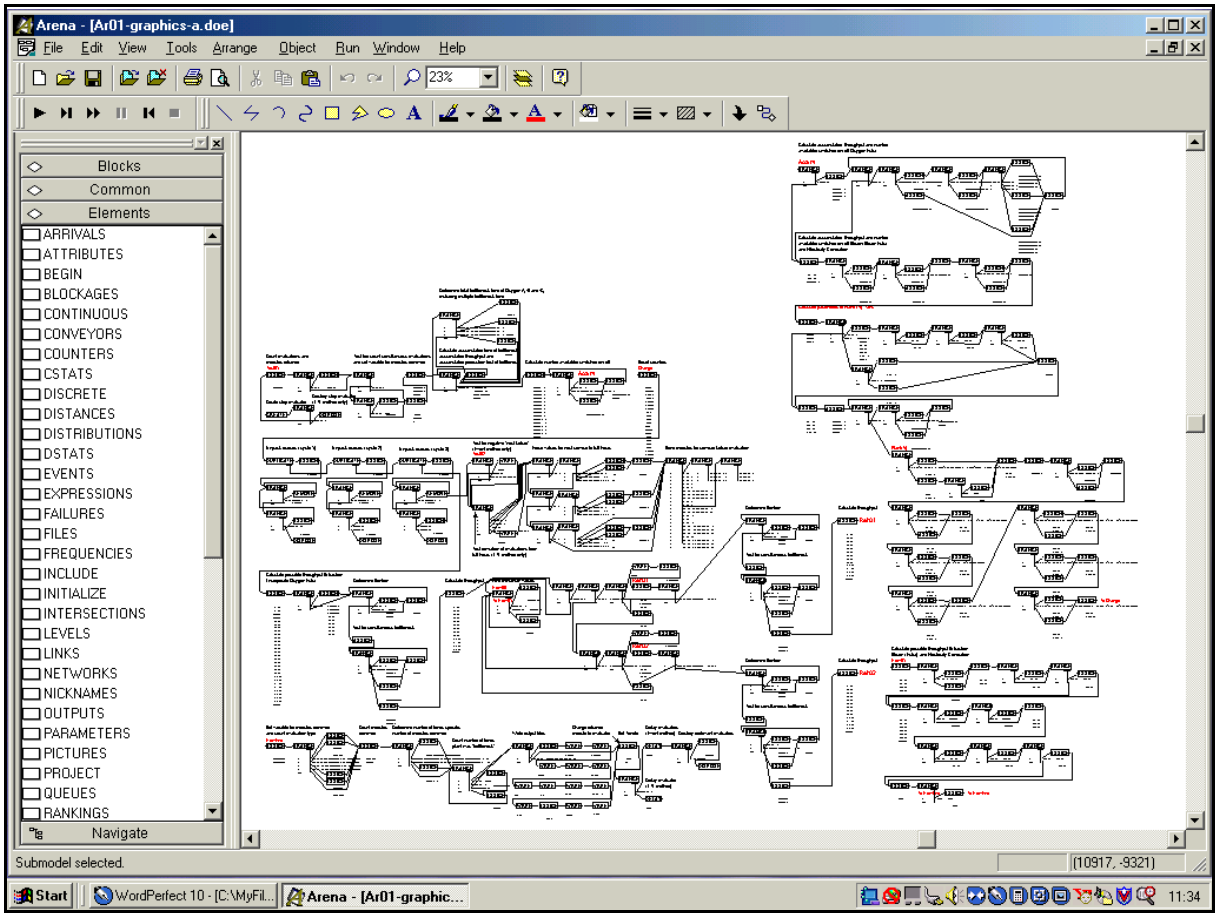
APPENDIX I

SIMULATION WINDOW OF THE LOWER HIERARCHICAL LEVEL (Arena Simulation Model - Example No.2)



* * * * *

APPENDIX J

N.IN
(Sample Size Determination Input File)

```
SAMPLE SIZE CALCULATION INPUT
CONFIDENCE INTERVAL (90%, 95% OR 99%)
   99.0
FAULT ALLOWED (HALF LENGTH OF CONFIDENCE INT)
 6661.2
IDENTIFIER  STDDEV
  0.125     7185.9
  0.250     7185.6
  0.500     7159.0
  1.000     7154.9
  2.000     7131.7
  3.000     7112.1
  4.000     7153.3
  6.000     7204.7
 12.000     7087.1
 24.000     7781.5
```

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APPENDIX K

N.OUT

(Sample Size Determination Output File)

```
SAMPLE SIZE CALCULATION OUTPUT
CONFIDENCE INTERVAL
      99.0
FAULT ALLOWED (HALF LENGTH OF CONFIDENCE INT)
    6661.2
IDENTIFIER    STDDEV    N(INT)   N(CALC)
      .125    7185.9       12.    11.227
      .250    7185.6       12.    11.226
      .500    7159.0       12.    11.143
     1.000    7154.9       12.    11.130
     2.000    7131.7       12.    11.058
     3.000    7112.1       12.    10.997
     4.000    7153.3       12.    11.125
     6.000    7204.7       12.    11.286
    12.000    7087.1       12.    10.920
    24.000    7781.5       13.    12.736
```

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APPENDIX L

SYNTHETIC FUEL PLANT SIMULATION MODEL YEAR

The Synthetic Fuel plant simulation model year is considered to consist of 360 days or 8640 hours (360 multiplied by 24 hours). This assumption is made to make provision for the easy subdivision of the simulation model year into equal smaller parts. The simulation model year can easily be subdivided into equal halves of six months each (*i.e.* 180 days each), equal quarters of three months each (*i.e.* 90 days each) and 12 equal months of 30 days each. That leaves only the seven-day week out of synchronisation with the other subdivisions of the simulation model year.

This simplification is incorporated to accommodate the service schedules of the modules of the Synthetic Fuel plant. The service schedules are expressed in terms of hours, days, weeks, months and sometimes even in terms of years by the maintenance division of the Synthetic Fuel plant. The hours, days, weeks, months and years that characterise the service schedules are all expressed in terms of hours in Table A2 and Appendix E and can readily by accommodated by the simulation model year. The only small aberration is created by weeks that are slightly out of synchronisation with the other subdivisions of the simulation model year.

The simplification of the 360 days simulation model year, however, does have an impact on the failure rates of the modules of the Synthetic Fuel plant. The failure rates of the modules are usually expressed in terms of the number of failures per year by the maintenance division of the Synthetic Fuel plant. The mean values of the exponential distributions that represent the failure rates of the modules are expressed in terms of hours in Table A2 (see Section 1.2 for a detailed explanation). The mean values of the exponential distributions that represent the failure rates of the modules are the MTBF values of the modules and they are derived by dividing the number of hours in the simulation model year by the number of failures per year of the modules. For example, at the Steam plant there are usually approximately 27 failures per year. That is approximately three failures per year (approximately one failure every four months) for each of the nine modules of the Steam plant (27 divided by nine). This implies that the MTBF of a Steam plant module in the simulation model year is 2880 hours (8640 hours divided by three). In contrast to this, the MTBF of a Steam plant module in the real-world year of 365 days is 2920 hours (8760 hours divided by three). Therefore the failures that are generated in the simulation model year (with an MTBF of 2880 hours) will be spaced slightly closer together than those that occur in the real-world situation (with an MTBF of 2920 hours). This may adversely affect the

output throughput of the Synthetic Fuel plant in a simulation model. The difference between the simulation model year MTBF and the real-world situation MTBF, however, is only 1,4% and therefore it is assumed that the effect of the simulation model year on the output throughput is negligible (40 hours divided by 2920 hours and multiplied by 100).

The output throughput values of the simulation model of the Synthetic Fuel plant are usually expressed as mean hourly rates that are calculated over the time period of the simulation run. For example, Table 3.2 indicates that the mean output throughput value of the Gas Production plant, for a simulation run consisting of 20 replications of a simulated time period of one simulation model year with an iteration time interval of one hour, is 1331462,8 nm^3/h. The total output throughput of the Gas Production plant during one real-world year can easily be determined by simply multiplying the average hourly rate by the number of hours in one real-world year and that is 11663614128,0 (1,17E+10) nm^3 (1331462,8 nm^3/h times 8760 hours).

It is therefore evident that the results that are generated by a simulation run of the Synthetic Fuel plant of one simulation model year can easily be "manipulated" or "extrapolated" to represent the results of one real-world year.

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APPENDIX M

SYNTHETIC FUEL PLANT RAW GAS PRODUCTION - 1993

Table M1: Gas Production Plant Output Throughput -1993

Month	Days (day)	Hours (hour)	Monthly Mean Output Throughput (nm^3/h)	Total Monthly Output Throughput (nm^3)
January	31	744	1362200	1013476800
February	28	672	1365700	917750400
March	31	744	975100	725474400
April	30	720	1381100	994392000
May	31	744	1374800	1022851200
June	30	720	1374800	989856000
July	31	744	1365000	1015560000
August	31	744	1362900	1013997600
September	30	720	1339800	964656000
October	31	744	1365700	1016080800
November	30	720	1365000	982800000
December	31	744	1362200	1013476800
			Total Output Throughput (nm^3)	**11670372000**
			Mean Output Throughput (nm^3/h)	**1332234,2**

Notes:

a) The Synthetic Fuel plant is actually a "scale model" of the real Sasol East plant (see Section 1.2) and therefore the monthly mean output throughput values of the Sasol East plant during the 1993 production year are adjusted with the same constant scale factor to find the values that are presented in Column 4 of Table M1. This is done to protect the client confidentiality of Sasol Synfuels. The fact that the same constant scale factor is used to adjust the capacities of the Sasol East plant and the monthly mean output throughput values of the Sasol East plant implies that Table M1 can be used to validate simulation models of the Synthetic Fuel plant.

b) The effect of a "phase" service is clearly visible in the monthly mean output throughput value of March that is appreciably less than those of the other months.

c) In this document the minimum sufficient sample sizes are calculated with an allowance for a 0,5% deviation from the real-world mean output throughput value of the Gas Production plant. From Table M1 it is clear that a 0,5% deviation from the real-world mean output throughput value is 6661,2 nm^3/h (1332234,2 nm^3/h multiplied by 0,005).

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APPENDIX N

DETERMINATION OF THE CONFIDENCE INTERVAL

Miller *et al.* (1990:212) indicate that if an estimate of the standard deviation is available, Equation N1 can be used to determine the confidence interval for a population mean for a small sample size (sample size less than 30).

$$x - t_{(\alpha/2)}(s/\sqrt{n}) < \mu < x + t_{(\alpha/2)}(s/\sqrt{n}) \qquad (Eq.:N1)$$

Where:

x	:	The sample mean.
t	:	The upper percentage point of the t distribution value.
$100(1-\alpha)$	:	The confidence interval, as a percentage.
s	:	The estimate of the standard deviation.
n	:	The sample size.
μ	:	The population mean.

An interval of this kind is referred to as a confidence interval for the population mean that has a $100(1-\alpha)$% degree of confidence. The endpoints of the interval are referred to as the lower and upper confidence limits.

The t distribution value is read from Table 4 in *Probability and Statistics for Engineers* (Miller *et al.*, 1990:570) for $n-1$ degrees of freedom.

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APPENDIX O

FIRST-ORDER ESTIMATE OF THE NUMBER OF SERVICES AND FAILURES

Table O1: Number of Services and Failures (8640-hour year)

No.	Name	Mod.	No. Service Estimate				No. Failure Estimate	
			Start Time (hour)	Cycle Time (hour)	Service Time (hour)	No. Service	MTBF (hour)	No. Failure
1	Coal Processing	14	84 588 5040	168 1176 10080	1 2 336	686 98 14	336	360
3	Steam	9	672	1344	34	54	2880	27
4	Gas Production	40	-	-	-	-	960	360
5	Temperature Regulation	8	1440	34560	408	2/"phase"	5760	12
6-A 6-B 6-C	Oxygen-A Oxygen-B Oxygen-C	6 6 7	720 8640 720	1440 17280 1440	24 336 24	36 0 42	1080 8640 840	48 6 72
6E-A 6E-B 6E-C	Oxygen Extra-A Oxygen Extra-B Oxygen Extra-C	1 1 1	1440 1440 1440	8640 8640 8640	336 336 336	1/"phase" 1/"phase" 1/"phase"	- - 1234	- - 7
7	Electricity Generation	4	17280	34560	720	0	1440	24
8	Plant(I)	4	1440	17280	408	2/"phase"	8640	4
9-A 9-B	Plant(II)-A Plant(II)-B	8 2	360 1440 5040 1440	720 2880 10080 17280	24 120 360 360	11 2 1 1/"phase"	11520 17280	6 1
10	Plant(III)	2	-	-	-	-	8640	2
11	Division Process	2	-	-	-	-	8640	2
12	Recycling	8	2160	4320	216	16	-	-

No.	Name	Mod.	No. Service Estimate				No. Failure Estimate	
			Start Time (hour)	Cycle Time (hour)	Service Time (hour)	No. Service	MTBF (hour)	No. Failure
13-A	Plant(IV)-A	4	-	-	-	-	34560	1
13-B	Plant(IV)-B	2	-	-	-	-	17280	1
13-C	Plant(IV)-C	1	-	-	-	-	34560	0
20	Plant(V)	8	-	-	-	-	5317	12
					Total No. Service	**1066**	**Total No. Failure**	**945**

Where:

No. : The plant identification number.

Mod. : The number of modules in the plant.

MTBF : The Mean Time Between Failure of the modules (hour).

Notes:

a) The number of services is calculated as an integer value in each instance by using the INT function of the spreadsheet software package (INT drops the fractional portion of a variable, returning its integer value).

b) The effect of the multiple service cycles is incorporated into the calculation of the number of services for the smaller plants that are subject to multiple service cycles.

c) The number of failures is calculated as an integer value in each instance by using the INT function of the spreadsheet software package.

d) From Point c) it follows that the number of failures of Plant(V) for an 8640-hour year is given as an integer value of 12 in Table O1 but as a real value of 13,00 in Table 3.3.

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APPENDIX P

RANDOM NUMBER GENERATION TEST

Various authors provide methods that can be used to test the randomness of a string of random numbers (Miller *et al.*, 1990:313-316; Steyn *et al.*, 1989:509-511). Miller *et al.* (1990:313-314) indicate that Equations P1 to P3 can be used to test a string of random numbers for randomness.

They state that if a sequence contains n_1 symbols of one kind and n_2 symbols of another kind (and neither n_1 nor n_2 is less than 10), the sampling distribution of the total number of runs, u, can be approximated closely by a normal distribution with the following:

Mean and standard deviation of u:

$$\mu_u = (2n_1n_2 / (n_1 + n_2)) + 1 \qquad (Eq.:P1)$$

$$\sigma_u = \sqrt{((2n_1n_2(2n_1n_2 - n_1 - n_2)) / ((n_1 + n_2)^2(n_1 + n_2 - 1)))} \qquad (Eq.:P2)$$

Where:

u	:	The number of runs where a run is a group of similar symbols in a sequence of two kinds of symbols, where the symbols are arranged in the order of observance or occurrence.
μ_u	:	The mean of u.
n_1	:	The number of symbols of one kind (or runs below the median).
n_2	:	The number of symbols of another kind (or runs above the median).
σ_u	:	The standard deviation of u.

Therefore, the test of the null hypothesis (that the arrangement of the symbols is random) can be based on the following statistic:

Statistic for test of randomness:

$$z = (u - \mu_u) / \sigma_u \qquad (Eq.:P3)$$

This test can also be used to test the randomness of samples consisting of numerical data by counting runs above and below the median. A string of random numbers between zero and one was generated with both the Arena and Simul8 simulation software packages and then subjected to the random number generation test. The results are presented in Table P1: *Random Number Generation Test Results*.

Table P1: Random Number Generation Test Results

Attribute	Arena Simulation Software Package	Simul8 Simulation Software Package
Null hypothesis	Arrangement of sample values is random	Arrangement of sample values is random
Alternative hypothesis	Arrangement of sample values is not random	Arrangement of sample values is not random
Level of significance	0,05 (95%)	0,05 (95%)
Criterion	Accept null hypothesis if: -1,960 < z < 1,960 (see t-distribution)	Accept null hypothesis if: -1,960 < z < 1,960 (see t-distribution)
Number of random numbers in string	280	280
Median	0,550625	0,524858
n_1 (runs below the median)	140	140
n_2 (runs above the median)	140	140
u (number of runs)	133	132
Mean of u (Equation P1)	141	141
Standard deviation of u (Equation P2)	8,352	8,352
Statistic for test of randomness (z) (Equation P3)	-0,958	-1,078
Decision according to test criterion	Accept null hypothesis because: -0,958 > –1,960 and -0,958 < 1,960	Accept null hypothesis because: -1,078 > –1,960 and -1,078 < 1,960
Result	Arrangement of sample values is random	Arrangement of sample values is random

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APPENDIX Q

ED EVALUATION METHOD OPTION ARENA SIMULATION MODEL RESULTS (Scenario I)

(See next pages for landscape view)

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Model AR01, ED Method, 8640 Hours, Oxygen Extra Off, Runtime = 8,6 Minutes (20 replications)

Throughput Primary Plants (ton/h, nm^3/h) (output.wks)

N	Coalp	Steam	Gaspr	Tempr	OxygA	OxygB	OxygC	Plan1	Pla2A	Pla2B	Plan3	Divip	Recyc
1	848.806	1606.761	1330741.6	1330741.6	1430172.5	248887.1	248887.1	931519.1	469955.6	469955.6	405336.7	164484.4	372607.6
2	841.524	1592.976	1319324.5	1319324.5	1417902.3	246751.8	246751.8	923527.1	465923.6	465923.6	401859.1	163073.2	369410.9
3	848.056	1605.341	1329565.3	1329565.3	1428908.4	248667.1	248667.1	930695.7	469540.2	469540.2	404978.4	164339.0	372278.3
4	850.423	1609.821	1333276.2	1333276.2	1432896.5	249361.2	249361.2	933293.4	470850.7	470850.7	406108.7	164797.7	373317.3
5	849.241	1607.585	1331423.6	1331423.6	1430905.5	249014.7	249014.7	931996.5	470196.4	470196.4	405544.4	164568.7	372798.6
6	849.954	1608.934	1332541.5	1332541.5	1432106.9	249223.8	249223.8	932779.1	470591.2	470591.2	405884.9	164706.9	373111.6
7	850.128	1609.263	1332813.9	1332813.9	1432399.7	249274.7	249274.7	932969.7	470687.4	470687.4	405967.9	164740.5	373187.9
8	850.290	1609.569	1333067.1	1333067.1	1432671.8	249322.1	249322.1	933147.0	470776.8	470776.8	406045.0	164771.8	373258.8
9	856.749	1621.797	1343194.4	1343194.4	1443555.7	251216.2	251216.2	940236.1	474353.3	474353.3	409129.7	166023.6	376094.4
10	847.716	1604.698	1329033.1	1329033.1	1428336.4	248567.6	248567.6	930323.2	469352.2	469352.2	404816.3	164273.2	372129.3
11	850.683	1610.314	1333683.8	1333683.8	1433334.5	249437.4	249437.4	933578.7	470994.6	470994.6	406232.9	164848.1	373431.5
12	853.113	1614.914	1337493.7	1337493.7	1437429.1	250150.0	250150.0	936245.6	472340.1	472340.1	407393.3	165319.0	374498.2
13	849.417	1607.916	1331698.4	1331698.4	1431200.8	249066.1	249066.1	932188.9	470293.5	470293.5	405628.1	164602.7	372875.6
14	856.086	1620.541	1342154.5	1342154.5	1442438.2	251021.7	251021.7	939508.2	473986.1	473986.1	408813.0	165895.1	375803.3
15	848.938	1607.011	1330948.6	1330948.6	1430395.0	248925.9	248925.9	931664.1	470028.7	470028.7	405399.8	164510.0	372665.6
16	851.576	1612.005	1335084.6	1335084.6	1434840.0	249699.4	249699.4	934559.2	471489.3	471489.3	406659.5	165021.2	373823.7
17	849.647	1608.352	1332059.4	1332059.4	1431588.8	249133.6	249133.6	932441.6	470421.0	470421.0	405738.1	164647.3	372976.6
18	838.716	1587.661	1314922.7	1314922.7	1413171.6	245928.5	245928.5	920445.9	464369.1	464369.1	400518.3	162529.1	368178.3
19	855.337	1619.124	1340981.1	1340981.1	1441177.1	250802.2	250802.2	938686.7	473571.7	473571.7	408455.6	165750.0	375474.7
20	851.795	1612.419	1335428.0	1335428.0	1435209.0	249763.6	249763.6	934799.6	471610.6	471610.6	406764.1	165063.7	373919.8
Mean	**849.910**	**1608.850**	**1332471.8**	**1332471.8**	**1432032.0**	**249210.7**	**249210.7**	**932730.3**	**470566.6**	**470566.6**	**405863.7**	**164698.3**	**373092.1**
			0.018	Deviation									
			6620.5	StdDev									

* * *

Throughput Secondary Plants (ton/h, MW/h, m^3/h, nm^3/h) (output2.wks)

N	Steam Ext	Elecg	Pla4A	Pla4B	Pla4C	Plan5	Sub1	Sub2	Sub3	Sub4	Sub5	Sub6	OxyeA	OxyeB	OxyeC
1	712.902	167.742	20.627	20.627	20.627	37.526	17.765	12.436	5.640	1.128	4934.5	2584.8	0.0	0.0	0.0
2	706.328	166.195	20.507	20.507	20.507	37.997	17.613	12.329	5.592	1.118	4892.2	2562.6	0.0	0.0	0.0
3	710.664	167.215	20.667	20.667	20.667	38.240	17.750	12.425	5.635	1.127	4930.2	2582.5	0.0	0.0	0.0
4	709.038	166.832	20.724	20.724	20.724	37.977	17.799	12.460	5.651	1.130	4943.9	2589.7	0.0	0.0	0.0
5	710.633	167.208	20.643	20.643	20.643	38.417	17.775	12.442	5.643	1.129	4937.1	2586.1	0.0	0.0	0.0
6	712.985	167.761	20.710	20.710	20.710	38.013	17.789	12.453	5.648	1.130	4941.2	2588.3	0.0	0.0	0.0
7	713.072	167.782	20.664	20.664	20.664	38.651	17.793	12.455	5.649	1.130	4942.2	2588.8	0.0	0.0	0.0
8	710.984	167.290	20.721	20.721	20.721	38.506	17.797	12.458	5.650	1.130	4943.2	2589.3	0.0	0.0	0.0
9	712.769	167.710	20.876	20.876	20.876	37.675	17.932	12.552	5.693	1.139	4980.7	2608.9	0.0	0.0	0.0
10	712.109	167.555	20.654	20.654	20.654	38.699	17.743	12.420	5.633	1.127	4928.2	2581.4	0.0	0.0	0.0
11	713.253	167.824	20.731	20.731	20.731	38.763	17.805	12.463	5.652	1.131	4945.4	2590.5	0.0	0.0	0.0
12	712.529	167.654	20.787	20.787	20.787	38.539	17.856	12.499	5.669	1.134	4959.6	2597.9	0.0	0.0	0.0
13	712.864	167.733	20.700	20.700	20.700	38.554	17.778	12.445	5.644	1.129	4938.1	2586.6	0.0	0.0	0.0
14	713.365	167.851	20.862	20.862	20.862	38.854	17.918	12.542	5.688	1.138	4976.9	2606.9	0.0	0.0	0.0
15	713.284	167.832	20.683	20.683	20.683	38.196	17.768	12.438	5.641	1.128	4935.3	2585.2	0.0	0.0	0.0
16	713.306	167.837	20.751	20.751	20.751	36.659	17.823	12.476	5.658	1.132	4950.6	2593.2	0.0	0.0	0.0
17	712.239	167.586	20.705	20.705	20.705	38.620	17.783	12.448	5.646	1.129	4939.4	2587.3	0.0	0.0	0.0
18	712.891	167.739	20.439	20.439	20.439	37.771	17.554	12.288	5.573	1.115	4875.9	2554.0	0.0	0.0	0.0
19	713.189	167.809	20.840	20.840	20.840	38.488	17.902	12.532	5.683	1.137	4972.5	2604.6	0.0	0.0	0.0
20	713.107	167.790	20.756	20.756	20.756	38.456	17.828	12.480	5.660	1.132	4951.9	2593.9	0.0	0.0	0.0
Mean	**712.076**	**167.547**	**20.702**	**20.702**	**20.702**	**38.230**	**17.789**	**12.452**	**5.647**	**1.130**	**4940.9**	**2588.1**	**0.0**	**0.0**	**0.0**

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Time “Bottleneck” (%) (bottle.wks)

N	Coalp	Steam	Gaspr	Tempr	OxygA	OxygB	OxygC	Plan1	Pla2A	Pla2B	Plan3	Divip	Recyc	Total	OxygA	OxygB	OxygC
1	0.00	0.00	30.34	0.00	902.10	100.45	21.58	2524.11	5003.15	0.00	12.11	46.16	0.00	8640.00	916.45	104.15	32.23
2	0.00	0.00	30.25	0.00	958.16	151.49	13.61	2308.28	5107.78	9.26	8.44	52.74	0.00	8640.00	994.48	180.29	21.14
3	2.71	0.00	58.03	0.00	1033.36	124.40	8.92	2288.95	5049.17	0.00	9.61	64.84	0.00	8640.00	1052.87	135.25	17.59
4	0.00	0.00	60.29	0.00	996.04	162.60	12.85	2643.90	4696.03	4.84	17.51	45.93	0.00	8640.00	1011.01	169.86	20.56
5	0.00	0.00	41.56	0.00	831.29	37.79	13.10	2434.31	5206.67	0.00	21.94	53.35	0.00	8640.00	836.17	37.79	17.98
6	0.00	0.00	13.23	0.00	950.74	75.58	25.97	2387.37	5107.59	1.14	65.46	12.92	0.00	8640.00	997.27	105.26	45.96
7	0.00	0.00	5.01	0.00	955.70	37.88	29.38	2680.08	4878.29	0.00	24.07	29.60	0.00	8640.00	977.04	48.85	39.74
8	0.00	0.00	35.06	0.00	1071.71	194.36	17.26	2516.67	4708.10	6.51	22.04	68.30	0.00	8640.00	1093.86	205.00	28.76
9	4.88	0.00	75.01	0.00	929.96	137.58	23.41	2662.25	4773.52	1.64	0.00	31.74	0.00	8640.00	939.51	138.54	32.00
10	0.00	0.00	52.87	0.00	1037.76	176.87	13.33	2690.06	4583.85	0.00	61.14	24.12	0.00	8640.00	1047.91	176.87	23.48
11	0.24	0.00	73.00	0.00	973.34	16.75	6.41	2598.56	4907.14	1.98	15.80	46.76	0.00	8640.00	981.01	19.30	11.53
12	0.00	0.00	31.69	0.00	993.91	65.61	7.77	2442.85	5044.19	2.69	9.23	42.06	0.00	8640.00	1001.13	66.25	14.34
13	3.91	0.00	66.81	0.00	890.15	130.23	11.39	2087.36	5432.71	3.10	14.32	0.00	0.00	8640.00	899.38	134.15	16.71
14	0.00	0.00	42.99	1.75	982.95	95.93	14.42	2679.33	4789.45	0.00	33.17	0.00	0.00	8640.00	1009.81	111.69	25.53
15	0.00	0.00	65.10	0.00	947.83	154.75	14.65	2179.46	5216.64	0.00	0.00	61.57	0.00	8640.00	962.22	158.55	25.23
16	0.00	0.00	89.19	0.00	991.31	75.92	19.50	2505.95	4876.64	7.49	30.65	43.34	0.00	8640.00	995.39	75.92	23.59
17	19.13	0.00	21.33	1.82	910.98	119.22	20.28	2530.70	4961.66	0.00	17.35	37.51	0.00	8640.00	934.92	123.52	39.92
18	0.00	0.00	212.58	0.00	685.48	23.69	16.03	2480.42	5077.44	3.88	24.60	115.88	0.00	8640.00	693.92	23.69	24.47
19	0.00	0.00	209.64	0.00	918.08	14.00	13.09	2426.02	5003.18	6.57	20.47	28.96	0.00	8640.00	943.66	28.53	25.19
20	0.00	0.00	110.13	0.00	974.43	69.01	15.65	2410.76	4996.28	3.95	27.34	32.44	0.00	8640.00	986.26	71.16	25.32
Mean	**1.54**	**0.00**	**66.21**	**0.18**	**946.76**	**98.21**	**15.93**	**2473.87**	**4970.97**	**2.65**	**21.76**	**41.91**	**0.00**	**8640.00**	**963.71**	**105.73**	**25.56**
Time %	**0.02**	**0.00**	**0.77**	**0.00**	**10.96**	**1.14**	**0.18**	**28.63**	**57.53**	**0.03**	**0.25**	**0.49**	**0.00**	**100.00**	**11.15**	**1.22**	**0.30**

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Production Lost “Bottleneck” (%) (priori.wks)

N	Coalp	Steam	Gaspr	Tempr	OxygA	OxygB	OxygC	Plan1	Pla2A	Pla2B	Plan3	Divip	Recyc	
1	0.0000	0.0000	0.0057	0.0000	1.4988	0.2012	0.0353	2.3673	4.4368	0.0000	0.0641	0.2441	0.0000	
2	0.0000	0.0000	0.0117	0.0000	1.6316	0.2476	0.0222	2.4420	4.9335	0.0231	0.0446	0.2789	0.0000	
3	0.0027	0.0000	0.0123	0.0000	1.7049	0.2033	0.0146	2.4551	4.1472	0.0000	0.0508	0.3429	0.0000	
4	0.0000	0.0000	0.0114	0.0000	1.6575	0.2658	0.0210	2.4181	3.9582	0.0121	0.0926	0.2429	0.0000	
5	0.0000	0.0000	0.0347	0.0000	1.3810	0.0618	0.0214	2.4461	4.4634	0.0000	0.1160	0.2822	0.0000	
6	0.0000	0.0000	0.0025	0.0000	1.5885	0.1235	0.0488	2.4637	4.0856	0.0028	0.3462	0.0683	0.0000	
7	0.0000	0.0000	0.0009	0.0000	1.5840	0.0619	0.0480	2.5793	4.1533	0.0000	0.1273	0.1565	0.0000	
8	0.0000	0.0000	0.0069	0.0000	1.7847	0.3177	0.0282	2.5152	3.5472	0.0163	0.1166	0.3612	0.0000	
9	0.0049	0.0000	0.0489	0.0000	1.5850	0.2249	0.0383	2.5026	3.4240	0.0041	0.0000	0.1679	0.0000	
10	0.0000	0.0000	0.0107	0.0000	1.7407	0.2891	0.0218	2.4888	3.9683	0.0000	0.3234	0.1276	0.0000	
11	0.0002	0.0000	0.0282	0.0000	1.6240	0.0274	0.0105	2.4216	4.2041	0.0050	0.0836	0.2473	0.0000	
12	0.0000	0.0000	0.0143	0.0000	1.6650	0.1072	0.0127	2.6318	3.6817	0.0067	0.0488	0.2225	0.0000	
13	0.0039	0.0000	0.0162	0.0000	1.5076	0.2129	0.0186	2.3947	4.5504	0.0078	0.0757	0.0000	0.0000	
14	0.0000	0.0000	0.0080	0.0028	1.6296	0.1568	0.0236	2.4149	3.6605	0.0000	0.1754	0.0000	0.0000	
15	0.0000	0.0000	0.0143	0.0000	1.5909	0.2529	0.0257	2.5453	4.0843	0.0000	0.0000	0.3256	0.0000	
16	0.0000	0.0000	0.0292	0.0000	1.6655	0.1241	0.0319	2.4646	3.8305	0.0187	0.1621	0.2292	0.0000	
17	0.0262	0.0000	0.0040	0.0029	1.5074	0.1949	0.0331	2.4345	4.2699	0.0000	0.0918	0.1984	0.0000	
18	0.0000	0.0000	0.0609	0.0000	1.1537	0.0387	0.0262	2.5497	5.3550	0.0097	0.1301	0.6128	0.0000	
19	0.0000	0.0000	0.1772	0.0000	1.5164	0.0229	0.0214	2.4614	3.6749	0.0164	0.1083	0.1531	0.0000	
20	0.0000	0.0000	0.0498	0.0000	1.6148	0.1128	0.0256	2.4479	3.9554	0.0099	0.1446	0.1716	0.0000	
Mean	**0.0019**	**0.0000**	**0.0274**	**0.0003**	**1.5816**	**0.1624**	**0.0264**	**2.4722**	**4.1192**	**0.0066**	**0.1151**	**0.2217**	**0.0000**	**8.7348**
Lost %	**0.0217**	**0.0000**	**0.3136**	**0.0032**	**18.1067**	**1.8589**	**0.3027**	**28.3032**	**47.1585**	**0.0759**	**1.3177**	**2.5376**	**0.0000**	**100.0000**

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Tank and Flares (m^3, nm^3, m^3/h, nm^3/h) (flares.wks)

N	Tank	FlareA		FlareB		FlareC1		FlareC2		FlareC3		FlareC4		FlareC5		FlareC6	
1	1004.0	20684.9	2.394	35871.2	4.152	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
2	1000.2	0.0	0.000	12707.4	1.471	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
3	1000.1	0.0	0.000	14306.4	1.656	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
4	1001.9	186.8	0.022	24992.1	2.893	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
5	1003.5	18716.1	2.166	10781.3	1.248	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
6	1001.5	923.6	0.107	23335.8	2.701	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
7	1005.3	18902.0	2.188	5211.8	0.603	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
8	1000.2	0.0	0.000	9592.6	1.110	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
9	1001.1	830.3	0.096	42020.2	4.863	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
10	1002.1	1583.5	0.183	639.3	0.074	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
11	1000.1	0.0	0.000	2698.2	0.312	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
12	1002.2	907.5	0.105	12367.0	1.431	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
13	1000.2	0.0	0.000	7065.0	0.818	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
14	1000.2	0.0	0.000	7183.9	0.831	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
15	1001.3	1876.2	0.217	16747.2	1.938	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
16	1001.2	530.0	0.061	64476.7	7.463	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
17	1000.2	0.0	0.000	5449.6	0.631	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
18	1000.5	0.0	0.000	15541.7	1.799	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
19	1001.3	1326.0	0.153	16738.7	1.937	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
20	1001.0	775.4	0.090	13008.5	1.506	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000	0.0	0.000
Mean	**1001.4**	**3362.1**	**0.389**	**17036.7**	**1.972**	**0.0**	**0.000**	**0.0**	**0.000**	**0.0**	**0.000**	**0.0**	**0.000**	**0.0**	**0.000**	**0.0**	**0.000**

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Number Modules Available, Switched On/Off (number) (sonoff.wks)

N	Coalp			Steam			Gaspr			Tempr			OxygA			OxygB			OxygC		
1	13.133	9.444	3.689	8.397	6.684	1.713	39.030	33.841	5.188	7.896	6.633	1.264	5.878	5.652	0.226	5.979	5.639	0.340	6.851	5.639	1.212
2	13.133	9.375	3.758	8.401	6.619	1.782	39.173	33.556	5.617	7.898	6.584	1.314	5.875	5.606	0.269	5.976	5.591	0.384	6.858	5.591	1.267
3	13.104	9.466	3.638	8.394	6.668	1.726	39.157	33.815	5.343	7.901	6.633	1.267	5.871	5.655	0.216	5.981	5.642	0.339	6.856	5.642	1.214
4	13.110	9.464	3.646	8.357	6.664	1.693	38.942	33.904	5.038	7.899	6.633	1.266	5.874	5.659	0.215	5.980	5.641	0.340	6.856	5.641	1.215
5	13.113	9.467	3.646	8.421	6.687	1.734	38.874	33.857	5.017	7.902	6.650	1.251	5.879	5.664	0.215	5.993	5.659	0.334	6.857	5.659	1.198
6	13.152	9.489	3.663	8.601	6.705	1.896	39.158	33.891	5.268	7.897	6.650	1.248	5.878	5.666	0.212	5.985	5.660	0.325	6.857	5.660	1.197
7	13.044	9.464	3.580	8.425	6.695	1.730	39.061	33.895	5.166	7.897	6.643	1.254	5.881	5.654	0.226	5.994	5.649	0.345	6.853	5.649	1.204
8	13.140	9.492	3.648	8.458	6.681	1.778	39.054	33.904	5.150	7.899	6.638	1.261	5.868	5.670	0.198	5.973	5.648	0.325	6.857	5.648	1.209
9	13.109	9.564	3.545	8.452	6.740	1.712	38.984	34.156	4.827	7.896	6.692	1.204	5.880	5.713	0.166	5.983	5.696	0.288	6.845	5.696	1.149
10	13.111	9.429	3.682	8.429	6.658	1.771	38.978	33.797	5.181	7.901	6.610	1.291	5.874	5.641	0.233	5.977	5.620	0.357	6.855	5.620	1.235
11	13.153	9.470	3.683	8.392	6.701	1.691	39.017	33.912	5.105	7.899	6.645	1.253	5.879	5.655	0.224	5.996	5.653	0.342	6.856	5.653	1.203
12	13.132	9.539	3.593	8.431	6.723	1.708	39.033	34.017	5.015	7.899	6.678	1.221	5.876	5.692	0.184	5.992	5.684	0.308	6.860	5.684	1.175
13	13.113	9.487	3.626	8.344	6.706	1.638	38.907	33.871	5.036	7.898	6.659	1.239	5.880	5.676	0.204	5.984	5.660	0.324	6.855	5.660	1.194
14	13.116	9.543	3.574	8.435	6.731	1.704	39.030	34.129	4.901	7.901	6.680	1.221	5.879	5.694	0.185	5.987	5.685	0.302	6.858	5.685	1.173
15	13.096	9.495	3.601	8.436	6.706	1.730	39.103	33.852	5.251	7.893	6.651	1.242	5.876	5.676	0.199	5.982	5.658	0.323	6.855	5.658	1.197
16	13.112	9.500	3.612	8.481	6.711	1.770	38.943	33.950	4.993	7.901	6.655	1.246	5.880	5.674	0.206	5.991	5.663	0.328	6.856	5.663	1.193
17	13.090	9.460	3.630	8.369	6.684	1.685	39.056	33.875	5.181	7.899	6.640	1.259	5.876	5.660	0.216	5.982	5.646	0.336	6.855	5.646	1.208
18	13.068	9.318	3.750	8.466	6.647	1.819	38.949	33.424	5.524	7.900	6.568	1.332	5.879	5.588	0.291	5.994	5.584	0.410	6.851	5.584	1.267
19	13.090	9.558	3.532	8.366	6.745	1.622	38.942	34.092	4.851	7.901	6.697	1.204	5.880	5.703	0.177	5.994	5.703	0.291	6.856	5.703	1.153
20	13.183	9.507	3.676	8.612	6.714	1.897	39.103	33.958	5.145	7.901	6.662	1.239	5.880	5.677	0.203	5.992	5.669	0.323	6.860	5.669	1.191
Mean	**13.115**	**9.477**	**3.639**	**8.433**	**6.693**	**1.740**	**39.025**	**33.885**	**5.140**	**7.899**	**6.645**	**1.254**	**5.877**	**5.664**	**0.213**	**5.986**	**5.653**	**0.333**	**6.855**	**5.653**	**1.203**

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Number Modules Available, Switched On/Off (number) (sonoff.wks - continue)

N	Plan1			Pla2A			Pla2B			Plan3			Divip			Recyc		
1	3.905	3.895	0.010	7.214	7.006	0.208	1.958	1.942	0.016	1.999	1.951	0.047	1.995	1.946	0.049	7.600	6.136	1.464
2	3.902	3.876	0.027	7.148	6.941	0.207	1.957	1.922	0.035	1.999	1.952	0.047	1.994	1.946	0.048	7.600	6.088	1.512
3	3.902	3.892	0.010	7.203	6.998	0.206	1.958	1.939	0.019	1.999	1.952	0.047	1.992	1.944	0.048	7.600	6.104	1.496
4	3.903	3.894	0.009	7.236	7.040	0.196	1.958	1.941	0.017	1.998	1.951	0.047	1.995	1.945	0.049	7.600	6.150	1.450
5	3.902	3.892	0.010	7.197	6.992	0.205	1.958	1.940	0.019	1.997	1.950	0.047	1.994	1.944	0.050	7.600	6.115	1.485
6	3.901	3.890	0.011	7.215	7.008	0.207	1.958	1.938	0.020	1.992	1.945	0.047	1.999	1.944	0.055	7.600	6.107	1.493
7	3.897	3.889	0.007	7.236	7.022	0.214	1.958	1.937	0.022	1.997	1.950	0.047	1.997	1.947	0.050	7.600	6.138	1.462
8	3.899	3.887	0.012	7.267	7.039	0.229	1.958	1.933	0.024	1.997	1.950	0.047	1.992	1.942	0.050	7.600	6.118	1.482
9	3.900	3.892	0.007	7.292	7.080	0.212	1.958	1.939	0.019	2.000	1.953	0.047	1.996	1.949	0.047	7.600	6.146	1.454
10	3.900	3.888	0.012	7.236	7.027	0.209	1.958	1.935	0.023	1.993	1.946	0.047	1.997	1.943	0.054	7.600	6.143	1.457
11	3.903	3.893	0.010	7.226	7.027	0.199	1.958	1.941	0.017	1.998	1.951	0.047	1.991	1.946	0.046	7.600	6.144	1.456
12	3.895	3.886	0.008	7.253	7.035	0.218	1.958	1.933	0.025	1.999	1.952	0.047	1.995	1.947	0.048	7.600	6.107	1.493
13	3.904	3.899	0.005	7.155	6.980	0.174	1.958	1.946	0.012	1.998	1.951	0.047	1.998	1.951	0.047	7.600	6.098	1.502
14	3.902	3.898	0.004	7.275	7.077	0.198	1.958	1.945	0.013	1.996	1.949	0.047	2.000	1.949	0.051	7.600	6.160	1.440
15	3.898	3.887	0.011	7.196	6.993	0.203	1.958	1.934	0.024	2.000	1.953	0.047	1.993	1.946	0.047	7.600	6.085	1.515
16	3.901	3.890	0.011	7.253	7.037	0.215	1.957	1.937	0.021	1.995	1.949	0.046	1.995	1.944	0.051	7.600	6.129	1.471
17	3.903	3.895	0.007	7.217	7.014	0.203	1.958	1.942	0.016	1.998	1.951	0.047	1.996	1.946	0.049	7.600	6.134	1.466
18	3.898	3.861	0.037	7.142	6.923	0.219	1.958	1.908	0.050	1.997	1.950	0.047	1.987	1.937	0.050	7.600	6.100	1.500
19	3.902	3.895	0.007	7.253	7.053	0.200	1.958	1.941	0.016	1.998	1.950	0.047	1.997	1.947	0.050	7.600	6.127	1.473
20	3.902	3.894	0.008	7.239	7.029	0.210	1.958	1.941	0.017	1.997	1.950	0.047	1.993	1.946	0.047	7.600	6.124	1.476
Mean	**3.901**	**3.890**	**0.011**	**7.223**	**7.016**	**0.207**	**1.958**	**1.937**	**0.021**	**1.997**	**1.950**	**0.047**	**1.995**	**1.945**	**0.049**	**7.600**	**6.123**	**1.477**

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Number Modules Available, Switched On/Off (number) (sonoff2.wks)

N	Elecg			Pla4A			Pla4B			Pla4C			Plan5			OxyeA			OxyeB			OxyeC		
1	3.996	3.996	0.000	4.000	3.883	0.117	2.000	1.947	0.053	0.997	0.997	0.000	7.088	6.590	0.497	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	3.996	3.974	0.022	4.000	3.875	0.125	2.000	1.953	0.047	1.000	1.000	0.000	7.390	6.736	0.654	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	3.996	3.992	0.004	4.000	3.892	0.108	2.000	1.953	0.047	1.000	1.000	0.000	7.389	6.815	0.574	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4	3.997	3.985	0.012	4.000	3.892	0.107	1.999	1.952	0.047	1.000	1.000	0.000	7.313	6.709	0.604	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
5	3.998	3.988	0.010	4.000	3.880	0.120	1.999	1.946	0.053	0.997	0.997	0.000	7.459	6.832	0.627	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	3.996	3.994	0.001	4.000	3.888	0.112	1.999	1.952	0.047	1.000	1.000	0.000	7.469	6.731	0.739	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7	3.995	3.995	0.000	4.000	3.878	0.122	1.999	1.947	0.052	0.998	0.998	0.000	7.560	6.860	0.700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	3.997	3.989	0.008	4.000	3.886	0.114	2.000	1.953	0.047	1.000	1.000	0.000	7.408	6.840	0.568	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9	3.995	3.995	0.000	4.000	3.891	0.109	1.999	1.952	0.047	1.000	1.000	0.000	7.150	6.595	0.555	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	3.995	3.995	0.000	4.000	3.886	0.114	1.999	1.952	0.047	1.000	1.000	0.000	7.750	6.967	0.783	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11	3.996	3.996	0.000	4.000	3.893	0.107	2.000	1.953	0.047	1.000	1.000	0.000	7.609	6.971	0.638	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12	3.997	3.997	0.000	4.000	3.885	0.115	1.999	1.952	0.047	1.000	1.000	0.000	7.323	6.819	0.503	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13	3.995	3.995	0.000	4.000	3.899	0.101	2.000	1.953	0.047	1.000	1.000	0.000	7.447	6.856	0.591	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	3.996	3.996	0.000	4.000	3.898	0.102	2.000	1.953	0.047	1.000	1.000	0.000	7.631	6.921	0.709	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15	3.997	3.997	0.000	4.000	3.885	0.115	1.999	1.952	0.047	1.000	1.000	0.000	7.348	6.743	0.605	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16	3.996	3.996	0.000	4.000	3.889	0.111	2.000	1.952	0.047	1.000	1.000	0.000	6.684	6.338	0.346	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17	3.994	3.994	0.000	4.000	3.895	0.105	2.000	1.953	0.047	1.000	1.000	0.000	7.526	6.867	0.659	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18	3.995	3.995	0.000	4.000	3.860	0.140	2.000	1.952	0.047	1.000	1.000	0.000	7.396	6.656	0.740	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19	3.997	3.997	0.000	3.999	3.893	0.107	1.999	1.952	0.047	1.000	1.000	0.000	7.570	6.888	0.682	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20	3.995	3.995	0.000	4.000	3.892	0.107	1.999	1.952	0.047	1.000	1.000	0.000	7.461	6.840	0.621	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mean	**3.996**	**3.993**	**0.003**	**4.000**	**3.887**	**0.113**	**2.000**	**1.952**	**0.048**	**1.000**	**1.000**	**0.000**	**7.399**	**6.779**	**0.620**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

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Number Evaluations, Services Completed/Missed, Failures Repaired (number) (verify.wks)

N	Eval	CoalS1		CoalS2		CoalS3		CoalF	SteamS		SteamF	GasprF	TemprS		TempF	OxyAS		OxyAF	OxyBS		OxyBF	OxyCS		OxyCF	ElecgS	
1	0	356	342	56	42	10	0	333	51	3	28	353	2	0	19	36	0	44	0	0	7	42	0	82	0	0
2	0	355	343	55	43	10	0	328	54	0	24	335	2	0	16	36	0	52	0	0	9	42	0	70	0	0
3	0	359	341	53	45	10	0	336	49	5	28	324	2	0	11	36	0	56	0	0	7	42	0	66	0	0
4	0	358	340	53	45	10	0	336	50	4	29	361	2	0	12	36	0	51	0	0	7	42	0	66	0	0
5	0	352	348	54	44	10	0	352	53	1	26	369	2	0	8	36	0	45	0	0	3	42	0	70	0	0
6	0	352	346	55	43	10	0	321	54	0	14	329	2	0	14	36	0	41	0	0	6	42	0	65	0	0
7	0	351	347	56	42	10	0	356	54	0	25	332	2	0	15	36	0	39	0	0	2	42	0	71	0	0
8	0	357	343	53	45	10	0	325	51	3	22	338	2	0	13	36	0	57	0	0	10	42	0	66	0	0
9	0	353	345	54	44	10	0	337	53	1	25	358	2	0	18	36	0	39	0	0	6	42	0	97	0	0
10	0	353	347	56	42	10	0	333	53	1	27	350	2	0	8	36	0	49	0	0	9	42	0	71	0	0
11	0	356	344	51	47	10	0	313	53	1	30	338	2	0	14	36	0	43	0	0	2	42	0	73	0	0
12	0	353	347	56	42	10	0	328	51	3	24	334	2	0	12	36	0	54	0	0	3	42	0	64	0	0
13	0	357	343	55	43	10	0	334	53	1	30	383	2	0	16	36	0	38	0	0	6	42	0	75	0	0
14	0	353	347	54	44	10	0	337	52	2	25	345	2	0	10	36	0	42	0	0	5	42	0	60	0	0
15	0	351	347	54	44	10	0	358	54	0	24	319	2	0	25	36	0	49	0	0	7	42	0	77	0	0
16	0	346	354	52	46	10	0	342	54	0	23	366	2	0	11	36	0	47	0	0	3	42	0	71	0	0
17	0	350	350	56	42	10	0	343	52	2	27	337	2	0	14	36	0	46	0	0	7	42	0	77	0	0
18	0	356	344	54	44	10	0	362	53	1	24	357	2	0	11	36	0	47	0	0	2	42	0	77	0	0
19	0	353	347	54	44	10	0	363	51	3	30	332	2	0	9	36	0	45	0	0	2	42	0	68	0	0
20	0	360	340	53	45	10	0	301	54	0	16	331	2	0	9	36	0	43	0	0	3	42	0	66	0	0
Mean	**0.0**	**354.1**	**345.3**	**54.2**	**43.8**	**10.0**	**0.0**	**336.9**	**52.5**	**1.6**	**25.1**	**344.6**	**2.0**	**0.0**	**13.3**	**36.0**	**0.0**	**46.4**	**0.0**	**0.0**	**5.3**	**42.0**	**0.0**	**71.6**	**0.0**	**0.0**

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Number Evaluations, Services Completed/Missed, Failures Repaired (number) (verify.wks - continue)

N	ElecgF	Plan1S		Plan1F	Pl2AS1		Pl2AS2		Pl2AS3		Pla2AF	Pla2BS		Pla2BF	Plan3F	DivipF	RecycS		Pla4AF	Pla4BF	Pla4CF	Plan5F	OxyeAS		OxyeBS	
1	28	2	0	1	48	48	16	8	8	0	5	1	0	0	1	2	16	0	1	1	1	15	1	0	1	0
2	19	2	0	2	46	50	16	8	8	0	7	1	0	5	1	3	16	0	1	0	0	12	1	0	1	0
3	24	2	0	4	48	48	16	8	8	0	6	1	0	0	1	2	16	0	1	0	0	12	1	0	1	0
4	20	2	0	2	47	49	16	8	8	0	4	1	0	2	1	2	16	0	1	2	0	12	1	0	1	0
5	11	2	0	3	47	49	16	8	8	0	6	1	0	0	2	2	16	0	1	1	1	11	1	0	1	0
6	24	2	0	3	48	48	16	8	8	0	5	1	0	1	5	1	16	0	0	2	0	9	1	0	1	0
7	28	2	0	6	47	49	16	8	8	0	4	1	0	0	2	1	16	0	0	2	1	10	1	0	1	0
8	21	2	0	5	51	45	16	8	8	0	2	1	0	2	1	3	16	0	0	0	0	12	1	0	1	0
9	35	2	0	4	48	48	16	8	8	0	1	1	0	1	0	2	16	0	2	1	0	12	1	0	1	0
10	31	2	0	4	47	49	16	8	8	0	4	1	0	0	5	1	16	0	1	2	0	6	1	0	1	0
11	25	2	0	2	48	48	16	8	8	0	4	1	0	1	1	3	16	0	1	0	0	9	1	0	1	0
12	20	2	0	8	48	48	16	8	8	0	3	1	0	1	1	2	16	0	2	2	0	14	1	0	1	0
13	32	2	0	1	48	48	16	8	8	0	8	1	0	2	1	1	16	0	2	0	0	12	1	0	1	0
14	21	2	0	3	47	49	16	8	8	0	2	1	0	0	3	0	16	0	1	0	0	8	1	0	1	0
15	16	2	0	8	47	49	16	8	8	0	6	1	0	0	0	2	16	0	1	1	0	12	1	0	1	0
16	24	2	0	4	48	48	16	8	8	0	3	1	0	3	4	2	16	0	1	1	0	18	1	0	1	0
17	28	2	0	4	47	49	16	8	8	0	5	1	0	0	2	1	16	0	0	0	0	10	1	0	1	0
18	29	2	0	6	51	45	15	9	8	0	8	1	0	1	2	5	16	0	0	1	0	12	1	0	1	0
19	21	2	0	3	48	48	16	8	8	0	3	1	0	3	2	1	16	0	3	1	0	7	1	0	1	0
20	26	2	0	3	46	50	16	8	8	0	4	1	0	3	2	2	16	0	2	1	0	11	1	0	1	0
Mean	**24.2**	**2.0**	**0.0**	**3.8**	**47.8**	**48.3**	**16.0**	**8.1**	**8.0**	**0.0**	**4.5**	**1.0**	**0.0**	**1.3**	**1.9**	**1.9**	**16.0**	**0.0**	**1.1**	**0.9**	**0.2**	**11.2**	**1.0**	**0.0**	**1.0**	**0.0**

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Number Evaluations, Services Completed/Missed, Failures Repaired (number) (verify.wks - continue, verify2.wks)

N	OxyeCS		OxeCF	Cmpltd	Md Ex	Md Rm	Ev Ex	Ev Rm	Rmvd	Rtrnd	Multpl	Dstryd	1	2	3	4	5	6	7	8	9	10	10+	Crr A6	Crr A7	Crr A8
1	1	0	9	3310	1575	2	224	1509	1584	1577	50	1577	1460	40	6	4	0	0	0	0	0	1	0	126	38	0
2	1	0	8	3234	1536	2	230	1466	1543	1538	50	1538	1415	42	6	4	0	0	0	0	0	1	0	123	38	0
3	1	0	4	3207	1525	2	225	1455	1530	1527	50	1526	1405	41	7	3	0	0	0	0	0	1	0	122	36	0
4	1	0	6	3266	1554	4	223	1485	1564	1558	50	1557	1436	42	6	4	0	0	0	0	0	1	0	125	36	0
5	1	0	5	3269	1553	5	229	1482	1562	1558	50	1558	1434	42	6	4	0	0	0	0	0	1	0	123	36	0
6	1	0	7	3139	1488	4	229	1418	1495	1492	50	1491	1370	42	5	4	0	0	0	0	0	1	0	122	38	0
7	1	0	5	3239	1540	3	225	1471	1548	1543	50	1543	1421	43	5	4	0	0	0	0	0	1	0	119	38	0
8	1	0	8	3212	1527	6	222	1457	1537	1533	50	1532	1411	41	6	4	0	0	0	0	0	1	0	128	35	0
9	1	0	9	3340	1590	1	228	1521	1597	1591	50	1591	1469	42	6	4	0	0	0	0	0	1	0	121	37	0
10	1	0	7	3263	1551	2	229	1481	1557	1553	50	1553	1431	41	6	4	0	0	0	0	0	1	0	124	38	0
11	1	0	6	3173	1508	1	225	1439	1515	1509	50	1509	1387	42	6	4	0	0	0	0	0	1	0	126	34	0
12	1	0	4	3196	1516	4	229	1447	1525	1520	50	1520	1399	41	6	4	0	0	0	0	0	1	0	125	38	0
13	1	0	5	3338	1593	2	222	1521	1598	1595	50	1594	1470	42	6	4	0	0	0	0	0	1	0	125	37	0
14	1	0	9	3171	1509	4	218	1440	1518	1513	50	1513	1392	41	6	4	0	0	0	0	0	1	0	124	36	0
15	1	0	9	3262	1553	3	223	1483	1560	1556	50	1556	1434	41	6	4	0	0	0	0	0	1	0	123	37	0
16	1	0	7	3291	1563	3	229	1496	1573	1566	49	1566	1447	41	6	4	0	0	0	0	0	1	0	123	35	0
17	1	0	4	3240	1544	2	220	1474	1550	1546	49	1546	1424	41	6	4	0	0	0	0	0	1	0	126	38	0
18	1	0	9	3362	1601	1	226	1534	1611	1602	51	1602	1481	43	6	4	0	0	0	0	0	1	0	125	35	0
19	1	0	3	3226	1533	5	226	1462	1541	1538	50	1538	1415	41	6	4	0	0	0	0	0	1	0	123	37	0
20	1	0	6	3107	1477	1	223	1406	1482	1478	50	1478	1354	42	6	4	0	0	0	0	0	1	0	124	35	0
Mean	**1.0**	**0.0**	**6.5**	**3242.3**	**1541.8**	**2.9**	**225.3**	**1472.4**	**1549.5**	**1544.7**	**50.0**	**1544.4**	**1422.8**	**41.6**	**6.0**	**4.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1.0**	**0.0**	**123.9**	**36.6**	**0.0**

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Number Times “Bottleneck” (number) (verify2.wks - continue)

N	Coalp	Steam	Gaspr	Tempr	OxygA	OxygB	OxygC	Plan1	Pla2A	Pla2B	Plan3	Divip	Recyc	Total
1	0.0	0.0	7.0	1.0	387.5	83.5	16.0	991.0	1773.0	0.0	6.0	44.0	0.0	3309
2	0.0	0.0	12.0	1.0	456.5	51.0	6.5	950.0	1729.0	12.0	2.0	13.0	0.0	3233
3	2.0	0.0	45.0	1.0	451.5	47.5	4.0	949.0	1652.0	0.0	22.0	32.0	0.0	3206
4	0.0	0.0	22.0	0.0	463.5	50.5	5.0	1125.0	1572.0	5.0	9.0	13.0	0.0	3265
5	0.0	0.0	29.0	1.0	359.5	13.0	13.5	967.0	1837.0	0.0	29.0	19.0	0.0	3268
6	0.0	0.0	6.0	1.0	412.8	30.8	12.3	979.0	1663.0	1.0	25.0	7.0	0.0	3138
7	0.0	0.0	4.0	1.0	418.5	10.0	16.5	1096.0	1676.0	0.0	10.0	6.0	0.0	3238
8	0.0	0.0	10.0	0.0	482.5	101.5	8.0	1003.0	1549.0	6.0	6.0	45.0	0.0	3211
9	1.0	0.0	23.0	1.0	397.0	58.0	24.0	1105.0	1718.0	1.0	0.0	11.0	0.0	3339
10	0.0	0.0	36.0	1.0	469.5	58.0	13.5	1092.0	1562.0	0.0	21.0	9.0	0.0	3262
11	1.0	0.0	35.0	1.0	423.0	12.5	3.5	1035.0	1640.0	3.0	5.0	13.0	0.0	3172
12	0.0	0.0	32.0	1.0	452.0	14.5	3.5	974.0	1688.0	1.0	11.0	18.0	0.0	3195
13	2.0	0.0	51.0	1.0	414.0	48.5	7.5	844.0	1963.0	3.0	3.0	0.0	0.0	3337
14	0.0	0.0	16.0	6.0	437.5	65.0	10.5	1056.0	1557.0	0.0	22.0	0.0	0.0	3170
15	0.0	0.0	18.0	1.0	438.0	58.5	8.5	912.0	1766.0	0.0	0.0	59.0	0.0	3261
16	0.0	0.0	32.0	1.0	460.5	17.0	8.5	1111.0	1625.0	4.0	13.0	18.0	0.0	3290
17	10.0	0.0	28.0	2.0	443.5	45.0	19.5	942.0	1723.0	0.0	5.0	21.0	0.0	3239
18	0.0	0.0	93.0	1.0	334.5	6.0	8.5	1042.0	1834.0	3.0	4.0	35.0	0.0	3361
19	0.0	0.0	103.0	1.0	449.2	4.7	9.2	990.0	1627.0	10.0	7.0	24.0	0.0	3225
20	0.0	0.0	24.0	1.0	428.0	22.5	14.5	936.0	1660.0	3.0	12.0	5.0	0.0	3106
Mean	**0.8**	**0.0**	**31.3**	**1.2**	**429.0**	**39.9**	**10.7**	**1005.0**	**1690.7**	**2.6**	**10.6**	**19.6**	**0.0**	**3241**

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"Throughput Vector" (ton/h, nm^3/h, m^3/h, MW/h) (tvector.wks)

Product	Coal	CoalCourse	CoalFine	CoalFine	Water	Water	Steam	Steam	Steam	Steam	Raw gas	Raw gas	Gas-water	Air	Oxygen
From	-	Coalp	Coalp	Coalp	-	Watet	Steam	Steam	Steam	Steam	Gaspr	Tempr	Tempr	OxygA	OsygB
To	Coalp	Gaspr	Steam	Slimesdam	Watet	Steam	Gaspr	OxygA	OxygB	Elecg	Tempr	Plan1	Pla4A	OsygB	OxygC
1	1257.491	848.806	373.724	34.961	1853.533	2448.533	863.815	557.210	185.737	712.902	1330741.6	1330741.6	851.675	1430172.5	248887.1
2	1246.702	841.524	370.443	34.735	1832.043	2427.043	856.404	552.429	184.143	706.328	1319324.5	1319324.5	844.368	1417902.3	246751.8
3	1256.379	848.056	373.134	35.189	1849.672	2444.672	863.051	556.717	185.572	710.664	1329565.3	1329565.3	850.922	1428908.4	248667.1
4	1259.886	850.423	373.594	35.869	1852.685	2447.685	865.460	558.271	186.090	709.038	1333276.2	1333276.2	853.297	1432896.5	249361.2
5	1258.135	849.241	373.491	35.403	1852.007	2447.007	864.257	557.495	185.832	710.633	1331423.6	1331423.6	852.111	1430905.5	249014.7
6	1259.192	849.954	374.087	35.150	1855.915	2450.915	864.983	557.963	185.988	712.985	1332541.5	1332541.5	852.827	1432106.9	249223.8
7	1259.449	850.128	374.154	35.167	1856.354	2451.354	865.160	558.078	186.026	713.072	1332813.9	1332813.9	853.001	1432399.7	249274.7
8	1259.688	850.290	373.867	35.532	1854.473	2449.473	865.324	558.184	186.061	710.984	1333067.1	1333067.1	853.163	1432671.8	249322.1
9	1269.258	856.749	376.125	36.384	1869.264	2464.264	871.898	562.424	187.475	712.769	1343194.4	1343194.4	859.644	1443555.7	251216.2
10	1255.876	847.716	373.263	34.896	1850.519	2445.519	862.706	556.494	185.498	712.109	1329033.1	1329033.1	850.581	1428336.4	248567.6
11	1260.271	850.683	374.352	35.236	1857.654	2452.654	865.725	558.442	186.147	713.253	1333683.8	1333683.8	853.558	1433334.5	249437.4
12	1263.871	853.113	374.977	35.781	1861.745	2456.745	868.198	560.037	186.679	712.529	1337493.7	1337493.7	855.996	1437429.1	250150.0
13	1258.395	849.417	373.903	35.075	1854.712	2449.712	864.436	557.610	185.870	712.864	1331698.4	1331698.4	852.287	1431200.8	249066.1
14	1268.275	856.086	376.018	36.171	1868.568	2463.568	871.223	561.989	187.330	713.365	1342154.5	1342154.5	858.979	1442438.2	251021.7
15	1257.686	848.938	373.825	34.923	1854.200	2449.200	863.949	557.296	185.765	713.284	1330948.6	1330948.6	851.807	1430395.0	248925.9
16	1261.595	851.576	374.633	35.385	1859.495	2454.495	866.634	559.028	186.343	713.306	1335084.6	1335084.6	854.454	1434840.0	249699.4
17	1258.736	849.647	373.873	35.216	1854.513	2449.513	864.670	557.762	185.921	712.239	1332059.4	1332059.4	852.518	1431588.8	249133.6
18	1242.543	838.716	370.644	33.182	1833.360	2428.360	853.546	550.586	183.529	712.891	1314922.7	1314922.7	841.551	1413171.6	245928.5
19	1267.167	855.337	375.762	36.068	1866.886	2461.886	870.461	561.497	187.166	713.189	1340981.1	1340981.1	858.228	1441177.1	250802.2
20	1261.919	851.795	374.668	35.456	1859.723	2454.723	866.857	559.172	186.391	713.107	1335428.0	1335428.0	854.674	1435209.0	249763.6
Mean	**1259.126**	**849.910**	**373.927**	**35.289**	**1854.866**	**2449.866**	**864.938**	**557.934**	**185.978**	**712.076**	**1332471.8**	**1332471.8**	**852.782**	**1432032.0**	**249210.7**

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"Throughput Vector" (ton/h, nm^3/h, m^3/h, MW/h) (tvector.wks - continue)

Product	Oxygen	Oxygen	Electricity	Pure gas	Res gas	Chem Prod	Res gas	Down gas	H2	CH4	C2	C2	Condensate	Recyc gas	NH3
From	OxygC	OxygC	Elecg	Plan1	Pla2A	Pla2A	Pla2B	Plan3	Divip	Divip	Divip	Divip	Divip	Recyc	Pla4A
To	Gaspr	Recyc	-	Pla2A	Pla2B	Sub1	Plan3	Divip	Pla2A	Recyc	Sub5	Sub6	Plan5	Pla2A	Pla4B
1	184436.1	64451.1	167.742	931519.1	469955.6	473.746	469955.6	405336.7	164484.4	140986.6	12336.3	6461.9	129.238	372607.6	20.627
2	182853.7	63898.1	166.195	923527.1	465923.6	469.681	465923.6	401859.1	163073.2	139777.0	12230.5	6406.4	128.129	369410.9	20.507
3	184273.1	64394.1	167.215	930695.7	469540.2	473.327	469540.2	404978.4	164339.0	140862.0	12325.4	6456.2	129.124	372278.3	20.667
4	184787.4	64573.8	166.832	933293.4	470850.7	474.648	470850.7	406108.7	164797.7	141255.2	12359.8	6474.2	129.484	373317.3	20.724
5	184530.6	64484.1	167.208	931996.5	470196.4	473.988	470196.4	405544.4	164568.7	141058.9	12342.7	6465.2	129.304	372798.6	20.643
6	184685.6	64538.2	167.761	932779.1	470591.2	474.386	470591.2	405884.9	164706.9	141177.3	12353.0	6470.6	129.413	373111.6	20.710
7	184723.3	64551.4	167.782	932969.7	470687.4	474.483	470687.4	405967.9	164740.5	141206.2	12355.5	6471.9	129.439	373187.9	20.664
8	184758.4	64563.7	167.290	933147.0	470776.8	474.573	470776.8	406045.0	164771.8	141233.0	12357.9	6473.2	129.464	373258.8	20.721
9	186162.0	65054.2	167.710	940236.1	474353.3	478.179	474353.3	409129.7	166023.6	142305.9	12451.8	6522.4	130.447	376094.4	20.876
10	184199.3	64368.3	167.555	930323.2	469352.2	473.137	469352.2	404816.3	164273.2	140805.6	12320.5	6453.6	129.072	372129.3	20.654
11	184843.9	64593.6	167.824	933578.7	470994.6	474.793	470994.6	406232.9	164848.1	141298.3	12363.6	6476.2	129.523	373431.5	20.731
12	185371.9	64778.1	167.654	936245.6	472340.1	476.149	472340.1	407393.3	165319.0	141702.0	12398.9	6494.7	129.893	374498.2	20.787
13	184568.7	64497.4	167.733	932188.9	470293.5	474.086	470293.5	405628.1	164602.7	141088.0	12345.2	6466.5	129.331	372875.6	20.700
14	186017.9	65003.8	167.851	939508.2	473986.1	477.809	473986.1	408813.0	165895.1	142195.8	12442.1	6517.3	130.346	375803.3	20.862
15	184464.8	64461.1	167.832	931664.1	470028.7	473.819	470028.7	405399.8	164510.0	141008.6	12338.2	6462.9	129.258	372665.6	20.683
16	185038.0	64661.4	167.837	934559.2	471489.3	475.292	471489.3	406659.5	165021.2	141446.8	12376.6	6483.0	129.660	373823.7	20.751
17	184618.8	64514.9	167.586	932441.6	470421.0	474.215	470421.0	405738.1	164647.3	141126.3	12348.5	6468.3	129.366	372976.6	20.705
18	182243.7	63684.9	167.739	920445.9	464369.1	468.114	464369.1	400518.3	162529.1	139310.7	12189.7	6385.1	127.701	368178.3	20.439
19	185855.3	64947.0	167.809	938686.7	473571.7	477.391	473571.7	408455.6	165750.0	142071.5	12431.3	6511.6	130.232	375474.7	20.840
20	185085.6	64678.0	167.790	934799.6	471610.6	475.414	471610.6	406764.1	165063.7	141483.1	12379.8	6484.6	129.693	373919.8	20.756
Mean	**184675.9**	**64534.9**	**167.547**	**932730.3**	**470566.6**	**474.362**	**470566.6**	**405863.7**	**164698.3**	**141169.9**	**12352.4**	**6470.3**	**129.406**	**373092.1**	**20.702**

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"Throughput Vector" (ton/h, nm^3/h, m^3/h, MW/h) (tvector.wks - continue)

Product	Tar acid	NH3	NH3	Alcohol	Carbonyl	Ethanol	Propanol	Acetone	MEK	Aldehyde	Methanol	H Aldehyde	N–Butanol	Ethane	Ethylene
From	Pla4A	Pla4B	Pla4C	Sub1	Sub1	Sub2	Sub2	Sub3	Sub3	Sub3	Sub3	Sub4	Sub4	Sub5	Sub5
To	-	Pla4C	-	Sub2	Sub3	-	-	-	-	Sub4	-	-	-	-	-
1	3.640	20.627	20.627	17.765	11.844	12.436	5.330	5.640	3.384	2.256	0.551	1.128	0.835	4934.5	9.376
2	3.619	20.507	20.507	17.613	11.742	12.329	5.284	5.592	3.355	2.237	0.546	1.118	0.828	4892.2	9.295
3	3.647	20.667	20.667	17.750	11.833	12.425	5.325	5.635	3.381	2.254	0.550	1.127	0.834	4930.2	9.367
4	3.657	20.724	20.724	17.799	11.866	12.460	5.340	5.651	3.390	2.261	0.552	1.130	0.836	4943.9	9.393
5	3.643	20.643	20.643	17.775	11.850	12.442	5.332	5.643	3.385	2.257	0.551	1.129	0.835	4937.1	9.380
6	3.655	20.710	20.710	17.789	11.860	12.453	5.337	5.648	3.388	2.259	0.551	1.130	0.836	4941.2	9.388
7	3.647	20.664	20.664	17.793	11.862	12.455	5.338	5.649	3.389	2.260	0.552	1.130	0.836	4942.2	9.390
8	3.657	20.721	20.721	17.797	11.864	12.458	5.339	5.650	3.390	2.260	0.552	1.130	0.836	4943.2	9.392
9	3.684	20.876	20.876	17.932	11.954	12.552	5.380	5.693	3.415	2.277	0.556	1.139	0.843	4980.7	9.463
10	3.645	20.654	20.654	17.743	11.828	12.420	5.323	5.633	3.379	2.253	0.550	1.127	0.834	4928.2	9.364
11	3.658	20.731	20.731	17.805	11.870	12.463	5.341	5.652	3.391	2.261	0.552	1.131	0.837	4945.4	9.396
12	3.668	20.787	20.787	17.856	11.904	12.499	5.357	5.669	3.401	2.268	0.554	1.134	0.839	4959.6	9.423
13	3.653	20.700	20.700	17.778	11.852	12.445	5.333	5.644	3.386	2.258	0.551	1.129	0.835	4938.1	9.382
14	3.682	20.862	20.862	17.918	11.945	12.542	5.375	5.688	3.413	2.276	0.555	1.138	0.842	4976.9	9.456
15	3.650	20.683	20.683	17.768	11.845	12.438	5.330	5.641	3.384	2.257	0.551	1.128	0.835	4935.3	9.377
16	3.662	20.751	20.751	17.823	11.882	12.476	5.347	5.658	3.395	2.264	0.553	1.132	0.838	4950.6	9.406
17	3.654	20.705	20.705	17.783	11.855	12.448	5.335	5.646	3.387	2.258	0.551	1.129	0.836	4939.4	9.385
18	3.607	20.439	20.439	17.554	11.703	12.288	5.266	5.573	3.344	2.229	0.544	1.115	0.825	4875.9	9.264
19	3.678	20.840	20.840	17.902	11.935	12.532	5.371	5.683	3.410	2.274	0.555	1.137	0.841	4972.5	9.448
20	3.663	20.756	20.756	17.828	11.885	12.480	5.348	5.660	3.396	2.264	0.553	1.132	0.838	4951.9	9.409
Mean	**3.653**	**20.702**	**20.702**	**17.789**	**11.859**	**12.452**	**5.337**	**5.647**	**3.388**	**2.259**	**0.551**	**1.130**	**0.836**	**4940.9**	**9.388**

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"Throughput Vector" (ton/h, nm^3/h, m^3/h, MW/h) (tvector.wks - continue)

Product	Ethane	Petrol	Butene	C5C6	Petrol	Diesel	C3	H Polymer	C4	Electricity	(Air)	(Oxygen)	(Oxygen)	Electricity	Steam (T)	Oxygen (T)
From	Sub6	Sub6	Sub6	Plan5	Plan5	Plan5	Plan5	Plan5	Plan5	-	OxyeA	OxyeB	OxyeC	-	Steam	OxygC
To	-	-	-	-	-	-	-	-	-	OxyeA	OxyeB	OxyeC	Gaspr/Recyc	OxyeC	GP/OA,C/EG	GP/R
1	2584.8	3.877	2.585	37.526	39.027	39.027	5.003	5.003	7.505	0.000	0.0	0.0	0.0	0.000	2319.663	248887.1
2	2562.6	3.844	2.563	37.997	39.517	39.517	5.066	5.066	7.599	0.000	0.0	0.0	0.0	0.000	2299.304	246751.8
3	2582.5	3.874	2.582	38.240	39.770	39.770	5.099	5.099	7.648	0.000	0.0	0.0	0.0	0.000	2316.005	248667.1
4	2589.7	3.885	2.590	37.977	39.496	39.496	5.064	5.064	7.595	0.000	0.0	0.0	0.0	0.000	2318.859	249361.2
5	2586.1	3.879	2.586	38.417	39.954	39.954	5.122	5.122	7.683	0.000	0.0	0.0	0.0	0.000	2318.217	249014.7
6	2588.3	3.882	2.588	38.013	39.534	39.534	5.068	5.068	7.603	0.000	0.0	0.0	0.0	0.000	2321.919	249223.8
7	2588.8	3.883	2.589	38.651	40.197	40.197	5.153	5.153	7.730	0.000	0.0	0.0	0.0	0.000	2322.335	249274.7
8	2589.3	3.884	2.589	38.506	40.046	40.046	5.134	5.134	7.701	0.000	0.0	0.0	0.0	0.000	2320.553	249322.1
9	2608.9	3.913	2.609	37.675	39.182	39.182	5.023	5.023	7.535	0.000	0.0	0.0	0.0	0.000	2334.566	251216.2
10	2581.4	3.872	2.581	38.699	40.247	40.247	5.160	5.160	7.740	0.000	0.0	0.0	0.0	0.000	2316.807	248567.6
11	2590.5	3.886	2.590	38.763	40.314	40.314	5.168	5.168	7.753	0.000	0.0	0.0	0.0	0.000	2323.567	249437.4
12	2597.9	3.897	2.598	38.539	40.080	40.080	5.138	5.138	7.708	0.000	0.0	0.0	0.0	0.000	2327.443	250150.0
13	2586.6	3.880	2.587	38.554	40.096	40.096	5.141	5.141	7.711	0.000	0.0	0.0	0.0	0.000	2320.780	249066.1
14	2606.9	3.910	2.607	38.854	40.409	40.409	5.181	5.181	7.771	0.000	0.0	0.0	0.0	0.000	2333.906	251021.7
15	2585.2	3.878	2.585	38.196	39.724	39.724	5.093	5.093	7.639	0.000	0.0	0.0	0.0	0.000	2320.295	248925.9
16	2593.2	3.890	2.593	36.659	38.125	38.125	4.888	4.888	7.332	0.000	0.0	0.0	0.0	0.000	2325.311	249699.4
17	2587.3	3.881	2.587	38.620	40.165	40.165	5.149	5.149	7.724	0.000	0.0	0.0	0.0	0.000	2320.591	249133.6
18	2554.0	3.831	2.554	37.771	39.282	39.282	5.036	5.036	7.554	0.000	0.0	0.0	0.0	0.000	2300.552	245928.5
19	2604.6	3.907	2.605	38.488	40.028	40.028	5.132	5.132	7.698	0.000	0.0	0.0	0.0	0.000	2332.313	250802.2
20	2593.9	3.891	2.594	38.456	39.994	39.994	5.127	5.127	7.691	0.000	0.0	0.0	0.0	0.000	2325.527	249763.6
Mean	**2588.1**	**3.882**	**2.588**	**38.230**	**39.759**	**39.759**	**5.097**	**5.097**	**7.646**	**0.000**	**0.0**	**0.0**	**0.0**	**0.000**	**2320.926**	**249210.7**

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Resource Utilisation (fraction) (utiliz.wks)

N	CoalpS	CoalpF	SteamS	SteamF	GasprF	TemprS	TemprF	OxygAS	OxygAF	OxygBS	OxygBF	OxygCS	OxygCF	ElecgS	ElecgF	Plan1S	Plan1F
1	0.4708	0.3332	0.2007	0.3196	0.6060	0.0944	0.0091	0.0999	0.0219	0.0000	0.0186	0.1167	0.0316	0.0000	0.0041	0.0944	0.0002
2	0.4703	0.3312	0.2125	0.2911	0.5512	0.0944	0.0078	0.1000	0.0242	0.0000	0.0245	0.1167	0.0251	0.0000	0.0035	0.0944	0.0032
3	0.4704	0.3377	0.1928	0.3440	0.5407	0.0944	0.0049	0.0996	0.0295	0.0000	0.0190	0.1167	0.0270	0.0000	0.0041	0.0944	0.0038
4	0.4699	0.3358	0.1968	0.3592	0.6133	0.0944	0.0063	0.1000	0.0254	0.0000	0.0197	0.1167	0.0266	0.0000	0.0033	0.0944	0.0023
5	0.4696	0.3502	0.2049	0.3068	0.6412	0.0944	0.0039	0.1000	0.0208	0.0000	0.0072	0.1167	0.0266	0.0000	0.0016	0.0944	0.0034
6	0.4678	0.3215	0.2125	0.1741	0.5454	0.0944	0.0081	0.1000	0.0216	0.0000	0.0152	0.1167	0.0256	0.0000	0.0044	0.0944	0.0041
7	0.4701	0.3602	0.2125	0.3100	0.5718	0.0944	0.0083	0.1000	0.0195	0.0000	0.0057	0.1167	0.0294	0.0000	0.0052	0.0944	0.0087
8	0.4700	0.3224	0.2006	0.2698	0.5738	0.0944	0.0070	0.0997	0.0317	0.0000	0.0267	0.1167	0.0257	0.0000	0.0033	0.0944	0.0062
9	0.4698	0.3396	0.2086	0.3199	0.5887	0.0944	0.0091	0.1000	0.0197	0.0000	0.0167	0.1167	0.0376	0.0000	0.0049	0.0944	0.0057
10	0.4704	0.3372	0.2037	0.3153	0.5884	0.0944	0.0043	0.1000	0.0259	0.0000	0.0231	0.1167	0.0287	0.0000	0.0054	0.0944	0.0051
11	0.4696	0.3165	0.2060	0.3685	0.5874	0.0944	0.0068	0.1000	0.0203	0.0000	0.0045	0.1167	0.0269	0.0000	0.0042	0.0944	0.0024
12	0.4702	0.3312	0.2007	0.3050	0.5810	0.0944	0.0064	0.1000	0.0238	0.0000	0.0077	0.1167	0.0236	0.0000	0.0032	0.0944	0.0108
13	0.4706	0.3380	0.2086	0.3599	0.6626	0.0944	0.0075	0.1000	0.0194	0.0000	0.0155	0.1167	0.0287	0.0000	0.0050	0.0944	0.0013
14	0.4698	0.3381	0.2014	0.3194	0.5934	0.0944	0.0044	0.1000	0.0209	0.0000	0.0132	0.1167	0.0249	0.0000	0.0036	0.0944	0.0038
15	0.4696	0.3575	0.2115	0.3025	0.5457	0.0944	0.0124	0.1000	0.0241	0.0000	0.0184	0.1167	0.0281	0.0000	0.0029	0.0944	0.0074
16	0.4685	0.3423	0.2116	0.2866	0.6145	0.0944	0.0048	0.1000	0.0197	0.0000	0.0088	0.1167	0.0270	0.0000	0.0039	0.0944	0.0041
17	0.4700	0.3429	0.2046	0.3411	0.5828	0.0944	0.0067	0.1000	0.0238	0.0000	0.0179	0.1167	0.0287	0.0000	0.0056	0.0944	0.0029
18	0.4702	0.3613	0.2086	0.2766	0.6017	0.0944	0.0058	0.1000	0.0213	0.0000	0.0058	0.1167	0.0316	0.0000	0.0047	0.0944	0.0075
19	0.4684	0.3644	0.2007	0.3568	0.5574	0.0944	0.0044	0.1000	0.0203	0.0000	0.0058	0.1167	0.0268	0.0000	0.0031	0.0944	0.0040
20	0.4698	0.3030	0.2125	0.1746	0.5704	0.0944	0.0048	0.1000	0.0195	0.0000	0.0082	0.1167	0.0236	0.0000	0.0050	0.0944	0.0035
Mean	**0.4698**	**0.3382**	**0.2056**	**0.3050**	**0.5859**	**0.0944**	**0.0066**	**0.1000**	**0.0227**	**0.0000**	**0.0141**	**0.1167**	**0.0277**	**0.0000**	**0.0040**	**0.0944**	**0.0045**

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Resource Utilisation (fraction) (utiliz.wks - continue)

N	Pla2AS	Pla2AF	Pla2BS	Pla2BF	Plan3F	DivipF	RecycS	Pla4AF	Pla4BF	Pla4CF	Plan5F	OxyeAS	OxyeBS	OxyeCS	OxyeCF
1	0.6889	0.0972	0.0417	0.0000	0.0014	0.0053	0.4000	0.0001	0.0005	0.0028	0.6220	0.0389	0.0389	0.0389	0.0117
2	0.6833	0.1524	0.0417	0.0011	0.0010	0.0061	0.4000	0.0002	0.0000	0.0000	0.4817	0.0389	0.0389	0.0389	0.0129
3	0.6801	0.1167	0.0417	0.0000	0.0011	0.0075	0.4000	0.0001	0.0000	0.0000	0.4945	0.0389	0.0389	0.0389	0.0061
4	0.6861	0.0778	0.0417	0.0006	0.0020	0.0053	0.4000	0.0003	0.0006	0.0000	0.5016	0.0389	0.0389	0.0389	0.0070
5	0.6861	0.1167	0.0417	0.0000	0.0030	0.0062	0.4000	0.0002	0.0007	0.0028	0.4369	0.0389	0.0389	0.0389	0.0055
6	0.6878	0.0972	0.0417	0.0001	0.0076	0.0015	0.4000	0.0000	0.0011	0.0000	0.3617	0.0389	0.0389	0.0389	0.0099
7	0.6861	0.0778	0.0417	0.0000	0.0028	0.0034	0.4000	0.0000	0.0013	0.0023	0.4015	0.0389	0.0389	0.0389	0.0065
8	0.6817	0.0509	0.0417	0.0008	0.0026	0.0079	0.4000	0.0000	0.0000	0.0000	0.5165	0.0389	0.0389	0.0389	0.0130
9	0.6889	0.0194	0.0417	0.0002	0.0000	0.0037	0.4000	0.0002	0.0005	0.0000	0.5196	0.0389	0.0389	0.0389	0.0120
10	0.6861	0.0778	0.0417	0.0000	0.0071	0.0028	0.4000	0.0001	0.0010	0.0000	0.2499	0.0389	0.0389	0.0389	0.0082
11	0.6889	0.0778	0.0417	0.0002	0.0018	0.0087	0.4000	0.0001	0.0000	0.0000	0.3636	0.0389	0.0389	0.0389	0.0079
12	0.6889	0.0583	0.0417	0.0003	0.0011	0.0049	0.4000	0.0004	0.0008	0.0000	0.5656	0.0389	0.0389	0.0389	0.0053
13	0.6889	0.1556	0.0417	0.0004	0.0017	0.0019	0.4000	0.0002	0.0000	0.0000	0.4772	0.0389	0.0389	0.0389	0.0091
14	0.6861	0.0389	0.0417	0.0000	0.0038	0.0000	0.4000	0.0001	0.0000	0.0000	0.3261	0.0389	0.0389	0.0389	0.0162
15	0.6857	0.1167	0.0417	0.0000	0.0000	0.0071	0.4000	0.0001	0.0009	0.0000	0.4982	0.0389	0.0389	0.0389	0.0102
16	0.6889	0.0583	0.0417	0.0009	0.0051	0.0050	0.4000	0.0001	0.0004	0.0000	0.7641	0.0389	0.0389	0.0389	0.0118
17	0.6861	0.0972	0.0417	0.0000	0.0020	0.0043	0.4000	0.0000	0.0000	0.0000	0.4203	0.0389	0.0389	0.0389	0.0061
18	0.6833	0.1556	0.0417	0.0004	0.0028	0.0134	0.4000	0.0000	0.0004	0.0000	0.4812	0.0389	0.0389	0.0389	0.0103
19	0.6889	0.0583	0.0417	0.0008	0.0024	0.0034	0.4000	0.0006	0.0006	0.0000	0.2914	0.0389	0.0389	0.0389	0.0042
20	0.6833	0.0778	0.0417	0.0005	0.0032	0.0071	0.4000	0.0002	0.0005	0.0000	0.4302	0.0389	0.0389	0.0389	0.0088
Mean	**0.6862**	**0.0889**	**0.0417**	**0.0003**	**0.0026**	**0.0053**	**0.4000**	**0.0002**	**0.0005**	**0.0004**	**0.4602**	**0.0389**	**0.0389**	**0.0389**	**0.0091**

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Comparison

8640 Simulation time

Service (Compare ((number of services completed*service time)/simulation time) with (resource utilisation))

Plant	Service	Service Time	Hours	H/Time	Util	% Delta
Coalp	354.05	1	354.05			
	54.20	2	108.4			
	10.00	336	3360			
		Total	3822.45	0.4424	0.4698	-2.7382
Steam	52.45	34	1783.3	0.2064	0.2056	0.0821
Tempr	2.00	408	816	0.0944	0.0944	0.0000
OxygA	36.00	24	864	0.1000	0.1000	0.0041
OxygB	0.00	336	0	0.0000	0.0000	0.0000
OxygC	42.00	24	1008	0.1167	0.1167	0.0005
Elecg	0.00	720	0	0.0000	0.0000	0.0000
Plan1	2.00	408	816	0.0944	0.0944	0.0000
Pla2A	47.75	24	1146			
	15.95	120	1914			
	8.00	360	2880			
		Total	5940	0.6875	0.6862	0.1296
Pla2B	1.00	360	360	0.0417	0.0417	0.0000
Recyc	16.00	216	216	0.4000	0.4000	0.0002
OxyeA	1.00	336	336	0.0389	0.0389	0.0000
OxyeB	1.00	336	336	0.0389	0.0389	0.0000
OxyeC	1.00	336	336	0.0389	0.0389	0.0000

Failure (Compare ((number of failures repaired*repair time)/simulation time) with (resource utilisation))

Plant	Failure	Repair Time	Hour	H/Time	Util	% Delta
Coalp	336.90	8	2695.2	0.3119	0.3382	-2.6264
Steam	25.05	120	3006	0.3479	0.3050	4.2874
Gaspr	344.55	16	5512.8	0.6381	0.5859	5.2186
Tempr	13.25	3	39.75	0.0046	0.0066	-0.2043
OxygA	46.35	2	92.7	0.0107	0.0227	-1.1940
OxygB	5.30	24	127.2	0.0147	0.0141	0.0616
OxygC	71.60	1	71.6	0.0083	0.0277	-1.9408
Elecg	24.15	1	24.15	0.0028	0.0040	-0.1252
Plan1	3.80	6	22.8	0.0026	0.0045	-0.1886
Pla2A	4.50	168	756	0.0875	0.0889	-0.1416
Pla2B	1.25	1	1.25	0.0001	0.0003	-0.0162
Plan3	1.85	8	14.8	0.0017	0.0026	-0.0908
Divip	1.90	18	34.2	0.0040	0.0053	-0.1319
Pla4A	1.05	0.5	0.525	0.0001	0.0002	-0.0090
Pla4B	0.90	3	2.7	0.0003	0.0005	-0.0151
Pla4C	0.15	24	3.6	0.0004	0.0004	0.0025
Plan5	11.20	336	3763.2	0.4356	0.4602	-2.4623
OxyeC	6.50	12	78	0.0090	0.0091	-0.0103

Evaluations

Completed	3242.25	
Mod Extra	1541.80	Modules returned that removed no modules
Mod Rem	2.85	Modules returned that removed modules
Eva Extra	225.25	Evaluators that removed no modules
Eva Rem	1472.35	Evaluators that removed modules
Total	3242.25	
Removed	1549.50	
Returned	1544.65	
Multiple	49.95	
Destroyed	1544.40	

Number (Removed histogram)

1	1422.75	1422.75
2	41.55	83.1
3	5.95	17.85
4	3.95	15.8
5	0.00	0
6	0.00	0
7	0.00	0
8	0.00	0
9	0.00	0
10	1.00	10
10+	0.00	
	Total	1549.5

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APPENDIX R

ED EVALUATION METHOD OPTION SIMUL8 SIMULATION MODEL RESULTS (Scenario I)

(See next pages for landscape view)

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Model S801, ED Method, 8640 Hours, Oxygen Extra Off, Runtime = 6,8 Minutes (20 replications)
Primary Plants: Throughput, Time and Production Lost "Bottleneck" (ton/h, nm^3/h, %)

Throughput	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	**Mean**	Deviation
Coal Processing	852.210	847.721	850.665	845.807	838.928	855.199	851.532	849.268	848.049	857.526	849.630	848.190	846.430	855.957	854.517	848.456	854.538	852.511	840.941	847.335	**849.770**	
Steam	1613.204	1604.707	1610.280	1601.084	1588.062	1618.862	1611.920	1607.635	1605.328	1623.267	1608.321	1605.595	1602.262	1620.297	1617.571	1606.099	1617.612	1613.774	1591.872	1603.975	**1608.586**	
Gas Production	1336077.8	1329040.0	1333656.3	1326039.6	1315254.9	1340763.6	1335014.5	1331465.1	1329555.1	1344412.3	1332033.3	1329776.0	1327015.8	1341951.9	1339694.3	1330193.1	1339728.2	1336550.0	1318410.6	1328434.3	**1332253.3**	0.001
Temperature Regulation	1336077.8	1329040.0	1333656.3	1326039.6	1315254.9	1340763.6	1335014.5	1331465.1	1329555.1	1344412.3	1332033.3	1329776.0	1327015.8	1341951.9	1339694.3	1330193.1	1339728.2	1336550.0	1318410.6	1328434.3	**1332253.3**	7273.6
Oxygen A	1435907.4	1428343.8	1433305.0	1425119.2	1413528.7	1440943.4	1434764.6	1430950.1	1428897.4	1444864.6	1431560.7	1429134.7	1426168.3	1442220.4	1439794.1	1429583.1	1439830.6	1436414.9	1416920.2	1427692.8	**1431797.2**	7462.5
Oxygen B	249885.2	248568.9	249432.3	248007.7	245990.7	250761.5	249686.3	249022.5	248665.2	251444.0	249128.7	248706.5	248190.3	250983.8	250561.6	248784.6	250567.9	249973.5	246580.9	248455.6	**249169.9**	
Oxygen C	249885.2	248568.9	249432.3	248007.7	245990.7	250761.5	249686.3	249022.5	248665.2	251444.0	249128.7	248706.5	248190.3	250983.8	250561.6	248784.6	250567.9	249973.5	246580.9	248455.6	**249169.9**	
Plant(I)	935254.5	930328.0	933559.4	928227.7	920678.4	938534.5	934510.1	932025.6	930688.6	941088.6	932423.3	930843.2	928911.1	939366.3	937786.0	931135.2	937809.8	935585.0	922887.4	929904.0	**932577.3**	
Plant(II) A	471840.1	469354.7	470984.9	468295.1	464486.4	473494.9	471464.6	470211.1	469536.6	474783.4	470411.8	469614.6	468639.8	473914.5	473117.3	469761.9	473129.2	472006.8	465600.9	469140.8	**470489.5**	
Plant(II) B	471840.1	469354.7	470984.9	468295.1	464486.4	473494.9	471464.6	470211.1	469536.6	474783.4	470411.8	469614.6	468639.8	473914.5	473117.3	469761.9	473129.2	472006.8	465600.9	469140.8	**470489.5**	
Plant(III)	406962.1	404818.4	406224.5	403904.5	400619.5	408389.3	406638.2	405557.1	404975.3	409500.7	405730.1	405042.6	404201.8	408751.3	408063.6	405169.6	408074.0	407105.9	401580.7	404633.9	**405797.2**	
Division Process	165144.0	164274.1	164844.7	163903.2	162570.2	165723.2	165012.5	164573.8	164337.7	166174.1	164644.1	164365.0	164023.9	165870.0	165591.0	164416.6	165595.2	165202.3	162960.2	164199.2	**164671.3**	
Recycling	374101.8	372131.2	373423.8	371291.1	368271.4	375413.8	373804.1	372810.2	372275.4	376435.4	372969.3	372337.3	371564.4	375746.5	375114.4	372454.1	375123.9	374234.0	369155.0	371961.6	**373030.9**	
Bottleneck Time %																						
Coal Processing	0.00	0.01	0.00	0.55	0.25	0.00	0.13	0.00	0.00	0.00	0.11	0.00	0.16	0.28	0.08	0.03	0.01	0.00	0.01	0.00	**0.08**	
Steam	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	
Gas Production	0.73	0.51	1.37	0.76	1.53	0.59	2.40	1.27	2.24	0.73	0.59	0.78	1.08	0.79	0.88	0.45	1.24	0.74	1.21	1.85	**1.09**	
Temperature Regulation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	
Oxygen A	12.39	10.30	10.21	10.17	10.00	12.40	11.73	10.76	10.78	11.36	11.92	11.45	10.70	11.68	11.85	10.49	11.26	11.48	11.43	11.13	**11.17**	
Oxygen B	1.43	1.35	1.81	1.27	0.82	1.61	1.22	2.06	1.52	1.43	1.59	0.68	0.34	1.49	0.54	0.91	0.90	1.87	2.17	1.46	**1.32**	
Oxygen C	0.23	0.20	0.13	0.18	0.22	0.26	0.14	0.09	0.19	0.42	0.19	0.20	0.22	0.14	0.15	0.28	0.10	0.09	0.15	0.15	**0.19**	
Plant(I)	28.77	27.77	28.99	27.42	25.48	28.84	30.31	28.33	28.07	30.63	26.17	28.78	23.44	28.96	28.89	29.03	29.93	28.73	23.63	26.07	**27.91**	
Plant(II) A	56.10	57.96	56.54	59.20	61.24	55.60	53.41	56.46	56.39	55.04	58.62	57.82	63.34	56.51	57.38	58.66	55.69	55.80	60.38	58.41	**57.53**	
Plant(II) B	0.06	0.00	0.09	0.06	0.00	0.04	0.02	0.00	0.10	0.00	0.05	0.04	0.00	0.04	0.02	0.00	0.07	0.00	0.07	0.05	**0.04**	
Plant(III)	0.10	0.83	0.51	0.18	0.09	0.12	0.11	0.40	0.22	0.00	0.13	0.00	0.32	0.11	0.00	0.14	0.17	0.73	0.58	0.39	**0.26**	
Division Process	0.19	1.06	0.33	0.22	0.36	0.54	0.54	0.62	0.49	0.39	0.63	0.25	0.39	0.00	0.21	0.00	0.64	0.56	0.38	0.49	**0.41**	
Recycling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	
Bottleneck Production Lost %																					**100.00**	
Coal Processing	0.0000	0.0007	0.0003	0.0707	0.0219	0.0000	0.0119	0.0000	0.0000	0.0000	0.0098	0.0000	0.0135	0.0245	0.0068	0.0023	0.0008	0.0000	0.0007	0.0000	**0.0082**	0.0937
Steam	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0000**	0.0000
Gas Production	0.0264	0.0153	0.0307	0.0143	0.0876	0.0365	0.2254	0.0282	0.0724	0.0188	0.0138	0.0171	0.0677	0.0307	0.0293	0.0109	0.0252	0.0152	0.0377	0.0942	**0.0449**	0.5127
Temperature Regulation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0000**	0.0000
Oxygen A	1.7680	1.4643	1.4493	1.4841	1.4667	1.7735	1.6896	1.5514	1.6030	1.6426	1.7534	1.6645	1.5710	1.6784	1.7196	1.4926	1.6236	1.6312	1.6717	1.5890	**1.6144**	18.4504
Oxygen B	0.2014	0.1912	0.2559	0.1790	0.1157	0.2274	0.1718	0.2905	0.2149	0.2021	0.2247	0.0963	0.0483	0.2102	0.0756	0.1291	0.1267	0.2640	0.3068	0.2056	**0.1869**	2.1356
Oxygen C	0.0326	0.0289	0.0189	0.0256	0.0313	0.0371	0.0193	0.0130	0.0264	0.0587	0.0274	0.0278	0.0314	0.0203	0.0219	0.0475	0.0144	0.0126	0.0211	0.0210	**0.0269**	0.3070
Plant(I)	2.4958	2.4931	2.4845	2.4722	2.4581	2.5626	2.4845	2.4977	2.4564	2.4042	2.4652	2.4767	2.3868	2.4035	2.3978	2.4242	2.4961	2.4107	2.6109	2.4629	**2.4672**	28.1974
Plant(II) A	3.8157	3.9111	4.0093	4.7371	5.5244	3.2213	3.6570	3.9557	4.2162	3.4136	3.9145	4.5161	4.6673	3.6585	3.8900	4.7189	3.5515	3.5320	4.5956	4.2256	**4.0866**	46.7048
Plant(II) B	0.0122	0.0000	0.0199	0.0123	0.0000	0.0084	0.0051	0.0000	0.0223	0.0000	0.0100	0.0088	0.0000	0.0080	0.0049	0.0000	0.0312	0.0000	0.0149	0.0115	**0.0085**	0.0969
Plant(III)	0.0474	0.3815	0.2326	0.0800	0.0427	0.0529	0.0487	0.1849	0.1009	0.0000	0.0589	0.0000	0.1454	0.0513	0.0000	0.0655	0.0762	0.3358	0.2643	0.1774	**0.1173**	1.3409
Division Process	0.0884	0.4838	0.1523	0.1001	0.1657	0.2472	0.2474	0.2822	0.2221	0.1769	0.2870	0.1122	0.1770	0.0000	0.0943	0.0000	0.2922	0.2539	0.1742	0.2241	**0.1890**	2.1606
Recycling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0000**	0.0000
																					8.7498	100.00

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Primary Plants: Number Available, Number Switched On/Off (number)

Number Available	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean
Coal Processing	13.107	13.134	13.088	13.099	13.087	13.144	13.076	13.172	13.086	13.114	13.111	13.164	13.071	13.061	13.076	13.154	13.140	13.123	13.107	13.093	**13.110**
Steam	8.524	8.393	8.435	8.421	8.436	8.367	8.425	8.509	8.459	8.513	8.361	8.484	8.496	8.411	8.373	8.411	8.458	8.513	8.391	8.562	**8.447**
Gas Production	38.870	39.019	39.069	39.186	38.804	38.971	38.886	39.058	38.982	38.988	38.889	39.042	38.822	38.788	39.002	39.129	39.115	39.057	39.124	38.884	**38.984**
Temperature Regulation	7.901	7.903	7.900	7.899	7.897	7.901	7.901	7.898	7.901	7.899	7.900	7.897	7.897	7.899	7.901	7.899	7.902	7.900	7.901	7.900	**7.900**
Oxygen A	5.871	5.875	5.877	5.872	5.877	5.866	5.878	5.880	5.884	5.878	5.869	5.878	5.873	5.880	5.873	5.877	5.878	5.876	5.877	5.881	**5.876**
Oxygen B	5.985	5.983	5.975	5.987	5.989	5.984	5.986	5.979	5.983	5.984	5.981	5.987	5.995	5.985	5.991	5.990	5.987	5.978	5.975	5.981	**5.984**
Oxygen C	6.850	6.849	6.861	6.858	6.858	6.856	6.852	6.857	6.855	6.851	6.857	6.850	6.859	6.857	6.862	6.851	6.860	6.860	6.850	6.855	**6.856**
Plant(I)	3.900	3.900	3.900	3.901	3.902	3.897	3.900	3.900	3.899	3.903	3.901	3.901	3.905	3.904	3.904	3.903	3.900	3.902	3.893	3.900	**3.901**
Plant(II) A	7.246	7.231	7.253	7.173	7.095	7.269	7.253	7.233	7.217	7.292	7.229	7.170	7.137	7.239	7.214	7.191	7.275	7.272	7.129	7.202	**7.216**
Plant(II) B	1.958	1.958	1.957	1.958	1.958	1.958	1.958	1.958	1.957	1.958	1.958	1.958	1.958	1.958	1.958	1.958	1.958	1.958	1.957	1.958	**1.958**
Plant(III)	1.999	1.992	1.995	1.998	1.997	1.999	1.997	1.996	1.998	2.000	1.999	2.000	1.997	1.999	2.000	1.999	1.998	1.993	1.994	1.996	**1.997**
Division Process	1.996	1.989	1.997	1.998	1.996	1.995	1.995	1.994	1.995	1.996	1.994	1.998	1.996	2.000	1.998	2.000	1.994	1.994	1.996	1.993	**1.996**
Recycling	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	7.600	**7.600**
Number Switched On																					
Coal Processing	9.508	9.475	9.481	9.408	9.339	9.569	9.486	9.472	9.445	9.570	9.495	9.444	9.454	9.553	9.531	9.452	9.538	9.523	9.391	9.469	**9.480**
Steam	6.706	6.703	6.703	6.672	6.652	6.737	6.693	6.685	6.685	6.742	6.706	6.689	6.698	6.733	6.728	6.700	6.731	6.717	6.652	6.699	**6.701**
Gas Production	33.979	33.797	33.910	33.723	33.447	34.100	33.941	33.857	33.805	34.187	33.880	33.817	33.750	34.127	34.068	33.827	34.065	33.988	33.535	33.780	**33.879**
Temperature Regulation	6.655	6.633	6.648	6.620	6.577	6.683	6.656	6.638	6.629	6.691	6.648	6.630	6.643	6.687	6.677	6.633	6.676	6.658	6.593	6.634	**6.645**
Oxygen A	5.674	5.666	5.674	5.637	5.591	5.707	5.675	5.668	5.652	5.710	5.669	5.640	5.652	5.703	5.685	5.645	5.692	5.689	5.624	5.656	**5.666**
Oxygen B	5.660	5.652	5.656	5.624	5.582	5.690	5.663	5.648	5.636	5.695	5.656	5.633	5.650	5.688	5.680	5.634	5.684	5.671	5.603	5.642	**5.652**
Oxygen C	5.660	5.652	5.656	5.624	5.582	5.690	5.663	5.648	5.636	5.695	5.656	5.633	5.650	5.688	5.680	5.634	5.684	5.671	5.603	5.642	**5.652**
Plant(I)	3.896	3.876	3.892	3.894	3.873	3.890	3.892	3.888	3.890	3.898	3.890	3.888	3.894	3.901	3.899	3.881	3.889	3.890	3.883	3.879	**3.889**
Plant(II) A	7.040	7.000	7.029	6.973	6.901	7.067	7.047	7.020	7.010	7.091	7.008	7.000	6.953	7.067	7.053	6.996	7.065	7.050	6.930	6.989	**7.014**
Plant(II) B	1.945	1.923	1.938	1.941	1.920	1.936	1.939	1.935	1.936	1.945	1.937	1.934	1.941	1.948	1.946	1.928	1.936	1.937	1.929	1.926	**1.936**
Plant(III)	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	1.953	**1.953**
Division Process	1.950	1.934	1.944	1.949	1.948	1.946	1.946	1.943	1.946	1.949	1.945	1.950	1.946	1.952	1.951	1.951	1.944	1.940	1.943	1.944	**1.946**
Recycling	6.132	6.086	6.134	6.120	6.077	6.117	6.138	6.121	6.131	6.157	6.097	6.129	6.077	6.146	6.145	6.124	6.139	6.123	6.062	6.089	**6.117**
Number Switched Off																					
Coal Processing	3.599	3.659	3.606	3.691	3.748	3.574	3.590	3.700	3.641	3.545	3.616	3.720	3.616	3.508	3.546	3.702	3.603	3.601	3.716	3.624	**3.630**
Steam	1.818	1.690	1.732	1.750	1.784	1.630	1.732	1.824	1.773	1.771	1.655	1.795	1.799	1.678	1.645	1.711	1.728	1.796	1.739	1.862	**1.746**
Gas Production	4.891	5.222	5.159	5.463	5.358	4.871	4.945	5.201	5.178	4.801	5.009	5.225	5.072	4.661	4.934	5.302	5.050	5.070	5.590	5.104	**5.105**
Temperature Regulation	1.246	1.270	1.252	1.278	1.320	1.217	1.245	1.260	1.272	1.208	1.252	1.267	1.254	1.212	1.224	1.267	1.226	1.242	1.308	1.267	**1.254**
Oxygen A	0.197	0.209	0.202	0.235	0.286	0.160	0.204	0.212	0.232	0.168	0.200	0.237	0.221	0.177	0.189	0.233	0.186	0.187	0.252	0.225	**0.211**
Oxygen B	0.325	0.331	0.319	0.363	0.407	0.294	0.324	0.331	0.347	0.289	0.325	0.354	0.345	0.297	0.312	0.356	0.303	0.308	0.372	0.339	**0.332**
Oxygen C	1.190	1.197	1.205	1.233	1.276	1.166	1.189	1.209	1.218	1.156	1.201	1.218	1.209	1.169	1.183	1.217	1.177	1.190	1.247	1.213	**1.203**
Plant(I)	0.004	0.024	0.008	0.007	0.029	0.007	0.007	0.012	0.009	0.005	0.011	0.013	0.011	0.003	0.005	0.022	0.010	0.012	0.011	0.020	**0.012**
Plant(II) A	0.206	0.231	0.223	0.200	0.195	0.203	0.206	0.213	0.206	0.201	0.221	0.170	0.184	0.172	0.161	0.195	0.210	0.222	0.198	0.213	**0.201**
Plant(II) B	0.012	0.035	0.019	0.017	0.038	0.022	0.019	0.023	0.021	0.013	0.021	0.024	0.017	0.010	0.012	0.031	0.021	0.021	0.028	0.032	**0.022**
Plant(III)	0.046	0.039	0.042	0.045	0.045	0.046	0.044	0.043	0.045	0.047	0.046	0.047	0.044	0.046	0.047	0.046	0.046	0.040	0.041	0.043	**0.044**
Division Process	0.046	0.056	0.052	0.049	0.048	0.048	0.048	0.051	0.049	0.047	0.049	0.047	0.050	0.048	0.047	0.049	0.049	0.055	0.053	0.049	**0.050**
Recycling	1.468	1.514	1.466	1.480	1.523	1.483	1.462	1.479	1.469	1.443	1.503	1.471	1.523	1.454	1.455	1.476	1.461	1.477	1.538	1.511	**1.483**

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Secondary Plants: Throughput, Number Available, Number Switched On/Off (ton/h, MW/h, m^3/h, nm^3/h, number)

Throughput	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean
Steam (Extra - Elec)	711.540	713.412	711.776	711.228	713.345	711.096	706.566	708.163	711.605	713.375	713.348	712.933	713.462	711.424	713.208	709.360	711.824	712.907	712.619	713.193	**711.819**
Electricity Generation	167.421	167.862	167.477	167.348	167.846	167.317	166.251	166.627	167.436	167.853	167.847	167.749	167.873	167.394	167.814	166.908	167.488	167.743	167.675	167.810	**167.487**
Plant(IV) A	20.763	20.658	20.730	20.607	20.444	20.836	20.747	20.696	20.666	20.894	20.705	20.602	20.621	20.859	20.652	20.671	20.816	20.655	20.489	20.649	**20.688**
Plant(IV) B	20.763	20.658	20.730	20.607	20.444	20.836	20.747	20.696	20.666	20.894	20.705	20.602	20.621	20.859	20.652	20.671	20.816	20.655	20.489	20.649	**20.688**
Plant(IV) C	20.763	20.658	20.730	20.607	20.444	20.836	20.747	20.696	20.666	20.894	20.705	20.602	20.621	20.859	20.652	20.671	20.816	20.655	20.489	20.649	**20.688**
Plant(V)	38.290	38.343	38.364	38.557	37.875	37.774	38.046	38.592	38.708	38.436	38.636	37.488	38.501	38.032	38.071	36.665	38.644	38.768	37.934	38.644	**38.218**
Number Available																					
Electricity Generation	3.996	3.997	3.996	3.996	3.996	3.997	3.995	3.995	3.995	3.996	3.996	3.998	3.997	3.995	3.997	3.997	3.996	3.998	3.997	3.995	**3.996**
Plant(IV) A	4.000	4.000	4.000	3.999	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	4.000	**4.000**
Plant(IV) B	1.999	2.000	2.000	1.999	2.000	1.999	1.999	2.000	2.000	1.999	2.000	1.999	1.999	2.000	2.000	1.998	1.999	1.999	1.999	2.000	**1.999**
Plant(IV) C	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997	1.000	1.000	0.992	1.000	1.000	0.994	1.000	1.000	**0.999**
Plant(V)	7.336	7.379	7.616	7.735	7.419	7.188	7.100	7.624	7.717	7.208	7.548	7.171	7.510	7.488	7.329	6.790	7.400	7.599	7.421	7.597	**7.409**
Number Switched On																					
Electricity Generation	3.996	3.997	3.989	3.996	3.996	3.995	3.966	3.977	3.988	3.996	3.996	3.997	3.997	3.994	3.997	3.994	3.989	3.998	3.995	3.995	**3.992**
Plant(IV) A	3.893	3.876	3.891	3.891	3.873	3.888	3.889	3.888	3.889	3.895	3.889	3.874	3.891	3.901	3.866	3.877	3.887	3.864	3.879	3.879	**3.884**
Plant(IV) B	1.951	1.953	1.953	1.952	1.953	1.952	1.951	1.953	1.953	1.952	1.953	1.946	1.951	1.953	1.936	1.951	1.951	1.940	1.952	1.953	**1.950**
Plant(IV) C	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.997	1.000	1.000	0.992	1.000	1.000	0.994	1.000	1.000	**0.999**
Plant(V)	6.795	6.839	6.855	6.897	6.685	6.635	6.663	6.908	6.942	6.779	6.897	6.575	6.829	6.742	6.700	6.457	6.841	6.893	6.679	6.888	**6.775**
Number Switched Off																					
Electricity Generation	0.000	0.000	0.008	0.000	0.000	0.002	0.030	0.018	0.007	0.000	0.000	0.001	0.000	0.001	0.000	0.003	0.007	0.000	0.001	0.000	**0.004**
Plant(IV) A	0.107	0.124	0.109	0.108	0.127	0.112	0.111	0.112	0.111	0.104	0.111	0.126	0.109	0.099	0.134	0.123	0.113	0.136	0.121	0.121	**0.116**
Plant(IV) B	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.047	0.053	0.047	0.047	0.064	0.047	0.047	0.060	0.047	0.047	**0.049**
Plant(IV) C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Plant(V)	0.542	0.541	0.761	0.838	0.734	0.553	0.438	0.716	0.774	0.429	0.651	0.596	0.681	0.745	0.630	0.332	0.559	0.706	0.741	0.709	**0.634**
Throughput																					
Oxygen Extra A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Oxygen Extra B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Oxygen Extra C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Number Available																					
Oxygen Extra A	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Oxygen Extra B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Oxygen Extra C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Number Switched On																					
Oxygen Extra A	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Oxygen Extra B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Oxygen Extra C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Number Switched Off																					
Oxygen Extra A	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Oxygen Extra B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Oxygen Extra C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**

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Tank and Flares, Throughput (Tertiary Plants), Time "Bottleneck" (m^3, nm^3, m^3/h, nm^3/h, %)

Tanks (Mean Volume)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean
Plant(IV) Tank	1002.8	1000.2	1000.1	1002.4	1000.2	1001.6	1002.3	1000.0	1000.0	1001.6	1000.0	1004.7	1002.0	1000.1	1011.3	1003.1	1001.8	1007.5	1001.8	1000.1	**1002.2**
Flares (Volume - Accumulated Throughput)																					
Flare A	1573.2	0.0	0.0	1862.1	0.0	1666.4	1523.4	0.0	0.0	1345.1	0.0	24342.5	2199.2	0.0	61325.2	2088.4	3151.2	42606.8	1607.8	0.0	**7264.6**
Flare B	18334.6	10896.7	14166.9	2217.6	12805.6	37129.4	24480.9	5770.2	817.0	21123.4	4974.6	36162.7	4656.9	30702.9	27682.5	60205.1	11216.1	4971.5	13775.4	1734.9	**17191.2**
Flare C1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Flare C2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Flare C3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Flare C4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Flare C5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Flare C6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Flares (Rate - Throughput)																					
Flare A	0.182	0.000	0.000	0.216	0.000	0.193	0.176	0.000	0.000	0.156	0.000	2.817	0.255	0.000	7.098	0.242	0.365	4.931	0.186	0.000	**0.841**
Flare B	2.122	1.261	1.640	0.257	1.482	4.297	2.833	0.668	0.095	2.445	0.576	4.185	0.539	3.554	3.204	6.968	1.298	0.575	1.594	0.201	**1.990**
Flare C1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Flare C2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Flare C3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Flare C4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Flare C5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Flare C6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Throughput																					
Sub(I)	17.837	17.743	17.804	17.703	17.559	17.899	17.823	17.775	17.750	17.948	17.783	17.753	17.716	17.915	17.885	17.758	17.885	17.843	17.601	17.735	**17.786**
Sub(II)	12.486	12.420	12.463	12.392	12.291	12.529	12.476	12.443	12.425	12.564	12.448	12.427	12.401	12.541	12.519	12.431	12.520	12.490	12.321	12.414	**12.450**
Sub(III)	5.663	5.633	5.652	5.620	5.574	5.682	5.658	5.643	5.635	5.698	5.645	5.636	5.624	5.687	5.678	5.638	5.678	5.665	5.588	5.630	**5.646**
Sub(IV)	1.133	1.127	1.131	1.124	1.115	1.137	1.132	1.129	1.127	1.140	1.129	1.127	1.125	1.138	1.136	1.128	1.136	1.133	1.118	1.126	**1.129**
Sub(V)	4954.3	4928.2	4945.3	4917.1	4877.1	4971.7	4950.4	4937.2	4930.1	4985.2	4939.3	4931.0	4920.7	4976.1	4967.7	4932.5	4967.9	4956.1	4888.8	4926.0	**4940.1**
Sub(VI)	2595.1	2581.4	2590.4	2575.6	2554.7	2604.2	2593.1	2586.2	2582.5	2611.3	2587.3	2582.9	2577.5	2606.5	2602.1	2583.7	2602.2	2596.0	2560.8	2580.3	**2587.7**
Test Bottleneck Time (%)																					
Oxygen A	12.62	10.45	10.35	10.31	10.09	12.58	11.88	10.90	10.95	11.77	12.36	11.57	11.04	11.79	12.04	10.63	11.47	11.56	11.61	11.38	**11.37**
Oxygen B	1.49	1.37	1.82	1.27	0.82	1.61	1.23	2.11	1.52	1.58	1.87	0.74	0.46	1.49	0.59	0.91	1.02	1.87	2.28	1.61	**1.38**
Oxygen C	0.40	0.34	0.26	0.32	0.31	0.45	0.27	0.18	0.35	0.69	0.36	0.27	0.44	0.25	0.29	0.42	0.19	0.16	0.23	0.25	**0.32**

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Number Failures Repaired, Services Completed (number)

Failure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean	
Coal Processing	340	328	350	333	341	321	366	318	349	338	349	305	351	352	355	315	336	326	331	342	**337.30**	
Steam	20	29	22	25	26	33	24	19	23	23	31	25	25	26	28	27	25	22	27	18	**24.90**	
Gas Production	371	356	348	325	369	357	357	334	357	371	365	349	361	372	362	334	338	339	322	359	**352.30**	
Temperature Regulation	9	7	10	13	16	10	10	15	8	12	10	17	18	13	9	13	8	11	8	10	**11.35**	
Oxygen A	57	44	43	52	40	60	41	41	35	42	59	46	46	40	52	50	46	42	47	42	**46.25**	
Oxygen B	6	6	9	5	4	6	5	8	6	6	7	5	2	5	3	4	5	8	9	7	**5.80**	
Oxygen C	86	85	64	69	65	74	87	70	71	86	64	79	61	71	55	79	58	63	81	73	**72.05**	
Electricity Generation	24	22	22	24	21	18	26	30	30	23	23	14	19	31	20	20	22	15	28	24	**22.80**	
Plant(I)	4	5	5	3	3	8	4	4	5	2	4	3	1	3	1	3	4	3	9	5	**3.95**	
Plant(II) A	4	4	3	7	9	3	3	4	5	1	4	7	9	4	5	6	2	2	9	5	**4.80**	
Plant(II) B	2	0	3	2	0	1	1	0	3	0	1	2	0	1	1	0	3	0	3	2	**1.25**	
Plant(III)	1	5	3	2	2	1	2	3	2	0	1	0	2	1	0	1	1	5	3	4	**1.95**	
Division Process	2	4	1	1	2	2	3	4	2	2	2	1	2	0	1	0	2	2	1	2	**1.80**	
Plant(IV) A	0	0	1	4	0	0	0	0	0	2	2	0	0	0	1	1	3	1	0	3	**0.90**	
Plant(IV) B	3	0	0	2	0	1	3	0	0	2	1	1	2	0	0	4	1	1	2	0	**1.15**	
Plant(IV) C	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	2	0	0	**0.30**	
Plant(V)	13	13	7	6	12	13	16	8	7	15	10	13	10	8	11	16	13	9	11	10	**11.05**	
Oxygen Extra C	9	9	6	6	6	4	12	11	7	4	12	5	6	8	6	12	11	4	4	6	**7.40**	907.30
Service																						
Coal Processing	356	361	357	355	357	358	349	358	358	354	359	354	355	360	356	358	356	356	352	360	**356.45**	
	54	53	51	56	55	55	54	56	56	54	52	56	55	55	56	55	56	55	56	53	**54.65**	
	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	**10.00**	
Steam	51	54	53	51	53	52	51	53	53	53	54	52	54	54	54	50	53	52	51	53	**52.55**	
Temperature Regulation	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	**2.00**	
Oxygen A	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	**36.00**	
Oxygen B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Oxygen C	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	**42.00**	
Electricity Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Plant(I)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	**2.00**	
Plant(II) A	47	47	48	47	44	47	48	48	47	48	48	47	48	46	48	48	47	48	47	47	**47.25**	
	16	16	16	18	16	15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	**16.05**	
	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	**8.00**	
Plant(II) B	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**1.00**	
Recycling	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	**16.00**	
Oxygen Extra A	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**1.00**	
Oxygen Extra B	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**1.00**	
Oxygen Extra C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**1.00**	646.95

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Number Services Missed, Evaluations (number)

Missed	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean	
Coal Processing	344	337	343	345	343	342	351	340	340	340	341	346	343	340	342	342	342	338	346	340	**342.25**	
	44	45	47	42	43	43	44	42	42	44	46	42	43	43	42	43	42	43	42	45	**43.35**	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Steam	3	0	1	3	1	2	3	1	1	1	0	2	0	0	0	4	1	2	3	1	**1.45**	
Temperature Regulation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Oxygen A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Oxygen B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Oxygen C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Electricity Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Plant(I)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Plant(II) A	49	49	48	49	52	49	48	48	49	48	48	49	48	50	48	48	49	48	49	49	**48.75**	
	8	8	8	6	8	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	**7.95**	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Plant(II) B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Recycling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Oxygen Extra A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Oxygen Extra B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
Oxygen Extra C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	443.75
Evaluation																						
Completed	3347	3288	3232	3202	3269	3270	3348	3195	3266	3295	3334	3188	3276	3326	3286	3213	3200	3155	3230	3271	**3259.55**	
Module Extra	1594	1565	1540	1519	1559	1556	1596	1517	1557	1572	1588	1515	1559	1583	1560	1527	1522	1500	1532	1559	**1551.00**	
Module Removed	1	3	2	7	2	3	2	3	3	2	6	3	4	3	3	5	4	2	5	2	**3.25**	
Evaluator Extra	226	223	218	226	220	225	223	227	219	218	222	225	222	226	229	224	222	224	228	221	**223.40**	
Evaluator Removed	1526	1497	1472	1450	1488	1486	1527	1448	1487	1503	1518	1445	1491	1514	1494	1457	1452	1429	1465	1489	**1481.90**	
Removed	1601	1574	1548	1530	1565	1563	1604	1525	1564	1579	1598	1522	1568	1590	1572	1536	1531	1506	1544	1564	**1559.20**	
Returned	1595	1568	1542	1526	1561	1559	1598	1520	1560	1574	1594	1518	1563	1586	1563	1532	1526	1502	1537	1561	**1554.25**	
Multiple	49	50	50	50	49	50	49	50	49	49	50	50	50	50	50	50	50	50	50	50	**49.75**	
Destroyed	1596	1569	1543	1527	1562	1560	1599	1521	1561	1575	1595	1519	1564	1587	1564	1533	1527	1503	1538	1562	**1555.25**	
1	1474	1448	1421	1406	1437	1437	1476	1399	1438	1452	1471	1396	1443	1466	1444	1409	1403	1378	1418	1440	**1432.80**	
2	43	41	42	40	42	41	42	41	41	42	43	41	41	40	42	42	42	42	41	40	**41.45**	
3	5	6	6	6	6	6	6	6	6	7	5	6	7	6	6	7	6	6	6	6	**6.05**	
4	4	4	4	4	4	4	4	4	4	3	4	4	3	4	4	3	4	4	4	4	**3.85**	
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	
9	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.05**	
10	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	**0.95**	
10+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**	

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Number Times “Bottleneck” (number)

No Bottleneck	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean
Coal Processing	0.00	1.00	1.00	20.00	9.00	0.00	6.00	0.00	0.00	0.00	4.00	0.00	8.00	11.00	3.00	1.00	1.00	0.00	1.00	0.00	**3.30**
Steam	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Gas Production	38.00	15.00	53.00	14.00	91.00	15.00	68.00	46.00	84.00	22.00	42.00	29.00	45.00	34.00	50.00	13.00	45.00	34.00	45.00	74.00	**42.85**
Temperature Regulation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Oxygen A	458.00	409.50	401.00	380.50	371.00	453.50	446.50	367.00	410.00	448.33	456.00	378.50	395.00	424.50	397.00	379.50	411.00	397.00	375.50	391.50	**407.54**
Oxygen B	62.00	37.50	92.50	81.00	44.00	34.00	25.00	71.50	32.00	52.33	44.50	29.50	4.00	58.00	8.00	26.00	42.00	40.00	97.50	45.50	**46.34**
Oxygen C	18.00	11.00	10.50	9.50	8.00	15.50	7.50	3.50	14.00	29.33	11.50	11.00	15.00	8.50	9.00	15.50	6.00	7.00	10.00	11.00	**11.57**
Plant(I)	1029.00	977.00	1023.00	963.00	888.00	1036.00	1065.00	1002.00	996.00	1053.00	984.00	1048.00	794.00	1067.00	1020.00	1038.00	1003.00	1049.00	852.00	953.00	**992.00**
Plant(II) A	1721.00	1757.00	1627.00	1714.00	1842.00	1683.00	1703.00	1667.00	1697.00	1671.00	1745.00	1663.00	1988.00	1720.00	1795.00	1735.00	1634.00	1579.00	1814.00	1758.00	**1725.65**
Plant(II) B	2.00	0.00	3.00	4.00	0.00	2.00	1.00	0.00	4.00	0.00	2.00	2.00	0.00	1.00	1.00	0.00	4.00	0.00	9.00	3.00	**1.90**
Plant(III)	8.00	41.00	8.00	6.00	2.00	4.00	3.00	22.00	12.00	0.00	5.00	0.00	13.00	1.00	0.00	4.00	11.00	29.00	19.00	14.00	**10.10**
Division Process	10.00	38.00	12.00	9.00	13.00	26.00	22.00	15.00	16.00	18.00	39.00	26.00	13.00	0.00	2.00	0.00	42.00	19.00	6.00	20.00	**17.30**
Recycling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Service Correction																					
Correction Serv1	124	124	123	119	121	122	123	126	125	124	125	124	125	124	121	124	126	123	116	125	**123.20**
Correction Serv2	38	36	37	38	37	36	38	38	38	38	36	38	38	37	38	37	38	37	38	35	**37.30**
Correction Serv3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0.00**

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“Throughput Vector” (ton/h, nm^3/h, m^3/h, MW/h)

Product	From	To	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean
Coal	**-**	**Coal Processing**	1262.533	1255.883	1260.245	1253.048	1242.856	1266.961	1261.528	1258.174	1256.370	1270.409	1258.711	1256.578	1253.970	1268.084	1265.951	1256.972	1265.983	1262.979	1245.839	1255.310	**1258.919**
Coal (Coarse)	**Coal Processing**	**Gas Production**	852.210	847.721	850.665	845.807	838.928	855.199	851.532	849.268	848.049	857.526	849.630	848.190	846.430	855.957	854.517	848.456	854.538	852.511	840.941	847.335	**849.770**
Coal (Fine)	**Coal Processing**	**Steam**	374.542	373.475	374.109	372.539	370.782	375.382	373.534	373.101	373.284	376.459	374.047	373.541	373.089	375.666	375.514	373.046	375.298	374.854	371.279	373.322	**373.843**
Coal (Fine)	**Coal Processing**	**Slimesdam**	35.781	34.687	35.471	34.701	33.146	36.380	36.463	35.806	35.036	36.424	35.035	34.847	34.451	36.461	35.920	35.470	36.146	35.614	33.618	34.654	**35.306**
Water	**-**	**Water Treatment**	1858.896	1851.903	1856.059	1845.773	1834.263	1864.400	1852.291	1849.453	1850.652	1871.456	1855.651	1852.336	1849.376	1866.260	1865.266	1849.095	1863.849	1860.941	1837.519	1850.900	**1854.317**
Water	**Water Treatment**	**Steam**	2453.896	2446.903	2451.059	2440.773	2429.263	2459.400	2447.291	2444.453	2445.652	2466.456	2450.651	2447.336	2444.376	2461.260	2460.266	2444.095	2458.849	2455.941	2432.519	2445.900	**2449.317**
Steam	**Steam**	**Gas Production**	867.279	862.710	865.707	860.763	853.762	870.320	866.588	864.284	863.045	872.689	864.653	863.188	861.396	871.092	869.626	863.459	869.648	867.585	855.810	862.317	**864.796**
Steam	**Steam**	**Oxygen-A**	559.444	556.497	558.430	555.241	550.725	561.406	558.999	557.513	556.713	562.934	557.751	556.805	555.650	561.904	560.958	556.980	560.973	559.642	552.047	556.244	**557.843**
Steam	**Steam**	**Oxygen-C**	186.481	185.499	186.143	185.080	183.575	187.135	186.333	185.838	185.571	187.645	185.917	185.602	185.217	187.301	186.986	185.660	186.991	186.547	184.016	185.415	**185.948**
Steam	**Steam**	**Electricity Gntn**	711.540	713.412	711.776	711.228	713.345	711.096	706.566	708.163	711.605	713.375	713.348	712.933	713.462	711.424	713.208	709.360	711.824	712.907	712.619	713.193	**711.819**
Raw gas	**Gas Production**	**Temperature Rgln**	1336077.8	1329040.0	1333656.3	1326039.6	1315254.9	1340763.6	1335014.5	1331465.1	1329555.1	1344412.3	1332033.3	1329776.0	1327015.8	1341951.9	1339694.3	1330193.1	1339728.2	1336550.0	1318410.6	1328434.3	**1332253.3**
Raw gas	**Temperature Rgln**	**Plant(I)**	1336077.8	1329040.0	1333656.3	1326039.6	1315254.9	1340763.6	1335014.5	1331465.1	1329555.1	1344412.3	1332033.3	1329776.0	1327015.8	1341951.9	1339694.3	1330193.1	1339728.2	1336550.0	1318410.6	1328434.3	**1332253.3**
Gas-water	**Temperature Rgln**	**Plant(IV)-A**	855.090	850.586	853.540	848.665	841.763	858.089	854.409	852.138	850.915	860.424	852.501	851.057	849.290	858.849	857.404	851.324	857.426	855.392	843.783	850.198	**852.642**
Air	**Oxygen-A**	**Oxygen-B**	1435907.4	1428343.8	1433305.0	1425119.2	1413528.7	1440943.4	1434764.6	1430950.1	1428897.4	1444864.6	1431560.7	1429134.7	1426168.3	1442220.4	1439794.1	1429583.1	1439830.6	1436414.9	1416920.2	1427692.8	**1431797.2**
Oxygen	**Oxygen-B**	**Oxygen-C**	249885.2	248568.9	249432.3	248007.7	245990.7	250761.5	249686.3	249022.5	248665.2	251444.0	249128.7	248706.5	248190.3	250983.8	250561.6	248784.6	250567.9	249973.5	246580.9	248455.6	**249169.9**
Oxygen	**Oxygen-C**	**Gas Production**	185175.7	184200.3	184840.1	183784.4	182289.7	185825.1	185028.3	184536.4	184271.7	186330.8	184615.1	184302.3	183919.7	185989.8	185676.9	184360.1	185681.6	185241.1	182727.1	184116.3	**184645.6**
Oxygen	**Oxygen-C**	**Recycling**	64709.5	64368.6	64592.2	64223.3	63701.0	64936.4	64658.0	64486.1	64393.6	65113.2	64513.6	64404.3	64270.6	64994.0	64884.7	64424.5	64886.3	64732.4	63853.8	64339.3	**64524.3**
Electricity	**Electricity Gntn**	**-**	167.421	167.862	167.477	167.348	167.846	167.317	166.251	166.627	167.436	167.853	167.847	167.749	167.873	167.394	167.814	166.908	167.488	167.743	167.675	167.810	**167.487**
Pure gas	**Plant(I)**	**Plant(II)-A**	935254.5	930328.0	933559.4	928227.7	920678.4	938534.5	934510.1	932025.6	930688.6	941088.6	932423.3	930843.2	928911.1	939366.3	937786.0	931135.2	937809.8	935585.0	922887.4	929904.0	**932577.3**
Residue gas	**Plant(II)-A**	**Plant(II)-B**	471840.1	469354.7	470984.9	468295.1	464486.4	473494.9	471464.6	470211.1	469536.6	474783.4	470411.8	469614.6	468639.8	473914.5	473117.3	469761.9	473129.2	472006.8	465600.9	469140.8	**470489.5**
Chemical prdt	**Plant(II)-A**	**Sub(I)**	475.645	473.140	474.783	472.072	468.232	477.313	475.267	474.003	473.323	478.612	474.205	473.402	472.419	477.736	476.933	473.550	476.945	475.813	469.356	472.924	**474.284**
Residue gas	**Plant(II)-B**	**Plant(III)**	471840.1	469354.7	470984.9	468295.1	464486.4	473494.9	471464.6	470211.1	469536.6	474783.4	470411.8	469614.6	468639.8	473914.5	473117.3	469761.9	473129.2	472006.8	465600.9	469140.8	**470489.5**
Down gas	**Plant(III)**	**Division Process**	406962.1	404818.4	406224.5	403904.5	400619.5	408389.3	406638.2	405557.1	404975.3	409500.7	405730.1	405042.6	404201.8	408751.3	408063.6	405169.6	408074.0	407105.9	401580.7	404633.9	**405797.2**
H2	**Division Process**	**Plant(II)-A**	165144.0	164274.1	164844.7	163903.2	162570.2	165723.2	165012.5	164573.8	164337.7	166174.1	164644.1	164365.0	164023.9	165870.0	165591.0	164416.6	165595.2	165202.3	162960.2	164199.2	**164671.3**
CH4	**Division Process**	**Recycling**	141552.0	140806.4	141295.4	140488.5	139345.9	142048.4	141439.3	141063.3	140860.9	142435.0	141123.5	140884.3	140591.9	142174.3	141935.1	140928.5	141938.7	141602.0	139680.2	140742.2	**141146.8**
C2	**Division Process**	**Sub(V)**	12385.8	12320.6	12363.3	12292.7	12192.8	12429.2	12375.9	12343.0	12325.3	12463.1	12348.3	12327.4	12301.8	12440.3	12419.3	12331.2	12419.6	12390.2	12222.0	12314.9	**12350.3**
C2	**Division Process**	**Sub(VI)**	6487.8	6453.6	6476.0	6439.1	6386.7	6510.6	6482.6	6465.4	6456.1	6528.3	6468.2	6457.2	6443.8	6516.3	6505.4	6459.2	6505.5	6490.1	6402.0	6450.7	**6469.2**
Condensate	**Division Process**	**Plant(V)**	129.756	129.072	129.521	128.781	127.734	130.211	129.653	129.308	129.123	130.565	129.363	129.144	128.876	130.326	130.107	129.184	130.110	129.802	128.040	129.014	**129.385**
Recycled gas	**Recycling**	**Plant(II)-A**	374101.8	372131.2	373423.8	371291.1	368271.4	375413.8	373804.1	372810.2	372275.4	376435.4	372969.3	372337.3	371564.4	375746.5	375114.4	372454.1	375123.9	374234.0	369155.0	371961.6	**373030.9**
NH3	**Plant(IV)-A**	**Plant(IV)-B**	20.763	20.658	20.730	20.607	20.444	20.836	20.747	20.696	20.666	20.894	20.705	20.602	20.621	20.859	20.652	20.671	20.816	20.655	20.489	20.649	**20.688**
Tar acid	**Plant(IV)-A**	**-**	3.664	3.646	3.658	3.636	3.608	3.677	3.661	3.652	3.647	3.687	3.654	3.636	3.639	3.681	3.644	3.648	3.673	3.645	3.616	3.644	**3.651**
NH3	**Plant(IV)-B**	**Plant(IV)-C**	20.763	20.658	20.730	20.607	20.444	20.836	20.747	20.696	20.666	20.894	20.705	20.602	20.621	20.859	20.652	20.671	20.816	20.655	20.489	20.649	**20.688**
NH3	**Plant(IV)-C**	**-**	20.763	20.658	20.730	20.607	20.444	20.836	20.747	20.696	20.666	20.894	20.705	20.602	20.621	20.859	20.652	20.671	20.816	20.655	20.489	20.649	**20.688**
Alcohol	**Sub(I)**	**Sub(II)**	17.837	17.743	17.804	17.703	17.559	17.899	17.823	17.775	17.750	17.948	17.783	17.753	17.716	17.915	17.885	17.758	17.885	17.843	17.601	17.735	**17.786**
Carbonyl	**Sub(I)**	**Sub(III)**	11.891	11.828	11.870	11.802	11.706	11.933	11.882	11.850	11.833	11.965	11.855	11.835	11.810	11.943	11.923	11.839	11.924	11.895	11.734	11.823	**11.857**
Ethanol	**Sub(II)**	**-**	12.486	12.420	12.463	12.392	12.291	12.529	12.476	12.443	12.425	12.564	12.448	12.427	12.401	12.541	12.519	12.431	12.520	12.490	12.321	12.414	**12.450**
Propanol	**Sub(II)**	**-**	5.351	5.323	5.341	5.311	5.268	5.370	5.347	5.333	5.325	5.384	5.335	5.326	5.315	5.375	5.365	5.327	5.366	5.353	5.280	5.320	**5.336**
Acetone	**Sub(III)**	**-**	5.663	5.633	5.652	5.620	5.574	5.682	5.658	5.643	5.635	5.698	5.645	5.636	5.624	5.687	5.678	5.638	5.678	5.665	5.588	5.630	**5.646**
MEK	**Sub(III)**	**-**	3.397	3.379	3.391	3.372	3.344	3.409	3.395	3.386	3.381	3.418	3.387	3.381	3.374	3.412	3.406	3.382	3.407	3.398	3.352	3.378	**3.388**
Aldehyde	**Sub(III)**	**Sub(IV)**	2.265	2.253	2.261	2.248	2.230	2.273	2.263	2.257	2.254	2.279	2.258	2.255	2.250	2.275	2.271	2.255	2.271	2.266	2.235	2.252	**2.259**
Methanol	**Sub(III)**	**-**	0.553	0.550	0.552	0.549	0.544	0.555	0.552	0.551	0.550	0.556	0.551	0.550	0.549	0.555	0.554	0.551	0.554	0.553	0.546	0.550	**0.551**
Heavy aldehyde	**Sub(IV)**	**-**	1.133	1.127	1.131	1.124	1.115	1.137	1.132	1.129	1.127	1.140	1.129	1.127	1.125	1.138	1.136	1.128	1.136	1.133	1.118	1.126	**1.129**
N-Butanol	**Sub(IV)**	**-**	0.838	0.834	0.837	0.832	0.825	0.841	0.837	0.835	0.834	0.843	0.836	0.834	0.832	0.842	0.840	0.834	0.840	0.838	0.827	0.833	**0.836**

Product	From	To	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Mean
Ethane	**Sub(V)**	**-**	4954.3	4928.2	4945.3	4917.1	4877.1	4971.7	4950.4	4937.2	4930.1	4985.2	4939.3	4931.0	4920.7	4976.1	4967.7	4932.5	4967.9	4956.1	4888.8	4926.0	**4940.1**
Ethylene	**Sub(V)**	**-**	9.413	9.364	9.396	9.342	9.267	9.446	9.406	9.381	9.367	9.472	9.385	9.369	9.349	9.455	9.439	9.372	9.439	9.417	9.289	9.359	**9.386**
Ethane	**Sub(VI)**	**-**	2595.1	2581.4	2590.4	2575.6	2554.7	2604.2	2593.1	2586.2	2582.5	2611.3	2587.3	2582.9	2577.5	2606.5	2602.1	2583.7	2602.2	2596.0	2560.8	2580.3	**2587.7**
Petrol	**Sub(VI)**	**-**	3.893	3.872	3.886	3.863	3.832	3.906	3.890	3.879	3.874	3.917	3.881	3.874	3.866	3.910	3.903	3.876	3.903	3.894	3.841	3.870	**3.882**
Butene	**Sub(VI)**	**-**	2.595	2.581	2.590	2.576	2.555	2.604	2.593	2.586	2.582	2.611	2.587	2.583	2.578	2.607	2.602	2.584	2.602	2.596	2.561	2.580	**2.588**
C5C6	**Plant(V)**	**-**	38.290	38.343	38.364	38.557	37.875	37.774	38.046	38.592	38.708	38.436	38.636	37.488	38.501	38.032	38.071	36.665	38.644	38.768	37.934	38.644	**38.218**
Petrol	**Plant(V)**	**-**	39.822	39.877	39.899	40.100	39.390	39.285	39.568	40.136	40.257	39.974	40.182	38.987	40.041	39.553	39.594	38.131	40.189	40.319	39.451	40.190	**39.747**
Diesel	**Plant(V)**	**-**	39.822	39.877	39.899	40.100	39.390	39.285	39.568	40.136	40.257	39.974	40.182	38.987	40.041	39.553	39.594	38.131	40.189	40.319	39.451	40.190	**39.747**
C3	**Plant(V)**	**-**	5.105	5.112	5.115	5.141	5.050	5.037	5.073	5.146	5.161	5.125	5.151	4.998	5.133	5.071	5.076	4.889	5.152	5.169	5.058	5.153	**5.096**
Heavy polymer	**Plant(V)**	**-**	5.105	5.112	5.115	5.141	5.050	5.037	5.073	5.146	5.161	5.125	5.151	4.998	5.133	5.071	5.076	4.889	5.152	5.169	5.058	5.153	**5.096**
C4	**Plant(V)**	**-**	7.658	7.669	7.673	7.711	7.575	7.555	7.609	7.718	7.742	7.687	7.727	7.498	7.700	7.606	7.614	7.333	7.729	7.754	7.587	7.729	**7.644**
Electricity	**-**	**Oxygen Extra-A**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
(Air)	**Oxygen Extra-A**	**Oxygen Extra-B**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
(Oxygen)	**Oxygen Extra-B**	**Oxygen Extra-C**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
(Oxygen)	**Oxygen Extra-C**	**Gas Prod/Recyc**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Electricity	**-**	**Oxygen Extra-C**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**
Steam (Total)	**Steam**	**Gas/Oxy-A, -C/Ele**	2324.744	2318.118	2322.056	2312.311	2301.407	2329.958	2318.487	2315.797	2316.933	2336.643	2321.669	2318.529	2315.725	2331.720	2330.778	2315.459	2329.436	2326.681	2304.492	2317.168	**2320.406**
Oxygen (Total)	**Oxygen-C**	**Gas Prod/Recyc**	249885.2	248568.9	249432.3	248007.7	245990.7	250761.5	249686.3	249022.5	248665.2	251444.0	249128.7	248706.5	248190.3	250983.8	250561.6	248784.6	250567.9	249973.5	246580.9	248455.6	**249169.9**

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Resource Utilisation (%)

Simulation Object	Run 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	-95%	Average	95%
Coal Processing Service	47.0313	47.0660	46.9629	47.0275	47.0339	47.0762	46.8887	47.0646	47.0930	47.0054	46.9758	47.0306	46.7753	46.7925	47.0635	47.0661	46.9035	47.0470	46.9863	46.9974	46.9522	46.9944	47.0365
Coal Processing Repair	33.8188	32.9086	35.5595	33.5223	34.4666	31.9782	36.6712	31.2682	35.4113	33.9351	34.6030	30.7446	35.3097	34.8707	35.3326	31.5291	33.5261	33.0604	33.3188	34.6186	33.0833	33.8227	34.5621
Steam Service	20.0689	21.2076	20.8559	19.9945	20.5791	20.3747	19.8600	20.8559	20.6156	20.8559	21.2364	20.4624	21.2494	21.2494	20.9212	19.2546	20.8559	20.1675	19.8292	20.8559	20.3070	20.5675	20.8280
Steam Repair	24.1495	37.3136	27.3959	32.1866	31.3513	36.8966	31.4685	23.8041	27.2478	26.2713	35.4407	27.9394	25.8780	31.0686	37.1455	31.0843	29.1926	26.2839	33.4524	22.8820	27.7973	29.9226	32.0480
Gas Production Repair	63.9469	58.5595	58.3266	54.1892	63.8738	59.5347	59.7077	56.6114	59.3060	61.9321	62.0220	59.3036	61.8933	64.4380	61.2601	55.6967	56.7088	57.8569	55.9956	58.9839	58.1457	59.5073	60.8690
Temperature Regulation Service	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222
Temperature Regulation Repair	0.4574	0.2807	0.5474	0.6992	0.8352	0.4972	0.4377	0.7550	0.4256	0.6612	0.5501	0.8140	0.8434	0.6880	0.4521	0.6255	0.3881	0.5865	0.4187	0.5096	0.4981	0.5736	0.6492
Oxygen A Service	9.9996	9.9996	9.9996	9.9889	9.9996	9.9996	9.9996	9.9996	9.9996	9.9813	9.9850	9.9996	9.9996	9.9996	9.9996	9.9996	9.9996	9.9996	9.9996	9.9983	9.9948	9.9973	9.9999
Oxygen A Repair	2.8984	2.4945	2.2767	2.6841	2.2461	3.3361	2.1789	1.9836	1.6173	2.2494	3.0810	2.2219	2.6014	1.9790	2.6246	2.2901	2.1917	2.3540	2.3248	1.8931	2.1848	2.3763	2.5679
Oxygen B Service	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Oxygen B Repair	1.4927	1.7139	2.4563	1.2673	1.0926	1.6099	1.3912	2.1174	1.6543	1.5782	1.8717	1.3365	0.5372	1.4888	0.8823	0.9591	1.2981	2.1856	2.5203	1.8989	1.3275	1.5676	1.8077
Oxygen C Service	11.6662	11.6555	11.6662	11.6639	11.6662	11.6567	11.6662	11.6662	11.6662	11.6662	11.6662	11.6662	11.6237	11.6662	11.6662	11.6662	11.6662	11.6662	11.6662	11.6662	11.6584	11.6629	11.6675
Oxygen C Repair	3.2239	3.3609	2.2396	2.5705	2.4090	2.7193	3.1420	2.6193	2.8389	3.2106	2.5611	3.2183	2.5197	2.5691	2.0778	3.0661	2.2995	2.3006	3.2912	2.7749	2.5650	2.7506	2.9363
Plant(I) Service	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222	4.7222
Plant(I) Repair	0.5390	0.5637	0.5281	0.4443	0.3881	0.8567	0.5901	0.5465	0.6137	0.2985	0.4843	0.4623	0.1027	0.1697	0.1466	0.2523	0.5833	0.3294	1.2220	0.5645	0.3655	0.4843	0.6031
Plant(II) A Service	67.6038	68.3776	68.8879	68.6102	67.7769	67.2213	68.8879	68.8879	68.6102	68.8879	68.8820	68.5777	68.8346	68.3324	68.8879	67.2702	68.6102	68.8879	68.6102	68.6102	68.2060	68.4627	68.7195
Plant(II) A Repair	7.7778	7.7778	5.8333	14.0741	17.5000	5.8333	5.8333	7.7778	9.7222	1.9444	8.2138	13.6111	17.5000	7.7778	9.7222	11.6667	3.8889	3.8889	18.5098	9.7222	7.2136	9.4288	11.6439
Plant(II) B Service	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667	4.1667
Plant(II) B Repair	0.0564	0.0000	0.0922	0.0570	0.0000	0.0389	0.0236	0.0000	0.1032	0.0000	0.0463	0.0407	0.0000	0.0372	0.0227	0.0000	0.0658	0.0000	0.0854	0.0535	0.0203	0.0361	0.0520
Plant(III) Repair	0.1037	0.8350	0.5091	0.1752	0.2635	0.1158	0.3367	0.4047	0.2209	0.0000	0.1290	0.0000	0.3182	0.1122	0.0000	0.1434	0.1668	0.7349	0.5783	0.3881	0.1653	0.2768	0.3883
Division Process Repair	0.4167	1.0588	0.3333	0.2190	0.3627	0.5409	0.5414	0.6176	0.4860	0.3872	0.6281	0.2455	0.3874	0.0000	0.2063	0.0000	0.6395	0.5557	0.3812	0.7266	0.3209	0.4367	0.5525
Recycling Service	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998	39.9998
Electricity Generation Service	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Generation Repair	0.4157	0.3295	0.3525	0.4115	0.3669	0.3126	0.4686	0.5373	0.5070	0.3500	0.3651	0.2179	0.3014	0.4879	0.2605	0.2831	0.3874	0.2148	0.3460	0.4503	0.3255	0.3683	0.4111
Plant(IV) A Repair	0.0000	0.0000	0.0219	0.0591	0.0000	0.0000	0.0000	0.0000	0.0000	0.0406	0.0276	0.0000	0.0000	0.0000	0.0201	0.0124	0.0341	0.0196	0.0000	0.0357	0.0052	0.0136	0.0219
Plant(IV) B Repair	0.1350	0.0000	0.0000	0.1078	0.0000	0.0695	0.1315	0.0000	0.0000	0.0990	0.0281	0.0671	0.1357	0.0000	0.0000	0.1741	0.1081	0.0648	0.1210	0.0000	0.0338	0.0621	0.0903
Plant(IV) C Repair	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2982	0.0000	0.0000	0.8184	0.0000	0.0000	0.6163	0.0000	0.0000	0.0000	0.0867	0.1934
Plant(V) Repair	51.4703	50.8296	28.0392	24.7547	48.8149	52.4755	65.9336	33.2966	28.0813	63.2561	41.0978	54.7524	43.8369	31.4699	45.8983	64.9902	52.5670	34.3122	46.8198	39.8130	39.3086	45.1255	50.9423
Oxygen Extra A Service	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889
Oxygen Extra B Service	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889
Oxygen Extra C Service	3.8889	3.8889	3.7727	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8889	3.8709	3.8831	3.8952
Oxygen Extra C Repair	1.1199	1.4297	0.8057	0.7596	0.9155	0.5278	1.8676	1.3548	1.0694	0.6242	1.7275	0.7334	0.6900	0.8002	1.1664	2.0083	1.3259	0.4835	0.4703	0.6031	0.8060	1.0241	1.2423

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Comparison

8640 Simulation time

Service (Compare ((number of services completed*service time)/simulation time) with (resource utilisation))

Plant	Service	Service Time	Hours	H/Time	Util	% Delta
Coalp	356.45	1	356.45			
	54.65	2	109.3			
	10.00	336	3360			
		Total	3825.75	0.4428	0.4699	-2.7149
Steam	52.55	34	1786.7	0.2068	0.2057	0.1119
Tempr	2.00	408	816	0.0944	0.0944	0.0000
OxygA	36.00	24	864	0.1000	0.1000	0.0027
OxygB	0.00	336	0	0.0000	0.0000	0.0000
OxygC	42.00	24	1008	0.1167	0.1166	0.0037
Elecg	0.00	720	0	0.0000	0.0000	0.0000
Plan1	2.00	408	816	0.0944	0.0944	0.0000
Pla2A	47.25	24	1134			
	16.05	120	1926			
	8.00	360	2880			
		Total	5940	0.6875	0.6846	0.2873
Pla2B	1.00	360	360	0.0417	0.0417	0.0000
Recyc	16.00	216	3456	0.4000	0.4000	0.0002
OxyeA	1.00	336	336	0.0389	0.0389	0.0000
OxyeB	1.00	336	336	0.0389	0.0389	0.0000
OxyeC	1.00	336	336	0.0389	0.0388	0.0058

Failure (Compare ((number of failures repaired*repair time)/simulation time) with (resource utilisation))

Plant	Failure	Repair Time	Hour	H/Time	Util	% Delta
Coalp	337.30	8	2698.4	0.3123	0.3382	-2.5912
Steam	24.90	120	2988	0.3458	0.2992	4.6607
Gaspr	352.30	16	5636.8	0.6524	0.5951	5.7334
Tempr	11.35	3	34.05	0.0039	0.0057	-0.1795
OxygA	46.25	2	92.5	0.0107	0.0238	-1.3057
OxygB	5.80	24	139.2	0.0161	0.0157	0.0435
OxygC	72.05	1	72.05	0.0083	0.0275	-1.9167
Elecg	22.80	1	22.8	0.0026	0.0037	-0.1044
Plan1	3.95	6	23.7	0.0027	0.0048	-0.2100
Pla2A	4.80	168	806.4	0.0933	0.0943	-0.0954
Pla2B	1.25	1	1.25	0.0001	0.0004	-0.0217
Plan3	1.95	8	15.6	0.0018	0.0028	-0.0962
Divip	1.80	18	32.4	0.0038	0.0044	-0.0617
Pla4A	0.90	0.5	0.45	0.0001	0.0001	-0.0083
Pla4B	1.15	3	3.45	0.0004	0.0006	-0.0221
Pla4C	0.30	24	7.2	0.0008	0.0009	-0.0033
Plan5	11.05	336	3712.8	0.4297	0.4513	-2.1532
OxyeC	7.40	12	88.8	0.0103	0.0102	0.0036

Evaluations

Completed	3259.55	
Mod Extra	1551.00	Modules returned that removed no modules
Mod Rem	3.25	Modules returned that removed modules
Eva Extra	223.40	Evaluators that removed no modules
Eva Rem	1481.90	Evaluators that removed modules
Total	3259.55	
Removed	1559.20	
Returned	1554.25	
Multiple	49.75	
Destroyed	1555.25	

Number (Removed Histogram)

1	1432.80	1432.80
2	41.45	82.90
3	6.05	18.15
4	3.85	15.40
5	0.00	0.00
6	0.00	0.00
7	0.00	0.00
8	0.00	0.00
9	0.05	0.45
10	0.95	9.50
10+	0.00	
	Total	1559.20

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