

Input Reference2030wind50percentWithCHP

The EnergyPLAN model 7.20



Electricity demand (TWh/year):	Flexible demand	0.00				Capacities		Efficiencies		Regulation Strategy: Technical regulation no. 2				Fuel Price level:													
Fixed demand	49.00	Fixed imp/exp.	0.00			Group 2:	MW-e	MJ/s	elec.	Ther	COP		KEOL regulation		00000		Capacities Storage		Efficiencies								
Electric heating	0.00	Transportation	0.00			CHP	1350	1647	0.41	0.50	Heat Pump		Minimum Stabilisation share		0.00		MW-e	GWh	elec.	Ther.							
Electric cooling	0.00	Total	49.00			Heat Pump	0	0	3.50		Boiler		Stabilisation share of CHP		0.00		Hydro Pump:		0	1	0.68						
District heating (TWh/year)	Gr.1	Gr.2	Gr.3	Sum		Group 3:	7500		0.90		CHP		Minimum CHP gr 3 load		450 MW		Hydro Turbine:		0	2.44							
District heating demand	2.26	14.29	22.63	39.18		CHP	2000	2440	0.41	0.50	Heat Pump		Heat Pump maximum share		0.50		Electrol. Gr.2:		0	360	0.80	0.15					
Solar Thermal	0.02	0.00	0.00	0.02		Heat Pump	0	0	3.50		Boiler		Maximum import/export		0 MW		Electrol. Gr.3:		0	0	0.40	0.50					
Industrial CHP (CSHP)	0.00	0.00	1.73	1.73		Boiler	11300		0.90		Distr. Name :		Price_DKV_2005.txt		Dependency factor		0.00 DKK/MWh		Ely. MicroCHP:		0	0	0.80				
Demand after solar and CSHP	2.24	14.29	20.90	37.43		Condensing	8000	0.52		Heatstorage: gr.2: 40 GWh		gr.3: 10 GWh		Multiplication factor		1.00		CAES fuel ratio:		1.156		(TWh/year)		Coal	Oil	Ngas	Biomass
Wind	3100 MW	7.26	TWh/year	0.00	Grid	Fixed Boiler: gr.2: 2.5 Per cent	gr.3: 1.0 Per cent		Electricity prod. from		CSHP		Waste (TWh/year)		Dependency factor		0.00 DKK/MWh pr. MW		Average Market Price		277 DKK/MWh		Transport	0.00	69.20	0.00	0.00
Offshore Wind	4500 MW	17.23	TWh/year	0.00	stabilisation	Gr.1:	0.00 0.00		Gr.2:		0.00 0.00		Gr.3:		2.41 0.00		Household	0.01	6.72	8.55	7.29	Industry	3.37	26.92	18.19	5.18	
Photo Voltaic	0 MW	0	TWh/year	0.00	share											Various	0.00	3.01	19.73	0.00							
Wave Power	0 MW	0	TWh/year	0.00																							
Hydro Power	0 MW	0	TWh/year																								
Geothermal	0 MW	0	TWh/year																								

Output

District Heating										Electricity															Exchange				
Demand		Production								Consumption					Production					Balance					Payment				
Distr. heating	MW	Solar	CSHP	DHP	CHP	HP	ELT	Boiler	EH	Ba-lance	Elec. demand	Flexi-ble	Elec-trolyser	EH	Hydro Pump	Tur-bine	RES	Hy-dro	Geo-thermal	Waste+ CSHP	CHP	PP	Stab-Load %	Imp	Exp	CEEP	EEP	Imp	Exp
MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	%	MW	MW	MW	MW	Million DKK	Million DKK
January	7177	1	197	413	2541	0	0	4025	0	0	6305	0	0	0	0	0	3662	0	0	274	2083	408	100	0	122	122	0	0	0
February	7343	2	197	422	3360	0	0	3363	0	0	6237	0	0	0	0	0	2424	0	0	274	2753	848	100	0	63	63	0	0	0
March	6256	2	197	359	2952	0	0	2747	0	0	6004	0	0	0	0	0	2722	0	0	274	2419	696	100	0	108	108	0	0	0
April	5013	3	197	286	2265	0	0	2260	0	2	5291	0	0	0	0	0	3161	0	0	274	1856	232	100	0	233	233	0	0	0
May	3933	3	197	223	2857	0	0	650	0	2	5162	0	0	0	0	0	2068	0	0	274	2342	594	100	0	116	116	0	0	0
June	1782	3	197	100	1412	0	0	97	0	-26	5017	0	0	0	0	0	2461	0	0	274	1157	1344	100	0	219	219	0	0	0
July	1782	4	197	99	1401	0	0	67	0	14	4574	0	0	0	0	0	1890	0	0	274	1148	1390	100	0	128	128	0	0	0
August	1782	3	197	100	1429	0	0	73	0	-19	5263	0	0	0	0	0	2461	0	0	274	1171	1517	100	0	160	160	0	0	0
September	2736	3	197	155	2163	0	0	222	0	-3	5401	0	0	0	0	0	2397	0	0	274	1773	1118	100	0	161	161	0	0	0
October	4076	2	197	234	2365	0	0	1260	0	18	5602	0	0	0	0	0	3270	0	0	274	1938	489	100	0	369	369	0	0	0
November	5347	1	197	307	2392	0	0	2448	0	1	6054	0	0	0	0	0	3704	0	0	274	1961	446	100	0	331	331	0	0	0
December	6385	1	197	368	2673	0	0	3144	0	3	6056	0	0	0	0	0	3229	0	0	274	2190	618	100	0	256	256	0	0	0
Average	4460	2	197	255	2315	0	0	1692	0	-1	5578	0	0	0	0	0	2788	0	0	274	1897	808	100	0	189	189	0	0	Average price (DKK/MWh)
Maximum	12535	28	197	723	4088	0	0	9300	0	3097	8603	0	0	0	0	0	7564	0	0	274	3350	5258	100	0	4069	4069	0	0	362
Minimum	1561	0	197	76	549	0	0	66	0	-2043	2795	0	0	0	0	0	2	0	0	274	450	0	100	0	0	0	0	0	0
Total for the whole year																									Million DKK				
TWh/year	39.18	0.02	1.73	2.24	20.33	0.00	0.00	14.86	0.00	0.00	49.00	0.00	0.00	0.00	0.00	0.00	24.49	0.00	0.00	2.41	16.66	7.10	0.00	1.66	1.66	0.00	0	0	

FUEL BALANCE (TWh/year):																				Imp/Exp Corrected			CO2 emission (Mt):		
DHP	CHP2	CHP3	Boiler2	Boiler3	PP	Geo-th.	Hydro	Elc.ly.s	Waste	CAES	Wind	Offsh.	PV	Wave	Solar.Th	Transp.	househ.	Industry	Various	Total	Imp/Exp	Netto	Total	Netto	
Coal	0.04	1.44	2.31	0.14	0.18	-	-	-	-	-	-	-	-	-	-	-	-	0.01	3.37	-	12.47	-1.18	11.30	4.27	3.86
Oil	0.77	0.32	0.52	2.97	3.85	-	-	-	-	-	-	-	-	-	-	69.20	6.72	26.92	3.01	114.66	-0.09	114.57	30.55	30.52	
N.Gas	0.62	6.65	10.72	2.38	3.09	-	-	-	-	-	-	-	-	-	-	-	-	8.55	18.19	19.73	77.98	-1.90	76.08	15.92	15.53
Biomass	1.06	7.35	11.37	1.65	2.26	-	-	-	-	-	-	-	-	-	-	-	-	7.29	5.18	-	36.36	-0.02	36.34	0.00	0.00
Renewable	-	-	-	-	-	-	-	-	-	-	7.26	17.23	-	-	0.02	-	-	-	-	-	24.51	0.00	24.51	0.00	0.00
H2 etc.	-	0.00	0.00	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	
Geothermal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	
Total	2.49	15.76	24.92	7.13	9.38	-	-	-	-	-	7.26	17.23	-	-	0.02	69.20	22.57	53.66	22.74	265.98	-3.18	262.79	50.73	49.91	



District Heating Production

	Gr.1				Gr.2										Gr.3										RES specification						
	District heating		Solar	DHP	District heating		Solar	CSHP	CHP	HP	ELT	Boiler	EH	Storage	Bal-	District heating		Solar	CSHP	CHP	HP	ELT	Boiler	EH	Storage	Bal-	RES1	RES2	RES3	RES4	Total
	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
January	414	1	0	413	2618	0	0	927	0	0	1690	0	22966	0	4146	0	197	1614	0	0	2335	0	5492	0	743	2918	0	0	3662		
February	424	2	0	422	2678	0	0	1308	0	0	1370	0	22966	0	4241	0	197	2051	0	0	1993	0	5492	0	1095	1328	0	0	2424		
March	361	2	0	359	2282	0	0	1119	0	0	1163	0	22966	0	3614	0	197	1833	0	0	1583	0	5492	0	867	1855	0	0	2722		
April	289	3	0	286	1829	0	0	799	0	0	1028	0	22011	1	2896	0	197	1466	0	0	1232	0	3966	1	710	2451	0	0	3161		
May	227	3	0	223	1435	0	0	1136	0	0	294	0	20406	5	2272	0	197	1721	0	0	356	0	4602	-2	720	1348	0	0	2068		
June	103	3	0	100	650	0	0	615	0	0	59	0	16637	-24	1030	0	197	797	0	0	38	0	5569	-2	752	1709	0	0	2461		
July	103	4	0	99	650	0	0	599	0	0	41	0	27431	11	1030	0	197	803	0	0	26	0	5430	3	505	1384	0	0	1890		
August	103	3	0	100	650	0	0	623	0	0	41	0	25568	-13	1030	0	197	806	0	0	32	0	6099	-6	721	1739	0	0	2461		
September	158	3	0	155	998	0	0	917	0	0	84	0	26236	-3	1581	0	197	1246	0	0	138	0	5706	0	707	1690	0	0	2397		
October	235	2	0	234	1486	0	0	884	0	0	592	0	27990	10	2354	0	197	1481	0	0	668	0	6416	8	1192	2078	0	0	3270		
November	308	1	0	307	1950	0	0	858	0	0	1090	0	29876	2	3089	0	197	1534	0	0	1358	0	1688	0	1146	2558	0	0	3704		
December	368	1	0	368	2329	0	0	989	0	0	1339	0	30321	1	3688	0	197	1684	0	0	1805	0	3146	2	773	2457	0	0	3229		
Average	257	2	0	255	1627	0	0	897	0	0	731	0	24634	-1	2576	0	197	1418	0	0	961	0	4929	0	826	1962	0	0	2788		
Maximum	723	28	0	723	4572	0	0	1647	0	0	3888	0	40000	1472	7240	0	197	2440	0	0	5412	0	10000	1624	3100	4500	0	0	7564		
Minimum	90	0	0	76	569	0	0	0	0	0	41	0	0	-1102	902	0	197	549	0	0	26	0	-1070	0	0	0	0	0	2		
Total for the whole year																															
TWh/year	2.26	0.02	0.00	2.24	14.29	0.00	0.00	7.88	0.00	0.00	6.42	0.00	-0.01		22.63	0.00	1.73	12.46	0.00	0.00	8.44	0.00	0.00		7.26	17.23	0.00	0.00	24.49		

ANNUAL COSTS (Million DKK)

Total Fuel =	60456
Coal =	696
FuelOil =	8419
Gasoil/Diesel=	13572
Petrol/JP =	17399
Ngas =	14712
Biomass =	5659
Waste =	0
Maginal operation costs =	457
Total Electricity exchange =	0
Import =	0
Export =	0
Bottleneck =	0
Fixed imp/ex=	0
Total CO2 emission costs =	7609
Total variable costs =	68522
Fixed operation costs =	3261
Annual Investment costs =	9566
TOTAL ANNUAL COSTS =	81349