

Country: **Finland**

Total number of plants: 14
with co-firing: 4
fossil fuels for co-firing:

Locations (+database No.):

Forssa (42), Jyväskylä (43), Kaipola (44), Karstula (45), Kiuruvesi (46), Kokkolan (47),
Kuhmo (48), Kuusamo (49), Lahti (50), Lieksa (51), Oulu (52), Pieksämäki (53), Pietersaari
(54), Pursiala (55).

Year of construction	No.	
before 1995	6	43 %
1995 - 2000	6	43 %
after 2000	2	14 %
unknown	0	0 %

Type of power generation	No.		Fuels	No.*	
Steam turbine:	12	86 %	Woodchips (forest residues):	12	43 %
Steam engine:	2	14 %	Woodchips (saw industry):	2	7 %
Organic rankine cycle:	0	0 %	Paper sludge:	0	0 %
Stirling engine:	0	0 %	Waste wood:	0	0 %
Hot air engine:	0	0 %	Bark:	3	11 %
Gas engine:	0	0 %	Peat:	6	21 %
Gas turbine:	0	0 %	Straw:	0	0 %
Other (or n.a.):	0	0 %	Other (or n.a.):	5	18 %

Character of plants	No.		Electric power	No.	
Testing plants:	0	0 %	<1MW:	1	7 %
Pilote plants:	0	0 %	1MW - <5MW:	2	14 %
Demonstration plants:	3	21 %	5MW - 20MW:	4	29 %
Commercial plants:	11	79 %	>20MW:	7	50 %
unknown:	0	0 %	unknown:	0	0 %

*) double counting possible because some CHP plants might use more than one fuel

Name: CHP Forssa

Database No. 42

Basic Info	
Country:	Finland
Location:	Forssa
Character of plant:	Commercial plant
Owner:	Forssan Energia Oy
Contact Person:	Mr. R. Palonen
Telephone:	+35/ 83/ 41261
Fax:	+43/ 83/ 4126750
email:	n.a.
webpage:	www.forssanenergia.fi
Year of construction:	1998

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	130.000.000 t/a
Electric power:	17 MW _{el}	Tot. lower heating value:	2,37 kWh/kg
Thermal power:	48 MW _{th}	Moisture content:	n.a. % wet
Co-firing:	N		
Fuel conversion:	Combustion	Type of fuel 1:	Woodchips (forest residues)
Annual production electricity:	57 GWh/a	Share of fuel 1:	100 %
Annual production heat:	155 GWh/a	Input of fuel 1:	130.000.000 t/a
Electric efficiency:	23,2 %	Type of fuel 2:	-
Thermal efficiency:	64,9 %	Share of fuel 2:	- %
Total efficiency:	88,1 %	Input of fuel 2:	- t/a
Ratio electricity/ heat:	0,36	Type of fuel 3:	-
Fuel power:	74 MW _{fuel}	Share of fuel 3:	- %
<i>Boiler (if steam technology)</i>		Input of fuel3:	- t/a
Steam mass flow:	800 t/h		
Steam temperature:	510 °C		
Steam pressure:	61 bar		

Costs		Emissions	
Investment costs:	16,6 Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	0,96512 Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	n.a. €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employes:	n.a.	SO ₂ :	n.a. mg/Nm ³

Source:

Risto Impola, The Analysis Report of Plant No. 17, VTT Energy, 2000, www.agores.org

n.a.... not available

Name: CHP Rauhalampi

Database No. 43

Basic Info	
Country:	Finland
Location:	Jyväskylä
Character of plant:	Commercial plant
Owner:	Jyväskylä Energiantuotanto Oy
Contact Person:	Mr. Markku Hulkkonen
Telephone:	+35/ 814/ 36141
Fax:	+35/ 814/ 273913
email:	n.a.
webpage:	www.jenergia.fi
Year of construction:	1993

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	n.a. t/a
Electric power:	87 MW _{el}	Tot. lower heating value:	2,77 kWh/kg
Thermal power:	180 MW _{th}	Moisture content:	45 % wet
Co-firing:	Y		
Fuel conversion:	Combustion		
Annual production electricity:	400 GWh/a	Type of fuel 1:	Woodchips (forest residues)
Annual production heat:	1050 GWh/a	Share of fuel 1:	27 %
Electric efficiency:	29,5 %	Input of fuel 1:	n.a. t/a
Thermal efficiency:	61 %		
Total efficiency:	90,5 %	Type of fuel 2:	Peat, coal
Ratio electricity/ heat:	0,48	Share of fuel 2:	73 %
Fuel power:	295 MW _{fuel}	Input of fuel 2:	n.a. t/a
<i>Boiler (if steam technology)</i>			
Steam mass flow:	n.a. t/h	Type of fuel 3:	-
Steam temperature:	533 °C	Share of fuel 3:	- %
Steam pressure:	135 bar	Input of fuel3:	- t/a

Costs		Emissions	
Investment costs:	8,4 Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	0,10 Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	23 €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employees:	n.a.	SO ₂ :	n.a. mg/Nm ³

Source:

Timo Järvinen, The Analysis Report of Plant No. 1, VTT Energy, Brochure: "Growing power", Tekes, 2002

n.a.... not available

Name: Paper factory Kaipola

Database No. 44

Basic Info	
Country:	Finland
Location:	Kaipola
Character of plant:	Commercial plant
Owner:	UPM Kyemme Paper Mill
Contact Person:	Mrs. Evelyn-Yip Lindmön
Telephone:	+35/ 83241/ 2733
Fax:	+35/ 83241/ 3275
email:	n.a.
webpage:	www.kvaerner.com
Year of construction:	1991

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	n.a. t/a
Electric power:	26 MW _{el}	Tot. lower heating value:	n.a. kWh/kg
Thermal power:	104 MW _{th}	Moisture content:	n.a. % wet
Co-firing:	N		
Fuel conversion:	Combustion	Type of fuel 1:	Woodchips (forest residues)
Annual production electricity:	140 GWh/a	Share of fuel 1:	n.a. %
Annual production heat:	561 GWh/a	Input of fuel 1:	n.a. t/a
Electric efficiency:	15,3 %		
Thermal efficiency:	61,2 %	Type of fuel 2:	-
Total efficiency:	76,5 %	Share of fuel 2:	- %
Ratio electricity/ heat:	0,25	Input of fuel 2:	- t/a
Fuel power:	170 MW _{fuel}		
<i>Boiler (if steam technology)</i>		Type of fuel 3:	-
Steam mass flow:	n.a. t/h	Share of fuel 3:	- %
Steam temperature:	530 °C	Input of fuel3:	- t/a
Steam pressure:	115 bar		

Costs		Emissions	
Investment costs:	32.006 Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	1.231 Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	n.a. €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employees:	n.a.	SO ₂ :	n.a. mg/Nm ³

Source:

Timo Järvinen, The Analysis of Plant No. 5, VTT Energy, 2000

n.a.... not available

Name: CHP Karstula

Database No. 45

Basic Info	
Country:	Finland
Location:	Karstula
Character of plant:	Commercial plant
Owner:	Sermet Oy Ltd
Contact Person:	Mr. Tero Pajunen
Telephone:	+35/ 81/ 7768811
Fax:	+35/ 817/ 7688211
email:	n.a.
webpage:	n.a.
Year of construction:	2000

Technology		Fuel	
Type of power generation:	Steam engine	Total fuel input:	n.a. t/a
Electric power:	1 MW _{el}	Tot. lower heating value:	3,2 kWh/kg
Thermal power:	9 MW _{th}	Moisture content:	26 % wet
Co-firing:	N		
Fuel conversion:	Combustion		
Annual production electricity:	5 GWh/a	Type of fuel 1:	Woodchips (forest residues)
Annual production heat:	45 GWh/a	Share of fuel 1:	100 %
Electric efficiency:	7,7 %	Input of fuel 1:	n.a. t/a
Thermal efficiency:	77 %		
Total efficiency:	84,7 %	Type of fuel 2:	-
Ratio electricity/ heat:	0,10	Share of fuel 2:	- %
Fuel power:	11,5 MW _{fuel}	Input of fuel 2:	- t/a
<i>Boiler (if steam technology)</i>			
Steam mass flow:	n.a. t/h	Type of fuel 3:	-
Steam temperature:	350 °C	Share of fuel 3:	- %
Steam pressure:	25 bar	Input of fuel3:	- t/a

Costs		Emissions	
Investment costs:	4,3 Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	4,3 Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	n.a. €/t	Particles:	n.a. mg/Nm ³
Subsidies:	1 Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employees:	n.a.	SO ₂ :	n.a. mg/Nm ³

Source:

Finish Enery Technology Cases, OPET Finland 2001

n.a.... not available

Name: CHP Kiuruvesi Timber

Database No. 46

Basic Info	
Country:	Finland
Location:	Kiuruvesi
Character of plant:	Commercial plant
Owner:	IPO Wood Oy
Contact Person:	Mr. Juha Huotari
Telephone:	+35/ 81/ 44499267
Fax:	n.a.
email:	juha.huotari@sermet.fi
webpage:	n.a.
Year of construction:	1999

Technology		Fuel	
Type of power generation:	Steam engine	Total fuel input:	n.a. t/a
Electric power:	1 MW _{el}	Tot. lower heating value:	1,48 kWh/kg
Thermal power:	6,3 MW _{th}	Moisture content:	50-65 % wet
Co-firing:	N		
Fuel conversion:	Combustion	Type of fuel 1:	Bark
Annual production electricity:	4,6 GWh/a	Share of fuel 1:	60 %
Annual production heat:	40 GWh/a	Input of fuel 1:	n.a. t/a
Electric efficiency:	9,4 %		
Thermal efficiency:	78,8 %	Type of fuel 2:	Woodchips (forest residues)
Total efficiency:	88,2 %	Share of fuel 2:	40 %
Ratio electricity/ heat:	0,12	Input of fuel 2:	n.a. t/a
Fuel power:	8 MW _{fuel}		
<i>Boiler (if steam technology)</i>		Type of fuel 3:	-
Steam mass flow:	n.a. t/h	Share of fuel 3:	- %
Steam temperature:	350 °C	Input of fuel3:	- t/a
Steam pressure:	25 bar		

Costs		Emissions	
Investment costs:	3,6 Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	4,8 Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	n.a. €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employees:	n.a.	SO ₂ :	n.a. mg/Nm ³

Source:

Risto Impola, The Analysis Report of Plant No. 21, VTT Energy Owner information, IPO Wood Kiuruvesi Timber, 08/2001

n.a.... not available

Name: Kokkolan Voima Oy

Database No. 47

Basic Info	
Country:	Finland
Location:	Kokkolan
Character of plant:	Commercial plant
Owner:	Kokkolan Energia
Contact Person:	n.a.
Telephone:	+35/ 68/ 262111
Fax:	+35/ 68/ 262110
email:	n.a.
webpage:	n.a.
Year of construction:	2001

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	n.a. t/a
Electric power:	20 MW _{el}	Tot. lower heating value:	2,6 kWh/kg
Thermal power:	50 MW _{th}	Moisture content:	50 % wet
Co-firing:	N		
Fuel conversion:	Combustion	Type of fuel 1:	Woodchips (forest residues)
Annual production electricity:	75 GWh/a	Share of fuel 1:	50 %
Annual production heat:	180 GWh/a	Input of fuel 1:	n.a. t/a
Electric efficiency:	25 %	Type of fuel 2:	Peat
Thermal efficiency:	63 %	Share of fuel 2:	50 %
Total efficiency:	88 %	Input of fuel 2:	n.a. t/a
Ratio electricity/ heat:	0,40	Type of fuel 3:	-
Fuel power:	80 MW _{fuel}	Share of fuel 3:	- %
<i>Boiler (if steam technology)</i>		Input of fuel3:	- t/a
Steam mass flow:	n.a. t/h		
Steam temperature:	n.a. °C		
Steam pressure:	n.a. bar		

Costs		Emissions	
Investment costs:	25,2 Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	1,26 Mio€/MW _{el}	NO _x :	150 mg/Nm ³
Fuel costs:	21,5 €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employees:	n.a.	SO ₂ :	140 mg/Nm ³

Source:

project partner

n.a.... not available

Name: CHP Kuhmo

Database No. 48

Basic Info	
Country:	Finland
Location:	Kuhmo
Character of plant:	Demonstration plant
Owner:	Kohmon Lämpö Oy
Contact Person:	n.a.
Telephone:	+35/ 88652/ 0309
Fax:	+35/ 88652/ 0145
email:	n.a.
webpage:	n.a.
Year of construction:	1992

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	n.a. t/a
Electric power:	5 MW _{el}	Tot. lower heating value:	2,1 kWh/kg
Thermal power:	13 MW _{th}	Moisture content:	35 % wet
Co-firing:	N		
Fuel conversion:	Combustion	Type of fuel 1:	Woodchips (forest residues)
Annual production electricity:	17,1 GWh/a	Share of fuel 1:	95 %
Annual production heat:	65,7 GWh/a	Input of fuel 1:	n.a. t/a
Electric efficiency:	24 %	Type of fuel 2:	Woodchips (saw industry)
Thermal efficiency:	64 %	Share of fuel 2:	5 %
Total efficiency:	88 %	Input of fuel 2:	n.a. t/a
Ratio electricity/ heat:	0,38	Type of fuel 3:	-
Fuel power:	26,5 MW _{fuel}	Share of fuel 3:	- %
<i>Boiler (if steam technology)</i>		Input of fuel3:	- t/a
Steam mass flow:	n.a. t/h		
Steam temperature:	490 °C		
Steam pressure:	81 bar		

Costs		Emissions	
Investment costs:	12,3 Mio €	CO:	200 mg/Nm ³
Spec.investment costs (elec):	2,5102 Mio€/MW _{el}	NO _x :	200 mg/Nm ³
Fuel costs:	n.a. €/t	Particles:	10 mg/Nm ³
Subsidies:	4,4 Mio €	C _x H _y :	<1 mg/Nm ³
Number of employes:	13	SO ₂ :	3 mg/Nm ³

Source:

Finish Energy Technology Cases, OPET Finland 2001, www.tekes.fi

n.a.... not available

Name: CHP Kuusamo

Database No. 49

Basic Info	
Country:	Finland
Location:	Kuusamo
Character of plant:	Commercial plant
Owner:	Fortum Service Oy
Contact Person:	Mr. Jari Hankala
Telephone:	+35/ 810/ 4511
Fax:	+35/ 895/ 632225
email:	n.a.
webpage:	www.fortum.com
Year of construction:	1998

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	n.a. t/a
Electric power:	6 MW _{el}	Tot. lower heating value:	n.a. kWh/kg
Thermal power:	17,6 MW _{th}	Moisture content:	35 % wet
Co-firing:	Y		
Fuel conversion:	Combustion		
Annual production electricity:	n.a. GWh/a	Type of fuel 1:	Coal
Annual production heat:	n.a. GWh/a	Share of fuel 1:	n.a. %
Electric efficiency:	23,3 %	Input of fuel 1:	n.a. t/a
Thermal efficiency:	66,9 %		
Total efficiency:	90,2 %	Type of fuel 2:	Woodchips (forest residues)
Ratio electricity/ heat:	0,35	Share of fuel 2:	n.a. %
Fuel power:	26,3 MW _{fuel}	Input of fuel 2:	n.a. t/a
<i>Boiler (if steam technology)</i>			
Steam mass flow:	n.a. t/h	Type of fuel 3:	Peat
Steam temperature:	525 °C	Share of fuel 3:	n.a. %
Steam pressure:	85 bar	Input of fuel3:	n.a. t/a

Costs		Emissions	
Investment costs:	25,315 Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	4,15 Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	n.a. €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employees:	n.a.	SO ₂ :	n.a. mg/Nm ³

Source:

Thermal Power Station Kuusamo, OPET Finland, VTT Energie, 9/2000

n.a.... not available

Name: Kymijärvi Power Station

Database No. 50

Basic Info	
Country:	Finland
Location:	Lahti
Character of plant:	Commercial plant
Owner:	Lahden Lämpövoima Oy
Contact Person:	n.a.
Telephone:	+35/ 38/ 2311
Fax:	+35/ 38/ 233504
email:	n.a.
webpage:	n.a.
Year of construction:	1997

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	n.a. t/a
Electric power:	167 MW _{el}	Tot. lower heating value:	3 kWh/kg
Thermal power:	240 MW _{th}	Moisture content:	50 % wet
Co-firing:	Y		
Fuel conversion:	Gasification		
Annual production electricity:	n.a. GWh/a	Type of fuel 1:	Woodchips (saw industry)
Annual production heat:	1,2 GWh/a	Share of fuel 1:	58 %
Electric efficiency:	n.a. %	Input of fuel 1:	n.a. t/a
Thermal efficiency:	n.a. %		
Total efficiency:	- %	Type of fuel 2:	REF
Ratio electricity/ heat:	-	Share of fuel 2:	42 %
Fuel power:	55 MW _{fuel}	Input of fuel 2:	n.a. t/a
<i>Boiler (if steam technology)</i>			
Steam mass flow:	n.a. t/h	Type of fuel 3:	-
Steam temperature:	n.a. °C	Share of fuel 3:	- %
Steam pressure:	n.a. bar	Input of fuel3:	- t/a

Costs		Emissions	
Investment costs:	12 Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	0,07186 Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	n.a. €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employes:	n.a.	SO ₂ :	n.a. mg/Nm ³

Source:

Brochure: "Growing power", Tekes, 2002

n.a.... not available

Name: Lieksa Cogeneration Power Plant

Database No. 51

Basic Info	
Country:	Finland
Location:	Lieksa
Character of plant:	Demonstration plant
Owner:	Lieksan Lämpö Oy
Contact Person:	Mr. Jouko Järvensivu
Telephone:	+35/ 13/ 5202500
Fax:	+35/ 813/ 526/ 758
email:	jouko.jarvensivu@lieksa.fi
webpage:	n.a.
Year of construction:	1994

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	n.a. t/a
Electric power:	8 MW _{el}	Tot. lower heating value:	n.a. kWh/kg
Thermal power:	22 MW _{th}	Moisture content:	30 % wet
Co-firing:	N		
Fuel conversion:	Combustion	Type of fuel 1:	Bark
Annual production electricity:	34 GWh/a	Share of fuel 1:	100 %
Annual production heat:	120 GWh/a	Input of fuel 1:	n.a. t/a
Electric efficiency:	22,3 %	Type of fuel 2:	-
Thermal efficiency:	61,5 %	Share of fuel 2:	- %
Total efficiency:	83,8 %	Input of fuel 2:	- t/a
Ratio electricity/ heat:	0,36	Type of fuel 3:	-
Fuel power:	35,8 MW _{fuel}	Share of fuel 3:	- %
<i>Boiler (if steam technology)</i>		Input of fuel3:	- t/a
Steam mass flow:	n.a. t/h		
Steam temperature:	510 °C		
Steam pressure:	60 bar		

Costs		Emissions	
Investment costs:	n.a. Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	n.a. Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	n.a. €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employees:	n.a.	SO ₂ :	n.a. mg/Nm ³

Source:

Finnish Energy Technology Cases, OPET Finland 2001

n.a.... not available

Name: Stora-enso, Fine papers ldt.

Database No.

52

Basic Info	
Country:	Finland
Location:	Oulu
Character of plant:	Commercial plant
Owner:	Stora-enso, Fine papers ldt.
Contact Person:	n.a.
Telephone:	+35/ 820/ 46124
Fax:	+35/ 820/ 4633242
email:	n.a.
webpage:	n.a.
Year of construction:	1997

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	n.a. t/a
Electric power:	77 MW _{el}	Tot. lower heating value:	2,6 kWh/kg
Thermal power:	168 MW _{th}	Moisture content:	50 % wet
Co-firing:	N		
Fuel conversion:	Combustion		
Annual production electricity:	460 GWh/a	Type of fuel 1:	Woodchips (forest residues)
Annual production heat:	1010 GWh/a	Share of fuel 1:	50 %
Electric efficiency:	27 %	Input of fuel 1:	n.a. t/a
Thermal efficiency:	60 %		
Total efficiency:	87 %	Type of fuel 2:	Peat
Ratio electricity/ heat:	0,45	Share of fuel 2:	50 %
Fuel power:	280 MW _{fuel}	Input of fuel 2:	n.a. t/a
<i>Boiler (if steam technology)</i>			
Steam mass flow:	n.a. t/h	Type of fuel 3:	-
Steam temperature:	n.a. °C	Share of fuel 3:	- %
Steam pressure:	n.a. bar	Input of fuel3:	- t/a

Costs		Emissions	
Investment costs:	59 Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	0,76623 Mio€/MW _{el}	NO _x :	150 mg/Nm ³
Fuel costs:	25 €/t	Particles:	20 mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employes:	n.a.	SO ₂ :	105 mg/Nm ³

Source:

project partner

n.a.... not available

Name: CHP Pieksämäki

Database No. 53

Basic Info	
Country:	Finland
Location:	Pieksämäki
Character of plant:	Commercial plant
Owner:	Pieksämäen Energia
Contact Person:	Mr. H. Lipsanen
Telephone:	+35/ 35/ 6779/ 22600
Fax:	n.a.
email:	n.a.
webpage:	n.a.
Year of construction:	1992

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	65.000.000 t/a
Electric power:	9 MW _{el}	Tot. lower heating value:	2,5 kWh/kg
Thermal power:	26 MW _{th}	Moisture content:	n.a. % wet
Co-firing:	Y		
Fuel conversion:	Combustion	Type of fuel 1:	Woodchips (forest residues)
Annual production electricity:	40 GWh/a	Share of fuel 1:	n.a. %
Annual production heat:	115 GWh/a	Input of fuel 1:	65.000.000 t/a
Electric efficiency:	23,8 %		
Thermal efficiency:	65,8 %	Type of fuel 2:	Coal
Total efficiency:	89,6 %	Share of fuel 2:	n.a. %
Ratio electricity/ heat:	0,36	Input of fuel 2:	n.a. t/a
Fuel power:	39,5 MW _{fuel}		
<i>Boiler (if steam technology)</i>		Type of fuel 3:	Peat
Steam mass flow:	n.a. t/h	Share of fuel 3:	n.a. %
Steam temperature:	510 °C	Input of fuel3:	n.a. t/a
Steam pressure:	60 bar		

Costs		Emissions	
Investment costs:	n.a. Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	n.a. Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	n.a. €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employees:	n.a.	SO ₂ :	n.a. mg/Nm ³

Source:

CHP Pieksämäki, OPET Finland, VTT Energy, 9/ 2000

n.a.... not available

Name: Alholmens Kraft AB

Database No. 54

Basic Info	
Country:	Finland
Location:	Pietersaari
Character of plant:	Demonstration plant
Owner:	Graninge Finland, Skelleftea Kraft
Contact Person:	Mr. Jari Niemela
Telephone:	+35/ 8204/ 16115
Fax:	+35/ 8204/ 86550
email:	jari.niemela@pvo.fi
webpage:	www.alholmenskraft.com, Brochure: "G
Year of construction:	2001

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	n.a. t/a
Electric power:	240 MW _{el}	Tot. lower heating value:	2,26 kWh/kg
Thermal power:	160 MW _{th}	Moisture content:	45 % wet
Co-firing:	N		
Fuel conversion:	Combustion	Type of fuel 1:	Peat
Annual production electricity:	1,3 GWh/a	Share of fuel 1:	45 %
Annual production heat:	2,52 GWh/a	Input of fuel 1:	n.a. t/a
Electric efficiency:	40 %		
Thermal efficiency:	26,8 %	Type of fuel 2:	Woodchips (forest residues)
Total efficiency:	66,8 %	Share of fuel 2:	35 %
Ratio electricity/ heat:	1,49	Input of fuel 2:	n.a. t/a
Fuel power:	597,8 MW _{fuel}		
<i>Boiler (if steam technology)</i>		Type of fuel 3:	Bark
Steam mass flow:	n.a. t/h	Share of fuel 3:	20 %
Steam temperature:	545 °C	Input of fuel3:	n.a. t/a
Steam pressure:	162 bar		

Costs		Emissions	
Investment costs:	170 Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	0,70833 Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	21,9375 €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employees:	50	SO ₂ :	n.a. mg/Nm ³

Source:

Brochure: The world 's largest biofuel CHP plant Alholmens Kraft, Pietarsaari, OPET Finland, VTT Energy, 4/2001

n.a.... not available

Name: CHP Pursiala

Database No. 55

Basic Info	
Country:	Finland
Location:	Pursiala
Character of plant:	Commercial plant
Owner:	Etelä-Savon Energia Oy Ltd
Contact Person:	Mr. Timo Leppänen
Telephone:	+35/ 15195/ 3813
Fax:	+35/ 15367/ 472
email:	n.a.
webpage:	www.es.fi
Year of construction:	1990

Technology		Fuel	
Type of power generation:	Steam turbine	Total fuel input:	n.a. t/a
Electric power:	30 MW _{el}	Tot. lower heating value:	3,17 kWh/kg
Thermal power:	100 MW _{th}	Moisture content:	n.a. % wet
Co-firing:	N		
Fuel conversion:	Combustion	Type of fuel 1:	Woodchips (forest residues)
Annual production electricity:	182 GWh/a	Share of fuel 1:	53 %
Annual production heat:	335 GWh/a	Input of fuel 1:	n.a. t/a
Electric efficiency:	20 %		
Thermal efficiency:	66,7 %	Type of fuel 2:	Peat
Total efficiency:	86,7 %	Share of fuel 2:	46 %
Ratio electricity/ heat:	0,30	Input of fuel 2:	n.a. t/a
Fuel power:	150 MW _{fuel}		
<i>Boiler (if steam technology)</i>		Type of fuel 3:	Oil
Steam mass flow:	n.a. t/h	Share of fuel 3:	1 %
Steam temperature:	510 °C	Input of fuel3:	n.a. t/a
Steam pressure:	77 bar		

Costs		Emissions	
Investment costs:	n.a. Mio €	CO:	n.a. mg/Nm ³
Spec.investment costs (elec):	n.a. Mio€/MW _{el}	NO _x :	n.a. mg/Nm ³
Fuel costs:	n.a. €/t	Particles:	n.a. mg/Nm ³
Subsidies:	n.a. Mio €	C _x H _y :	n.a. mg/Nm ³
Number of employes:	n.a.	SO ₂ :	n.a. mg/Nm ³

Source:

CHP Pursiala, OPET Finland, VTT Energy, 9/2000

n.a.... not available