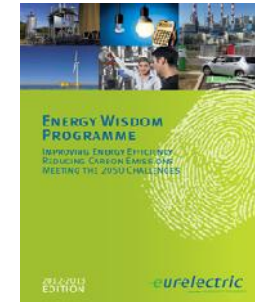


Fortum



Project Name	Refurbishment of hydro power plants
Project Category	Electricity Generation: Efficiency Improvements
Project Location	Finland, Sweden
Project Description	Refurbishments of twenty HPPs in Finnish and Swedish rivers have been implemented since 1991. Refurbishments are part of Fortum's extensive hydro power refurbishment programme. The projects included e.g. modernisation, service and maintenance operations of the generator, turbine and electricity and automation systems. The refurbishments together have resulted in an increase of 97 MW in the electric output of the units. The average annual increase of electricity generation is estimated to be about 230 GWh.
Project Manager	Seppo Haapajoki, Power Division/Senior Expert, Power Plant Performance, Technology & Performance Development, seppo.haapajoki@fortum.com
Project Name	Boiler conversion at Uimaharju CHP plant
Project Category	Electricity Generation: New Generating Capacity: CHP
Project Location	Finland
Project Description	The old soda recovery boiler was converted to BFB bark boiler and a new turbine plant was built. The electricity steam ratio (electricity generation / heat production) of the CHP plant has increased from about 0.13 to 0.35.
Project Manager	Markku Muilu, Heat Division Technical Manager, markku.muilu@fortum.com
Project Name	Fuel switching at Hässelby CHP plant
Project Category	Electricity Generation: Fuel Switching
Project Location	Sweden
Project Description	In 1992, it was decided to stop coal-firing in Hasselby and to apply for a permit to fire wood pellets instead of coal. Plans to introduce bio-fuels and still use the main parts of the coal-firing equipment resulted in the construction of trail-firing with wood pellets. Since then, the woodpellet-firing capacity has increased year by year and by the early 2000s the Hässelby plant was almost totally converted to bio-fuel. When the Hässelby plant started woodpellet firing, the supply of wood pellets was limited. The conversion from coal to bio-fuels not only involved the conversion of the plant, it also meant that new woodpellet factories had to be built.
Project Manager	Ulf Wikström, Heat Division Environmental Manager, ulf.wikstrom@fortum.com

Project Name	New boiler at Högdalen CHP plant
Project Category	Electricity Generation: New Generating Capacity: CHP
Project Location	Sweden
Project Description	The new boiler was built to produce more steam for the Stockholm south district heating system as well as increasing the electricity output of the Högdalen plant. When the decision to build a new boiler was taken there were also concerns about the future use of existing boilers in Högdalen due to new EU legislation. However it was possible to keep existing boilers in a modified version. The new boiler has a capacity to incinerate 34 t waste/h.
Project Manager	Ulf Wikström, Heat Division Environmental Manager, ulf.wikstrom@fortum.com
Project Name	Optimisation of Brista power plant
Project Category	Electricity Generation: Availability Improvements
Project Location	Sweden
Project Description	The project has connected two larger systems for district heating in Stockholm which also makes the production in the biomass power plant Bristaverket more optimized. The environmental discharge is much lower and the season for electricity production much longer as a result of the project.
Project Manager	Ulf Wikström, Heat Division Environmental Manager, ulf.wikstrom@fortum.com
Project Name	Fuel switching at Värtan CHP plant
Project Category	Electricity Generation: Fuel Switching
Project Location	Sweden
Project Description	Testing of different bio oils in order to move from fossil oils to renewable fuels which is in line with EU directives to increase the amount of renewable energy produced. Also, olives have been used to replace fossil fuels.
Project Manager	Ulf Wikström, Heat Division Environmental Manager, ulf.wikstrom@fortum.com
Project Name	Construction of Kuusamo CHP plant
Project Category	Electricity Generation: New Generating Capacity: CHP
Project Location	Finland
Project Description	A new combined heat and power (CHP) plant has been commissioned in 1994. In the earlier district heat system only heat was produced. The new power plant produces nearly all district heat consumed in the town of Kuusamo. Main fuels of the CHP plant are indigenous fuels (peat, wood). Kuusamo CHP plant is based on fluidised bed combustion technology. It is equipped with peat drying technology which enables heat recovery and its utilisation in district heat production.
Project Manager	Markku Muilu, Heat Division Technical Manager, markku.muilu@fortum.com

Project Name **Fuel switching at Kauttua CHP plant**
Project Category Electricity Generation: Fuel Switching
Project Location Finland
Project Description The use of biomass based and recycled solid fuels (REF) have been increased since 1990. Coal and peat have been replaced. New solid fuel reception and handling terminal with conveyor and crusher was built. New PDF storage for incompact waste paper was built. Fortum has owned the industrial power plant Kauttua since 1991.
Project Manager Markku Muilu, Heat Division Technical Manager, markku.muilu@fortum.com

Project Name **Construction of Kirkniemi CCGT plant**
Project Category Electricity Generation: New Generating Capacity: CHP
Project Location Finland
Project Description The construction of a new gas-fired combined-cycle power plant was completed in 1997. Also, new gas burners were fitted in one of the old boilers in 1997. Due to the project, the fuel usage of the power plant changed almost totally: coal was the main fuel earlier and nowadays, the fuel share of natural gas is about 90 %. The wood based fuels have been used in both systems, but in the current system, the amount of wood in form bark is larger than in the older system. The electricity heat ratio (electricity generation / produced heat) of the CHP plant is much higher than the ratio of the old power plant. In the old power plant, the heat electricity ratio was less than 0.2 and currently, it is almost 0.9.
Project Manager Markku Muilu, Heat Division Technical Manager, markku.muilu@fortum.com

Project Name **Construction of wind power plants**
Project Category Electricity Generation: New Generating Capacity: Renewables
Project Location Finland, Sweden
Project Description Tunturituuli Oy (belonging to Fortum Corporation since 1999) has constructed three wind power plants in Finland during 1990's. The company has altogether nine wind mills in operation. Installed capacity is 6 MW and estimated annual generation 11 GWh.
Project Manager Seppo Haapajoki, Power Division/Senior Expert, Power Plant Performance, Technology & Performance Development, seppo.haapajoki@fortum.com

Project Name **Upgrading and modernisation of nuclear power plants**
Project Category Electricity Generation: Efficiency Improvements
Project Location Finland, Sweden
Project Description During the projects, the thermal power of several reactors have been upgraded and together with these and certain other measures to improve the turbine efficiency, an increase of about 790 MW in the electrical output of the power plants have been possible. The annual average additional energy due to the projects has been about 5.1 TWh in 2010-2011. The main goals of the modernisation projects were ensured safety, additional generation capacity, extended plant life time and more competent and motivated staff.
Project Manager Seppo Haapajoki, Power Division/Senior Expert, Power Plant Performance, Technology & Performance Development, seppo.haapajoki@fortum.com