

# IF YOU GO DOWN TO THE WOODS TODAY ...

The classic children's nursery rhyme continues ... "you'll be in for a big surprise". Riikinvoima Ekovoimalaitos' new waste-to-energy plant near Varkaus in eastern Finland is something of big surprise – an ANDRITZ-supplied, top class, environmentally friendly facility, consuming 145,000 tonnes of household waste, situated in the middle of natural Finnish forests.

It has to be said; the Finns really know how to "do green". In fact, the country was ranked the world's greenest by the Environmental Performance Index (EPI) for 2016. The EPI ranks countries' performance on high-priority environmental issues, and Finland came in on top with a score of 90.68, ahead of Iceland, Sweden, Denmark, and Germany.

But the question has to be asked about the facility at Riikinvoima: why a waste-to-energy plant when there is so much wood around in Finland, particularly for use in biomass for generating district heating and electricity? "Well, what else would we do with our unrecyclable household waste?" comes the direct response from Juha Räsänen, Managing Director, Riikinvoima Waste-to-Energy plant. "In Finland we are good at recycling; we have been taking it seriously for decades, and there is a belief that this in itself would solve all the problems and the waste would just disappear. But of course, it doesn't; there is always something left, mainly plastics, that can't be reused and in this region would normally have gone to landfill.

"However – and most importantly for this Riikinvoima project – recent EU regulations mean that landfill is not allowed, and the implementation of these regulations means we needed to move fast in compliance, particularly here in eastern Finland where there is no access to any waste consuming plants."

## THE VERY BEST TECHNOLOGY

Due to the EU regulations, plans were put in place to build a facility in the area, and in 2012 a company was formed from eight eastern Finnish waste collection companies as well as the company responsible for district heating in Varkaus. The plan was to build a waste combustion plant with fluidized bed technology for incinerating waste and producing electricity for 4,300 homes and district heating for around 10,000 homes. This would need a waste-to-energy facility that would have the capacity

to treat 145,000 tonnes of waste per year, which would generate 180 GWh of district heating and 90 GWh per year.

After some delays during the bidding process for the project – which meant valuable time was lost when it finally came to deciding on a supplier – ANDRITZ was finally chosen as the preferred supplier for the project, and was given just 26 months to provide the full scope of supply.

ANDRITZ Senior Project manager Olli Ryymin, says of the Riikinvoima order, "High efficiency of the boiler as well as the very best in technology to enhance environmental protection was at the top of the customer's list in the case of

Riikinvoima. In fact, our expertise in these areas is why we won this order."

ANDRITZ was asked to supply a turnkey solution for the waste-to-energy plant, which included a circulating fluidized bed boiler (CFB), waste fuel treatment and flue gas cleaning systems, steam turbine, electrification, automation, and all auxiliary systems including civil works and systems installations. In addition to the main project technology, ANDRITZ also supplied a flue gas condenser to condense water from the flue gases and increase the plant's district heat

production. The delivery was conducted from several Finnish ANDRITZ locations as well as other specialist products shipped from Austria.

"The flue gas condenser delivery includes heat recovery from the flue gases, district heat exchangers, and waste water treatment. This was a really important part of the delivery," adds Ryymin.

The flue gas cleaning system consists of an ANDRITZ TurboSorp (ESP) – a semi-dry flue gas cleaning system and bagfilter. The TurboSorp separates the acidic components from the flue gas and the bagfilter removes the dust particles.

## INTERESTING TIMES

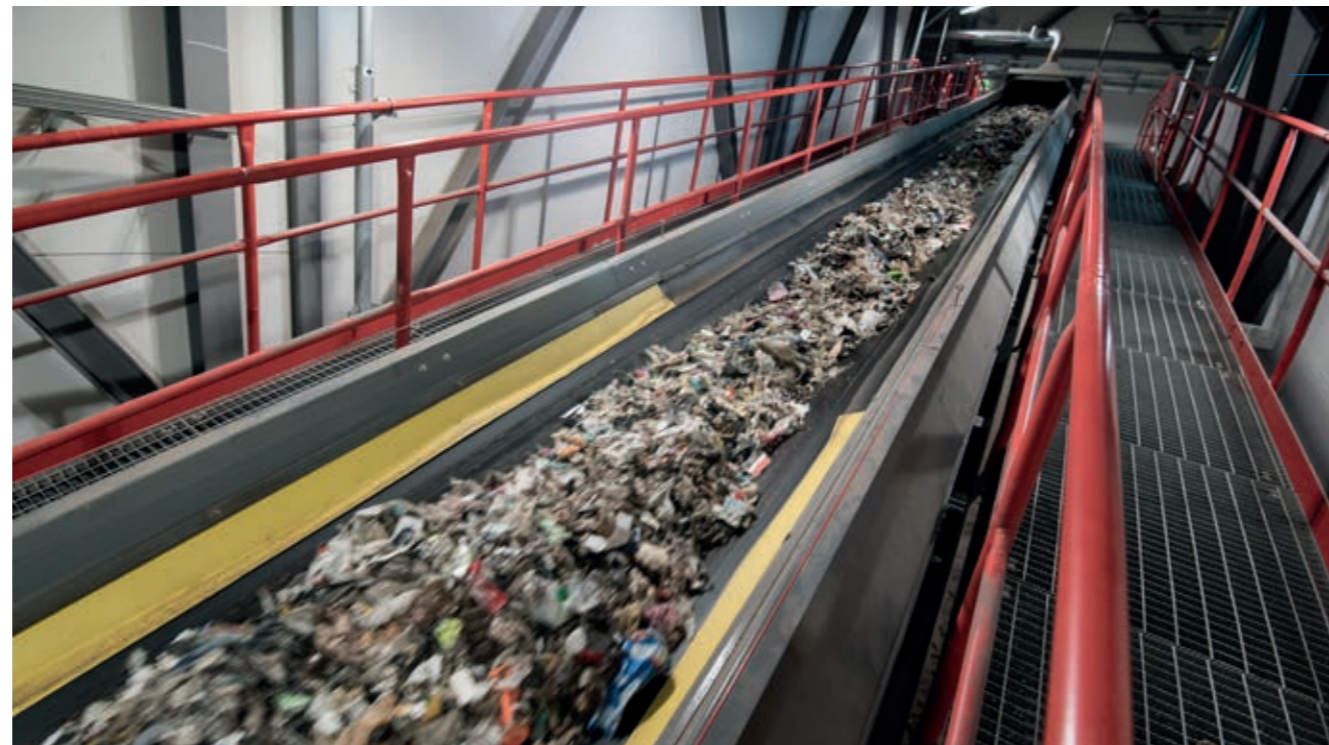
Work started on the construction of the plant in early October 2014. Räsänen says, "This was an interesting period, but before we could even start the project, we had to get everybody on board – the owners of the company and the politicians – and we needed to



Juha Räsänen, in front of the incoming waste receiving area.



ANDRITZ Recovery and Power Senior Project manager Olli Ryymin (L) with Juha Räsänen.



Conveyor belt showing the type of waste going into the plant.

The ANDRITZ flue gas cleaning system consists of ESP, a TurboSorp system (semi-dry flue gas cleaning system), a bagfilter, and flue gas condensation. The TurboSorp plant separates the acidic components from the flue gas.



ensure that everybody was aware not only of the cost, but also of the ultimate benefits of the project.

“After all that time deliberating, the deadline for the expiry of landfill permits crept ever closer and suddenly there was not a lot of time left. We had to start the project. We awarded the order to ANDRITZ on October 13, 2014, and the next day work started on the site – they had to work fast, as there was only a 26-month window to operate in before the permits expired!”

By the end of January 2015, three months later, the concrete was laid at the site and

just four months later the steel was erected followed by the boiler parts. “With regard to the erection and boiler installation, there were a few challenges,” says Ryymin. “But these were quickly dealt with. We had to be flexible during the building and installation phase; it’s the only way to keep as tight as we can on schedule.”

**LET THE TRUCKS START ROLLING**

In the meantime, the eight waste collection companies had been making sure all the fuel for the plant was ready and in place, with the first waste truck entering the plant – 19 months after placing the order. “We need to process about 750 tonnes of waste a

day at the plant,” explains Räsänen. “This equates to around 19 trucks a day, collecting waste from around 600,000 inhabitants in the eastern region of Finland.”

The waste is first weighed at the plant’s weighbridge and is then transported to the waste reception hall where it is off loaded into a bunker. Here the householders’ plastic bags are opened and the waste is broken up with a remotely operated grab crane. “Waste is fed into the treatment system to be able to meet the requirements of 90 mm pieces (maximum) through two stage shredding and three stage metal separation process.”

“After all this, we have treated waste with every particle below 90 mm, which is now ideal for burning and ready to proceed to the boiler,” adds Räsänen.

**“OUR PLANT IS VERY ENVIRONMENTALLY FRIENDLY”**

The boiler fired up on July 15, 2016, only 20 months after placing the order - and since the start-up, it has consumed around the full capacity of waste at 145,000 tonnes. Räsänen says, “Looking at the figures from August 2016 to August 2017, we treated 130,000 tonnes. We had six months commissioning time in that first year, so we are delighted considering that the start-up time

is included as well. We also managed to provide the bulk of the heating to Varkaus during the last winter.

“As far as emissions are concerned, we monitor them online measuring carbon, nitrogen, hydrochloride, and carbon monoxide. Emission limits are very tight since we are burning waste and these limits are set by EU. Our online displays show a red line if any element exceeds the limit, and we monitor this continuously. Because of this, we can clearly say that our plant is very environmentally friendly.”

As far as the day to day running of the plant goes, there are still a few small things out-

standing, mostly to do with getting the waste through in the most efficient way. Räsänen concludes, “Emissions are low and energy and heat production is in good order. It has been a major learning curve for all of us, as we knew nothing about waste management at the beginning of this project. I can definitely say that we have invested in the right technology and we have well-trained people operating the plant, always taking steps to ensure that the very latest knowledge and information is available to them.”

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**JUHA RÄSÄNEN**  
Managing Director  
Riikinvoima Waste-to-Energy plant



**THE TECHNOLOGY**

**The ANDRITZ scope in Riikinvoima:**

- Circulating Fluidized Bed (CFB) boiler - PowerFluid
- Waste fuel treatment
- Steam turbine and generator
- Flue gas cleaning, consisting of ESP, a TurboSorp system (semi-dry flue gas cleaning system) and bagfilter
- Flue gas condenser
- Electrification, automation
- Auxiliary systems
- Construction and erection works

