

PIETARSAAREN LUKIO, Pietarsaari.

FINLAND



Municipality and sustainability: CURRENT ENVIRONMENTAL ACTIONS

Energy Awareness Week

The aim of the week is to raise awareness on the effective use of energy in organizations, companies and communities. During the campaign, participants present what is being done all around Finland to reduce energy use and to cut down carbon dioxide emissions. The execution is free: press releases, training, events, competitions - whatever means that suit the message and the participant.

Energy Awareness Week is organized every year during the second week of October. The coordinator is Motiva, a state-owned company promoting energy and material efficiency as well as renewable energy.

There are other events related to Energy Awareness Week. The latest lecture on the theme sustainable development was held in Pietarsaari in the beginning of April: Sustainable Development in Everyday Life - Monitoring Air Quality in Pietarsaari. The event was free for everybody.

The waste disposal district of Ekorosk

It is possible to recycle or reuse roughly 90 % of the waste which comes to Ekorosk, both household and industrial. This is a very impressive result, the envy of the rest of Finland. However, none of this would be possible without the efforts of customers. More and more people are becoming environmentally conscious. Waste recycling is one way of saving our natural resources for coming generations. Every household generates a great deal of waste.

Solar House

The IEA5 Solar House was the fifth low-energy house built as part of the Solar Heating and Cooling Programme (SHC) of the International Energy Agency (IEA). The Solar House contains the latest technology and solutions available at the time, with the goal of reducing the need for externally supplied energy to a minimal level.

The Solar House's energy effectiveness is based on extremely high-density

insulation and tight window constructions as well as a heat recovery ventilation (HRV) system. Solar panels and a ground source heating system provide the house with "free" energy. Compared to typical houses, the Solar House saves up to 90% on heating energy costs. It also therefore comes out on top in a comparison with other low-energy houses built throughout the world, despite the cold Finnish climate.

Alholmens Kraft

Alholmens Kraft is the largest bio-fuelled power plant in the world. They produce electricity, process steam and district heating for the industry and private households. The power plant is located at the factory premises of UPM-Kymmene Ab in Alholmen, Jakobstad.

The power plant burns 800 cubic metres of fuel per hour at full effect, with 40-60% of the fuel being bio-fuel. The aim is to continuously increase the amount of bio-fuel used. The electricity effect of the power plant is 265 MWe, which can be compared to the effect needed to illuminate a road according to the public road authority's standard (250W lights at every 40 metres of the road) around the entire planet.

Apart from electricity Alholmens Kraft also produces district heating for the inhabitants of Jakobstad (60 MWdh) and process steam and heat for the UPM Kymmene plant in Jakobstad (100 MWth). The power plant is aiming to break even in the production of electricity, that is to exactly produce the amount of electricity ordered by its owners.

The boiler used by the plant is the largest CFB-boiler (Circulating Fluidised-Bed Boiler) in the world and was supplied by Kvaerner Pulping. The hearth of the boiler measures 8.5 metres x 24 metres and is 40 metres high. The steam data are high (165 bar / 545°C) compared to the usual parameters for bio-fuel boilers and increase the effectiveness of the entire plant. The optimal combustion conditions in the CFB-process make low emission values possible, while electro-filters, lime insertion and ammonia injection with SNCR secures the plant against the release of particle matter, sulphur dioxide and nitrogen dioxide. There are also re-heating, rotating air pre-heaters and steam-cooled cyclones to reach a high efficiency and availability.

Sustainable development in food services in public institutions

In school catering they prefer seasonal harvest and suitable for the time of the year when possible, and affordable groceries.

Widely defined, local food consists of all food products grown in Finland or made out of Finnish raw materials. The principles of sustainable development also actualize in local and organic food. Sustainable development, healthiness and the good taste of

food is mixed when the school meal is made as much as possible of domestic ingredients.

NEW ACTIONS AND PROJECTS

Intelligent dimmable street lights

VTT Technical Research Centre of Finland has developed a dimmable LED street light that consumes significantly less energy than current lighting systems, while improving the lighting characteristics. According to EuP manufacturing of mercury vapor lamps is disclaimed until the year 2015. (Official Journal of the European Union)

Traditional street lights work on full power when turned on, and the amount of light is not usually adjusted. The new LED street lights developed by VTT adapt to the ambient conditions with the help of sensors and wireless control, allowing them to be dimmed on the basis of natural light, environmental conditions (for example light reflected from snow) and the number of pedestrians. In order to maintain comfort, several characteristics important to road users, such as the amount and colour of light and the shape of the light beam, are considered in the luminaire design. Particular attention was paid to glare control, light distribution and sufficient lighting of road shoulders.

The intelligent street lighting system stores information on energy consumption, temperature, lighting level, and number of pedestrians, among others. According to laboratory measurements, the new LED street light is 50 per cent more energy-efficient than traditional lights on the market – without the intelligence factored in. With lighting levels adjusted according to the number of users or to natural lighting conditions, an additional energy saving potential of 40 per cent with added intelligence has been observed. The developed lighting method is based on available components (for example, LEDs and sensors).

Power outlets for electric cars

The city of Pietarsaari plans to install charging points for electric vehicles.

Fuel made of butanol

There is an innovative project about making fuel of butanol in the neighboring city of Pietarsaari, Kokkola. The project is a collaboration with University of Oulu.

Butanol is made of potatoes with the help of fermentation. It is possible to make fuel even of potato peelings.

Pietarsaaren lukio and sustainability:

CURRENT ENVIRONMENTAL ACTIONS

In the National Core Curriculum for Upper Secondary Schools 2003

one of the cross-curricular themes is **sustainable development**

- Students study environmental Courses in English, Swedish and German and make a commitment to act in an environmentally way and at the end of the course students evaluate their actions
- Students are sorting waste for recycling; separating paper waste and other waste

NEW ACTIONS AND PROJECTS

- New area for parking and secure bicycles against theft
- Change of taps of water with a timer to decrease water consumption
- Light and thermal insulation of all classrooms
- Measure Wi-Fi waves from the interior of the school to decrease radiation

REFERENCES

Ab Alf Slussnäs Oy:

<http://www.alfslussnas.fi/en/lowenergy>

Alholmens Kraft:

http://www.alholmenskraft.com/en/company/bio-fuelled_power_plan

Ab Ekorosk Oy:

<http://www.ekorosk.fi/docs/waste-disposal-home-guide.pdf>

APropos (Suomen Akatemia online):

<http://www.aka.fi/fi/Apropos/Artikkelit/Tieteessa-nyt/Bensiinin-korvaajia-kehitetaan-jatteista/>

http://yle.fi/uutiset/tutkimus_tuiki_tavalliset_perunankuoret_voisivat_korvata_fossiilisia_aka-aineita/6689455

Finnish National Board of Education (FNBE):

http://www.oph.fi/koulutus_ja_tutkinnot/perusopetus/hyvinvointi_ja_turvallisuus/kouluruo_kailu/kotivaki/turvallisuus_ja_tarkoituksenmukaisuus/kestava_kehitys_sesonkiajattelu_luomu_ja_lahiruoka

http://www.oph.fi/download/47678_core_curricula_upper_secondary_education.pdf

Motiva Group:

http://www.motiva.fi/en/motiva_ltd/

http://www.energiansaastoviikko.fi/ajankohtaista/kampanjauutiset/kampanjauutiset_2013/energy_awareness_week_starting_in_finland.2149.news

http://www.motiva.fi/files/2648/EuP-direktiivin_vaikutusten_arviointi_Tie-ja_katuvalaistus_seka_toimistovalaistus.pdf

<http://www.motiva.fi/taustatietoa/ohjauskeinot/direktiivit/energiatehokkuusdirektiivi>

SO ECO GREEN -meeting in Grottaferrata April 2014

http://www.motiva.fi/files/7214/Energy_Efficiency_Directive.pdf

VTT Technical Research Centre of Finland:

[http://www.vtt.fi/index.jsp /](http://www.vtt.fi/index.jsp/)

http://www.vtt.fi/news/2013/25042012_AthLEDics.jsp?lang=en