

Green Angel Syndicate

Market Needs Review with respect to

Energy Efficiency and Near Zero Carbon Emissions Due to

Energy Use in Public Buildings

On behalf of

Thermopolis, Lapua

In support of

Interreg Europe project ZEROCO2

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Green Angel Syndicate
24 East Claremont Street
Edinburgh
EH7 4JP
UK

Contact: Nick Lyth
Tel: +44 (0) 7802 150053
Email: nick@greenangelsyndicate.com
Website: www.greenangelsyndicate.com



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Introduction

The following review has been produced as an outcome of a desk research exercise followed by a seminar in Seinäjoki, Finland designed to explore the current status and quality of energy efficiency projects in public buildings in the South Ostrobothnia region in western Finland, and in particular, the funding measures available to support them from the public and private sectors. The grounds for this review are therefore based on the publicly available data dealing with funding options for energy efficiency projects in public buildings, whose target is zero CO₂ emissions; and the seminar in Seinäjoki itself. Within the limitations of these review formats, this report is offered as a bridge towards understanding market needs in South Ostrobothnia with respect to energy efficiency in public buildings, and how best these can be addressed with improvements to public policy and funding measures. The review has been concluded with the seminar, and so we introduce the report with an account of the seminar itself.

Seminar

Place: Seinäjoki, South Ostrobothnia, Finland

Date: 15th January 2018

In attendance:

Matti Alakoskela	Thermopolis Oy
Lea Hämäläinen	Thermopolis Oy
Marjo Mäkipelto	Thermopolis Oy
Anssi Puska	City of Seinäjoki,
Alexi Fridmodig	SeAMK, University of applied sciences
Tomi Kohtanen	South Ostrobothnia Chamber of commerce
Sanna Puumala	Regional council of South Ostrobothnia
Timo Lakso	Regional council of South Ostrobothnia
Alpo Kitinoja	University of Vaasa
Tapio Sivula	Centre for economic development, transport and the environment (South Ostrobothnia)
Riina Rintamäki	City of Lapua
Nick Lyth	Green Angel Syndicate
Steve Taylor	Green Angel Syndicate

Purpose of the Seminar

The purpose of the seminar was to discuss the impact of financial instruments available in South Ostrobothnia for energy measures within public buildings. It contributes to the ZEROCO2 project, in which Thermopolis is a partner, designed to improve the policy measures in such a way as to promote zero carbon emissions from energy use in public buildings.

This requires practical improvements in the infrastructure and systems for public buildings' energy consumption and the introduction of renewable energy, using technologies both existing and new. But these depend on a policy framework supported by, and stimulating, investment.

A further purpose of the seminar was to discuss how policy is supported by investments, the sources of that investment, whether public or private, and the effectiveness in achieving a result as a consequence. The attendees at the seminar represented a wide range of local public and private sector players who may be able to influence policy and uptake of renewable energy and energy efficiency measures in public buildings. This enabled a balanced view of the issues.

Current Funding Opportunities

Business Finland (formerly TEKES) is the most important publicly funded assistance organisation for financing research, development and innovation in Finland. One of its streams for public sector funding covers procurement and while this is not energy efficiency specific it could offer an option to support procurement which encourages or promotes energy efficiency or zero CO2 within other projects. Business Finland could meet up to 50% of eligible costs.

Energy Aid is a Finnish Government run fund with a budget for 2018 of €55 million. Priority is given to new technology projects and demonstration or pilot projects. Energy Aid also targets investments related to energy efficiency agreements, and investment in decentralized energy production and renewable transport fuels in the non-emissions trading sector.

ERDF is potentially available through Finland's structural funds programme – Sustainable growth and jobs 2014 to 2020 – which offers potential for public building projects to apply for ERDF under Priority 2. This includes “Developing solutions based on renewable energy and energy-efficient solutions”. This aims to increase RDI connected with renewable energy, energy efficiency and material efficiency, allowing an increase in the proportion of renewable energy sources in energy production and the development of business based on renewable energy solutions and energy and material-efficient solutions.



The European Agricultural Fund for Rural Development (EAFRD) is a funding mechanism under the Common Agricultural Policy (CAP). One of the priorities of the EAFRD for 2014-2020 is the promotion of resource efficiency and support of the shift towards a low carbon and climate resilient economy in agriculture, food and forestry sectors. This fund offers some opportunities for energy efficiency, renewable energy and research into energy issues in traditional farming areas.

ARA is the housing finance and development center of Finland which provides funding for municipalities to produce special needs and care homes and is currently placing an increased emphasis on energy efficiency and renewable energy within the homes being built with their financial assistance.

The European Investment bank provides Intermediated loans to local banks with the condition of transferring them to small and medium-sized businesses. These loans can be provided for purposes such as improving environmental sustainability of SMEs and supporting a competitive and secure energy supply.

Policy Background

There are policies at national and regional level relating to both buildings and funding but there is a feeling that there could potentially be improved co-ordination and linkages between the two especially on the regional level. The Regional Strategy sets targets to 2040, with the Regional Program 2014-2017 section updated during the year 2017 to the Regional Program 2018-2021; this guides how the European funds should be used in the region. There was a lack of detail in this strategy on how buildings contribute to the carbon reduction targets. In the updated section for 2018-2021, there is a short mention of buildings relating to carbon emissions, but this link could be stronger. In addition, there is a Regional Energy and Climate Strategy for South Ostrobothnia, but the goals are currently less bold with weak linkages to the Regional Strategy which could potentially direct funding towards the Energy and Climate Strategy.

The Building Code is a national level guidance that rigidly directs the construction of new buildings (design, energy efficiency demands etc.) and influences the renovation of existing buildings (energy efficiency). The national level of guidance is heavily weighted towards near zero energy buildings and often causes regional level authorities to be reluctant to deal with buildings directly in their policies. City planning guides the spatial use of land as well as sets limits to the type, direction, location, size and even colour of used facade materials of a building, thus limiting the choice and possibly the use of new materials. City planning can be influenced on a regional and local level.

There is policy encouragement to develop new technologies and provide innovative solutions in the renewable energy sector. However, to secure funding support through Business Finland there would need to be an export angle. Purely domestic technologies will not attract support. This is potentially relevant to a growing concern over indoor air quality and humidity problems.



Current research and policy is unclear whether the problems with air quality are due to poor quality construction in the 1970's or 1980's, lack of proper maintenance, too much use of disinfectants, to something implemented more recently or even all of these. This is a cause for lots of research and debate. Currently there are different policies and regulations for different types of buildings e.g. residential buildings follow the Decree of the Ministry of Social Affairs and Health on health-related Conditions of Housing and Other Residential Buildings and the Qualification Requirements for Third-party Experts, and buildings that are used for working places follow the Occupational Safety and Health Act. There appears to be uncertainty within existing knowledge which needs to be addressed to assist future policy recommendations.

The rapid development of the Building code towards near zero energy buildings has caused many to be concerned that the current building norm will end up causing all new buildings to grow mouldy. Thus, society will end with only rotten buildings. The two-main construction research institutions have presented opposite opinions on the matter. Therefore, there is great division on indoor air quality issues. The research bodies currently have different opinions on issues such as humidity and air quality in well insulated buildings.

There has been funding for air quality and problematic public buildings, but this ended in 2014, despite continuing problems in schools and other public buildings. Lack of policy to encourage such investment has led to a subsequent lack of funding making it difficult for some municipalities which should develop within fixed budgets.

In terms of policy support for larger scale renewable energy projects, there is a regional land use plan which designates an area for a regional scale biodiesel plant. To date there is no developer support and there appears to be a gap between policy and implementation. There is also a Regional land use plan, which points out all potential locations for wind farms with 10 or more turbines. Some of these sites have already been developed and are operational.

There is also changing policy regarding financial support for renewable energy investments. Feed in Tariffs for wind powered projects had become higher than needed, and through working with EU recommendations, the FIT regime is changing. But there still appears to be a lack of policy and funding support for solar projects. This may in part be due to Finland's seasonal extremes with long hours of daylight in summer but limited light in winter. Research into seasonal storage or energy prediction during periods of darkness should be encouraged before solar could become more attractive. In spite of these limitations, more private companies, homeowners and even municipalities have chosen to invest in solar power.

Current Local Investment projects

There is a long history in Finland of energy efficiency in buildings, especially in terms of insulation against heat loss, which is not surprising for a country that lives through such cold winters. For example, triple glazing is more or less standard on all windows in public buildings. For this reason, many projects are taken for granted and viewed as standard rather than standalone Zero Co2 projects.

The Regional Authority of South Ostrobothnia has developed projects which advise on issues of energy at a strategic level. At least two projects have been supported with ERDF, and the Authority has undertaken research and investigation, strategy writing, and strategy implementation.

Since May 2010 eight municipalities have been working together and employ Thermopolis to help to create a joint climate strategy and to implement this strategy. At the beginning of 2011 the municipalities received ERDF funding from the Regional Authority for a two-year project during which the joint climate strategy was created. This was followed by another ERDF funded one-year project to start the implementation of the created climate strategies. Seven municipalities participated in this second project.

After the implementation project came to an end the municipalities decided to continue working together using their own funds. The implementation of the climate strategy has included energy audits on municipal buildings, implementing savings measures identified by the audit, training users of the public buildings (for example, kitchen and maintenance staff are trained how to save energy), creating training materials for schools to use with pupils in elementary and secondary schools and the municipalities have joined the voluntary Energy Efficiency Agreements, which included setting targets for energy savings between the years 2008-2016. Energy Aid was used to implement energy saving measures. Most municipalities achieved their targets. Since mid-2017, five municipalities have decided to continue working together.

The voluntary Energy Efficiency Agreements, hereafter EEA, are the chosen tool in Finland to reach binding measures as introduced in 2012 when EU revealed the Energy Efficiency Directive (EED, 2012/27/EU) in terms of energy efficiency, which has been followed by other propositions of the Commission for EED updates. The first EEA period was 2008-2016 and due to the success a second period has been introduced for the years 2017-2025. The utility of EEAs has been highlighted in the current National Energy and Climate Strategy (2016) of Finland and they have a significant role in the implementation of the EED.¹

¹Energy Efficiency Agreements official website.
<http://www.energiatehokkuussopimukset2017-2025.fi/en/>

The EEA's cover various sectors such as municipal, property and building, industrial, farm and oil sector. The agreements are signed by a representative from a municipality, company or other eligible organisation wanting to participate, a representative of the national government and a representative of the relevant sectoral association. The municipality or other organisation agrees to reach a set target in energy savings during the agreement period. How this target is reached is decided by the municipality/company or other organisation independently. Energy consumption data, measures taken, and savings achieved are reported on a yearly basis to the relevant association and the government follows the overall achievements. The principle of continuous improvement is an essential element of all the agreements. Energy audits are a typical practice that EEA's have implemented.

There is also a regional Biogas Project which is funded through ERDF and which supports research and implementation for a small biogas plant, which generates fuel for tractors and agricultural equipment.

The Agricultural Fund is not generally available to Municipalities. They could be an indirect beneficiary and the current programme has funded several awareness raising projects, including some related to farming and forest energy. Farmers also have a separate section which includes advice on energy efficiency issues (Neuvo 2020). But the Agricultural Fund does not directly support public bodies. Investments in farming and farming related energy production may attract grant support of up to 40% of total project costs.

The ARA can and is used to fund public bodies with grants or loans used to construct housing or service homes for special needs groups, the elderly and low-income citizens.

Across Finland there is evidence of new school buildings aspiring towards better indoor air quality. This has given rise to a new emphasis on using wood, including Cross Laminated Timber (CLT). As a building material wood has a lower carbon footprint overall and can be seen as a step towards Zero CO2 buildings.

Many of the municipality owned buildings in Finland are in need of retrofitting. The upper limit on budgets has potentially prevented some energy efficiency measures from being implemented. Because future reduced running costs are not always considered, there is a lack of clarity which could help investments with a short payback period.

The city of Seinäjoki has actively stepped up to manage and retrofit its public buildings. Following a series of energy audits across schools in the city, an implementation programme is under way. One school outside Seinäjoki has had its oil-fired heating system changed to ground energy and this is being considered for other schools. Payback can be between 10- 18 years which influences whether investment take place or not. Other projects include a library using electric heating, which will be converted to air-to-air heat pumps, with a potential 6-year payback period. There has also been research and



audits for municipal lighting systems, resulting in moves towards LED lighting, new technology for the Seinäjoki swimming pool, and a movement activated lighting system. Most projects are funded through low cost municipal loans, together with Energy Aid.

There is also a solar panel project, which is financially supported through Green Energy Finland until 2020. There are two solar power plants already installed, with ongoing research, based on a form of leasing system where the city pays monthly fees for 12 years, and then owns the plants. This provides 18 years of free energy for the City. The plants are in a facilities service base; and a library, which used to be a City Hall.

Much of the energy efficiency work being undertaken in Seinäjoki is due to the Energy Agreement system in Finland, which encourages and assists targets to be met. Granlund Manager software for property management is provided to enable electricity and heating meters to get hourly real-time data. This system is also used to manage all city owned buildings (>600) in the Central Control Room.

The municipality of Lapua provides a good example of a new school building. Alanurmo School in Lapua was constructed during the EU FP7 period, partially funded by EU through the FP7 programme. Windows are more efficient in terms of thermal quality than usual, lights are ambient lighting controlled, sensors to control the ventilation system, solar thermal on the roof, boreholes connected to heaters in the air exchange units, heating in winter, cooling in summer, constant temperature. While Alanurmo School is now a model school in terms of energy efficiency, there is growing concern over indoor air quality and humidity in near zero energy buildings. This has led to a renewed interest in CLT and log structures. As described in previous sections.

While the construction of new buildings will always now have energy efficiency standards to meet, the renovation of existing schools, kindergartens, day cares, social services and healthcare buildings, will also increase energy efficiency. Improvements in building technology may receive financing from Business Finland (Tekes until end 2017), but insulation does not get funding because the payback period is so long.

When asked will Alanurmo be repeated in Lapua. the answer is that some of the technologies possibly, but it was a large investment, and it remains uncertain whether it was worth it. So, the answer is currently not clear. Boreholes may be advisable, but solar thermal is less beneficial because it generates heat when the schools are closed over summer but generates little during Finland's dark winters.

Other local projects in Lapua include heat exchange and LED lights installed at the vocational school; indoor football and other sports centre, swimming hall and basketball, social services HQ and an old people's home. This was financed by Tekes and municipal loans.

Overall there has been slow take up of smart meters by the municipalities in the use of the data available, and limited investment in solar based projects.

Policy / Funding Compatibility

The Building sector is controlled nationally, with policies developed by the National Government. The building code is nationally controlled, and the regions have little say in influencing changes to it. Some regions would like it to be more flexible and less Helsinki-orientated. For example, there is a lack of specific designs for rural areas.

The city of Seinäjoki and some of its neighbouring municipalities are relatively well-off, but most of the regions' municipalities have limited available finance. Energy Aid and EU funds could be used but intervention rates are limited, and these funds may not be sufficiently attractive to the poorer municipalities who may require loans to support the grants should they wish to invest in building work.

In January 2018 certain funds and functions were merged to create Business Finland. It is to be hoped that this move will create greater co-ordination between policy and funding. It is still too early to determine the effects so far.

The Investment Sector

There is one of the only specialist private sector venture capital investment fund in Finland, called VNT Management Oy, which specialises in early stage and small companies in the energy sector. This company provides a good service that is committed to real energy improvements; it is aware of the improvements and their impact on energy usage; and it contributes to Government policy when asked, with cordial links into the Ministry of Economics in particular. But it does not work with Government programmes, and its investments are not connected to Government policy in any way. The tax regime does favour individual private investments, but not venture capital investments by a body such as VNT. To some extent, this is compensated for by the availability of subsidies for energy projects, which do give advantages to the businesses in question; and by the existence of Public/Private enterprises targeting the sector with public funded grants, such as Merinova, in which VNT itself has some shares. These are regional development organisations which facilitate public funding of regional projects, including the use of European funds.

Finland is fortunate in the presence of VNT. Three years ago, the European Investment Fund undertook research of the sector, and concluded that VNT is unique in Europe. There is no other specialist Venture Capital fund management company in the whole of Europe.



In commenting on the situation in Finland, VNT has only one salient problem which, in its view, needs addressing:

“One of the major problems in business is that the regulations should not hinder the activity of business. Environmental policy related business opportunities are no use without supportive industrial policy.” (Jarmo Saaranen, Director, VNT)

He explains this as follows. If Government regulations do not follow global developments, they become a bottleneck for development. Finland has been very restrictive in the field of energy, which is bad for its development. The renewable energy sector has been lobbying for new proposals. Utilities are afraid of the open electricity market. Finland was early to adopt it, but certain things have been stopped, like easy connections to the grid, whereas in Germany they have been much more open, and encouraged the open market.

“It is important that Finnish Government understands what is going on and that energy and industrial policies reflect this. There is a new law coming that allows organizations to share energy through their central heating system – new rules. My neighbour can take my surplus energy under this new law, I don’t have to sell it back to the grid. The rules must help to develop the market, and this can be tough. 10 years ago, they opened an electric energy stock exchange, and energy sales, transmission and generation organizations were separated, and they opened the market. But the rules controlling the profitability of the transmission companies, based on assets owned, restricted the transmission organizations to use for instance leasing including services, so the open market did not work. Regulation is mandatory, but the side effects will follow.”

Market Needs – Considerations

1. Should new funds be created? Finland is a relatively wealthy country with a strong history of investment in energy efficient buildings. The need may not be to seek additional funding, although that would always be welcome, it may be more prudent to incentivise and increase interest in energy efficiency in public buildings and help direct funding towards projects in the less affluent rural areas and where investments would provide an economic return.
2. Should tax incentives be created to stimulate investment in building efficiency measures for public buildings? This has not been seen as a major issue and is possibly less relevant in Finland than in some other European countries.
3. The Feed In Tariff system is undergoing change but could still be managed more effectively. There are some incentives towards helping meet capital costs of solar projects and these could be explored further.
4. Most public buildings are well insulated with relatively efficient heating systems. The current interest appears to focus on air quality and humidity within well insulated buildings and the current research into incidences of mould, damp warm rooms and air changes has and should be taken further with a view to gaining

scientific support for policy improvements in relation to air quality within buildings. This could be combined with greater public education as the knowledge of the ventilation/insulation balance is possibly not well understood. There is however, a growing concern that air quality within buildings is linked to health and wellbeing, and improvements in this area could reduce sickness, lost work hours, health service costs etc.

5. The benefits of renewable energy are probably not adequately addressed in schools or in the workplace and there could be greater encouragement to consider the potential for buildings to be energy generators as well as energy users.
6. There is a good emphasis on monitoring and developing information databanks. This helps provide confidence in the promotion and investment in renewable energy and energy efficiency projects in public buildings. There is increasing individual employee motivation with evidence of training sessions for kitchen and maintenance staff. Such schemes could be rolled out more intensively across the region.
7. The Finnish Government has set criteria and targets for renewable energy investment and reduced CO2 emissions. To date they do not consider a Zero CO2 target and there could be potential to encourage the aspiration towards Zero CO2 rather than simply reduced CO2.
8. Public funding is possibly not as closely linked to policy as it could be. This may be especially the case in the less affluent rural municipalities.
9. Private sector funding is hampered by an unhelpful regulatory framework which reflects a failure of Government to change energy regulations with the changing market conditions. Its effect is needlessly restrictive to productive commercial growth.

Market Needs – Conclusions

In conclusion, the Market Needs for the ZEROCO2 project in connection with the region, and its market conditions, are nothing like as severe as in other partner regions within the project. In many ways, Finland is advanced and progressive in its approach to this subject, and the partner region is well served by a highly active and professional service which is led by the partner itself. The following therefore lists the topics which could usefully be improved, which address the areas of need that do exist within the region, and will improve the impact of the policy instrument chosen for the ZEROCO2 Interreg Europe project in the South Ostrobothnia region:

1. Energy indicators included in the Regional Strategy
2. Mid-term evaluation of the Regional Strategy
3. Evaluating Regional climate and energy strategy
 - a. updating
 - b. setting and following targets and indicators



- c. creating an action plan
 - d. smart regions
4. No more public buildings heated by oil
 - a. energy and climate strategies for municipalities
5. Oil heating in private buildings decreasing
 - a. energy advice
 - b. other measures and means
6. Creation of new Regional structure (national decision)
 - a. how could energy issues and zeroco2 be included in this process?
7. Sustainable Communities (Alavus, Kuortane, Kurikka, Lapua and Kauhava)
 - a. The action plans, the objectives for improvement
 - b. how could the regional operator help the municipalities in this task?
8. Technical problems
 - a. battery/storage
 - b. hybrid and building automation
 - c. Co-operation with Seinäjoki university of Applied Sciences (SeAMK) which is creating a platform for people building single family homes. It will combine all necessary expertise and information and authorities. We are interested in the fact that authorities are included. They were hoping we could help with ideas for choosing renewable energy. This is not exactly related to public buildings, but definitely related to promoting the ZEROCO2 concept and lowering CO2 emissions. Also, during the project, the high amount of oil heated buildings in our region has been noticed and this could be an action to decrease these numbers.
 - d. how could these become action?
9. Training on zeroco2 concepts
10. Financial problems
11. Lobbying nationally and at EU level
 - a. difficulties to get new concept of ZEROCO2 through as it is not a term used at any level