

Energy in a
Circular Economy
Module 2 - Training material

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INTRODUCTION

Saved money, increased competitiveness, satisfied customers and reduced climate impact - these are just some of the benefits of energy-efficienting your business and investing in renewable energy.

The number of conscious green consumers increases. They are attracted to sustainable marketing and are looking for companies that have undertaken to reduce their environmental impact and really do it too. One way to do that is to work with efficient resource management, regardless of raw materials, fin-

ished products or energy use. Energy efficiency and the use of renewable energy sources are two parts that are important in your work with circular economics.

With the help of this education, we hope to help you get started or inspire you for new measures for smart energy use. We want you to set and achieve goals about reduced energy costs and the share of renewable energy in your business. Hopefully, you will also be inspired to work continuously with energy issues to achieve even better results.

OBJECTIVES

Objectives – What we want to teach/take away in this module?

Objectives and expected results

- Provide a perspective of the meaning of energy use in relation to circular economy
- Introduce modern energy concepts, such as, Renewable energy, Energy efficiency, Prosumer, Energy cluster, Energy Management System etc.
- Equip you as a business owner/staff with capacity to:
 - Evaluate the options for sourcing clean energy
 - Identify possibilities to produce your own renewable energy
 - Identify relevant business areas that use energy

- Develop a plan about how to improve the energy consumption
- Monitor the results of different measures
- Inspire you with different examples of possibilities in turning toward renewable sources

As a workshop participant, you should have received good support to begin identifying actions within your company. The purpose is for you to start sketching an action plan for energy and transport actions. We can help you with advice to further develop the action plan.





THEME.

CIRCULAR ECONOMY AND ENERGY

A DEFINITION

Circular economy takes in consideration the type and sources of material, paying close attention to material and organic flows. It aims to make products that are durable and that can be reused, refurbished and recycled. It achieves this aim by the intentional design of a service or product to ensure they are sustainable.

In relation to energy, renewables are the main source of energy in the circular economy. In addition, reducing consumption, efficient use, as well as, local production are main elements in a circular economy.

"Circular energy" is the use of renewable sources in continuous effort towards energy efficiency in relation to technology (production, distribution and efficiency) and user behavior". In terms of behavior, it is relevant to involve both staff and guests.

A business can work with its energy use in four fronts

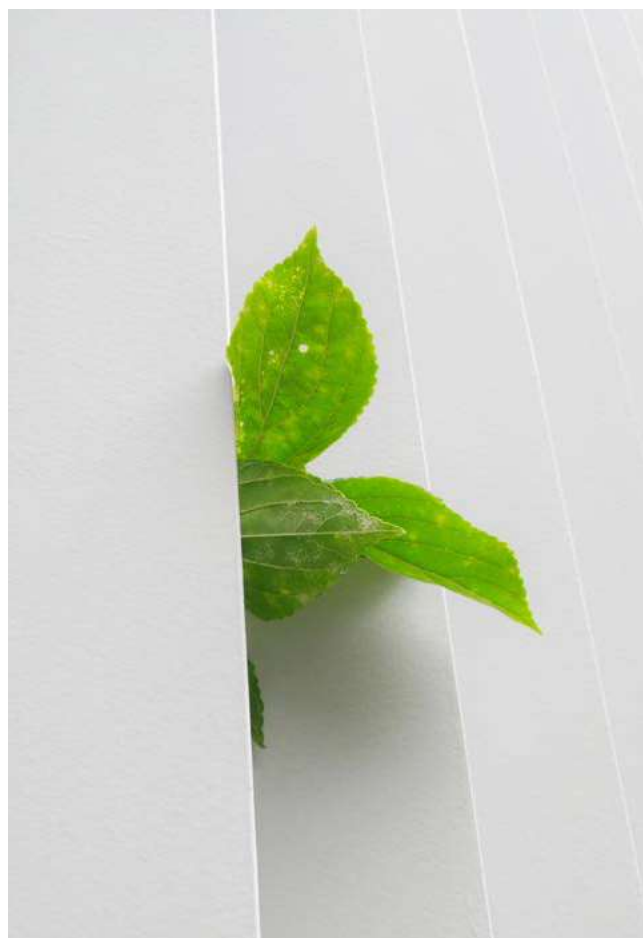
- Sourcing renewable energy
- Producing renewable energy
- Working on Energy efficiency (technical and behavior change)
- Considering the energy use within other business innovation

Sourcing is simply buying energy that are made from renewable sources. Today, its availability is dependent on the energy offer in a given region, i.e., it is dependent on the possibility of buying renewable energy from energy sources providers.

Producing energy is a way that allow business to save resources by having their own energy either by having their own producing system or by participating in cooperatives.

Energy efficiency is the work to improve the use, as well as the quality of technology. It could be as simple as turning of the lights when they are not needed and making sure that heaters and pumps are functioning well. It could be as big as changing the insulation material of the house, or double glazing the windows.

Many new technologies and offers are going to consume energy, whether they are electric cars, daily technology or cleaning robots. Making sure that the energy used in those technologies comes from renewable sources is a key aspect of the circularity of a business.



ENERGY KEYWORDS

Here are some keywords / concepts about energy that may be helpful to have knowledge about when you read more about energy issues or attend the workshop.

SUSTAINABLE ENERGY

Sustainable energy can be looked from the perspective of consumption/production or for its impact on the environment and society. Sustainable energy is a form of energy that meet our today's demand of energy without putting them in danger of getting expired or depleted and can be used over and over again. Sustainable energy should be widely encouraged as it do not cause any harm to the environment and is available widely free of cost. All renewable energy sources like solar, wind, geothermal, hydropower and ocean energy are sustainable as they are stable and available in plenty.

Technologies promote sustainable energy including renewable energy sources, such as hydroelectricity, solar energy, wind energy, wave power, geothermal energy, bioenergy, tidal power and also technologies designed to improve energy efficiency. Renewable energy sources do not contribute to increased climate impact.

PROSUMER

Alt 1. A prosumer is a consumer of electricity who also produces electricity and can sell it back to the grid. Today the own production of electricity is often made through a rooftop solar photovoltaic (PV) system.

Alt 2. A prosumer is someone who both produces and consumes energy – a shift made possible due to the rise of new connected technologies and the steady increase of more renewable power like solar and wind onto our electric grid.

E-COOPERATIVES

(energy networks or energy clusters)

Today, it becomes more common for energy consumers to merge and produce their own energy and sell energy to the network. It can be about building a common solar cell plant where members have shares. It can also be companies that merge and use waste heat from a plant or produce energy together. These initiatives can also be called energy networks or energy clusters.

ENERGY EFFICIENCY

Alt 1. Energy efficiency is a measure of how efficiently an appliance, building, organization or country uses energy. For example, using the proper insulation material at the necessary locations helps a building use less energy for heating and cooling while maintaining a comfortable temperature. Similarly, using LED lights and natural sunlight helps to reduce the amount of energy required to attain the same level of illumination that could be traditionally received by incandescent light bulbs.

Alt 2. Energy efficiency is defined as the use of energy in an optimum manner to achieve the same service that could have been achieved using a common less efficient manner. Energy efficiency is the practice of reducing the energy requirements while achieving the required energy output.

Energy efficiency is key to ensuring a safe, reliable, affordable and sustainable energy system for the future. It is the one energy resource that every property owner possesses in abundance and is the quickest and least costly way of addressing energy security, environmental and economic challenges.

ENERGY RESILIENCE

Resilience is the capacity to go through and surpass adversities. In relation to energy that implies having multiple sources of energy (solar, wind etc) as well as multiple ways of getting it (as opposed to just one factory or a grid that is designed in line.)

ENERGY STORAGE

Energy storage is the capacity to reserve energy for a future use. Classical examples are chargeable batteries, water tanks heated from solar energy etc. Now there are also possibilities to store electricity for longer periods in the form of hydrogen.

With the help of fuel cells, the hydrogen can then be converted to electricity again. Or you can use the hydrogen as fuel for vehicles.

Energy storage can enable the production of energy to be more independent of consumption. This is desirable for heating and electricity consumption throughout the day and throughout the year. During the summer, solar radiation and heat production is high, while the need for building heating and electricity for lighting is low, while the opposite applies during the winter. Interest for individuals to be able to store energy expect increase. Not least, bearing in mind that storage in batteries makes it possible to store electricity from solar cells. In order to achieve a high level of self-sufficiency, energy storage is needed, given the imbalance between energy consumption and energy production from solar cells. For those who have electric cars, there are also opportunities to temporarily store electricity in the car batteries.

AN OVERVIEW OF ENERGY USE IN TOURIST FACILITIES

Restaurants and hotels need a lot of energy because there are many energy-intensive installations on a small surface. Restaurants use more than twice as much energy as hotels, calculated per square meter of local area. It is electricity consumption in cooking that accounts for the biggest difference in energy use between restaurants and hotels. However, many hotels have their own restaurant.

The energy accounts for a significant part of the operating costs of hotels and tourist facilities. The Swedish Energy Agency conducted a study of different Swedish hotels. The hotels used an average of 250 kWh of energy per square meter and year. Just over half,

132 kWh per square meter and year, went to heating. Of the annual energy consumption, about 70% is used for heating of premises and hot water, which corresponds to 40% of the cost of a hotel that is open all year round. Lighting accounts for 8% of energy consumption and 21% of energy costs. In a restaurant, the kitchen equipment uses the largest amount of energy 35% followed by 28% for heating and cooling systems, 18% dishwashers, 13% lighting and 6% cooling. Take a walk in the business and note when everything turns on, how much starts, even though it may not be used until several hours later, and how much lighting and equipment that are on at night.





REDUCE ENERGY DEMAND AND MAKE ECONOMIC AND ENVIRONMENTAL BENEFITS

Energy efficiency is always profitable from a business-related perspective. Efficient energy use helps to increase profits by reducing energy costs. All energy we use also has an impact on the environment. It is only the unused energy that does not give an environmental impact.

Work for smart energy use in four steps

I. Observe and get key figures

Understand where the energy is used. Knowing what you pay for the energy (electricity, heat, cooling) and how you use it are important components for managing the operation of a good energy management system.

II. Plan around Key topics

Energy Efficiency - Reduce your energy demand and improve your systems

Begin at the right end and reduce the need for purchased energy. Every saved kilowatt hour is a profit for both wallet and environment. Explain how it affects the environment

Increase the share of renewable energy by buying or producing it

When you're energy-efficient, it's time to review what energy sources you use. Install systems that can use renewable energy to produce heat, cooling and electricity. Switching to another system becomes more cost effective because you can use a smaller boiler or heat pump or a lower subscribed district heating effect. See also what opportunities you have to produce your own electricity or hot water using solar energy.

Transport and Use the remaining fossil energy efficiently.

It is not always easy to get rid of all fossil fuels at once. Choose low cost fuel vehicles and low emissions and train staff

driving a lot of driving in Eco Driving. Encourage guests to choose sustainable transports, which can increase their experiences during the visit.

Engagement

Engage the staff, explain how you want to work with energy issues and ask them to come up with suggestions on how to save energy. Engage your guests by informing them of your sustainable energy policy and asking them to help save energy. It not only leads to reduced energy consumption, but also provides a better experience of comfort and service.

Energy Management System

Consider whether you want to visualize your energy saving with ecolabelling and / or environmental management systems.

III. Implement

Organize your actions and progress follow up. Contact key partners and move on.

IV. Check

Before we dive in in such steps, we would like to introduce the concept of a guiding star, and some reflection questions for preparing your mind for choosing a viable solution for your business.

THE GUIDING STARS TOWARDS CIRCULAR ECONOMY

We used to look for the stars as guidance. In circular economy having guiding stars means selecting some guidelines or directives that can help business to look at their activities with new eyes. Some example of guiding stars are: "Our companies is carbon neutral", "We are zero waste", or "We use sustainable products".

It is much easier for companies to find or develop new solution if they have directions to where they should be moving. There are many action one can take to be sustainable and develop a more circular approach. If a company chooses a "Zero waste" as a guiding star, then looking at supply and production efficiency, as well as looking at consumer left overs gains a whole new perspective. Waste is not just an externality to be managed, but it becomes something to be designed out of the equation or considered into the equation. Ultimately, such change of perspective allows the development of new busi-

ness partnerships and revenue streams.

Example, the Restaurant Silo in Brighton has Zero Waste as their business model and guiding star. They have shown that it is possible to drive a sustainable food movement, both financially and ethically. Read more about what they have done at their website <http://www.silobrighton.com/story/>

Moreover, having a guiding star helps to bring together different initiatives that are effective however that would be lost or meaningless without the reference pro-

vided by the guiding star. For example, insulating a roof is an action business can make in order to improve energy efficiency. It has a great benefit saving energy resources and money. However, such action is not something to be marketed without a context, it simply hard to make sense or a point out of it. However, if the business has a guiding star like "Using resources as best as possible" or "Getting CO2 neutral", then such action can be place in a context. A business can advertise how insulating the roof saves resources thus reducing waste of energy, reduces their CO2 emissions or both!

Reflection questions for developing a guiding star

- Are you committed already to any guiding star?
- What kind of guiding star could be added to the heart of your business?

Examples of slogan

A restaurant could use from field to field. Zero waste, "Our company is carbon neutral", "We are zero waste", or "We use sustainable products"



QUICK START ON ENERGY AND CIRCULAR ECONOMY

Some of the questions below can help you to have a quick overview of your current and future development related to energy and circular economy. Perhaps some of the things you already do, others can be more difficult, and perhaps you can find some inspiration for your next steps:

Resources use:

- What kind of Energy do you source?
 - Can you buy energy that is renewable?
 - Can you produce energy yourself?
 - On your future purchases/leases can you get products that are energy efficient?
- Which aspects of your business are the most energy intensive?

Processes:

- Which process can you change in order to save energy or increase energy efficiency?
 - Support behaviour change among staff and clients?
 - Buy as local as possible?
 - Work with eco-driving?
 - Structural additions in building, e.g:
 - Install solar panels
 - Improve insulation
 - Etc
- Would help to install an energy management system?

Rest products and left overs:

- How can you recover energy that is not used?
 - Recover heat from water and from ventilation?
 - Connect your local electricity production to the grid to save unused energy?
 - Install a battery storage system?



OBSERVE AND PLANNING

OBSERVE

Continuously monitoring where the purchased energy is taking place is one of the most important building blocks for a successful energy work. The follow-up will give you knowledge of how energy is used. Observing your energy use also provides information about the results of the actions that you implement. Therefore, regularly collect the amount of energy purchased and divide energy into different energy types. Do not forget to monitor energy usage for transport. In table 5.1 and 5.2 we have made a template that you can use to estimate your annual use of energy, water and fuels for vehicles.

Heat, electricity and water

Table 5.1. Inventory of energy consumption and costs

Cost item	Annual volume	Annual cost	To think about:
Oil	m3	Euro	
District heating	kWh	Euro	Include fixed and variable fees
Biofuel	m3	Euro	Include shipping costs
Electric mains	kWh	Euro	Include fixed and variable fees
Electricity Trading		Euro	Include fixed and moving (energy tax and electricity certificate) fees
Water	m3	Euro	Include fixed and moving fees
District cooling/cooling that not is included above		Euro	Include fixed and variable fees
Other:		Euro	
Total:			

Key figures heat, electricity and water

In order to compare energy usage between years, it is also interesting to link usage to how much your space and services are being used. Examples of key ratios that may be interesting to follow up are, for example:

- Energy usage per guest night
- Electricity consumption per guest night
- Water consumption per guest night
- Energy usage per number of meals sold

Fuels (vehicles and work machines)

Table 5.2. Inventory of fuel consumption and costs

Cost item	Annual volume	Annual cost	To think about:
Petrol		Euro	
Diesel		Euro	
HVO		Euro	
Biogas		Euro	
Electricity		Euro	
Other fuel		Euro	
Total:		Euro	



IDENTIFYING ACTIONS

Now that you know how much energy is used and what it's used to, it's time to start identifying possible actions. Many believe that it is in the processes that use the most energy that can be more efficient. However, you can find processes that use a smaller amount of energy but, in return, you can make a big efficiency with a small effort. A common mistake is that the "soft" measures are not investigated. Often, too much focus is placed on technical measures that require larger or smaller investments. A significant part of energy use can be captured by changing operating routines, behaviors and attitudes.

How much you can influence yourself when it comes to action also depends on whether you own the property or if you rent premises. When you rent premises, dialogue with the property owner is important.

Engage the staff for identifying possible behaviour changes

Many companies start their energy efficiency efforts by calling an energy consultant and ordering an energy survey. Another way is to start looking at a part of the business where the company believes it can make a big savings, such as the heating system. What you risk losing by doing so is that your own staff can't get a speech and feel no commitment. A successful and long-term energy efficiency work is linked to the management's and staff's common commitment. Start creating this commitment by

organizing any kind of meeting or workshop at the company that focuses on the energy issue.

For assistance with lecture and management of the workshop, contact your local energy and climate advisor or your regional energy agency.

After the review you can discuss the following in smaller groups:

- Are we aware of our energy use?
- What suggestions do we have on energy efficiency measures?
- How can we contribute or stimulate

reduced energy consumption in our daily work?

- Do we have the knowledge that we need or do we need to get help from outside?
- Can we change our routines (operations, purchases, etc.)?
- How do we measure and monitor energy use? Do we have good measuring equipment?
- Are we following the impact of implemented measures? How?
- How do we inform our guests about our work?

The basis you have provided is the basis for starting to formulate policies, purchasing procedures, operating procedures, action proposals and suggestions for further work. At the same time, you have anchored your work and created commitment to the entire organization. Often there are already good proposals for energy efficiency measures that, in principle, need not cost anything.

LOOK FOR POSSIBLE SOLUTION WITHIN KEY AREAS

Look for possible solutions within four key areas. The key areas are:

- Energy efficiency
- Energy supply and production
- Sustainable travel and transports
- Energy management

CIRCULATION PUMPS

Circulation pump takes the heat from a source, such as the district heat exchanger, heat pump or boiler, warms the elements or floor heating hobs and back to the heat source. Old and dis-regulated pumps that run around the clock and all year round take a lot of energy. By switching to a modern circulation pump, it can reduce energy costs.

ENERGY EFFICIENCY

Energy efficiency is the use of energy as economical and efficient as possible for users, and at the same time as sustainable as possible for society. This reduces environmental and climate impact while at the same time contributing to business's increased competitiveness. The cost of the actions you implement is earned through reduced energy costs. Moreover, there are other financial benefits on the purchase of new systems such as increased productivity and improved indoor environment. Energy efficiency is achieved through technical solutions - such as type of lighting or recovering heat from the exhaust air. Energy can also be saved by a change in behavior or new business offers, for example by turning off unnecessary lighting or offering customers the opportunity to borrow electric bicycles as alternative to car trips. In this section we focus on what you can do to energy-efficient in the building linked to technical solutions.

In case study 9.2 you can read about the benefits for a hotel that works with energy efficiency.



BUILDING ENVELOPE



Building envelope is a collective name for those parts of the building that keep the cold outside and the heat inside a building. There are, for example, exterior walls, basement walls, ceilings, floors, windows and exterior doors. In order to reduce the heating costs of a building, it is often profitable to review the climate scale.

Insulation

Insulation is used to restrict undesired heat exchange. It can help to keep warm places heated and cool places cooled. For example it can prevent that heated space loses warmth to the cold outside air. Good heat insulation in walls, floors and ceilings is the most effective way of reducing the building's heat losses in winter and prevent "overheating" in the summer. Such measures reduce the cost of heat and cooling.

It is common to improve the insulation associated with refurbishment and renovation, in order to offer guests better living and energy saving.

The most cost effective is to start by insulating the roof. If this measure is already done, then you can proceed to look at the needs and possibilities for additional insulation of exterior walls.

In most cases, the best way is to insulate the exterior wall. That gives a high insulation effect and the old construction becomes warmer and drier. In case of culture-historically valuable building or if the façade consists of a ventilated brick shell, external additional insulation may be inappropriate. Then you can instead do an internal additional insulation.

When insulating roofs and/or walls, it is important to inspect the ventilation in the building. When air tightness changes, the ventilation must be adapted to the new conditions. Otherwise, there may be problems with moisture damage.

Even buildings that generally have a good insulation can have imperfections that contribute to traction and heat loss. Heat and air leaks through slots, insulation inserts, cold bridges, etc. That can impair thermal insulation ability. Such imperfections in walls and ceilings are usually found in connection with building components eg. at floor and ceiling angles and around windows and doors. Another problem area is installation implementations, such as channel transitions in windbreakers.

Thermography

A thermographic camera is a good tool for finding heat leakage, it makes possible to map where energy losses occur inside or from a building. The method is quick and the heat images taken by the camera are clear and convincing arguments for possible actions (see figure 5.1.-5.2).

A control of the building with heating camera can for example:

- Visualize energy losses
 - Detect insufficient insulation
 - Locate air leaks and cold bridges
- In some municipalities, energy and climate advisors have access to thermographic cameras, or they can advise you on companies that work with thermography.

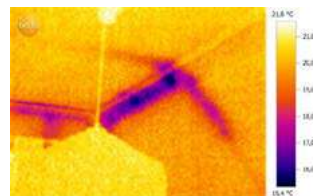


Figure 5.1. The heating camera shows cold surfaces in the roof where, for example, it may be poor insulation or a cold bridge. Photo: Mikael Nyman

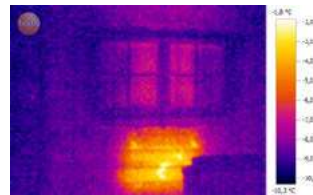


Figure 5.2 The thermographic camera shows that a lot of heat from the element radiates through the wall. The insulation needs to be improved. Photo: Mikael Nyman



Windows and doors

Windows and doors also play a major role in the building's energy consumption. Heat can leak through cracks or low insulating materials. This means energy losses and higher costs.

Measures can be a relatively simple such as sealing windows and doors or choosing windows and doors with better insulating properties in connection with renovation. The positive of such measures is that the heat loss, whiff and noise from outside diminishes.

For hotels with large entrance doors it can also play a big role in how long the doors are opened and if there is an airlock to avoid cold to leak in the entrance.

Windows can be major energy thieves. Old and poorly insulated windows mean major energy losses. Up to 30% of the heat in a building can disappear through the windows. By replacing old windows with

new energy efficient windows with low U value, it can significantly reduce heat losses.

Double glazing provides a good insulation. In addition, modern glass surfaces like low-emission glass and sunscreen, you can significantly reduce the need for heating and cooling. Because it is quite costly to replace old windows, an alternative that can be profitable is to complement the existing windows in ways that prevent heat losses, for example with better glazing. This is especially true if the windows are well maintained.

After changing the window, the heating system must be adjusted to reduce energy consumption. Also, consider revising the ventilation as the air density in the building changes in conjunction with the change of window.

Blinds

Blinds are becoming increasingly common in cooling to increase the comfort of buildings during the summer. First look at the possibilities of sun shielding. External sunshade is more efficient than internal. Internal protection prevents the solar energy from entering the building but heats the air between the window glass and the blind, in consequence the warm air is then passed on into the building, however at a lower rate.

Common ways to protect against the sun are:

- Fixed horizontal external sun protection (swingable or fixed): for example, slats, gratings, PV-cells or balconies.
- Movable exterior vertical sun protection, especially for facades to the east and west: for example shutters, exterior shutters, blinds, awnings and light-blind blinds.
- Indoor sunscreen: for example curtains, blinds, blinds.

- Vegetation: climbing plants on north and west facades, deciduous trees to the south (sunbeams shine through deciduous trees in winter and absorbed in the summer). Vegetation improves the microclimate by evaporating water and cooling the air.

Choices of colors and materials are also important in reducing the heat supplement. Light color and materials that do not absorb so much sunshine reflect the sunbeams and keep the building cool when the sun shines. Dark surfaces and high-absorbent materials provide warming. In cold weather, dark areas are recommended to increase the passive heat supplement during winter time. Moreover, look for material can be recycled. There is a strong movement for reusing natural or synthetic fabrics, you can help to increase the circularity of your business by choosing one of these materials.

VENTILATION



A good indoor climate and a healthy working environment are dependent on ventilation - fresh air enters the building and "polluted" air is released. An unbalanced ventilation can cause problems, for example, if ventilation is too strong, it will extract heat from the building.

Some key features of an effective ventilation system include heat recovery and the ability to adjust airflow as needed. Both features reduce energy usage and operating costs for the house. For example, there are programs for controlling airflows via the booking system, so that the ventilation is not running in unoccupied rooms. Similarly, ventilation in conference rooms can be controlled after use.

Exactly how the ventilation should be constructed and calibrated depends, of course, on the type of building and its uses. If you change the use of the building, you also need to adjust the ventilation.

Here are some questions that are good to review in terms of ventilation:

- What type of ventilation system do you have?

- Is the ventilation correctly adjusted after the airflow?
- Are the operating hours of the ventilation necessary?
- Do you have heat recovery of indoor air?

There are different types of ventilation systems:

- natural ventilation
- exhaust air system (F),
- Off and supply air systems (FT) and
- heat recovery and supply air systems (FTX)

Self-propelled systems (natural ventilation) are most common in buildings built before 1970. These older ventilation systems are based on the fact that fresh air enters the building through valves and imperfections. This system rarely meets today's demands for comfort, airflow, electricity and energy efficiency. Unfortunately, there are no technical possibilities for recovering heat in the outgoing air in a self-propelled system. It is possible to reduce energy consumption by replacing existing air valves to new ones that can regulate the air intake according to outside temperature and humidity. If you

have self-propelled systems, you can review the possibility of installing a better ventilation system.

In the extract air system, air is supplied in the same way as in a self-propelled system. The difference is that air outflow is done with the help of fans which are often found in the kitchen and bathroom.

Electricity use in exhaust systems can be reduced if the old fan is replaced with a new one with higher efficiency and with modern control and control equipment. Pressurized exhaust air fans save heat energy by sensing when the house is being overventilated, and if so it slow down the fan speed. With modern technology, ventilation flow can be varied by season - less in winter and more during the summer. An exhaust air system can be supplemented with an exhaust air heat pump to recycle the heat contained in the extract air.

Instead of allowing the heated air to be thrown away by the ventilation system, you can take advantage of the waste heat in a heat recovery system, known as FTX system. The system raises the temperature of the supply air with heat from the exhaust air. Energy savings can be around 50-90% compared to having a normal ventilation system.

One simple solution is to check if ventilation times can be reduced. Many times, ventilation is also ongoing when no one is staying in the premises, for example during the night or on weekends.

Another solution is upgrading of any existing heat recovery in the building is usually the most efficient energy efficiency mea-

sure. This can be done, for example, by replacing the heat exchanger and fans in the ventilation unit with new and more energy efficient variants. In many cases, it may be worth considering a replacement of the entire unit because old units are often poorly insulated and untight compared to new ones. SFP - Specific Fan Power is a measure that indicates the energy efficiency of a fan or unit. SFP should be no more than 2. The lower the number the more energy-efficient fan. Better heat recovery of indoor air contributes to reduced peak power, which in turn can result in lower fixed costs for electricity or district heating.

Adjustment, maintenance and clean ventilation ducts

Having a functioning ventilation in the premises is important for the health of the staff, clients and for the well-being of the building. A first step is to clean all ventilation ducts and filters. The denser and dirtier a filter is, the greater the need for electricity. If the ventilation duct 100 mm means a 5 mm coating a reduction of the ventilation flow by 20%. This is especially important in the kitchen.

No matter what mechanical ventilation system you have, it is important that it is properly adjusted. This is an important pre-requisite for efficient energy use in buildings. When installing or rebuilding the ventilation system, an initial adjustment must always be performed. Moreover, regular maintenance and follow up with the required ventilation controls reduces the risk of poor indoor climate, ventilation noise, moisture and radon problems.



HEATING AND COOLING SYSTEMS

Regular maintenance, reduced heat / cooling losses and the correct set temperature can increase efficiency and performance in heating and cooling systems. Additionally, using central control and regulating systems for heating and cooling, as well as to lighting and ventilation makes it possible to control indoor comfort in tourist facilities while minimizing energy dissipation. Currently, there is much talk about smart houses where different functions can be monitored and remotely controlled.

Here are some questions to discuss when it comes to heating and cooling systems:

- How well adjusted is the heating system?
- What are your controls for optimizing indoor temperature?
- Is solar energy a good option for you to produce heat and/or hot water?
- If you have refrigeration storage, is there a possibility of recycling heat from the refrigeration engine?
- Is there the possibility to use proximity to the sea for comfort temperature control?
- Is it interesting to install solar cells to produce electricity when the cooling needs are high?

Measurement and statistics

As in any other energy efficiency work it is important to keep regular measurements. Preferably, the meters should be read monthly or more often – and then registered into the log system, which can be done by hand or with support of an automatic system.

In this case, measurements of heating consumption need to be "adjusted" so we are able to be comparable one year to another year. This happens the outdoor temperature varies between years. There are several programs that easily handle energy statistics for one or more buildings.

Thermostatic valves

To use heat from solar radiation, people staying in the room or technical equipment, radiators should have thermostatic valves that regulate the heat. The heat supply is discontinued if the thermostat valve detects other heat sources. This reduces energy consumption and contributes to a more comfortable temperature.

Optimization of indoor temperature

Traditional control of waterbased heating systems adjusts itself by controlling the flow temperature according to the outdoor temperature. Today there are different control systems that also takes into account other parameters such as indoor temperature, weather forecasts, internal heat loads and the building's thermal integrity.

It has also become more common for property owners themselves to install indoor temperature sensors and use them to control the temperature. In such cases, often existing control systems often need to be re-programmed. Heat control based on indoor sensor allows for better indoor climate and reduced energy and power requirements for heating, saving both environment and money.

Indoor temperature can also be controlled via the booking system, so that ventilation increases when the guest has checked in. Example: Install system temperature control system, and set the temperature of 21 ° C when the guest checks in and decreases to 18 ° C upon check out.

There are also energy management systems in buildings that check and monitor the operation of buildings that could be used to adjust the heating in the building among other energy related areas such as ventilation, lighting, electricity, etc. See more in chapter 5.7. Energy Management systems). In this context, we start to lean towards the so-called "smart buildings". A smart building that is connected to a smart network allows remote control or automatic control of heating and cooling, water heating, appliances and lighting, for example, depending on time and day, humidity, outdoor temperature and if the building is used or not. If you have multiple buildings, there is a system where microcomputers with built-in sensors can continuously measure the situation in the current building. With the help of antennas, information from the different buildings can be collected. Through good access to such data, adjustments can be made to optimize operation or, for example, detect leaks.

The actual heating system

Measures to improve and improve the central heating system:

- Check that the boiler (or other heat source) size and radiator area correspond to the heating requirement of the building as a whole, or the room in which it is located. If it is oversized you may consider obtaining a new system.
- Regular service on boiler equipment, etc., to ensure safe and efficient operation.

- Isolate the boiler and pipes
- Check the system for leaks and corrosion.
- Use a digital thermometer to make sure the temperature is set correctly - the heating costs increase by about 8% when the indoor temperature increases by 1 ° C.
- Have the right water temperature in the boiler and heating system - Use thermostat to ensure that the water is not warmer than necessary.
- Install programmable thermostats to vary the temperature during the day or week, for example, to reduce the temperature at night.
- Switch to a system that warms both the rooms and the hot water.
- Regulate the room temperature with thermostatic valves on the radiators.
- If you have an old heating system, it's a good opportunity to replace it when renovating a building. The conversion into an efficient building makes it possible to switch to heat pumps, solar thermal, geothermal heat or waste heat.

Energy efficient cooling systems

Measures to improve and improve the cooling system:

- Regularly service refrigeration systems to work safely and efficiently.
- Use high-quality filters and low air resistance. Replace filter frequently.
- Install an economizer that cools the air before entering the air conditioner.
- Check that the temperature is set correctly - to cool buildings at 24 ° C. Additional cooling costs more.
- Install programmable thermostats in central cooling systems to set temperatures that vary during the day or week.
- Install sensors for windows and doors that turn off the air conditioner when open.

- Recycle heat from refrigeration engines, air conditioning and any refrigeration and freezing compartments. Use heat for warming hot water or water in the spa.

Free cooling

There are many different types of free cooling, but one thing they have in common - environmental impact and energy use are small compared to traditional compressor cooling devices. It is possible to produce free cooling for comfort cooling by using natural cold in water, air or bedrock.

Cold water is pumped from sea, lake or a geothermal source. In the building where the cooling is to be used there is a heat exchanger that transfers the cooling in the water to the building's cooling system. When the cold water is no longer cold, it is led back and cooled again to pump it back.

If your company has geothermal heat, you can use the borehole to cool the water. At the same time, the borehole is reloaded with the leftover heat. The average temperature of the borehole increases, which provides a better efficiency to your heat pump.

An alternative is to use the outdoor air when it is cooler than the air in the room to be cooled.

In some places there are also possibilities for connecting to district cooling produced by municipal energy companies.

Produce your own electricity to your cooling system

The development for companies to produce their own electricity gives new opportunities for cost constraints. For example, solar cells can be good to meet a high demand for electricity for air conditioning.



WATER-TIGHT FIXTURES AND EQUIPMENT

Water-tight showers reduce a lot the head demand. They can either mix air into the water jet or restrict the amount of water flowing in the shower or out of its nozzle. Yet, such technologies retain the feeling of a powerful shower jet. With water-tight showers, the consumption of cold and hot water can decrease by 50-60%.

By installing taps that are self-closing on toilets you can also save water and energy.

With efficient washing machines and dishwashers, the water needs can be reduced even more. Remember to consider water and energy consumption when purchasing new washing machines and dishwashers!

Example: Ribersborgs coldbathhouse in Malmö installed two screwdriving shower systems. The new technology reduces water consumption by about 90% and energy consumption by 80%. In two months more than 100,000 liters of water were saved.



LIGHTING

Good lighting is important for the guests' and staff's comfort, as well as for your facility atmosphere. It is common for you to save up to 30-40% of the lighting without affecting comfort. It is usually easy and profitable to energy-efficient lighting.

Here are some questions that are good to review when it comes to lighting:

- How old are your lighting fixtures, are they more than 5 years old?
- Are there reflectors in the fixtures? Are the reflectors cleaned once a year?
- Are the luminaires equipped with LED lights?
- Is the lighting sectioned?
- Is the lighting demand-driven?
- Is it often lit in corridors and places where people usually do not stay?
- Is there any presence control or any other type of control installed?

The power consumption of the lighting can be reduced by selecting energy efficient light sources, installing technical control systems as presence control or

by sectioning the room. Start by finding out if all lighting is useful. In rooms with daylight, the lighting sometimes doesn't need to be lit at all. In conference rooms and staff rooms, lighting is often lit despite the fact that nobody is there. Installation of presence detector, timer or daylight sensors can significantly reduce power consumption. It is therefore important to choose the right lamps and light sources for optimum lighting! Keep in mind that luminaires are often used for many years, so there's a lot to be saved in choosing luminaires for effective A ++ to A lamps. In the case of the lamp itself, LEDs are energy low. Select lamps with energy labelling class A to A ++. Do not forget to replace lighting also in advertising signs and signs for emergency exit etc.

With control and control equipment you can save even more energy. Here are examples of systems that can be used for lighting:

- Dimmer is used to vary the brightness manually. Can be used in rooms.

- Motion detector turns on the light when they detect someone in the vicinity. Energy consumption can be reduced by up to 80%, as no energy is wasted when the room is empty. It is good from the energy efficiency point of view to be used in corridors, stairs, public toilets, refrigerators, freezers, staff and storage spaces regulated.
- Light level sensor turns on the lighting when the light falls below a certain predetermined level. Can be used outdoors, in reception / lobby in corridors and stairs and in other public areas.
- One way to save even more is to connect the lighting to a key lock where a key card is required for lighting in the hotel room. The system consists of a magnetic card and external and internal card reader. When the guest puts in a valid card, a green LED lights up indicating normal operation and opening the door. It can be used to control lighting and ventilation and more.

Restaurants may have different lighting needs, depending on the atmosphere you want to create and whether the business is on coincide with day light. Divide the lighting into different areas / sections and make sure you can control the lighting individually. Then you can customize the lighting in different parts of the room according to your wishes and needs. You can customize the lighting with different luminaires, lights and dimming.

In the kitchen the lighting is lit for a large part of the day. It is common with fluorescent lamps with traditional T8 fluorescent lamps. By replacing new, energy-efficient T5 luminaire, you can reduce electricity consumption by about 20%. You also have a longer burn time, while the excess heat and cooling needs decrease in the kitchen.

ENERGY SUPPLY AND PRODUCTION



For us being final electricity consumers sometimes it is very difficult to imagine where it comes from or what are the ways it is produced. Still by consuming electricity we are in some extent responsible for the oil or coal burning and air pollution during electricity production process somewhere at the other end of the cable.

Here we can mention a few ways of being more responsible – to be more energy efficient or to consume energy produced from renewables.

This item takes a general overview into the ways we can have access to renewable energy in your business. In short, it is either possible to consume the energy from an "ecological" provider, or the alternative is to produce our own energy. In this chapter we will explore electricity, heating and cooling in relation to its sourcing and productions

A business consumes energy in many ways. For this reason it is important to know whether the energy we use come from sustainable sources. Overall the main energy uses of energy are around electricity, heat and cooling, as well as fuels.

ELECTRICITY



In modern times it is very difficult to imagine your life or business without electricity. It is waving around us in pretty all machines and devices. Even if there is silence in the room we still can see tiny red lights on those modern boxes, fulling your WiFi, the telephone and the microwave. Sourcing electricity

Normally the supply chain of electricity starts from production at oil, coal, gas, biomass combustion plants, wind or solar farms, is followed by large high voltage transfer grids, wide lower voltage distribution grids and finally comes to consumers. Mainly in the European Union energy market is demonopolised, so we can choose from a variety of electricity suppliers with different plans and prices. In some countries of the Baltic sea region we even can request suppliers to provide us only electricity produced from renewable sources, such as wind, hydro or solar power.

Until this kind of production scales and stabilizes, that does not guaranty to have better energy prices, however it gives clear marking of your tourism SME as being "responsible" in terms of decreasing environmental pollution. This can be used for marketing purposes of making your business more popular in some customers groups.

Producing your own electricity

Wind turbines of small or large scale can be placed on the roof or in the premises of your business location. They will produce electricity for your needs with possibility to store or sell excess energy to the grid. In some countries of the Baltic sea region electricity storage in the grid is being regulated by laws on renewable energy and can reduce overall energy prices while in other countries is still not legalised. It must be mentioned, that production of electricity from wind at your business location is very specific and mainly is limited by legal regulations related to noise and vibra-

tions as well as it can cause discomfort to your consumers.

At the same time solar installations are more friendly and even can be invisible while placed on the roof of the business property. Price of solar installation each year is dropping significantly, so in comparison with nuclear power solar power is already cheaper.

Electricity production from the hydro plants is site specific while still is possible in some locations.

Look at case study 9.3, to see how a hotel used their solar plant for marketing among their guests.

Cooperatives and symbioses

We even can start to produce our own electricity from renewables (become producers) or become a part of cooperatives producing energy from renewables.

Becoming a part of cooperative producing energy from renewables is a good idea as you don't have to become a renewable energy specialist, but you can still be involved in energy production from renewables. You will have the possibility to buy and consume energy as well as use the fact for the promotion of your tourism business.

Being part of the grid – maximizing your production and investment

At the same time, it will produce electricity for your needs with possibility to store or sell excess energy to the grid. In some countries of the Baltic sea region electricity storage in the grid is being regulated by laws on renewable energy (excess energy can be stored in the grid or sold to the grid operator) and can reduce overall energy prices while in over countries is still not legalised.

HEAT



From the old times human had to keep their homes and bodies warm, especially in the cold seasons. Off course we are talking about more northern regions (not Equatorial Africa) with seasons when outside temperature drops down to some 10 degrees or less. Fire was the main source of heat for many centuries, while heat carrier was slightly changing from air to water. That was a logical transition as when buildings, blocks and towns are becoming bigger, it is very difficult to supply heat using air.

Sourcing heat

Now in most of the towns we have so called district heating systems which supply hot water to hundreds of buildings through underground pipelines. District heating concept allows to concentrate heat production (burning/air pollution control and management) in one or few places while

still has significant energy losses in pipeline as well as high maintenance costs during the life time of the pipeline.

For last decades we can see the trend of replacing coal, oil and gas with renewable fuels (still burned biomass, biogas), which still does not totally avoid green gas emissions. Possibility to buy heat produced from renewables gives clear marking of your tourism SME as being "responsible" in terms of environment pollution. This can be used for marketing purposes of making your business more popular in some customers groups.

Locally produced heat energy allows to avoid significant energy losses in pipeline in comparison to district heating while puts all production and O&M expenses on your tourism business SME. Still a good idea would be to replace coal or oil with

straw/wood chips/pellets or gas with biogas. In some countries this will lead to lower heating price through tax reduction – check out what is applicable in your country.

In longer prospective majority of EU countries are planning to stop burning fuels, which leads to the use of solar (solar collectors), geothermal energy or electricity for heating.

Producing your energy for heating and cooling

Solar collectors can be used to provide hot water as well as to supply comfort heating.

Another solution is geothermal heating. Geothermal energy is heat energy generated and stored in the Earth. It can be used by the heat pump to arrange prop-

er heating of the hotel, restaurant or SPA. Depending on the technology used (shallow, deeper) it can give significant drop in heating price at the same time avoiding greenhouse gas emissions. And off course we must not forget, that heat pump works both directions, meaning it can be used for cooling in hot summer season. It must be mentioned, that use of geothermal energy at your business location is very site specific and can be limited by insufficient space as well as legal regulations.

If your company is situated next to the Baltic Sea or a lake seaheating and cooling can be an option. With seaheating you have pipes on the bottom of the sea connected to a heating pump. The price is similar or lower than the installation for geothermal energy, depending on how much diving works that needs to be done.

COOLING



Cooling is same important as heating due to huge amount of electricity spent for air conditioning in majority of hotels and restaurants. When planning to build a new building, "Passive house" concept through right positioning, allocation of windows, special construction materials and etc. allows to avoid expensive air conditioning (cooling) systems. Unfortunately, that is almost impossible (or at least very expensive) to implement in already existing buildings. So we can use

external solutions like geothermal energy. It even can be a water tank placed under the surface of the ground with the opening left open during all cold season. With the increase of the outside air temperature water inside the tank will remain cold enough to be pumped through water heating (and now cooling) system and cool the building during all the hot season.

Some possible action in source and production of energy are

To source:

- Check the possibility of sourcing renewables
- To buy electricity produced from renewables
- To buy heat produced from renewables

To produce our own energy check the possibility and advantages of:

- To install wind turbine
- To install solar power plant
- To build hydro power plant
- To become a part of cooperative
- To replace fossil fuels with renewables
- To install solar collectors
- To install geothermal power unit
- Partake in an energy cooperative

SUSTAINABLE TRAVEL AND TRANSPORT

We depend on transportation to move goods and people between different locations. Not least, to travel to excursions, go on holiday and see and experience new places and cultures. Travel is increasing and new generations grow up with the whole world as possible destinations. Transportation is an important part of the visiting industry and how easily accessible an attraction affects how popular the attraction is.

At the same time, the transport sector is our biggest challenge for reducing greenhouse gas emissions. In Sweden, we have come a long way to using renewable energy for heating and electricity, but it still uses a lot of fossil fuels for our cars. Replacing fossil fuels with renewables is therefore an important issue, especially in terms of circular economy. At the same time, we also need to look at how transport can be more efficient and if there are alternatives other than choosing the car.

Within the visiting industry, an important part can be to see which travel options are available to the guests and offer package solutions with accommodation and travel. It can also be about offering guests good options when they are in place. An example is to offer accommodation guests to rent or rent electric bicycles to get to nearby destinations, restaurants and more. Or why not offer sustainable excursion packages? Here there may be a potential for developing new services / solutions!

If travelers become more aware and place higher demands on sustainable companies in the hospitality industry and transport companies, companies that meet customer needs have a head start compared to companies with less environmentally friendly alternatives.

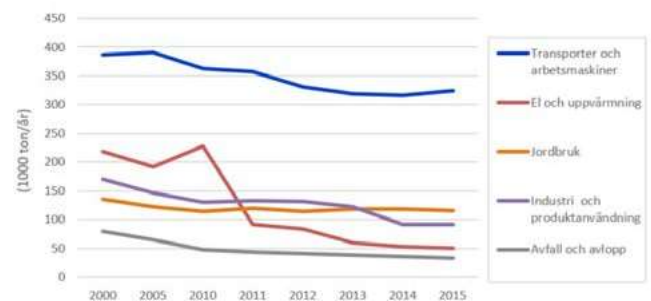
THE CAR HAS GIVEN US A COMFORTABLE WAY TO TRAVEL - BUT THE TRIPS AFFECT THE ENVIRONMENT

Road traffic causes large carbon dioxide emissions that adversely affect the climate, nature and people. Emissions contribute significantly to the greenhouse effect and to acidification and eutrophication of soil and water.

Transport also causes noise problems. Nearly two million people in Sweden today are exposed to traffic noise that exceeds the guideline set by the government for outdoor use at the residence, 55 dBA. It's a hidden health problem!

Roads become barriers for both humans and in nature. In today's cities, traffic routes are often barriers between different districts and can be an obstacle for those who want to go safely. As a result, many people choose the car to travel short distances. Roads also affect the conditions for conservation of biodiversity and ecosystem services that are important to humans.

Reduction of CO₂ emissions from transport - a major challenge for many regions. Combustion of fossil fuels such as petrol and diesel causes carbon dioxide emissions. It contributes to the greenhouse effect and has a negative impact on the climate. Road transport accounts for about 30 percent of Swedish emissions of CO₂ and the proportion continues to increase as road traffic increases. In Blekinge, transport accounts for 66% of total CO₂ emissions in the county. Of these, passenger cars account for 35% of total CO₂ emissions (National emissions database data for 2015). In other words, it is a challenge to find solutions that make it possible to travel without affecting the climate! Here, for example, biogas cars and electric vehicles are good alternatives. Biogas and electricity are also fuels that can be produced locally. It's also good to find solutions that mean we do not need to use the car as much!



Source: Climate- and energystategy for the county of Blekinge.

OPPORTUNITIES TO REDUCE CLIMATE IMPACT FROM TRANSPORT IN THE VISITING INDUSTRY



Transport is needed to allow tourists to travel to and from the destination. When the tourist is in place, there are transports for food, trade and other things that the tourist consumes. Important parts in addition to the personal transports, are distribution of goods and cleaning. Larger tourist locations often have a restaurant, shop and other services that require delivery of goods. In addition, waste is generated that has to be handled. These parts of the transportation industry are also important for the tourist facilities to operate. In other words, there are environmental benefits to do through dialogue with suppliers of goods and services.

Those who conduct a business focused on offering accommodation, food and / or spa can work to get more sustainable transport by:

- Work with the company's own transport, choice of transport modes, vehicles and fuels
- Set requirements for / dialogue on supplier transport
- Offer the guests sustainable transport options
- Minimize the need for transportation, buy goods as local as possible

THE COMPANY'S OWN SHIPMENTS AND REQUIREMENTS FOR SUPPLIER TRANSPORT

Start by inventorying all transports that your business results in, both your own transports and the transportation services you buy. Review them and think about how to reduce the environmental impact of your transport.

benefit both you and the suppliers.

The procurement authority helps public actors to formulate environmental and sustainability requirements for procurement. The requirements can also be used by companies. Requirements are collected in criterion libraries that are accessible to all. There you can find tips on requirements related to vehicles and fuels. For example, suppliers may have training in ecodriving, vehicle requirements, route optimization requirements and fuel.

Here are some examples of actions you can work with:

- Develop a policy for your work on sustainable transport. Policies may include the company's own vehicles, staff travel, the goals and requirements that will be placed on suppliers.
- Change to renewable biofuels or electric power for your own vehicles. Set the corresponding requirement that your suppliers of goods and services run on renewable fuels.
- If you do not have access to renewable fuels, use a fuel that is as good as possible. Use low fuel consumption vehicles. Set the same requirements for suppliers of goods and services. If you buy a new car - does the manufacturer work with circular economics?
- If you have many suppliers, it may be a good idea to make demands for coordinated deliveries from the suppliers. Coordinated transport can

Show where you find criteria and how they look for vehicles:

<https://www.upphandlingsmyndigheten.se/hallbarhet/stall-hallbarhetskrav/>
<https://www.upphandlingsmyndigheten.se/hallbarhet/stall-hallbarhetskrav/fordon-och-transport/>

Ev. discussion passport

What shipments do you have in the company? What shipments do we cause by deliveries and more? Is there any way to reduce transport needs or to make them more sustainable?



OFFER GUESTS SUSTAINABLE TRANSPORT OPTIONS

One way to make it easier for your guests to make good travel options is to reduce their car needs when visiting your location. Then it's also easier to go collectively to you. This can be done in many different ways depending on how your visitor's destination looks. See the following examples as ideas and think about what can work with you.

- Collaborate with public transport companies to open lines and a stop-over to suit your business
- Add public transport as the first option in "How to find the way" on your site
- Have easy-to-access information about times, lines and ticket purchases for local traffic, for example in the entrance or in the rooms.
- Offer attractive and sustainable package holidays with both travel and accommodation or experience.
- Offer guests to borrow or rent bicycles / electric bicycles for various excursions. Perhaps there is the opportunity

to collaborate with more companies in the immediate area and develop a common bicycle pool. Example if there is rental bikes at the train station, the need for car and taxi rides reduces.

- Develop sustainable offers / excursion packages, such as guided bike tours
- Access to the car pool if transport is needed on site

For those guests who come by car or want to rent a car, it may be good to be able to offer a charging point for electric cars. Collaborate with a car rental company or car pools that can deliver cars that use renewable fuels. Tell your guests about these opportunities on the web. If you recommend taxi companies, recommend the companies that run with environmental cars.

Examples where companies work together to provide sustainable transport solutions

Alpine pearls - holidays in ecotion
What does "Alpine Pearls" stand for? It stands for car- and carefree holidays. The umbrella organization Alpine Pearls joins together 25 Alpine villages in their quest for gentle mobility and climate-friendly holidays. Guests at these villages will enjoy carefully chosen environmentally friendly mobility solutions. These hand-picked villages provide a variety of mobility options ensuring your ability to get around in ways that do not adversely affect the environment. Guaranteed! When you use the train and/or bus for your trip to a Pearl, you will take advantage of our typical Alpine Pearl comfort right from the start throughout your entire stay here.
<https://www.alpine-pearls.com/en/>

Examples of development of new offers

Astrid Lindgren's world in Vimmerby is considering developing an offer with packages from Stockholm to Vimmerby,

where bus travel, accommodation and entrance to Astrid Lindgren's world are included. By offering such charter bus trips, they can attract more visitors from the region of Mälardalen. At the same time, trips can be made more sustainable compared to each family driving their own car. Astrid Lindgren's world has also got an own railway station, where the train stops during the high season.

Offer non-car activities. It is more common for different visitors in the visiting industry to offer activities where visitors combine experiences and physical activity. This may include guided bike tours or food walks. Perhaps you can develop such an offer yourself or with any other company in your area.

Discussion sessions:

How do you see today's travels? Is there anything you can market in another way? What offers do you have or could develop? Are there other companies you can work with to find transport solutions?

REDUCE TRANSPORT NEEDS - AVOID UNNECESSARY TRANSPORT



- Select goods and commodities transported as short as possible along the road. For example, if you have a restaurant, you can buy locally produced food.
- Own cultivation of vegetables, fruits and spices
- Plan the menu by season to reduce the need for long shipments of non-seasonal commodities. What are energy efficient products from a transport perspective?
- Collaborate with suppliers and create local supply chains
- Select locally produced materials for buildings and furniture, and more
- Waste Minimization

Handling goods and food produced locally reduces the need for transportation. Today, for example, about half of what we put on the plate from other countries. What we import most is fish, fruit and vegetables. Often it is about products that can't grow in Sweden. But we also ship as much as we could grow ourselves. For example, we import 12 kilos of apples and pears per person, mainly from Italy and the Netherlands.

Many fruits and vegetables, with short shelf life, are transported by air or in refrigerated transport. It has a high climate impact and it is smarter to instead choose fruit and vegetables produced close or transported by boat. Road haulage also needs to be reduced, for example, by transporting more goods by rail or by loading more in each truck (increasing the fill rate).

Final task:

Make suggestions for actions that you can work with in your company.

What concrete measures can you work with and what areas do you see needs / the opportunity to develop new services?

You can use the table 6.1 section for actions related to travel and transports.



ENERGY MANAGEMENT SYSTEMS

ENERGY MANAGEMENT SYSTEMS



Energy Managements System support you in collecting data in relation to energy use. The correct system analysis, metering and recording the consumption of energy and hot water use is essential to create a base line as well as, to start identifying and implementing energy saving measures. Moreover, such monitoring supports assessing the progress of implemented measures.

Another common feature of energy management systems is that it can help you to establishing the system parameters for an efficient energy use. For example, if the building or a room is empty it can set down the temperature in order to save energy. Such changes can be done by preprogramed settings (for example, from 9-10 no ventilation is needed), or by sensing real time.

Energy management system are a great support tool for working with energy efficiency, for this reason these two share similar benefits.

The benefits of an effective implementation of the Energy Management System include:

- Reduce operation cost and improve its efficiency
- Save resources and reduce emissions
- The ability to analyse and visualize energy related data
- The ability to quickly diagnose faults and defining its causes
- Increased employee awareness in the field of reducing energy use
- Systematic approach to energy related issues
- Increasing the comfort of staying indoors.

An energy management system can be as simple as keeping an excel sheet, and adjusting your energy parameters by hand and maintain it through eco behavior of staff and customer. Today however, it is possible to install sensors that are linked to software system that allow a more precise reading and adjustment of the system even in real time.

SENSORS AND THE INTERNET OF THINGS (IOT)



According to Forbes, The internet of things (IoT) is the concept of basically connecting any device with an on and off switch to the Internet and/or to each other. This includes everything from cell-phones, coffee makers, washing machines, headphones, lamps, wearable devices and almost anything else you can think of. Such connection allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into

computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention IoT can be used also for the energy management.

The IoT will be a key support tool for working with energy consumption and production. On the consumption side, IoT is used to manage energy efficiency. Sensor are used to monitor energy use and other parameters, for example: indoor/outdoor temperature, or whether a room

is full or empty. Such sensors are connected to a software that allows monitoring and steering capacity over the situation

For example, sensors can help to gather data to inform how much heat or cooling needed in a room, by comparing the outside to the inside temperature or simply by sensing the amount of people in a room; In a cold winter day a room full of people needs less heating than a room with only one person.

On the production side, IoT has a good potential to integrate micro-producers and prosumers into the energy grid, i.e., selling the surplus energy production to the grid at an adequate time (see producing your own energy). The real time data gathered by the IoT permits balancing the energy production and demand, that ensures that the grid is not overloaded and the energy is distributed to where it is needed.

BUILDING MANAGEMENT SYSTEMS

One way to implement energy management in your business is through “building management Systems (BMS)”. It’s an integrated system that gives you the ability to monitor and manage all devices and systems in the building and its surroundings. It collects information from the entire building in one place and allows you to react in real time to changes in external and internal conditions, to achieve optimal use of energy, media, improve functionality, safety and comfort. The main tasks of building management systems (BMS) are: integration, monitoring, control and optimization of installation and technical equipment in buildings.

Moreover, BMS allows the integration of elements made in various standards (BIB / KNX, LonWorks, BACnet) into one system, which allows to you create a system that best suits your needs.

Such systems are often modular and allows to expand the installation, or implement it in stages. For example, it can be first adapted only to a part of the facility and then in some stages to the whole building.

It may also allow the steering of different elements of the system, at will or by pre-

programmed parameters. For example, if some lights have a failure the specific segment can be turned off remotely, or when a guest leaves the room all lights turn off.

BMS systems perform the functions of:

- control of
 - internal and external lighting
 - room heating
 - control of ventilation
 - air conditioning
 - filtration
- alarm and monitoring systems
- UPS power control systems

- fire smoke control system, control and monitoring of fire dampers
- integration of other automation systems in the building.

There are a number of platforms and solutions provided. Such system can allow great control and granularity over the system although the interface may look very technical. A number of companies are working to offer packages and interfaces that are user friendly, from big companies like Electric Schneider (<https://www.schneider-electric.com/en/product-subcategory/1210-building-management-systems/?parent-category-id=1200>). (<https://raybased.com/en/>) to small entrepreneurial companies. Watty is a company that is focused on user friendly management systems through the installation of one device and following different devices through electric current picks (<https://watty.io/>) instead of having a multiplicity of sensors. Depending on the size of your business and level of control require you might prefer one platform over the other.



FROM PLANNING TO IMPLEMENTING

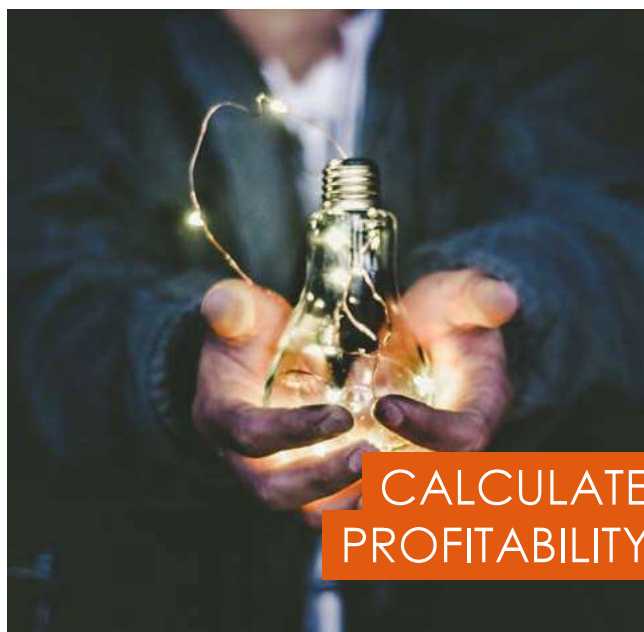
AS CHOOSING PRODUCTS AND SOLUTIONS FOR DIFFERENT ACTIONS



Energy related changes made within the company should be carried out by having the long term consumption in mind, so it will be as energy- and cost-effective as possible. To achieve this, long-term energy planning is required. When choosing a product or solution, it is important not only to look at the purchase price, but also to consider operating

costs when comparing different options. Another important aspect is also to review the ability to use new technologies or ask suppliers what solutions they would suggest for your problem. Perhaps they can contribute with innovative solutions for your particular business.

CALCULATE PROFITABILITY



Payoff time usually economists call the time it takes from action to repayment of the investment. Generally, one usually strives for as short a pay-off time as possible and the absolute maximum for a real estate economist is usually when the pay off time is as long or longer as the time needed for refurbishments and measures in the building.

Sometimes suppliers have the tools to help

One example is that several companies that manufacture and sell insulation materials have calculation programs on

their websites. There you can make an overview of the amount of energy and costs that can be saved, for example, for additional insulation of a building. The more detailed and accurate information available about the existing building and the geographical conditions - the safer also results from the energy calculations.

By calculating the amount of energy that can be saved, for example, by insulation and then asking for a pricing of work and materials, it is possible to calculate how long it takes before the action is paid!

COST ANALYSIS (LCC)



Cost analysis is a method of calculating the total cost of a product including purchase cost, operating cost, maintenance cost, environmental taxes, possible subsidies and settlement costs. LCC can show that qualitative products that seem expensive at the time of purchase can pay off in the long run. A clear example is the difference between a house built to save energy when living in the house and a regular house. The energy-efficient house can be more expensive to build, but after a number of years, the additional cost has been

earned due to lower energy costs. There are many examples, the most common thing is that white goods and lamps that are more expensive in purchasing can pay off in the long run, thanks to lower energy consumption.

In Sweden, the procurement authority has developed a general tool for LCC calculations that can be used both for estimating costs. LCC calculations help you as a customer to choose the most energy-efficient and cost-effective solutions. The procurement authority's calcu-

lation models have been developed for some product areas where standardized industry data is readily available and there is a clear economic and environmental potential for LCC to demand products with cheaper operation. For example, it is good to make LCC calculations when installing new lighting to get a good picture of installation, operating and maintenance costs throughout the life of the lamp.

The procurement authority in Sweden has the following LCC calculations:

- General calculation
- Indoor lighting
- External lighting
- Cars
- Kitchens - fridge and freezer
- Vending machines and coffee machines
- Appliances



IMPLEMENTING. EXERCISE

In this stage actions regarding to each plan will be implemented. Your energy plan describes how your company will work with different actions related to production, distribution and use of energy. Now it is time to implement the measures and turn in to action. Distribute responsibility for the various actions and determine how you can follow up the results.

You can use table. 6.1 as a template when you are developing your action plan. The number of actions is depending to how big the plan is and if all areas for actions are relevant for your business. Timeline can be the same as timeline in planning in the best case.

Table. 6.1. Action plan for the energy & transports

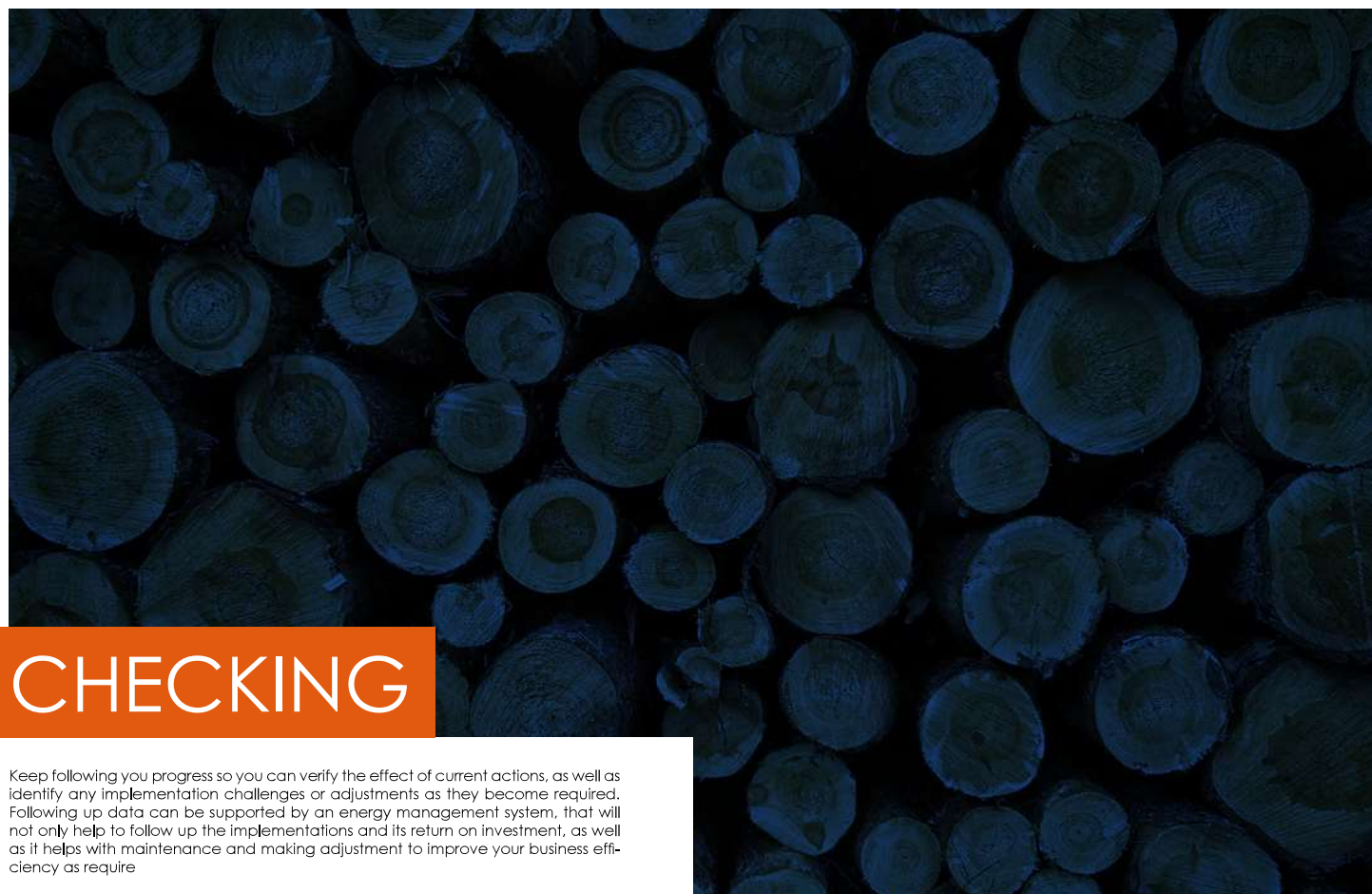
Actions related to energy supply							
Action	Timeline	Responsible	Share of renewable energy before the action	Share of renewable energy after the action	Increased share of renewable energy supply (%)	Investment	Annual saving or benefit
Example: Installing a geothermal plant for heating and cooling	2019	CEO	0 %	60 %	60 %	X Euro	X Euro
Action 1							
Action 2							
Action 3							

Actions related to production of renewable energy							
Action	Timeline	Responsible	Energy from selfproduction before the action	Energy from selfproduction after the action	Increased production of renewable energy (kWh/year)	Investment	Annual saving or benefit
Example: Installing PV-cells	2018	Caretaker	60%	80%	X kWh/year	X Euro	X Euro
Action 1							
Action 2							
Action 3							

Actions related to travel and transportation							
Action	Timeline	Responsible	Emissions of CO2 before action	Emissions of CO2 after action	Increased share of renewables/ Decreased amount of km by car	Investment	Annual saving or benefit
Action 1							
Action 2							
Action 3							

Actions related to energy management							
Action	Timeline	Responsible	Energy use before action	Energy use after action	Reduced energy consumption	Investment	Annual saving or benefit
Action 1							
Action 2							
Action 3							

In case study 9.1 you can see an example of an camping that made an energy survey and got suggestions of different measures.



CHECKING

Keep following you progress so you can verify the effect of current actions, as well as identify any implementation challenges or adjustments as they become required. Following up data can be supported by an energy management system, that will not only help to follow up the implementations and its return on investment, as well as it helps with maintenance and making adjustment to improve your business efficiency as require



FINANCING

This chapter provide current sources for financing and support in relation to energy efficiency and the implementation of renewable energy systems within Lithuania, Sweden and Poland. Remember that such programs and values will change over time. Such projects also describe more general support, and each specific regional support were not mapped here (v.g municipal grants and programs) however they might exist and may be of help, remember to check in with your local experts!

FINANCING IN LITHUANIA



Lithuanian Environmental Investment Fund (LEIF)

The Lithuanian Environmental Investment Fund (LEIF) was established by the Ministry of Environment in 1996. The main goal of the LEIF is to support public and private sectors in realization of environmental projects and projects to reduce the negative impact of economic activities on environment in compliance with the Environmental Strategy of the Republic of Lithuania.

The Fund supports investment projects in the areas of Energy Efficiency, Renewable Energy and Climate Change in the form of soft loans and subsidies. LEIF grants per applicant can not exceed more than EUR 200 000 over a period of three years. Fund can provide subsidy max. up to 80% of the investment costs of each project. Renewable energy as well as energy efficiency technologies are eligible to benefit from the LEIF support. There are biggest allowed expenses including spare materials and installation set for each technology. Some of them are presented in the table 8.1 (excluding VAT).

Table 8.1. Overview of funding possibilities in LEIF

Technology, equipment	Units	Max expenses, Eur
Renewable Energy		
Solar collector system	m2 (total area)	435-525
Biomass pellets boiler with infrastructure	kW (nominal)	145
Heat pump "ground-water" system	kW (nominal)	840
Heat pump "water-water" system	kW (nominal)	840
Heat pump "air-water" system	kW (nominal)	525
Heat pump "air-water" system	kW (nominal)	380
Wind turbine, horizontal axle, grid	kW	2465
Wind turbine, horizontal axle, battery	kW	2090
Wind turbine, vertical axle, grid	kW	1855
Wind turbine, vertical axle, battery	kW	1655
Solar photovoltaic system, grid	kW	2175
Solar photovoltaic system, battery	kW	1945
Hydro power	kW	678
Energy Efficiency		
Roof insulation, not changing surface	m2	14,50
Roof insulation, changing surface	m2	43,50
Ceiling insulation	m2	14,50
Floor insulation	m2	29
Wall insulation	m2	30
Windows	m2	128
Doors	m2	261
Biomass boiler with infrastructure	kW (nominal)	87
Tabular heat exchanger	100 m3/h	1160
Rotational heat exchanger	100 m3/h	1450
Small scale CHP with gas internal combustion engine	kW electrical	796
Energy certification of building	building	145

More information on financial support from the Lithuanian Environmental Investment Fund can be found on the official website <http://www.laif.lt>.



INVESTMENT AND BUSINESS GUARANTIES (INVEGA)

The guarantee institution UAB "Investicijų ir verslo garantijos" (INVEGA) was established by the Government to support Small and Medium-sized Business Development in 2001. INVEGA manages financial instruments designed to help with starting up or expanding a small or medium-sized business, i.e. soft loans, loan guarantees, interest rate subsidies, and support for the first job.

Partial financing of interest allows small and medium-sized enterprises companies that receive financial support in the

form of non-repayable subsidies to reduce their burden of obtaining financing, cut costs and plan business development with more ease. 50-95 percent of the interest actually paid can be compensated up to 36 months.

Consultancy expenses of the micro, small and medium-sized businesses are also eligible to be covered by INVEGA Consultation Services Reimbursement program.

In the frame of Eco Consultant LT service up to EUR 4,000 of costs of consultation

on more efficient use of resources and conservation of natural resources can be covered (intensity 85%). At the same time up to EUR 2,000 of the costs of business consultations over a period of 6 months (intensity 65-85%) can be reimbursed in the frame of Business Consultant LT service.

More information on financial support from the guarantee institution INVEGA can be found on the official website <http://invega.lt>.

Additionally, it must be mentioned, that European Union is providing financial as-

sistance to Lithuania through variety of funds, such as Cohesion fund or LIFE Programme, which in some cases can be used for implementation of the CE activities and improvements. More information on these financial tools can be found on the official site of the Ministry of Environment <http://www.am.lt>.

FINANCING IN SWEDEN



Within Sweden there are a few main actors providing financial support to renewable energy and energy efficiency. They are the national energy agency (with support of the regional offices); the county administrative board and the National Agency of agriculture.

Some of the grant programmes provide support the installation of renewable energy technology, while others support the research and testing of new solutions. In addition, the development agency Vinnova has a programme oriented to circular economy. The main programmes are described below. Please also note that there might be other funding opportunities at the regional and municipality level.

The main support programs described here are:

1. Grant to Solar panels
2. Climate Jump
3. Support for energy monitoring in small and medium-sized enterprises
4. In-depth support for energy efficiency
5. Electricity certificate
6. Support from the Rural Development Program
7. Support for production of biogas
8. The wind power network (Nätverk för vindbruk)
9. Energy efficiency and energy crops
10. Vinnova Circular and/or biobased economy

Other support

11. Business Development Support
12. Support for research and innovation projects
13. Support for Energy Storage (Private Person)
14. Advice and other support
15. Incentives for energy efficiency

You can see an overview showing the different grants/support in table 8.2.



Table 8.2 Financing – opportunities to apply for support in the energy field

Function	Support	Who can apply	Application submitted to:	Max amount	% of support given in relation to total cost
Solar Energy	Grant to Solar panels	Business, private persons and municipalities	The county administrative board	1,2 millioner SEK per PV-cell system or solar power- and solheating hybride system.	30 %
Energy storage	Support for energy storage	Private persons	The county administrative board	50 000 SEK	Max 60 %
Transitioning from fossil fuels to renewables	Climate Jump, good for activities related to buildings and transport	Business, public actors and other organizations	The county administrative board	Max. 2 millioner SEK within 3 years	Max 70 %
Energy efficiency mapping	Support for energy mapping in SME	Small and medium enterprises	Energy Agency for Southeast Sweden	Max. 50 000 SEK	Max 50 %
Energy efficiency	Deepening support for mapping and efficiency in SME's	Small and medium enterprises	Energy Agency for Southeast Sweden		Max 70 %
Selling energy surplus	Electricity certificate		National Energy Agency		
Innovation development of circular and biobased solutions	Circular and biobased economy	Research institutions, business, municipalities and other organizations	Vinnova	It varies according to the particular program under this banner	It varies



1. Grant to Solar panels

There is a state support for the installation of solar cells. The support can be given to companies, individuals and municipalities as a one-off payment for the installation of all types of network-connected solar cell systems. The amount for the grant is calculated on the whole solar installation, design, materials and work. The eligible costs may amount to a maximum of SEK 37,000 plus VAT per installed kilowatt. For solar heating systems, eligible costs may amount to no more than SEK 90,000 plus VAT per installed kilowatt. The aid applies to actions implemented by 31 December 2020 at the latest.

You can get a grant for a solar system per building or for a system per property if it is built on the ground. It is not possible to combine the contribution with "ROT" deductions for the same action.

Links:
<https://www.lansstyrelsen.se/blekinge/stat-och-kommun/miljo/energi-och-klimat/stod-till-solcellsanlaggning.html>
<http://www.energimyndigheten.se/fornybart/solenergi/solceller/stod-till-solceller/investeringsstod/>

2. Climate Jump

Money from this grant should go to climate investments at local level, for example at a company. The contribution is focused on measures that reduce greenhouse gas emissions. This means measures where you replace fossil fuels like oil and natural gas in buildings, processes or in transport. For example, it is possible to apply for subsidies to build charging stations for electric vehicles, biogas plants, switching from fossil oil or natural gas to other sources of energy for heating and more and for communication projects. You can't receive contributions for a single action if the pay off period is < 5 years

Links:
<https://www.lansstyrelsen.se/blekinge/stat-och-kommun/miljo/energi-och-klimat/klimatinvesteringsstod.html>

Information about application
<http://www.naturvardsverket.se/klimat-klivet>

3. Support for energy monitoring in small and medium-sized enterprises

Does your company want to work more efficiently with your energy use and reduce the cost of energy consumption? An energy survey is then the first step, and companies can get financial support to implement it. Contact the Energy agency for southeast Sweden for assistance on the road from application to completed energy survey.

An energy survey shows how much energy is supplied annually and used to drive the company's operations. It shows how energy is distributed in operations and costs.

The energy survey provides suggestions for measures that can save energy. The proposals can be investment in new equipment, but also new working methods and procedures.

Links:
<http://www.energimyndigheten.se/nrp/stod-for-energiartlaggning-i-sma-och-medelstora-foretag/>
<http://www.energi.kontorsydost.se/bidrag-till-energiartlaggning>

4. In-depth support for energy efficiency

They offer financial support for companies, for example, implementing energy-efficient measures, developing their organization or promoting the development of new processes, new technologies or testing of this. The support is aimed at all small and medium-sized companies. It will contribute to increased opportunities for companies to streamline their energy use.

Small and medium-sized companies that have carried out an energy survey, or an equivalent assessment of energy use in their operations, may apply for the support.

Link:
<http://www.energimyndigheten.se/nrp/teknikutveckling-och-innovation-fordjupande-stod-inom-energieffektivisering/>



5. Electricity certificate

Electricity certificate is a financial support for renewable energy producers. For each produced megawatt hour (MWh) renewable electricity, the producer receives an electricity certificate. The electricity certificates are sold in an open market, thus providing additional revenue to renewable electricity generation, in addition to the usual electricity sales. The energy sources entitled to be awarded electrical certificates are wind power, some hydropower, some biofuels, solar energy, geothermal energy, wave energy and turf in combined heat and power plants. An electricity certificate is awarded to a manufacturer who has produced and measured a megawatt electricity in an approved facility.

Link:
<http://www.energimyndigheten.se/fornybart/elcertifikatsystemet/>

6. Support from the Rural Development Program

If you have a climate-smart idea that you want to develop or test, you can apply for project support from the Rural Program. You can, for example, receive project support for projects that increase the production and use of renewable energy, and to projects that reduce the climate impact of agriculture or facilitate agriculture's adaptation to a changing climate. The aid can be applied via Blekinge County Administrative Board.

Link:
<http://www.jordbruksverket.se/amnesomraden/stod/stodilandsbygdsprogrammet/investeringar/fornybarenergi.4.6ae223614dda2c3dbc44f7d.html>

7. Support for the production of biogas

The purpose of the grant is to increase the supply and use of renewable energy. The investment will lead to reduced greenhouse gas and ammonia emissions.

Investment support can be sought for actions involving investment in biogas production plants, such as biogas, upgrades, stock deposits and pipelines.

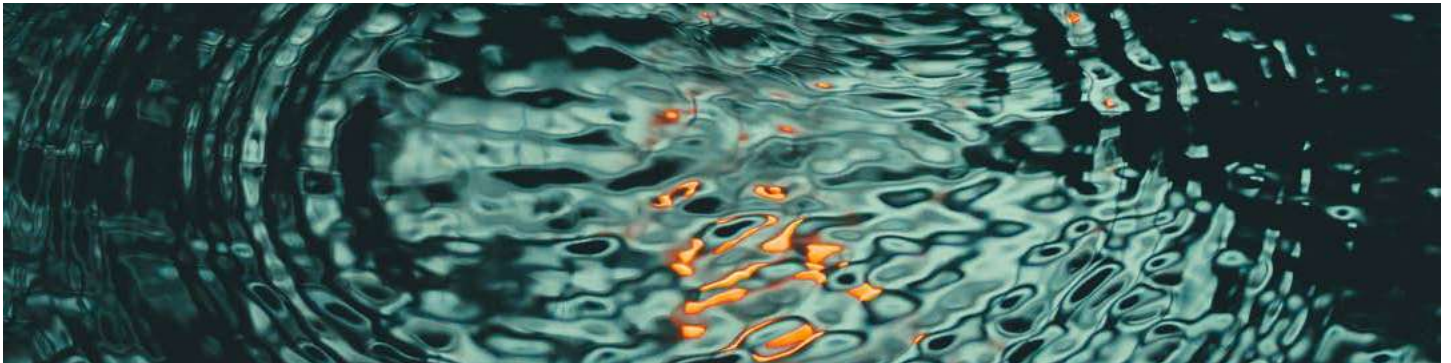
The contribution is included in the rural program. Companies can receive support with 40% of the cost of the investment.

Links:
<http://www.jordbruksverket.se/amnesomraden/stod/andrastod/godselgasstod/beskrivningavstodet.4.5027191e14d8eb30892e7b68.html>
<http://www.jordbruksverket.se/amnesomraden/stod/andrastod/biogasstod2018.4.3ed012e7163ab843f5e5557.html>

8. The wind power network (Nätverk för vindbruk)

The network for wind farms is intended to increase knowledge of wind power and to promote a well-established and well-located expansion of wind power, which also generates added value locally. On behalf of the government, the network for wind farms has been supporting regional initiatives since 2008, with experience from which the whole country can then benefit. This is done by announcing project funding each year. The wind power network is operated by the Swedish Energy Agency in cooperation with four regional nodes.

Link:
<https://www.natverketforvindbruk.se/sv/>



9. Energy efficiency and energy crops

Do you want to streamline energy use in your agricultural or gardening business? Then you can apply for support for different investments.

Corporate support for investments in energy efficiency and energy crops in agriculture and gardens is available to facilitate investments in, for example, energy-efficient lighting and ventilation, shadow weave, heat exchangers, or energy crops with fencing around planting.

Link:
<https://www.lansstyrelsen.se/blekinge/foretag/lantbruk-och-djur/stod-till-jordbruksforetagare/energieffektivisering-och-energirodor.html>

10. Vinnova Circular and bio-based economy (CBE)

Vinnova aims to strengthen Swedish innovation in circular and bio-based economics, CBE, such as recycling, sharing and bio-based materials. In addition, a comprehensive policy work is needed to change a strongly rooted consumption model. They look for both small entrepreneurs and innovators who together want to change a whole industry from within. If you have a project idea that contributes to this, you can get funding from Vinnova. Vinnova finances several initiatives where research institutes, companies, municipalities and other organizations together develop sustainable business models and new technical solutions.

The funds directed to this are: SEK 500 million between 2015 and 2020. There are different programs under the CBE. The total amount that projects and actors can apply, as well as the co-financing required varies depending on the program it relates to.

There are therefore many examples to highlight among the projects previously funded by Vinnova. Link: <https://www.vinnova.se/m/cirkular-biobaserad-ekonomi/>

Other support

11. Business Development Support

The Energy Agency helps innovative companies in environmental and energy engineering to take new products and services to the market. The purpose of the Energy Agency's support is to speed up companies to grow and thus achieve a faster dissemination of innovations in the energy field than would otherwise be possible. The Energy Agency supports companies until innovation has reached such a degree of maturity that private actors are prepared to enter into funding and drive continued development.

<http://www.energimyndigheten.se/forskning-och-innovation/affarsutveckling-och-kommersialisering/>

12. Support for research and innovation projects

The Energy Agency supports research and development for new knowledge about the supply, conversion, distribution and use of energy. Support is also provided for pilot and demonstration facilities where new technology is being tested. However it is necessary to have a research institution as work partner.

<http://www.energimyndigheten.se/forskning-och-innovation/forskning/demonstrationsprojekt/>



13. Support for Energy Storage (Private Person)

The contribution can be sought by private individuals who wish to store their own electricity. The contribution will make it easier for individuals to benefit from their solar systems.

In order to receive the contribution, the energy storage system must be connected to a self-production facility of renewable electricity that is connected to the electricity grid. The contribution will help to save electricity for use at a time other than the production stage and to increase the annual share of self-produced electricity to meet its own electricity needs. Eligible costs are costs for installing electricity storage systems, such as battery, cabling, control systems, smart energy hubs and work.

It is not possible to combine the contribution with other public support, such as ROT deductions, for the same action.

<http://www.energimyndigheten.se/nyhetsarkiv/2016/oppet-att-soka-stod-for-energilagring-i-hemmet/>

14. Advice and other support

a) Find your energy and climate adviser
Energy and climate advice is a free service from your municipality. The counselor will help you with tips for getting more energy and it will help you get an overview of the different options you have to choose from.

b) Regional Energy Agency
Want your business to get started and energy efficiency? Do you have any questions about our support? Would you like assistance in seeking support? Contact the energy agency in your region.

c) Enterprise Network for Energy Efficiency
Enterprise Network for Energy Efficiency
Throughout the country, companies are working on energy efficiency by participating in regional corporate networks. The project will help SMEs to streamline their energy use by 15 percent over a four-year period.

d) the Groups

We have several order groups and networks. They serve as a platform for cooperation between industry actors and the state in order to reduce energy use in buildings.

<http://www.energimyndigheten.se/energieffektivisering/jag-vill-energieffektivisera-min-organisation/ekonomiska-stod-och-metodstod2/radgivning/>

15. Incentives for energy efficiency

How can more companies save energy in an easier way? Through the project incentives for energy efficiency, the already existing environmental supervision in SMEs is combined with energy efficiency. It saves time while more companies can be reached. The companies that are subject to environmental supervision already have visits by supervisors today but now these staff can also help with the companies' energy efficiency.

FINANCING IN POLAND



In Poland it is difficult to point out to different funding programs and grants because the situation changes every year. In general funds for projects can be applied to various government institutions, both on the national and regional level. We point some of these organization below

Institutions on the national level:

1. National Fund for Environmental Protection and Water Management (NFE&WM) which was established in 1989 as a result of the regime transformation in Poland,

in cooperation with voivodeship funds for environmental protection and water management is the pillar of the Polish system of financing environmental protection. The basis of the National Fund's operation as a State legal person is the Act on Environmental Protection Law.
Link: <https://www.nfosigw.gov.pl/en/>

Quite interesting programme for the company from tourism sector is the LIFE programme. The LIFE programme is the only financial instrument the European Union devoted exclusively to co-financing projects in the field of protection and

improvement of the environment and human impact on climate and adaptation to its changes. Its main purpose is to support the process of implementing Community environmental law, the implementation of EU policy in this area, as well as the identification and promotion of new solutions for environmental problems in nature.

The LIFE programme – action programme for the environment and climate change (2014-2020) was established by Regulation of the European Parliament and of the Council (EU) on 11 December 2013. The

implementation of the programme was divided into two periods, within which the so-called Multiannual Work Programmes will be adopted, used by the EC to define the implementation framework of LIFE in a given period.

The LIFE programme is managed by the European Commission, which every year publishes a call for proposals (call for proposals). Everyone registered in the European Union (public entities, as well as private, commercial, and non-commercial ones) may be a beneficiary of the LIFE programme. The total budget of the



LIFE Programme for the period 2014-2020 is EUR 3 456 million including measures for the environment – EUR 2 592 million and for climate – EUR 864 million. The budget for financing projects in the 2014-2017 financial perspective is EUR 1 347 million in the framework of the sub-programme for Environment, and EUR 449 million for the sub-programme for Climate Action. Standard LIFE project funding by the European Commission amounts to up to 60% of eligible costs, and, in the case of projects for priority habitats and species – up to 75%. Polish Applicants may also apply for co-financing of the project with NFP&WM national measures complementing the finances of the project up to 95% of eligible costs. (EC co-funding, NFP&WM co-funding)
Link to more information: <http://nfosigw.gov.pl/en/life-program/general-information/>

2. The National Centre for Research and Development - is the implementing agency of the Minister of Science and Higher Education. It was appointed in the summer 2007 as an entity in charge of the performance of the tasks within the area

of national science, science and technology and innovation policies. When it was founded, it was the first entity of this type, created as the platform of an effective dialogue between the scientific and business communities.

The topics of differentiated programme interested for company from tourism sector can be found on the web page: <http://www.ncbr.gov.pl/en/about-the-centre/>

An interesting program for tourism sector is INNOTECH:

INNOTECH is a programme whose aim is to help research entities and businesses carry out innovative projects representing various scientific areas and industrial sectors (In-Tech programme path), with a special focus on advanced technologies (Hi-Tech programme path).

It is addressed to entities involved in research projects and preparatory studies preceding the implementation of research results, whose purpose is to develop and implement innovative technologies, products or services.

INNOTECH has two paths: In-Tech and Hi-Tech, addressed to two different categories of beneficiaries, whose projects are co-funded with different public funding instruments.

Main objectives of the INNOTECH Programme include:

- increase in number of developed and implemented technological innovations,
- increase businesses' spending on scientific research and development valuable from the economic point of view,
- reinforce the cooperation between universities and public research units

In this two Institutions each year appear different programs to be applied. Companies from the tourist sector, should follow the announced competitions by the institution above and depending on the needs of companies apply for funds.

Institutions on the regional level:

1. Provincial Fund for Environmental Protection and Water Management - the same core of interest like a NFP&WM but

in regional scale for one voivodeship. Example for Pomeranian region. <https://wfos.gdansk.pl/#about>

2. Marshal Office - institutions responsible for EU funds on regional level. For the SME Company for tourism sector it seems to be a very interesting program. The Regional Operational Program of the Pomorskie Voivodeship.
Link: <http://www.rpo.pomorskie.eu/skorzystaj>

The Regional Operational Program of the Pomorskie Voivodeship for the years 2014-2020 supports a wide variety of areas and types of projects, which were defined in the text of the program itself and in the Detailed Description of the Priority Axes (see more details in table 8.3).



8.3 Priority Axes within the Regional Operational Program:

Priority Axis	Value in EUR
1. Commercialization of knowledge	€ 139 860 877,00
2. Companies	€ 174 647 688,00
3. Education	€ 119 579 843,00
4. Vocational education	€ 68 677 602,00
5. Employment	€ 225 468 821,00
6. Integration	€ 114 306 948,00
7. Health	€ 104 975 500,00
8. Conversion	€ 159 013 250,00
9. Mobility	€ 357 213 312,00
10. Energy	€ 214 951 001,00
11. Environment	€ 120 909 938,00
12. Technical Support	€ 65 206 918,00
All	€ 1 864 811 698,00

From the point of view of tourism companies and the circular economy, these axis seem particularly interesting:

Priority Axis 10. ENERGY

Thanks to EU funds, The Regional Operational Program can invest in:

- increasing the energy efficiency of public and residential buildings,
- production of electricity and heat from renewable energy sources,
- reconstruction or extension of distribution power grids,
- construction or modernization of heat sources and heat supply systems in cities,
- extension of the air monitoring system,
- modernization of outdoor lighting.

Priority Axis 11. ENVIRONMENT

Thanks to EU funds, The Regional Operational Program can invest in:

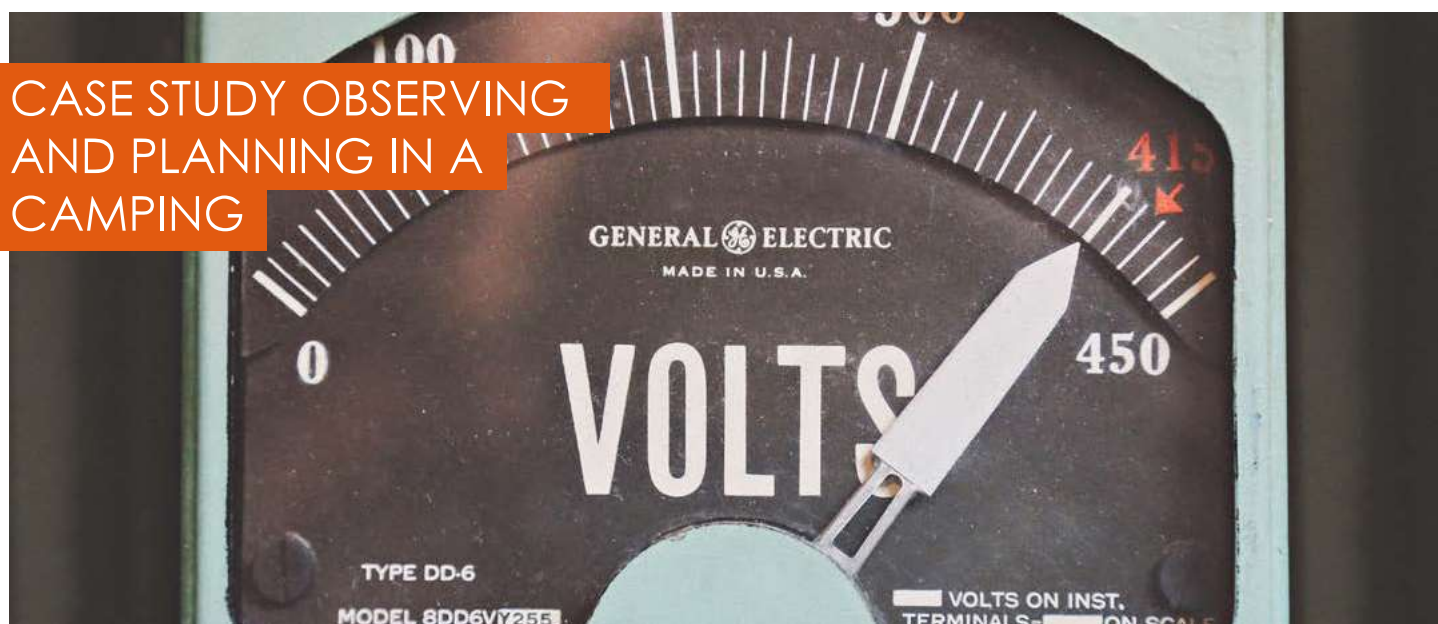
- counteracting and minimizing the effects of extreme climatic events,
- early response systems in case of catastrophic events,
- projects related to waste management,
- projects in the field of sewage management and water supply,
- protection of nature, especially in protected areas.

Link to more information:
<http://www.rpo.pomorskie.eu/na-co-mozna-uzyskac-wsparcie#>



CASE STUDIES ENERGY MODULE

CASE STUDY OBSERVING AND PLANNING IN A CAMPING



In this case, a camping has started an active energy work by measuring its energy consumption and planning for actions. A few years ago, the campsite was sold to a new owner. The new owner wanted to review the buildings and see what potential there was available to reduce the impact on the environment, save money and to be able to market their energy work.

The owner therefore began to measure the energy use for the campsite and its restaurant. A successful reduction of energy use had been made through some simple measures most related to operat-

ing times and behavioral issues. In order to identify what measures needed to save more energy, the owner chose to make an energy analysis together with the regional Energy Agency for Southeast Sweden. The purpose of the energy analysis was to see what potential was available to reduce and optimize energy use. In addition, a rough estimate was made of the amount of energy that can be saved for different actions.

Background

The facility is a campsite with hostel and restaurant. It has approximately

6500-night guests via camping and about 5000 via the hostel. The utility area is more than 1400 m². Total energy consumption is approximately 310 MWh / year in terms of electricity. Most of the buildings are from the 1960s.

Observing

In order to monitor the energy use and the measures that may be taken, the owner had begun to measure the energy consumption of the camping. The measurement data available was divided into the campsite and the restaurant.

Electricity consumption for camping /

hostels is approximately 245 MWh / year. For restaurant and kitchen, the electricity consumption is 62 MWh / year. Energy use for the camping area corresponds to approximately 13.5% of the total turnover for camping / hostels.

The owner also looked at which energy suppliers for power grids and electricity trading they had agreements with. The purpose was to see if it is possible to save money by switching supplier and if the energy supplier supplies green electricity.

Status analysis

The whole property generally holds a rela-



tively low energy standard. The campsite has 5 buildings and their climate screen consists of wood walls, with flat roofs and a floor plan. The buildings have conventional double-glazed windows. The standard of insulation is from the original year of construction. Direct-acting electricity is used for heating. The campsite is located outside district heating areas and can't be connected to district heating.

Restaurant / Kitchen: The restaurant has 2 air / air heat pumps from 2010. These heat the serving section. Built-in freezers and cold rooms are installed without locks. 1 frying table and 2 hot-air ovens are installed in the kitchen.

Reception / dressing: The kiosk windows has only single glass. One side has no sun shielding and together with several freezers and low ceilings, this causes great cooling needs during summertime. This has been partially attempted with a portable air cooler connected to exhaust air ventilation. In the space behind there is a bake-off oven installed which also causes a large cooling requirement.

Conference building and hostel: A conference room for about 100 people was built in the 1980s. Original surfaces are used for hostels with single / double rooms, common areas and kitchens. The hostel and the conference room have exhaust ventilation without any heat recovery.

Residential building / garage: Heating center for this building and the hostel is located here. The production units consist of an air / water heat pump. The heat pump is old and needs to be replaced with a more efficient heat pump.

Water: Large amounts of water are used, a total of 1,600 m³. Of this, about 600-700 are estimated to be hot water that is heated in large, electricity water heaters in 4 separate places in each building.

Electricity: Electricity is used for all energy-intensive parts such as hot water, heating, and operation of all equipment.

Lighting: There is a good awareness of switching off and low energy lamps are used in part, fluorescent lamps are older, there are no presence detectors that

control lighting. The parking lights out in the camping area consist of older type of mercury. For phase lighting, low energy lamps are used. For lighting there is a very large potential for improvement and sectioning.

Heating: Electricity is used for heating, radiators 40-60 MWh/year, hot water 70 - 100 MWh/year and camping vans 50 MWh/year.

Ventilation: All rooms are ventilated by conventional exhaust ventilation without heat recovery. Some units are partially out of order. The company should make an analysis of future needs and operations and how heat recovery can be implemented in a good way.

Cooling: For cooling the restaurant there is cooling in the form of 2 air / air heat pumps. The kiosk has several heat-producing machines, such as freezers, refrigerators and a bake-off oven. We suggest that exhaust ventilation should be installed in the kiosk roof with forced ventilation during the hot season. Other times, this ventilation should be sealed.

Other: Control and monitoring systems are of older model and have no centralized functions.

Proposal for measures

After reviewing the business, we have prepared action proposals. Hot water production accounts for the greatest energy consumption, but heating should also be prioritized.

- Continue to allow energy and environmental issues to be a natural part of the organization. Further educate all staff in these areas and take advantage of their presence in finding energy-saving measures. Observe the energy aspects of operating instructions. Introduce premium schemes to encourage staff in energy saving measures. At internal meetings, have this as a separate item on the agenda. Possible savings potential 5-10% of current energy use.
- Consider energy-efficient solutions for new investments and rebuilding, such as energy efficient windows, additional insulation of ceilings and energy efficient doors.



- Water heating with electricity should be replaced by solar heat and / or pellets.
- Existing heat pump for heating / hot water is replaced with a new heat pump or with a pellet-fired boiler. Connect kitchen / restaurant with a culvert to achieve even higher savings effects. If the activities are expanded in these buildings even in winter, the savings effects will increase even more.
- Heating system optimized through adjustment, adaptation control equipment, etc. partly centralized but also

in the respective rooms. Make it possible to lower the temperature in every wing in the conference- and hotel building at low occupancy. Only when one wing is fully loaded will the next in, etc. be connected. The conference room is made accordingly.


- Ventilation is adapted via two-speed or frequency control to reduced air change in autumn, winter and spring. Otherwise, optimizations are made for operation, damper, etc. A summary should be made of existing ventilation systems with airflows, operating hours, function.

- Energy-efficient lighting with presence control, light ceilings and sectioning. Use HF lamps. Switch to more energy efficient lamps. Replace outdoor lighting from mercury to high pressure sodium. There is potential to save 10-30% of the energy consumption for lighting.

The energy analysis at the camp site shows that there are many measures that would greatly reduce energy use and costs. Some of the measures require no or a very small investment, others require more extensive investments. Before the

company decides on any investments taken, a more detailed study and costs should be taken for the actions that the campsite is interested in.

Comment: I took several years before the camping owner decided to make the measures. But in the winter 2017-2018 almost all the suggested measures were performed. The more detailed study and offers made clear that the measures were profitable investments. Now the camping produces renewable energy from solar panels and have become more energy efficient.



CASE STUDY, AN ENERGY SURVEY AND MEASURES HALVED THE ENERGY USE

When Carola Nilsson went from being hotel manager to owner of Hotel Hammarstrand, she was increasingly interested in her energy use. A usage that was high, and as an energy survey showed could be reduced by more than half.

Hotel Hammarstrand in Jämtland is a hotel and conference facility that is booked by tourists who want to experience the scenic surroundings during the summer months. The rest of the year is mainly booked by conferences.

Carola Nilsson took over 2015 as owner of the hotel, and as a new owner, she began to go through more numbers, and not least the figures that showed a high energy consumption.

The Energy Office gave a tip about support for energy survey

Carola was aware that the business could be energy-mapped, but the thought of the cost of receiving consultants meant that it did not turn off. At least not until the Energy Office of Jämtland and Härjedalen contacted the hotel.

Together with other companies, Hotel Hammarstrand was invited to an information meeting on energy efficiency. At the meeting, they received information about the possibility of seeking support from the Swedish Energy Agency of up to SEK 50,000 to carry out an energy survey.

Carola also realized that all work did not require a consultant, but she could work on energy efficiency with the support of the Energy Agency. So by seeking the support and doing parts of the work itself, costs could be held down. At the same time Carola became more familiar with the subject.

Possible to halve energy use

Together with an energy consultant, an energy survey was conducted, resulting in a report with accompanying action proposals. The survey showed that, on average, the hotel had an energy consumption of 412 megawatt hours (MWh) per year. The proposed measures showed a possible saving of 239 MWh per year. Thus, if all measures were to be implemented, energy use could decrease by more than half.



Work on the measures is ongoing

Several of the measures proposed have now also been implemented. Half of all single rooms have now got new windows, and the worst windows in the kitchen have been replaced. In all double rooms one of the windows has been replaced. Instead of windows that could not be opened earlier, there is now a window that can be opened and which is also good from an energy point of view. A profit for both guests and energy use.

Parts of the lighting have previously been replaced with LED lighting, but now all lighting has been replaced, which is estimated to save 39 MWh. With an investment of 600 Euro for the new lamps, it is

only a repayment period of 2-3 months before the investment is paid.

Work is now underway to install thermostats on elements so that the heat can be maintained at an even level.

The hotel's design also contributed to the high energy consumption. The hotel is a long-term building built in several stages on a sloping plot. At the bottom there is the entrance and reception and on the top is a restaurant. At the entrance the door was often open and, together with the kitchen's powerful fan system, which was placed at the top of the building, a lot of cold air was drawn in when the door was open.

By creating an airlock with double doors in the entrance, the effect of this could be significantly reduced.

The biggest investment is left to do

The hotel is currently using an electric boiler for heating, and the energy survey proposals showed that the biggest energy savings can be made by replacing this with a geothermal heating plant. An energy saving of approximately 150 MWh per year.

Installing geothermal heat is, however, a high cost of about 70,000 Euro. An action that Carola hopes will be possible in two to three years.

When she took over the hotel there was a need to carry out many different forms of repairs and there has therefore been a balance between improving for the guests and reducing energy use.

Carola sees that there were other positive aspects of actively participating in the work of energy survey and the measures to energy-efficient.

- It has become easier to explain to the staff, previously I knew the problems but could not always explain to others.

Source: Swedish Energy Agency

CASE STUDY - RENEWABLE ENERGY: SOLAR CELLS AT QUALITY HOTEL FRIENDS IN SOLNA



The hotel gets some of its electricity needs supplied with green, locally produced electricity for a predictable cost.

Hotelldirektör Björn Callin säger "Vi vill ligga i framkant och arbeta med gröna värden. Vi vill också att våra solceller ska inspirera andra att hänga på. Tillsammans kan vi klä Arenastaden i solceller!"

Quality Hotel Friends installed solar panels on the roof of Solna in 2017. The green electricity from the solar cells will be used directly in the property's operations. This

means that the hotel will receive some of its electricity needs with green, locally produced electricity at a foreseeable cost.

Nordic Choice Hotels has always had a great focus on solutions for a more sustainable society and this will be a further step in the continuous work to reduce the environmental impact of the business.

Hotel Director Björn Callin says "We want to be at the forefront and work with green values. We also want our solar cells to inspire others to follow us."

Facts about the solar system:

- The plant is 200 sqm and produces about 29 MWh of electricity per year
- On the roof stands 110 silicon panels, saving about 2 tons of carbon dioxide per year

- Boil 290,000 liters of coffee (about 800 liters per day)
- Drive 145,000 km in a Tesla electric car (which can be charged outside the hotel)

Shows what the hotel can do with electricity as a marketing

- What can the hotel do with the green electricity equivalent to 29 MWh per year?
- The hotel gets enough electricity to boil 1 million eggs
- Do approx. 5 million smartphone downloads



CASE STUDY - SAMSO ISLAND AND ENERGI AKADEMIET

The Building

The Energi Akademiet at the Samso island in Demark uses in its building environment a combination of different techniques in order to establish a good track on energy use.

The building has concrete walls in strategic areas to store heat and cooling. The kitchen is an example of such area. The wall can store the heat of the kitchen as well as the whether. This cools down the anbiance and save the head for later use when the house need warming.

Another technique is the smart ventilation system that takes care of air quality and cooling. Moreover they store rain water, recycling it in toilets.

Energy Producing Cooperatives

The Akademiet facilitated the creation of cooperative projects in order to produce renewable energy.

One of this projects is the implementation of district heating through biomass. Another project is the generation of electricity through a cooperative of wind turbines. electricity among other activities, a big highlight is the engagement process that they go through in order to achieve such results.

They created forums to engage their stakeholders and created a financing system so the ownership would stay within the island.

For example, they made a deal with the bankers that people could buy shares of wind turbine on credit. They calculated the cost and price according to energy

production, and established a fixed fee for 7 Years to cover the ROI. Today they have covered the investment and are generating profits in an addition to a positive environmental and social impact

Moreover, the work for installing wind turbines was facilitated by a collaborative work with Island authorities by establishing areas that are allocated for the construction of wind turbines, now everyone who wants to build a turbine can do it without going through the bureaucracy of getting a permit for the land.

The district heating facility using biomass has a similar ownership as the wind cooperative. People can be an owner for approx. 13euro. At the beginning, farmers get a contract for 5 years to gather they biomass, making it a secure investment for them also. Nowadays such contract are even longer. On the customer side,

buyers can feel the stability of such system which prices does not vary as the oil prices changes.

Transport

One of the ferry routes is also owned by island employing local people. Moreover, the ferry itself is moved by batteries fueled by biogas. Such option allow them to use their biogas plant so the money stay in the island. It also saves money since the local production of fuels makes the operation cost cheaper and more resilient.

Other circular solutions

In another project they cooperated with water pump producer to create a more sustainable pump that can be repaired and updated without throwing the whole pump away. It is a modular concept that also enable the possibility of the company offering services.



APPENDIX 1 VEHICLES AND FUELS

APPENDIX 1

VEHICLES AND FUELS

Different vehicles and fuels in Sweden based on information from Miljöförordningen Sweden

- Biogas
- Fuel cells - hydrogen gas
- Electric cars and electric hybrids
- HVO

Biodiesel

Biodiesel, the most common of which is RME (rapemethyl ether) made from rapeseed oil and other esters from vegetable oils (also known as the name FAME). Also included is HVO (hydrogenated vegetable oil), which is FAME processed into a copy of diesel oil. RME and FAME are mostly used for incorporation into fossil fuels. As far as HVO is concerned, it is possible to drive diesel cars entirely at HVO. Read more about HVO further down.

Biogas

Vehicles that can be driven on gas usually have two tank systems, one for gasoline and one for gas. Apart from the gas tanks, there is not much that separates gas cars from gasoline cars. Gas cars work just like ordinary gasoline cars, except that the range of using only gas is shorter. The fuel tank will handle when the gas is over, so the total possible mileage is usually longer than the corresponding gasoline model. In a comparison of fuel consumption and fuel price, one liter of gasoline corresponds to about 0.74 kg of gas.

The gas is a mixture

Vehicle gas is the collective name of

the fuel used in gas vehicles. Vehicle gas consists of biogas and natural gas in varying blend. Vehicle quality and natural gas biogas are essentially pure chemical and consist mostly of methane. This means that they can be mixed in any proportion in the car's tank and you can tank at any gas tank. The proportion of biogas in the vehicle gas is now around 70 percent, with major local variations. There is also the possibility of tanking 100 percent biogas, that is, it is possible to drive fossil-free by gas car.

Biogas is renewable

Biogas is a renewable fuel sometimes can be recovered by digestion of, for example, food waste, manure or sewage sludge. The climate benefit with biogas will therefore be very big and even exceed 100 percent because it not only replaces fossil fuels but also takes care of waste.

Natural gas is fossil

Natural gas is a fossil, that is, no renewable, fuel extracted from oil sources, and recently also through oil shale. Driving on natural gas produces greater greenhouse gas emissions than biogas but lower than gasoline and diesel.



Fuel cell vehicle

A fuel cell car is often powered by hydrogen. A fuel cell car is a type of electric car. It is equipped with fuel cells that convert oxygen and a fuel to electricity that drives the car's electric motors. Some of the electricity is also stored in a smaller battery that equals the variation in power consumption based on driving. The cars have many advantages: the range is around 50-60 miles and they are thought in 3-4 minutes.

Usually the vehicle is fueled with hydrogen. If hydrogen is produced on green electricity, they are completely emission-free - exhaust ducts come clean water only.

Electric car and charge-hybrid

A clean electric car does not release any emissions. The electric car is powered by electric motors that run on electricity only from a battery.

The battery in the electric car is charged with power from the power grid. Battery development also goes fast, which makes the range considerably increasing without the batteries getting bigger or heavier.

Most models now sold in Sweden (2017) have a range of 20-28 miles. But the trend is moving towards longer range and two models have already passed 40 miles, Renault Zoe and Tesla. The extent to which the battery is sufficiently affected by the outdoor temperature and the amount of electrical equipment used in the car. When it's cold and you have to heat the cabin, much of the electricity will disappear and the range will be shorter.

Although the range of electric cars is significantly shorter than for other cars, it is fully enough for most car journeys made daily by private individuals as well as companies. The daily journeys made in Europe are approximately 4.5 miles.

Difference between electric cars and charge hybrids

The hybrid is also called a plug-in hybrid and has two engines: an internal combustion engine and an electric motor. Charge-hybrids, like electric cars, have a battery that can be charged from the electricity network/chargers, however, the battery doesn't hold as long as the charged electric cars. Charge hybrids are also fueled with gasoline or diesel.



A prerequisite for electric cars to really benefit from an environmental is that they are thought of with renewable electricity. The most optimal is if you yourself have the opportunity to produce electricity from solar cells and charge your car.

If all drivers in Sweden were to drive on electricity (over 4 million electric cars), just under 10 TWh would be needed. This corresponds to less than 10 percent of Sweden's total electricity usage.

Electric hybrid

Elhybrid has two engines, a common combustion engine and an electric motor. When you're driving, both engines

can work to drive the car, either at the same time or separately. Electric hybrid cars use the internal combustion engine to charge the electric motor battery while traveling, but also braking and idling can be used for charging. Part of the energy that becomes waste heat in a regular car can be used as electricity in the battery and drive the electric motor. This reduces fuel consumption. Elhybride can't be charged with electricity from outside. The electric motor instead makes the electric hybrid an extra energy efficient vehicle for fossil or renewable fuels.

HVO

HVO is a renewable diesel that reduces the diesel car's carbon dioxide emissions.

HVO (hydrogenated vegetable oil) is made from vegetable oils and animal fats. The production of HVO sold in Sweden is based on crude oil, which is a residual product from the pulp industry, rapeseed oil, palm oil, slaughter waste and also fat from restaurants collected and processed. The palm oil included in HVO sold in Sweden is certified according to the EU's strict rules for renewable fuels. There is also a residual product from palm oil production, PFAD used in HVO. It is not certified.

Since HVO is very similar to fossil diesel, up to 30-40 percent of HVO can be mixed into diesel in the current diesel standard. It is often done in the diesel sold at the service stations.

For higher inclusion, the vehicle manufacturer's approval is required. Many truck manufacturers and some car manufacturers have approved their 100 percent HVO vehicle (HVO100).

Information about different vehicles broken down by fuel
<https://www.miljofordon.se/bilar/>
<https://www.miljofordon.se/bilar/soek-bil/>

Here you can charge electric vehicles
<http://www.uppladdning.nu/>



TRAINING MATERIAL

Energy in Circular Economy

Module 1 - Guide for Trainers

LEAD PARTNER

Agencia Renerga Pinaros S.A.

EL INSTITUTO PARA LA
CALIDAD DE LA ENERGÍA

ENERGIA
SOLAR

energimontor

MAP

CRT

Linnaeus University

PARTNERS



CIRCINNO



INTRODUCTION

The role of energy in circular economy might not be that obvious. It can be easily stated that ideas that stand behind the role of energy in circular economy are among others: high efficient energy systems, sustainable energy management and implementing technologies based on renewable sources as well as sustainable use of available resources. The goal of this part of workshop is to present ideas and solutions

regarding energy within the circular economy. Energy is just another resource in a company and should be carefully managed, not wasted, saved and recovered.

When the topic of energy efficiency usually concerns the whole - for example - of a building, we should remember also to develop positive habits of users and customers who press the button.

OBJECTIVE

The purpose with the training in the energy module is that we should:

- Provide a perspective of the meaning of energy use in relation to CE
- Introduce modern energy concepts, such as, Renewable energy, Energy efficiency, Prosumer, Energy cluster, Energy Management System etc.
- Equip the business owner/staff with capacity to:
 - Evaluate the options for sourcing clean energy
 - Identify possibilities to produce their own renewable energy
 - Identify relevant business areas that have a high use of energy
 - Identify actions that will decrease their energy consumption
 - Identify actions that will lead to more sustainable travel and transports
 - Monitor the results of different measures
- Introduce the SME's to an action plan for energy and transports and help them getting started with their work to develop an action plan for their own business.
- Inspire participants with different examples of possibilities in turning toward renewable sources
- Give the participants an opportunity to have an experience exchange with other participants, either through regional or cross boarder exchange.
- Support the SMEs to develop new CE inspired services/products



SUGGESTED AGENDA (1 DAY WORKSHOP)



The training is supposed to take one day but could also be made shorter. Here we suggest an agenda for a training between 08:30 and 15:30.

Introduction – 40 minutes

- Presentation of speakers and the agenda
- Presentation of the SME participants and their expectations about the day
- Short introduction to circular energy
- Circular economy and energy
- The importance of a circular star
- Energy use in the tourism sector

Energy and resource efficiency – total 1 hour

- Building envelope
- Ventilation
- Circulation pumps

Coffee break - 30 minutes around 09.45

Energy and resource efficiency - continues

- Heating and cooling
- Lightning
- Energy management systems
- Water economy
- Reducing waste

Measuring is to know – how to identify actions 15 minutes

- Introduction about observing
- Short discussion with your neighbour about what data you have access to or are missing

Energy tour at the hotel / restaurant where the education is conducted - 30 min

- An energy advisor leads the tour together with the CEO or energy coordinator. Comments on good solutions and ways to improve the energy efficiency
- If it is a big group, you can take half the group for the tour while the other half is having the discussion. Then you change the groups.
- If it's a restaurant it's a good idea to make the tour after lunch, for example at 14.00.

Discussion in smaller groups, energy efficiency - 30 minutes

- What is the current situation in your business? What would you like to improve? Start developing an action plan. Ask the groups to give examples of what they discussed before going to lunch

Lunch break – 60 minutes



Energy supply and production - 30 minutes

- Electricity
- Heating and cooling

Solar panels, electric cars and charging posts

- Solar panels
- Financing

Discussion in smaller groups, supply and production, solar panels, electric cars and charging posts 30 minutes

- What is the current situation in your business? What would you like to improve? Start developing an action plan. Ask the groups to give examples of what they discussed.

Sustainable travel and transports – 30 minutes

- Your own transports
- Your supplier's transports
- Your guests transport

Coffee and discussion sustainable travel and transports,

smaller groups - 30 minutes

- What is the current situation in your business, what would you like to improve, start developing an action plan

Financing – 10 minutes

This part must be adapted to the country where training is being held, since there are different grant, support and tax systems in the countries.

Promoting of subsequent workshops and advisory services - 5 minutes

Evaluation of the day, closing – 10 minutes

LIST OF SLIDES



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Slide 2 Agenda

3-7 Circular economy

Slide 3 The difference between linear and circular economy
Slide 4 A quick background to raise again the relevance of CE
Slide 5 The CE principles. Principles as formulated by Ellen McArthur
Slide 6 Short version of the principles
Slide 7 Technical and biological cycles

Slide 8-9 Circular Economy examples

Slide 8 Restaurant Silo
Slide 9 Hotel Green Solution House Bornholm

Slide 10-12 Energy Consumption in Tourism sector

Slide 10 Energy Consumption in tourism sector
Slide 11 Energy Consumption in hotel
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Slide 13 Energy smart adaptation in three steps
Slide 14 Main areas of improvement
Slide 15 Energy Efficiency = Making more with less
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Slide 18 Doors and windows
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Slide 32 Example of guest behaviour change

Slide 33-37 Energy Audit

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Slide 35 Energy-map of Press Kogyo
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Slide 39-42 How to identify actions?

Slide 39 How to identify actions?
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GUIDE OF SLIDES

Slide 1-2

Welcome

Welcome participants and bring up any logistical matter. Share the aim of the day to inspire SMEs and helping them to find possible solutions.

(Slide 2) Present the agenda -show only the topics you will talk about. It is often effective to show planned breaks and lunch at the agenda

We suggest holding a small introduction round among the participants and their expectations about the day, (better for small and medium sized groups, but also possible in big groups if one keeps the introductions very short)



Slide 3 to Slide 7



Circular economy quick review of CE

If your group need a deeper introduction check the first module of the project for the related material.

Provide a quick background to raise again the relevance of CE.

Speak about the difference between linear and circular economy.

This is an opportunity to show how CE includes many concepts, and the work done so far just add to the transition towards CE. It includes many

of the concepts in green and sustainable work.

This is also a place to highlight that one of the strengths of CE is that it prompt business not only to address such issues but to design their core business and supply chain in a way that include those aspect as a business solution not as a problem mitigation, but as opportunity.

In that sense CE moves from the feeling and sense of moral obligation to the one of opportunity. The opportunity is to re-shape "what do we use" – "how

do we use it and offer it" and "what to do with the bi-product and waste."

Introduce the principles. You may read or just refer to them. Acknowledge they are written in very academic form but there is a way to easily understand them (here you might want to bring the "resolve" or other frameworks.

You may highlight that the idea is to

- Minimize the intake of resources
- To regenerate and keep natural resources in balance
- By redesigning the business offer
- In such way that also exclude pollution and waste

Explain that the idea is to keep the things we produce in cir-

ulation if possible, to preserve their value.

It is a short version of the principles. You may use this slide directly or move from the fully explicit principles to the short version. We have used the long ones to say that those are the more scientific version, and can they be explained in simple

terms. It is a way to show that CE can be simple to understand.

Explain that there are technical and biological cycles to be considered and you may give a technical example such as reusing the memory chip on a computer before recycling. Or a biological cycle example, before composting an interme-

diary step for retrieving the gas can help to make the most of such resource.

Here you can make the bridge to CE and Energy saying that Renewables and Energy efficiency are key elements to be keep coherent to the CE concept and principles.

Slide 8 - 9



Example Circular Economy

We used to look for the stars as guidance. In circular economy having guiding stars means selecting some guidelines or directives that can help business to look at their activities with new eyes.

Some examples of guiding stars are: "Our company is carbon neutral", "We are zero waste", or "We use sustainable products". It is much easier for companies to find or develop new solution if they have directions to where they should be moving. There is many action's one can take to be sustainable and develop a more circular approach. Moreover, having a guiding start helps to bring together different initiatives that are effective however that would be lost or meaningless without the reference provided by the guiding star. For example, insulating a roof is an action business can take in order to improve energy efficiency. It has a great benefit saving energy resources and money. However, such action is not something to be marketed without a context, it simply hard to make sense or a point

out of it. However, if the business has a guiding start like "Using resources as best as possible" or "reducing waste", then such action can be place in a context. A business can advertise how insulating the roof saves resources thus reducing waste of energy, reduces their CO2 emissions or both!

Slide 8 Example about a circular guiding star – The Silo and Zero Waste

The restaurant Silo in Brighton have a Zero Waste as a business model. They have shown that it is possible to run a restaurant based on sustainable solutions. It is possible both economical and ethic. They try to buy and produce this as local as possible. They get bulk deliveries. The food waste is used to produce energy and soil improvement. If a company chooses a "Zero waste" as a guiding star, then looking at supply and production efficiency, as well as looking at consumer left overs gains a whole new perspective. Waste is not just an externality to be managed, but it becomes something to be designed out of the equation or considered

into the equation. Ultimately, such change of perspective allows the development of new business partnerships and revenue streams.

Slide 9 Example about a circular guiding star – Green Solution house

Green Solution House is a hotel and conference centre in Bornholm. Their business model is to be circular and work with the Cradle to cradle principle. Explain cradle to cradle if the participants are not familiar with the concept. Their circular thinking permeates the entire business and part of the profit is reinvested into sustainable solutions / new technology. They are using natural or recycled materials, the produce their energy from solar energy, food waste etc., they have their own water treatment, green walls for better indoor environment, etc.

Reinforce with a definition that the work is about:

- Use of renewable energy sources
- Continuous effort towards energy efficiency

The last part of the definition reinforces that this can be done in different parts of the business:

- Production (including supply chain)
- Distribution, as well as
- User Behaviour

Slide 10 -12



Energy Consumption in Tourism sector

Provide an overview of figures and main energy consumption. Please adapt this to your audience and location.

Slide 13

Energy Smart adaption in three Steps

1. Reduce end-use of energy – no or low cost (behavior and optimizing)

2. Make more efficient use of energy – need investments
3. Increase the share of renewable energy – no or low cost



Slide 14

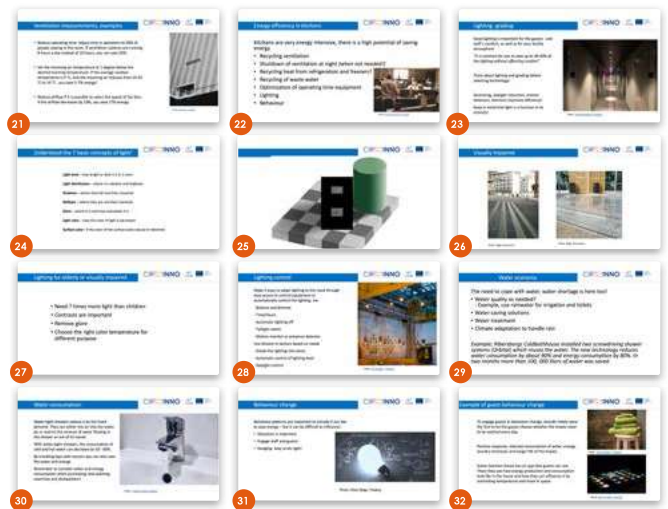
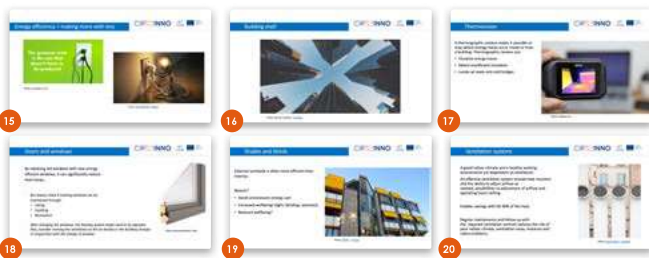
Main Areas of Improvement

These slides provide a small overview of the main areas of improvement. It works as a reminder of the agenda and

what is about to come. This Slide could also be used to speak about Energy topics is a very short version.



Slides 15-32



Energy and Resource Efficiency

These slides bring up first a definition of energy efficiency. It follows many possible areas of improvements that are described in the content training, please check the material in case more detailed information is needed.

The topics are:

- Building Envelope
- Thermovision
- Doors and windows
- Shades and blinds
- Ventilation systems
- Ventilation measurements (examples)
- Energy Efficiency in Kitchens
- Lighting - grading
- Understand the 7 principles of light

- Lighting for visually impaired
- Lighting for the elderly or visually impaired
- Lighting control
- Control of lighting
- Water economy
- Water consumption
- Behaviour Change
- Example of guest behaviour change (and engagement) initiative

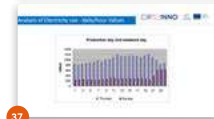
Slide 33- 37



Energy Audit
Opportunity to explain how one keep track and makes changes in the above-mentioned areas (Slide 33) energy efficiency run through (Slide 34) Audit in 4 steps (Slide 35) example of an energy audit map (Slide 36) Night walk – showing possible areas to keep track and check for
This could be also an opportunity for a practical example: An invited regional or local energy advisor (or similar organization) will lead a climate walk through the building together with a



representative from the hotel or restaurant to which the education is located. The energy advisor comments on the building, installations, lighting and more. The advisor talks about what is good and gives advice on what can be improved. The aim is for participants to see concrete examples of what we have discussed during the theoretical review.
(Slide 37) Analysis of electricity use – daily-/hours values



Slide 38

Energy Management Systems

Intro and benefits of EMS and BMS

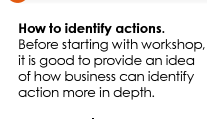
Energy Managements System support you in collecting data in relation to energy use. The correct system analysis, metering and recording the consumption of energy and hot water use is essential to create a base line as well as, to start identifying and implementing energy saving measures. Moreover, such monitoring supports assessing the progress of implemented measures. Another common feature of energy management systems is that it can help you to establishing the system parameters for an efficient energy use.

Examples

Provides two examples, Ray-based that has much more sensors and control possibilities, and Watty, that works with one general sensor and is more for overview and smaller places. As a third example you can use this video: <https://youtu.be/LFKLUVJWK08> Although it is a big Hilton case, that might not be applicable or scary to SMEs (use at your own risk :)). It can be helpful to show what an EMS /BMS is and could even be used earlier.



Slide 39-42



How to identify actions.
Before starting with workshop, it is good to provide an idea of how business can identify action more in depth.

Energy Analysis

LCC

For this step I would be ideal



that you can either have companies to bring some of their data to the workshop. An alternative is that the workshop is divided in two parts that run in different days. So, companies can do a homework focused on their area of interest and continue with focused exploration.

Slide explanation:
By considering the entire cost, both the purchase and operating costs you get an overall picture of what an equipment cost.

To only look at the purchase



price can give a misleading picture of the actual cost.
LCC calculations are a tool for identifying the saving potential often found in low operating and maintenance costs.

Use LCC when purchasing products or services that use a lot of energy, fuel or water in the user phase.
It is also advisable to use LCC calculations when purchasing products that affect the use of energy, such as air filter.

To measure is to know - intro to the topic

Slide 43



WORKSHOP 1 Discussion

Ask the participants to talk to their neighbour and discuss their access to data and what they are missing. After 5 minutes ask if anyone has a good example or if a few participants briefly can share their situation.

OR

Do a 30 minutes workshop in groups with 4-5 persons in each.

Identify actions and measures – observing and planning – for:

- Energy Efficiency
- Energy Management Systems

Trigger questions is to ask:

- What would be interest for their company? – to ground the knowledge.
- What is their current situation?
- What would they like to improve?

Use the template for the action plan and write down ideas for about 5-10 minutes. Discuss ideas and potential solutions with the other members in the small group. The trainer and energy advisor will walk from group to group and listen/answer eventual questions. 15 min. Round up the workshop by asking every group to tell the others about one problem/solution that the group have discussed.

Slide 44-49



Introduction to energy supply
44. makes a point why to consider the energy supplier.

45. Why renewable energy - Explain why renewable energy is advantageous

46. gives some general figures about energy production according to different sources

47. Energy Production of RES – listing of different sources

48. Electricity price in Sweden – It may also be interesting to have some up to date data for your region. Please adapt or add a slide relating to your context

49. heating sources such as district heating – talks about district heating – today this is a harder system to influence. Many states are taking initiatives to provide a cleaner heat production for comfort and warm water. It is possible to complement this by production your own heat and hot water through the solution discussed in the next session.

Slide 50

Buy renewable energy

Could speak about the possibility of buying energy from renewable sourcing from a supplier, i.e. as opposed to producing yourself. Every region is different please create a slide adapted to your circumstances



Slide 51

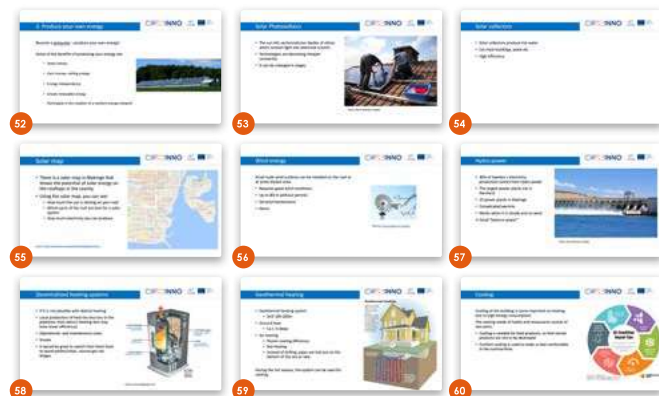
Buy Shares

This slide is a good transition between trying to source renewable energy from suppliers to the possibility of producing your own electricity.

It is possible to buy shares in cooperatives that can provide a business with energy (electricity often) directly via cable transmission or indirectly by trading energy shares. This is a good alternative in places that there are no renewable energy providers, or in cases that the business cannot



Slide 52-62



- Solar collectors
- Exercise solar map (explanation below)
- Wind Energy
- Hydropower – Dams have lots of challenges, in region with rivers, this could be an alternative https://youtu.be/eXlm_axyu0
- Decentralized heating systems (quick intro)
- Geothermal heating
- Cooling systems
- Energy from food waste

Exercise solar map:

When talking about energy it is possible to do an exercise using the solar map (solkartan) to estimate how much savings and potential there is – business can be asked to look at their own roof. In international cases, the map also allows to show the potential of different placements according to the direction of the roof.

<https://www.svenssolenergi.se/ati-installera-solenergi/solkartor> (Video) https://www.youtube.com/watch?v=8x9i5kC-1G_U&feature=youtu.be

<https://www.kansstyrelsen.se/blekinge/antbruk-och-landsbygd/miljo/energi-och-klimat/stod-till-solcellsanlaggning.html>



Here you can provide examples such as Green House Solution <http://www.greensolutionhouse.dk/green-solutions/> also mentioned above or the and Quality Hotel Friends in Solna described in the slide

Slide 63

Workshop 2. Energy supply and production

Do a 30 minutes workshop in groups with 4-5 persons in each. Identify actions and measures – observing and planning – for:

- Renewable energy supply and production

Trigger questions is to ask:

- What would be interesting for their company? – to ground the knowledge.
- What is their current situation?
- What would they like to improve?

Use the template for the action plan and write down ideas for about 5-10 minutes. Discuss ideas and potential solutions with the other members in the small group. The trainer and energy advisor will walk from group to group and listen/answer eventual questions. 15 min.

Round up the workshop by asking every group to tell the others about one problem/solution that the group have discussed.



Minimize food waste



To reduce food waste, it is most important to:

- Fix targets for avoidable food waste reduction
- Routines for right portions
- Menu planning Internal education / training on costs

- General awareness campaigns on avoidable food waste prevention
- Planning production

Of medium importance is

- Purchasing routines
- Reporting on costs
- Training on environment and sorting waste

Less important is

- Freezing and storage routines
- Routines for following recipes
- Introduce incentives for

- reducing food waste
- Follow up buffet routines
- Access and measure food waste

In the slide there is an example from the Scandic Hotel I Karlskrona. Scandic Hotel I Karlskrona sells leftovers through the Karma app. It's a new service they have developed to reduce their food waste. It's very popular among their customers. It's possible due to their ability to have a quick cooling, then the food can be sold to new customers.

Slide 64-65

Food and resources



Foodstuffs are using a lot of resources through their production process, processing and distribution. This is at the core of the biological materials cycle. For the hotel restaurant sector, this encompasses production of raw materials, the deselection of plant and animal parts deemed unfit for human consumption and their cascading into other sectors, for example into biological energy and the animal foodstuffs sectors.

- Material flows involved in food and meal packaging, including glass, paper, plastic and card box. It is not only the amount and type of wrapping that is relevant to consider, but equally so the 'after-life' or possible re-use or recycling of these materials.

- Energy use in relation to transport of biological materials as well as processed and prepared goods. Here not only distance matters, but also the efficiency of the involved transportation technology including the consumption side.
- Water use involved in food preparation, cooling and cleaning. Here it is necessary to distinguish between direct and indirect water use, i.e. use in the hotel kitchen and indirect water use accumulated through the production and processing of food items.
- Energy use in food preparation, cleaning and storage. Like with water, it is possible to distinguish between the direct use in the hotel kitchen and the indirect energy content accumulated through the production and processing of food items. The accumulated energy content is sometimes expressed as equivalent of tons of CO₂-emissions to relate it to climate change. The indirect energy content

from food material transportation may be included in this calculation.

- Technological kitchen appliances. The in-house impact of the chosen technology such as refrigerators and freezers, ovens, pressure steamers, dishwashers etc., will directly influence the energy-consumption and water use of the hotel kitchen.
- Cutlery, plates, glasses, etc.: Hospitality restaurants use many plates, cups, glasses, cutlery and interior decorations. In a circular economic thinking, the energy and material content used in the production of these, as well as the after-use life of these are relevant to consider.

Slide 66



Waste minimization

Reducing waste amounts also means more efficient use of resources. Waste minimization is a key stone in the concept of circular economy.

Keep in mind that:

- Which materials you choose, please use natural materials
- Choose non-toxic products
- Products should be designed to be disassembled and recycled

- Is it possible to repair products or replace broken parts? (Give an example about floor mats, which are made up of various interchangeable modules. In that way you can replace worn parts instead of the entire carpet.)
- Recycle and recycle materials
- Organic food waste can be raw product for energy production

Slides 67 – 77

67

68

69

70

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74

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76

77

Transport in tourism
(Slides 67) Sustainable travel and transport in tourism

Provides an overview of the use and (slide 68) impacts of transport in tourism sector

(slides 69) Sustainable Transports
The other slides allow the exploration of the following topics:

- Own Transportation and

Suppliers

- Own Transportation of Staff
- Public transport
- Shuttle services
- Drive and rent an eco-fuelled vehicle
- Types of fuel
- Wellbeing and energy efficiency
- Recreational use

Slide 78

How to identify action within transport

For discussion points for observing planning and beyond, the trainer can focus on the following topics:

- Transport within the company
- Suppliers transport solutions (distance, requirements etc)
- Guest transportation
- New Offer around transport and mobility.



Slide 79



Workshop 3 - discussion sustainable travel and transports

For this step I would be ideal that you can either have companies to bring some of their data to the workshop, on that the workshop is divided in two parts, so companies can do a homework focused on their area of interest and continue with focused exploration.

Workshop 3. Energy and resource efficiency

Do a 30 minutes workshop in groups with 4-5 persons in each. Identify actions and measures – observing and planning – for:

- The companies own transports
- The suppliers transport
- The guests travel and transports

Trigger questions is to ask:

- What would be interest for their company? – to ground the knowledge.
- What is their current situation?
- What would they like to improve?

Use the template for the action plan and write down ideas for about 5-10 minutes. Discuss ideas and potential solutions with the other members in the small group. The trainer and energy advisor will walk from group to group and listen/answer eventual questions. 15 min.

Round up the workshop by asking every group to tell the others about one problem/solution that the group have discussed.

Slide 80



Financing (in Sweden)

First and foremost, adapt this information to your land and to the current point I time, for the types of support changes.

After discussion it is possible to focus on the financing possibilities that are relevant or direct them to appropriate consultants and advisory services

The slide about financing must be developed separately in each region. The reason is that there are different national grants in different countries. You get an idea about the different grants that you can talk about in the training material. Make sure that the information I still is actual since grant systems tends to change over time.

Slide 81



Closing the day

Here you can promote offers about how participants can move forward and get feedback on workshop.

Often it is better to ask the participants to fill in an evaluation form before they leave.



APPENDIXES

APPENDIX 1 SUGGESTED AGENDA (2H WORKSHOP)

The training is supposed to take one day, but could also be made shorter. Here we suggest an agenda for a training of 2h.

- Introduction – 20minutes
- Energy and resource efficiency – total 15 min
- What and how to keep track off energy efficiency? 15 minutes
- Energy Management system 5 min

Coffee-Break

- Energy supply and production - 15 minutes
- Waste minimization 10
- Sustainable travel and transports – 15 minutes
- Financing – 10 minutes
- Close





APPENDIX 2

LIST OF SLIDES FOR SHORT VERSION OF WORKSHOP

The number on the left correspond to the slide number in the short (PPT) presentation.

The slide description, i.e., Slide 1..., Slide 2..., correspond to the slide number according to the guide for trainers, in case one needs more info about a given slide.

Slide 1	Welcome
Slide 2	Agenda
Slide 3	The difference between linear and circular economy
Slide 4	A quick background to raise again the relevance of CE
Slide 6	Short version of the principles
Slide 7	Technical and biological cycles
Slide 8-9	Circular Economy examples - Hotel Green Solution House Bornholm
Slide 10	Energy Consumption in tourism sector
Slide 11	Energy Consumption in hotel
Slide 12	Energy Consumption in restaurants
Slide 14	Main areas of improvement
Slide 15	Energy Efficiency = Making more with less
Slide 33	Energy Efficiency = Run Through
Slide 36	Night walk – What should we keep track of?

Slide 34	Energy audit in 4 steps
Slide 41	LCC - Life Cycle Cost
Slide 39	how to identify actions?
Slide 38	Energy management systems
Slide 44	Energy supply
Slide 47	Energy production from RES
Slide 50	Buy renewable energy
Slide 51	Buy shares
Slide 52	Produce your own energy
Slide 61	Energy from food waste
Slide 62	Examples energy production in hotels
Slide 66	Waste minimization
Slide 65	Minimize food waste
Slide 67	Sustainable travel and transport in tourism +
Slide 68	Environmental impact
Slide 69	Sustainable transports
Slide 78	How to identify actions?
Slide 80	Financing (in Sweden)
Slide 81	Closing

APPENDIX 3

LIST OF SLIDES FOR SHORT VERSION OF WORKSHOP

Workshop description

This document is an excerpt and it is based on the descriptions of workshops that are included in the PPT slides and the guide for trainers description of the energy module of the CIRTOINNO project.

Such workshops are meant to support organizations:

- Reflect on the information they just heard
- Try to apply this knowledge to their own sourcing and use of energy.

The workshops follow the build-up of the energy module training developed on the CIRTOINNO project. The content and design of the workshop is inspired by the guiding methodology selected under the training development: Observe, Plan, Act and Measure.

It is meant to be use in conjunction with the Manual for Users so participants can register their data



WORKSHOP 1 DISCUSSION

Ask the participants to talk to their neighbour and discuss their access to data and what they are missing. After 5 minutes ask if anyone has a good example or if a few participants briefly can share their situation.

OR

Do a 30 minutes workshop in groups with 4-5 persons in each.

Identify actions and measures – observing and planning – for:

- Energy Efficiency
- Energy Management Systems

Trigger questions is to ask:

- What would be interest for their company? – to ground the knowledge.
- What is their current situation?
- What would they like to improve?

Use the template for the action plan and write down ideas for about 5-10 minutes. Discuss ideas and potential solutions with the other members in the small group. The trainer and energy advisor will walk from group to group and listen/answer eventual questions. 15 min. Ask people how can they follow up their choices (check).

Round up the workshop by asking every group to tell the others about one problem/solution that the group have discussed.

WORKSHOP 2 ENERGY SUPPLY AND PRODUCTION

Do a 30 minutes workshop in groups with 4-5 persons in each.

Identify actions and measures – observing and planning – for:

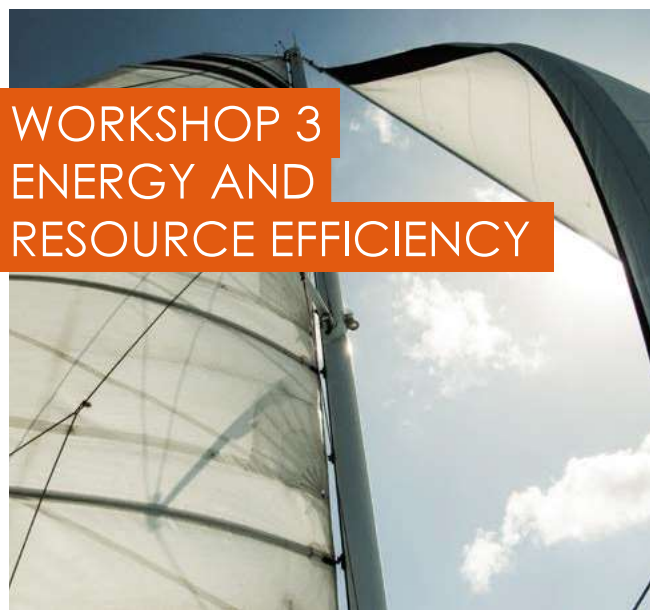
- Renewable energy supply and production

Trigger questions is to ask:

- What would be interest for their company? – to ground the knowledge.
- What is their current situation?
- What would they like to improve?

Use the template for the action plan and write down ideas for about 5-10 minutes. Discuss ideas and potential solutions with the other members in the small group. The trainer and energy advisor will walk from group to group and listen/answer eventual questions. 15 min. Ask people how can they follow up their choices (check). 15 min.

Round up the workshop by asking every group to tell the others about one problem/solution that the group have discussed.



WORKSHOP 3 ENERGY AND RESOURCE EFFICIENCY

Do a 30 minutes workshop in groups with 4-5 persons in each.

Identify actions and measures – observing and planning – for:

- The companies own transports
- The suppliers transport
- The guests travel and transports

Trigger questions is to ask:

- What would be interest for their company? – to ground the knowledge.
- What is their current situation?
- What would they like to improve?

Use the template for the action plan and write down ideas for about 5-10 minutes. Discuss ideas and potential solutions with the other members in the small group.

The trainer and energy advisor will walk from group to group and listen/answer eventual questions. 15 min. Ask people how can they follow up their choices (check). 15 min.

Round up the workshop by asking every group to tell the others about one problem/solution that the group have discussed.



WORKSHOP 4

In shorter workshops might be worth to get a template and work through it to get a more wholistic view of the company resource use and business models.

In such cases, it can be useful to use templates such as the one developed by Cirtainno, namely Template for assessment of current activities, or the "Circulab template"