Moving towards total sustainability of an island, Gotland - SE

1. Policy Objective & Theme

- SUSTAINABLE USE OF RESOURCES: Sound use of resources and promotion of less resource intensive processes/products
- SUSTAINABLE ECONOMIC GROWTH: Balancing economic, social, cultural development whilst enhancing environment

2. Key Approaches

- Integration
- Participation
- Knowledge-based
- Ecosystems based approach
- Socio-economic
- Technical

3. Experiences that can be exchanged

The means by which an island community can move towards full sustainability.

4. Overview of the case

Since 1992, Gotland declared it would achieve a 100% renewable energy balance by 2025, a fully sustainable society within the course of a generation.

5. Context and Objectives

a) Context

Gotland is located in the middle of the Baltic Sea; it is the largest Swedish island with a population of 58,000. Tourism (700,000 visitors a year) and agriculture are the main economic activities. The isolated location of the island has contributed to a relatively low economic growth as compared to other parts of Sweden. High costs for transports of energy, goods and people have contributed to a non-dynamic growth of the local economy. The island has a large renewable energy source potential in wind, biomass, small-scale hydro, geo-thermal power and solar. A responsible exploitation of these resources will enhance the local economy and provide a better living environment. The combination of renewable energy with measures that increase the efficiency with which natural resources are used is a central part of Gotland’s strategy, Vision Gotland 2025, for realising a sustainable society.

b) Objectives

The municipality has approved an overall goal that Gotland will be a fully sustainable society in the course of a generation i.e. in 25-30 years. This aim has been reflected in many plans and documents of the municipality which were developed in consultation with local actors and the population at large.

6. Implementation of the ICZM Approach (i.e. management, tools, resources)

a) Management

The municipality is responsible. It has established a co-ordination group which is responsible for producing an annual environmental report. In 1996, a Regional Energy Agency was also established to promote the development of a sustainable energy system. It works with local actors and national and European programmes to promote the implementation of sustainable energy technologies.

b) ICZM tools

The municipality's objectives relating to a 100% renewable energy programme have been outlined in a number of documents e.g. Energi 2010 - the Municipality's energy plan, Vision Gotland 2025. Many interesting and innovative examples of renewable energy initiatives have been developed.

Gotland's central position in the Baltic provides a natural energy resource - the wind. More than 2000 households on Gotland own shares in wind turbines through local wind energy co-operatives. Windpower is currently responsible for around 20% (175 GWh/yr) of the island's total electricity consumption. There are wind farms at various locations around the island with Sweden's first marine wind farm (2.5MW) and plans to build more. Single wind turbines are also used to provide electricity for farms and factories. Two companies have both installed 500 kW wind turbines which each produce around 1.1 GWh/yr. Some farms with forward thinking owners have also invested in their own wind turbines and use these to enhance their environmental profiles.

Reducing energy consumption is another major strand of the strategy. A combined town-university library has been built from plans of Gotland's University College. It is a visible demonstration of their high environmental ambitions. Energy efficiency and the use of renewable energy resources feature strongly in the building's design. To reduce the need for energy intensive air-conditioning systems, sea-water is used for cooling the interior spaces during the warmer months of the year. A sea-water based heat-pump provides heat during the winter. The pumps are driven by electricity generated by 50m2 photo-voltaic cells mounted on the library's roof. The need for artificial lighting is low as daylight use is optimised by the building's design. The building's structure and ventilation systems have been designed to make the most of the structure's capacity for thermal storage. High performance façade systems allow daylight penetration while keeping in heat in the winter months and providing shading during the summer. Re-cyclable materials have been given high priority and high performance glazing gives both passive solar gain and low energy loss. The largest high-school uses separation toilets to enable urine to be collected and used as fertiliser. It, too, uses low emission building materials, chosen to allow for future re-use and re-cycling. Natural ventilation is assisted by specially designed chimneys that adjust to the wind direction and solar panels provide hot water.

Gotland is using waste water for irrigation. It is collected in artificial pools where it is naturally purified for several months. Irrigation, using the purified wastewater, allows the soil to absorb the nutrients contained in the water leaving the soil naturally fertile. Such nutrients would otherwise pollute the island's lakes and waterways and helps to reduce the eutrophication of the Baltic Sea. More and more farmers are also switching to ecological food production with 8% of the land so cultivated, with the main market in the Stockholm area. Eco-tourism is becoming a reality with the introduction of e.g. eco-safaris by bicycle, following in the footsteps of Linnaeus or visiting environmentally oriented companies and sites.

Raps Methyl Ester or RME is an organic, renewable fuel produced from rapeseed oil and made in Sweden. It is used in vehicles to reduce the need for fossil fuels thereby decreasing the output of carbon dioxide into the atmosphere. Many modern diesel engines can use RME - either on its own or mixed with diesel. To set a good example, and as part of it's commitment to phasing out fossil fuel use, the local authority has acquired around 60 vehicles that can be fuelled with RME. Other organisations on the island have chosen to use RME driven vehicles as part of their environmental programmes.

Gotland's sustainable development plans, decisions and targets require regular updating and evaluation to ensure the process moves forward towards the goal of sustainability. The Municipality has signed a partnership declaration with the European Commission and has been accepted as one of the 100 Renewable Energy Communities as outlined in the Campaign for Take-off.

7. Cost and resources

The investment for the library was €13.5 million. Other figures are not available.

8. Effectiveness (i.e. were the foreseen goals/objectives of the work reached?)

Renewable energy accounts for ca. 10% of the island's total energy supply: the use of oil for heating has been reduced by 75% since 1980; sulphur discharge from oil burning furnaces has been reduced by 95% since 1980; emissions of CO2, sulphur and nitrous oxides have been reduced by 20% between 1993 and 2005 (the cement factory excluded). Oil-fired burners have been converted to use wood-chips in municipal properties whilst bark, wood-chips, demolition wood and shavings from local sawmills are burned in modern furnaces. A sea-water based heat pump with a 10 MW capacity supplies a district heating network and bio-gas from landfill and a sewage treatment plant is used. RME-fuelled vehicles are part of the municipalities fleet.

9. Success and Fail factors

The local authority itself is leading from the front and uses 100% renewable electricity and 85% of the heating comes from renewable bio-energy. The advantage of having a long-term plan with a specific time-frame is that other planning which involves the production of short term plans can become a part of the overall objective. The Energy Agency has carried out a number of demonstration, sustainable energy projects with the support of the EU's and Swedish research and development programmes. The experiences from Gotland indicate that the development of a sustainable energy system requires action at all levels of society :

- Political frameworks and plans need to be put in place.
- Organisations should be established that can promote sustainable energy.
- Local companies that can implement and manage Renewable Energy Sources projects should be encouraged.
- Utilities need to be involved when grid networks need adapting.
- The available financing mechanisms need to be identified and understood.
- Public acceptance issues need to be addressed.
- The benefits to the island in terms of jobs and regional economic benefits need promoting.
- Local participation and ownership should be encouraged.

The most challenging energy issue on Gotland is the transport sector. Gotland needs more local production of renewable fuels for cars and other types of transport. It is highly dependent upon boat and air transport to, and from, the mainland.

10. Unforeseen outcomes

None so far.

11. Prepared by

A. H. Pickaver, Coastal & Marine Union (EUCC), The Netherlands

12. Verified by

It has not been possible to verify this case.

13. Sources

- Energi 2010 Energiplan för Gotlands Kommun planperiod 2007-2010 (2006) Gotlands Kommun
- Energy 2010 Energy plan for the municipality of Gotland year 2007-2010: (2006) Gotland Municipal Council
- The sustainable society (undated) Gotlands kommun
- Vision Gotland 2025 Regionalt utvecklingsprogram för Gotland – RUP (2008) Gotlands kommun

- www.europa.eu/energy/idea_site/ (the Campaign for Take-off)
- www.gotland.se
- www.hgo.se (for information about the library)
- www.managenergy.net/indexes/l285.htm

- Energiplan 2010 Gotland (1.79 MB)
- Energy plan 2010 Gotland (6.9 MB)
- The sustainable society (2.49 MB)
- Vision Gotland 2025 (1.56 MB)