



Final Report



POWER
Low Carbon Economics



European Union
European Regional Development Fund



INTERREG IVC
Innovation & Community Research
Integrating Local Authorities' Initiatives

_TIMBER Project Final Report

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TIMBER! Project Final Report
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POWER FOR WOOD

> Five regional stories, one storyline

by Frank van Empel & Caro Sicking

Explorers from five European regions met for a kick-off in the heart of Het Groene Woud (The Green Forest) on the 27th and 28th of May 2010. A kick off for a project that has to do with biomass and the transition from a carbon based economy into a bio-based economy. The name of the project: TIMBER, short for Tools for Integrated Management of Biomass Energy Resources. Conclusion after two days of talking and exchanging viewpoints: the five partners approach biomass as an energy source very different, their individual point of view, problem and scope differ greatly. But that is the European way: unity in diversity. By the way: the picture of the TIMBER Team has been taken in Stockholm. The composition of the TIMBER Team is a classic example of European diversity:

- From the North, powerplayer in biomass, the

Stockholm County Council - Office of Regional Planning, Stockholm;

- From the South, pioneer in the bio-based economy, Provincial Energy Agency of Cádiz (APEC), Cádiz;

- From the East the brains & models of the Mineral and Energy Economy Research Institute of the Polish Academy Research Institute of Sciences (MEERI), Krakow;

- From the West, a not for profit company, Ngage Solutions in Saunderton, UK;

- And last but not least, from the middle, municipality of Boxtel, the Netherlands – small initiator and go-getter.

The Theme: the transition into a bio-based economy, which can be loosely defined as an

economy consisting of those sectors that derive a majority of their market value from biological processes and/or products from natural materials, as opposed to products and processes associated with non-renewable resources and/or purely chemical processes.

> Men of honor

Who would have thought, back in 1950 when Robert Schuman, Jean Monnet and Konrad Adenauer presented the Schumanplan, that in 2010 a Dutch municipality of 30.000 would work together with the capital of Sweden on sustainable energy? But they do, they analyze, exchange experience and share new insights online and during various meetings. The analysis focuses on the feasibility, on the impact of using biomass on biodiversity, on the opportunities and on the juridical obstructions.

“The challenge is not the technical feasibility of a low-carbon economy, but making it happen.”

The POWER Programme was made possible by the INTERREG IVC Programme and is co-financed by the European Regional Development Fund (ERDF).

Capitalising on and inspired by the work undertaken under GROW, an INTERREG IIIC mini-programme (www.grow3c.com), the legacy was the formation of an enlarged inter-regional partnership for POWER focusing on driving low-carbon economies in the following European regions:

Andalucía, (Spain), Emilia Romagna (Italy), Małopolska (Poland), Noord-Brabant (Netherlands), South East England (UK), Stockholm (Sweden) and Tallinn (Estonia)

The seven participating regions have come together within POWER to develop collaborative projects, each of which will involve exchange of best practice and knowledge transfer, based on a shared exploration of the complex issues involved in delivering a low-carbon economy.

Achieving a low-carbon economy, and the tremendous opportunities it offers for innovation, economic growth and ‘green’ jobs, has been recognised by governments around the world, most recently as a key strategy for economic recovery through the global economic downturn. Through international collaboration, the POWER Programme will help to find and develop new, more sustainable, low-carbon and lowimpact solutions to delivering social, economic and environmental well-being, with a key emphasis on innovations in public policy and organisation.

> Independence

Biomass is the fast lane to a substantial independence of oil, natural gas and coal. Wind, Solar & Water power don't come close yet. Biomass, in some areas, does! Stockholm County for example is already largely independent of oil and coals. This has a lot to do with Swedish legislation, dating from 1991, when the central government decided to cut on carbon emissions by raising taxes on it. Stockholm has to import a lot of the biomass it uses for electricity and heat. Governmental organizations and private companies work together on the counties power supply and have since long entered the international biomass market and imports wood (chips, pellets et cetera) from far away countries like Canada and the Baltic states. Logistics to supply the populated county, which endures harsh and cold winters, with heat and electricity are of great importance to the area.

> Looking for improvement

The Swedish are still looking for improvement and aim to design a standard model for the regional development of sustainable and renewable energy based on biomass resources. Next to improvement of logistics, Stockholm searches for ways to fuel surrounding smaller dwellings with small de-

central biomass plants. Notably the transport sector is stimulated to go bio too. The automotives use one third of the total energy consumption and emit 40% of the carbon while driving along. Large-scale biomass operations to warm and power the city and its' peering villages are risky business from sustainable point of view considering fuel - food competition and the pollution that transports often emit.

> The land

The landscape around Boxtel is symbolic for all other beautiful places, from Sweden's south-central east coast, where Lake Mälaren meets the Baltic Sea, to the most southern town of Europe, Tarifa, where the Atlantic Ocean meets the Mediterranean Sea. And every landscape in between. For those who have an eye for natural beauty every landscape is worth to be contained. In the valleys of Het Groene Woud, one of the twenty Dutch national landscapes, the Dommel, the Beerze and Essche Stream flow swiftly along forests, meadows, moorlands, heaths and shifting sands. On clear & cloudy days they look like liquid steel connecting small, rural areas in which the tall standing and soft wooded poplar shields against the wind and demarcates country lines. Hundreds

of poplars standing side-by-side guard the noisy A2 highway as well, indicating the area behind them is a Land of Nature, where cars are banned. The typical relationship between river valleys, ash, villages and meadows is quite evident. Especially along the natural banks of the Beerze and at the spots where the Dommel meanders freely, surrounded by high altitude platforms, such as Liempde and St. Oedenrode. Still, in many other areas this coherence vanished by deforestation, reclamation of the moors and the disappearance of ash fields and camps. Woods and bushes have taken nearly one fifth of the area by now. Heather fields cover a total of 450 hectares. Ash covers one third of the national landscape (seize: 35.000 ha, of which 7.500 ha core nature).

> Boxtel enters Europe

To broaden the perspective and take the road to Brussels was an initiative of the Streekraad (County Council). A new program called POWER, funded by Interreg IVC, gave small rural town Boxtel (30.000 inhabitants, surrounded by trees and meadows) and its partners the opportunity to penetrate deeper into Europe. Boxtel worked out a project proposal for the POWER Programme¹, which has been accepted.

ABOUT THE TIMBER PROJECT

TIMBER! is a project within the POWER programme (INTERREG IVC), in which 5 regions (Buckinghamshire, Stockholm, Cádiz, Malopolska and Het Groene Woud) work together on the development of a tool for sustainable, regional management of biomass. In order to develop this tool, the input of results from different regional researches carried out by the partners have been used.

Main goal of the Timber! project is to come up with a practical tool through which the usage of biomass based energy can be stimulated and propagated. Via an increase of the use of this specific form of green energy, emissions will be reduced and the dependency on 'traditional' fossil based energy will decline. Up till now, in most regions, there are still few experiences with the usage of biomass energy at local and regional scale. The Timber! project has focussed on energy plans at this level in order to come up with practical formats for energy plans that will serve as an example for other regions, in order to implement their own.

A crucial aspect of Timber! is the exchange of experiences from the five participating regions. The regions each with their own biomass experiences in the past, all have a certain state of the art from which joined forces in the Timber! project.

> Biomass for sustainable development

At city hall Boxtel the administration together with the Regional Board of the National Landscape Het Groene Woud (De Streekraad) found the connection. Het Groene Woud produces lots of wood, lop, dead branches. To achieve the landscape targets, among which biodiversity, the lop needs to be removed. It can be used for energy production. The idea is to build a rather small (5 megawatt) biomass power plant, financed with a grant from Brussels and money from the local bank (pay back period 10 years). The organization works with supply contracts to obtain delivery security. Should the plant need even more biomass, then it buys wood chips at the global market. The global market price at the moment of writing (August 2011) is pretty high, €50 per metric ton, compared to a reasonable contractual delivery price of €15/ton in the Netherlands. This is yet another reason for long term, fixed price supply contracts. If the energy business turns out to be profitable extra money can be invested in water storage for instance or for sustainable development of the agriculture area. The city council, officials, the Regional Council of Het Groene Woud and a few more stakeholders met to talk about the idea. Whilst talking the number of opportunities as

well as the excitement grew.

Boxtel took the road to Brussels in order to get a better exploitation of the surrounding landscape. Other regions took it for the same or totally different reasons. Crucial here is that the European Commission has created the opportunity and invites regions to join in for their own reasons. One reason however all participating regions have in common. They recognize that a change in the use and production of energy is inevitable. Global warming, one of the most pernicious consequences of the continuous and growing use of fossil fuels, underlines the urgency of a change in our energy supplies and policies.

Also the reduced availability and possible exhaustion of stocks of fossil energy make it necessary not only to think about using other energy sources but also to make a step-change at short notice. The need for a change towards a more sustainable operating energy and economy system is generally accepted. In order to reduce carbon dioxide emissions and the dependency of 'traditional' fossil fuels as well, a number of alternative energy sources and related technologies to use these are being developed. However, there are still significant barriers to overcome and roadblocks to be removed before a large-scale use of such energy sources can be realized. One of the most promising energy

What is BIOMASS? Biomass refers to all parts of living plant material, like field crops and trees in the forest. All parts of the plant matter can have useful functions, including the stalks, the seeds and the residues, in making food, fuel and products. The cheapest and lowest-value usage of biomass is combustion—burning plant material for heat and energy. There are many more high-value uses for biomass, however. There are vast agricultural opportunities. In the Mississippi Delta for example, biobased products like biofuels, green chemicals, biobased materials like plastics and lubricants, and health and nutrition products are being produced and invented. Among renewable sources, biomass stands out as the most flexible and reliable, as it can be used to generate energy (heat and electricity) and serve as a sustainable and adaptable feedstock for downstream processing to produce liquid transportation fuels, chemicals and materials. The future holds a significant opportunity for economic development and growth built around a new biomass production and processing industry for regions that are rich in biomass, such as Stockholm (Sweden) and Malopolska (Poland).

Municipality of Boxtel/Streekraad Het Groene Woud & De Meerij

Boxtel, a municipality of 30.000 inhabitants, is located in the centre of the National Landscape Het Groene Woud and on the crossroads of railroads and highways. In a sustainability benchmark of Dutch municipalities, it reached the top of the chart for several years now. Sustainability is one of the main goals of local policies. The Streekraad (regional Council) is a regional stakeholder platform for the National Landscape, and is responsible for the development of the National Landscape.

The Groene Woud region in the province of North Brabant is a so-called 'National Landscape' and about 45.000 hectares in size. Within the area, values like biodiversity heritage and liveability are threatened by urban pressure. In spite of this, the region has been able, over the last 12 years, to extend nature areas, realise nature 'connecting zones' etc.

In the Groene Woud region, the municipality of Boxtel has taken the lead in sustainable development. Within Timber! they work with other municipalities in order to analyse the possibilities to develop a energy plant, contributing to the enhancement of several regional sustainable goals and based on a sustainable cost-efficient logistics systems. The aim is to create an

economically profitable energy enterprise, from which financial benefits can be re-invested in the regional sustainable development.

Within the Timber!-project the municipality of Boxtel has researched the current and potential available biomass in 8 municipalities. Conclusion was that about 2.6 kilotons dry matter can be 'directly' used in a biomass powered energy plant. However, the potential of biomass is additionally 17.5 kilotons dry matter biomass. The conclusion of the research is that with this amount of available biomass, a biomass plant can be cost effective. That is, if it can deliver most of its warmth to a location with a large energy demand in the area. At this moment, there is no such location yet. Therefore the options to start a regional biomass square have been researched. The advantage of this concept is that it will improve the energetic value of the biomass and it also will enable the region to start up their logistic system for the collection of biomass. In the process of developing this regional biomass concept a sustainability analysis has been executed. In this way Boxtel is capable to make, sustainable decisions in the further execution of the project.

sources is biomass. Like other forces in nature this one has its' counterforce too. The increasing demand for biomass raises the price and as a side effect the price of food goes up as well. Therefore the participating regions in the TIMBER project decided on the principle that the biomass they use for power or heat generation may under no circumstances be conflicting with food supply. Moreover the fuel for food competition is easier to handle on a regional level. How to measure and monitor still is an unanswered question, though there are some guidelines in TIMBER.

> Beauty Queens

Apart from Stockholm all regions plan and experiment with small-scale local biomass plants, which will be supplied with wood, perennials et cetera harvested in local forests. The wood is available and will be collected for the benefit of the forest, to enhance biodiversity and strengthen the natural beauty of the landscape. As a matter of fact Het Groene Woud in Brabant (NL) and Buckinghamshire (UK) both contain protected landscapes, so-called Area of Outstanding Natural Beauty. Noord-Brabant set up the goal of sustaining the landscape with the profits of biomass energy generation. This

ambition, that surmounts the TIMBER project has been adopted by Cadiz (SP) and Buckinghamshire as well.

> Piece of Cake

By 'enlarging the cake' i.e. connecting to forest-owners who mainly hold on to their property for conservation reasons – instead of production and profit – and appealing to the cultural and historical value of the regional landscape, TIMBER tries to broaden the acceptance of biomass energy generation. Moreover including the interests of stakeholders who are mainly driven by other motivations than turning wood into energy, makes the business model of local biomass production significant healthier and robust. Waste wood pays for conservation of the landscape and small life (biodiversity). New partnerships and alliances stand in the coulisses waiting for a governance model that engages all stakeholders, suppliers and customers, a fashion of collective governance. Such a participative long lasting bond is necessary for supply and demand security. The TIMBER team explores the possibilities of strengthening regional cooperation; Setting up new initiatives like producers and consumers cooperatives, to create a local market for heat and/or electricity generated

with biomass. This leads to a bid for a new project with the TIMBER partners, plus a new partner: the Philips University in Marburg (Germany), called Repco which is specialized in supply chain linkages between energy consumers and producers. The first challenge is to get the idea accepted by landowners, environmental groups and consumers. Some are suspicious on supply security, others fear for yet another window dressing project. In order to shape a sound biomass infrastructure, opponents will have to be included in the decision-making, which can take place according to the Mutual Gains Approach as described by Larry Susskind.

The above shows the regions' capacity of learning from each other, of 'enlarging the cake' in order to find smart methods of financing sustainable development and to involve all regional stakeholders. Using methods of decision-making that take all interests into account, by the involved people and organizations themselves can prevent long, tiresome and costly objection procedures.

> Two faces

The word already fell: market. Biomass is a two-faced commodity. There is a large-scale global market where pellets, woodchips and woodlogs travel the world to the highest

MEERI Institute

MEERI was established in 1986 in Krakow as a constituent unit of the Polish Academy of Science. The Institute employs 101 persons. The organisation's main research areas include Polish mineral resources, geodynamic synoptic and geothermics of Polish geostructural basins, development of information systems for the purpose of forecasting development of the mineral resources economy, fuels and energy economics, regionalisation of Polish energy policy under economic and ecologic considerations, industrial waste storage in exhausted mine sites and management of municipal waste and sustainable development of Polish regions.

The Institute participated in TIMBER! on behalf of the Malopolska region. In Malopolska, the domestic consumption of biomass for energy use in the participating regions has increased in the last years. However, the use of these systems is still low in comparison to its potential. The difficulty is that there is insufficient infrastructure, information and experience in the biomass market.

MEERI has carried out several studies, evaluating the current and future potential of biomass energy in their region and its possible application for public buildings.

The researches show that the production of heat and electricity from biomass cause a more than twice lower environmental impact compared to conventional energy sources. The analysis conducted also indicates that the availability of fuel is one of the key factors influencing the market of individual users, and import from fuels has a significant higher environmental impact because of the transport. However there is a need for these fuel imports, because of a lack of local producers. When regional policies focus on the development of this market, as well as new national regulations on acquisition of biomass by large corporations, may contribute to:

- > agricultural development,
- > a wider access of individual users to biomass waste from the sawmill industry
- > and increase the number of producers (e.g. pellets from wood waste) in the region.

bidder. The sheer magnitude of this and the professional, profit driven ways of conduct are totally out of proportion to regional medium and small-scale trade. The Regions in TIMBER, except for Stockholm, look like little Davids compared to the biomass Goliaths. On the other hand provinces like Malopolska in Poland, Buckinghamshire and Noord-Brabant as well have areas with wood at locations that are not easy to access, scattered and small. Big behemoths aren't interested in harvesting these places. For sustainable, regional development though they seem to be quite important. Bio-energy may be a stimulating and economically interesting outlet for innovation and development of regionally based agriculture. Turning local wood harvests and agricultural 'waste' into local heat or energy supply, is the name of the game. A game that creates jobs for the community and does not need transportation. To support and stimulate the small forest- and landowners, join forces, lower costs and attract customers, several similar plans are studied in different regions. One can call it a Tree Station, A Biomassaplein – Dutch for biomass square – or as in the IE Programme Bavaria and Austria did: A Biomass Centre. This place, strategic located, offers opportunities to dry and process the raw material into the desired quality of biomass,

which is determined by the type of plant or boiler that will burn it. Then the stock is stored and distributed to nearby furnaces, boilers and plants. One large question still hovers: who is going to invest in these Tree Stations?

> Boilers

Especially Cadiz and Malopolska have been researching and building boilers in community houses like a municipal Kindergarten. They have been experiencing and learning by doing, calculating and comparing systems and type of preferred and available biomass. In Cadiz for example waste wood from grapevines and olive trees offers possibilities for biomass as renewable fuel. Therefore the Spanish region converted a boiler in a winery too, annually saving 56 tonnes of carbondioxide with return on investment as quick as five years (subsidy not included, then it takes 3,6 years)

In short all TIMBER partners have been researching the habitat and culture of the own area and comparing studies – Malopolska suggests the method of Life Cycle Assessment to compare different situations and monitor outcomes, processes and technologies and experimenting on the feasibility of biomass energy an/or heat generation.

> Residual heat & fossil fuel free

On the economical feasibility of incinerating lop for energy; the first impression is that it is very well possible to keep a 5-megawatt bio plant busy without the absolute need for subsidy. The remaining question is where to leave the heat. Warmth is considered a low form of energy, but still can be used in an effective way, like in Den Bosch, just 20 kilometers from Boxtel, where the waste treatment plant Treurenburg started in April 2011. According to expectations Treurenburg will transport warmth to an adjacent industrial area for seven months a year, and reach an economic break even point by doing so. TIMBER showed that economically sound, small-scale development is possible. Stockholm may be a best practice that more or less can be followed by the others. It showed the TIMBER partners that under the right conditions (legislation, taxes), bio-energy could be a sustainable alternative to fossil fuels.

> Challenges

Another challenge, apart from where to feed in residual heat, is the bio plant itself. Sometimes power plants in the neighborhood are available, but a lot of the times these are not adjusted to firing wood. The building of a

APEC

APEC is a non-profit foundation, created in 2006 to specifically deliver an EU Intelligent Energy for Europe Project. Its trustees include the Cadiz Provincial Council. APEC exists to promote savings and energy efficiency and the use of renewable energy, optimizing existing resources and conducting advocacy. Operating with the philosophy of "think globally, act locally", APEC is committed to local action and public awareness. APEC works every day in close contact with local public entities and other key stakeholders, developing and disseminating energy management and actions throughout the province on behalf of the provincial government of Cádiz (Andalucía).

Andalucía is one of the main agricultural regions of Spain so the majority of biomass in the region comes from this activity and also from biomass sub-products generated by agro food industries. The total potential of biomass in the region is 3.300 ktoe per year. In the province of Cádiz the total energy potential of biomass is 275 ktoe per year, and most of the municipalities of the province have a potential biomass energy production between 250-750 MWh/km²/year. Andalucía plans to see 256 MW of biomass electricity installed capacity and 649 ktoe in biomass heat generated.

The main potential forest biomass production area is located in the east of the Province, due to the existence of cork oak forests. Most part of this area is protected because of its high environmental value, so that the uses and extractions are restricted. In addition, the cork oak is traditionally used by for the production of cork. There are other interesting areas for forest biomass production (mainly pinus sp. and eucalyptus in the coast), but they are smaller and are located far from major production areas.

Researches also showed that potential production of biomass from agricultural residues is considerably high (251.913,30 t.), although the management of this resource is currently limited to its crushing and abandonment on farmland. In addition, the Province has large and good farmlands and favorable weather conditions for the development of energy crops. These energy crops would feed big scale biomass power plants in combination with resources from agriculture and forestry, contributing also to the supply security and stability.

Several feasibility studies for small scale biomass boilers on public buildings have been carried out and the research has showed that not only it is possible to place these boilers within the locations, but also will provide financial and environmental benefits.

whole new plant needs to be carried by the local population. With regard to this, communication matters. In short the roadblocks TIMBER sees ahead are: Where is the profit? How to collect biomass? Where is the demand for heat? How to secure power supply? What about the grid? How can local and regional initiatives be scaled and/or become interconnected, in a way that a sustainable biomass energy production and supply becomes reality?

Europe invites people to do their own thing but also asks to be open to and curious about

others. The size of the network makes current steering instruments and hierarchy in organizations useless. Self-organization is the only realistic steering option here. Diversity leads to confrontation and out of this dialectical process synthesis can rise the natural way. So, let the old thesis go and let the new synthesis come. United in diversity. That is the way Europe works.

> The ways of Brussels

Europe describes ten conditions for local authorities to get the unions' support. These

ten conditions are thus formulated that they compel communities to think in chances and opportunities, instead of risks and insecurities. Europe acts like a coach stimulating community spirit and cooperation. The next ten conditions are formulated from the bottom up perspective of TIMBER.

What's the context of TIMBER? And which steps have been taken?

1. *Nominate a Need:* a change in the use and production of energy is inevitable;
2. *Name a Solution:* one of the most promising energy sources is biomass;
3. *Institutionalize the Process:* late 2005, the EU adopted the Biomass Action Plan, in which a number of measures are outlined through which the usage of biomass energy has to be stimulated. TIMBER just has to tune in.

4. *Summing up Roadblocks:* numerous obstacles hinder the rise of large-scale firing of biomass. For example the use of raw material for input is still conceived to be a waste. This is a matter of attitude, ethics and culture. TIMBER as a community can work on that.

5. *Zooming In:* what's the problem? As there are no logistic structures for collecting and processing wood and other biomass, particularly in small (agricultural) landscapes, nature and forest areas, the logistical challenges to are enormous. The TIMBER project will not only strive to meet these

challenges and overcome the barriers in the participating regions, but will also provide easy-to-use tools for other actors and regions.

6. *Mutual Gains. Stress the necessity of cooperation and the use of (social) networks:* The 'scale of economies' for biomass energy makes it necessary to enclose for instance both small and medium-sized producers of raw materials and to create a sustainable but cost efficient logistic system. Existing networks of waste collectors could be extended and new networks can be developed. Combinations with other biomass flows, such as waste flows

ORPS

ORPS works on regional planning and regional development within the County of Stockholm for Stockholm County Council's Regional Planning Committee. ORPS seeks to achieve a shared vision for how the unique assets and strengths of the Stockholm region can best be managed and developed. It works on a broad spectrum of regional planning issues, producing documentation, forecasts and statistics, dealing with issues including land use, housing, the environment, nature conservation, energy and climate, sparsely populated areas, social perspectives and international cooperation.

Currently just over 2 million inhabitants live in the Stockholm County. By the year 2050, the population is expected to increase to almost 3 million. In the Stockholm region the use of biomass for heating purposes, electricity and biogas production has a long tradition. Today bio fuels already account for a significant part of the county's total energy consumption of 55 TWh.

Most of the consumed bio fuels are imported into the region. It is estimated that 50% of wood chips and pellets are imported by land transportation and 50 % imported by boat. It is also estimated that 80 % of the boat deliveries are from other countries. Annually 0.24 million tonnes household waste is used for incineration

and energy production (2 TWh). 0.2 million tonnes ashes and close to 0.1 million tonnes treated slush are also produced within the region annually.

The regional heat consumption is expected to level off at 13 TWh while close to 100% of the regional heat production is assumed to be based on bio fuels in year 2025. Factors such as 100% bio fuelled energy production, stagnating heat consumption and warmer climate indicate that the regional bio fuel import also probably will level off after 2025.

In order to secure a bio energy system that supports environmental friendly regional bio fuel consumption, the region faces several challenges. Securing of a distinct definition of the "bio fuel system" and of comprehensive regional bio fuel statistics are two important challenges. Supporting bio energy competitiveness and assuring of the actual execution of investments in new bio energy plants and bio energy logistic facilities are other important tasks. Also the monitoring of the ongoing regional district heating networks' further integration and its consequences on future location of production units must be worked with on the regional level. The promotion of small scale energy solutions and sustainable use of biomass from forest residues are other crucial working fields. Further and reinforced collaboration between public and private stakeholders will give the Stockholm region an advanced position in the work towards climate neutral energy systems

in the food and feed industry and agricultural flows are possible.

7. Distinguish different scale-levels: The local (or small regional) level is the ideal level to approach the energy system in a more integral way (energy as an integral part of the local/regional economy) and to integrate energy production into the regional agricultural (waste) production. This creates both a more sustainable, low-carbon economy and a 'green' energy system.

8. Broadening: Energy, as a backbone, should be connected to and integrated with aspects such as biodiversity, nature, landscape, rural heritage, climate, social cohesion etc. and add value to these aspects. This is within reach at small-scales in close connection with and palpable to the people using and producing energy. In the TIMBER project, integrated sustainable biomass energy plans have been developed.

9. Learning by Doing: In the TIMBER regions municipalities, the Regional Board and other stakeholders work together in creating a bio energy plant, contributing to the enhancement of several regional sustainable goals and based on a sustainable cost-efficient logistics system.

The aim is to create an economically profitable energy enterprise, from which financial benefits can be re-invested in the regional sustainable development. In most areas urban pressure threatens values like biodiversity, heritage and livability.

10. Learning from Each Other: The five regions cooperating in the TIMBER project, Noord-Brabant (sub region Het Groene Woud), Andalucía (Province of Cadiz), Malopolska, South East England (Buckinghamshire sub region) and the Stockholm region have significant biomass resources. All five regions, in which agricultural areas are mixed with cities, have many different, often small, landowners and a relative high share of woodland. Nevertheless, there are differences between the participating regions, not only with respect to their economic structure and population density but also in the field of bio-based energy. The potentials of exchanging information and learning from each other's experiences, is the main reason for the five regions to cooperate in the TIMBER project.

TIMBER is one of the POWER projects where rather small players like the Noord Brabant municipality of Boxtel (30.000+ inhabitants) or

Ngage can become super heroes. The main lesson learned may be the know how to collect biomass as a natural capital. The capital can be used for the production of warmth and electricity in the short run. In the long run more opportunities will come. The sky is the limit in the bio-based economy and the organization of the resources in such an economy is the first and most important link in the bio-chain. Without biomass no bio-economy.



Five European regions performed The TIMBER project on biomass energy. In the chapter Carved in Wood you can read about their experiences. It provides a theoretical background for activities in past and future. The subtitles can be read as a story.

Ngage Solutions

Ngage solutions is a not for profit organisation which possesses a strong track record of working with European, national, regional and local Government Departments across all the major sectors, including enterprise, business/industry, environment, education, rural communities and society. Ngage participated in Timber! on behalf of the region South East England.

South East England has a population of 479,000 people, a third of who live in rural areas.

The county is distinguished by its rich heritage and landscape - over a quarter of the county is included within the Chiltern area of Outstanding Natural Beauty and a further third is covered by the Metropolitan Green Belt. In Chiltern Hills there are about 17,400 hectares of woodland. 75% of the woodland is privately owned, with previous research studies showing the area is capable of producing a sustained annual yield of 60,000 tonnes.

There are approx. 450 owners, nearly half of which own woods of less than 20 hectares. However the area actively managed has been in decline largely because of poor financial returns. Only 18% of land owners state that woodland management they undertake is self financing.

The main reasons for the current low volumes are the low prices of timber, in both actual and real terms, for many years as local markets have ceased to operate. The market for firewood is buoyant and increasing. To compete with existing fossil fuels for medium to large

scale energy generation wood-fuel needs to be chipped or pelletised. The material also needs to be delivered at a price of about £5.00 per GJ, which equates to about £13.00 per m3 of wood chip at 40% moisture content.

Within the TIMBER project, ngage has researched the effectiveness of the current Biomass policies in the local area, and identified a number of potential barriers that are inhibiting the market from performing effectively and efficiently. On the Supply Side, these include the need to stimulate more active forestry management; the need to improve the commercial returns generated from Biomass; and the need to encourage more commercial intermediaries and processing facilities into the county. On the demand side, barriers include the need to increase confidence in Biomass; the need to up-skill facility managers; the need to encourage more installations; and the need to make information about biomass more easily available. As far as 'interface' issues (between supply and demand) are concerned, there is the need to encourage greater collaborative action in the supply chain (between users and producers), in order to increase economic viability and fuel security. In addition to researching these issues, ngage has encouraged the adoption of positive biomass policies in the public and private sector in Buckinghamshire; overseen the signing of supply agreements for 2500t of timber; reviewed 2 potential sites for a woodfuel hub; and produced a Regional Biomass Plan.

CARVED IN WOOD

> Setting up a bio-based economy

'La terre est l'unique source des richesses'

(Earth is a unique source of wealth, François Quesnay)

1. Mr Taxman makes the scene

The proportion of biofuels used in the Swedish energy system steadily increased. Since 1991, Sweden has had an economic growth of barely 50 per cent and at the same time the use of bio-energy has increased with 85 per cent and climate gas emissions have been reduced by 9 per cent. This positive development has been possible due to early implementation of the carbon dioxide tax (1991) and an extensive structural change. The introduction of a carbon dioxide tax resulted in the replacement of fossil fuels by biofuels, especially in district heating plants but also in industry and in the domestic sector. An echo from 100 years ago, when biomass was the world's primary source of energy and nature still was a huge source of wealth.

2. While entrepreneurs set the stage for...

Per Carstedt, a Ford dealer in northern Sweden has been spending several years in Brazil where he got used to ethanol cars. At that time, 1992, they were non-existent in Sweden. There were no filling stations. There was no market. In order to get a critical mass Per Carstedt and a colleague from the Swedish Ethanol Development Foundation formed a buyers' consortium of fifty municipalities, companies and individuals that committed to buy 3.000 ethanol cars. By the time Carstedt and his colleagues imported the first fifty Fords, Carstedt had managed to persuade one filling station in his home region and another one in Stockholm to install pumps with ethanol. By 2002 another 40 stations

delivered ethanol. The number of fuel stations doubled in 2005, doubled again in 2006 and reached the 1.000 in August 2007, 25% of the Swedish fuel stations. Carstedt: 'We struggled to get the kind of critical mass that would drive the market forces'. Today Carstedt's company SEKAB is leading in the bio-ethanol producing sector. Among others they produce cellulosic ethanol from waste wood. Further on in this text you can read more on this and the opportunities it holds for a bio-based low-carbon region.

3. A Low Carbon Economy

Fossil fuels still account for 87 percent of global energy. Poland (95%), The Netherlands (94%), Italy (90%), the UK (89%), Estonia

Policy Recommendations from Timber!

1. Strengthen regional cooperation

A regional approach is a good way to get started with RE (and biomass in particular because biomass does have the most direct connection with a region). In our view setting up a sustainable system means we will keep searching for the options to connect the regional production to other regional goals, like biodiversity in a way it is strengthening these goals. Working together on a regional – local scale will result in a shorter connection between consumers and production of energy. This will mean greater acceptance and support.

2. Growing to large scale use is possible, starting small

> Large scale development

The establishing of biomass based large scale energy production in CHPs is possible in basically all European regions. Pre-conditions are though good logistic settings (access to near port is a big advantage) and due regional transport possibilities. Looking for the use of as much as possible regional sources is necessary, not only because of the international biomass market and the economical risks. But also from a sustainability point of view.

> Combining large medium and small scale

Especially in less (in the field of RE) developed (rural) areas starting small is evident. Biomass has a clear rural vocation since for its production, management and operation is essential the work of farmers and other rural actors. Biomass must therefore represent a development opportunity for these areas as well as a vector of innovation and modernization for agricultural sector. For this purpose, biomass energy policies should be linked to rural development policies.

3. Data

A big problem is the poor data basis for “biomass”. Both nationally/regionally and on international level there are very limited data on how biomass is handled. There is a big need to adjust that i.e. by dedicated data projects. Supplying data like this could be a task for Europe.

(87%) and Spain (82%) are all still very dependent on fossil for their energy use. Of all EU-countries that have a region participating in the POWER Programme only Sweden scores in the low carbon league, with 37% of the energy use fossil and a pretty 26% renewables.

4. Unfortunately demand runs faster than renewables can walk...

The global power production increased from 6000 TWh in 1973 to 17.000 TWh in 2004, and is expected to grow to 25.000-35.000 TWh in 2050.

5. And politicians can talk

Policymakers, especially politicians, are always worried about their credibility with regard to societal problems such as sustainable development. In debates they need to express faith in at least one promising solution. Policymakers need to 'tell themselves forward'. They need to tell stories of hope and expectation and make promises about how they will solve problems. This credibility pressure creates willingness to accept certain promises from producers or opinions from environmentalists or pressure groups.

6. Back home

Forget the bigger pictures for a while. They are too complex for individual citizens, businessmen and civil servants to handle personally. Representation by so called 'regime actors' (e.g. national farmer's organizations, the Ministry of Agriculture, national banks) may be the second best alternative. In fact these organizations don't represent individuals but protect vested interests. They tend to choose for 'fit' options close to the existing regime. Besides they make deals, which have to be carried out by other people. That doesn't always work out fine. Let us give it a try on another track. Let us focus on the things we can oversee. The region where we live, the people we love, the community that fits us like a second skin. From that sunny, warm spot that is our HOME we can build up our own Vision. Figure it out!

7. Focus on technical solutions

You may not realize it yet, but we are on the way to a bio-based economy. One of the characteristics of such an economy is that it no longer relies on coal and oil to power its' machinery, but develops all kinds of alternative sources like bio fuels, biomass...green stuff. A jump back in time as a run-up to the future. On one side of the

spectrum we have low-tech solutions for trivial problems. In the late 1970s for instance a small network of farmers and agricultural researchers began to investigate small farm-scale manure digestion as a source of energy. Technical problems and (after 1986) decreasing oil prices lowered the expectations of this option. By the mid 1980s, visions shifted towards large centralized plants. The focus was less on the production of biogas and more on manure processing (transforming it into less environmentally damaging substances). Both solutions are marginalized now. But new low-tech opportunities will come out of the blue, because of down to earth creativity of everyday people. At the other side of the spectrum there is a lot more spectacle. With nanotechnology for instance, it may be possible in the distant future to build-up all kinds of objects, just out of air, water and trace elements, molecule-by-molecule and atom-by-atom. Imagine a printer that prints three-dimensional objects that are exact clones of the originals. In experiments it already has been realized. In the long run mankind may get complete control over food ingredients and genes. This much is for sure. So, goodbye salmonella bacteria and dioxin scandals. The next signal that we move towards a bio-based economy: of all the

4. Sustainability

A large scale use of biomass for energy use should go hand in hand with an explicit use of certificated biomass fuels i.e. fuels that do not jeopardize food production, that have a good primary energy factor (i.e. the energy for the production of a biomass fuel must be lower than 20 percent of the final energy content) and that are produced in a sustainable way. Large scale use does have the risk it will cause some negative effects, more or less comparable with fossil fuels. It is obvious that in Stockholm, with a huge demand, the situation is different to other regions and bio energy does perform far better compared to fossil fuels. Still in several cases, the supply of biomass is carried out with fuel transported from production plants located far away from consumption facilities. The consumption of cheap fuels prevails over the exploitation of local resources due mainly to economic reasons. Using the methodology of LCA (Life Cycle Assessment) done by Meeri makes clear some of these sustainability issues. Sustainability criteria should also be about the regional use of regional produced biomass and include the positive impact on regional environment and sustainability, not only in a technical way. But keeping it practical. Houses have to be heated!

5. From Green Energy to a Green bio based Economy?

Some international experts do doubt it is the best option to burn biomass for energy. Biomass can be used for better, more financially rewarding uses. Some argue biomass is not the most sustainable RE. Still the biomass market is growing and in the next decades it will be necessary to reach the sustainability goals. If even when the bio based technologies will be as developed in a way a large scale demand for biomass from these industries does exist is in the future and not to predict by us. But we do know working on the regional cooperation and production for biomass will place a region in a good position. When production and logistics are in place a region will have a head start in the bio based economy.

6. Coherent long lasting National policies

A fundamentally increased use of biomass is strongly affected by national settings as carbon taxes, energy certificates etc. It is concluded National policies differ in the several countries and change too often. This is a big barrier for development. Policies should be long lasting and reliable to ensure an economical approach.

renewable energy sources (solar, wind, geothermal), only biomass has the diversity to become an energy supply, a food source and a source of raw materials for products.

8. Beyond oil....

Fuel is just one of the uses for petrol. As barrels of oil are processed into gasoline and diesel, the remaining products are refined and sold for a myriad of uses. Plastics, medicines, textiles, synthetic rubber, lubricants, asphalt and solvents such as those used in paints, lacquers and inks are all examples of products made with petroleum. We should explore alternative, bio-based methods for manufacturing and producing these goods. A bio-based economy offers a new business model for the world, one based on cellulose and carbohydrate chemistry. Agricultural-based processing is better for the environment and lessens our dependence on oil. Just as importantly, it can be more cost-efficient. Biomass has the same origin as fossils do and is usable for the same products. The difference is that biomass is healthier for humans and the Earth. Why? It is living material existing in the lifecycle of the planet, while the fossils are stored away and by releasing e.g. the carbon stored in oil, extra carbon is poured out over Earth instead of the

carbon that is already there in the living flora and fauna.

9. We still got POWER

The bio-based economy has a lot to do with Earth. The remark of François Quesnay that all wealth stems from ownership of land was current in the second half of the 18th century. François Quesnay (June 4, 1694 – December 16, 1774) was a celebrated French economist of the Physiocratic school who was known for publishing the 'Tableau économique' (Economic Table) in 1758, which provided the foundations of the ideas of the Physiocrats. This was perhaps the first attempt to describe the workings of the economy in an analytical way, and as such can be viewed as one of the first important contributions to economic thought. In those days people just put another log on the fire to get warm. In the next two centuries the world economy changed as a result of the Industrial Revolution, which mechanized work. Now, in the 21st Century, we are back on the old track - be it on a different income and technology level - experiencing an Eco-Industrial Revolution whose magnitude to change the economic landscape surpasses the previous eras. The POWER-regions, a working-and-sharing together of 7 EU-regions in 2011, can have a

pivotal and unique role to play because the regions house all the essential components – land, labor and logistics – to create jobs and reinvigorate both the rural and urban economies using natural resources and existing infrastructure.

10. A Green Money Machine

The green economy is a major new industry driven by macro forces including: global climate change, population growth, concerns about drinking water and food shortages, pollution and waste remediation. The green economy refers to the development of clean, green products, energy efficiency technology. The global green economy is currently estimated as a \$140 billion industry, and countries around the world have committed more than \$200 billion in recent stimulus spending to promote energy efficiency and use of renewable resources. The green economy invites a return to the roots of the European Mainland through strong agricultural, manufacturing and innovative economies, which have prospered for the past 400 years. The green economy in the POWER-regions is a return to the hardworking ethos of the European farmer and the urban industrial base, which supplies the country with food, fuel and products. Building a clean

Tool for setting up a biomass energy concept

In Timber! all researches and knowledge sharing have served as input to create a tool for other European regions that want to start up their own regional biomass management concept. The aim was to create a tool that collected all available knowledge from the different regions, but at the same time would be easy to use and usable for as many regions as possible.

This resulted in the development of a digital tool, that contains the following content:

- > An overview of different phases you can go through while developing your own regional plan;
- > A model which gives an overview of different aspects to take into consideration while setting up your regional biomass management concept and explains how these aspects are of influence on the possibilities of a biomass concept in your region;
- > 13 best practices from 5 countries, as examples for possible good initiatives concerning biomass energy for your region;
- > The analyses and feasibility studies that have been carried out in the Timber! project with English summaries;
- > Five regional plans from the Timber! partners, to inspire the development of your own and how the tool can be used practically;
- > Policy recommendations, based upon the experiences of the project.

All this information can be found on <http://www.timber-project.eu>.

energy economy using renewable resources and strategies for energy efficiency is a thoughtful solution to Europe's economic and environmental concerns. The 7 POWER-regions have the building blocks (like TIMBER) for a thriving bio-based economy that will grow over the next two decades because of regional assets in diverse agriculture, transitional manufacturing potential, logistics and distribution capacity and workforce development in renewable energy technology to train thousands of workers. Mankind can redesign the old green farming and manufacturing traditions according to sustainability principles.

One of the principles is: Greening the economy means being good stewards of the land and preserving its bounty for future generations without harming other parts of the world or the people living there plus securing training and employment for workers across a range of industries.

Heard it through the grapevine

When we set the infrastructure right (with collective governance, a healthy market, Tree Stations for regional collection and distribution et cetera) and get biomass accepted as a valuable replacement of fossil

fuels, involving the public in their own energy generation (behavior and attitude) meanwhile conserving the landscape, enhancing biodiversity, developing skills and innovating, we can leap forward. By 'We' we mean everybody who really wants to adopt the insight of TIMBER: biomass is not waste, but the crucial resource of the futuristic bio-based modern society.

Stockholm already has knowledge on and experience in turning waste into energy by anaerobic digestion. A technique that simplified comes down to microorganisms breaking down biodegradable material in the absence of oxygen and producing energy in the meanwhile. A glimpse of the future!

The end of Timber!

In only one and a half year the Timber partners have taken big steps in strengthening the position of bio-energy in their regions. Also we were able to create a tool for colleagues in other European regions which hopefully can be of use when they want to walk the same road. And at last we contributed to the policy recommendations of Power as a whole. Recommendations to the European Union and to the Power regions. We like to thank the European Union and the seven Power regions, and especially the Regional Contact Persons for this opportunity and their support. We also thank the persons and partners in our regions who contributed and worked with us in getting this result.

We also “thank” ourselves. The Timber! partnership was successful for our own goals. At the same time we quit worked as an international team on our tool and recommendations. Working in a project like this is very rewarding, not only because of the funding but mostly because of the exchange of knowledge and experience. Working in an international context means broadening your horizon. This is not only work. It is fun.

The Timber! partners felt so confident with each other we produced a new European project for the Intelligent Energy Europe Program: Repco, which is aiming to strengthening regional cooperation on the production and use of bio-energy on several new ways. Making use of our experience and what we learned in Timber!

So let's hope this is only goodbye for a short time. When Europe allows we will be able to get back to you.

The Timber! Team

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