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*“Practical Partnerships for Achieving 100%
Renewable Energy Communities”*

FINAL REPORT

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The Northern Energy
Initiative
2nd Floor, Kelburn House
7-19 Mosley Street
Newcastle upon Tyne
NE1 1YE

Tel: +44 191 233 9300
Fax: +44 191 233 9309
e-mail: enquire@tnei.org.uk
web: www.tnei.org.uk

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1. INTRODUCTION

Work on the “Practical Partnerships for Achieving 100% Renewable Energy Communities” ALTENER Project commenced on 1st January 2002. Completion of the project was achieved within 18 months, at the end of June 2003, in accordance with the contract between the partners and the European Commission. The Interim Report on the project, marking the completion of 70% of the contracted work, was sent to the European Commission DG TREN on 10th March 2003, and approved by the Commission on 15th May 2003. This Final Report has been prepared by the project co-ordinator The Northern Energy Initiative, TNEI, on behalf of all the Partners.

This Final Report is submitted to demonstrate that the Partners have completed their work in accordance with the contract, and to secure the release of the Final Payment from the Commission.

2. CO-OPERATION BETWEEN PARTNER COUNTRIES

2.1 Meetings held between Partners

A total of four Transnational meetings were held during the course of the project. The “kick off” meeting took place in Teesdale, UK in January 2002, a meeting in Trentino, Italy took place in June 2002, a meeting in Kalmar, Sweden in October 2002, and the final meeting took place in Kerry, Eire in May 2003. Representatives from each of the partner countries took part in these meetings.

These meetings added considerable value to the country specific work, as explained later in this report. Discussions with local experts, site visits and tracking the development of our respective ideas and feasibility studies over the course of the project provided inspiration and specific new projects.

The minutes of the Transnational meetings are attached as Annex 1.

2.2 Ongoing Links developed between the Partners, and with Other Parties

a) Wood fuel and Biomass Strategy

All the Partners have an interest in the development of biomass/wood fuels. In Sweden, and in Kalmar and Kronoberg in particular, there have been major advances in the use of wood fuels in recent years. During the Swedish visit in October 2002 a number of presentations were given regarding the use of wood fuels and visits were made to plants manufacturing and using various wood fuels – pellets, briquettes and chips. Equipment for use in homes was of particular interest.

During the first half of 2003 TNEI was commissioned by the Regional Development Agency (One North East) to prepare a Biomass Action Plan for the North East of England. In addition to being able to draw upon the ideas and assistance of Swedish Partner ESS, TNEI also formed a partnership with Stockholm based Windbourne International AB to undertake the preparation of the Biomass Action Plan. Windbourne International AB also work with ESS on a number of projects. The linkages with between the Swedish Partner ESS, TNEI and a further partner were particularly valuable in preparing the Biomass Action plan. Further co-operation is expected in this field.

b) Use of Second Hand Wind Turbines

Wind energy development is of particular interest to the UK, Swedish and Irish Partners. In addition to normal commercial wind development, there is also interest in placing wind turbines within the grounds of large electricity users to provide a dedicated supply. Such projects are often too small to be of interest to commercial developers, or are in urban areas with relatively low wind speeds which makes it difficult to make a financial case for development.

During the Partner meeting in Sweden in October 2002 a presentation was given by Vindkompaniet, a subsidiary of Global Renewable Energy Partners, on the development of wind power in Sweden, and the growing market in second hand wind turbines following the repowering of early schemes. This idea seemed to offer a way forward for the introduction of wind onto one of the UK Partner's (GlaxoSmithKline) factory in Teesdale. Follow up conversations took place and various Danish Web Sites offering second hand turbines were consulted. A planning application for two second hand wind turbines has now been submitted to Teesdale District Council. A separate project in South Shields, UK, being led by TNEI, has identified sites for a further three second hand turbines in urban/industrial locations. At present it seems most likely that the Teesdale turbines will be sourced from the UK. Further projects will be sourced from other suppliers in Europe, notably from Denmark. The initial idea of using second hand wind turbines in urban/industrial applications was first raised through the Swedish Partner, and is leading to new partnerships being formed some of which will be between companies in different EU countries.

c) Hydropower

All the Partners have an interest in the development of hydropower. The Italian Partners have developed hydropower to the greatest extent, Trento has little scope for further significant schemes in the future. In Teesdale Partner company Northumbrian Water Ltd undertook a series of feasibility studies into hydro power on the District's reservoirs. As a result of the ALTENER Project ESS the Swedish Partner have started to examine the potential for hydropower production, building on the experience gained in Trento and Teesdale. This may lead to future co-operation.

d) Local Co-operatives

One of the particularly interesting aspects of the Partner co-operation has been to gain an increased understanding of how the differing national institutional frameworks have influenced the development of renewable energy. Of all the Partner countries, Trento in Italy stood out as having the most radically different approach, based on the use of co-operatives. Under this longstanding model local communities have a large influence on which projects are developed and maintain a real interest through continued ownership. In south east Sweden the co-operative model has been used on a small scale to bring together farming associations and biomass and biogas interests. Co-operatives have also developed wind power on the Island of Öland. In the UK co-operatives are not a common framework for development, but increasing interest in "Community Renewables" may allow TNEI to draw from Trento's experience in the future. Further developments may lead to future co-operation.

e) Small scale District Heating

Small scale district heating is of interest to all the Partners, and is most developed in Sweden at the present time. Study visits have been organised to the County of Kronoberg in Sweden to look at plants for small numbers of buildings and small villages. The REGBIE project will allow this co-operation to continue between Trento and ESS.

In Teesdale a planned small district heating plant in Middleton in Teesdale will benefit from the use of experience gained from Swedish. From the Swedish point of view the use of biomass and the district heating knowledge provides a basis for future business.

2.3 Co-operation in Dissemination

a) Use of Partner Publicity Material

During the course of the Project Partners have shared the materials they have used for disseminating information about renewable energy. This has been a valuable source of new ideas. A 20 page Booklet used to draw together the results of the UK project in Teesdale used material collected and photographs taken during the Swedish visit.

b) Web Site

FTC in Italy have developed a Web Site in Italian and English which will be used to publicise information from each Partner's part of the overall project. This will enable the Project to continue after the EC's funding ceases as Partners will be able to update their contribution as progress is made towards implementation of specific schemes.

2.4 Future Co-operation

At the final Partners meeting in Kerry in May 2003 a number of future areas of co-operation were agreed:

a) Transport Sector

Transport was not included within any of the work undertaken by the partners during this Project. However it is a growing energy sector. ESS are looking to put together new projects to the European Commission's CIVITAS and STEER Programmes, and may seek to involve other Partners, along with others in the development of new projects.

b) Bioenergy

Drawing the agricultural sector into biomass production is of interest to all the Partners. Raising awareness is a first step, and could lead to changed farming practices. The Trento co-operative model could be relevant to this issue. The same could also be true of the supply of farm wastes for biogas production. Further joint projects may emerge under this heading. A discussion regarding the building of a wood pellet production plant in the North East of England is underway in co-operation with Swedish companies.

c) Fuel Substitution using Biomass

A 5MW peat burning power station at Deelis Bridge in Kerry ceased production in 2002. The peat was supplied by local producers and was an important source of employment in a remote rural area. The plant may be suitable for conversion to use biomass instead of peat. Technical regulatory and institutional factors will be important. A comparison and analysis of the role of these factors across projects on a local, regional, national and EU institutional scale would help to underpin further co-operative ventures. It is possible for example, that the co-operative model of developing and running projects exemplified in Trento may be applicable to the arrangements for the supply of biomass fuel to the plant. SKDP have circulated the technical specification of work that needs to be completed to TNEI and ESS for comment. It may be possible for Partners to participate in the development of this project, alongside others.

d) Rolling out the 100% Renewable Energy Communities Concept

TNEI is currently preparing a Renewable Energy Strategy for the North East of England. The use of 100% Renewable Energy Communities as a mechanism for promoting local action is seen as an important complement to strategic regional action. As more communities take up the 100% challenge new co-operative links will be formed with others across Europe. In the region of Kronoberg the municipality of Växjö has declared its intention to be to be a fossil fuel free municipality, this has had a positive impact on all partners.

e) *The Future Hydrogen Economy*

In particular using biogas from sewage and farm wastes as a feedstock for hydrogen production could form the basis for future co-operation

f) *Photovoltaics, Establishing Supply Chains and Installer Networks*

All the Partners are interested in developing PV installations. Trento in particular has a very ambitious PV installation programme. In each country establishment of PV supply chains and installer networks is an issue that would benefit from future co-operation

g) *Geographic Information Systems and Renewable Energy*

TNEI, in conjunction with both Newcastle Universities, has developed a comprehensive Geographic Information System for onshore wind development. The approach and lessons learned could be extended to include other renewable resources such as biofuels, based on both wood and animal waste. This may provide a subject for future co-operation.

3. UK PARTNERS REPORT

Prepared by The Northern Energy Initiative

3.1 Introduction

Teesdale District is located within County Durham in the North East of England. It is a largely rural area covering 84,000ha, with a population of about 25,000. It has two main market towns, Barnard Castle and Middleton in Teesdale, situated on the River Tees, and a number of scattered villages and hamlets. It is a District of two parts, the upper western part of the dale is within the North Pennines Area of Outstanding Natural Beauty and is flanked by open moorland rising to 800m above sea level. The lower, eastern part of the District is characterised by rolling mixed farming and areas of extensive commercial forestry.

Very little of Teesdale's energy is drawn from renewable sources at the present time. There is a small amount of hydro power generated at a water treatment works, some off-mains properties have small wind chargers complementing diesel generators, and there is some use of logs in domestic wood stoves. It can be said that the age of renewable energy is still to dawn in Teesdale.

Against this backdrop the District and County Councils are very keen to see Teesdale emerge as an exemplar in the development and use of renewable energy. The response to the project from residents of the District also indicates support for renewables.

Teesdale has a wide range of renewable energy resources. Uniquely in the North Pennines Teesdale has six drinking water reservoirs with potential for hydro power. The District has extensive areas with average wind speeds above 7m/s, which defines the threshold of commercial interest in wind development in the UK. In addition Hamsterley Forest, Stang Forest and numerous small woodland areas have the potential to supply biomass for heating.

The ALTENER bid brought together partners with an interest in each of these resources. Northumbrian Water own the District's water supply infrastructure, and the Forestry Commission own Hamsterley Forest and the Stang Forest. While a number of wind developers are interested in a number of sites in Teesdale, AMEC Wind agreed to become a project partner. The two largest employers in the District, GlaxoSmithKline, and Deerbolt Young Offenders Institution, together with Teesdale District Council, Durham County Council and the University of Northumbria are also partners in the project.

The Partners adopted the project title "Teesdale Renewable Energy Challenge," TREC, at an early stage and produced a logo for use on publicity.

3.2 Local Energy Plan and Baseline Study

Since the privatisation of UK energy supply utilities in the early 1990's it has become increasingly difficult to obtain data on energy use relating to specific areas. It was however essential to make some assessment of the energy being used in Teesdale to establish a baseline from which the objective of moving towards 100% renewable energy supply can be measured.

Initially the areas served by the gas grid were plotted and the number of dwellings served by mains gas estimated at about 50% of the total housing stock. Teesdale has a relatively high proportion of old stone built housing, and growth in housing numbers is limited. Actual energy use data was obtained from the major energy users in the District through a number of energy audits undertaken through Action Energy and information was requested via a leaflet circulated throughout the District. Data was made available by the two local authorities in respect of their premises and activities. Finally, estimates were made using national data.

The overall use of energy in Teesdale is estimated to be 622,500MWh pa. The following table provides detail by type of user and energy source.

Teesdale Energy Use Estimates MWh pa

Sector	Electricity	Gas	Oil	Coal	LPG	Sector %
Housing	68571	127999	127999	63999	139	62%
Industry	41663	58823	278	17	36	16%
Commercial	17269	11457	2130	200	999	6%
Institutional	39014	51384	2129	486	35	15%
Farming	2915	12	3630	598	725	1%
Total	169432	249675	136166	65300	1934	
Sector %	27%	40%	22%	11%	--	
Overall Total	622507					

The key points to emerge from this table are as follows:

- Electricity supplies about 27% of Teesdale’s energy use and mains gas about 40%
- Housing is the largest single sector accounting for 62% of all energy use
- Use of oil and coal is relatively high in the domestic sector, reflecting the fact that half the housing stock is off the gas network
- There are major industrial and institutional users in the District

In terms of preparing a Local Energy Plan for Teesdale, the main priorities for action suggested by the table above are as follows:

- Generation of renewable electricity from hydro and wind
- Increasing the use of biomass for heating particularly in housing not connected to the gas network in order to reduce dependence on oil and coal
- Increasing the use of gas fired CHP by commercial, industrial and institutional users
- Generally increasing energy efficiency and reducing demand
- Increasing the number and type of good practice energy demonstrations and exemplars in the District
- Increasing levels of awareness of renewable energy, so that larger schemes receive support from the community, and smaller scale applications across a range of technologies become more commonplace.

The development of Teesdale’s reservoir based hydro resources and a single 20MW wind farm (described below) could provide about 65GWhpa of electricity, equivalent to 38% of the District’s current use of power and about 10% of all energy demand. During the last month of the Project Partner AMEC Wind brought forward the possibility of a larger wind farm at Hamsterley Forest, in the region of 60MW. A development of this scale could supply 70 to 80% of Teesdale’s electricity. Together with the hydro resource and other small renewable electricity projects it would be possible to achieve 100% renewable electricity supply. There is however still considerable further work to be done before the Hamsterley wind farm is developed, and considerable uncertainty about the scale of any project.

The figures above show that making progress towards a high renewable electricity figure is “simpler” than achieving a high figure for renewables as a whole, including all forms of energy used for space and process heating. If the hydro and wind projects being examined in TREC are financially viable they can be spearheaded by just two commercial organisations. Increasing the use of biomass for heating will require many hundreds of individual householders and SMEs to understand woodfuels and invest in plant and equipment to use them.

In parallel with the Teesdale TREC project TNEI had a contract from the Government Office for the North East to prepare a Regional Renewable Energy Strategy by June 2003. This Strategy, which is now complete, reviewed each element of the Region's renewable energy resource and considered how to approach the UK Government's targets of 10% renewable electricity by 2010 and 20% by 2020. In many ways work undertaken in Teesdale was valuable in framing the Regional Strategy exercise. TREC has been an exemplar pilot exercise. By way of return the Regional Strategy has provided a context for the Teesdale Local Energy Plan. In particular the Regional Strategy has shown that the site identified for wind development at Hamsterley Forest is relatively unconstrained in regional terms. It is one of a small number of locations that have been put forward for inclusion in Regional Spatial Strategy. This will help to reinforce the case for wind development on this site during its planning stages, and complement the local work completed during the ALTENER contract.

The Local Energy Plan prepared for Teesdale and was submitted to the District Council at the end of June 2003 (see Annex 2.5). This will feed into the District Council's land use Local Development Framework in the coming months.

3.3 Feasibility Studies

a) Hydro Power

Northumbrian Water Ltd owns and operates six drinking water reservoirs in Teesdale District. The largest and most recent, Cow Green reservoir is located in the upper dale and has no link to the electricity distribution network. The remaining five reservoirs are situated in two small tributary valleys, Lunedale and Baldersdale. Water from Cow Green is released into the River Tees and abstracted some 40km down river at the Broken Scar Water Treatment works on the outskirts of Darlington. Water from the Lunedale and Baldersdale reservoirs is taken by pipeline to the Lartington Water Treatment Works in Teesdale.

Currently there are three very small hydro-electric schemes operating at Cow Green, Grassholme and Hury reservoirs, each rated at 35kW. Power generated is used on site for operational purposes. In addition the supply pipe arriving at Lartington feeds a 150kW turbine, the power from which is again used on site.

The ALTENER contract work programme proposed the completion of two feasibility studies into the potential and economic viability of developing hydropower including pumped storage. Northumbrian Water commissioned consultants ENTEC to undertake the necessary appraisals. Five of Teesdale's reservoirs are considered to have potential for the development of hydro power:

Potential Hydro Power

Cow Green	1,350kW
Selset:	1,000kW
Balderhead	450kW
Blackton	90kW
Grassholme	50kW

Of these the first three, Cow Green, Selset and Balderhead, are considered to have the best prospects for development in the short to medium term. Selset can be readily connected to the electricity distribution network, in the case of Balderhead the cost of connection makes this an economically marginal scheme. Cow Green would need a new network connection of about 5 km most of which would have to be buried in or alongside an existing access road because of the environmental sensitivity of the area. In each case the extent of visible new development would be minimal, much of the required plant can be located within existing structures and would not be noticed.

An Environmental Scoping study of the above three projects has been completed by Northumbrian Water. There a number of sensitive environmental issues concerning any development at Cow Green, which require further evaluation.

Hydro power development at the above three reservoirs would generate 13.5GWh pa, equivalent to 8% of the electricity currently used in Teesdale.

Selset Reservoir appears to have the best prospects for early development. A detailed feasibility study has been completed and a preliminary engineering design has been undertaken.

The economic prospects for hydro development at Teesdale's remaining reservoirs are not attractive in the short term because of the small electrical output that can be achieved and the costs of these projects.

The possibility of linking two of the Baldersdale reservoirs as part of a pumped storage scheme was considered early in the work programme but there are no proposals to progress this.

The parent company of Northumbrian Water Ltd has recently been taken over, and as a result the final months of the ALTENER contract were ones of uncertainty as to whether the new owning company would wish to proceed with the hydro schemes or sell them on to a third party. At the time of writing this report it is unclear how the hydro projects identified will be taken forward.

The ALTENER contract proposed the completion of three feasibility studies into the prospects for micro hydropower at remote off mains locations. Preliminary studies were undertaken at the village of Middleton in Teesdale, examining the possibility of reinstating existing 100+year old water power infrastructure. A small stream flowing through Middleton was used in the last century to run two mills, one used for sawing timber, and the second for corn grinding. The structure of both mills remains to the present day along with some of the supply water infrastructure. The owner of both mills approached TNEI and Northumbrian Water Ltd during the early months of the project. Conclusions are that the water flow characteristics on the stream in question would not provide the basis for an economically viable hydro scheme. The former corn mill is situated in the main street of Middleton in Teesdale, which is a magnet location for tourists. The refurbishment of the mill to demonstrate old and modern hydro technology and possibly other renewables such as photovoltaics has been discussed by the project partners. At the present time the owners of the mill are not in a position to finance such a scheme and no other funding body has been identified. The mill remains a possible candidate renewable energy exemplar building, but it needs other economic drivers such as tourism or retail if its potential is to be realised.

In addition three farm related possible hydro sites were visited in upper Teesdale by Northumbrian Water and TNEI. None of the sites visited had a hydro resource that would justify investment.

No other work has been commissioned on micro hydro, and no off mains hydro prospects have been identified.

b) Wind Power

AMEC Wind is a TREC partner based in the North East of England with a proven track record in the development and operation of wind farms. Currently AMEC Wind have four operational sites in the region, including Tow Law in Teesdale's neighbouring Districts, Wear Valley and Derwentside. Having Tow Law as an exemplar close to Teesdale is particularly helpful as it enables comparisons to be drawn in respect of the size of turbines, and the scale and visual impact of the project.

Work on harnessing the Teesdale wind resource was initiated by a series of meetings between TREC partners AMEC Wind, Durham County Council, Teesdale District Council and TNEI. Durham County Council have built a detailed Geographic Information System (GIS) over a number of years to assist in the process of identifying potential wind development sites. The GIS contains a wide range of relevant data fields including: average wind speed at 45m above ground, address points around which "stand off" buffers can be specified, areas of landscape and nature conservation significance, etc. The GIS was interrogated to locate possible wind sites in Teesdale. As explained earlier, the upland part of Teesdale is covered by a national designation "Area of Outstanding Natural Beauty" (AONB) this area was excluded from the site searching process.

The potential sites to emerge from the GIS sieving process were relatively small and fragmented. This is because the lower part of Teesdale District is in part a former coalfield with numerous small mining villages, the remainder has scattered farms and individual dwellings all of which require a separation of up to 600m from the nearest wind turbine to avoid problems of noise and visual dominance. In addition to the factors represented in the GIS initial thought was given to grid connection and land availability.

Initial desk assessments and visits to a number of relatively small sites were undertaken during the first half of 2002. During this period the Forestry Commission approached AMEC Wind with regard to parts of Hamsterley Forest which have been, or are about to be, clear felled. AMEC carried out an initial appraisal which indicated that the areas in question had a good wind resource and could accommodate a medium sized wind farm of for example 161MW turbines or 102MW turbines. A 20MW wind farm could generate up to 52GWh pa, equivalent to 31% of Teesdale's electricity demand.

Hamsterley Forest is not included in the designated North Pennines AONB because it is a commercial softwood forest. It does however extend into the AONB which adjoins it on three sides. The moorland which runs to the western edge of the forest is a designated Special Protection Area (SPA) and provides nesting and feeding areas for a number of protected bird species. The site identified for wind development is also on the edge of Teesdale's administrative boundary and would be visible from the neighbouring Wear Valley District. While the site being considered has no housing nearby it is a considerable distance from the nearest points at which electricity could be connected to the electricity distribution network.

AMEC Wind have expressed a preference for the development of a single medium sized wind farm in Teesdale over a number of smaller scattered wind development sites in the lower part of the District. From a developers point of view the costs involved in bringing a small two or three turbine projects to realisation can be the same as for a much larger project. In addition there is potential for a scatter of small schemes to have a greater visual impact than a single larger scheme. In the Teesdale case the smaller sites considered are within settled rural areas and can be seen from numerous roads intersecting crossing this part of the District. The Hamsterley Forest site is more remote as regards housing and transport routes.

With these factors in mind Teesdale District Council convened a meeting in the autumn of 2002 involving Durham County Council, Wear Valley District Council, the Countryside Agency, English Nature, AMEC Wind and TNEI. The Hamsterley Forest site was discussed in its own right and in comparison with the alternative approach of developing a number of smaller sites to achieve a similar capacity. An exhibition and two public meetings were held in November 2002 to report to people in Teesdale on progress on TREC. AMEC Wind gave information on the process that had led them to the Hamsterley site, and opportunity was given for local people to raise matters of concern.

Further progress has been made on the Hamsterley site since the submission of the Interim Report in March 2003. As explained above a Regional GIS for wind development has confirmed that this area is relatively unconstrained as far as wind development is concerned, and therefore has an important part to play in meeting the Region's targets for renewable energy. Grid connection studies have been undertaken and further work on the economic viability of differing scales of project has been completed. In addition, as the site was registered under the UK's Non Fossil Fuel Obligation, NFFO, by a separate developer, negotiations took place to establish a commercial link between AMEC and the other developer.

In June 2003 AMEC Wind reconsidered the scale of wind development at the Hamsterley Forest site and put forward proposals for a larger project of about 60MW which could provide some 70 to 80% of Teesdale's electricity requirements. Further discussion between AMEC Wind and Teesdale and Durham Councils took place in June 2003 on the issue of increasing the size of the project to about 60MW, and an exhibition in Barnard Castle on 18th June 2003 provided information to the public.

Further work on the economic and planning implications of this threefold increase in capacity will continue after the end of the ALTENER contract.

c) Energy from Biomass

Woodland accounts for just over 6% of Teesdale's overall area. Ownership of the 5,230ha of woodland in the District is split between the Forestry Commission (51%) and a number of private owners. Large areas of land within the District are held within single estates, many of which have extensive, scattered woodlands.

The Forestry Commission's principal holdings are in two large commercial softwood forests, Hamsterley and The Stang. These are mature forests first planted at the beginning of the last century, which are managed, harvested and replanted in accordance with a long term overall plan. The privately owned, estate, woodlands comprise a mixture of softwood plantations and mixed hard and softwoods, from which wood is extracted for local sawmills. The lower parts of the District are also characterised by small and scattered amenity woods.

The ALTENER contract proposed the completion of two feasibility studies of the potential of Teesdale's woodlands to supply biomass fuels for space heating and power generation. In addition, the potential for supplementing existing resources with short rotation coppice was to be considered.

At an early stage in the project it was decided that the use of woodfuels to generate electricity would not be viable in Teesdale. The size of plant required for commercial viability would be beyond the supply capability of the woodland resource. It is also unlikely that a site could be found for such a plant in the District. In contrast there is a current project for a 30MW biomass fired power station on an industrial site within urban Teesside. This is self evidently a more appropriate way for this technology to be developed. In the light of this early conclusion work has focused on the use of woodfuel/biomass for heat supply.

Forestry Commission's work on the project included:

- Making an assessment of the biomass resource in Teesdale
- An assessment of the potential for setting up an Energy Supply Company, ESCO, in Teesdale
- Commissioning an assessment of the potential for wood heating in specific buildings in Teesdale
- Design and costing of a wood fueled heating system for installation at Lartington Water Treatment Works

To date an assessment of 13 buildings have been completed by consultants to the Forestry Commission, North Energy Associates. Of these, nine are schools owned by Durham County Council, Northumbrian Water's Lartington and Broken Scar Water Treatment Works where examined, and two large country houses. The assessment considered the boiler plant, potential for fuel storage, suitability for wood chips and pellets, the amount of fuel required, the economic case and conclusions on how worthwhile conversion to woodfuel would be. Another possible user of woodfuel pellets, a new build doctors surgery in Butterknowle, was identified through the planning process, but although the use of wood fuel was explained the building user decided to opt for a conventional source of heat.

The Forestry Commission will now consider the fuel resource required to serve the buildings most suitable for conversion and develop a Business Plan for fuel supply in close discussion with Durham County Council, Northumbrian Water and other potential wood fuel users, and suppliers. The Forestry Commission will look to provide the necessary thinning and felling licences required for the production of wood fuel and will actively work to address any perceived weaknesses in the supply chain.

The Partner visit to Kalmar and Kronoberg In Sweden in October 2002 focused on the use of woodfuels in a range of applications, from district heating to individual house pellet heating. In response to the visit an analysis of options for action was completed, and the UK Partners decided to take the following action:

During the early part of 2003, as part of a different project, TNEI prepared a Regional Biomass Action Plan. The experience gained during the ALTENER Project was very valuable in considering the practical issues involved in creating a new biomass market. It is probable that Teesdale will be used to pilot some of the proposals in the Biomass Action Plan because of the preparatory work undertaken in the ALTENER Project. Areas not connected to the gas network will be a particular focus for further action to promote wood fuels.

A study investigating the feasibility of a biomass district heating scheme in Middleton in Teesdale was prepared as a bid for funding from the Energy Saving Trust. This was successful and work commenced in June 2003. The proposal is to investigate the technical, economic and social barriers to the installation of a biomass fired district heating scheme in 70 houses in Middleton in Teesdale. Teesdale District Council owns the majority of the houses. The properties are due to have their heating systems upgraded over the next five years. There is a possibility that a district heating scheme using biomass as a fuel could be an economic alternative for providing space heating and hot water. There is also a school currently heated by oil adjacent to the domestic properties. The inclusion of the school in the scheme could improve the economics of the overall project.

3.4 Demonstrations and Exemplar Buildings

The ALTENER contract proposed the completion of at least six evaluations of how to introduce solar technologies onto new and existing buildings, leading to the establishment of solar exemplar buildings.

In practice building evaluations have considered the full range of renewable technologies rather than just solar options. To date the following evaluations have been completed:

- *GlaxoSmithKline*, is a Partner in the Project, and as the largest single employer in Teesdale operates a major pharmaceutical factory in Barnard Castle. The factory operates 24hrs a day and has a maximum electrical load of about 4MW. At the beginning of the Project the factory was visited to consider the potential for renewable energy. The possibility of installing roof mounted solar hot water to serve the factory canteen and provide water for hand washing etc was identified as a possible option. PV was considered but not regarded as an attractive option on this site for economic reasons. One key problem is that own generation is not regarded as a "core activity" making it difficult to justify funding from within the company.

The development of dedicated wind generation at the GSK factory was considered to be a possibility worth investigating further. The land available for turbines is limited, and there are dwellings relatively close to the site. "Medium scale" wind turbines, with an overall height of about 45m, could be accommodated on site but not the larger machines currently favoured by commercial wind developers, who could provide the necessary funding. As a result of contacts made at the Partner meeting in Sweden the idea of using second hand wind turbines on this site was investigated. The Swedish contact led to a Danish web site dealing in second hand turbines, and at the beginning of 2003 discussions were opened with a UK wind farm operator owning turbines which will become surplus to requirements towards the end of 2003.

Negotiations between GSK and the owner of the turbines suggested that a deal could be arranged which would benefit all parties, and which avoids the need for GSK to find significant capital. A series of photomontages showing two wind turbines on the GSK site were prepared along with maps showing the "zone of visual influence" and predicted noise contours. Discussions were held with Teesdale District Council, the local planning authority. GSK undertook a preliminary consultation exercise with local residents, and panels showing the proposal were displayed as part of the TREC exhibition in Barnard Castle on 18th June. A planning application was submitted after the exhibition. Work to progress this project will continue after the completion of the ALTENER contract.

- *Deerbolt Young Offenders Institution*: is a Partner in the Project and is part of the Government's Prison Service. The buildings on the site were visited at the beginning of the project. The construction of the residential blocks rules out any roof mounted solar panels. An earlier district heating scheme has been removed in favour of gas fired heating systems in individual buildings, unfortunately this rules out the introduction of a biomass heating system in the short to medium term. There are no suitable candidate locations for wind turbines on the site because of the proximity of residential development.
- *Durham County Council Schools*: initially three schools were examined for potential for solar technology, but the scope for roof mounted solar panels was found to be severely restricted by construction factors. In addition there were clearly more pressing priorities in terms of achieving greater energy efficiency at each of the schools. Subsequently nine schools have been examined to see what scope exists for conversion to the use of woodfuels. The potential for rolling out an installation programme in those most suitable is being discussed with Durham County Council.
- *Teesdale Sports Centre*: owned by Teesdale District Council, this is a relatively new building with efficient gas fired plant. Introducing solar hot water panels onto the aluminium profile roof was seen initially as presenting difficulties. A local SHW company has however been able to prepare a design and quote for the installation of 78 square metres of panels. Teesdale District Council have submitted an application for grant assistance to the Government's "Clear Skys" programme. Work on this project will continue after the completion of the ALTENER contract.

- *Barnard Castle Library*: owned by Durham County Council, this would be an ideal building to demonstrate and introduce the public to PV. Unfortunately the only visible location for a PV canopy interfered with emergency access and was overshadowed.
- *Village Halls at Hutton Magna, Staindrop and Boldron*: these three village halls were separately evaluated and reports sent to the relevant association. The halls have recently been refurbished to a very high standard and are already very low energy users. In each case there is scope for the installation of roof mounted solar hot water and PV, and for the introduction of biomass heating. The main disincentive to investment is the low intensity of use of these buildings.
- *Honeyman Water Ltd, Barnard Castle*: this company is initiating the development of office and laboratory building, advice was provided on the full range of relevant renewable technologies.
- *Other Properties*: a number of other properties were briefly considered as candidates for renewable technologies, but not progressed to a fuller evaluation.
- *Telephone Advice*: has been provided to a number of enquirers, including the use of biomass at a farm and holiday complex at Cleatham, the use of ground sourced heat at a holiday cottage conversion at Edge Knoll Hamsterley, the use of biomass at a new doctors surgery at Butterknowle, the use of solar hot water at a farm with caravans and greenhouses at Boldron, the manufacture and use of solar hot water panels at Whorlton, the use of a small district heating scheme to serve four isolated houses near Eggleston village, and the availability of grants for PV at a property in Staindrop.
- *Langdon Beck Youth Hostel*: this represents the most fully developed exemplar building in Teesdale at the present time. Currently 2 kW of PV have been installed on the hostel roof, together with solar hot water panels. The hostel has introduced grey water clean up using reed beds and has plans for a small wind turbine. TNEI have assisted the hostel manager in relation to the PV and wind projects. The hostel is situated in a very visible location in the upper dale and has a significant throughput of visitors. Information is provided explaining the projects that have been developed on the site. The hostel was visited during the Partners initial meeting in January 2002.
- *Good Practice Guidance*: the UK's Town and Country Planning System is a key point in the development process where information and persuasion can be applied to increase the application of renewable and energy efficiency technologies to new build and refurbishment projects. Teesdale District Council's Planning Service has been supplied with information during the course of the project which has enabled it to increase awareness amongst developers, architects and builders. In order to enable the Planning service to become more pro-active a document entitled "Good practice guidance for energy-efficient design, and the installation of renewable energy systems into local buildings" has been prepared by the University of Northumbria. This is attached in Annex 2.1. Teesdale District Council are also incorporating the text of this document into their forthcoming "Planning Handbook" which will be made available without charge.

A number of broad conclusions can be drawn from work undertaken under the "Demonstrations and Exemplar Buildings" heading:

- There is a small, but increasing number of individuals and organisations aware of and keen to introduce renewable energy into their buildings and projects.
- Unfamiliarity and cost are key barriers to the introduction of renewables.

- The ALTENER Project has helped to raise awareness of renewable energy opportunities in Teesdale and has led to specific projects which will continue to progress, and numerous general enquires.
- Providing information at the initial contact with the Planning Service in the form of a Good Practice Guide is a key opportunity.
- Of the many opportunities considered and evaluated relatively few are on a definite pathway towards implementation, those that are have the backing of an enthusiastic individual who understands the technology in question and is actively seeking means of implementation.
- Increasing the use of building related renewables requires the availability of good information and advice.

Action to achieve a number of exemplar renewable energy demonstration buildings in Teesdale will continue after the close of the ALTENER contract.

3.5 Awareness Raising

Initial public awareness raising was achieved by launching TREC at the first Project Partners meeting, held in the first month of the work programme in January 2002. The meeting was held in Barnard Castle and was publicised in the local press. This was followed by a fairly regular flow of correspondence in the Teesdale Mercury, the local newspaper, principally on the issue of commercial scale wind farms.

A meeting to inform interested non-partner organisations about the project was also held in January 2002, this included representatives of English Nature, the Countryside Agency, local authorities and local associations and interest groups.

The TREC Partners decided not to hold a major publicity event until there was some output from the wind, hydro, biomass and energy planning activities to report. By the summer of 2002 it was agreed that sufficient progress was being made to make it worthwhile holding a public meeting and exhibition. In order to prepare for this event the following steps were taken:

- A leaflet explaining the TREC project, describing the renewable energy technologies relevant to Teesdale was printed (10,000 copies) and distributed to the majority of households and SMEs in the District. Copies were also sent to key organisations and distributed through libraries and other public buildings. The leaflet included a reply paid return asking for details of energy consumption and ideas for the development of renewable energy. The leaflet also publicised the public meeting and exhibition. This initial leaflet is attached as Annex 2.2.
- The exhibition and two public meetings were held in the GlaxoSmithKline Social Club in Barnard Castle on 13th November 2002. A total of 90 people came to the exhibition and meetings, in addition a class of 30 children from a local junior school and their teachers also attended. The public meetings were held twice at 2pm and 5.30pm and included presentations from TNEI on the energy situation in Teesdale and the project in general, from AMEC Wind on the Hamsterley wind proposal, from Northumbrian Water on prospects for hydro power, and from the Forestry Commission on opportunities for the use of biomass. The presentations were followed by wide ranging questions and debate.
- The exhibition included panels provided by project Partners to illustrate their presentations and examples of "hardware" including solar hot water panels, PV panels, wood pellets and chips, wood pellet room heaters, and a small wind battery charger. The examples of renewable energy equipment on display generated a great deal of interest.

- Just over 300 individual responses, 85% from residents, were received from the TREC leaflet circulated in advance of the public meetings. Wind energy was most frequently referred to with supportive comments outweighing those against by 6 to 1. Hydro, solar and biomass also received strong support. The response to the leaflet was overwhelmingly supportive of renewable energy.
- An article on TREC was published in "Green Futures" a regional environmental publication in September 2002. A further article was published in "New Review" the Department of Trade and Industry national publication on renewables early in 2003.
- An officer of Teesdale Council and a representative of Northumbrian Water Limited appeared on a local TV news programme to discuss aspects of the project.

In order to draw the Project to a close and report on progress a second Exhibition and Public Meeting were held in Barnard Castle on 18th June 2003.

- A second leaflet was printed and circulated to the majority of households and SMEs in Teesdale District. The leaflet is attached as Annex 2.3.
- A 20 page illustrated brochure was prepared and sent to a wide range of organisations inviting them to the public meeting. The brochure is attached as Annex 2.4.
- The brochure was "launched" and distributed to people attending the exhibition and meeting on the 18th June.
- The brochure has been sent to a wide range of organisations within the Region and further afield.

3.6 Delivery Partnerships

The TREC project started with an almost "blank sheet of paper" as far as renewable energy in Teesdale was concerned. The ALTENER Project created a local partnership to undertake the work described above. Follow on activity includes TREC Partners and other organisations. "Delivery Partnerships" being formed to continue on from the ALTENER Project include the following:

a) District Heating at Middleton in Teesdale

A feasibility study is examining the development of a biomass fuelled district heating scheme in this village. Work on the delivery of this project is being led by Teesdale District Council, TNEI, and North Energy Associates.

b) On-site wind development at GlaxoSmithKline Barnard Castle

TNEI are acting as GSK's agent in respect of the planning application of this project, described above. GSK are in discussion with Windcluster as regards commercial terms for the installation of second hand wind turbines on their site. If these negotiations are unsuccessful other suppliers of turbines will be approached, possibly in other EU countries.

c) Wind development at Hamsterley Forest

TREC Partners AMEC Wind and the Forestry Commission are discussing commercial terms in respect of this project.

d) Biomass Partnerships

The Forestry Commission are working closely with Teesdale's single largest landowner, Raby Estates, and potentially with Northumbrian Water to develop partnerships for the delivery of biomass fuels.

3.7 Exemplar Status

One of the "Direct Outcomes" set out in the contract work programme concerned the achievement of "Exemplar Status" for Teesdale in terms of renewable energy development. It is too early to state that Teesdale has achieved this particular Outcome.

Starting more or less "from scratch" as far as renewable energy is concerned, Teesdale now has a number of projects going forward, a major wind farm, a factory based wind project, proposals for heat from biomass and solar hot water, and hydro schemes to follow. Residents and businesses are more aware of the benefits and possibilities associated with renewable energy. The District Council is seeking to encourage the use of renewables in new development proposals.

Already Teesdale is seen as an exemplar in the approach it has taken towards renewables, particularly in setting a high target, and taking a comprehensive overview of all the available resources. The approach is likely to be rolled out into other local authority districts in the North East of England and beyond. Over time Teesdale's reputation as an exemplar will build as the work commenced as part of this ALTENER Project, and other initiatives bear fruit and there is more development on the ground.

3.8 UK Partners Report Conclusion

Progress on achieving the "Direct Outcomes" specified in the Contract work programme, can be summarised as follows:

- *Completion of a Local Energy Plan:* this has been achieved, the Plan is attached as Annex 1.2.
- *Completion of two hydro feasibility studies leading to preparation of planning applications:* three feasibility studies have been completed. Planning applications have not yet been prepared because of the changed ownership of Northumbrian Water Ltd. The work completed provides the basis for future planning applications
- *Completion of three micro hydro feasibility studies:* two have been completed, others were considered but it was not worthwhile taking them further
- *Completion of a report on market potential for use of biomass, completion of two feasibility studies on biomass space heating, and a study of use of short rotation coppice:* feasibility studies have been completed in respect of 13 properties. Consideration of a business plan for biomass has led to proposals for the establishment of an Energy Supply Company
- *Completion of at least six evaluations of introducing solar technology:* evaluations that have included solar technology have been undertaken in respect of 12 properties, and preliminary evaluations and telephone advice has been given in respect of numerous other buildings.
- *Achievement of greater awareness:* circulation of a leaflet throughout the District on two occasions, two public meetings and exhibitions, press reports and technical press articles. Publication of a 20 page illustrated brochure.
- *Establishment of "Exemplar" status:* this is being achieved progressively as described in section 3.6 above.
- *Publication of reports:* Two technical press articles and publication of a 20 page illustrated brochure.
- *Development of a Strategic Approach:* this will be achieved through the Local Energy Plan, which has been related to the parallel preparation of a Regional Strategy for Renewable Energy. The Plan and the Regional Strategy will also feed into the Teesdale Local Development Planning Framework.
- *Improved public understanding and acceptance of renewables:* this has been and will continue to be achieved through ongoing awareness raising and demonstration projects.

- *Preparation of proposals for wind energy:* (this was omitted from the “Direct Outcomes” section of the work programme but is included elsewhere) evaluation of small and large sites for wind development undertaken, the Hamsterley site is progressing towards a planning application. A planning application has been made in respect of the GlaxoSmithKline factory site.

It is clear from the above review that the UK part of the ALTENER Project, TREC, has successfully achieved the “Direct Outcomes” set out in the ALTENER contract. No significant changes to the scope and programme of work were necessary, and the adjustments that have been made have been beneficial to the project as a whole. In particular more building evaluations at differing levels of detail have been undertaken than was originally envisaged and their scope has been considerably wider than solar technology. The scope and depth of work on biomass and awareness raising has also been widened.

4. SWEDISH Partners Report

Prepared by the Energy Agency for Southeast Sweden, Energikontor Sydost, ESS

4.1. Introduction

The Energy Agency for Southeast Sweden has since mid 1999 worked within the provinces of Kalmar and Kronoberg in Sweden, which have a population of 420,000. The main aims of Energy Agency for Southeast Sweden are energy efficiency and increasing the use of renewable energy sources, such as wind, solar and biomass.

Activities cover energy use in the society as whole, i.e. industry, urban areas and dwellings. Energy used for:

- heating
- power and lighting
- transportation

One of the goals is to reduce the emissions of CO₂ and other greenhouse gases and also reduce the emissions of NO_x and acidificational gases. The use of locally produced energy will increase employment in energy production and manufacturing of equipment in the energy sphere.

To reach the goals Energy Agency for Southeast Sweden has established an Energy Balance study for the region as a starting point. Energy Agency for Southeast Sweden arranges energy education at all levels and supports research and development in the energy sphere and co-ordination of the energy advice bureaux in the area. It also provides the link between the EC and the region in energy matters.

Co-operation takes place with activities in all aspects of energy - regional, national and international. The organisations responsible for the Energy Agency for Southeast Sweden's are the Kronoberg County Association of Local Authorities, together with the Regional Council in Kalmar County who partly are financing the project, the municipalities in the area, the county administrative board of Kronoberg, the county council of Kronoberg and Delegation of Energy matters in South Sweden. From 2003 ESS also had support from the national level.

A working plan for Energikontor for 2003 describes ESS's work in more detail, this can be found under www.energikontor-so.com under " verksamhetsplan ". This also provides a summary of most of ESS's projects in English.

The Swedish partners in this project all come from within the region and are described in the Proposal. The Partners already enjoyed good regional and local co-operation and this has been much improved under this PPA 100 % RES project. The project has been run with an increasing awareness that something has to be done about the climate change issue. The Partners have a tool to help make progress in this sector and this will be good for the future. The energy balances and policies that have been worked out in the region and the municipalities have had a very good impact on the co-operation in the region.

The partners are the Kronoberg County Association of Local Authorities together with the Regional Council in Kalmar County. The municipalities in the area and especially Borgholm, Mörbylånga, Växjö, Alvesta, Älmhult and Tingsryd has been dealing much in the project. Others are the county administrative board of Kronoberg, the county council of Kronoberg and Delegation of Energy matters in South Sweden has supported with money and information.

The University of Växjö has participated in the biomass studies and information. The University of Kalmar has participated in the work with energy balances and wind energy.

The Bioenergygroup of Växjö (Bioenergigruppen I Växjö) consists of seven companies in the region and University of Växjö. The purpose is to work jointly with R&D in the bioenergy sector. Most of the work is done in close co-operation between ESS and the partners.

4.2 Presentation of studies and projects undertaken in Sweden

The following studies have been undertaken at the Energy Agency for Southeast Sweden in the project PPA 100 % RES Småland and are set out in more detail in this report. The work has been done in co-operation with the Universities of Kalmar and Växjö and with staff at the municipalities in the counties. ESS has also worked together with SERO (the association for the Swedish energy unions) for the study on the island Öland and regarding biogas from farming. The staff at the county administrative board in both counties in the work and with local energy actors, especially in the work with the region environmental objectives. Since the area is geographically quite big the work involves some travel all over the region. The offices of Energy Agency for Southeast Sweden are in Oskarshamn and Växjö; both towns are situated in the middle of each county.

ESS has provided a detailed description on some of the studies and shorter for some. All reports can be find at our website www.energikontor-so.com.

4.3 Local Energy Balances and Plans: Island of Öland

The study **Öland 100 % RES** is complete and a seminar was held in October 2002 in Färjestaden at the Island Öland. Local politicians and local energy actors were invited to attend. The study Öland 100 % RES was done in co-operation with Högskolan I Kalmar (the university of Kalmar), Mälardalens högskola (university of Mälardalen), SERO among others. The work will be continued by a working group from the two municipalities. Here follows the abstract of the report:

Öland, the second largest island in Sweden, is situated in the Baltic Sea. The island has two municipalities, Borgholm and Mörbylånga. Tourism is the most important industry. The number of people on the island increases from 24,800 inhabitants to 250 – 300,000 during the holiday season from June to August. This situation makes the energy needs different from the rest of Sweden. Normally we use the largest amount of energy in households during winter for heating, at Öland the consumption increases during summer time and is much less during the winter.

The project Öland 100 % RES (self-sufficient on renewable energy sources) describes the present energy situation and also indicates the future energy situation. The term self-sufficient means that the amount of non-renewable energy now imported to Öland, could in the future be produced locally on Öland, and surplus energy, such as locally produced biogas and/or wind power electricity, could be exported to the mainland. The term renewable energy sources (RES) refers to energy derived from the sun, characterised by flows and constant regrowth, such as wind power and bio fuels. Non-renewable energy sources are for instance fossil fuels, such as oil and coal.

The energy balance based on figures from the year 2000 shows present energy requirements. Öland consumes **942 GWh**¹ (the equivalent of 94 200 m³ of oil), (Borgholm consumes 360 GWh and Mörbylånga 582 GWh). More than 40 % of this is electrical energy (of which 4 % is locally produced wind power electricity), almost 50 % is fossil fuels where petrol and diesel fuel represent nearly 30 %. Öland produced approximately 40 GWh of wind power energy during 2000 and the bio fuel extraction was approximately 23 GWh (the equivalent of 2 300 m³ of oil), which is less than the Swedish average usage. Öland is not a typical wooded district so these figures were expected.

¹ 1 GWh of energy is equivalent of approx. 100 m³ of oil and approx. 1000 m³ woodchips.

Öland's energy supply during 2000 was 38 MWh/capita (the equivalent of 3.8 m³ of oil), which is below the Swedish average of 48 GWh/capita. The largest energy consumer of all the community sectors is industry. Industry's energy requirements were 315 GWh during 2000, and pit coal was most frequently used. The second largest consumers were households, consuming 230 GWh, mostly electrical energy. The third largest consumer was the transportation sector, using mostly fossil fuels, 187 GWh. Energy consumption creates a great deal of pollution, 127,000 tons of carbon dioxide, an estimated 402 tons of nitric oxides and approximately 140 tons of highly volatile organic hydrocarbons (VOC) is emitted.

Öland has 47 **wind power** stations (28 MW) and during 2001 they produced 63 GWh of electrical energy, which is 16 % of Öland's entire electricity consumption. The offshore wind power station Utgrunden produces half of this energy. There are several obstacles to wind power energy expansion on Öland, one being the island's limited grid capacity. There is only enough space left for a further 81 MW, which will cover half of the island's electricity needs. At present there are a number of applications at the county administrative board for various wind power projects. Several of these projects will conflict with Öland's nature and culture interests and therefore the county administrative board are negative towards nearly half of these development plans. There is a great deal of interest regarding extensive expansion of offshore wind power stations up to 3,000 GWh. To realise this, the two Öland municipalities, the administrative county board and the wind power companies and other interested parties, have to work together and make joint plans. Investigations regarding the consequences of the offshore wind power stations on the marine nature and bird life must be conducted and studied further. At the present wind power represents only a part of Öland's energy needs, but there are prospects of producing considerably more energy than the island can consume, if only a way around the obstacles can be found.

The **bio fuel** extraction rate for Öland is largely based on estimates, since small-scale use of wood for heating has not been statistically verified. During 2001, 18 500 m³ of woodchips were extracted from the forests. An analysis of the bio fuel potential, taking in consideration forestry and nature conservation, shows that the extraction rate can be increased to 27 000 m³/year, which is the equivalent of 23 GWh of energy. Today's farming does not generate any waste products suitable for energy production and there are no plans to start growing energy crops on the farmlands of Öland.

The food industry on Öland produces enough waste products for anaerobic digestion to enable a large biogas plant in Mörbylånga. Cattle and chicken manure can also be added during the digestion process. Approximately 13 GWh of biogas can be produced without using cattle manure, and using cattle manure, another 2 GWh of biogas can be produced per 1000 milk cows. If the farms are located close to each other, communal biogas plants could be a financially sound solution. To reduce manure transportation by tractor, the largest and closest farms can be connected by a pipe system for manure transportation to a jointly owned biogas plant. To increase profitability for these plants, this gas should be used for heat production, so the plants should ideally be located next to major heat consumers. Biogas can also be used for electricity production, but with today's electricity costs, it can be difficult to make this profitable. Biogas can also be used for powering vehicles. The analysis shows that a low initial investment cost is crucial to make a profit from a biogas project. The biogas production on Öland can at the best contribute with 20 GWh (which is the equivalent of 2 000 m³ of oil) to the local energy supply.

Öland and its surroundings have enough raw materials for an **ethanol** production plant on the island. However, it is difficult to make a profit from this, since the ethanol plant needs large amounts of heat supply, and should ideally use surplus heat from a different process. Perhaps such a plant should be located in a larger city where the conditions are more favourable. The ideal solution would be to co-ordinate biogas production with an ethanol plant. If large parts of the crops

are used for ethanol production there is potential for producing 22,600 m³ of ethanol which the equivalent of 128 GWh (12800 m³ of oil).

All energy consumption creates some kind of environment stress; so all energy consumption should be reduced for sake of the environment. There is a possibility of reducing the energy consumption by about 75 GWh within companies and buildings on Öland through **a more rational use of energy**, (between 10 – 25 % of energy consumption in businesses). Information and training in issues regarding rational use of energy for staff is a good start. Electrically heated premises can be converted to bio fuel-based heating, additional attic beam insulation, installation of energy-saving lighting, only air when needed, and heat recycling are some other effective methods. On Öland there are a large number of tourist facilities that have large hot water consumption during the summer. Using sun panels can produce approximately 5 GWh of hot water. Simpler versions of sun panels for hot water for holiday houses and other buildings can be useful and profitable.

The **transportation** sector uses 20 % of Öland's total energy supply. 170 GWh of petrol and 80 GWh of diesel fuel. The problem with the transportation sector is that there are many outlet sources; they are small and far apart. During the summer months the population multiplies to ten times the usual size and the traffic increases drastically. The public transportation system on Öland covers the island adequately, but the question of how public transportation works in practice is an individual issue. A poll conducted in two villages on Öland presented critical opinions about public transportation, and it also conveyed how difficult it can be to change habits, to start taking the bus instead of driving. The main objective is to provide good communication for Öland and a bike route is being constructed on the island. A change of vehicle fuel would reduce the carbon dioxide emissions and therefore the region should work for the development of ethanol fuels and biogas vehicles.

A poll conducted in **two villages on Öland** showed that the households that use wood for heating are happy with that solution, while the households using electrical heating are generally less satisfied. The motives for changing heating systems are financial and for the sake of convenience, and the main problem is usually the initial cost. A lot of people had a positive attitude towards solar panels as well as wind power, and there was a suggestion of a wind power plant connected to their village.

The vision of the future shows us that local energy production can contribute to Öland's energy supply, but to finally reach the vision "Öland 100 % RES", wind power must comprise a significant portion of the locally produced energy. Another important factor is reduced energy consumption, i.e. a more rational use of energy within all sectors. However, this study shows that the vision is possible – **Öland can become 100 % RES (totally self-sufficient on renewable energy sources). To achieve this we need an innovative energy policy on all levels, local, regional as well as national.**

4.4 Local Energy Balances and Plans: County of Kalmar

The energy balance for the County of Kalmar, 2000, maps energy flows in the county. It also compares the differences between 1995 and 2000. The purpose is to find the trends and variations in the energy field.

Kalmar County was, during 2000, supplied with 13,2 TWh energy, an increase of 30 % since 1995. The largest user of energy was the industrial sector, 50 %, which has increased the consumption of energy by 60 % since 1995; most of the energy is biomass. The transportation sector uses 20 % of the total energy consumption. The consumption of fossil fuels caused 1 250 000 tons of CO₂ emissions (5,3 ton/person). Since 1995 the emissions of CO₂ has increased a little, but not as much as the energy consumption. The use of petrol and diesel oil causes half of the emissions of CO₂. The domestic sector has decreased its energy consumption by 6 % since 1995, the consumption of oil is only half compared to 1995, but the consumption of electricity has increased by 17 %. The use of bio fuel is doubled.

The balance is used as a base for the future spatial planning regarding energy and climate.

<u>Energy supply</u>	<u>Year 1995 Year 2000</u>	
Total energy consumption	10,2 TWh	13,2 TWh
	1151700	1250000
CO ₂	ton	ton
Fossil fuel	4270 GWh	4380 GWh
Biomass	3006 GWh	6340 GWh
Electricity	3212 GWh	3 025GWh

The total consumption of biomass was doubled during the years between 1995 and 2000 due to an increase in both housing and industry use. The domestic sector used 9 % of the total amount. The rest was more or less used by the industrial sector. The pulp factory in Mönsterås uses a considerable part of the bio energy. The pulp factory doubled its production, which hides differences in the statistics. Kalmar County has the largest production of wood in the south of Sweden, which leads to good resources for locally produced bio energy

A total of 20 % of the total need for electricity in the region is met by locally produced by wind power, hydropower and by backpressure power stations, CHP (supplied by bio fuel). In 1995 only 7 % of the electricity consumption was locally produced. Since 1995 the wind power plants have increased, and the production of industrial backpressure power is doubled.

The main goal for Energy Agency for Southeast Sweden, set in the Energy balance from 1995, was that at least half of the energy consumption should be from renewable energy sources by 2010. Already in this energy balance for 2000 is **63 % of the energy consumption is from renewable energy sources**. Another goal for 2010 was to reduce the emissions of CO₂ by 15 %, instead the emissions of CO₂ has increased by 10 % compared to 1995. One aim for 2010, was to reduce the consumption of electricity by 10 %, so far it has decreased by 6 %.

The conclusion of the Energy balance 2000 is that despite a sharp increase of the energy consumption the main goal is already attained: more than 50 % of the energy is renewable. Next goal is to achieve 100 % RES in the region.

4.5 Local Energy Balances and Plans: County of Kronoberg

The energy inflow into the county of Kronoberg was all together 6,5 TWh in 2000. In 1995 the energy supply comprised 6,3 TWh, we have seen a 3% increase during the period. It can be compared to the economic growth that was nearly 10 %.

Still there is a big potential in energy efficiency measures in all society sectors.

The share of renewable energy sources was 45 %. It is an increase by 28 % since 1995 when the share of renewable energy was 35%. Renewable energy sources are bio fuel, water-, windpower and solar energy.

The use of fossil fuels, which include gasoline, diesel and fuel oil, amounts to 2,8 TWh and are still the largest form of energy supply in the county of Kronoberg. It means a share of 43 % of the energy supply in the region.

The trend is that bio fuel substitutes heating oil within all sectors except in the transport sector as a whole where we still have consumption increase of fossil fuels. That is due to the heavy traffic with an increased use of diesel. The gasoline consumption is decreasing.

Industry is not reducing its consumption of fossil fuel, but has decreased its electricity consumption.

The total consumption of electricity was reduced by 5% between 1995 and 2000, and the emissions of CO₂, carbon dioxide, show the same trend.

	Year 1995 ²	Year 2000
Total energy turnover	6,3 TWh	6,5 TWh
Energy per GRP ³ (kWh/SEK)	0,17	0,16
	780	000
CO ₂ -emission	tonnes	740 000 tonnes
Fossil fuels	2 950 GWh	2 800 GWh
of which gasoline and diesel oil	2 000 GWh	2 030 GWh
Fuel oil and LPG	890 GWh	670 GWh
Bio fuel	1 150 GWh	1 660 GWh
Electricity⁴	2 290 GWh	2 170GWh
of which		
local hydropower	284 GWh	350 GWh
local CHP ⁵	1 GWh	110 GWh

The regional production of electric power has increased substantially during the five years and there are still satisfactory opportunities for increasing CHP use.

Local energy and climate balances

One goal is that each municipality will have a local energy plan and an energy policy. Before this is achieved each municipality will receive a local energy balance, which shows the local energy balances, one for each municipality. The energy balances for the region will contain an analysis of the energy flow to the counties and how and where the energy is used. It will also contain a valuation of the emissions the energy flow causes, with accent of the greenhouse gas CO₂.

² Previous data from 1995 is modified in this table

³ It means Gross Regional Product, the total value of produced goods and services in the county of Kronoberg.

⁴ Refers to gross consumption. Gross Supply totals 2 050 GWh year 2000 respectively 2 230 GWh year 1995.

⁵ Refers to biofueled share. Approx. 90% of electricity production from CHP is based on bio fuel, approx 10% is based on oil.

The regional energy balance can be used as a tool for the region to set the environmental quality objectives. *(The Swedish Parliament has established 15 environmental quality objectives, such as "Clean air" and "High-quality groundwater", to guide Sweden towards a sustainable society. The 15 environmental objectives will function as benchmarks for all environment-related development in Sweden, regardless of where it is implemented and by whom. Each region (county) in Sweden will set these objectives from a local point of view.)* Since ESS has taken an active part in the work to set the local objective "Reduced Climate Impact" in both Kalmar and Kronoberg Counties, the energy balances for the counties will have immediate value.

Today 18 of 20 energy and climate balances are fulfilled with very good levels of acceptance. For both Kalmar and Kronoberg county and the municipalities, for Oskarshamn, Mönsterås, Öland , Alvesta and Växjö. ESS also work to produce energy policies and plans to fulfil new strategies for the period till 2010. We attach some of the reports in the Swedish Annexes.

The energy balance for each municipality can be used as a base for the local energy and climate plans and to set local energy strategies in order to reduce the use the fossil fuel and electricity and increase sustainability.

Regional climate objectives for the counties of Kronoberg and Kalmar.

On the national level environmental objectives have been established and decided by parliament. There are 15 objectives and two of them deal with energy. One about climate change and one about buildings. ESS has been working very closely with the regional authorities to form these and to implement and process them with politicians, the press, industries and other decision makers. The objectives have now been decided and are very well developed in the climate change sector. As mentioned above both counties have decided to be fossil fuel free regions in the year of 2050 and to reach 50% by 2010. The last will be quite easy though we are almost already there. The first will be a long process with most difficulties in the transport sector.

A complete report on the objectives can be found under www.g.lst.se and www.h.lst.se and look for "Miljömål".

4.6 Feasibility Studies

a) Increased use of bio fuel in houses

Another objective for ESS is to increase the use of wood fuelpellets for heating instead of electricity or oil in the region. The project "**Trygg Pelletsvärme i Småland**" ("**Secure Pellets Heating in Småland**") was carried out August 2002. The main objective of this project was to assist people who want to install pellet burners in their houses, by enabling them to get the information they need through just one phone call. To achieve this on a municipal level, ESS worked together with the municipal energy advisors in 14 of the municipalities in the counties of Kalmar and Kronoberg. Together we carried out information meetings and training courses with a total of about 900 participants. Basic technical and financial information material has been prepared to use in each region.

Our opinion is that this is easier to do now, because today there are more informed people who work with sales and installation of pellet heating equipment, and in the production and sales of pellets.

During 2000/01, approximately 1,500 of the 6,000 pellet burners installed in Sweden where installed in the counties of Kalmar and Kronoberg. The figures for 2001/02 are higher, 3,500 of a total of 13,000-14,000 for the entire country. The increase has been large in general, and especially in these regions.

The increase in the pellet production on a national level was from 600,000 t/year to slightly more than 800,000 t/year. We have no information on the regional increase.

Through our contacts, ESS try to stimulate the market to increase the pellet production regionally, and our assessment of the situation is that the production of 200,000 t/year for 2001 could rise to more than 300,000 for 2002.

We see good prospects for a continuous expansion, and our assessment is that there are about 6,000-7,000 pellet burners in this region and this is a solid basis for further expansion via neighbouring contacts.

The project "Trygg Pelletsvärme i Småland" ("Secure Pellets Heating in Småland") has been an important link in this development. The market, the contractors and the pellet equipment manufacturers, together with the municipalities all play an important part in further expansion.

ESS finished the project during 2002, through our contacts, a network of market operators. ESS also renewed contacts in the wooden house market to try and reach this market as well with information about pellets, which has been difficult during the project time.

The struggle to continue the increase in pellet use will continue in the Alterner project REGBIE which will promote the plant size of 50 to 1000 kW.

b) Wind energy

A study has started to make spatial plans in the region of the east coast of Kalmarsund and the island Öland both on land and offshore. This work is mostly done by the regional authorities of Kalmar county.

The period for this project has been a quite calm period for wind due to low energy prices. Last year there have been some big changes, first electricity energy prices were raised, but more importantly since May 2003 green electricity certificates have been introduced with a cost of 1.6-2.4 Eurocent/ kWh. For 2001 63 MWh/y is produced at 48 windturbines. The planning is for more offshore first of all but some on land will be built. A presentation leaflet has been produced for the presentation of wind power to the public and tourists. An exhibition for offshore wind opened in Bergkvara on the mainland south from Kalmar.

A cluster has been started in the region to develop the wind energy and also to spread information. A project has also started within the Interreg III B programme called " Wind Energy in the BSR " under the lead of City of Rostock.

ESS has produced a leaflet to inform people and tourists on Öland about the existing windturbines and some technical information.

ESS are now preparing a leaflet about wind energy in the region and a draft of this is within the Swedish Annexes.

c) Solar

In the region a project called " Fånga solen " (Catch the Sun) has been running during this project with studies on tourist and sports buildings. The studies show possibilities but still not very many solar energy plants have been built.

Presentation of the work is done under the Öland study. ESS has difficulties in making big changes except in some municipalities with a good interest from some contractors. In the PV sector the cost in Sweden is too high except for buildings outside the electricity grid.

d) CHP from biomass

ESS have been running a study about possibilities of running more CHP from bioenergy in the region and there are very good possibilities. This study is done for a bigger region of south Sweden with support from DESS. The potential to increase production of electricity from biomass in CHP plants in the regions of Kalmar and Kronoberg is about 3- 400 GWh pa. The production today is 800 GWh pa at five different plants.

A report from the study is attached in the Swedish Annexs.

e) Nearby district heating

The project " Nearby District Heating Kronoberg " has continued and is developed in Kalmar county and ESS have worked on this. It is a purposeful venture aiming to replace oil and electricity for heat production. The project covers 26 plants which have been built or are under construction during the period of 1999-2002. The total heating effect is 120 MW and out of the produced 220 GWh/y, is 180 GWh/y or nearly 80 % coming from biomass instead of oil and electricity. In addition to that, most of the plants are also prepared for the production of electricity, but it is not yet profitable. The decrease of CO₂-emissions is significant, and as most of the biomass comes from local or regional suppliers, we have also managed to increase the employment in remote areas. A similar campaign is also running in the county of Kalmar.

ESS have just started an ALTENER project called REGBIE that will continue the work with biomass in the sector from 100 kW and up. In this also the region of Bolzano and Trentino will participate.

We are also running a network for bioenergy called Bioenergigruppen I Växjö that is dealing with R&D about biomass and especially with combustion and environment for furnaces 100 kW to 15 MW. This has members from Universities and the regional companies working in the biomass sector. In this project there has been a close co-operation in the Nearby District Heating Kronoberg project as well as those about CHP and biomass and environment.

f) Biomass and environment

A report has been completed on how to support introduction of biomass in plant sized 0.3- 10 MW, with technical and environmental education. The project will continue in 2003 and is supported by STEM.

A summary is enclosed, the whole report can be read and downloaded on www.energikontor-so.com. Go to project /rapporter and miljökrav biobrånse.

g) Fuels for cars

In this field ESS are running a network called TransportEko Sydost that works to establish ethanol gas filling stations in the region and we now have five of them.

We are also together with University of Växjö participating in the beginning of DME from biomass within a proposal for FP6 regarding the Värnamo plant and a Centre for excellence in producing synthesised gas from biomass. We just have a small role in the project but has done a lot of job in the background.

4.7 Awareness Raising

Awareness of renewable energy in our region is quite good and as mentioned earlier some of the municipalities have said that they intend to become fossil fuel free. Also the use of biomass is very high in the region. Some people have a strong commitment to just use fossil fuel free energy.

But still there is a very long way to go and this project together with efforts in other projects has had a very strong impact mostly in these municipalities that are relatively new in this field.

During the period of this project awareness of energy issues in the transport sector has increased and many actions have started to change behaviour with cargo, car sharing, ecodriving, and mobility management.

The energy balances and the contacts with the politicians in every municipality in the region, as well as with the regional authorities, has been very important for the moment and also in the long term with a new strategic plan for energy and environment. ESS believes that this project has created a new attitude among politicians. This has been our strategy, to help decision makers understand the effects of energy use on climate change, and also that energy produced in the region can improve the job situation. To change 2-3000 MWh of oil to biomass makes one job permanent.

In the public sector the work with pellets for heating has had a great impact and increased its use in this and the small scale sector.

ESS consider that European co-operation is very important to its national work, and improves awareness in the region about other subjects and for us mostly with PV and hydro that is not so developed in our region.

4.8 Delivery Partnerships

As indicated above, work is ongoing in the energy and environmental area, and this project PPA 100 % RES has focused on gathering together all parts of the issue. We have had a base on which to form energy balances and plan for the region and the municipalities. The next step is take them down to concrete examples in different parts of renewable energy as biomass, solar CHP, PV, hydro power, wind and also energy efficiency. Different projects have been undertaken and they are described above.

The work will continue with more and more focus on achieving real changes to build, save energy, decide about new plants and installations. The region is around 50 % using RES for all energy consumption and is really struggling towards 100 % RES. This is decided on the regional level and in some of the municipalities. We think this is the big point for us in this project, Kronoberg and Kalmar counties as 100 % RES regions. ESS has to work hard in the future to keep this going the right direction.

4.9 Exemplar Status

As mentioned earlier a lot of projects have been undertaken together with our partners here in Sweden as well as with our partners in UK, Italy and Eire. We have described them thematically above and they are also set out in the Swedish Annexes. We commenced work as an energy agency under the SAVE program, with a favourable position in the region. Having a kind of a neutral status the agency can undertake studies free and without looking for personal profit. Its focus on sustainability and environmental tasks, regional development and international co-operation makes it a strong partner in this work. It is really very important that there is an actor that can take this role.

4.10 Conclusions in relation to the ALTENER contract "Direct Outcomes" (Sweden)

The aim of achieving 100 % RES regions has been adopted in Kalmar and Kronoberg in official documents on the regional level. We have been working closely to achieve this. Active partnerships and implementation of projects has been achieved on the local level with different companies. Progress is very good and in the updated energy balance for 2000 it has been shown that in Kalmar 47 % of all energy comes from bio energy and a total of 62 % comes from RES when more than 50 % of the electricity comes from hydro. The figures in Kronoberg are 26 % bio energy and 45 % is the total RES of all energy used in the region including even transport. The objective of 50 % in the year 2010 is well on its way.

Due to this it has been able fulfil the Objectives and the Direct Outcomes for the PPA project in the Kronoberg and Kalmar counties:

- A summary is that the project in Kalmar and Kronoberg is very well on its way to being a 100 % RES region. The objective on the regional level is to decrease the CO₂ emissions with 20 % to 2010.
- The work on energy balances and plans on the municipality level has been done in Alvesta, Växjö, Borgholm, Mörbylånga, Mönsterås and Oskarshamn municipalities. It is still under work in Växjö and Tingsryd but will be ready during this year due to plans in the municipalities.
- We have prepared balances and plans that can be used in other regions in Sweden. A leaflet for wind energy and information material regarding pellets, CHP from biomass and a compendium for environmental tasks for biomass in the sector 0.3- 10 MW is completed.
- During the ALTENER contract period the development of district heating has increased. Although the intended 10 new plants have not been built during this contract period this Direct Outcome will be fulfilled during the next few years. The increase of use of biomass is not measurable for the period but an overview shows that it could be over 10,000 m³ of fossil fuel that has been switched to renewable fuels during the period. This will be shown at the energy balance for 2003. The biomass market is also more mature now and the prices have stabilised on a little bit higher level that is good for the long term.
- Regarding job creation the changes in the biomass sector mean that 20-40 new jobs have been created and for the wind energy sector 5-10 new jobs.
- Wind energy is under development and in the region of Kalmar county there are now planned to be built wind turbines for more than 200 MW
- We have developed regional and local plans and policies concerning energy and climate
- Also the co-operation between the regions in the PPA 100 % RES project is very good and will continue even after this project.
- The study Öland 100 % RES has opened a discussion about the energy situation at Öland and the possibilities of achieving a sustainable society at the island Öland. The study shows that Öland can reach the vision to be 100 % RES if the wind power develops. This is also the case for other municipalities as Alvesta, Växjö, Älmhult and Tingsryd.
- The increased use of pellets in domestic houses shows that the interest in this fuel is growing and more pellets are used new house-owners dare to make this investment. The project "Trygg pelletsvärme..." has helped a lot of house owners to decide to choose pellets.
- The continuation of efforts to increase small-scale district heating is going on with good results. A summary for these plants in Kronoberg and Kalmar is within the Swedish Annexes.
- The CHP study shows possibilities of development on a small scale over 1 MW.
- The drafts of the regional and municipality energy balances were received with great interest and many of the municipalities are asking for the local energy balances and are waiting impatiently for them to be ready. We are working hard to meet these demands.
- So far ESS has had positive feedback on the work, and key persons in the region have adopted the project and the results so far. ESS look forward to the future work with great optimism and we are convinced that this work will help the region to reach the vision of 100 % RES.

5. ITALIAN PARTNER REPORT ITALIAN PARTNER FINAL REPORT

Prepared by Federazione Trentina Delle Cooperative

5.1 Introduction

Federazione Trentina delle Cooperative has been working on the ALTENER Project with Consorzio Lavoro Ambiente – CLA (Consortium Labour and Environment) , Consorzi Elettrici (Electric Consortia) of Stenico, Storo and Pozza di Fassa, Consorzio dei Comuni (Municipalities Consortia of Trentino) and it has the special responsibility for the Energy Service Department of the Autonomous Province of Trento (PAT). Cassa Centrale delle Casse Rurali del Trentino (Central Cooperative Bank of Trentino) has also contributed by granting loans on easy terms payments for all those (private citizens and SMEs) interested in investing in RES.

Historical and Geographical Background

Trentino Alto Adige Region is divided into the Autonomous Provinces of Trento and Bolzano. The autonomy of Trentino allows for a wide administrative and legislative competence, supported by financial funds provided by the State. The Council of the Autonomous Province of Trento discusses and approves laws in diverse social sectors and these measures are ratified by the central government in Rome.

Trentino covers a surface area of 6,204 sq. km from an altitude of 8 m above sea level at Lake Garda to above 3,700 m at the top of Monte Cevedale: 60.8% of it is covered by forest, 5.8% is for agricultural use, 25.3% is for meadow and pastures, 8.1% is used for other purposes. The most important characteristic of the region are its mountains: 75% of the total area of the region is more than 1,000 m above sea level.

The region has a population 477,000 people living in 223 municipalities. The three primary economic sectors in the region are Services (65.2% of which tourism represents 8.5%, especially during summer and winter months), Industry (30.7%), and Agriculture (4.1%).

5.2 Energy Use and Renewable Energy in Trentino Energy Consumption

As for energy consumption, the province follows similar patterns to the national figures; oil and petrol are mostly used in the transport and industrial sectors, while natural gas and electricity are used mostly for civil uses. Final consumption (per sector) are divided up as follows (TOE):

agriculture	40	(3%)
industry	313	(23%)
transportation	436	(33%)
Civil uses	551	(41%)

Total	1341	

Half of the whole energy production derives from petrol, 26% from natural gas, 17% from electricity and 7% from solid fuels

[The local 2003 Energy Plan has been completed and provides updated information on the distribution and use of energy. It is supported by maps prepared by the CLA technicians in cooperation with the Provincia Autonoma di Trento \(See Italian Annex\).](#)

RES in Trentino

In the province hydroelectricity is the main renewable energy source and provides approx. 93% of the overall electricity requirements. There are 284 hydroelectric plants in Trentino with a total annual production (dependent on weather conditions) of between 2.8 and 4.2 TWh/yr (around 30% is for export). Most of the plants (206) have a power output of less than 220 KW, producing 0.8% of the total production. Over the whole territory, there are 54 plants with a power output greater than 220 KW, accounting for 6.2% of total production, while 93% of total production is supplied by 24 plants with a power greater than 3MW. There is no more scope for building large scale hydroelectric plant in the province. This is partly due to the limited access to finance and also due to increased environmental concerns. Small scale and micro plants may be developed if there are no detrimental environmental impacts resulting from them.

Due to its alpine vegetation and its main industries, there are also considerable resources available for energy production from biomass within the province, especially wood and agricultural waste. In the province biomass provides heat and power. The resource is currently used for individual and district heating schemes. There is currently 45MW of district heating plant in the province. There are 10 new plants currently being built or in the planning process.

Trentino also exploits solar energy. Out of a total number of more than 5,300 solar panels for hot water being installed in the province from 1990, over 1,600 were installed in 2002 alone. Nevertheless large-scale promotional work is required to increase the number of installations, especially for hotels and other tourist infrastructures. Photovoltaic panel installations have also increased over the last years, in part thanks to the high percentage contribution given by the Autonomous Province of Trento (70% of the total costs).

A substantial amount of work is required to increase awareness of energy efficiency issues within the population of Trentino. Many of the buildings are old and have no insulation or energy efficiency measures in place. Many use old and inefficient boilers to provide heating.

Nevertheless, in the recent years the interest for RES and Rational Use of Energy (RUE) has greatly increased. From 1980 to 2001, 15,000 requests for financial contributions for different renewable energies plants have been financed by the Autonomous Province of Trento (1 for every 30 inhabitants, 1 for every 12 families) and **about** 96,000 TOE have been saved every year in the district (this is about 6% of the entire energy consumption of the province, or 9% of all consumption, transportation excluded).

Above all, there is now a widespread awareness among citizens. Firms and professionals have acquired solid technological competence and professional skills.

5.3 ALTENER Project in Trentino

The objectives in the ALTENER project for Trentino have been:

1. To achieve an energy package for the single citizen/family through a network of consultancy points, which will progress towards 100% use of renewable energy.

Consultancy points have been created in the form of a network of experts among public and private organizations with Consorzio Lavoro Ambiente as leading body. The leaflet produced during the first phase of the project allows citizens to find general information on RES and contact point addresses.

2. To reduce the use of traditional energy sources supplied by the national network, both for heating and electricity to save as much energy as possible and to produce energy through RES for commercialization.

The possibility of reducing traditional energy is quantified in feasibility studies summaries and in the 2003 Local Energy Plan. (see attached annexes 1, 6, 8, 9, 10, 11).

3. The organization and eventual collection of data regarding RES and their potential application on the total territory of the Province of Trento and the selection of a few pilot areas.

The first document to be produced, was the European, national and local legal framework. The second step was to map the territory and the already existing application of RES, in order to identify possible sites for new feasibility studies in the context of the Local Energy Plan. (see attached annexes nr. 1, nr. 2 nr. 5 of the interim report)

4. The application of RES (Photovoltaics, Solar Hot Water, Wind, bio-mass resources and nearby heating) in a few selected sites.

Feasibility Studies were carried out by professionals in collaboration with the local partner of PPA 100% RES. (see attached annexes n. 5, n.6, n.8, n.9, n.10, and n.11)

5. Dissemination campaign of the results of the pilot projects in order to develop a further use of RES

See point 5.6 of this document.

6. Creation of a network of consultancy points to give services to SMEs, single citizen and/or families.

The network of consultancy points has been created by the headquarters of the local partners and in relation to financial contributions, an agreement has been signed between Federazione and the local cooperative banks.

5.4 Awareness Raising and Planning

A) RES MARKET AND LEGISLATIVE FRAMEWORK REPORT

Federazione Trentina delle Cooperative in collaboration with the Energy Service Department of the Autonomous Province of Trento has collected data regarding RES and their possible application on the territory of Trentino. We have concluded a report – “Il mercato dell’energia in Italia”) that describes the present situation of energy market in Trentino and in Italy and the legislative framework. (See Annex 1 “Il mercato dell’energia in Italia”, Interim Report)

B) MAPS OF THE TERRITORY

In the preparatory phase the expert’s team produced maps of the territory visualising and enhancing available sites for pilot projects and feasibility studies. (See Annex 5 “Map visualising sites available for pilot examples”, Interim Report)

C) LEAFLET ON RES

In this phase Federazione, in collaboration with the Energy Service Dept. of Autonomous Province of Trento, prepared a leaflet on RES to be distributed among private families through co-operative banks (341 branches scattered on the whole district). The leaflet has been added to the series on “Renewable Energies” of the Energy Service Department of Autonomous Province of Trento.

The leaflet is entitled “Renewable Energies” and it is divided into three main parts.

- A general part that illustrates what are RES and what are their benefits (for the environment, for energy saving, etc.).
- A more specific part that explains how RES can be produced by private citizens, what are the main advantages they can offer them and what are the incentives given at local, national and European level.
- The third part illustrates the PPA 100% RES project, what are its goals and purposes and where information can be obtained by the local partners of the project.

- For the distribution of this informative booklet we have chosen co-operative banks, primarily for their capillary distribution on territory. (See Annex 3 "Leaflet on RES", Interim Report)

D) TRANSNATIONAL MEETING IN TRENTO, 7TH AND 8TH OF JUNE 2002

The second transnational meeting of ALTENER PPA 100% RES was held in Trento the 7th and 8th of June 2002. Transnational partners as well as local partners presided the event, which had wide dissemination through media and the 'Collected Works' brochure that has been produced. (See Annex 2 "Collected Works", Interim Report)

E) ENERGY EXPO IN TRENTO

The leaflet was presented at the Energy Expo held in Trento from the 22nd to the 24th November. The Expo takes place every year in the autumn and it is a meeting point for all exhibitors that operate in the field of renewable energies. The event includes seminars and workshop. Within this context the project has been presented and discussed.

F) SEMINARS

A series of seminars whose objective was to train personnel able to deal with information requests at specific consultancy points (ConSORZI Elettrici, Cooperatives, PAT, Federazione) were organized. The seminars primary topics have been the presentation of: PPA 100% RES project and European Directive on Green Energy, normative framework, energy problems, conventional and renewable energy sources, energy efficiency, prices and tariffs. The seminars started on the 24th September 2002 and continued until the 10th December 2002 (4 hours once a week). The people interested have mainly been specialized workers, technicians, engineers, and management bodies. (See Annex 4 "Lectures' notes from seminars", Interim Report)

G) WHITE BOOK ON CO-OPERATION AND ENERGY

The presentation at national level of the White book on cooperation and self production of electrical energy in Italy – held in Trento on the 27th of February 2003 – has been achieved in co-operation with the national body of co-operatives "Confcooperative" and the Italian Ministry of Productive Activities.

'Libro bianco su cooperazione e autoproduzione elettrica in Italia' aims to point out the important role of cooperation in the electrical energy sector, both in production and distribution.

The book, edited by Confcooperative, focuses on three main objectives:

1. enterprise models for the development of co-operatives of self-production and distribution in the electrical energy sector
2. information on dissemination and on application possibilities of this co-operative model
3. exploration of technical and legislative data on co-operation and energy sector

The White book gives space to the ALTENER Project enhancing its innovative role in RES promotion and development strategies. (See Annex 2, Final Report)

H) VOLUNTARY AGREEMENT BETWEEN FTC AND AUTONOMOUS PROVINCE OF TRENTO

The Federazione Trentina delle Cooperative has signed a voluntary agreement with the Autonomous Province of Trento that aims to promote joint initiatives between the two bodies (private and public) in the field of renewable energy. (See Annex 3, Final Report)

I) AGREEMENT BETWEEN FTC AND THE CENTRAL CO-OPERATIVE BANK OF TRENTO

The Agreement signed by Federazione Trentina delle Cooperative and the Central Co-operative Bank allows the 341 co-operative Banks in Trentino to grant loans with payment on easy terms to clients interested in investing in renewable energy sources.

Circular letters sent by the coop Central Bank:

“Federazione Trentina delle Cooperative and the Autonomous Province of Trento – Energy Service have recently completed an agreement on promotion of lower energy consumption, the use of renewable energies, efficiency in the use of resources and reduction of gas emissions. The agreement has its roots in the ALTENER project, which aim is to experiment with models for a more rational use of energy and to develop renewable energy sources like biomass and solar energy.

The Autonomous Province of Trento has applied to the project by favouring the installation of RE plants with economic contributions to citizens (from a minimum of 25% to a maximum of 75% of the total cost). Today in Trentino there are 5,300 families who utilize renewable energies, the applications for installing RE plants are rapidly increasing (925 in 2001, 1600 in 2002); as a matter of fact this sector is expanding and becoming more and more interesting and important.

As co-operative banks, that belong to the Trentino co-operative movement, we have been asked to take part into the project. Our contribution will be carried on by offering low rate loans to realise RE plants, in order to help our clients in paying the part of RE plant's costs not covered by public funding.

On the basis of a positive evaluation of the project by the Directors Committee and the Marketing Committee, we have developed the following offer:

Maximum fundable import:	25.000 euro
Technical form:	24 up to 60 months loan
Addressed to:	owners of the building where RE plant will be installed

The evaluation on whether or not granting a loan is up to each single co-operative bank, on the basis of the financial documentation provided by the applicant.

In order to apply for low rates loans on this project from our banks, the applicant has to present the documentation certifying the approval of RE plant project by the Autonomous Province of Trento and its economical contribution.” (See Annex 4, Final Report)

J) CO-OPERATION AMONG VARIOUS AGENCIES AND BODIES

The project has aimed at strengthening co-operation between various public and private bodies.

This has been achieved through all the actions carried on in PPA 100% RES. Formal agreements have been signed, training seminars have been realized thanks to the co-operation between diverse bodies in planning and thanks to trainers involvement.

A team of experts coming from Electrical Consortia, CLA and Provincia Autonoma di Trento (both by the Energy department and Environmental Department) has worked throughout the whole project to reach excellent final results.

5.5 Feasibility Studies

General

The ALTENER project has promoted and undertaken feasibility studies to map the possibilities of applying various technologies. Although the expansion and development of small-scale hydropower has not been discounted work did not take place investigating hydro possibilities. The only work undertaken in this field was an investigation into the possibility of using renewable energy to power pumped storage facilities. Instead other technologies will be investigated. Research will be carried out into energy efficiency and renewable energy.

In this phase we have tried to encourage the target groups to advance ideas towards practical realization of projects. Consorzi Elettrici of Stenico, Storo and Pozza di Fassa and other public and private bodies have been involved to carry out feasibility studies for the application of RES (photovoltaic, solar hot water, wind, biomass resources and district heating) in selected areas.

The renewable energy resources available in Trentino are solar energy (both for heating and electricity) water (hydropower), wind and biomass (from wood and manure).

Hydroelectric power has been excluded from the feasibility studies because of its current large-scale exploitation.

In the original project we had foreseen seven feasibility studies: two on biomass, two on biogas, two on photovoltaic and one on public illumination. Due to sudden and unforeseeable problems, the engineers previously contacted for one feasibility study on biomass and one feasibility study on biogas withdrew their commitment.

We have therefore redirected the resources to another feasibility study (photovoltaic roof for CET, Cooperativa Ecologica Trentina) not included in the original project. However, these changes amount to less than 20% of the overall budget.

Regarding biomass plants based on wood waste there are already three plants working efficiently. We organized some visits involving the electrica consortia and farmers in order to show them how it would be possible to develop similar plants in their area (Stenico).

Solar energy heating systems were excluded because of their extensive use. It was considered more interesting to evaluate photovoltaic systems applied to medium sized buildings (up to 20 kW) occupied by small companies (the most frequent form of economic enterprise in Trentino).

Finally a feasibility study for a huge photovoltaic plant has been undertaken in order to verify the technical possibility of producing renewable energy not just for private need but also on a larger scale.

Biogas

Feasibility study for the production of biogas from animal waste for electricity and heating – Fivè

With the livestock industries becoming more intensive and larger, significant amounts of effluents are generated in the area of Stenico that must be collected, stored, and utilised efficiently. Properly managed manure and effluent can be used as a plant nutrient source with little negative environmental consequence.

The study aimed to find a way to treat animal manure and effluent to generate a usable energy product. Biogas coming from animal waste can be burned to produce heat, electricity, or both. A real challenge of the study is to find a way to eliminate or reuse effluent at the end of the process and to control odour.

The feasibility study for the production of biogas from animal waste involved all livestock producers in an extended area of Fivè and has been carried out with the consultancy of Consorzio Lavoro Ambiente and Consorzio Elettrico di Stenico. The experts in charge of the work have been Dr. Loschi and Dr. Niederbacher.

The area of the study includes four municipalities that are similar from a geographical and economic point of view. The economy is based on agriculture, breeding and tourism.

There is a need to harmonise traditional breeding activity and the developing tourism sector. The breeders wish to transform manure into biogas, in order to obtain an odourless product, which won't harm the balance of the water-soil ecosystem.

A co-operative plant for the production of biogas presents many advantages:

- Reduction of the impact of bad odour produced by pouring out manure
- Reduction of the impact on water tables, streams and rivers
- Centralized management of the plant and reduction of maintenance costs
- Production of electrical energy to be sold to the national electricity network or to be partially distributed to partners
- Provision of heating to the area through a tele-heating plant.

The plant would include anaerobic fermentation tubs where manure and agriculture waste can produce methane under controlled conditions. Gas motors will use the methane for electrical energy and heating.

Characteristics of the projected plant:

- | | |
|--|--------------------|
| • Livestock industries of the area: | 44 |
| • UBA total number: | 4805 |
| • Potato waste: | 1000 q |
| • Creamery waste: | 10.000 q |
| • Total power of gas motors: | 690 kW |
| • Electrical energy production per year: | 4.605.460 kWh/year |
| • Thermal energy production per year: | 3.075.010 kWh/year |
- (See Annexes 5, 6, 7, Final Report)

Biomass

Feasibility study for a district heating plant from wood biomass in Madonna di Campiglio: feasibility study for the development of a community based district-heating scheme in Madonna di Campiglio that sought to utilize the abundant biomass resources of the area. District heating is wide spread in Tretnino thank to availability of wood from forests. The study has been carried out with the consultancy of Consorzio Lavoro Ambiente. The person in charge of the work has been Dr. Martin Atzwanger. (See Annex 8, Final Report)

Solar

Feasibility study on the efficiency of photovoltaic panels in Pieve di Bono

The aim of the study was to test photovoltaic efficiency/effectiveness and economic advantage. Bucaneve Servizi is located in Chiese Valley, which lays in south-north direction and is therefore suitable for solar energy production.

The restoration and reorganisation of the building of Bucaneve Servizi is a great opportunity to realize the project proposed through the feasibility study.

The structure includes offices and an industrial shed, on which roofing photovoltaic panels could be installed.

Characteristics of the projected plant:

- Installed power on the sheds' roofing: 9,7 kWp
 - Electrical energy production pro year: 10.060 kWh/year
 - Reduction of oil consumption in 30 years: 80.000 l
 - Reduction of CO2 emissions in 30 years: 220.000 kg
- The panels will be installed on the cooperative 'Bucaneve's roof (10 kWp). Electricity production and power, costs and environmental impact will be constantly monitored. The study has been carried out with the consultancy of Consorzio Lavoro Ambiente and Consorzio Elettrico di Storo. The expert in charge of the work has been Dr. Karl Trojer. (See Annex 9, Final Report)

Feasibility study for a photovoltaic roof in Gardolo, Cooperativa Ecologica Trentina

The project's aim was to undertake an evaluation for the installation of photovoltaic panels on the roof of C.E.T. Cooperativa Ecologica Trentina, which lays in the municipality of Trento, on the side of the Avisio river.

The co-operative enterprise mainly works on environment management activities, on research and surveys of polluting agents, and on the management of purification plants, therefore in the building there are just offices and chemistry and physics laboratories.

On the occasion of the restoration and enlargement of the building, this feasibility study has evaluated the opportunity for installing a photovoltaic system on non-utilized roof surfaces.

The construction is made of a rectangular shed with a flat roof – which is now utilized as a terrace – and of the offices' building.

Thanks to the site where C.E.T. is located – on the east side of the Adige valley – the building faces south and west; its eastern side does not get as much sunlight because of the northern slope of mount Calisio. The feasibility study - also referring to the surveys of the University of Trento in a similar site - plans to build supporting frames on the flat roof of the shed.

C.E.T. uses between 3500 – 7500 kWh of electrical energy a month, if the average workday is of 8 hours and a maximum installed power of 30 kW.

This means that C.E.T. needs approximately 55000 kWh pro year.

Characteristics of the projected plant:

- Installed power on the shed's terrace: 6,7 kWp
- Installed power on the roof of the offices' building: 8,0 kWp
- Total installed power: 14,7 kWp
- Electrical energy production pro year: 16.610 kWh/year
- Reduction of oil consumption in 30 years: 145.000 l
- Reduction of CO2 emissions in 30 years: 360.000 kg

The study has been carried out with the consultancy of Consorzio Lavoro Ambiente. The expert in charge of the work has been the engineer Karl Trojer. (See Annex 10, Final Report).

Feasibility study on photovoltaic and aeolic technologies for the vast area of the Logistic platform for intermodal transportation of Trento (INTERPORTO)

The idea was to produce electric energy for the lighting system of the of the Interporto of Trento (Logistic platform for intermodal transportation) from a vast area of photovoltaic panels (6000 kWp) and from an aeolic plant (power to be evaluated).The Company is in fact consuming huge amount of electrical energy: therefore the project will have positive outcomes. However practical advantages have to be seen in long term term, as the construction of a vast area of photovoltaic panels is very expensive (labour, materials, installation, maintenance).

The study plans to achieve a vast area of photovoltaic panels on a huge surface corresponding to the area of the Logistic platform for intermodal transportation. The takes into consideration the management of the Interporto and the plans of reorganisation and enlargement of the area.

The power of the photovoltaic panels would be of 3,4 MWp, thanks to the use of the whole surfaces expanse. The area of the Interporto would become an exemplar building at international level since today the biggest photovoltaic plant on roof produces only 2,1 MWp, 60% less than the Interporto plant.

The area includes the Interporto sheds, utilized as parking for the logistic platform for intermodal transportation, and also other industrial sheds located nearby: panels would be placed on the roofing of these sheds facing sun.

The feasibility study suggests the creation of a Consortium to run the photovoltaic plant, in order to be the reference point for consumers and for the organisation that manages commercialisation of electricity.

The plant would be part of the electricity network of the northern area of Trento, but it would need substations to transform the energy, because of its high power which would not permit to utilize it for commercialisation.

The technical elements of the feasibility study are integrated by a detailed economical analysis.

Characteristics of the projected plant:

- Installed power on the sheds' roofing: 3,7 MWp
- Electrical energy production pro year: 3.800.000 kWh/year
- Reduction of oil consumption in 30 years: 33.000.000 l
- Reduction of CO2 emissions in 30 years: 78.000.000 kg

The study has been carried out with the consultancy of Consorzio Lavoro Ambiente. The expert in charge of the work has been the engineer Karl Trojer. (See Annex 11, Final Report)

Photovoltaic in the municipality of ISERA – Exemplar Building

The idea is to promote exemplar buildings, in order to encourage the use and the application of this technology not only through information campaigns but also through demonstration projects. In the Municipality of Isera photovoltaic panels has are to be applied on a public day nursery. Its location is the most suited for the panels as they can be turned to south and exploit sunshine at its best. The building represents the perfect combination between the use of a renewable source, the respect for the environment and aesthetics. The expert in charge of the work has been the engineer Emiliano Leoni. (See Annex 12, Final Report)

5.6 Dissemination

Dissemination Phase management is being considered of the utmost importance in order to reach ALTENER PPA 100% RES objectives. Many different actions have been carried out at many levels:

- Web site (www.ftcoop.it/altener/)

As for the third phase of the project, Federazione has designed and realised a web site which gives information on project's results and progresses. The Web site also contains links to information and databases and links to reach the other project's partners. It was ready to be used by the end of December 2002. (See Annex 13, Final Report)

- Video

Federazione Trentina delle Cooperative has produced a video that shows in few minutes the possible application of RES and RUE technologies in the Countries involved in the project. (See Annex 14, Final Report)

- Press release collection

The project actions and results have constantly been presented in the local and national press, raising interest among citizens. (See Annex 15, Final Report)

- White Book

The publication of "Libro bianco su cooperazione e autoproduzione elettrica in Italia" has also contributed to wider dissemination at national level of project results.

- Leaflet on RES

As we already mentioned, a leaflet on RES has been produced and distributed to a wide public.

- Co-operation Movement Network

ALTENER PPA 100% RES outcomes and renewable energy themes have been disseminated through the Italian Co-operative Movement, which gives special attention to environment and energy production and use. (See Annex 16, Final Report) Coop members have been reached and by Federazione Trentina delle Cooperative at local level and by Concooperative at national level.

Phone calls, requests of further information, and applications for RES project funding prove the success of ALTENER awareness raising campaign, which has reached wider public and has involved professionals of many different organisations, raising major interest and involvement by public administrators as well.

5.7 Delivery Partnership

As indicated above, many different actors have been involved in the development of the project. The innovative aspect have been the effective cooperation between private and public bodies in pushing towards achieving 100% Renewable Energy Communities. Federazione Trentina delle Cooperative, Consortia belonging to the coop movement, Co-operatives, private experts and professionals, Municipalities, Public Departments and Authorities have built positive relationships, setting common goals and long term strategies as basis for future collaboration.

5.8 Exemplar Status

Trentino has been investing in RES for many years through the exploitation of hydropower and public authorities have developed a strong environmental awareness. Nevertheless citizens and the private sector have not reached yet such a level of awareness and interest in environment themes.

In this context the ALTENER Project has contributed to raise environmental awareness in the wider public and to launch different RES sectors. Exploiting biomass and solar energy other than hydropower opens new paths towards establishing 100% RES Communities.

The achievement of an "Exemplar Status" in terms of renewable energy development is a long term objective which is being gradually reached through the development of a strategic approach in collaboration with Public Authorities and private bodies.

5.9 Conclusions

ALTENER PPA 100% RES has produced many relevant results at local, national and transnational level. Actions carried on throughout the project have developed deeper roots and will keep producing results even after the end of PPA 100% RES.

Expected direct outcomes planned in the project were:

- *A report of the extent of RES already in use within the whole district. (annex 2 of the interim report)*
- *A map of the whole district visualising all existing RES sites and the sites available for the pilot exemplars.(annex n.5 of the interim report)*
- *The completion of a Local Energy Plan in co-operation with Consorzio Energetico, chosen for managing the resources in the pilot areas; (CLA, Cons. Elettr., Dip. Energia). (annex 1)*
- *The completion of two feasibility studies of the local wood based activities to supply biomass to produce biofuel for co-generation (heating and power); (KLAUS). (this outcome was partially achieved but priority has been given to biogas and solar energy, as indicated by the Energy Service of the Province of Trento. Study visits have been organized for cooperative members to Predazzo and CLA have participated in the planning of the attached feasibility study – annex n. 8 - of a tele heating plant in Madonna di Campiglio . Ing. Klaus has not taken part to the action as planned.*
- *The completion of two Feasibility studies analysing the potential of biogas for generation coming from animal breeding and farms; . (annex 5, annex 6. This two studies are referred to the same area but analyse two different aspects of the pilot project)*
- *The completion of two feasibility studies for introducing solar technologies into new and existing buildings, including an analysis about the PV technologies (LEONI).*
- *Instead of two there have been elaborated three feasibility studies (two on existing buildings – annex n. 9 and n. 10 and one on new structure – annex n. 11. The expert in charge of the studies has been Ing. Karl Trojer.*
- *The completion of one analysis on the possibility of developing a public light system using PV technique; (LEONI).*

This has not be done because Ing. Leoni was unable to develop this study during the duration of this project. He gave a contribution in expert meetings by describing his PV projects, with particular regard to the building of a nursery school in Isera (annex. 12)

Additional objectives and outcomes, that were not included in the final bid, have been successfully achieved throughout the development of the project.

6. IRISH PARTNER REPORT

6.1 Introduction

This section highlights the activities and results of the work undertaken by the KARE Consortium (Kerry Awareness of Renewable Energy) to increase awareness on the application, operation and benefits of Renewable Energy Sources in County Kerry, Eire.

The KARE Consortium, co-ordinated by South Kerry Development Partnership Ltd includes sixteen members from both public and private organisations throughout County Kerry. The Consortium has been working together with members from the County Development Board and interested parties to implement the objectives of the programme in a manner that reflects the principles of sustainable development. Throughout the implementation of project the Consortium have received positive feedback from the general public and various awareness tools have been utilised in order to increase awareness of the benefits and opportunities of Renewable Energy Sources in the region.

At a time when sustainability is at the core of development issues the information and activities of the KARE Consortium has provided a forum for discussion on the opportunities and application of renewable energy sources in the County. The Kerry Awareness of Renewable Energies Consortium (KARE) trust that the information provided by the project will highlight the consequences of the current energy management and production systems in the county and subsequently encourage the use of renewable energy resources.

The members of the KARE Consortium include:

- South Kerry Development Partnership Ltd
- Institute of Technology Tralee
- Kerry Biomass Technology
- Coillte
- Saorgus
- Tuatha Chiarrai
- Partnership Trali
- North Kerry Together
- Comhar Cumhann Naomh Fhionan Teo
- Shannon Development
- South West Regional Authority
- Teagasc
- Meitheal Forbartha na Gaelteachta
- Sliabh Luachra
- Kerry County Council

6.2 Objectives (as set out in the Altener contract)

The goals of the Kerry Awareness of Renewable Energy (KARE) initiative are:

- To design and implement an integrated awareness-building programme focussed on stimulating the local market for Renewable Energy Sources.
- To encourage the Rational Use of Energy and place County Kerry onto the path towards 100% renewable energy supply.
- To build upon the County image as being 'environmentally aware', continue to protect the natural landscape of the county, and integrate with the flanking objective of growing a sustainable tourism sector in tune with the natural environment.

The mechanisms used in order to achieve these goals involved the following elements: A County Energy Audit and Energy Plan, an extensive awareness campaign, which involved numerous awareness tools such as a postal drop, educational posters, media representation and a roadshow which took place in September 2002. In addition the Consortium forwarded correspondence on the use of green energy to all customers using over 1Gwh of electricity annually. Since November 2002, such consumers are entitled to choose their supplier under the deregulation of the electricity market in Ireland. The Consortium also undertook a series of feasibility studies on demonstration projects in the region.

6.3 Background

County Kerry occupies one of the most peripheral geographic locations in Europe and has a population of approximately 133,400 inhabitants. It covers an area of 4,875km sq. in the Southwest of Ireland and can be divided topographically and demographically into two distinct regions South Kerry is characterised by high mountain ranges, National Heritage Areas and low populations levels, while North Kerry consists of extensive low lying farm lands and a slightly higher population base.

The main economic activities in the region include tourism and agriculture. However traditional agriculture is in decline, whilst tourism, which does offer potential, is highly seasonal, tending to reinforce problems of underemployment.

Approximately 90% of energy utilised in County Kerry is obtained from non-renewable resources, mainly fossil fuels such as oil and coal. In addition all such resources are imported, which means that energy expenditure in Kerry represents a constant drain on local resources. In contrast renewable energy resources such as wind and bioenergy are in abundant supply locally and represent a reliable, recession-proof supply opportunity potentially involving locally managed resources. Where large-scale renewable energy projects, excluding the construction phase, have traditionally been of only marginal value to local development, small projects, finely-tuned to meet their specific local needs represent a far more beneficial approach.

County Kerry is currently utilising approximately 2% of its potential renewable energy supply. The majority of the renewable energy supply is obtained from wind power and small-scale hydropower projects at County Council water treatment works. Bioenergy which has major potential in the county is being utilised at a waste water treatment works

and some manufacturing plants in the county, however the full potential of this resource is not been fully capitalised. In the north of the county intensive agricultural activities could benefit from the use of renewable technologies such as anaerobic digestion, while the southern region which is has a high level of commercial forestation could capitalise on the use of wood as a fuel.

Oil is the predominant fuel source in the county. This may be attributed in part to increased transport and the number of households that have switched from solid fuel heating to oil fired central heating systems. Traditionally peat played a major role in energy production in the region, however increasing environmental pressure and the efficiencies and conveniences of conventional oil and electricity systems have led to a decline of the use of this resource.

County Kerry is a region that is still developing its internal infrastructure and simultaneously has the potential to produce large amounts of renewable energy. Ample supplies of renewable energy resources exist in the area, particularly biomass and wind. This confluence of circumstances represents an immense opportunity that must not be missed. The ALTENER project has enabled the development of the first energy based partnership in the region, and has increased awareness of the technological, economic and environmental benefits of renewable energy among Consortium members and throughout various sectors in the county.

6.4 Events Undertaken

The following list presents a summary of events that were undertaken for the ALTENER project:

- Audit Report
- Energy Strategy
- Postal drop of 26,000 Brochure on RES/Press Releases
- Conference representation
- Exemplar building search
- Database on RES Enquires
- Radio interview
- Schools Competition – colouring, essays and posters
- Energy Road show
- Information Evenings
- Participation at Regional Science Exhibition
- Feasibility Projects

The following text provides an insight into the energy reports and the activities that have been operating to date. The audit report involves the examination of the following energy parameters in County Kerry: consumption, production, legislation, climate change, barriers to RES development and recommendations to overcome such barriers. In terms of the Strategy it is believed that innovative and practical policy is necessary in order to achieve a goal of 100% RES supply in the region, with investment and funds for RES projects a priority. The importance of renewable energy sources cannot be over looked, particularly in a climate of import dependence and increasing energy demands.

6.5 The Energy Report

The energy situation in Kerry is characterised by increasing demand, scarce indigenous sources of fossil energy, limited interconnection and a correspondingly high dependence on imports for our energy supply. The strong growth in energy demand, at the same time as more stringent environmental constraints begin to take effect, presents the single biggest challenge for energy market in the decade ahead. Other key factors are security and reliability of energy supply and the availability of adequate funding for infrastructural development. The Consortium members are of the view that the information compiled for the ALTENER project and the activities undertaken to increase awareness have provided a basis from which the vision of 100% RES supply can be progressively worked on.

6.6 Review of Relevant Legislation

In order to understand the current context of the energy sector in Ireland, a review of relevant legislation was undertaken. The main regulatory and policy influences are outlined below while a more comprehensive list is available in Irish Partner Annex 1.

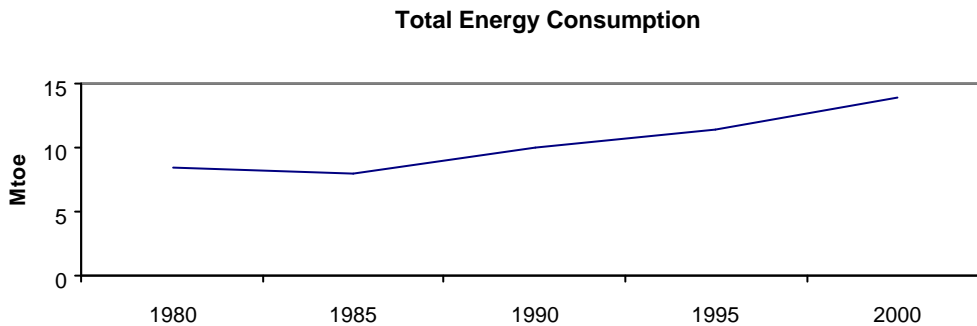
- The Directive 96/92/EC of the European Parliament and of the Council of 19th December 1996 concerning common rules for the internal market in electricity, provides that:

“ A Member state may require the system operator, when dispatching generating installations, to give priority to generating installations using renewable energy sources or waste or producing combined heat and power”
- The Electricity Regulation Act 1999 implements into law certain provisions of the EU Council Directive 96/92 and provides the regulatory framework for the introduction of competition in the generation and supply of electricity in Ireland.
- The Act, in conjunction with the European Communities (Internal Market in Electricity) Regulations 2000, provides for the establishment of the Commission for Electricity Regulation, and gives it the necessary powers to license and regulate the generation, distribution, transmission and supply of electricity.
- Green Paper on Sustainable Energy, The Department of Public Enterprise indicates how Ireland will progress towards meeting its energy requirements in an economically and environmentally sustainable way and lays out Ireland’s policy for limiting energy related CO2 emissions.
- The Green Paper proposes that increased research, raising awareness and identification and removal of barriers are essential to maximising RES and CHP development.
- In October 2000 the Department of the Environment and Local Government published its National Climate Change Strategy. This Strategy provides a framework for achieving greenhouse gas emissions reductions in the most efficient and equitable manner while continuing to support economic growth.

6.7 Energy Consumption

Energy demand has increased considerably in Ireland as a result of increased economic growth, changing values and lifestyles, technological developments and environmental considerations.

Electricity consumption has increased at the rate of 5.6% per annum during 1994-1999 compared to 3.8% in the period 1980 to 1990. This is an extremely high rate by international standards. The Transmission System Operator in Ireland announced in October 2002 that annual power demands for the next 5 years are expected to grow faster than electricity generation capacity, and there are concerns that demand will outstrip supply by 300MW.



In order to examine the current situation on a regional basis a preliminary energy audit of the county was undertaken. However it must be borne in mind that since deregulation of the market it has become increasingly difficult to obtain comprehensive information relating to energy use and supply. Due to this difficulty of obtaining information from oil companies, LPG distributors and coal merchants some of the results below were estimated.

The figures represented in the table below are a reflection of TPER. Total Primary Energy Requirement (TPER) is a measure of all energy consumed in a region including that consumed and/or lost in transformation, transmission and distribution process (e.g. electricity generation, transmission and distribution, oil refining). Tonnes of Oil Equivalent (TOE) is an international standard measure of energy. The results can be found by fuel type below.

TPER 2000 for Kerry

TOE	COAL	*PEAT	BRIQUETTES	OIL	*GAS	*ELECTRICITY
2000	16998	38760	2766	219737	2667	130724
Cost €m	6.1	8.2	1.35	140.0	1.7	36.79

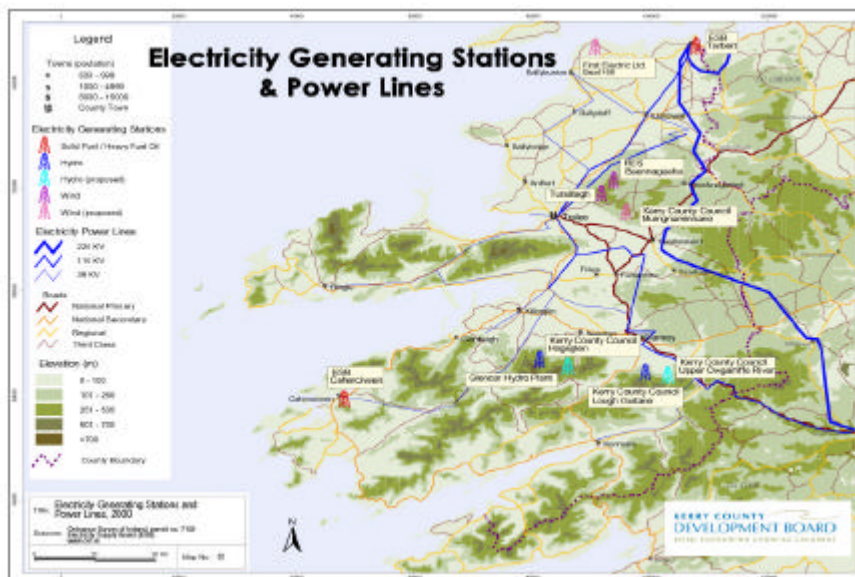
* Exact figures were unavailable for these fuels types, so above figures are estimates

TPER 1990 and 1998 for Ireland

MTOE	SOLIDS	OIL	GAS	ELECTRICITY
TPER 1990	1.76	4.29	1.45	1.02
TPER 1998	1.5	7.05	2.35	1.44
% DIFF	-14.8	64.3	62.1	41.2

In monetary terms the County is spending over Ir£193 million per annum on energy. This equates to an energy cost of €1442 per head of population in the County. Nationally oil demand grew by 64% and in County Kerry it was observed that oil was the dominant energy supply source. This may be attributed in part to increased transport and the number of households that have switched from solid fuel heating to oil fired central heating systems.

These figures also highlight an additional issue i.e. security of supply. County Kerry imports most of its energy with the exception of turf/peat. However, we still have a large reliance on foreign owned and controlled fossil fuels. The County is very vulnerable to outside forces regarding energy and therefore should seek to maximise the use of renewable energy sources.



In general Kerry reflects the national energy consumption trends, where the major spend is on oil for transport and electricity production, however on a regional basis oil consumption is slightly higher due to the presence of Tarbert Generating station. On a national level the demand for peat and coal has declined in recent years while natural gas and oil consumption has increased. County Kerry is not connected to a natural gas pipeline, which has negative implications in terms of the economy and environment, however it may also present an opportunity to increase application of renewable energies in the region as an alternative to natural gas.

6.8 The Energy Plan for Kerry

The Energy Plan for Kerry, is guided by the following objectives:

- To use the available resources to optimise the benefits of renewable energy, subject to strict environmental and economic criteria, thereby setting good example and practise to others
- Enable renewable energy to develop in the County by expanding the educational role of Local Development Agencies
- Encourage the use of renewable energy by policy formation or financial measures wherever economically and environmentally acceptable
- Monitor the use of renewable energy schemes in the county and act as a source of information to make the results of this monitoring freely available.

The actions identified to maximise RES and RUE potential in the region are as follows:

- To increase levels of awareness on the operation, application and benefits of renewable energy in Kerry.
- To maximise the use of wind power in the region
- Encourage the development of demonstration projects in the region and use existing projects as a tool to highlight best practises.
- To increase the use of biomass for heating particularly in the domestic and institutional facilities in order to reduce dependence on oil
- To encourage environmental cohesion between tourism and transport industry through increased awareness on the application of biodiesel.
- To increasing energy efficiency and reduce energy demand in county Kerry.

6.9 The Energy Plan

Emphasis was placed on awareness programmes throughout and close links were established between consortium members and key actors in the energy sector.

This allowed the Consortium to scrutinise activities or otherwise enable the County Council to demonstrate the use of renewable energy within its normal budgets as an alternative to existing expenditure, they were either to be innovative enough to attract outside funding or be suitable enough for fulfilment in partnership with outside bodies.

Possible funding for projects was examined via the National Development Plan, LEADER funding and internal resources. The AER system is better suited to large-scale installations selling power to the grid. Preparation of a bid demands significant effort and investment and the intense competition makes success uncertain. The strategy document has therefore concentrated on small local own use schemes whose economics rely upon their ability to provide a substitute for electricity usually bought in at the premises involved.

The Consortium has pursued only those technologies that were previously identified as suitable for development within the county, which are also sufficiently advanced to be economically viable within the timeframe. On this basis relevant technologies were selected.

The plan examines the selected technologies in turn, considering the nature of each technology, the energy resource available and ways in which various agencies might benefit from using it.

A course of action proposed for each technology, which aims to satisfy the objectives of the strategy, and four potential projects are outlined with a view to developing or demonstrating individual technologies.

Approximately 98% of the energy produced in Kerry comes from the combustion of fossil fuels. Only 2% of energy is derived from natural or renewable sources, mainly wind. Some efforts have been made to increase this percentage, however recent a planning policy introduced by the Local Authority has excluded wind farm expansion in the southern half of the county and the designation of a Special Area of Conservation in North Kerry has also limited the expansion in this area. At present there are 3 wind farms in Kerry with a combined capacity of 25MW and planning permission has been approved for 3 more wind farms in the east of the county which will raise wind farm capacity by 30MW. Hydro projects represent a total of 3000Kw in the county, while the major electricity production units include a 650MW Oil Burning Power Station at Tarbert, and a 5 MW Peat Station at Cahirciveen which is due for decommissioning in 2003.

Co. Kerry Indicative Scenario for Developing Key Sectors 1999-2003

Sector	Campaign Key Actions (National)	Theoretical Co. Kerry Targets based on per capita percentage E.U. population
Wind Energy	10,000 MW of wind turbine generators	44 MW of wind turbine generators
Biomass	10,000 MWth of combined heat and power biomass installations	44 MWth of combined heat and power biomass installations
	1,000,000 dwellings heated by biomass	4,400 dwellings heated by biomass
	1,000 MW of biogas installations	4.4 MW of biogas installations
	5 Mio tonnes of liquid biofuels	0.02 Mio tonnes of liquid biofuel

6.10 Wind Energy

Saorgus Energy Ltd. was formed in 1993 and was initially called Western Windpower Ltd. The principals were Mike Barry from Tralee and Aidan Forde from Killarney. Subsequently, John Bourke from Dublin joined as a third director, and the members of the company have remained the same since then.

The company specialises in the development of large wind energy sites in Ireland and overseas, and has interests in several large projects throughout the country. Powergen PLC are no longer a participant in the Irish renewables market following a buy out of their wind energy interests in Ireland in January 2003 by Saorgus Energy Ltd.

The Tursillagh project in Tralee County Kerry was initiated in 1993 when agreement was made with Coillte Teo to purchase the site. A bid for a Power Purchase Agreement (PPA) under the first round of the Alternative Energy Requirement (AER1) was made in 1994 but was unsuccessful. The site, which is approx. 60 Ha in size, was subsequently entered in AER3 where it was successful in obtaining a 15 year PPA for a 15MW (megawatt) wind farm. Construction of the 23-turbine windfarm started in November 1999 and was completed in late August 2000.

The turbines are the Vestas V47 model which, in a strong breeze, are each capable of producing enough electricity to supply almost 700 electric fires. The turbine towers are made of tubular steel and are 50m tall. The blades are made of glass-reinforced plastic and are each 23.5m long.



A 250 tonne crane erects the turbines in four lifts; bottom tower section (20t), top tower section (20t), nacelle (box on top carrying gearbox and generator, 20t) and finally the hub with three blades attached (10t).

The connection of the wind farm to the electricity network is via an underground 38kV cable which runs along the local roads to a 38/110 kV ESB substation on the northern edge of Tralee.

Tursillagh supplies 50,000,000 units of electricity per year to the ESB network. This electricity is sold on by ESB to be used throughout Kerry in homes, streets and industry. This amount of power is equivalent to fully supplying half of Kerry's homes for as long as the wind blows over Tursillagh. If you live in Kerry and it's windy outside, the chances are that the electricity powering your computer right now comes from the wind at Tursillagh.

Saorgus intends to extend the Tursillagh farm with a development of 8 turbines which are to be added to the existing wind farm of 23 turbines. The new turbines will be updated versions of the Vestas V47 turbines on the site and will each be capable of generating 850kW of electricity.

Construction is expected to start in August 2003. It is anticipated that the existing connection to the electrical network will be sufficient to cope with the increased power from the wind farm.

The Cloghboola Project is a large wind farm of 23 turbines on Cloghboola hill a few km west of Knocknagoshel in Co. Kerry. It is anticipated that large wind turbines with generation capacity of 1.75-2.0MW each will be used at this project.

This will give an overall capacity of 40-46MW, easily the largest wind farm in Kerry (at the moment Tursillagh 1 is the largest in Kerry and in Ireland).

At present, the project is awaiting a contract to sell the power from the project into the National Grid. As soon as this is complete, the construction process can begin. Once this project is complete, Kerry will be a net exporter of green electricity, almost all of it generated from wind.

The site for the proposed Cordal Wind Farm is on the county boundary between Cork and Kerry east of Castleisland, Co. Kerry and north west of Ballydesmond, Co. Cork. Planning permission for 21 turbines on the Kerry side of the border was granted by An Bord Pleanála in 1998 and for a further 20 turbines on the Cork side in 2001. Cordal was chosen as the most suitable site for this venture owing to a number of factors:

- Wind speed measurements indicate that they are high enough to justify the economic harnessing of the wind for electricity.
- The site is well served with roads within the site and from surrounding main roads.

The site is reasonably close to the National Grid at various locations. This is necessary so that electricity can be exported from the wind farm.

The turbines would not be visible from large areas of surrounding countryside and, where visible, it would mostly be a distant view.

Few people live close to the site.

- The ecological quality of a large proportion of the area has already been substantially damaged by the presence of monoculture forestry. The operation of the wind farm would not affect the existing animals and plants and would tend instead to benefit the ecology of the area because the wind farm will use only 1-2% of the overall site.
- The planning process involved discussions with Dúchas in relation to how the turbines can co-exist with Hen Harrier hawks which use the site. It also involved close liaison with the Irish Aviation Authority in regard to changes in approach procedures for aircraft using Kerry Airport.



Another Saorgus Project is located at Muingaminnane approx. 5km east of Tursillagh close to the North Kerry landfill facility. The capacity of this wind farm, which has full planning permission, will be 15.3MW. 18 Vestas V52 turbines or similar will be used. The site will have a higher capacity than phase 1 of the Tursillagh project but, because of the slightly larger turbine size, 5 fewer turbines will be used.

6.11 Kerry County Council Lough Guitane Hydro-Electric Scheme

Kerry county council operate a small hydro electric scheme on the Lough Guitane Owgarriff River Intake. The Electricity is used in the adjacent Lough Guitane pumphouse which has a demand of 350 kW approximately.

It consists of Gilkes Turgo Impulse Turbine connected to a 250 kW Electric Generator. The advantages of a Turgo Impulse Turbine are as follows:

- Wide operating range with twin spool valve control. 40 - 230 kW
- High efficiency across the range.
- Flow control to prevent water hammer.
- Suitable for river water with abrasives.
- Head level control system which ensures maximum power generation from the available water

6.12 Tralee Waste Water Treatment Plant - Anaerobic Digestion

Proposal:

Co-Digestion of Sewage Sludge and Source- Separated Organic Fraction of Municipal Solid Wastes to generate Electricity for the Plant and Thermal Heat for the Anaerobic Digester and Sludge Pasteurization.

The main benefits of A.D are:

- Minimisation of waste disposal to landfill.
- Reducing the water polluting potential of waste.
- Reduced greenhouse gas emissions.
- Reduction of odour. AD stabilizes slurries and can reduce odour by up to 80%.
- Generation of electricity and heat from the methane produced in the digestion process.
- Improving manure nutrient management by replacing mineral fertiliser.

6.13 Landfill Gas Electricity Generation

Landfill gas is produced during the decomposition of the organic matter within degradable waste. This gas can contain up to 50% methane giving it a relatively high calorific value. When exploited as a fuel, landfill gas can be used for electricity generation.

The Landfill is an engineered, contained landfill designed to control leachate and landfill gas migration through the use of barrier and collection methods. The landfill currently has an ultimate capacity of approximately 600,000 tonnes. The total accumulated waste as of the end 2002 was 370,000 tonnes. The waste being deposited at the landfill is primarily household and therefore the percentage of organic waste is estimated to be approximately 40%.

The scheme consists of :

- Two 400m³ digester tanks.
- Sludge recirculation system with heat exchanger.
- Recycled biogas sludge mixing system
- Biogas holding tank.
- 55 KWe Combined Heat and Power (CHP) biogas fuelled engine/generator.
- Present gas yield is 500 m³ approximately.
- Methane content - over 50%
- Electricity generation capacity of 600kW at present and 1MW in 2004.
- 1MW would supply the needs of 2,000 houses.
- Reduction in harmful greenhouse gas emissions in excess of 33,000 tonnes of CO₂ equivalent/year.

6.14 Motor Tax Office

The Motor Taxation at the County Council buildings in Tralee is an exemplar facility for the demonstration of renewable technologies. The building fabric is highly insulated in all elements of walls, floors and roof.

It contains a geothermal heating/cooling system., solar water heating system, natural ventilation system, energy efficient lighting with movement sensors and a Building Management System.

Geothermal Heatpump

The thermal reservoir consists of an area of 2,000 sq. meters containing 5,100m. of underground collector tubing.

- The heatpump unit comprises of two fully independent refrigeration circuits.
- Rating conditions for heating: Condenser leaving water +40°C - Evaporator leaving water +3°C.
- Electricity input power: 35 kW
- Heat output power 130 kW
- Co-efficient of performance: 3.7
- The heat pump obtains over 70% of its energy “free of charge” from the ground.
- The building fabric is highly insulated - 3 hrs operation of the Heatpump, at night, is sufficient for a full day’s heat requirement.
- Hot water is supplied “free of charge” by the solar collectors on the roof.

Building Research Energy Conservation Unit (BRESCU) Motor Tax Building Management System

- Controls the heatpump. (temperature + time)
- Controls the temperature in each room by regulating the individual heating/cooling circuits.
- Monitors and records the electricity consumption.
- Monitors and records all room temperatures and operations within the heating/cooling circuits.

6.15 Future Plans by Kerry County Council

Future plans for the expansion of renewable energy within the County Council are as follows:

6.8 MW Windfarm at Stack's Mountains

1.0 MW Hydro Project at Hag's Glin

0.5 MW Hydro Project at Owgarriff River

6.16 Wood Pellet Demonstration

- LEADER Funding has been applied for the conversion of an oil boiler at the Adult Education Centre Cahirciveen. It is hoped to use a 50kW Wood Pellet Boiler for a period of 12months, with the view to expanding the scheme to similar institutions, provided a local source of pellet products can be obtained.
- A preliminary feasibility study on the conversion of 5% MW station is being also undertaken South Kerry Development Partnership.

6.17 Awareness Campaign

An extensive awareness campaign took place throughout the county and incorporated various promotional tools. The first step to increasing public awareness on renewable energy resources was the publication of information on the ALTENER project and the benefits of renewable energy in the local papers and considerable interest was highlighted by the number of enquires made to the KARE Consortium co-ordinating body South Kerry Development Partnership Ltd.

Meetings and telephone conversations occurred between interest and relevant members in the region including the Office of Public Works, Health Boards, Town Councils, An Taisce – environmental lobby group and interested parties.

- Postal Drop of 26,000 leaflets on renewable energy resources in Co. Kerry.
- Press Releases in local newspapers, Radio Interviews, Conference Representation
- An ENERGY ROADSHOW was undertaken in September, which involved visiting the major towns in the county to promote renewable energy.
- A website for has been constructed and can be viewed at www.kerryenergy.ie

- A Schools Competition was held for all schools throughout the County to increase awareness of renewable energy sources among the younger generation of society in the region
- INFO Evenings have been held for the agricultural sector, a site visit to an alternative technology centre in Sneem Co. Kerry was held to demonstrate how to develop small scale systems.
- Kerry Science Festival –ITT. As part of National Science week the KARE consortium took part in a regional science festival held at the local institute of technology in Tralee. The exhibition included a video display of wind farm construction as well as actual solar panels and wood pellets to demonstrate the application of renewable energy technology.
- Members of the KARE Consortium have also distributed educational Posters on Renewable Energy Sources throughout the county.
- In addition the Consortium forwarded correspondence on the use of green energy to all customers using over 1Gwh of electricity annually. Since November 2002, such consumers are entitled to choose their supplier under the deregulation of the electricity market in Ireland

Along with the promotion of renewable forms of energy the Consortium is also promoting the Rational Use of Energy. Many rural houses are built of stone walls and contain low to non existent insulation measures, in order to combat low efficiency measures the Consortium has been involved with the promotion of the Low Income Housing Programme operated by Sustainable Energy Ireland. This enables community groups to avail themselves of funding to undertake actions such the installation of attic and wall insulation, draught proofing, energy efficient lighting, heating and energy awareness training. One member of the KARE Consortium, Comhar Cumann Naomh Fhionan Teo has joint forces with Cunamh Energy Action, Tralee with regard to a bid for the low income housing programme and as a result 40 houses in south Kerry will receive energy efficiency installations in 2004.

6.18 Conclusions

It is difficult to predict the technological, geopolitical and economic changes that will take place in the future, however it is important to understand current energy demand and supply situation in order to plan and develop a sustainable and viable sources of energy.

The KARE Project has opened a forum for the discussion on Renewable Energy in the County and the possibilities of increasing RES applications throughout the county. In light of the current geopolitical tension and subsequent rises in oil prices the opportunities RES offer are becoming apparent to communities throughout Kerry in conjunction with the efforts of the KARE Consortium. The project has received positive feedback from the public and there is great interest in the development of the demonstration projects. The reports will provide a valuable tool for future planning in the region and although the information was difficult to collate due to a lack of regional data, it will provide a template for other counties to follow.

During the life of the ALTNER project the KARE Consortium have identified many actions that are necessary to increase awareness and the development of renewable energy. In

providing a unique environmental platform for trans-national learning, KARE created new trading opportunities for South Kerry. Training courses have been provided, in order to improve knowledge about innovative technologies. This has highlighted the benefits and practicalities of applying the renewable energy technologies in businesses, and also demonstrated access to various funding streams.

The transnational visits have also enabled the transfer of technology and knowledge between the participating countries. The KARE Consortium regard the visits as being an important component of the project in that they highlighted the application, operation and benefits of renewable energy schemes at various levels. The project has endeavored to increase awareness of RES and RUE application throughout various sectors of the economy. The Consortium look forward to future developments in the project and are of the view that the information and activities undertaken through the ALTENER programme will assist the region to attain a vision of 100% RES supply.

Progress in achieving the 'Direct Outcomes' specified in contract work programmes can be summarised as follows:-

- Establishment of baseline information and the production of a County Energy Plan. This has been achieved and is attached as Irish Annex 3.
- Reducing local reservations to renewable energy. This has been achieved by the measures described in this report, section 6.17 above.
- Encouraging demonstration projects. These are described in sections 6.10 to 6.16 above.
- Transfer of experience. This has been achieved by the trans-national meetings, and by meetings of the KARE Consortium
- Encouraging a tenfold increase in the use of RES by 2010. The project has helped to encourage a number of steps towards this goal.
- Training programme, some training has been achieved through awareness raising activities.
- Establishment of four demonstration projects. In addition to those described, steps are being taken towards the conversion of Deelis Power Station to biomass firing.

7. Target Groups and Key Actors

7.1 UK Teesdale

This report demonstrates that in accordance with the ALTENER contract all the organisations listed in paras 4.1.1/2 have been fully involved in the delivery of the project.

In summary:

The Key Actors and Partners listed met on a regular basis to steer the project.

During the project a number of SMEs premises were examined to see if they were suitable for the introduction of renewables

Use of wood fuels from the Raby Estates was considered.

The Youth Hostels Association hosted part of the initial Transnational meeting.

Teesdale local community groups and Village Halls Consortium were involved in the Project

7.2 Sweden

As described above ESS regard politicians and people in management positions in energy companies as the real target groups. You have to present strategies to them so that they think that these are their own thoughts about the region as 100 % RES.

The next target group is the media, the press, radio, TV and other opinion makers to develop good contacts and relations. This will help in presenting new ideas about the needs of the energy and climate sector to a broad group of the public.

The third target group are teachers and pupils, to have them understand what is needed for the future. The issue is behavioural changes, and the small steps that have to be taken by many individuals.

The fourth target is the public, and our way of reaching them is through co-operation with the local energy advisors. The public is the most difficult group to reach

Together with some local advisors we have arranged a tour of exhibitions in seven municipalities with the theme " Heating in your house" .

We have a long term strategy in our contacts with different groups and as we always are working in projects with a start and an end the project has to fit into the strategy. We think this project " PPA 100 % RES " has been a perfect model for us to work with all subjects and groups.

7.3 ITALY

ALTENER PPA 100% RES in Trentino has represented a unique chance to push towards long term results in energy saving and in the use of RES by impacting on local society at many different levels.

The project has allowed the development of new competences and skills in the co-operatives expert team involved and has opened new markets for the co-operative movement creating new job opportunities.

A new network of experts at European level has been created and will be able to co-operate in future projects and in counseling and consultancy in the sector of Renewable Energy.

A team of local experts trained during the project is working in a network with public and private organizations.

ALTENER PPA 100% RES has given its indirect but effective contribution to the completion of 2003 local Energy Plan (See Annex 1, Final Report) that has been realized by public authorities setting the main objectives for future development in the use of RES and in saving energy.

Municipalities of the province, Members of Consorzio dei Comuni, have requested the coordination of the experts team in developing new projects at local level, taking as examples the feasibility studies realized with PPA 100% RES especially in the biogas sector (i.g. Municipality of Brentonico, Cavalese and Cavareno).

The co-operatives network involved in the ALTENER project is becoming a reference point for citizens interested in renewable energy.

The academic world has shown great interest in ALTENER PPA 100% RES activities and has proposed new projects to be managed in partnership with Federazione Trentina delle Cooperative and member co-operatives (eg. hydro-energy to be used in marginal sites such as mountain houses/hostels or in agriculture). (See Annex 17, Final Report)

Awareness raising pathways in the environment and RES sector have been co-planned by Schools and Federazione Trentina delle Cooperative; documents and materials produced during PPA 100% RES (leaflet, website, video...) have been utilized in these environmental education projects.

Key actors in the development of the project have been the co-operative movement, through Federazione Trentina delle Cooperative, Consorzio Lavoro Ambiente, electricity Consortia (Consorzio Elettrico di Storo, Consorzio Elettrico di Pozza di Fassa, Consorzio Elettrico Industriale di Stenico).

Co-operative enterprises and coop members have been involved through feasibility studies, dissemination of project actions and thanks to the agreement with Co-operative banks.

Key actors have worked together to involve society at many different levels: first of all local government authorities and the public sector, through the collaboration of the Energy Department of the Autonomous Province of Trento. Many Municipalities and Districts that have been involved thanks to the feasibility studies undertaken.

The project has contributed to the development of specific skills and new market opportunities thanks to experts that have been contacted, trained and involved.

Media have always been contacted and involved in publicizing actions and results of the project in order to reach wider public at local and national level.

Citizens have been reached through media, leaflets, the coop banks, the project web site. Environmental education projects are being developed by the school sector of Federazione Trentina delle Cooperative in order to reach pupils and schools. Dissemination actions have been successful since interest in RES and awareness of society have grown.

7.4 Ireland

The Key Actors and Partners identified in the contract met on a regular basis during the course of the project.

The project closely involved companies and other organisations in the agricultural, manufacturing, tourism and service sectors as described earlier in this report

8. OVERALL CONCLUSIONS

8.1 Achievement of the 100% Renewable Energy Goal

Each Partner Country has demonstrated by the preparation of Energy Plans the undertaking feasibility studies, and by raising awareness and creating partnerships, real progress can be made towards the goal of 100% renewable energy supply.

8.2 UK Teesdale

Starting from almost zero, the ALTENER project has put Teesdale onto the pathway toward 100% renewable energy Supply. At least 40% and possibly 100% of Teesdale's electricity requirements can be met from renewable sources within the District. Over time wood fuels will supply an increasing share of the heating market. Achieving a full 100% renewable energy supply covering all fuel sources would require a radical change in the heating market. These developments may well follow on from the initial groundbreaking work initiated by this ALTENER Project.

8.3 Sweden

It is hoped that the region in the long term will reach the target of being fossil fuel free. A long-term objective is to create good models for, among other things, buildings and different sub-regions. Another objective is to achieve 100% renewable energy (100% RES, Renewable Energy Sources) in these regions and create a new market for RES and create new jobs. This is also well on the way and plans and objectives to develop of the use of RES in the long-term are being taken in the regions of Kalmar and Kronoberg and in some of the local municipalities. This will be done during the coming years due to time taken by the political process. The regional environmental objectives for CO₂ emissions and climate change state that the region shall use 50 % RES in the year of 2010 and fossil fuel free in 2050.

Co-operation between the four partner countries has been very good with visits to each other, exchanges of knowledge and good examples, energy studies of use of bioenergy is making progress in Teesdale helped by Swedish consultants. Co-operation with Kerry County on a study for a CHP plant and with Trentino about small-scale district heating and other contacts between the regions is also underway.

The work done in the different regions has helped in the drive towards RES in your own region and has increased co-operation to improve common work. There have been very many new and inspiring ideas. For ESS this has been a very good working project with strong co-operation, open minds and a willingness to help the other partners. We have met four times and have had weekly contacts over email and telephone. Very good working and professional relationships have been formed that will last long into the future. We are discussing exchange of employees to benchmark more closely what is done in the different regions.

The main target of achieving a 100 % RES region is very well on its way, as mentioned above; we have worked with strategic documents on the regional level as well as implementing real projects. We are successful in the strategic documents and well on our way with biomass, wind and some solar. More efforts have to be made within fuels for cars and lorries, PV, biogas and wind.

8.4 Italy

ALTENER PPA 100% RES in Trentino has represented a unique chance to push towards long term results in energy saving and in the use of RES by impacting on local society at many different levels.

The project has allowed the development of new competences and skills in the co-operatives expert team involved and has opened new markets for the co-operative movement creating new job opportunities.

A new network of experts at European level has been created and will be able to co-operate in future projects and in counseling and consultancy in the sector of Renewable Energy.

A team of local experts trained during the project is working in a network with public and private organizations.

ALTENER PPA 100% RES has given its indirect but effective contribution to the completion of 2003 local Energy Plan (See Annex 1, Final Report) that has been realized by public authorities setting the main objectives for future development in the use of RES and in saving energy.

Municipalities of the province, Members of Consorzio dei Comuni, have requested the coordination of the experts team in developing new projects at local level, taking as examples the feasibility studies realized with PPA 100% RES especially in the biogas sector (i.g. Municipality of Brentonico, Cavalese and Cavareno).

The co-operatives network involved in the ALTENER project is becoming a reference point for citizens interested in renewable energy.

The academic world has shown great interest in ALTENER PPA 100% RES activities and has proposed new projects to be managed in partnership with Federazione Trentina delle Cooperative and member co-operatives (eg. hydro-energy to be used in marginal sites such as mountain houses/hostels or in agriculture). (See Annex 17, Final Report)

Awareness raising pathways in the environment and RES sector have been co-planned by Schools and Federazione Trentina delle Cooperative; documents and materials produced during PPA 100% RES (leaflet, website, video...) have been utilized in these environmental education projects.

8.5 Ireland

As described earlier in this report, starting from a low base as far as the use of renewable energy is concerned, the ALTENER project has greatly increased awareness of the potential of these technologies for increasing economic activity and improving the environment. Over time the implementation of the projects identified, coupled with the benefits of increased awareness and demand will put County Kerry onto a firm pathway forward towards the long term goal of 100% renewable energy supply.

8.6 Final Word

All the partners are grateful to the European Commission for their financial support and encouragement for the project through the ALTENER programme. Without that support the work we have undertaken and the partnership formed would not have been possible.

In each county a solid basis of undertaking has been built which will facilitate further activity in the future leading towards our goal of 100% RES.