

CENTRAL EUROPE PROGRAMME

Thematic Study on Energy Efficiency and Renewable Energies



April 2014

This study is conducted within the thematic capitalisation activities of the CENTRAL EUROPE Programme co-financed by the ERDF.

Information on the transnational co-operation programme CENTRAL EUROPE and projects can be found on www.central2013.eu.

CENTRAL EUROPE Programme

Joint Technical Secretariat

Kirchberggasse 33-35/11

A-1070 Vienna

E-Mail: info@central2013.eu

Coordinator: Viera Slavikova

Author of the study:

GREENOVATE! EUROPE

Rue d'Arlon 63-65

1040 Brussels

Email: simon.hunkin@greenovate.eu

www.greenovate-europe.eu

Sarine BARSOUMIAN

Simon HUNKIN

Katharina KRELL

Astrid SEVERIN

With assistance from

Guillaume CORRADINO

DISCLAIMER

The opinions expressed in this document are the sole responsibility of the author(s) and do not necessarily represent the official position of the CENTRAL EUROPE Programme.

Quotes, reproduction and translation for non-commercial purposes are authorised, provided the source is acknowledged and the publisher is given prior notice and sent a copy.

Executive Summary

Energy efficiency and renewable energies have great potential for economic development in Europe's regions by boosting energy security, creating jobs and increasing regional autonomy, as well as helping to fight climate change. As the benefits of sustainable energy have become clear, the visibility of both of these policy areas has grown substantially and become a main area of focus for policy-makers. The European Union has contributed greatly to the growth of these sectors in Europe, with the Europe 20/20/20 targets setting the mid-term policy framework, and a variety of programmes and tools providing finance and support for regional development.

The countries and regions of central Europe vary greatly in their policy frameworks and have a wide disparity in their current performance and 2020 targets. Almost all countries are on track for meeting their commitments in electricity generation, but as a general trend, most are at risk of missing their targets for the heating and cooling sector, and are off track in the transport sector. The frontrunners in central Europe are Austria and Slovenia, where 30.9 and 18.8 percent of total energy consumption, respectively, comes from renewable resources. Comparatively, Hungary and the Czech Republic are at the back of the pack at 9.1 and 9.4 percent. For energy efficiency, all states of the area have great improvements to make if they are to meet their targets, with some states missing even the basics of an energy efficiency policy framework.

The CENTRAL EUROPE Programme, financed by the European Regional Development Fund (ERDF) under the European Territorial Co-operation (ETC) objective, facilitates transnational co-operation to improve the innovation, accessibility and environment of cities and regions in central Europe in order to increase their competitiveness and attractiveness. A thematic topic of the programme is 'Energy efficiency and renewable energies', wherein projects are funded to contribute to smart and sustainable growth that will help Europe to meet its 2020 targets. This study supports the delivery of high quality outputs and demonstrates the thematic value of the programme by identifying the relevance of transnational co-operation based on the analysis of existing and planned achievements of 21 CENTRAL EUROPE projects which have been assigned to the energy efficiency and renewable energies theme.

Energy efficiency involves 'delivering more services for the same energy input, or the same service for less energy input', with huge advantages for competitiveness and economic and environmental well-being. It has been estimated that if the EU's Resource Efficiency Flagship Initiative and Energy Efficiency Plan were fully enacted, they could lead to savings of around EUR 1,000 per household each year, create up to 2 million jobs and reduce greenhouse gas emissions by 740 million tonnes. The building sector has particularly high potentials for energy efficiency optimisation, being, as it is, the largest energy using sector in Europe. To improve the energy efficiency of buildings,

investments need to be made into retrofitting and renovation, with efforts to support awareness raising and education on energy efficiency potentials, and tools developed for monitoring energy performance.

Renewable energy is any energy resource naturally generated over a short timescale that is derived directly or indirectly from the sun, or from other natural movements and mechanisms from the environment. Central Europe has huge potentials in biomass, which can be used to generate electricity, provide carbon neutral heating, and produce renewable fuels for transportation. Small hydropower, wind power, solar energy and geothermal energy also have great potentials in the central Europe region, but renewable energy technologies must always be appropriate for regional conditions, which requires benchmarking of regional resources and long-term strategy planning.

A variety of policy tools are open to regions that wish to benefit from energy efficiency and renewable energies. Regulatory policies, fiscal incentives and public financing are often used at national levels, and may be scaled down to regional level depending on regional political structures. A first step for all regions for both renewable energies and energy efficiency measures is awareness raising and strategy establishment, after careful consideration of aims and regional strengths, weaknesses and potentials. Regions embarking on this route can benefit greatly from transnational co-operation to share knowledge and experiences to the benefit of all.

Previous studies of renewable energies at the regional level have noted that regions develop through different maturity stages for use of sustainable energy technologies and policies. These stages are: Commitment & Planning (benchmarking, strategy setting, public information campaigns), Emerging Markets (demonstration investments, financial and political support for first-adopters), Mature Markets (commitment to R&D, support to business development and innovation) and Saturated Markets (export focused initiatives, technological leadership). The regions of central Europe fall mostly within the Commitment & Planning and Emerging Market stages of development, making planning, tool development and demonstration investments of key importance to establishing sustainable energy uptake.

The CENTRAL EUROPE Programme and its funded projects have made substantial progress in assisting central European regions to adapt their regional policies and take advantage of the benefits of renewable energy and energy efficiency. The 21 projects under the energy efficiency and renewable energies theme have been divided into two subthemes for the purpose of presenting programme achievements.

Co-operating to reduce the carbon footprint of buildings

Eight projects fall within this subtheme, which aims to increase the uptake of energy efficiency and renewable energy technologies in both public and private buildings. The project topics range from

establishing Energy Performance Contracting (EPC) models to performing Life-Cycle Assessments of SMEs. The programme has made a strong impact in the regions involved, creating over 15 energy plans and performing at least 17 demonstrations and pilot actions. Direct influence on policies can be seen in many of the project achievements, and the tools and strategies that have been developed are perfectly suited to central Europe's development stage, with substantial potential for transfer to other regions.

Particularly promising achievements include the CEC5 Common European Sustainable Building Assessment (CESBA) tool, which provides a common framework for better understanding, implementation and promotion of building sustainability; and, EnSURE's pilot actions for testing the framework conditions for energy efficient refurbishments, which resulted in the elaboration of Sustainable Energy Action Plans and a handbook for use by other regions.

A mapping of programme achievements within this sub-theme shows that impact has been widespread across most countries in central Europe, with Hungary and Poland having performed particularly well in the Programme, whilst the Czech Republic and Slovakia have been somewhat under-represented in projects. With this said, CENTRAL EUROPE Programme achievements have evidently had influence on the establishment of the Czech Republic's Heating and Cooling Incentive (only the second such incentive in Europe), which should give a boost to the uptake of renewable heating and cooling in buildings.

Co-operating to use renewable energy sources in the regions effectively

13 projects fall within the renewable energy subtheme, aiming to increase the use of renewable energies, and particularly bioenergy, in central Europe. Projects have tackled issues from the creation of Regional Energy Concepts (RECs) to the testing of innovative biochar technologies and the establishment of knowledge and consultancy networks. The projects have had very impressive achievements, creating over twenty RECs and strategies, performing ten demonstrations and creating a variety of tools and policies. Impacts can be seen directly in national, regional and EU frameworks, such as contributing to the Danube Bioenergy Action Plan, part of the EU's Danube Region Strategy, and the above mentioned Renewable Heat Incentive.¹

Particularly interesting outputs include the 4BIOMASS Transnational Action Plan for central Europe which provided recommendations for regional-authorities and national policy-makers through co-operation with national ministries, resulting in a great deal of positive change for policy frameworks; the TRANSENERGY web-based decision supporting tool which provides information on trans-boundary geothermal potentials and created a framework for international co-operation for

¹ Part of the EU Strategy for the Danube Region:
http://ec.europa.eu/regional_policy/cooperate/danube/index_en.cfm

resource management; and, the E2BEBIS biochar demonstrations which have ambitious aims to change EU frameworks which do not currently recognise biochar as a tool for tackling CO₂ emissions. The mapping of programme achievements shows that all countries in central Europe have benefitted hugely from project activities, with outputs spread evenly amongst Member States, but with particularly impressive impact on the newer members of the EU.

Through programme activities, the CENTRAL EUROPE projects have created viable policy toolkits for both energy efficiency and renewable energies, covering the tools and actions needed for benchmarking, strategy setting and the provision of ongoing financial and political support. They have also contributed to raising awareness in the regions of sustainable energy potentials and are likely to have a large impact on central Europe to achieve its 2020 targets by supporting smart and sustainable growth through behavioural change of citizens and municipalities.

Transnational Level Recommendations

- Highlight the extremely large potential of energy efficient building renovation for local growth and job creation (up to 2million jobs, EU-wide);
- Emphasise heating and cooling activities and promote district heating and the Czech Republic's heat incentive as an inspiration for other countries;
- Take stock of the results (analyses, action plans, tools, etc.) and combine them into a comprehensive policy package for large-scale implementation (e.g. through mainstreaming programmes);
- Look to more advanced and ambitious projects based around district renovation and supporting new and innovative retrofit technologies;
- Build further on achievements and potentials in bioenergy – keep momentum and encourage roll-out throughout central Europe;
- Look further into geothermal energy which has huge potential for heating and cooling.

National and Regional Level Recommendations

- The Policy Cycle elaborated in this report, and the Policy Packages outlined in the conclusions, should be used by policy-makers interested in setting up comprehensive approaches to sustainable energy policies;
- Use mainstreaming programmes for implementing renewable energy and energy efficiency measures, particularly for energy efficient building renovation, which is still an emerging sector;
- Make use of the benchmarking tools developed by CENTRAL EUROPE projects to make mid- to long-term strategies based around their regional resources;
- Increase chances of technology uptake, by fully involving regional stakeholders, politicians and the public in debates on sustainable energy, making arguments about competitiveness and economic benefit;
- Take the lead in energy efficiency policy – where national frameworks remain inadequate – to increase regional competitiveness. National policy-makers should set the right frameworks to encourage long-term investment;
- Improve sustainable transport frameworks - regional policy-makers should look to the sustainable public transport and logistics theme of the CENTRAL EUROPE Programme for synergies.

Contents

Executive Summary	3
1. Introduction	9
2. Thematic background.....	11
2.1. Energy efficiency	11
2.2. Renewable energy	13
2.3. European policy framework	16
2.4. European regional policy	18
2.5. Policy cycle.....	21
2.6. Central European framework	25
2.6.1. Austria	27
2.6.2. Czech Republic.....	27
2.6.3. Germany.....	28
2.6.4. Hungary	28
2.6.5. Italy	29
2.6.6. Poland	30
2.6.7. Slovakia	30
2.6.8. Slovenia.....	31
2.6.9. Ukraine	31
3. Methodology	32
3.1. Projects.....	32
3.2. Data Gathering	36
3.3. Analytical approach.....	37
3.3.1. Assessment criteria	37
3.3.2. Presentation of thematic achievements.....	38
3.3.3. Achievement – criteria matrix.....	39
4. Thematic achievements	41
4.1 Programme level analysis.....	41
4.1.1. Added value of transnational co-operation	42

4.1.2.	Common challenges	43
4.1.3.	Benefits of CENTRAL EUROPE project achievements	44
4.2	Co-operating to reduce the carbon footprint of buildings in our cities and regions ...	46
4.2.1.	Strategies and policy actions	46
4.2.2.	Awareness raising and education	49
4.2.3.	Tool development and adoption	51
4.2.4.	Knowledge transfer	54
4.2.5.	Pilot actions and investments.....	55
4.2.6.	Relevance and added-value for central Europe territories.....	57
4.3	Co-operating to use renewable energies in the regions efficiently.....	59
4.3.1.	Strategies and policy actions	59
4.3.2.	Awareness raising and education	63
4.3.3.	Tool development and adoption	65
4.3.4.	Knowledge transfer	67
4.3.5.	Pilot actions and investments.....	69
4.3.6.	Relevance and added-value for central Europe territories.....	72
5.	Conclusions and recommendations	74
5.1.	Co-operating to reduce the carbon footprint of buildings in our cities and regions ...	74
5.2.	Co-operating to use renewable energies in the regions effectively.....	77
5.3.	Programme level.....	78
	Bibliography.....	85

I. Introduction

With a population of over 150 million people and covering more than 1 million square kilometres, the CENTRAL EUROPE Programme area covers a substantial portion of the European Union, straddling the line between 'Old' and 'New' Europe. As a result, the region encompasses regions with large disparities in development, wealth and policy maturity. No other transnational programming area in Europe is as varied in technical and social infrastructure, gross domestic product or expenditure on R&D.² By encouraging transnational co-operation, the CENTRAL EUROPE Programme aims to improve the innovation, accessibility and environment of its cities and regions, thus increasing competitiveness and attractiveness.

The CENTRAL EUROPE Programme is financed by the European Regional Development Fund (ERDF), which aims to strengthen economic and social cohesion in the EU by correcting imbalances between regions. The current CENTRAL EUROPE Programme runs from 2007-2013 with a budget of EUR 231 million for funding projects. The programme co-finances transnational co-operation activities that benefit Objective 3 of the EU regional policy (2007-2013) – European Territorial Cohesion.

At the NUTS 2 statistical level, the central Europe area encompasses all regions from Austria, the Czech Republic, Hungary, Poland, Slovakia and Slovenia, as well as eight regions from eastern Germany, nine regions from northern Italy, and (although not receiving ERDF funding), five regions from western Ukraine.³ NUTS 2 regions represent the basic level at which most regional policies are applied (local authorities, city municipalities, etc.), engaging stakeholders in the process of policy-



² Österreichisches Institut für Raumplanung & Polish Academy of Sciences, Institute of Geography and Spatial Organisation – *CENTRAL EUROPE PROGRAMME: Results of the regional analysis, Document analysis, online survey, interviews, SWOT* (2012), p. 12.

³ **Germany:** Baden-Württemberg, Bayern, Berlin, Brandenburg, Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhalt, Thüringen. **Italy:** Emilia-Romagna, Friuli-Venezia Giulia, Liguria, Lombardia, Piemonte, Provincia Autonoma Bolzano/Bozen, Provincia Autonoma Trento, Valle d'Aosta/Vallée d'Aoste, Veneto. **Ukraine:** Chernivtsi, Ivano-Frankivsk, Volyn, Lviv, Zakarpattia.

development for the priorities of the CENTRAL EUROPE Programme. Target groups include regional and local authorities, development agencies, universities and research institutes, chambers of commerce, innovation centres and other relevant actors in the fields of innovation, economic development and environment.

Priority areas have been chosen to reflect the challenges that face central Europe, though they have large implications for other regions of the EU as well. The priorities are: Facilitating innovation; Improving accessibility; Using the environment responsibly; and, Enhancing the competitiveness and attractiveness of cities and regions. Projects approved under these four thematic priorities have been assigned to six thematic topics: Technology transfer and business innovation; Sustainable public transport and logistics; Environmental risk management and climate change; **Energy efficiency and renewable energies**; Demographic change and knowledge development; and, Cultural heritage and creative resources.

Within the energy efficiency and renewable energy theme, two further subthemes exist:

- **Co-operating to reduce the carbon footprint of buildings in our cities and regions** – helping urban areas to improve the energy efficiency of their building stock so they can reduce their carbon footprint;
- **Co-operating to use renewable energy sources in the regions efficiently** – Supporting regional energy planning by encouraging the use of locally available renewable energy sources.

As the 2007-2013 programming period is coming to an end, the CENTRAL EUROPE Programme seeks to capitalise programme achievements in relation to current and future EU policy frameworks. This thematic study aims to capitalise on the achievements (including both outputs and results) of the projects funded by the CENTRAL EUROPE Programme on the topic of Energy Efficiency and Renewable Energies, in line with the programme's stated objectives:

- **Support delivery of high-quality achievements:** the capitalisation will give evidence of the critical mass mobilised at the transnational level, verify potential relevance of project achievements and their uptake into regional policies, and reflect upon the territorial relevance and added value creation for the territories concerned by identifying the main achievements of the programme in energy efficiency and renewable energies.
- **Demonstrate the thematic value of the programme:** the capitalisation will facilitate communication and wider use of project findings, both within and beyond the programme, sensitise policy-makers and stakeholders in the theme, offering additional opportunities to the projects to capitalise the results and link programme achievements with the new structural framework of the Europe 2020 strategy and future energy and cohesion policy.

2. Thematic background

The visibility and importance of energy efficiency and renewable energy policy has increased over recent years, for a variety of reasons. Perhaps the most immediately obvious for many is the need to reduce greenhouse gas (GHG) emissions as a response to global warming, but equally important arguments can be made for energy security, job creation and regional autonomy. EU legislation has also contributed its fair share in catapulting renewables and energy efficiency onto the policy agendas of Europe's countries and regions.

This section will firstly explore the thematic topics of renewable energy and energy efficiency, in a sectoral manner. It will then provide an overview of the European policy framework for the theme, and lead into a discussion of the state-of-play in the central Europe regions.

2.1. Energy efficiency

Energy efficiency involves, 'delivering more services for the same energy input, or the same service for less energy input.'⁴ Energy efficiency delivers great advantages in terms of competitiveness and economic and environmental well-being. It has been estimated that the full implementation of the EU Resource Efficiency Flagship Initiative and Energy Efficiency Plan could lead to savings of around EUR 1,000 per household every year, create up to 2 million jobs and reduce greenhouse gas emissions by 740 million tonnes.⁵

However, in order to tap into these huge potentials, energy efficiency will need to become the new norm. Energy efficiency needs to be supported, not only in end use of energy, but at each stage, from primary energy extraction, through transmission, and on to end-use. Energy efficiency is one of the most cost-effective ways to ensure energy-security and reduce greenhouse gas emissions. It is often referred to as the 'low-hanging fruit' of the EU 20/20/20 targets, but challenges remain high, particularly because of the diversity of energy uses.

2.1.1. Sectors

The CENTRAL EUROPE Programme makes particular efforts in the **building sector** – the largest energy using sector in Europe, with great potential for savings to be made. Currently, the sector is responsible for around 40 percent of total energy consumption and 36 percent of greenhouse gas emissions in the EU. However, Europe has a particular old building stock, with around 40 percent of

⁴ International Energy Agency – www.iea.org/topics/energyefficiency

⁵ European Commission – *Energy Efficiency Plan 2011*, COM(2011)109

buildings predating 1960.⁶ Only around one percent of the building stock is of modern construction. In order to make old buildings more efficient, investments need to be made into renovation and retrofitting. However, across Europe a ‘one size fits all’ approach will not suffice, and different technologies and products will be needed for different types of buildings.

Energetic renovation is often discussed only in the context of cost savings for the building owner or user and reduction of greenhouse gas emissions. However, renovation also creates economic stimulus for job creation, increases property values, and reduces energy import dependency. From a societal perspective, energy efficiency in buildings reduces fuel poverty and increases comfort, with subsequent impacts on health.⁷ Possible actions include the use of proper insulation, installation of low-energy triple glazed windows, new ventilation systems with heat recovery mechanisms, sealing gaps to ensure buildings are air-tight, and using low-energy appliances.

Building energy-performance assessments are a prerequisite for the production of goals and targets, by providing an indication of potential actions to be undertaken and the savings that could be made. However, a patchwork of assessment models exists in different countries, which need to be harmonised to broaden applicability of the methodologies and to make ratings understandable to users from various markets and backgrounds. Different assessments can put different weightings on issues such as materials, energy consumption, water, pollution, carbon emissions, heat emissions and indoor environmental quality.⁸ The main challenge for deep renovation is the complexity of the problem, requiring an initial energy performance assessment, followed by integrated approaches that combine technology solutions with new financing models, user involvement and education, and policy frameworks. Each aspect by itself is difficult and requires specific skills and experience. The combination of aspects calls for strategically planned multi-stakeholder initiatives that are likely to be dependent on policy action.

New constructions are much easier to make energy efficient, with efficiency and life-cycle performance taken account of during the design and construction phase. New buildings can integrate energy efficiency measures and renewable energies concurrently; for example, planning of new constructions should respect positioning for optimal use of natural resources (geothermal heating, solar exposure, etc.), with inclusion of efficiency measures.

Energy efficiency in buildings need not only be implemented at the single-building level. Two-thirds of Europeans live in urban environments, and in order to have a maximum impact, district and city renovation strategies will be needed. District renovation can provide economies of scale and

⁶ The Economist, Intelligence Unit – *Investing in energy efficiency in Europe’s buildings: A view from the construction and real estate sectors* (2013)

⁷ Building Performance Institute Europe – *A guide to developing strategies for building energy renovation* (2013)

⁸ Roderick, Y., D. McEwan, C. Wheatley, C. Alonso – *A Comparative Study of Building Energy Performance Assessments between LEED, BREEAM and Green Start Schemes* (2009)

lead to deep penetration of energy efficient technologies. However, such programmes need leadership from regional and national governments to provide stable frameworks, long-term planning and financial assistance.⁹

Industry remains a large consumer of energy, and changes must be made at individual factory level, but also across entire value chains. For the average manufacturing company, energy represents around 10-15 percent of its total costs.¹⁰ In addition, energy savings can be achieved through the reduction of material use. Energy costs are therefore a critical cost for manufacturing firms. With rising costs of energy, ability to use resources efficiently will determine the competitiveness of companies in the global market. Although energy efficiency measures require upfront investments, once they are repaid they lead to profits from the measures, and increased competitiveness. As a starting point, energy audits can be performed, highlighting where energy is most used and wasted, with recommendations following on investments that can be made to improve efficiency. More complex analyses can be performed to understand energy and resource use across value chains, requiring larger investments and greater co-ordination, but with larger savings overall.¹¹

After buildings, **Transport** is the second largest energy-using sector, with a 32 percent share of final energy consumption.¹² Energy efficiency of vehicles has improved significantly over past decades, but there is still much that can be changed. Efficiency can be partly improved by changing user behaviour, but more can be achieved at manufacturing level by setting targets for fuel efficiency. As transport relies on oil and oil products for 96 percent of its energy needs, it is by far the most fossil fuel reliant sector.¹³ Whilst a move to non-fossil fuelled transportation is needed, energy efficiency provides the most immediate chance for change.

2.2. Renewable energy

‘Renewable Energy’ refers to, any energy resource naturally generated over a short timescale that is derived directly from the sun (such as thermal, photochemical and photoelectrical), indirectly from the sun (such as wind, which is powered by the rotation of the earth and temperature differences, hydropower, which is reliant on the water cycle and evaporation, and photosynthetic energy which

⁹ European Commission, DG Regional Policy – *Cities of tomorrow: Challenges, visions, ways forward* (2011)

¹⁰ Greenovate! Europe, *Resource efficiency potentials in manufacturing industries: A comparison of resource saving potentials of single companies vs. manufacturing value chains* (2013)

¹¹ *Ibid.*

¹² The CENTRAL EUROPE Programme operates a thematic topic on Sustainable Public Transport and Logistics, separate to the Energy Efficiency and Renewable Energies topic.

¹³ European Commission – *White paper on transport* (2011)

is stored in biomass), or from other natural movements and mechanisms of the environment (such as geothermal and tidal energy).¹⁴

Renewable energies are able to provide a range of advantages for regions that invest in them. Advantages include:

- As their name suggests, renewable resources are infinite, and because they are derived from natural processes (wind, sun, water), they are also free. As a result, most renewable energies have low operational costs compared to fossil fuel sources;
- Using renewable energies improves the environment locally, through cleaner air, or through accompanying resource management, and reduce carbon emissions which are responsible for climate change;
- Renewables increase the security of supply as the resources are indigenous. Although technologies may need to be imported to less mature regions, energy resources do not;
- Renewably generated energies do not need to be transported far to end-users, reducing logistics costs and improving efficiency;
- Investing in renewable energies creates jobs and keeps money in the region, instead of flowing to energy producing regions elsewhere;
- As renewable energy technologies can be decentralised, many regions can benefit from investments and the creation of jobs that are not threatened by globalisation.

2.2.1. Sectors

The CENTRAL EUROPE Programme supports its regions to increase their use of renewable energies, with a particular focus on bioenergy, which is a particularly promising energy source for the regions. National plans expect biomass to make up between 94.2 percent (Czech Republic) to 54.2 percent (Italy) of renewable heating sources by 2020.¹⁵ Within most of the states of central Europe, biomass is the most developed renewable energy market. However, renewable energies encompass a wide range of technologies that can be fitted to any regional context, with different technologies being suitable for different regional strengths and resources. Many mature and efficient technologies are available, but further research efforts will lead to greater efficiency improvements and cost reductions.

Biomass is a very flexible energy source that can be transformed into heat, electricity, liquid fuels (such as biodiesel) and biogas, depending on how it is converted, and what form of biomass is used. Raw materials come, broadly, from three strands: forestry, agriculture and waste

¹⁴ European Renewable Energy Council – *Renewable energy in Europe: Building markets and capacity* (2004), p. xxxvi.

¹⁵ Ecofys – *Towards nearly zero-energy buildings: Definition of common principles under the EPBD* (2013)

(forestry, agricultural and biodegradable municipal solid waste). Conversion methods are combustion, thermo-chemical conversion, biochemical processes and physico-chemical.¹⁶

The most widely used conversion method is simple combustion to produce heat, and this is biomass's main use, with around 95 percent of renewable heat coming from biomass combustion. Wooden logs and pellets are viable for small scale heating systems, but larger systems are able to use wastes and refuses from the wood industry. Emerging technologies include the production of lignocellulosic ethanol, which uses only the wood of plants – rather than the edible parts, or energy crops – to produce ethanol that can be mixed with fuel or used in industrial processes, with other current efforts aiming at integrating so far unused biomass into the formal energy supply chain.

Other technologies of use to the central Europe area include small hydropower, wind power, solar power and geothermal power. **Small hydropower** plants (capacity of under 10MW) have developed to respect natural water habitats, and have a very limited environmental impact compared to large hydropower plants that require dam construction. Yet, permitting can be a challenge in many countries, but there is an abundance of abandoned plants across Europe that could quickly, and relatively cheaply, be brought back on-line for energy production. Small hydropower is very cost effective, as plants have a long-life span with low-cost maintenance.

Wind power is the fastest growing electricity generation technology and in locations with good conditions, it is already cost-competitive. Europe is the front runner in the technology, with growth largely driven by Feed-In-Tariffs. The intermittency of wind and grid connection issues requiring good planning and management.

Solar energy can be used in many different applications. The production of electricity from solar power can be achieved through the use of photovoltaics (PV) and concentrated solar power (CSP), whilst solar thermal collectors produce heat for both water and spatial heating. Trends include the emergence of concentrated PV cells to increase the yield of receptors, without increasing their size and surface area, and the integration of PV into roof tiles and other construction elements. Solar thermal is a technology that can be implemented throughout the continent, being both inexpensive and easy to install, mostly onto individual houses, hotels or swimming pools. CSP, in comparison, is not suitable for many central Europe regions, being dependent on direct sunlight.

Geothermal energy can be used as an energy source for both heating and cooling (its main use) as well as for electricity production (dependent on geological conditions). Geothermal heating and cooling technology has developed in such a way as to be useable almost anywhere; as geothermal heat is a widely available indigenous source that is available everywhere. Systems either operate in low temperature soils at a shallow level using a heat pump, or by exploiting hot

¹⁶ European Renewable Energy Council – *Renewable Energy in Europe: Building markets and capacity* (2004), p. 41.

groundwater from underground, in which case, aquifer resources need to be protected. Either source can be used for individual heating systems, or in district heating.

2.3. European policy framework

Although different regions and Member States in Europe have different support policies in place, all regions function within the overall energy policy framework of the European Union. The foundation of EU energy policy can be traced back to the 1980s with the Single European Act and the single market programme.¹⁷ Since this point, energy policy has grown more important at the EU level, with greater national co-ordination and integration, although the process is still underway.

Given its importance to economic development, energy remains a vital policy area for Member States, with the EU initially given only narrow competencies to legislate for the internal energy market and environmental aspects of energy. However, the EU has gained increasing competencies, and EU Member States have also joined together to build joint strategies and targets for the transfer to sustainable energy production and use, as the value of energy efficiency and renewable energies have become increasing understood.

The 2001 Directive on the promotion of electricity produced from renewable energy sources in the internal energy market (RES-E Directive) was the first step for renewable energy targeting, setting a non-binding target of 12 percent of gross domestic energy consumption from renewables by 2010, with 22.1 percent of electricity produced by RES.¹⁸ Although the RES-E Directive targets were non-binding, it had positive effects, with national targets being set for the first time, triggering action by the Member States. The Directive was amended to add targets for the ten new states that joined in 2004 and two in 2007, before being overhauled for the 20/20/20 targets of Europe 2020.

The **Europe 2020 Strategy** is the EU's growth strategy for the period 2010-2020, combining a series of targets and flagship initiatives that aim to encourage, 'smart, sustainable and inclusive growth'. Measures within the strategy are holistically linked and mutually supporting, with targets set by the strategy focusing on employment rates, R&D investment, education, poverty and social inclusion, and climate change and energy sustainability. Renewable energy and energy efficiency

¹⁷ Wallace, H., M. Pollack & A. Young (eds.) – *Policy-making in the European Union*, Sixth ed. (2010), pp. 359-360.

¹⁸ Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market

have not received specific Flagship Initiatives, instead being cross-sectoral issues of concern to all initiatives.¹⁹

In March 2007, it was decided by the EU27 Heads of State and Government that targets should be set for 20 percent of final energy consumption to be coming from renewable resources by 2020 with a 20 percent reduction in greenhouse gas emissions. Accompanying these binding targets was the non-binding target of a 20 percent increase in energy efficiency.²⁰ The combined targets of this 'EU climate and energy package' – more informally known as the 20/20/20 targets – will contribute significantly to the goals of Europe 2020. As Member States of the EU have very different renewable energy policies and current shares of use, the RES Directive established reference levels of RES use in 2005 for the EU27 and set targets as a percentage increase on 2005 reference levels, resulting in widely different targets for each country. This agreement reflects the idea of burden-sharing and co-operation amongst European States.

Although 20/20/20 targets for energy efficiency were not binding, a host of other legislation is in place to support energy efficiency uptake. The Energy Efficiency Directive requires Member States to lead the way with energy efficiency through public procurement, energy utilities to encourage users to cut their consumption, and large companies to perform energy audits every three years.²¹ Consumer information is also to be improved, with clearer metering and billing. This latter effort supports other initiatives, including the Energy Labelling and Eco-design Directives.

In the building sector – the largest user of energy in Europe – the Energy Performance of Buildings Directive requires Member States to apply energy performance standards for new and existing buildings, ensure certification schemes are in place for building energy performance and make regular inspections of boilers and air conditioning systems mandatory.²² The long-term aim of the Directive is that all new constructions are 'zero energy buildings' by 2021 (2019 for public buildings). As part of this, Member States have been required to draw up national plans for increasing the number of zero energy buildings and set intermediate targets.

As we get ever closer to 2020, new targets and measures will need to be considered to keep up momentum and provide long-term security for investment in renewable energies and

¹⁹ Flagship initiatives are in **Smart growth**: Digital agenda for Europe; Innovation Union; Youth on the move; **Sustainable growth**: Resource efficient Europe; An industrial policy for the globalisation era; **Inclusive growth**: An agenda for new skills and jobs; European platform against poverty.

²⁰ European Commission – *Communication from the Commission, Europe 2020: A strategy for smart, sustainable and inclusive growth*. COM(2010)2020final.

²¹ Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC

²² Directive 2010/31/EU of the European Parliament and of the Council of 16 May 2010 on the energy performance of buildings

efficient technologies.²³ The European Commission has published a Communication entitled 'Energy Roadmap 2050', which explores scenarios for greater reduction in energy use, further diversification of energy supply technologies and higher uptake of renewable energies (up to 75 percent of energy generation).²⁴ In the meantime, Europe 2020 targets will only be met with continued, full engagement from national and regional players, including regional authorities and municipalities.

2.4. European regional policy

Cohesion policy plays, and will continue to play, an important role in helping regions to achieve regional energy goals, and programmes such as CENTRAL EUROPE will continue to allow regions to strengthen their policies and local frameworks. Adequate regional governance remains hugely important for the successful implementation of EU policy, with around three quarters of EU policy enacted at the regional level.²⁵ Therefore it is essential that policies be created that are adapted to the regional level, taking account of varied political, social and economic structures and strengths.

Regional energy policy plays a key role in the energy future of the EU and renewable energy and energy efficiency are, as is often said, 'two sides of the same coin'. Decentralised renewable power production can greatly increase efficiency, for example, through more efficient production and reduced transmission losses. Greenpeace have estimated that for 100 units of energy produced from fossil fuels at a centralised plant, only 22 units are used, with 62.5 units lost at generation, 3.5 in transmission and 13 through inefficient end use.²⁶

Local energy systems can be of great economic and social advantage, stimulating regional development that fits the strengths and infrastructure of the area, thus providing jobs and secure, cheap energy. Energy efficiency policies in a region can greatly boost industrial competitiveness encouraging measures that drive down resource costs. In the renewable energy field, biomass energy, for example, requires local fuel supplies, thus promoting agricultural jobs and creating rural employment through co-ordination between farmers and the renewable energy sector.

However, regions often have difficulty in implementing investment-heavy programmes or initiatives that require particular expertise. In other cases, regions may wish to adopt targets but

²³ European Renewable Energy Council – 45% by 2030: Towards a truly sustainable energy system in the EU (2011)

²⁴ European Commission – Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Energy Roadmap 2050. COM(2011)0885final.

²⁵ Committee of the Regions – Special Eurobarometer 307 on the role and impact of local and regional authorities within the European Union: Opinions on the different levels of public authorities and awareness of the Committee of the Regions (2009), p. 3.

²⁶ Greenpeace and European Renewable Energy Council – Energy [R]evolution: A sustainable EU27 Energy Outlook (2012), p. 19.

have no legal ability to make them binding. To overcome this, regional agencies can implement and manage programmes and initiatives, and public and private partners can be established. If financing does not come from the national level, and if regional taxation is not possible, then a region can attempt to secure financial support from private or European level sources. We are also increasingly seeing the integration of energy efficiency and renewable energy measures into other policy areas and existing competencies, such as urban and rural (re)development.²⁷

At the regional level, Energy Concepts and Regional Strategies are an important tool for sustainable energy implementation. The Sustainable Energy Action Plans (SEAPs) of the Covenant of Mayors are one such example, although plans can also be drawn up in other contexts. The Covenant of Mayors is based on voluntary commitments to fight against climate change, where regional authorities pledge to meet the EU's 20% CO₂ reduction target. In SEAPs, signatories to the Covenant outline their CO₂ reduction targets and how they intend to reach them, defining activities to be undertaken in line with Covenant guidelines. The Member States (including the entirety of Italy and Germany) of the central Europe region contain 1,846 regional authorities who have submitted SEAPs.²⁸

Within such strategies, there are a variety of traditional policy tools available to regions wishing to increase their share of renewable energy use. Regulatory policies, fiscal incentives and public financing have been largely successful at national level, and could be scaled down for regional use, depending on regional political structures. However, it should be noted that there may be a narrower scope for implementation, and economies of scale (or lack of) may have an impact on effectiveness. The type of policy instruments used in a region depends not only on political independence and structure though. Regions must also take account of their own development and how much experience they have in renewable energy use. A region starting out in renewable energies will need to implement very different policies to those being implemented by regions with thirty years of experience. Policies will also reflect differences in regional resources and know-how.

EU cohesion policy, broadly speaking, has the objective of reducing disparity amongst regions' levels of development to strengthen economic and social cohesion, but it is also a tool for the EU to implement its priorities at the regional level. Current cohesion policy has three main objectives:

- I. The convergence objective – aiming to stimulate growth and employment in the least developed regions (with GDP less than 75 percent of EU average), highlighting innovation and the knowledge-based society, adaptability to economic and social changes, the quality of the environment and administrative efficiency;

²⁷ REN21, p. 64

²⁸ SEAPs produced per Member State in central Europe: Austria – 8; Czech Republic – 2; Germany – 52; Hungary – 18; Italy – 1,718; Poland – 26; Slovakia – 3; Slovenia – 5; and Ukraine – 14. Figures shown are for the whole of Italy and Germany, not just the regions within the central Europe programme area.

2. The regional competitiveness and employment objective – aiming to reinforce the competitiveness and attractiveness of regions, as well as boosting employment;
3. The European territorial co-operation objective – aiming to reinforce cross-border, transnational and interregional co-operation by promoting common solutions for the regional authorities of different countries in urban, rural and coastal development, the development of economic relations and the establishment of SMEs. Co-operation is based around research, development, the knowledge-based society and risk prevention.²⁹

For all of these objectives, both ‘Energy’ and, ‘Environment and climate change’, are key funding priority areas, with particular emphasis on encouraging energy efficiency and the use of clean technologies.

For the European territorial co-operation objective (which includes transnational programmes such as CENTRAL EUROPE), the development of cross-border and transnational activities and joint strategies for sustainable development are encouraged, with focuses on innovation, the environment, accessibility and sustainable urban development. Objective three also aims to reinforce the effectiveness of regional policy by encouraging regional and local authorities to form networks and exchange experience.

Cohesion policy achieves its aims with the use of its funding instruments – the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund – which can be used to enact regional policies and strategies. Effectively, regional policy is one of the key delivery mechanisms of the Europe 2020 strategy in the regions. To ensure that cohesion funding has the desired effect, for the next programming period (2014-2020), cohesion funding is directly linked to the Europe 2020 priorities of smart, sustainable and inclusive growth.³⁰

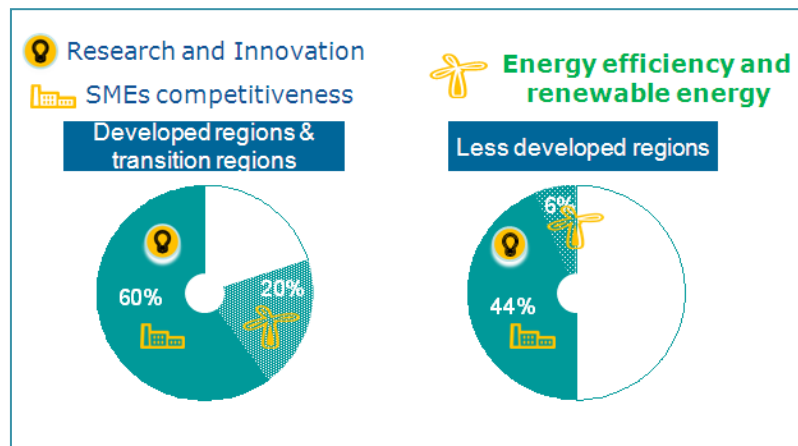
Partnership agreements, which are agreed between the Commission and Member States, set out national contributions to the thematic objectives to ensure that Member States and their regions continue to contribute to Europe 2020 objectives. Regions have also been required to identify their strengths and devise Smart Specialisation Strategies, targeting funding to areas in line with the 2020 objectives that can also have maximum impact upon regional social and economic development.

Under the three Cohesion Funds for 2014-2020, sustainable energy issues will gain an increased share compared to 2007-2013. For example, the quantity of money allocated for energy efficiency in the ERDF, Cohesion Fund and ESF is expected to more than double from the last funding period, to around EUR 17bn. For the ERDF budget, extra emphasis will be placed on energy

²⁹ European Commission, DG Regional Policy – *Cohesion Policy 2007-2013: Commentaries and official texts* (2007)

³⁰ European Commission, DG Regional Policy – *Cohesion Policy 2014-2020: Investing in growth and jobs* (2011)

efficiency and renewable energies, taking up 20 percent of budget allocated for developed regions and 6 percent for less developed regions.



Graphic replicated from presentation by Mathieu Fichter, European Commission DG REGIO, at Greenovate! Europe General Assembly, December 2012.

Accompanying these efforts are the **Research and Innovation Strategies for Smart Specialisation (RIS3)**. RIS3 encourages the design of national and regional research and innovation strategies to deliver more targeted Cohesion and Structural Fund support, in synergy with research funding from Horizon 2020.³¹ RIS3 will ensure that funding is focused into key priorities and on areas of strength that will have greatest impact. Such areas are to be drawn up each region with the assistance of local businesses, research centres and universities.³² In order to access cohesion funds under some priorities, a region will be required to have an RIS3 strategy as an ex-ante condition.³³

2.5. Policy cycle

In order to stimulate energy efficiency and renewable energy uptake in the regions, a variety of policy instruments are available. However, whilst many studies and papers are available on national level policies and policy-tools, there is less information available for regional level actions.

A first attempt to shed light on regional policy for renewable energies (but not energy efficiency) was made by EurObserv'ER in their 2011 report on the state of renewable energies

³¹ European Commission, DG Regional Policy – *Guide to Research and Innovation Strategies for Smart Specialisation (RIS3)* (2012)

³² European Commission – *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Regional Policy contributing to smart growth in Europe 2020*. COM(2010)553final.

³³ European Commission, DG Regional Policy – *Connecting Smart and Sustainable Growth through Smart Specialisation: A practical guide for ERDF managing authorities* (2012), p. 24.

across Europe, which reported on best practices from seven regions across Europe.³⁴ A repeated exercise of seven new regions was carried out the following year.³⁵ The aim of these studies was to identify motivation for regional initiatives, prevalence of tools and the requirements for adoption of renewable energies. EurObserv'ER created a 'regional policy value chain' showing regional maturity stages for implementation of increasing advanced tools.



The authors of this thematic study – Greenovate! Europe – elaborated upon this policy cycle as part of a capitalisation exercise on renewable energy for the INTERREG IVC Programme.³⁶ For this, the cycle was further developed through analysis of 212 good practices collected by the seven renewable energy projects of INTERREG IVC. This cycle has been developed further still for use in this study, adding energy efficiency policies into their respective stages. As the arguments that can be made for renewable energies overlap with energy efficiency – reduction of CO₂ emissions, energy costs and energy imports, increase of regional independence, energy security and economic performance – there are synergies between policies between the two sectors, and many of the tools that apply for renewable energy apply for energy efficiency, and vice versa.

The policy cycle is presented in the graphic above and the table below and contains four stages, starting with 'Commitment and Planning' before reaching the stages of 'Emerging Markets', 'Mature Markets' and finally 'Saturated Markets'.³⁷ For each development stage, a set of relevant policy initiatives and indicators have been listed as a 'tool box' for regional policy makers that aspire to become sustainable energy regions.

The cycle is presented here, firstly to show an optimal route for policy development, and secondly to highlight how CENTRAL EUROPE assists regions to make inroads into energy policy development. A first step for all regions for both renewable energies and energy efficiency measures is awareness raising and setting strategies, after careful consideration of aims and regional strengths, weaknesses and potentials. Integrated plans should be encouraged that take account of all energy

³⁴ EurObserv'ER – *The state of renewable energy in Europe*, 11th EurObserv'ER report (2011)

³⁵ EurObserv'ER – *The state of renewable energy in Europe*, 12th EurObserv'ER report (2012)

³⁶ Greenovate! Europe – *Thematic programme capitalisation of INTERREG IVC projects on renewable energy* (2013)

³⁷ Table and Graphic are taken from: Greenovate! Europe – *Thematic programme capitalisation of INTERREG IVC projects on renewable energy* (2013), pp. 7-9.

issues, although single-issue plans, such as bioenergy or building efficiency strategies are more feasible for regions just starting out.

The CENTRAL EUROPE Programme supports development of regional plans and energy concepts, as well as tools for awareness raising, communication and monitoring, amongst other tasks. The cycle highlights the appropriateness of CENTRAL EUROPE activities, as most regions in central Europe are in Commitment and Planning or Emerging Markets. The cycle will be referred to later as an analytical tool for judging relevancy of project outputs to the central Europe region as a whole.

The Policy Cycle – Regional sustainable energy policies by regional development stage³⁸

Commitment and Planning	
<p><i>Renewable energy</i></p> <ul style="list-style-type: none"> Awareness-raising of hidden costs of fossil fuels in electricity generation. 	<p><i>Energy Efficiency</i></p> <ul style="list-style-type: none"> Awareness-raising of life-cycle performance and assessment; Business modelling (owner-tenant problem).
<ul style="list-style-type: none"> Analysis of regional market and SWOT follow-up; Organisation of debates with regional stakeholders; Setting of clear quantitative targets (if possible branding as “xx% RES region” / “xx% EE increase”); Development of regional energy strategy and long-term policy; Peer reviews and study visits; On-going communication and co-operation with regional stakeholders; Public information campaigns. 	
Emerging Markets	
<p><i>Renewable Energy</i></p> <ul style="list-style-type: none"> Support to public acceptance and local ownership i.e. through co-operative schemes; Facilitation of permitting processes and spatial planning. 	<p><i>Energy Efficiency</i></p> <ul style="list-style-type: none"> Creation of Energy Service Companies (ESCOs); Performance regulations and building codes; Support for single-residency renovation; Energy performance labelling.

³⁸ Greenovate! Europe Analytical Framework based on EurObserv'ER – *The State of Renewable Energies in Europe 2011* and elaborated for the INTERREG IVC Capitalisation on Renewable Energy and the CENTRAL EUROPE programme Thematic Study on Energy Efficiency and Renewable Energy.

- Awareness raising through on-going information campaigns and educational programmes;
- Green public procurement of technologies and services;
- Demo investments in proven RES and EE solutions;
- Capacity building through training programmes i.e. installers, quality certification and support to leading actors;
- Technology networking and cluster development;
- Institutional support for investors (e.g. agency, business accelerators);
- Regional financing instruments (e.g. subsidies, innovation vouchers, loans, bank guarantees, investment funds, etc.).

Mature Markets

Renewable Energy

- Community ownership of RES enabling infrastructure i.e. grids, district heating and storage capacity.

Energy Efficiency

- Multi-residential building and city district renovation efforts.

- Continued development of energy targets and strategy, to ensure long-term goals
- Communication to reinforce positive image and gain public acceptance;
- Strong commitment to R&D;
- Close co-operation in dedicated triple helix cluster;
- University programmes (technical, socio-economic, project management...);
- Support to innovation and start-ups;
- Simplification of investment procedures and availability of seed and risk capital;
- Regional business leadership ambition.

Saturated Markets

- Well-developed infrastructure for transport and logistics;
- Export initiatives and incentive schemes i.e. encouragement of internationalisation strategies and business plans;
- EU/Global technology leadership ambition;
- Demo investments in innovative energy solution (e.g. pre-commercial procurement);
- Dedicated international fairs and events;
- Involvement of world leading companies;
- EU leading R&D centres;
- Clusters of international scope.

2.6. Central European framework

As specified in the Renewables Directive, all central European countries have accepted renewable energy targets to be reached by 2020. Ukraine, as a member of the Energy Community since February 2011, has also committed to targets and the implementation of the EU *acquis communautaire* on energy.³⁹

Each country was left to decide how they wished to meet their targets, and all were required to write up National Renewable Energy Action Plans (NREAPs), showing the measures that they were going to implement.⁴⁰ The 2005 renewable energy reference levels, Directive targets and NREAP forecasts are presented in the table below. Also represented, in the final column, is the view of the renewable energy industry, and what they realistically believe Member States will be able to achieve with their NREAPs.⁴¹

CENTRAL EUROPE Country	Share of energy from renewables in final consumption of energy, 2005 (%)	Share of energy from renewables in final consumption of energy, 2011 (%)	Renewables directive target for share of energy from renewable sources in final energy consumption, 2020 (%)	NREAP forecast – renewables share in final energy consumption, 2020 (%)	Renewables Industry forecast – share in final energy consumption, 2020 (based on NREAPs) (%)
Austria	23.3	30.9	34.0	34.2	46.4
Czech Republic	6.1	9.4	13.0	13.5	13.7
Germany	5.8	12.3	18.0	19.6	26.7
Hungary	4.3	9.1	13.0	14.7	18.3
Italy	5.2	11.5	17.0	16.2	19.1
Poland	7.2	10.4	15.0	15.5	18.4
Slovak Republic	6.7	9.7	14.0	15.3	26.0
Slovenia	16.0	18.8	25.0	25.3	34.1
EU27	8.5	13	20.0	20.7	24.4
Ukraine ⁴²	1.9	5.5 (2009)	11.0	N/A	N/A

³⁹ Energy Community – Protocol concerning the accession of Ukraine to the Treaty establishing the Energy Community (2010)

⁴⁰ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable energy sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

⁴¹ European Renewable Energy Council – Mapping Renewable Energy Pathways towards 2020 (2011)

⁴² Energy Community – Annual Implementation Report (2013)

With the exception of Slovenia and Austria, all countries in central Europe started in 2005 with renewable energy having a lower share of total energy consumption than the EU average. According to the renewable energy industry, though, Germany and Slovakia look set to exceed the average by 2020. Promisingly, all countries look to be on track to meet their targets, but this will only remain the case if renewables continue to be robustly supported.

From an energy efficiency point of view, Member States have been required to create National Energy Efficiency Action Plans (NEEAPs) and National Energy Plans for Nearly Zero-Energy Buildings (details of which are covered in the following sections).

The general view of the central Europe Member States is that bioenergy potential is particularly strong, there are weaknesses in renewable transport support policies, and sustainable buildings need to receive greater support. Most countries look to be on track for their 2020 targets, but must continue to be ambitious and address their areas of weakness. Countries show varying levels of ambition, and often show good intentions in their action plans, but have not fully enacted policies within their long-term frameworks.

The CENTRAL EUROPE Programme has produced a variety of policy tools and instruments which can help the region to improve further their chance of achieving their targets.

In order to better understand the achievements of the CENTRAL EUROPE Programme and its projects, we elaborate, below, profiles of the main strengths and weaknesses of each country in the area. With the exception of some areas of Germany, Italy and Austria, the country profiles reveal that central European regions are largely situated in the Commitment and Planning and Emerging Market phases of the Policy Cycle in section 2.5. The country profiles below have been elaborated using:

- Concerted Action Energy Performance of Buildings – *Implementing the Energy Performance of Buildings Directive* (2011)
- Ecofys – *Towards nearly zero-energy buildings: Definition of common principles under the EPBD* (2013);
- Ecofys – *Country profile of Ukraine: Evaluation of energy and climate policies compared to the EU* (2013)
- Energy Community – *Annual Implementation Report* (2013)
- Energy Efficiency Watch – *Energy Efficiency in Europe: Assessment on Energy Efficiency Action Plans and Policies in EU Member States* (2013)
- EurObserv'ER – *The State of Renewable Energies in Europe* (2012)
- European Commission – *EU Energy in Figures: Statistical Pocketbook* (2012)
- European Renewable Energy Council – *EU Tracking Roadmap 2013 – Keeping track of renewable energy targets towards 2020* (2013);

- European Renewable Energy Council – *Mapping Renewable Energy Pathways towards 2020* (2011)
- Worldwide Fund for Nature & Ecofys – *Climate Policy Tracker for the European Union* (2011).

2.6.1. Austria

Austria is the leading country in the EU for use of solar-thermal heat for private households, and a large share of its electricity is generated by hydropower. In total, 67 percent of Austria's electricity is generated from renewable sources. Austria also makes substantial use of bioenergy sources, for heating purposes. Despite these uses of indigenous energy, Austria still has a net energy import dependency of around 62 percent.

Austria has a relatively advanced policy mix, encouraging both energy efficiency and renewable energy uptake. In biomass and biogas heating systems, a feed-in-tariff is offered for electricity produced by combined heat and power. In order to maximise income from electricity, people are inclined towards more efficient combined generation systems. This has led to an 83 percent growth in the market since the 1990s. The Keep on Track project states that Austria has met its interim 2012 renewables target, and believes it will meet its 2020 obligations in overall renewables use and in heat, but requires further effort to meet its targets in electricity and transport.

Energy Efficiency Watch identified transport as the weakest sector in Austria's energy efficiency policies, having no specific transport related instruments, except those required by the EU. Surveyed experts were evenly split on whether Austria would meet its energy saving targets or not. According to its NREAP and NEEAP, Austria is expecting 80 percent of its predicted energy savings by 2016 to come from building related measures. At present though, Austria has no explicit targets set for increasing numbers of nearly zero-energy buildings. Austria's Energy Strategy outlines nearly-zero energy buildings as a priority area for R&D, but does not mention any specific policy instruments for the construction sector.

2.6.2. Czech Republic

The Czech Republic is the least energy dependent country of the central Europe area, with an energy import dependency of only 26 percent. To encourage renewable energy development, the Czech Republic offers a technology-specific feed-in-tariff premium for electricity as well as tax exemptions. Investment grants are used to encourage uptake of renewable heating and cooling.

With a 13 percent target for renewable energy use by 2020, the Czech Republic has put a particular focus on biomass and biogas for electricity and heat generation; a sector with substantial

growth potential. The Czech government was heavily criticised by the renewable energy industry for its retroactive halving of feed-in-tariffs, which shook investor confidence, as well as a tax of 26 percent which was placed on electricity produced by solar PV plants built in 2009 and 2010. Whilst initially lagging, the Czech Republic has begun to make good progress on signing voluntary agreements with industry to increase use of renewables and reduce greenhouse gas emissions.

The transport and appliance sectors are regarded by Energy Efficiency Watch as a real area of weakness in an otherwise well-balanced NEEAP. Although the country has a strong framework of policies in place, there is no binding energy efficiency target to be met. It is argued that more could also be done in the public sector, especially for public building retrofitting, where there are large differences in approach between regional municipalities.

2.6.3. Germany

Germany implemented the *Energiewende* ('Energy transition') in 2010, a policy that was given extra weight after Japan's Fukushima nuclear disaster and the decision to shut down all nuclear reactors in Germany. The *Energiewende* sets targets of an 80-95 percent reduction in greenhouse gas emissions, a 60 percent share of renewables and a 50 percent increase in electricity efficiency by 2050. In 2010, Germany had a net energy import dependency of 60 percent.

The main support tool in Germany is a feed-in-tariff, paid by the grid operator to the system operator, ultimately coming from electricity consumers. The tariff level is set by law and paid over a twenty year period. Investment support is provided for certain renewable energies – solar, biomass, biogas, wind, hydro and geothermal, depending on the size of the installations. The Keep on Track project notes that Germany has met its 2012 interim target, though it missed its NREAP target for the transport sector. Overall, growth in renewable electricity and heat has been higher in Germany than the EU average and the country is on track to meet its targets, though greater effort needs to be made in transport. Although making good progress, Germany has been criticised for its energy tax exemptions for the industrial sector.

Energy Efficiency Watch's survey of energy experts found that, generally, policies were considered ambitious. Forty-three percent of respondents believed that Germany would probably or definitely meet its energy efficiency targets, whilst twenty-nine percent believed they would be missed. Germany received particular praise for its building efficiency policies, but had a noted weakness in transport efficiency instruments.

2.6.4. Hungary

In 2010, Hungary had a net energy import dependency of 58 percent. Hungary offers a feed-in-tariff that is dependent on technology type and is size-specific. To encourage development of renewable

heating and cooling, investment grants are provided. Until 2011, feed-in-tariffs were used to support gas and biomass co-fired combined heat and power plants, receiving around two thirds of funding. Similarly, much funding was being paid to co-fired coal and biomass plants. However, the feed-in-tariff for electricity is now only paid to plants using pure renewable energies.

Hungary's NREAP puts particular emphasis on biomass and geothermal energy as electricity production sources, with its heat target to be met, mostly, with biomass. In the transport sector, development of bioethanol and biodiesel are to be encouraged. Hungary is estimated to produce around 54 million tonnes of biomass per year; primarily from agriculture, but also from forestry. It also has the most substantial geothermal reserves of any of the central European states.

Although Hungary has discussed the importance of energy efficiency in several strategy documents, it has not fully translated its strategies into many actual policies. The policies that do exist are strong in the appliances, public, residential and industrial sectors, but there is still room for improvement. Seventy-five percent of the experts questioned by Energy Efficiency Watch felt that Hungary would either miss its energy efficiency targets or achieve them but make only very limited savings.

2.6.5. Italy

Italy's main support tool is a quota based green certificates system, supported by a technology and size specific feed-in-tariff. Payments are guaranteed for either 15 or 20 years, depending on the technology. This tariff is complemented by a renewables obligation and green certificate scheme. Renewable heat is supported by White Certificates and tax relief. Although the heat sector in Italy is growing, there are inadequate support policies in place to encourage uptake to its maximum potential.

Keep on Track estimates that Italy will achieve its targets in renewable electricity and heat, but needs further effort in transport. The growth rate for renewable electricity doubled in 2010-2011, compared to the previous six years. With a net energy import dependency of 84 percent, Italy is the most energy dependent country in the central Europe area.

Italy's energy efficiency policies are regarded by experts as generally unambitious and forty-seven percent of the experts surveyed by Energy Efficiency Watch believe that the country will not meet its 2020 targets. Of particular concern is Italy's approach to the industry and tertiary sectors, where instruments need to be further developed. In particular, there is room for introducing binding targets, and economic incentives. For transport policy, which is controlled largely at the municipal level, there are a variety of regional policies achieving different levels of success. Greater co-ordination is needed between authorities to boost uptake of efficient transport.

2.6.6. Poland

Poland just missed its 2012 interim target for the electricity centre, but reached its overall renewables targets. As with other states, the weakest sector is transport. At current growth rates, Poland is expected to meet its 2020 targets, but there is still room for improvement in its performance. A particular area of growth for Poland is in renewable heating, where the country is trying to capture more of its high potential. Compared to other central European countries, Poland has a low energy import dependency of 32 percent.

Renewables have primarily been promoted through a quota system, requiring electricity generators and suppliers to fulfil a set quota of green certificates demonstrating renewable generation. This compares with the rest of the central Europe area, where feed-in-tariffs are the norm. Certificates are given to producers of renewable electricity who also receive investment support from national and EU funds, and receive special tax rates.

Energy Efficiency Watch note that experts are concerned by the lack of a national energy agency to support national aims, and that there is a particular lack of awareness in industry of the importance of energy efficiency.

2.6.7. Slovakia

Slovakia's main renewable energy support instrument is a feed-in-tariff, which is set annually. Slovakia has very large potentials for biomass and bioenergy, being 41 percent covered in forest. Its NREAP sets out that biomass will be heavily used for heating purposes, with electricity generation to be mostly from large hydropower plants and onshore wind; two other sectors with large potentials. In 2010, Slovakia had a net energy import dependency of 63 percent.

In both renewables and energy efficiency policies, Slovakia is considered to be one of the weaker EU states by the WWF. Outside of forestry, it states that policies are insufficient and take a piecemeal approach, lacking an integrated framework.

Slovakia's NEEAP is regarded as very weak by Energy Efficiency Watch, with over ninety percent of experts believing that insufficient progress is being made. A lack of funding is recognised as the main problem. Energy efficiency policies are strongest in the residential sector and weakest in transport. From a governance perspective, Slovakia is encouraged to increase involvement of non-governmental and market actors, with particular focus on voluntary and mandatory energy savings targets for industry.

2.6.8. Slovenia

At the time of writing the NREAPS, Slovenia had the second highest use of renewables in central Europe, after Austria. Despite this, Slovenia has a net energy import dependency of 49 percent. Having substantial forestry resources is expected to make it easy for Slovenia to meet its targets in renewable heating and cooling, though it is not so certain if the country will meet its targets in other sectors. For heating, Slovenia is also looking to expand the role of district heating, with combined heating and power to be the priority for public infrastructure. Renewable electricity generation is largely expected to rely on large hydropower; the sector that currently dominates Slovenia's renewable energy landscape.

Slovenia has an advanced policy mix when compared to others of the new EU Member States. It has, for example, introduced programmes for the co-financing of renewable heat in households, industry and districts. New builds are required to install 25 percent renewable energies, and a tax on greenhouse gas emissions has been implemented, with industries exempt only if they agree to reduce their emissions by a set level.

Slovenia, whilst regarded as generally weak in the sector, did receive some praise for its transport policies, which were included as recommended best practices for other states by Energy Efficiency Watch. Slovenia has, for example, linked public transport subsidies to the kilometres travelled by passengers, rather than just number of kilometres on the road, giving incentive for bus companies to transport more people and avoid unnecessary fuel usage.

2.6.9. Ukraine

Under the Framework of the United Nations Framework Convention on Climate Change, Ukraine has pledged a 50 percent reduction in greenhouse gas emissions by 2050, compared to 1990 levels. Ukraine is in the process of developing a comprehensive framework for promotion of renewable energy and is working towards full compliance with the EU Renewable Energy Directive, including the adoption of an NREAP, which has been drafted in 2013.

In 2007, Ukraine introduced a mandatory building code for new buildings and has put several standards in place for energy-using products. The EU energy labelling Directive has been fully transposed into national legislation, but has not fully complied with the *acquis*, with many acts remaining to be adopted.

Ukraine has elaborated an NEEAP for the period 2012-2020 and implements numerous fiscal instruments such as tax incentives and CO₂ taxation to stimulate energy efficiency. However, licensing and permitting to build renewable energy facilities remain complex and time consuming and is in great need of simplification.

3. Methodology

3.1. Projects

As an initial step for the elaboration of thematic achievements, the authors began a screening exercise for data collection from all twenty-one projects funded by the CENTRAL EUROPE area under the energy theme. In order to better analyse the projects, they were allocated to one of two subthemes.

3.1.1. Co-operating to reduce the carbon footprint of buildings in our cities and regions;

Project	Overview
CEC5 Demonstration of energy efficiency and utilisation of RE sources through public buildings www.projectcec5.eu	The CEC5 project focuses on the implementation of a common certification procedure for renewable energies and energy efficient public buildings. The overall goal is to create a model for public buildings to increase the demand for zero energy buildings on a large scale. After the development of joint criteria, seven demonstration buildings in seven central European countries will be built or renovated to highlight energy efficiency potentials. This will demonstrate and promote energy-efficient public building and show new techniques and methodologies.
CombinES Combining energy services with subsidy schemes to finance energy efficiency in Central Europe www.combines-ce.eu	CombinES aims to combine public subsidies with other types of private co-financing schemes through the Energy Performance Contracting (EPC) mechanism to promote energy efficiency in Europe by leveraging funding. The project will analyse EPC potential and prepare guidelines and recommendations for the provision of subsidy resources.
COP Cities on power www.citiesonpower.eu	COP promotes the use of renewable energy in urban areas and aims to test and develop strategies and policy concepts to increase use of renewable sources in the urban context. COP will prepare frameworks for encouraging investments in renewable energy, including Local Action Plans and a Renewable Energy Joint Strategy.
EnergyCity Reducing energy consumption and CO2 emissions in cities across Central Europe www.energycity2013.eu	EnergyCity aims to develop tools for the reduction of energy consumption and to increase energy efficiency in building stocks and urban agglomerates, particularly focusing on housing stocks and industrial areas. EnergyCity collects aerial thermography data on seven cities, to create a tool that allows for analysis of cost competitiveness of energy efficiency and renewable energy integration. This tool will allow municipalities to make better energy efficiency decisions to minimise energy losses.

<p>EnSURE</p> <p>Energy savings in urban quarters through rehabilitation and new ways of energy supply</p> <p>www.ensure-project.eu</p>	<p>EnSURE develops strategies for renovation of buildings and energy efficiency in urban areas. It provides practical guidelines to encourage municipalities, housing companies, owners, energy providers and other stakeholders to realise energy efficient renovation and to renew energy supply systems. The project implements pilot actions for awareness raising and gives advice on how to finance such activities and promote energy efficient urban development in politics.</p>
<p>GovernEE</p> <p>Good governance in energy efficiency</p> <p>www.governeeproject.eu</p>	<p>GovernEE aims to improve good governance and decision-making to strengthen policy-makers' responsibility for energy-conscious decisions. GovernEE develops and tests a strategic toolkit, including an ICT tool for monitoring public buildings, integration of PV into a historic building, and training of decision-makers.</p>
<p>LiCEA</p> <p>Life Cycle Based Energy Audits</p> <p>www.licea.eu</p>	<p>LiCEA explores the state of the art in energy auditing applied in a life cycle perspective. LiCEA aims to apply life-cycle energy audits to SMEs, allowing new energy saving opportunities. To achieve this, the project will develop a Smart Tool to audit energy consumption, develop training courses and raise awareness, test the tool with 5 SMEs (aiming for 5 percent energy use reductions in each) and perform 240 audits.</p>
<p>VIS NOVA</p> <p>Sustainable and Efficient Energy for Rural Regions</p> <p>www.vis-nova.eu</p>	<p>VIS NOVA aims to help regions to cover their energy demand through regional resources, tackling both the supply (provision of sustainable energy) and demand (efficient use) of energy. The project will elaborate Energy Efficiency plans which are based on a Transnational Sustainable Energy Strategy and EU good practice, to create new added value in the renewable energy sector.</p>

3.1.2. Co-operating to use renewable energy sources in the regions efficiently

Project	Overview
<p>4BIOMASS</p> <p>Fostering the sustainable use of renewable energy sources in Central Europe – Putting biomass into action</p> <p>www.4biomass.eu</p>	<p>4BIOMASS aims to increase biomass use as a renewable energy source and improve energy efficiency, whilst taking account of the sustainability concerns surrounding biomass use. 4BIOMASS partner share best practices and knowledge, to elaborate an action plan for sustainable biomass for energy production, with integrated bioenergy policies, that will assist in the management of national Bioenergy Action Plans (nBAPs). Using the transnational action plan, national plans are developed in line with national and regional needs.</p>

CEP-REC Introduction of Regional Energy Concepts www.cep-rec.eu	CEP-REC aims to quantify energy demand at the regional level to promote renewable energies, highlight business potentials, support strategy negotiation and promote the Regional Energy Concept (REC) instrument as a prerequisite for sustainable energy supply, by developing RECs for nine pilot regions. The project aims to secure a safe, affordable and environmentally friendly energy supply by overcoming public scepticism to renewable energies and foster consensus on their use.
Coach BioEnergy Strengthening the energetic use of biomass in Central and Eastern Europe by establishing a standardised transnational consulting net for regions www.coach-bioenergy.eu	Coach BioEnergy establishes a transnational consultancy network to overcome underuse of available knowledge on biomass technologies and services, particularly in rural areas. The project bundles the expertise of scientific institutions and practitioners, able to turn scientific knowledge into practice-oriented knowledge for consultants and regional multipliers. Coach BioEnergy considers production and harvesting processes, technologies for conversion, logistics and ecological and social aspects, to elaborate a methodology for the development of local renewable energy concepts.
DANUBENERGY Improving eco-efficiency of bio-energy production and supply in riparian areas of the Danube river basin and other floodplains in Central Europe www.danubenergy.eu	DANUBENERGY aims to increase the efficient use of bioenergy in the Danube river basin by testing technology for efficient solid fuel production and opening up new areas for biomass production. The project explores efficient integrated generation technology and the exploitation of waste materials from grasslands and other non-food biomass.
E2BEBIS Environmental and Economic Benefits from Biochar clusters in the Central area www.e2bebis.eu	E2BEBIS aims to create a transnational strategy to create a body of good practices and a series of policy instruments for the adoption of biochar technology for CO ₂ sequestration. The project will create regional clusters to operate demonstration plants and will advance new policies, contributing to full legal adoption by authorities at the regional, national and supranational levels.
EnergyRegion Effective development of dispersed renewable energy in combination with conventional energy in regions www.energy-region.eu	EnergyRegion deals with aspects of energy market diversification, dynamic development and increased dispersion of energy production. The project will create regional strategies for investment in renewable energy sources and create initiatives for promoting renewable energies and increasing social awareness.
GUTS Green Urban Transport Systems www.gutscentral.eu	GUTS aims to contribute to sustainable urban mobility in central Europe, helping cities and urban agglomerates to prepare the ground for innovative clean transport investments, with a transnational strategy on clean public transport and regional action plans.

MANERGY Paving the way for self-sufficient regional energy supply based on sustainable energy concepts www.manergyproject.eu	MANERGY aims to promote Regional Energy Concepts (RECs) and local energy strategies by developing a handbook for local authorities – elaborating a methodology to be used - with the aim of increasing renewable energy use and increasing energy efficiency. The REC analyses outlined energy potentials, after which the project performed pilot actions to test the handbook leading to the elaboration of Sustainable Energy Action Plans in some regions.
ReSOURCE Utilisation of post-mining potentials for sustainable re-development in Central European cities and regions www.resource-ce.eu	ReSOURCE aims to produce best-practice examples and guidelines on how to improve competitiveness and attractiveness of post-mining regions, with a focus on sustainable development and evaluation of biomass and geothermal potentials. Partners jointly implemented pre-investment studies, pilot actions, competitions and summer schools.
REZIPE Renewable energies for zero-emission transport in Europe www.rezipe.eu	The REZIPE project aims to reduce emissions of CO ₂ , NO _x , and fine dust by introducing zero emission vehicles in urban environments. The energy used in zero emissions vehicles is derived from clean and renewable energy sources. REZIPE tests clean vehicles in pilot projects in 6 European cities and produced outputs to support municipalities and cities to make the switch to sustainable, clean transport.
RUBIRES Rural Biological Resources www.rubires.de	RUBIRES aims to strengthen the use of renewable resources and improve efficiency, whilst also developing adjustment strategies in forestry and agriculture due to climate change. RUBIRES develops and uses new tools for knowledge exchange and transfer of technology and scientific knowhow, particularly focusing on the development and improvement of material flow management, land-use demands and the implementation of a method to manage regional added value partnerships and chains.
SEBE Sustainable and Innovative European Biogas Environment www.sebe2013.eu	SEBE aims to co-ordinate the further development of biogas technology use. SEBE establishes a common understanding of possibilities, policies and frameworks through a Transnational Knowledge Management (TKM) tool, establishes guidelines and a transnational strategy for future education and training biogas, and will create a Competence and Knowledge Centre Network to offer in-depth knowledge and know-how.
TRANSENERGY Transboundary Geothermal Energy Resources of Slovenia, Austria, Hungary and Slovakia www.transenergy-eu.geologie.ac.at	The TRANSENERGY project aims to provide tools based on a geoscientific basis by evaluating transboundary geothermal resources to promote their sustainable use. The project focuses on decision makers and stakeholders' needs by providing a user-friendly web-based decision support tool. The project makes estimations on geothermal reserves within the project area and aims to develop a harmonised management strategy of transboundary geothermal resources.

3.2. Data Gathering

Data was gathered from project application forms, project websites, project outputs and materials provided by the CENTRAL EUROPE Programme. In order to ensure a consistent approach for analysis of projects, a screening sheet was created and completed for each project by the study authors.

As a second step, a questionnaire was submitted to the lead partners of all projects for further elaboration of project achievements and successes, as well as to collect qualitative views that were not available through other sources. Eighteen out of twenty-one projects replied. Once questionnaires had been returned, seven projects were selected to be interviewed for further information, based on the screening sheets and questionnaire responses.

The selection criteria for interview were;

1. That a project had interesting achievements for which the information available during the screening was not sufficient for the more detailed analysis;
2. That projects reflected a variety of sectors (rural/urban, planning/tools, etc.);
3. Preference was given to projects that had been completed or were near completion.

Interviews were held with lead partners from:

1. **GovernEE** – 5 November 2013
2. **MANERGY** – 6 November 2013
3. **4BIOMASS** – 6 November 2013
4. **CEC5** – 7 November 2013
5. **COACH BioEnergy** – 12 November 2013
6. **EnSURE** – 15 November 2013
7. **RUBIRES** – 29 November 2013

Interviews asked for information on project rationales, specific project achievements and future plans. Interviewees were also asked to outline what they believed to be the most impressive outputs, so as to give an open-ended discussion. Responses from the questionnaires and interviews were added to the project screening sheets.

3.3. Analytical approach

In Section 4 – Thematic Achievements – the most relevant achievements from the projects in the energy theme will be presented according to subtheme, highlighting their achievements and future potentials. More specifically, this Thematic Achievements section will:

- **Give evidence of the critical mass mobilised at the transnational level related to energy efficiency and renewable energies** – Critical mass is defined as the level of awareness and implementation of a practice (policy, tool, methodology, technology) at which the rate of adoption becomes self-sustaining and creates further growth in renewable energies and energy efficiency. Critical mass is demonstrated by securing ongoing commitment from regional policy-makers or stakeholders, securing financial commitments, and having ongoing impact beyond the end of the project;
- **Verify the potential relevance of project achievements and their uptake into/contribution to policies (regional, national or EU level)** – The relevance of project achievements involves their suitability to promote sustainable energy use, in line with the Policy Cycle in Section 2.5. The uptake of project achievements can be qualitatively assessed by the perceived influence of the achievements in shaping policy frameworks, or by their potential to contribute to policy frameworks based on correlation to the Policy Cycle;
- **Reflect territorial relevance and added value created for the territories concerned by also mapping the main achievements** – Territorial relevance and added-value created reflect the geographic spread of a project impact and suitability to regional strengths and conditions. The relevance of the achievements can be judged, again, against the Policy Cycle.

3.3.1. Assessment criteria

To provide evidence to support these goals, the outstanding achievements of the projects and their potential impacts will be discussed in the following sections. In order to identify the extent to which projects have reached these goals, criteria have been elaborated, against which project achievements have been judged. The criteria are as follows:

1. **20/20/20 Relevance:** Projects have achieved progress, or are likely to achieve progress, in the central Europe regions towards the Europe 20/20/20 goals of cutting carbon dioxide emissions, boosting the use of renewable energies and improving energy efficiency, by the implementation of pilot actions or demonstrations;
2. **Sustainable Growth:** Achievements support the EU's flagship initiatives at the regional level by supporting smart, sustainable and inclusive growth and to this end they have strengthened regional policies, increased awareness or provided tools or evidence that can build a critical

mass, to stimulate the transfer to a sustainable energy future within the confines of regional policy frameworks. Achievements have demonstrated their critical mass and territorial relevance by securing ongoing commitment from regional policy-makers or stakeholders, or have secured finance, to ensure ongoing impact beyond the end of the project;

- 3. Market Appropriateness:** Achievements represent the most prevalent market maturities in central Europe – Commitment and Planning and Emerging Markets (see section 2.5. Policy Cycle). These achievements are applicable to other regions in the area, to act as inspiration and provide guidance to other policy-makers;
- 4. Transfer Potential:** Achievements have high potential for transfer to other regions outside of those where the CENTRAL EUROPE project partners are located, according to the Policy Cycle, and to the European level by acting as good practices for regional initiatives and with a potential to shape EU regional policy and programmes;
- 5. Territorial Relevance:** Project achievements have had an impact not only for a few partners of a project, but have had an impact for many of the partners, highlighting territorial relevance and added value for a variety of regions involved in the CENTRAL EUROPE Programme.

The achievements chosen for further analysis in the next sections meet either several or all of the above criteria. Below we present an overview of the achievements, why the achievements are strong, and the expected impacts. Where appropriate, the relevant criteria met have been highlighted in brackets.

3.3.2. Presentation of thematic achievements

The CENTRAL EUROPE Programme clusters its actions in five categories:

1. Joint Strategy and Action Plan Development;
2. Transnational Tool Development;
3. Joint Management Establishment;
4. Investment Preparation;
5. Pilot Actions Including Investments.

These types of actions produce a variety of different outputs, from tangible ones like small-scale renovations and strategies, to intangible ones such as improved awareness and knowledge sharing. Based on the programme action types, and an initial screening of project achievements, the following classification was elaborated. The categories (outlined further on pages 44-45) are:

1. **Strategies and policy actions** – Plans and actions that support an increased share of renewable energy resources and sustainable energy use;
2. **Awareness raising and education** – Actions that are intended to increase awareness amongst politicians, publics and stakeholders;
3. **Tool development and adoption** – Technical development and implementation of tools that can monitor energy use and potential and improve energy efficiency, including training activities;
4. **Internal knowledge transfer** – Sharing of good practices and experiences amongst project partners for mutual learning;
5. **Pilot actions and investments** – Actions that test, verify and demonstrate the feasibility of tools and technologies and provide evidence of performance.

These categories are all recognised as being vital in contributing to the critical mass (of technology/policy/methodology uptake and awareness) needed to transfer to sustainable energy use, as recognised by their inclusion in the Policy Cycle of section 2.5. These categories are particularly needed in Commitment and Planning regions and Emerging Market regions, giving an initial indication of territorial relevance.

These categories will be explored further in the Programme Level Analysis, (Section 4.2.3, below), which takes account of critical mass in the programme as a whole in the energy theme. The analysis then moves to analysis by subtheme. As a final point, territorial relevance is demonstrated by mapping achievements to reveal their territorial spread throughout central Europe.

3.3.3. Achievement – criteria matrix

The table below presents an overview of the main project achievements, in relation to the criteria they have achieved for inclusion. The table is divided into the two subthemes, and then projects are presented in alphabetical order, with reference to the section in Chapter 4 in which more detail can be found.

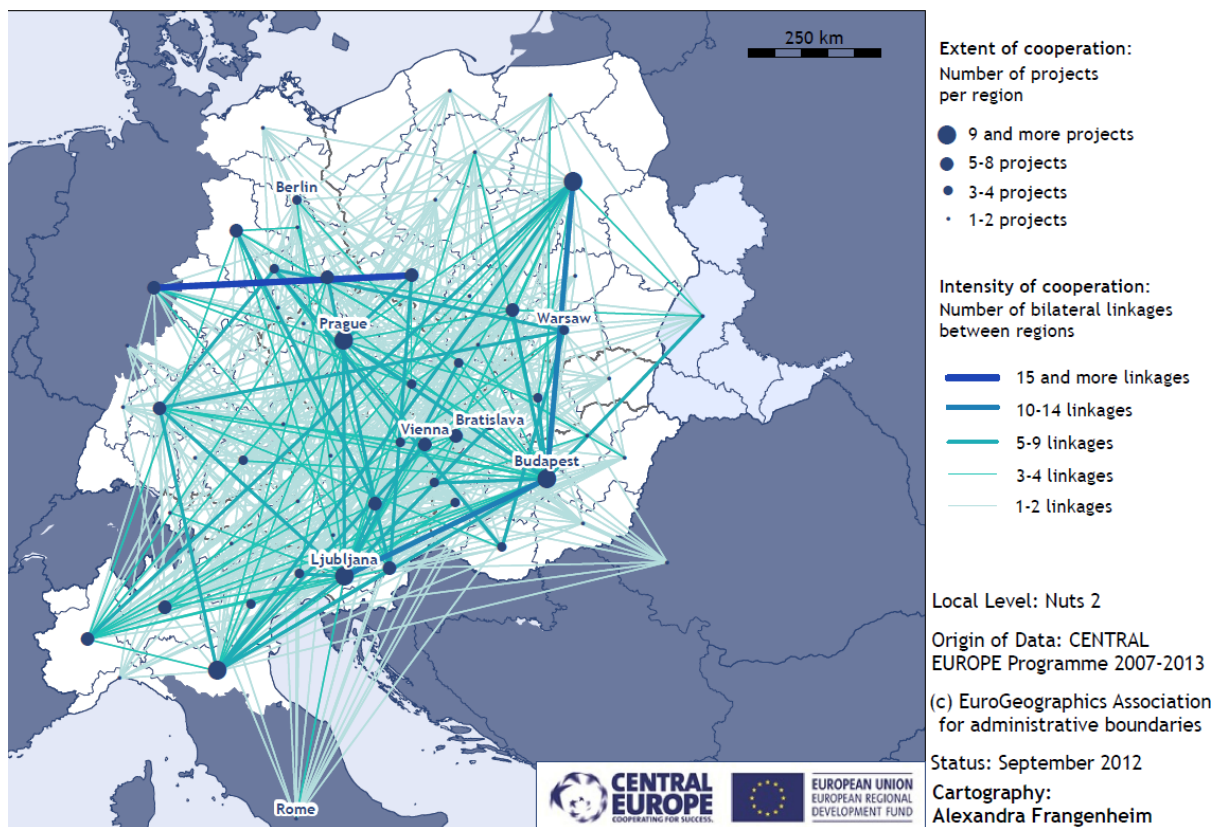
Project achievements	Criteria				
	20/20/20 Relevance	Sustainable Growth	Market Appropriateness	Transfer Potential	Territorial Relevance
Co-operating to reduce the carbon footprint of buildings in our cities and regions					
CEC5 CESBA Tool (4.3.3)	X	X	X	X	X
CEC5 Demonstration buildings (4.3.5)	X				X
CombinES Performance Contracting (4.3.1)	X		X	X	X
COP Solar and Geothermal Maps (4.3.3)	X	X	X		X
COP Local Action Plans	X	X			

(4.3.1)					
EnergyCity SDSS (4.3.3)	X	X			X
EnergyCity Citizen Awareness Campaign (4.3.2)	X		X		
EnSURE Energy Action Plans (4.3.1)	X		X	X	
EnSURE Info Points (4.3.2)	X		X		X
EnSURE Pilot Actions including renovations (4.3.5)	X	X			X
GovernEE Training and Coaching (4.3.2)	X		X		X
GovernEE Cross-Sectoral Toolkit (4.3.1)	X	X		X	
GovernEE Monitoring for Public Buildings (4.3.3)	X			X	
LiCEA SME Smart Tool (4.3.3)	X				X
VIS NOVA Energy Efficiency Plans (4.3.1)	X			X	
VIS NOVA Pilot Actions (4.3.5)	X	X			
Co-operating to use renewable energies in the regions efficiently					
4BIOMASS Transnational Action Plan (4.4.1)	X	X		X	
4BIOMASS Joint Management Tool (4.4.3)	X	X			
CEP-REC RECs (4.4.1)	X	X			
CoachBioEnergy CBE Network (4.4.2)	X	X			X
DANUBENERGY Demonstrations (4.4.5)	X	X	X		X
E2BEBIS Biochar Demonstrations (4.4.5)	X	X	X	X	X
ENERGYREGION Pilot Actions (4.4.5)	X	X	X	X	
GUTS Transnational Strategy (4.4.1)	X		X	X	X
MANERGY RECs (4.4.1)	X	X		X	
RESOURCE Resolution (4.4.2)	X	X			
REZIPE Online Tools (4.4.3)	X				
RUBIRES Geographic Information System (4.4.3)	X	X			
SEBE Future Biogas Action Plan (4.4.1)	X	X			
SEBE Knowledge Centre (4.4.2)	X				X
TRANSENERGY Web Mapping Tool (4.4.3)	X	X	X		

4. Thematic achievements

4.1 Programme level analysis

In total, the CENTRAL EUROPE Programme provides funding for 124 projects. The energy efficiency and renewable energy theme comprises 21 of the funded projects. Over 1,300 partners have taken part in a CENTRAL EUROPE project, with 210 of them participating in the energy efficiency and renewable energy theme. The map below shows co-operation linkages between partners on the energy topic in the CENTRAL EUROPE Programme, highlighting the intensity of involvement of NUTS 2 regions.⁴³



The CENTRAL EUROPE Programme has a total budget of EUR 231 million for funding projects, with around EUR 37million (14 percent of the total), allocated to energy efficiency and renewable energy projects. Internal assessment performed by the Programme based on statistics from the monitoring system estimates that by March 2013, this has created about EUR 134 million of future investment

⁴³ CENTRAL EUROPE Secretariat – Infographic: *Cooperation links and projects in fields of “energy efficiency and renewable energies” in the CENTRAL EUROPE Programme (2012)*, at: http://www.central2013.eu/fileadmin/tmpl/images/thematicpages/Networkanalysis_Energy_projects_steps5.pdf

and 24 permanent co-operation networks, as well as launching 371 pilot activities and creating around 297 jobs.⁴⁴

4.1.1. Added value of transnational co-operation

“Breaking up existing groups of regional actors through international co-operation increases political attention on the issues.”

Carsten Debes – ReSOURCE

As part of our qualitative questionnaire, we asked project Lead partners to assess the importance of transnational co-operation for assisting them to develop regional policies in energy efficiency and renewable energies. The vast majority of respondents rated its importance as either Very High or High. No respondents rated it as being of low importance.

Project partners reported a wide variety of reasons for why transnational co-operation has been of use, but in particular, the following trends can be noted.⁴⁵

Mutual learning – By far the most frequent response was that of the value of mutual learning, between different country backgrounds and development maturities in sustainable energy. Some respondents particularly praised the motivational and inspirational aspects of pairing regions of different development backgrounds.

Skill synergies – Project partners reported that transnational co-operation gave them access to skills that they did not have present within their own region. This was not just found between most and least advanced regions, but also amongst regions of similar development levels.

Development of transnational actions – Project respondents mentioned issues that can only be tackled at the transnational level, such as joint management of cross-border geothermal heat resources. CENTRAL EUROPE projects provided the framework within which such future actions could be organised, to tackle issues that may otherwise have remained unanswered.

“Decision-makers are sometimes more willing to co-operate if they see something is already working in another country.”

Hana Zábranská – CombinES

⁴⁴ CENTRAL EUROPE Secretariat – Infographic: *Cooperating on Energy Efficiency in Central Europe* (2012), at: <http://www.central2013.eu/typo3temp/pics/003eca7911.jpg>

⁴⁵ It should be noted that this section of the questionnaire was entirely qualitative, and division of responses into the categories was performed, on judgement, by the authors.

“The different levels of engagement towards sustainability in the different countries were motivating for the less engaged partners.”

Tamás Csoknyai – EnergyCity

Political and social buy-in – Several

projects noted that transnational co-operation raised the profile of issues that their regions were facing, and broke down existing group mentalities to cause long-term change in regional energy planning.

4.1.2. Common challenges

Questionnaire respondents were asked to give an overview of what they considered to be the main barriers to implementing sustainable energy methods. Looking at the responses, it appears that the main driving factors for increased renewable energy and energy efficiency are a desire to reduce CO₂ emissions, bring down costs for local consumers, and diversify away from import reliance. However, it is also clear that the European Framework plays an important role, with several respondents highlighting that it is very difficult for regions to reach their obligations of increasing renewable energy use and decreasing greenhouse gas emissions without external help. Here, the strength of the CENTRAL EUROPE Programme is clear, providing finance, access to expertise and shared inspiration between partners.

“There is a low share of renewable energies in some countries of central Europe and low priority for renewable energy in national strategies.”

Andrzej Czajkowski – COP

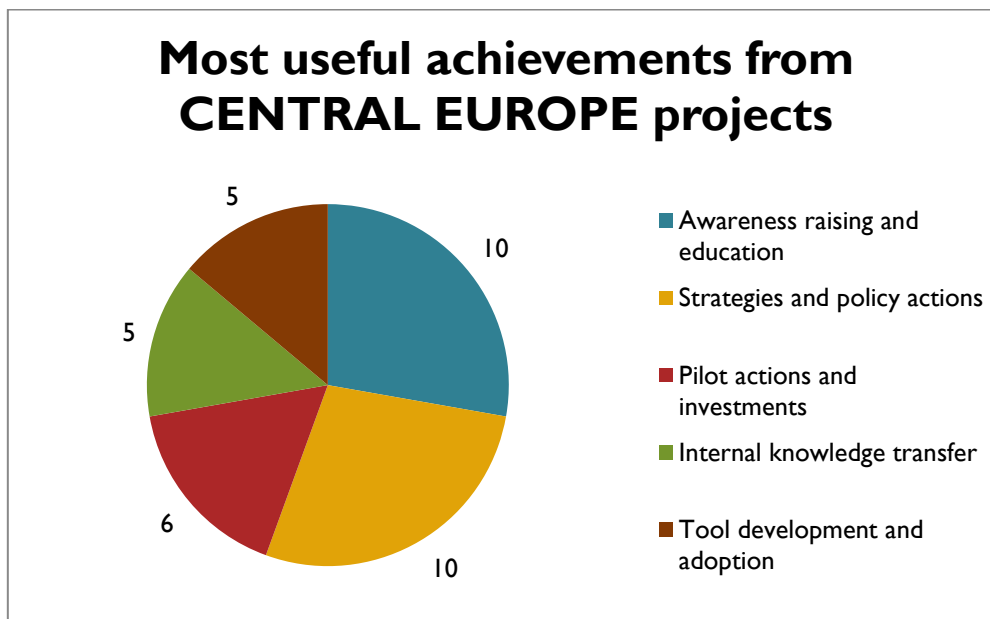
“European countries rely on external energy sources – mainly on natural gas coming from Russia, which is used in heat consumption. This dependency needs to be decreased, as energy security cannot be guaranteed if political or financial conflicts hinder supply.”

Balázs Borkovits – MANERGY

Reflecting the overview of the central Europe area given in the previous chapter, several questionnaire respondents felt that national frameworks were insufficient to achieve long-term or ambitious aims. Other problems identified, in line with the Policy Cycle, place many central Europe regions in an early development stage, with challenges identified as included public scepticism, excessive reliance on external energy sources, lack of political buy-in and political complexity, and a lack of joint cross-border actions.

4.1.3. Benefits of CENTRAL EUROPE project achievements

In order to capture which achievements were perceived as most useful by project partners, the questionnaire asked which of the five identified types were regarded as being most important for boosting uptake of sustainable energy solutions. Each project was asked to choose two options. The responses are shown in the graph below.



Awareness raising and policy strategies were regarded as the most important project achievements of the CENTRAL EUROPE Programme, but, importantly, the others were not far behind, with a good distribution of perceived usefulness. The responses suggest that partners in the projects found CENTRAL EUROPE Programme activities to be territorially relevant and of importance to building a critical mass of knowledge, awareness, experience and technology uptake, to drive sustainable energy development. The achievement types, and their relevance to sustainable energy development, are outlined below.

- I. **Strategies and policy actions** – As outlined in the Policy Cycle, energy strategies should be the starting point for any region wishing to integrate sustainable energy measures, taking account of the regional starting point (benchmarking) and elaborating realistic but optimistic goals. Once goals are in place, policy actions are needed to support their achievement. CENTRAL EUROPE projects elaborate both transnational strategies and regional strategies – setting out jointly developed steps, and region specific actions, respectively. Through this, the

CENTRAL EUROPE Programme helps regions to elaborate and implement short- and long-term strategies and develop policies to support regional sustainable energy development.

2. **Awareness raising and education** – Public and political awareness of potentials to sustainable energy solutions must be expanded if the market for such technologies and services are to grow. The CENTRAL EUROPE Programme requires all projects to disseminate their actions and promote their outputs, but some projects are specifically focused on increasing societal and stakeholder awareness, and have produced especially promising communications tools.
3. **Tool development and adoption** – Tools and technical actions rely on specific expertise that may not be available in all regions. The CENTRAL EUROPE Programme thus allows regions to work together to share their expertise and develop and implement tools and methodologies for tracking energy usage and potentials. The Programme also supports training and capacity building for use of the new tools. Such tools, once in use, can be very powerful for providing evidence for the potential of sustainable energy solutions.
4. **Knowledge transfer** – Knowledge transfer between partners is a fundamental part of all CENTRAL EUROPE projects, and is often not an outcome in and of itself. However, some projects have chosen to collect databases of good practices as a way of sharing knowledge amongst themselves, and made them available for others to elaborate policy strategies, implement innovative actions and improve the knowledge of energy practitioners. Sharing good practices can help to inform other partners of the state of the art and provides successful examples of technologies and policies in action, which can be used to convince policy-makers and the public of the value of sustainable energy generation and use.
5. **Pilot actions and investments** – Pilot actions and demonstration sites provide valuable insight into the requirements and potential of different technology types, policies and other initiatives. Pilot Actions are a way for testing and verifying earlier outputs of the project, so often, in the CENTRAL EUROPE Programme, pilot actions are linked to the elaboration of other outputs, (as explored above), and have also been very successful as awareness raising tools.

4.2 Co-operating to reduce the carbon footprint of buildings in our cities and regions

Subtheme I explores the projects that primarily played a role in reducing the carbon footprint of buildings in cities and regions, through a mixture of energy efficiency and renewable energy measures. The eight projects falling under this subtheme together have a total budget of EUR 18 million, with an ERDF contribution of around EUR 14.5 million. The achievements below have all met the conditions of the Criterion **20/20/20 Relevance**, but with all other criteria also present. Projects dealing with energy efficiency of buildings had fewer concrete impacts such as changes to policy frameworks and leveraged investments (Criterion **Sustainable Growth**) than the renewable energy subtheme projects, reflecting underdeveloped support in the regions for energy efficiency in buildings, compared to support for renewable energies. However, the most prevalent Criteria are **Transfer Potential and Territorial Relevance**, showing high potential for transfer to other regions and territorial relevance of the achievements, and suggesting the emergence of a critical mass of awareness and practice adoption.

4.2.1. Strategies and policy actions

The CENTRAL EUROPE Programme has supported regions to produce a variety of strategies and tools for reducing the carbon footprint of buildings. The most promising examples and their potential for replication are presented below.

CombinES – Maximising public-finance impact through Energy Performance Contracting – The CombinES project looks to improve the model of energy efficiency funding in central European regions by combining public subsidies with Energy Performance Contracting (EPC) to create a new type of subsidy system. The new system will involve private third-party co-funding, thus maximising the utility of public funds. EPCs encourage energy efficiency, but are currently underused due to several barriers in subsidy programmes and insufficient support for Energy Service Companies (ESCOs).

The CombinES EPC is a more advanced tool than a simple subsidy, as it relies on a certain amount of awareness and a willingness on the part of private entities to use their own



funds for energy efficiency measures. Regions that are implementing subsidy systems should consider moving across to co-financing models such as EPCs for their private sector support; the tool has high replicability, dependant on political buy-in **(Transfer Potential)**.

In order to ensure long-term impact, the project will produce policy recommendations which will be applicable to the 2014-2020 programming period of the Cohesion and Structural Funds, allowing other regions to implement similar projects or adopt the CombinES model. Consultation with policy-makers is ongoing for inclusion of the scheme in the next programming periods, and recommendations will be tailored to each central European country, but will remain applicable to other countries as well **(Market Appropriateness & Territorial Relevance)**. At the end of the project, CombinES will produce two final reports; one for investors and ESCOs, and one for policy-makers, providing tailored support and advice to different audiences. It is hoped that through these measures, the subsidy scheme will have a wide take-up. The tool should be considered by policy-makers at regional, national and European levels as a good practice in energy efficiency funding **(Transfer Potential)**.

EnSURE – Sustainable Energy Action Plans for

urban development – In order to encourage refurbishment activities, relevant stakeholders need to be motivated and assisted with financial issues. As recognised in the Policy Cycle, Action Plans are a key tool for regions staring out in sustainable energy measures, making them particularly relevant for the developing central Europe region **(Market Appropriateness & Transfer Potential)**. The EnSURE project has prepared five Sustainable Energy Action Plans to encourage municipalities, housing companies, owners, energy providers and other stakeholders to implement energy efficient urban development.



Energy Savings in Urban Quarters
through Rehabilitation and
New Ways of Energy Supply

MANUAL OF
ENERGY-EFFICIENT
URBAN
DEVELOPMENT

The EnSURE project recognises that energy efficiency measures should not be left to take place at the single-building level, but should be integrated into regional plans and strategies to encourage wide take-up of measures. As a first step, a Joint Transnational Energy Concept was developed, from which the five regional action plans were developed. In this context, transnational co-operation provided valuable exchange of experience, allowing for comparable data to be gathered from each region to provide a background of common challenges and a body of best practices. The

project also proposed models for funding schemes and contracting models based on energy efficient measures for use in the regions.

As a result of project activities, a detailed manual and policy recommendations have also been created to help other regions to integrate sustainable energy into their urban environments (**Transfer Potential**). The documents are available through the EnSURE website.

COP – Local Action Plans for Renewable Energy – The Cities on Power project will develop Local Action Plans for Renewable Energy and have them endorsed by policy-makers for the cities of Warsaw and Klagenfurt, and the Regions of Torino and Ravenna. Investment plans will accompany the action plans with the intention of easing and ensuring post-project investment of at least EUR 2million and renovation of 14 buildings (**Sustainable Growth**). To begin the process, a Joint Renewable Energy Strategy is elaborated and endorsed by local authorities, before being used to elaborate the regional plans. By involving local municipalities throughout the elaboration of the Action Plans, COP will ensure political buy-in to their recommendations.

In order to ensure wider take-up, project dissemination activities aim to reach 70 municipalities and at least 100 functional agencies. The project is still ongoing, and impact cannot yet be measured, but it is expected that COP will contribute strongly to local and regional policies for energy efficiency and renewable energy by defining methods and financial incentives to foster future investments.

VIS NOVA – Energy Efficiency Plans – In order to improve energy efficiency in rural areas, VIS NOVA elaborated five Energy Efficiency Plans for its partner regions based upon a Transnational Sustainable Energy Strategy. Each strategy is to be endorsed by the relevant public authorities in the regions. The Transnational Sustainable Energy Plan is based on EU best practice to fill gaps in regional frameworks. In order to test its approaches, one pilot action and two feasibility studies were performed in each region. Once the energy efficiency plans are complete, guidelines will be elaborated to assist other regions to transfer and replicate approaches (**Transfer Potential**). It is too early to see concrete influence on policy, but stakeholders have been involved throughout the project as part of ‘Local Support Group’ meetings, which will assist to ensure long-term support and take-up after the end of the project.

GovernEE – Cross-Sectoral Toolkit on energy efficiency in public and historic buildings and Guidelines for local energy efficiency action plans – GovernEE recognised low energy efficiency in buildings (especially historic buildings) as a particular weakness for regional authorities, due to low awareness of energy consumption and renewable energy potential. The Cross-Sectoral

Toolkit contains a collection of guidelines, benchmarks and recommendations for administrative, legal and financial aspects of policy-making for building retrofitting and the use of renewable heating systems. The Guidelines propose a common methodology for the creation of local energy action plans. GovernEE partners produced action plans for six partner regions, which were discussed at regional assemblies for approval by local policy-makers and inclusion in future policy frameworks (**Sustainable Growth**). Municipalities outside of the project have shown interest in the guidelines, which will continue to be promoted by the project partners (**Transfer Potential**). The Toolkit and Guidelines are available from the GovernEE website.

4.2.2. Awareness raising and education

Every CENTRAL EUROPE projects must perform communication activities to ensure widespread awareness of its results but the following activities are particularly worth highlighting.

GovernEE – “Improving local decision-makers’ competence” training and coaching – In order to overcome a lack of awareness for decision-makers in the challenges of sustainable buildings, GovernEE implemented pilot training events in each partner region for municipal institutions (**Market Appropriateness & Territorial**



Relevance). The workshops aimed to strengthen decision-maker responsibility for sustainable energy use and improve public awareness. Each region held three workshops, for decision-makers,

facility managers and users.

“Municipalities wish to continue looking into the energy efficiency topic and potential investments. Transnational projects are very important for providing financial capabilities, especially when national and regional budgets are falling.”

Erszébet Czinger – GovernEE

In total, five coaching sessions for decision-makers were held (each with 5-7 participants), and around thirty training events were held (reaching around 400 people). A higher level conference was held on energy efficiency opportunities in buildings, tackling legal, administrative and financial barriers with 11 members of the Hungarian Parliament. Although it is difficult to measure the impact

of such activities, GovernEE has suggested future activities to monitor positive changes in the public-sector employees trained.

To support the training events, GovernEE drew up documents on securing energy efficiency commitment from large energy providers, a comprehensive strategy to shape public attitudes towards energy efficiency, and, training documents and materials adapted to local contexts. Documents are available on the GovernEE website.

EnergyCity – Citizens Awareness Campaign – A key challenge of improving energy efficiency is to get members of the public interested in and aware of potential savings. EnergyCity have created an online tool that calculates energy performance and losses in homes, and shows potential heating energy savings, hoping to motivate households to invest in energy efficiency measures, thus improving overall urban energy performance (**Market Appropriateness**). The campaign website highlights how optimising heat use can have a large impact in consumer bills. It contains a short animated video on the EnergyCity project and the SDSS tool (see above), as well as an interactive tool for estimating savings. Although simple, the tool illustrates the high potentials in energy efficiency that are ready to be tapped. The campaign website is: www.energycity2013.it/en

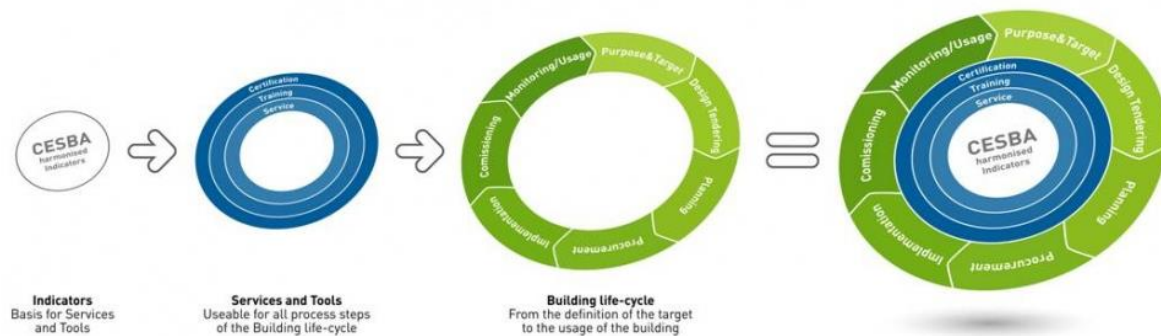
EnSURE – Baukultur Magazine - Within the context of the EnSURE project, a high-quality magazine was published at the end of the project to help to build awareness of the value and potential of the urban sustainable energy, exchange knowledge and encourage involvement in 'Baukultur' (Building Culture). The magazine presents local experiences, best practices, joint recommendations and project findings. The attractive, visual magazine invites a wide-range of actors to learn about integrated sustainable energy solutions in the built environment. It is available through the EnSURE website.

EnSURE – Energy Efficiency Info Points – A network of new and existing information points has been established by EnSURE, working together to disseminate information on energy efficiency, as well as project results. The info points target citizens, property owners and politicians. The project also defined an 'Energy SMART Building', with a guideline summing up the knowledge. The guideline takes account of different types of buildings, such as large tenement housing, public buildings, business premises, and historic and listed buildings. It also provides guidance on how to manage projects and integrate stakeholders.

4.2.3. Tool development and adoption

To reduce carbon emissions from buildings, CENTRAL EUROPE projects have created a variety of tools which can support regions to meet their Europe 2020 obligations and which can be built upon for future regional policies.

CEC5 – Common European Sustainable Building Assessment (CESBA) tool – As part of the CEC5 project, a common tool was created to assess the energy performance of existing and new buildings. The CESBA system was elaborated with the assistance of other projects from different programme areas supported by European Commission, DG Environment. The tool aims to provide a common framework for a better understanding, implementation and promotion of building sustainability.



CESBA is a bottom-up approach for generating a joint mass oriented, open-source assessment guideline as well as establishing building standards for construction. CESBA indicators can be used as a planning and assessment instrument over the whole building life-cycle from planning and conception, to performance monitoring. The tool was used by the project partners in elaborating their planned demonstration buildings. CESBA thus directly helped the project partners to create efficient and sustainable buildings in their regions. It is hoped that the CESBA tool will influence the development of regional policies, particularly to validate the accuracy of performance assessment tools, with the demonstration buildings also acting as awareness raising tools for the general public.

The CESBA tool is one of the strongest energy-related achievements of the CENTRAL EUROPE Programme, meeting **all five evaluation criteria** for assessment of project impacts. The tool was used within the project for the rehabilitation of demonstration buildings, and although the CEC5 project is not yet finished, evidence is building up on the further impact of the tool. In Austria, the Vorarlberg municipality has reduced funding for 'regular' buildings, and increased funding for efficient ones. The municipality uses the 'Kommunaler Gebäudeausweis' ('Municipal building identification') tool to set performance criteria, which has been harmonised with the CESBA to

check accuracy. In the near future, the Kommunalen Gebäudeausweis tool is expected to be extended to all public buildings. The CESBA tool is available at www.CESBA.eu.

EnergyCity – Spatial Decision Support System – A lack of awareness and benchmarking data is a key barrier to energy efficient building renovations. In order to overcome this and build awareness of savings potentials, the EnergyCity project developed a Spatial Decision Support System (SDSS) allowing for the estimation of energy consumption and CO₂ emissions from buildings. The SDSS shows overhead thermographies of districts within seven cities of the partner regions – Bologna, Budapest, Ludwigsburg, Munich, Prague, Treviso and Velenje – allowing decision-makers and urban planners to map where heat loss is greatest, thus recognising areas of high CO₂ emissions to be tackled through energy strategies and energy efficiency improvements.

The SDSS tool was used in a pilot action for providing training to city planners and architects and has been adopted by municipalities involved in the project for use in their urban planning departments. The tool is available for use by



other municipalities, and although it has not yet been taken up by other regions, there is large potential. The main barrier to uptake has been the cost of obtaining overhead, aerial thermographies. However, dissemination activities are ongoing and other regions have shown an interest in the tool. The project has prepared a final publication outlining the SDSS and potential applications. The project partners intend to further develop the tool to make it more attractive and accurate through projects in the next programming period (**Sustainable Growth & Territorial Relevance**).

Details of how to access the tool are provided in the project's final publication, which can be accessed from the EnergyCity homepage, as well as a policy guideline document.

COP – Solar and Geothermal Maps with IT-toolbox – Cities on Power is developing an IT-toolbox for determining renewable energy potentials in urban areas, hoping to facilitate the planning of new investments by allowing potential investors to verify data on technical and environmental potentials of renewable generation. The interactive toolbox will include information on geothermal and solar potential, as well as assessments of existing infrastructure and possible

future development options. The tool can provide data on specified addresses, based on available information, and can be used by Local Authorities and by citizens, to spread awareness of the potentials for solar PV, solar thermal cells and geothermal heat pumps (**Market Appropriateness**).

The toolbox is an important outcome that can be used to overcome a lack of awareness in renewable energy potential for urban buildings and can be used to elaborate plans and strategies; the first step to integrating renewables into the energy mix. The lead partner identified that elaboration of the toolbox is only possible through interregional co-operation which has allowed partners to share expertise between public and private institutions to form a tool that is applicable to a variety of socio-economic and political backgrounds. The toolbox is to be disseminated internationally. The toolbox can be used to prepare future investments, and will also been used to prepare investment documents for Turin (IT), Warsaw (PL), Ravenna (IT) and Klagenfurt (AT), showing wide territorial relevance of the achievement and strong potential for uptake into regional policies (**Sustainable Growth & Territorial Relevance**) (see next section for more).

LiCEA – SME Smart Tool – In order to improve the energy efficiency of SMEs, the LiCEA project is creating a tool for auditing SME energy performance. The tool simplifies an auditing model based on Life Cycle Analysis, to ensure energy and cost savings along the production chain. Industry remains one of the largest polluting industries, but has huge potentials, especially in terms of energy efficiency. The LiCEA tool will be based on local surveys in the partner countries, giving an international view of the efficiency indicators needed for analysis, thus ensuring wide applicability of the tool.

Initial verification of the tool will be performed with 25 SMEs, before energy audits are performed on 200 SMEs from the five partner regions of the project, in five sectors: hosiery, wood, mechanical, tourism and food. In order to ensure maximum uptake of the tool, LiCEA will be performing training seminars, for at least 40 energy agencies and 6 development agencies, involving over 300 energy managers – a particularly impressive reach (**Territorial Relevance**). Guidelines will be drawn up on how to use the tool for other stakeholders. The project will disseminate the tool to local authorities so that they are able to integrate it into their regional energy plans in support of long-term targets and framework goals. The results of the LiCEA project will be uploaded to their website, as they become available.

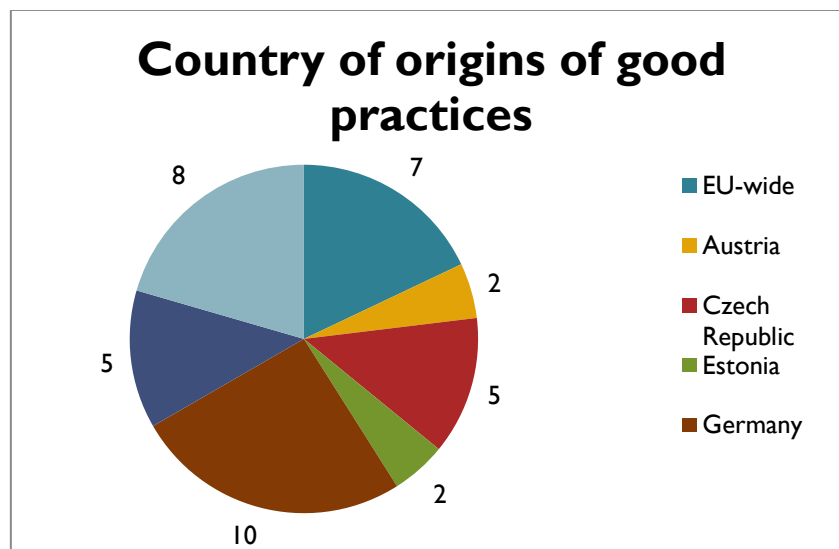
GovernEE – Monitoring system for assessing public building performance – In the framework of the GovernEE project, a smart measuring system was developed for monitoring the energy performance of buildings in Burgenlandkreis (DE), Hódmezővásárhely (HU) and Prague (PL).

The Automated Meter Management system provides continuous and up-to-date information on energy consumption, facilitating the calculation of consumption and cost estimations for the elaboration of energy plans. This is a good practice for providing information that can be used to make arguments for sustainable energy investments. The system allows municipalities to report energy data by type of energy resource, monitor energy consumption and make annual plans and cost calculations, as well as providing information for comparative analyses for a better understanding of energy performance in buildings. The system was tested in municipalities in three countries. The project co-ordinators faced challenges in accommodating the needs of the different users, but noted particular added value from transnational co-operation for collecting and comparing data for the tool, as well as developing an understanding of the challenges of installing the meter in a variety of political settings. Municipalities outside of the project consortium have expressed interest in using the tool, showing wide applicability of the achievement and manner in which a critical mass of awareness can build in one region to stimulate change in another (**Transfer Potential**).

4.2.4. Knowledge transfer

Internal knowledge transfer amongst partners is an intrinsic part of all CENTRAL EUROPE projects, and has been vital for the creation of project achievements. As part of this process, some projects have published collections of good practices that can be used by third parties for inspiration.

From the energy efficiency in buildings subtheme, we have identified GovernEE and VIS NOVA as projects which have in particular collected good practices. In total, they have collected 39 good practices on improving the energy performance of buildings. The geographic spread of good practices on renewable energy sources (below) highlights the strength of the CENTRAL EUROPE Programme in bringing experience from a variety of national backgrounds.



GovernEE has collected 35 good practices on sustainable energy use in buildings, used to elaborate its outputs and pilot actions. Particularly interesting practices were:

- *Cross-border CO₂ neutral model region* (Austria and Italy) – A joint learning process for development and experimentation of strategies for sustainable energy implementation to develop common guidelines about energy efficiency use and perform energy audits in 100 buildings.
- *TELENOR Headquarters Building* (Hungary) – A new construction designed from the outset to include energy efficiency and renewable energy measures. This practice was also selected by the partners of the INTERREG IVC Project GEO.POWER as a good practice, and was identified having very high transferability.⁴⁶

VIS NOVA collected 4 energy efficiency good practices, the most relevant of which was the implementation of an energy efficiency concept in Delitzsch, Northern Saxony. The city developed a strategy, 'Visions of the City of Delitzsch 2015', enshrining the objective of increasing energy efficiency in private households. The City has been self-sufficient since 2010 and is a model example of energy efficiency in an urban environment.

4.2.5. Pilot actions and investments

The CENTRAL EUROPE Programme is unique amongst the interregional tools of the Cohesion Funds in funding pilot actions and refurbishments. Pilot actions directly contribute to lowering carbon emissions and improving energy efficiency by enacting a technology or practice. Below are some of the most interesting demonstrations for energy efficient buildings.

EnSURE – Pilot renovations of residential buildings – In the participating cities of the EnSURE project, pilot projects have been implemented to test and better understand energy efficient refurbishments and their required framework conditions. A variety of different building types were selected for renovation, including tenement houses, public buildings, listed buildings and social housing, allowing for the project to understand the requirements of different ownership structures and legal and financial frameworks. Technologies including district heating, combined heat and power and renewable energy integration were performed. The pilot actions included new concepts, as well as practices that built upon previously successful renovation methodologies. In total, 4 pilot actions were performed **(20/20/20 Relevance, Sustainable Growth & Territorial Relevance)**.

⁴⁶ Greenovate! Europe – Thematic Programme Capitalisation of INTERREG IVC Projects on Renewable Energy (2013).

The pilot projects were used to create the Sustainable Energy Action plans and handbook (see above), but have also had wider impacts upon the regions involved, and are expected to continue to assist the regions involved to improve their energy efficiency performance. For example:

- In Genoa (IT), the local energy agency enacted a pilot called, “Intelligent Condominiums”, involving renovation of private buildings by providing assistance through an Energy Savings Company (ESCO). The method has been integrated into the regional energy legislation and adopted by 18 municipalities in Sustainable Energy Action Plans;
- In Sopot (PL), an historic music school was renovated using renewable energy sources, resulting in reduced energy consumption. The aim was to demonstrate the potential of renewable energies and to raise public awareness of innovative solutions. In tandem with an Energy Contact Point, the region saw an increased interest in energy efficiency and renewables;
- In Warsaw (PL), a residential building was renovated and equipped with solar energy panels, overcoming initially high scepticism from the building administrators to provide an ongoing demonstration.

CEC5 – Demonstrating seven low-energy buildings in seven countries – The CEC5 project is demonstrating energy efficiency measures and renewable energies in seven demonstration buildings to show the value of sustainable energy solutions and to test the CESBA building assessment methodology in real-life situations. Each building will be accessible to the public, with a permanent exhibition showing state-of-the-art technologies to citizens. Demonstrations are being implemented in Bydgoszcz (PL), Ludwigsburg (DE), Soca valley (SL), Trnava (SK), Udine (IT), Vorarlberg (AT) and Vysocina (CZ), giving a wide spread of public-building role models across central Europe (**Territorial Relevance**).

The CENTRAL EUROPE Programme provides only a small percentage (approx. 10%) of the costs for refurbishment and construction, with projects leveraging additional funds. Not all demonstrations have been completed as of the writing of this report, making it too soon to have any indication of impact, but the project aims to fully inform and train fifty people in each country about energy efficiency standards (350 people, total). Each partner is operating a promotional campaign and is hoping to get between 500 and 1,000 visitors to each pilot site. Further, each partner is to organise meetings on their demonstrations that will reach out to at least 100 people each. Ten SMEs in each country will be directly involved in training other SMEs on energy efficiency standards. This will amount to 70 trainers and around 320 trained personnel.

VIS NOVA – Pilot actions – The VIS NOVA project is producing pre-investment and small investment pilot actions to test and research identified best practices. The result of the projects will be included in regional Energy Efficiency Plans (see above) for adoption by local authorities. During the planning process, partners are scoping financial resources from national programmes, and allocating responsibilities to local energy and development agencies to provide medium- to long-term management of plans.

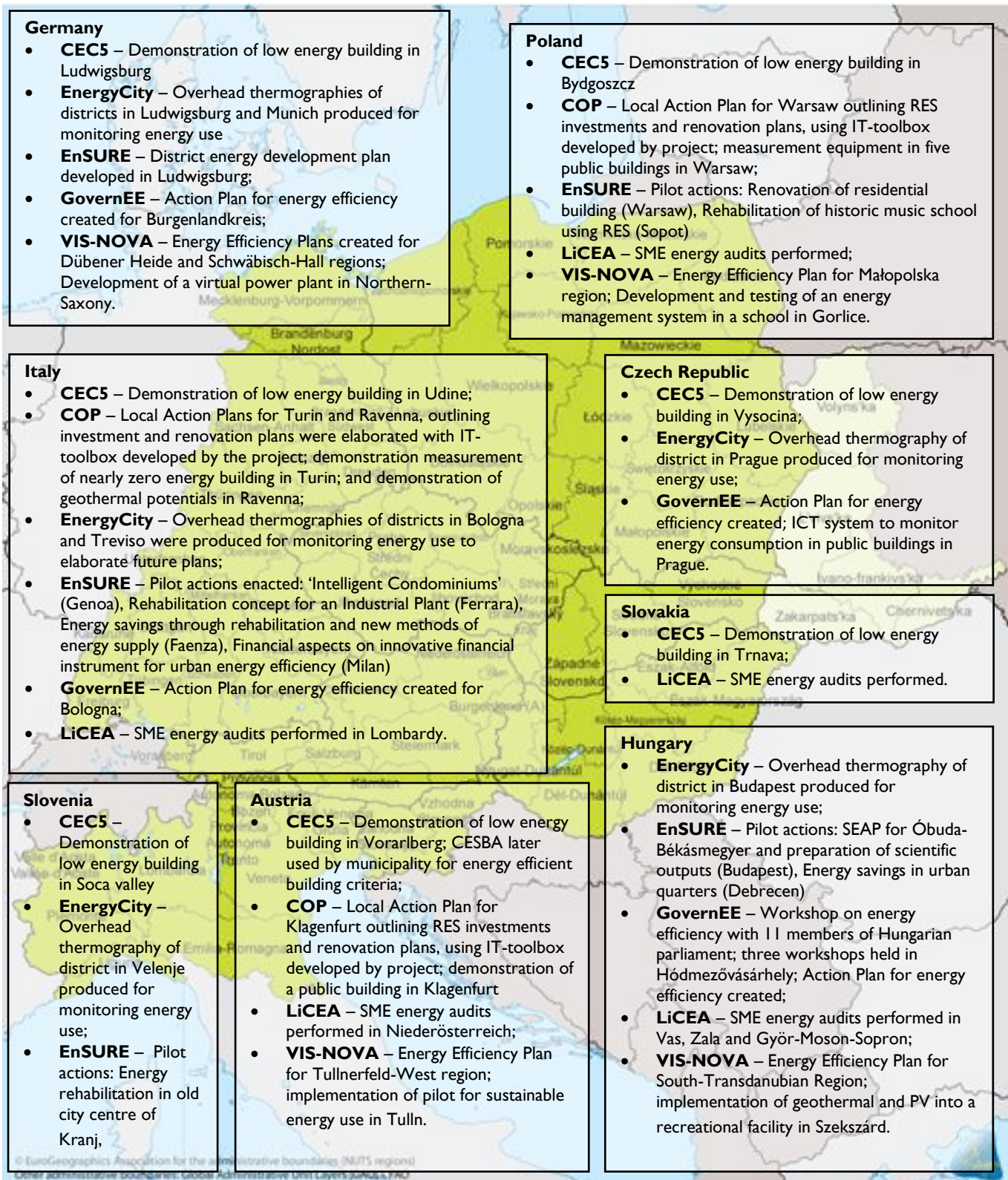
Four demonstrations are being implemented **(20/20/20 Relevance and Sustainable Growth)**. In Northern Saxony (DE) a virtual power plant (a cluster of distributed generation installations which are controlled from central point), will be set up and tested. In Gorlice (PL) a new energy management system will be tested in a public school and managed by the administrative district. In Tulln (AT) three components will be implemented to promote sustainable energy production on the basis of regional resources (biogas, recycling of waste, energy wood). In Szekszárd (HU), where the investment has already been successfully implemented, geothermal and photovoltaic energy sources were combined to supply a recreational facility with heat and electricity.

4.2.6. Relevance and added-value for central Europe territories

The achievements explored above show good relevance to the central Europe region in terms of the regional development and strengths. Although there are wide disparities between the countries that take part in the programme – which is an advantage for knowledge sharing amongst partners – regions primarily show Policy Cycle development phases of Commitment and Planning and Emerging Markets. The tools above have been highlighted for their suitability to these development phases and their high potential for uptake by other regions. The post-project impacts of the practices explored – demonstrations, investments and policies influenced – concretely show the added-value generated by the CENTRAL EUROPE Programme.

In order to further demonstrate the territorial relevance of the CENTRAL EUROPE Programme's achievements, the map below shows their geographic spread. Due to space constraints, it is not an exhaustive list, but demonstrates the value generated by the CENTRAL EUROPE projects per Member State of the programme.

Mapping examples of achievements in co-operating to reduce carbon footprint of buildings



4.3 Co-operating to use renewable energies in the regions efficiently

Subtheme II explores the projects with aspects specifically related to the use of renewable energies. The thirteen projects falling under this subtheme have a combined budget of around EUR 28 million, with an ERDF contribution of around EUR 22 million. All of the achievements below have met Criterion **20/20/20 Relevance**, having high potential to assist central Europe regions to contribute to the 20/20/20 targets. Compared to the energy use in buildings projects, the renewable energy projects showed much greater take up into policy frameworks and leveraged investments (**Sustainable Growth**), reflecting the more advanced policy frameworks that exist for renewable energy in central Europe (and indeed, Europe as a whole), compared to energy efficiency.

4.3.1. Strategies and policy actions

More so than under the previous subtheme focussing on energy efficiency of buildings – which was stronger for tools and demonstration plants – the renewable energy subtheme has produced many outstanding strategies and policy actions for uptake of renewable energies.

MANERGY – Regional energy concepts and handbook – In order to promote Regional Energy Concepts (RECs), MANERGY has drafted six RECS – one for each of its partners – and drawn up a handbook on how to produce a REC in other regions without requiring external expertise or high costs. The RECs will therefore have a direct impact on the partner regions involved and also have high transferability to other regions (**Sustainable Growth & Transfer Potential**). RECs are tools for mid-term planning and making recommendations on policy frameworks, alongside providing assessments of regional opportunities and strengths. They therefore take account of long-term development of the municipality, noting both supply and demand – generation and consumption – making it possible to use local resources and develop joint projects.

In order to test the strategy, pilot actions were held in three target areas (town, micro-region, district or group of buildings) in each of the six partners as pre-investment activities, producing Sustainable Energy Action Plans for eighteen target regions. The audience for the RECs include local authorities, financial experts, policy-makers, renewable energy players. It is expected that the

“The handbook will be able to support the municipalities of the CENTRAL EUROPE area to develop their own concepts and action plans without external support, which they usually cannot afford.”

Balázs Borkovits – MANERGY

handbook will provide guidance to any region that may wish to produce a REC, with especial worth for small and rural regions, and regions that may not be able to afford the expertise that is usually needed for energy planning.

In this respect, the contribution of the CENTRAL EUROPE Programme was particularly noticeable. Transnational co-operation has allowed for the collection and benchmarking of the most common problems and solutions, which will be applicable to a wide variety of regions.

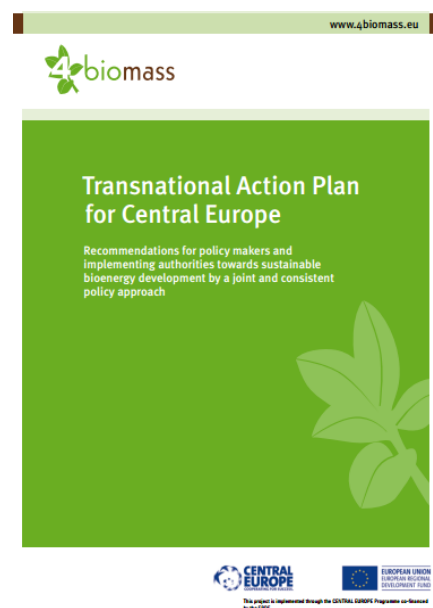
The Action Plans recommend actions to be taken, as well as financial resources for making them possible. Implementation of these actions will get underway in the next Programming period as they have received support from their respective regional authorities, showing the critical mass achieved by securing ongoing commitment to future actions (**Sustainable Growth**). As long-term energy planning requires expertise, MANERGY has produced feasibility studies and business plans for the establishment of energy agencies or energy management bodies. As each country has different financial support tools, the business plans monitor and provide information on funding possibilities for each region, thus laying the groundwork for future investments.

One of the clearest demonstrations of the how MANERGY has encouraged political change in its regions, is that the project supported the accession of eighteen Hungarian and three Italian towns to the Covenant of Mayors and assisted these regions to produce sustainable energy action plans, which are also a prerequisite for access to certain financial tools, such as MLEI-PDA (**Sustainable Growth**).⁴⁷

The RECs and handbook will be available on the MANERGY website.

4BIOMASS – Transnational Action Plan for Central

Europe – The partners of the 4BIOMASS project prepared recommendations for policy-makers and regional authorities for a joint and consistent policy approach towards sustainable bioenergy development. The project partners included a variety of energy agencies, working with associated Ministries from the Czech Republic, Germany, Italy, Slovenia, Slovakia and Ukraine, giving extensive political buy-in to sustainable biomass from the beginning of the project. “The action plan is a consequence of successful co-operation within the partnership”, noted Aino Martikainen from the German Agency for Renewable Energy Resources. ‘Exchange between



⁴⁷ Mobilising Local Energy Investments – Project Development Assistance – An Intelligent Energy Europe fund available to members of the Covenant of Mayors.

the actors and learning from each other', were recognised as vital to the production of the Action Plan.

The Action Plan contains around sixty recommendations to boost uptake of small-scale heating, as current legislation is largely intended to support large-scale implementation and large boilers. General recommendations of interest to a variety of actors are given, as well as specific recommendations for each of the seven countries involved in the partnership, who intend to use them to update national frameworks. Although many of the recommendations are specifically relevant to the partner regions, the recommendations have potential for influencing other regions and should be considered by regional authorities with high biomass potentials (**Transfer Potential**).

4BIOMASS has demonstrated critical mass through its impressive achievements in securing long-term uptake (**Sustainable Growth**). Project partner CZ Biom used the project recommendations to provide support for the introduction of a renewable heat incentive into revision of the national Renewable Energy Resources Act, making the Czech Republic only the second EU country (after the United Kingdom) to introduce such an incentive. In Poland, Małopolska

"The established co-operation between stakeholders and institutions will contribute to more sustainable investments and use of bioenergy in the long run. Thus 4Biomass contributed to the 2020 goals of the EU to increase the share of renewable energy in the total energy consumption."

4BIOMASS Final Report

Voivodeship has adopted a plan to support small scale heating, using the recommendations defined by 4BIOMASS. Project partner, AGH University of Science & Technology (Krakow), will use project results to influence ongoing discussions on revision to Poland's bioenergy support schemes. Energy Centre Hungary has used around a third of the 4BIOMASS recommendations to assist the Hungarian Ministry of Foreign Affairs to elaborate the Danube Biomass Action Plan; a part of the EU's Danube Region Strategy.

The Action Plan is available through the 4BIOMASS website.

SEBE – Future European Biogas Utilisation and Policy Action Plan – The objective of Future European Biogas Utilisation and Policy Action Plan (FEBAP) is to elaborate a strategy for the sustainable development of biogas production by determining the potential for the production of biogas, identifying barriers in specific regions and countries and setting out objectives for the medium and long term to improve use. The FEBAP was created with co-operation from a Policy Advisory Board, which was created by the SEBE partners, to accompany the project throughout its

operation. This represents a best practice in project structure and management and should ensure ongoing commitment for changing regional policy structures (**Sustainable Growth**). The Advisory Board is made up of regional policy-makers, national stakeholders, and interest groups, and their assistance has guaranteed greater applicability of the FEBAP to regional actors. The FEBAP is available through the SEBE website.

GUTS – Transnational Strategy – The GUTS Transnational Strategy is a decision-making tool targeting politicians and managers at public authorities and public transport companies. The GUTS project recognised a particular problem in central Europe of old public vehicle fleets, with large efforts needed to encourage investment into sustainable and clean vehicles. The Transnational Strategy assists cities and agglomerations to find sustainable public transport solutions by providing the framework for a strategy on public transport. The Strategy was preceded by master studies on governance, and financial and technical feasibility, with technical implementation tools for public authorities and transport operators. Such an approach ensures the relevance of the strategy to the regional context and can encourage widespread uptake of recommendations and good practice (**Market Appropriateness & Transfer Potential**). The outputs of the GUTS project are available on the project website.

CEP-REC – Regional Energy Concepts and ‘How-to’ guide – In order to secure sustainable energy futures in nine of its partner regions, the CEP-REC project is developing regional energy concepts to visualise energy demand and support discussions on energy strategies. The RECs will help create wider acceptance of renewable energies by engaging stakeholders, and will suggest ways to combine findings with existing plans and strategies, as well as contributing to the identification and implementation of joint projects for achieving 2020 targets. This approach of integrating recommendations with existing strategies is an excellent way of securing political investment. Looking to potential future projects should ensure that the critical mass created is built upon further and is a clear demonstration of added-value created by the project (**20/20/20 Relevance & Sustainable Growth**). To ensure transferability to other regions, CEP-REC will produce ‘How to’ guides for its outputs, which can be taken account in elaborating strategies and projects.

4.3.2. Awareness raising and education

Coach BioEnergy – The CBE Network –

Within the project Coach BioEnergy, a permanent consultancy network has been established for overcoming underuse of available knowledge on biomass technologies and services, particularly in rural areas. The project has gathered expertise on environmental, economic and social aspects of biomass use together into one place for the provision of bioenergy coaching. Issues throughout the production of bioenergy are tackled, including technologies, logistics and waste management, assessed through life-cycle analyses. The project generates added-value by transforming existing scientific information into practice-oriented knowledge which can be used by consultants and multipliers. Coach BioEnergy also makes use of demonstration projects as illustrations of knowledge potential to build a critical mass of awareness that can stimulate policy change (**Sustainable Growth**).



In each country involved in the project, regional consultancy bureaus were responsible for disseminating informing and coaching local actors on the cleanest, most efficient and cost-effective ways of using biomass resources. An online network was established to ease the management and communication of gathered knowledge. Through the website, users are able to access CBE reports and outputs, but also access their regional contact points to request further assistance. In this way, the project ensured territorial relevance by ensuring that knowledge provision was relevant to all partners (**Territorial Relevance**). The contact points continue to function after the end of the

“The results of the project’s policy analysis significantly helped to develop our future policy towards biomass energy utilisation in order to effectively fulfil the envisioned development goals.”

Maria Světlík, Czech Ministry of Agriculture, on Coach BioEnergy

project, as a mid- to long-term achievement, and demonstrating high added-value from investment into the project.

The Coach BioEnergy partners, taking account of their regional needs, have come up with suggestions for biomass use in their regions, creating pilots of local Renewable Energy Concepts (RECs), and a methodology for elaboration of RECs. The creation of RECs by the network has had a clear impact. For example, in Hungary, the renewal of the

heating system of Szada was carried out from leveraged funds outside the project budget, as proposed in the created REC.

By pooling expertise, the Coach BioEnergy partners have also produced and submitted policy recommendations, to be considered by authorities for inclusion in NREAPs. The Czech partner in the project was invited to participate in the revision of the NREAP after Coach BioEnergy presented its initial policy analysis, and recommendations have been used to shape the Czech Republic's biomass support schemes. In Hungary, Coach BioEnergy results influenced the Hungarian government to begin looking at the establishment of a national coaching network.

SEBE – Competence Knowledge Centre Network – In order to boost public awareness of biogas use and provide information to stakeholders, the SEBE project established a network of Competence Knowledge Centres (CKCs). The CKC Network is comprised of national contact points for the general public, and provides access to high-level expertise and technology for players in the biogas market. The CKCs have contributed to the SEBE project through regional consulting, the operation of pilot actions, and provision of expertise to policy and strategy development.

SEBE partners have conducted 14 pilot actions and consulted partners in each of the project countries, demonstrating high added-value for the investment it received. The very high impact of the project can be seen in the consultancy activities of the network - in total, SEBE CKC Network activities have helped 59 public and private organisations to implement strategies, energy concepts and policy actions (10 in Slovenia, 1 in Austria, 8 in Italy, 10 in Romania, 3 in Hungary, 10 in Germany, and 17 in Poland) (**Territorial Relevance**). Activities include:

- Implementation of a strategy for management of organic solid waste in a Slovenian municipality;
- Development of a regional energy concept in Römerland Carnuntum (AT);
- Creation of a regional energy plan, providing funding for the construction of biogas plants in Emilia-Romagna (IT).

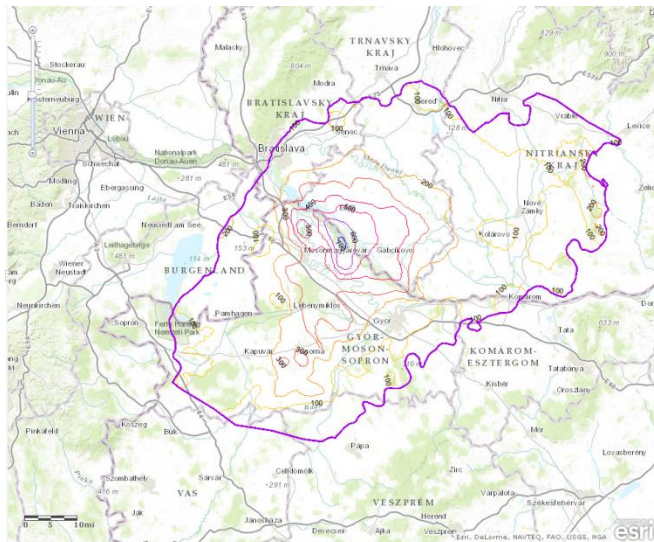
As further impacts of pilot actions and the CKCs, the project has led to joint innovative actions such as co-operation in Italy organised by Edmund Mach Foundation with local companies to deal with urban organic waste treatments in biogas and biomethane, and to use biogas as a fuel in transport. Further activities include the establishment of a concept for a gas powered fleet of public transport in Slovakia and a EUR 300,000 investment by a multi-utility company in Piedmont (IT) for expanding an existing biogas plant, adapting the plant for biomethane, and the construction of a biomethane refuelling station.

Contact points for the CKC Network can be found through the News & Events section of the SEBE website.

RESOURCE – The RESOURCE Resolution – The RESOURCE project has produced a resolution on pro-active development of post-mining regions, including aspects of renewable energy integration to secure political buy-in and raise awareness of potentials in the post-mining areas in central Europe. The resolution has been signed by project partners and stakeholders. Although the resolution is a policy tool – containing policy recommendations and suggested actions – its form as a high level resolution, promoted and signed in a conference format highlight a best practice in awareness raising and building a critical mass of political commitment (**Sustainable Growth**). Forty signatures are collected from partner regions involved in the project, as well as thirteen from similar projects and networks. The resolution is available through the RESOURCE website.

4.3.3. Tool development and adoption

TRANSENERGY – Web-based decision supporting tool – Geothermal energy has large potential for the central Europe region, but difficulties are encountered as regions and countries share resources which do not respect state boundaries. TRANSENERGY has collected scientific data on geothermal potentials, and produced a web-based tool for providing easily understandable information for the Western Pannonian basin (covering borders between Austria, Hungary, Slovakia and Slovenia). The tool supports decision-making for government authorities, experts and private investors about geothermal conditions, providing solutions for different pre-defined geothermal use scenarios. TRANSENERGY shows very high territorial relevance as all four countries involved in the project have committed themselves to increasing their geothermal energy use. The project tackles an issue that could not have been solved by each state individually, showing a high added-value of transnational co-operation (**Sustainable Growth & Market Appropriateness**).



Detailed studies were performed at five cross-border areas where problems have arisen in the past over geothermal resources due to unco-ordinated management. The data and maps have

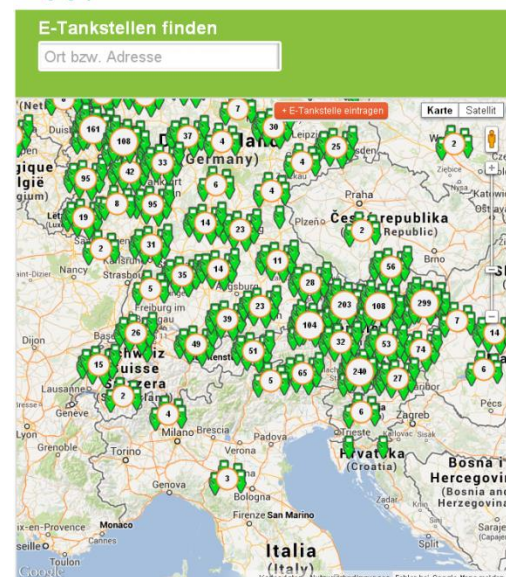
been used to produce a Joint Strategy paper on use of geothermal resources, and recommendations for sustainable joint management, including a joint management system. Project results have been taken into account by the four countries involved in the project in the delineation of transboundary aquifers and a future project will be prepared under the Danube Region Strategy, inspired by TRANSENERGY, and using funds from Horizon 2020. The mapping tool is available under the 'Pilot areas' link on the TRANSENERGY website.

RUBIRES – Geographic Information System – A key challenge to overcome for bioenergy use is ensuring a consistent supply of sustainable biomass, whilst taking account of land-use. RUBIRES developed a Geographic Information System (GIS) to analyse, describe and evaluate spatial distribution of unused biomass resources. The GIS has been used by each partner to help elaborate a regional potential analysis by finding unused biomass resources. Results have been used to further develop regional value chains and to produce plans for land use. The technology has high potentials for raising awareness of potentials and ensuring sustainable biomass supply, but requires adaption to regional conditions. Eszterházy Károly College has induced EUR 1.8million of investments in Eger (HU) for a follow-up project for further basic research into the use of GIS systems for efficient use of renewable energy resources (**Sustainable Growth**). The project will run for 28 months and is supported by the Hungarian New Széchenyi Plan (NSRF). Its financial support comes from the Social and Regional Funds. RUBIRES has also made a major contribution to the creation of the ZUERST (Zukunftsorientierten Energie und Rohstoffzentrum) project, based in St. Margarethen an der Raab, Austria.

4BIOMASS – Joint Management Tool – The 4BIOMASS partners elaborated a Joint Management Tool to support investors in bioenergy by providing overviews of policy frameworks in the partner countries, as well as contacts for implementing agencies and technology and fuel providers. The database pools information from around Central Europe on demonstration projects and successful approaches to bioenergy, to help investors to find successful approaches to bioenergy production and supply. The Joint Management Tool was established through transnational forums, which also allowed for stakeholders to be networked. Through project co-operation 4BIOMASS has created high added-value for its regions; the project has leveraged a EUR 19.68 million of future investments, including a EUR 773,000 investment in three district heating plants in Slovenia (**Sustainable Growth**). The Joint Management Tool is available through the 4BIOMASS home page.

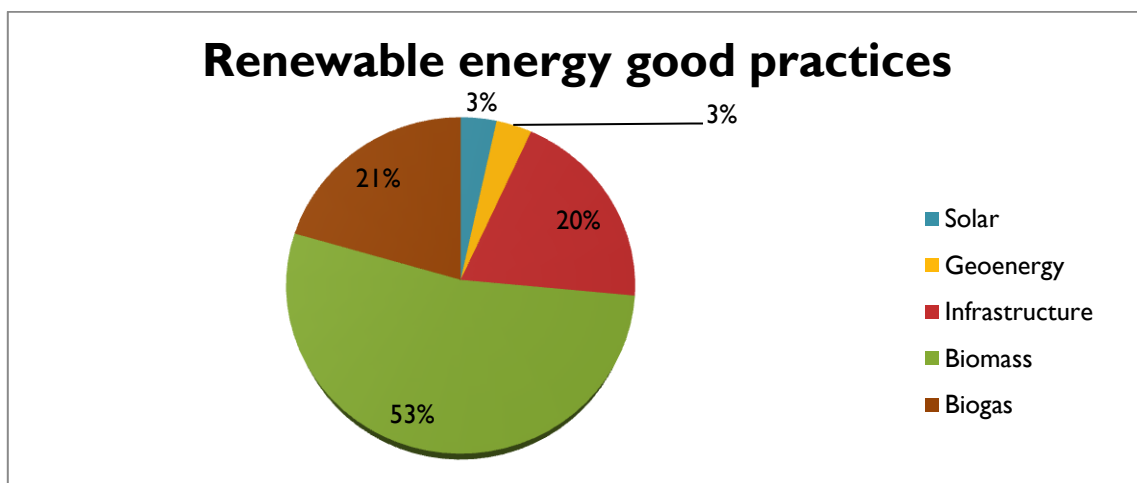
REZIPE – Online tools – The REZIPE project on zero-emission vehicles has performed pilot actions in four countries and created an online decision-making tool to help choose which zero-emissions solutions will fulfil specific requirements, as well as providing a catalogue of electric vehicles and charging apparatus. An online toolbox allows users to filter documents according to key words, leading them to the respective part of the ‘REZIPE guide for implementing zero emission vehicles’. Finally, a charging spot locator identifies locations at which electric vehicles can be charged.

Charging spot locator



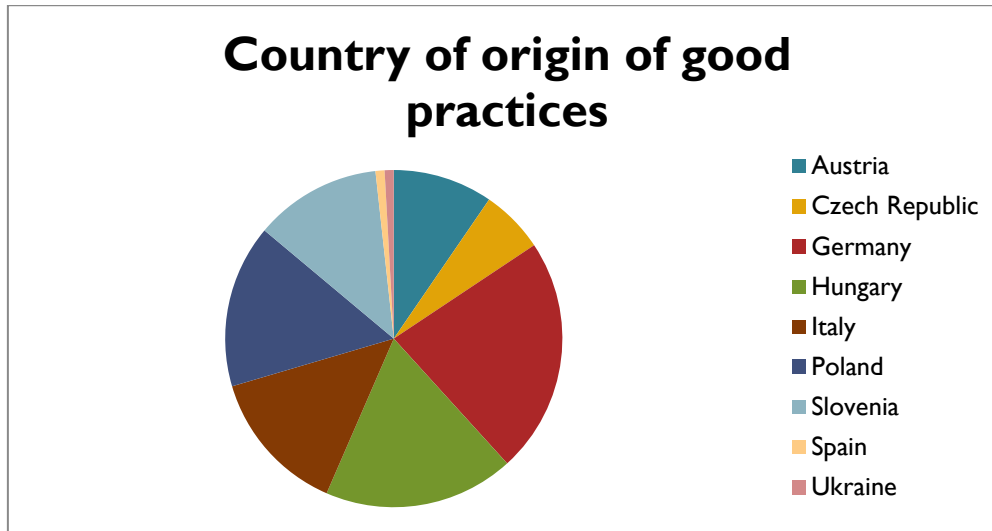
4.3.4. Knowledge transfer

The CENTRAL EUROPE projects made available 118 good practices on integration of renewable energy sources into regions. Collecting good practices creates a critical mass of awareness that is able to influence regional policies and investments in renewable energy technologies. The graph below shows how these good practices align by technology.



Given the potential of biomass in central Europe, its prominence should not be surprising. The high number of infrastructure practices comes from the two renewable transport projects – REZIPE and GUTS – where practices were largely focused on charging points, e-vehicle availability and rental schemes.

The geographic spread of good practices on renewable energy sources (below) highlights one of the real strengths of the CENTRAL EUROPE Programme, in being able to bring experience from a variety of national backgrounds.



Below is an exploration of the most interesting practices, gathered by each of the projects that produced a substantial good practice database.

RUBIRES has collected 20 good practices to highlight the potential of renewable energies. Many of the practices collected were policy, rather than technology, based. A few of the most interesting are:

- *Education centre in the village of Felsotárkány (Hungary)* – Local and regional entrepreneurs rarely participate in partnership based programmes due to a lack of awareness. The education centre aims to spread information and increase competencies in SMEs in the region.
- *‘Become Renewable!’ awareness and training of inhabitants in Savinja Šalek (Slovenia)* – ‘Become Renewable!’ was a campaign that prepared communications plans for awareness raising and training of policy makers and the public, with integrated participation of experts.

4Biomass collected 46 practices on boosting the use of biomass as a fuel source. The good practices were used to elaborate sustainable energy action plans. Two practices that particularly stood out are:

- *Organic Rankine Cycle CHCP production (Austria)* – The first combined heat and power plant in the world based on an Organic Rankine Cycle (ORC), combined with an absorption chiller for power production and cooling for optimal efficiency. ORC recovers heat from low

temperature sources. The plant uses waste woods as a feedstock and heat is used in district heating.

- *Das Bioenergiedorf Breuberg-Rai (Germany)* – The first community in Hesse with self-sufficiency in energy supply from biomass, based on the establishment of a management co-operative of 155 homes. Renewable energy is supplied to 900 inhabitants and two schools, preventing release of 2,000 tonnes of CO₂.

Coach BioEnergy collected 32 good practices on increasing biomass use. The practices gathered by the project on biomass heating deserve particular attention:

- *Biomass heating plant in Ostritz (Germany)* – The biomass heating plant is operated with a Public-Private Partnership (PPP) built on municipality initiative. Fuel comes from the local timber industry, with an overall output of 4MW.
- *Construction of central heating in the village of Velký Karlov (Czech Republic)* – Using subsidies from the state environment fund, and assistance from Municipal Credit Austria and the Czech Energy Agency, the village installed a low-pressure water heater for combustion of biomass, showing good use of combined subsidies and cross-border co-operation.

REZIPE collected 20 good practices on increasing the use of sustainable transport solutions. The vast majority were infrastructure based. Interesting practices included:

- *SonnENWende (Austria)* – A Mutual Building co-operative bought an electric car and pedelecs for employees to use on inner city business, with PV cells on its building to supply energy for charging, saving 1,500kg CO₂ per year.
- *Battery charging stations for electric cars in Ljubljana (Slovenia)* – A PPP between the local municipality and an energy company, Ljubljana installed 6 charging points and gave free parking to electric vehicles to encourage uptake of e-vehicles.

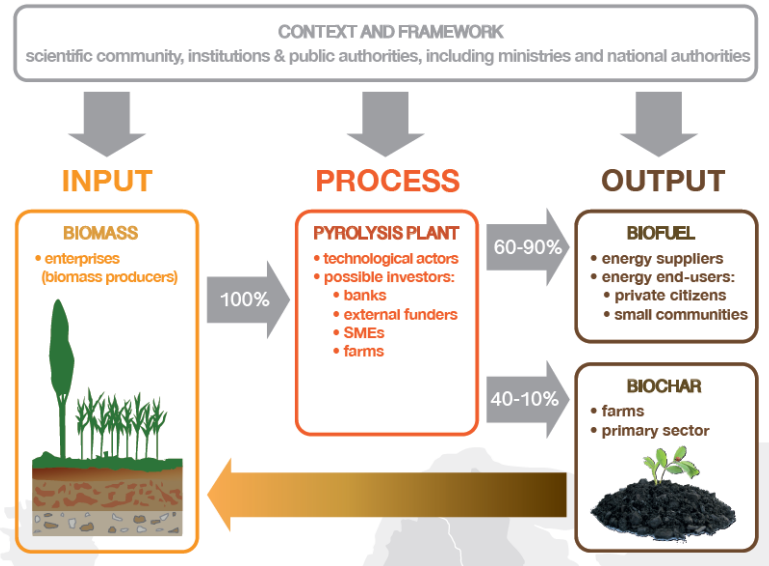
4.3.5. Pilot actions and investments

E2BEBIS – Biochar demonstrations – Biochar production, when combined with bioenergy production, is a clean energy technology. As biochar is produced when combustion occurs with a lack of oxygen, carbon is not released as CO₂ is not produced. Instead, biochar remains, which can be used as in soil to increase crop yields and prevent fertiliser run-off. However, policy frameworks do not recognise biochar as a tool for tackling CO₂ emissions, instead viewing it as a waste. Biochar is an interesting, emerging technology and project results should be closely considered by regional and European policy-makers (**Transfer Potential**). The technology is particularly relevant for the

territories of central Europe due to the prevalence of biomass resources (**Market Appropriateness & Territorial Relevance**).

In all, seven pilot demonstrations will be held and used to build transnational strategies and policy recommendations that can be used to change regional and national policies (**Sustainable Growth**). The project will construct clusters, based around the project partners and produce feasibility studies for the demonstrations. Following the

Biochar lifecycle cluster actors



demonstrations, a transnational strategy and collection of good practices will be created, leading to policy recommendations which will be presented at transnational conferences. Involvement in the CENTRAL EUROPE Programme and transnational co-operation has allowed project partners to reach out to stakeholders from a variety of backgrounds. Once policy recommendations have been produced, there will be scope for other projects in future to transfer recommendations.

DANUBENERGY – Solid Fuel and Biogas from Biomass demonstrations – The DANUBENERGY project aims to open up new areas for biomass development, but also to increase the efficiency with which bioenergy is produced. For this reason, the project will test technology for integrated generation of solid Fuel and Biogas from Biomass (IFBB). IFBB removes the fibrous parts of high-lignified plants (solid fuels) from the liquid parts (easily digestible) using a screw press. The liquid part is burnt to produce heat and electricity. The heat is used to dry the solid fuel, and the electricity is sold to the grid. The solid fuel can then be easily stored and transported for future use. Efficiency of conversion into useable energy (heat and electricity) is 55 percent, compared to 25 percent in an average biogas plant.

The DANUBENERGY demonstrations will take the form of a stationary plant at Baden-Baden (DE) and a mobile plant which will be tested in every partner region of the project, showing compatibility with different environments and biomass sorts. Comparisons between the small mobile demonstration and the sedentary plant will allow for scale-up comparisons. As a result of the demonstrations, DANUBENERGY will produce feasibility studies and set a scientific basis for region-specific investments. Tailor-made schemes will be explored for each region, investigating different

business models and co-operative measures (for example, contracting models, producer co-operatives and joint energy suppliers)

Investing in these demonstration plants has high territorial relevance given the strength of biomass as a fuel source in central Europe, and has high potential for shaping future investments and priorities at regional level (**Market Appropriateness & Territorial Relevance**). The project has only just started, so full impact is not yet visible, but there has already been success in leveraging future investments, with one company preparing an investment of EUR 1 million and five others having shown interest (**Sustainable Growth**). Through its actions, the project will trigger further investments in energy efficient generation systems, whether through the creation of new plants, or the adaptation of existing ones.

ENERGYREGION – Pilot actions on renewable energies – The main goal of the ENERGYREGION project is to promote sustainable development in renewable energy sources in central Europe by increasing public awareness and creating regional strategies. To assist with these goals, ENERGYREGION is implementing action plans under the topics of wind, biomass and dispersed generation. Pilot actions are ensuring the direct improvement of energy performance in the regions involved and should provide adequate evidence to shape future investments, raise awareness and give inspiration to future projects, both within and outside of the involved regions. (**Sustainable Growth, Market Appropriateness & Transfer Potential**). Below are descriptions of the demonstration actions:

- Wind resource measurements have been performed in four regions to enable efficient wind energy development and attract investors by highlighting resource potential. The measurements record wind speed and direction, as well as temperature and humidity. The collected data will be used to produce a feasibility study for wind development;
- Optimised biomass gasification will be tested in order to compare economic efficiency of combustion parameters. An installation of a combustion furnace and a gasification boiler will allow for tests to be undertaken with different biomass types, with results disseminated to target groups to increase biomass utilisation;
- The final action involves a hybrid power plant of PV, a vertical axis wind turbine and a fuel cell, installed on a building located near to a popular attraction in Wrocław (PL). A review of possible methods of monitoring individual sources has been performed, giving guidelines on how to monitor a diverse system of dispersed generation. The results of the action will help to boost mixed generation systems and determine the best technologies with a simulation model setting the economical, ecological and social criteria required for success.

4.3.6. Relevance and added-value for central Europe territories

Although there are wide disparities between the countries that take part in the programme, regions, in general, are situated in the Policy Cycle development phases of Commitment and Planning and Emerging Markets. The tools are suitable for these development phases and show potential for other regions. The post- impacts of the practices explored – demonstrations, investments leveraged and policies influenced – highlight the added-value generated by the CENTRAL EUROPE Programme.

The map below shows their geographic spread of the CENTRAL EUROPE Programme's achievements. It is not an exhaustive list, but demonstrates achievements per Member State of the programme.

Mapping examples of achievements in co-operating to use renewable energies in the regions



5. Conclusions and recommendations

Whilst each European country is facing specific difficulties and challenges in the run-up to the 2020 energy and climate targets, generally speaking Member States of the CENTRAL EUROPE Programme area are making good progress towards their renewable energy targets. This is particularly true for electricity production whilst heating & cooling remains slightly behind and needs a boost. The biggest challenge for most countries of central Europe remains the area of sustainable transport, where the least progress has been made.

With regard to renewable energy, a forerunner of central Europe is clearly Austria. Already in 2011, the country had achieved an outstanding 30.4% share of energy from renewables in the final consumption of energy and according to industry forecasts, Austria will overachieve on its target of 34% and reach about 46% of energy from renewables by 2020. Austria has similar renewable energy sources available to most other countries in the region, and should be taken as model in the region for policy frameworks.

The outlook for energy efficiency is far less positive, however, this is not a specific feature for central Europe alone. In most European countries, policies for energy efficiency are not yet in place and many countries will be unable to meet the European targets in this area. Accounting for 40% of total energy use, buildings offer large potentials for energy savings, particularly through retrofitting of buildings older than 10 years (80% of Europe's building stock).

5.1. Co-operating to reduce the carbon footprint of buildings in our cities and regions

The main difficulty for reducing the carbon footprint of buildings remains the complexity of the sector, encompassing energy efficiency and renewable energy use, and taking account of technology solutions, finance, user involvement, awareness raising, education and policy frameworks.

Energy efficiency is still far from being a mainstream activity, and the CENTRAL EUROPE Programme has provided tools, strategies and sample actions that can be used as examples for moving towards a more energy efficient future. Tools such as the EnergyCity Spatial Decision Support System (SDSS) should be used to highlight potential energy savings in tandem with campaigns to encourage individual building renovations. Few regions are ready to attempt district-level renovation, but should build upon the results of the projects in order to continue to develop the critical mass needed to shift towards better energy performance for buildings and more ambitious initiatives for improving energy efficiency.

Projects supported by the CENTRAL EUROPE Programme have proven to be excellent at tackling single issues which can assist regions to reach 'low-hanging fruit', as highlighted by the

Thematic Achievements section, but energy efficiency needs to be tackled in a holistic, life-cycle approach. However, as energy efficiency remains a relatively underdeveloped policy area throughout Europe, reaching the low-hanging fruit is the first step in achieving stronger efficiency savings. With a critical mass of evidence for savings potentials, energy efficiency can become a mainstream concern. The CENTRAL EUROPE Programme has certainly contributed to the creation of a critical mass of evidence for the potentials of improving the energy performance of buildings.

The majority of achievements of the projects reflect the Commitment and Planning and Emerging Market stages of the Policy Cycle (see section 2.5) – they show a particular focus on establishing the correct policy frameworks, and use of existing technologies. With this said, pilot actions with demonstrations have been ambitious, and have included small-scale renovations and renovations of historic and other public buildings. The integration of renewable energy sources into buildings is increasingly gaining traction, and was demonstrated by pilot actions as being technically and economically feasible.

Below, a comprehensive **Policy Package** has been identified for implementation with the assistance of larger financial sources, such as the mainstreaming programmes. Regions which are just beginning to promote sustainable energy in buildings should look to the package as a starting point for their policy development. The package covers the major tools needed in regions with little experience of the policy area:

1. Spatial planning (EnergyCity) and the CESBA tool (CEC5) should be seen as best practices in performance monitoring, to highlight gaps in efficiency and potential savings that could be made through building renovation;
2. Tools such as the Maps and Toolbox (COP) should be used next to highlight ways of capitalising on the opportunities identified by performance monitoring;
3. Strategies and guides drawn up in the EnSURE, COP, VIS NOVA and GovernEE projects should be studied and used as starting point for strategy generation, taking account of the monitoring results of points 1 and 2, above. Wide political and social buy-in should be secured through the creation of a Political Board or Local Support Group (VIS NOVA), and communication campaigns;
4. GovernEE training and coaching is a best practice in awareness raising, and the guides produced on securing energy efficiency commitments from energy providers, shaping public attitudes, and training decision-makers should be consulted to elaborate a communication plan;
5. Investments should be made in demonstrating building renovation – initially small scale renovations should be attempted, before moving onto more complex multi-occupancy

buildings and district renovation. The pilot renovations of the EnSURE project show ambition and have been successful in demonstrating complex renovation pilot actions;

6. Performing the above pilot actions can create a critical mass of knowledge and awareness that encourages individuals to enact renovations on their own. The Energy Performance Contracting model (CombinES) should be explored by regions for enacting renovation subsidies.

Critical mass mobilised

Projects have demonstrated that they have mobilised critical mass by securing commitment from regional policy-makers and stakeholders, and/or by securing finance and future investments in building renovation. From the Thematic Achievements listed in Section 4.3, the projects performed over seventeen demonstrations and pilot actions and developed more than fifteen energy plans, with political commitment and a list of further actions with which to approach the next regional funding programming period. These achievements will significantly help the regions to achieve the 20/20/20 targets.

Potential relevance and uptake to policies

CENTRAL EUROPE project achievements in this subtheme have shown high relevance in the context of the thematic background and policy frameworks. The focus on awareness raising, demonstration and tools that can highlight energy potentials is entirely suitable for the development stage of the central Europe regions, being essential for moving on to more advanced policy stages.

Direct influence on policies can be seen in many of the project achievements, with other achievements having potential for wide scale deployment once projects are complete. The above policy package provides a substantial body of good practices that can be used to encourage building renovation uptake at the regional level.

Territorial relevance

The map in section 4.3.6 shows the impressive spread of thematic achievements. As outlined in the thematic background, much of the central Europe area falls under the Commitment and Planning and Emerging Market stages of the Policy Cycle, as elaborated in Section 2.5 (strategies, awareness raising, demonstration). The Policy Package, above, demonstrates that the projects have achieved goals which are suitable to these regional development stages of the Policy Cycle. Looking back to the overview of the central Europe region, it is particularly impressive to see progress made in a theme that has been seen as weak in many European countries.

5.2. Co-operating to use renewable energies in the regions effectively

Renewable energies provide many advantages for regions that invest in them, including boosting employment and improving energy security. The projects under this subtheme have made excellent contributions towards developing regional frameworks to support renewable energy use.

Compared to the energy performance of buildings, the use of renewable energies is becoming much more of a mainstream practice and, thanks to strong EU frameworks, is supported by all member states. Therefore, projects under the subtheme have been more ambitious and tackled a wider range of issues than the projects under Subtheme I, reflecting that renewable energy markets, technologies and services are more developed and that awareness is higher in the central Europe area.

A comprehensive **Policy Package** for encouraging development of renewable energy markets can be devised from the project results. Regions starting out in renewable energy development should consider implementing projects that build upon the results of the CENTRAL EUROPE Programme, as the Policy Package covers the major tools needed for encouraging renewable energy use:

1. The Web Mapping Tool (TRANSENERGY) and Geographic Information System (RUBIRES) are good examples of renewable energy resource analysis. As elaborated in the policy cycle, regions should begin their efforts by establishing their main strengths in resource availability;
2. Political buy-in can be secured through practices such as the RESOURCE resolution, as long as messaging makes the benefits of renewable energies to regional economic development clear;
3. As with the previous subtheme, the strategies and guides drawn up by the projects (in particular, 4BIOMASS, SEBE, GUTS and CEP-REC) are impressive and should act as models for regions starting out in renewable energy exploitation;
4. Awareness and education tools developed are strong, and networks such as the Coach BioEnergy Network (showing how to capitalise on existing knowledge and make it available to regions), and SEBE Competence Knowledge Centre Network should be used as contact points for knowledge sharing;
5. The demonstration pilot actions within the projects, E2BEBIS and DANUBENERGY, are good examples of projects that can boost renewable energy use by improving efficiency and performance in regions already committed to renewable development.

Critical mass mobilised

Projects have demonstrated that they have mobilised critical mass by securing commitment from regional policy-makers and stakeholders, as well as finance and future investments. From the thematic achievements outlined, the projects under this subtheme have produced over 20 Regional Energy Concepts and Strategies, and have performed more than ten demonstrations, to secure political buy-in and investment. These activities will significantly help the regions to achieve the 20/20/20 goals.

Potential relevance and uptake to policies

Project policy-recommendations and strategies are contributing to national strategies and EU initiatives, such as the Danube Region Strategy. In particular, the results of the projects exploring innovative technologies such as biochar (E2BEBIS) and integrated generation of solid fuel and biogas from biomass (DANUBENERGY) should be watched closely by regional, national and EU policy-makers for the recommendations that they will produce, once they are completed. Projects, such as MANERGY, have also directly contributed to the elaboration of Sustainable Energy Action Plans for the Covenant of Mayors.

Territorial relevance

Central Europe shows particular promise for bioenergy, and the focus on biomass that was evident in many projects shows a high degree of territorial relevance. The map in section 4.4.6 shows an excellent spread of Thematic Achievements. Much of the central Europe area falls under the Commitment and Planning and Emerging Market stages of the sustainable energy Policy Cycle, and projects have achieved goals which are suited to this development stage. The activities of the CENTRAL EUROPE Programme should help the regions to develop further, though continued commitment from regional players will be needed to reach Mature and Saturated Market phases.

5.3. Programme level

In how far does transnational co-operation contribute to reaching EU objectives set for the theme, in ways that other instruments could not?

Reaching the EU 2020 targets for smart, sustainable and inclusive growth will only succeed with implementation and investment at municipal and regional level. It is here that buildings and city districts will be retrofitted, that owners and tenants will implement new business models to finance refurbishment, and where renewable energies are available, produced, harvested, transformed and

stored. Enabling regions and municipalities to develop and implement strong regional renewable energy and energy efficiency policies and instruments is thus an extremely important pre-requisite for reaching the European targets.

In this perspective, transnational co-operation plays a major role in accelerating the development of relevant regional policies through the creation of synergies and economies of scale; sharing of costs in the development of tools (especially in rural and peripheral areas); raising the awareness of relevant regional stakeholders and demonstrating successful, local applications.

The CENTRAL EUROPE Programme plays an important role in collecting and benchmarking the most common problems and solutions that regions encounter in the development of policies aiming at reducing the carbon footprint of buildings and using renewable energy efficiently. The programme helps to kick-start the policy cycle by supporting the regions to develop strategies and set targets, raise awareness and invest in demonstration projects.

What is the added value of transnational co-operation regarding the themes compared to other EU funding instruments?

There are three main EU funding instruments that are relevant for the themes of Renewable Energy and Energy Efficiency:

1. The 7th Framework Programme for Research and Technological Development (2007-2013) that will be continued under **Horizon 2020** – the new European Framework Programme for Research and Innovation for the period 2014-2020. These major European funding instruments are supporting basic research, strategic and applied research, demonstration projects and close-to-market activities such as piloting, prototyping and testing. The third pillar of Horizon 2020, ‘Societal Challenges’, is particularly relevant for Renewable Energy and Energy Efficiency and will support the development of new, interdisciplinary and innovative solutions for ‘Secure, clean and efficient energy’, ‘Smart, green and integrated transport’ and ‘Climate action, resource efficiency and raw materials’.
2. The former **Intelligent Energy Europe** (IEE) Programme has also been integrated into Horizon 2020’s Societal Challenges and will continue to focus on the removal of non-technical barriers by providing awareness and information, capacity building, support to energy agencies, financing instruments for renewables and energy efficiency and first market introduction projects.
3. The **European Structural and Investment Funds** have earmarked significant amounts for large scale energetic renovation of existing buildings and the development of renewables infrastructures such as wind parks in the eligible regions.

- a. The **European Regional Development Fund**, which funds the CENTRAL EUROPE Programme, funds a variety of other transnational and interregional programmes, but the majority of its funding goes towards individual regions and cities and projects within one country. Only a fraction is reserved for interregional and transnational co-operation. ERDF priorities include the low-carbon economy and innovation and research.
- b. The **European Social Fund** promotes employment, social inclusion and education, which can be useful for regions wishing to fund vocational energy-themed training;
- c. The **Cohesion Fund** is aimed at EU Member States with a GDI per inhabitant which is 90% or less of the EU average. The Cohesion Fund supports trans-European transport networks and projects which can benefit the environment in terms of energy efficiency and renewable energy use.

In comparing the CENTRAL EUROPE Programme to the above-mentioned EU funds and related instruments, the following differences and synergies can be observed:

Knowledge creation vs. knowledge sharing and mutual learning

While EU funding instruments such as FP7 (to be continued in Horizon 2020) focus on excellence and innovation, (i.e. on the creation of new knowledge in form of technologies and business models); transnational programmes such as CENTRAL EUROPE have a less stringent definition of innovation and a larger capacity to build and improve regional capacities, to share existing knowledge, enable mutual learning and to raise awareness at regional level. This has been confirmed by the partners of the CENTRAL EUROPE projects on energy efficiency and renewable energy who clearly see the main added value of transnational co-operation as the opportunities created for mutual learning and access to skills that are not available in their regions. In order to benefit from research projects, CENTRAL EUROPE partners can look to the latest research results and innovations produced under the research framework programmes on decentralised energy production and energy efficiency, and integrate them into their own work.⁴⁸ Partners can also build upon their experiences by collaborating with Smart Cities projects, and can promote their experiences for the benefit of others by participating in learning platforms.⁴⁹

⁴⁸ A few examples include the EuroPruning project on the use of agricultural wastes as biomass, the MeeFS project on energy efficient building facades, ECO-SEE on improved internal environments for energy efficient buildings, or SWIP on integration of small wind turbines into urban and peri-urban areas.

⁴⁹ For example, municipalities could sign up to the 'My Smart City District' campaign with their results and benefit from the networking and exchange of expertise that the platform will offer. See <http://eu-gugle.eu/> for more.

Depth vs. Breadth

Whilst other EU funding instruments tend to go in-depth, involving a small number of actors, transnational co-operation projects create breadth, impacting a large number of regional organisations and citizens. For major societal challenges such as renewable energy and energy efficiency, this larger roll-out at regional level is of paramount importance. The project partners underlined that the CENTRAL EUROPE projects particularly supported the creation of political and social buy-in in the regions.

European / national vs. regional / local level

Compared to funding instruments such as Horizon 2020, where impact remains at the level of a single participating organisation such as a university or a SME, transnational co-operation enables broad participation and the engagement of regional stakeholders and citizens, who can get involved and gain experience directly from the co-operation. In addition, co-operation allows for practical solutions across regional borders to be found and develops transnational actions (e.g. to share energy transport means or regulate the access to a geothermal source).

Target audiences

CENTRAL EUROPE, like other regional programmes, allows for the development of strategies, action plans, and regional policy instruments, targeted at regional policy makers, whilst also engaging researchers, the public and the private sector. Policy-makers are able to exchange approaches with their equivalents from other regions, get inspiration and see with their own eyes what works and what might not. Transnational co-operation can contribute to existing macro-regional strategies by strengthening links within central Europe. The elaboration of transnational tools and actions to solve common problems, where single regions may not have adequate capacity to cope alone, or to organise co-operation with other regions, is of huge added-value to the target audience, as evidenced by the quality of outputs achieved by the projects.

Investment decisions

In the online survey of the CENTRAL EUROPE Programme carried out in preparation of the period 2014-2020, almost 90% of the regions mentioned the ‘use of renewable energy sources’ as the most urgent need in central Europe⁵⁰. At the same time, funding and investment available in the regions of central Europe is scarce. Based on small amounts for pilot investments supported by the

⁵⁰ Österreichisches Institut für Raumplanung & Polish Academy of Sciences, Institute of Geography and Spatial Organisation – CENTRAL EUROPE PROGRAMME: Results of the regional analysis, Document analysis, online survey, interviews, SWOT (2012), p. 12.

programme, in many cases CENTRAL EUROPE project partners leverage further funds to cover the full costs of large scale investment activities (e.g. for refurbishment and construction). Projects have confirmed that having the initial investment from the programme can often stimulate regional authorities to invest additional funds from their own resources. The key added value brought by the CENTRAL EUROPE Programme is that through transnational co-operation it supports the regions in:

- Understanding risks and opportunities involved;
- Conceiving relevant strategies and actions plans;
- Joining forces and economies of scale;
- Developing tools and methodologies that support strategic decisions;
- Securing political buy-in and investment commitments;
- Focusing on investments that generate the greatest impact in a region.

Which actions of the current CENTRAL EUROPE Programme have proven to be relevant and successful for the sub-themes on the territorial level? Which actions could be considered in the future programme?

Reducing the carbon footprint of buildings

Retrofitting Europe's old building stock to achieve greater energy efficiency and to reduce their carbon footprint is the biggest challenge for all European regions, not only the central Europe area. Investment in energy efficiency in buildings and the integration of renewables is also an opportunity that can substantially lower regional energy demand and boost economic activity in the construction sector.

Despite Europe's ambitious targets, energy efficiency is still poorly addressed and often there are no policies developed at national, regional and local level. In this respect, the actions of the CENTRAL EUROPE projects have proven to be very relevant and successful for the regions involved, namely through:

- Developing tools that are relevant for devising strategies and policy actions, such as the energy performance assessment of existing, public, historic and new buildings or spatial decision support systems for mapping heat loss in cities and estimating energy consumption and CO₂ emissions;
- Devising energy efficiency plans, sustainable energy action plans and guidelines for the creation of local energy action plans and concepts;
- Disseminating information and enabling citizens to better understand the energy use in their own living environment;

- Collecting good practices regarding sustainable energy use in buildings, and demonstrating energy efficient renovation in cities throughout central Europe;
- Coaching and training of municipal officers and energy managers;
- Using energy performance contracting to open new ways of funding reduction of the carbon footprint of buildings.

These actions have been well chosen as they mainly address the first phases in the policy cycle ‘Commitment and Planning’ and ‘Emerging Markets’. A future programme should build on these actions and ensure that all regions participating in the CENTRAL EUROPE Programme can benefit from the experiences, strategies and tools already developed with a view to implementing them in their own region or city. In this respect, the CENTRAL EUROPE projects should also be encouraged to seek synergies with other transnational programmes under the European Territorial Co-operation objective, and interregional programmes such as INTERREG IVC (INTERREG EUROPE from 2014) and URBACT that have accumulated a large wealth of knowledge in these areas.

Regions that have successfully devised their strategies and started activities as ‘Emerging Markets’ according to Section 2.5 (i.e. awareness raising, demo investments, energy performance contracting and capacity building through training programmes), should now broaden the scope of activities under ‘Emerging Markets’ including technology networking and development, green public procurement, institutional support for investors and the development of regional funding instruments.

For regions that have developed strategies, the CENTRAL EUROPE Programme should particularly support all actions under ‘Emerging Markets’ to further reduce the carbon footprint of building and to eventually enlarge the scope to multi-residential building blocks and city districts in line with the smart city efforts and future projects should take into account the results of the first European smart city projects, which are currently under development. As renovation of buildings on a large scale can be challenging, regions should build upon action plans and strategies developed in the CENTRAL EUROPE Programme, using, for example, the mainstreaming programmes to invest into wide deployment. The new programming period has a significant budget earmarked for building retrofitting.

Improving the use of renewables in regions

With regard to renewables, the CENTRAL EUROPE Programme has provided a relevant and successful focus on bio-energy (particularly biomass and biogas) but also on geothermal and solar energy. This focus is relevant considering the specific features and challenges of central Europe with regard to its climate and natural resources, the disparities and spatial rift between periphery and

dynamic metropolitan areas and the geographical location of central Europe at the cross-roads from west to east and from north to south. It is also in line with the impetus that is needed for appropriate policies and actions in renewable heating and cooling. For renewables, the focus of actions supported by CENTRAL EUROPE Programme has also proven to be very relevant, particularly in regard to following factors:

- Climate and natural resources – Agriculture and forestry are key economic sectors in central Europe; and geothermal sources are also widely available for extensive exploitation;
- Disparities and spatial rift – Biomass and biogas are available throughout central Europe, including in peripheral areas, allowing for the instigation of economic activities and growth outside of metropolitan areas;
- Location at the crossroads – Central Europe's geographical location can be used to create a logistics hub for bio-energy products in central Europe, and open new markets in Europe and beyond.

Since regions have already made important progress towards the targets of renewable energy, less emphasis has been on general strategy development, but rather on concrete regional energy concepts and specific action plans addressing for example small scale heating or biogas. An extremely important policy success is the development of a renewable heat incentive in the Czech Republic, which is the second heat incentive in Europe, after the UK. Similar schemes should be supported in all countries of central Europe (and beyond).

Most actions can be classified under the 'Emerging Markets' stage of maturity installing networks of competence knowledge centres and regional consultants; providing support to investors in bioenergy; and implementing a wide range of demonstration and pilot actions. For future direction, more emphasis is required for sustainable transport where central Europe appears to be lagging behind. In this area, the CENTRAL EUROPE Programme should seek synergies and make the experiences of other transnational, interregional and other programmes available. The future CENTRAL EUROPE programme should keep the current focus on bioenergy which is the real strength of the central Europe area, but more should be done to support district heating, by making it a key area for policy development and support actions.

Bibliography

Committee of the Regions – *Special Eurobarometer 307 on the role and impact of local and regional authorities within the European Union: Opinions on the different levels of public authorities and awareness of the Committee of the Regions* (2009)

Concerted Action Energy Performance of Buildings – *Implementing the Energy Performance of Buildings Directive* (2011)

Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market

Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable energy sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC;

Directive 2010/31/EU of the European Parliament and of the Council of 16 May 2010 on the energy performance of buildings

Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC

Ecofys – *Towards nearly zero-energy buildings: Definition of common principles under the EPBD* (2013);

Ecofys – *Country profile of Ukraine: Evaluation of energy and climate policies compared to the EU* (2013)

Economist Intelligence Unit, The, – *Investing in energy efficiency in Europe's buildings: A view from the construction and real estate sectors* (2013)

Energy Community – *Annual Implementation Report* (2013)

Energy Efficiency Watch – *Energy Efficiency in Europe: Assessment on Energy Efficiency Action Plans and Policies in EU Member States* (2013)

EurObserv'ER – *The State of Renewable Energies in Europe* (2011, 2012)

European Commission – *Communication from the Commission, Europe 2020: A strategy for smart, sustainable and inclusive growth. COM(2010)2020final.*

European Commission – *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Regional Policy contributing to smart growth in Europe 2020. COM(2010)553final*

European Commission – *Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Energy Roadmap 2050. COM(2011)0885final.*

European Commission – *Energy Efficiency Plan 2011*, COM(2011)109

European Commission – *White paper on transport* (2011)

European Commission, DG Regional Policy – *Cohesion Policy 2007-2013: Commentaries and official texts* (2007)

European Commission, DG Regional Policy – *Cities of tomorrow: Challenges, visions, ways forward* (2011)

European Commission, DG Regional Policy – *Cohesion Policy 2014-2020: Investing in growth and jobs* (2011)

European Commission, DG Regional Policy – *Connecting Smart and Sustainable Growth through Smart Specialisation: A practical guide for ERDF managing authorities* (2012)

European Commission, DG Regional Policy – *Guide to Research and Innovation Strategies for Smart Specialisation (RIS3)* (2012)

European Commission, Eurostat – *EU Energy in Figures: Statistical Pocketbook* (2012)

European Renewable Energy Council – *Renewable Energy in Europe: Building markets and capacity* (2004)

European Renewable Energy Council – *45% by 2030: Towards a truly sustainable energy system in the EU* (2011)

European Renewable Energy Council – *Mapping Renewable Energy Pathways towards 2020* (2011)

European Renewable Energy Council – *EU Tracking Roadmap 2013 – Keeping track of renewable energy targets towards 2020* (2013);

Greenovate! Europe – *Thematic programme capitalisation of INTERREG IVC projects on renewable energy* (2013)

Greenovate! Europe – *Resource efficiency potentials in manufacturing industries: A comparison of resource saving potentials of single companies vs. manufacturing value chains* (2013)

Greenpeace and European Renewable Energy Council – *Energy [R]evolution: A sustainable EU27 Energy Outlook* (2012),

International Energy Agency – www.iea.org/topics/energyefficiency

Österreichisches Institut für Raumplanung & Polish Academy of Sciences, Institute of Geography and Spatial Organisation – *CENTRAL EUROPE PROGRAMME: Results of the regional analysis, Document analysis, online survey, interviews, SWOT* (2012),

Roderick, Y., D. McEwan, C. Wheatley, C. Alonso – *A Comparative Study of Building Energy Performance Assessments between LEED, BREEAM and Green Start Schemes* (2009)

Wallace, H., M. Pollack & A. Young (eds.) – *Policy-making in the European Union*, Sixth ed. (2010)

Worldwide Fund for Nature & Ecofys – *Climate Policy Tracker for the European Union* (2011)