



3.2.4 Transnational Sustainable Energy Strategy

**CERE – Center of Excellence for Renewable Energy,
Energy Efficiency and Environment**

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A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europe server (<http://europa.eu>).

About VISNOVA

The CHALLENGE of VISNOVA pursues an integrated approach which addresses both the supply (provision of sustainable energy) and demand site (efficient use). Based on best practices collection, transferred and tested in pilot measures (both pre-investment and small investment), included to regional energy development plans adopted with a political vote, financial resources from national programmes will be explored and responsibilities for the plans' implementation assigned.

Thus, VIS NOVA partners aim to integrate a concept of energy autonomy based on renewable sources and energy efficiency into regional development policies, public authorities in rural regions need adequate planning instruments to avoid isolated approaches that fail to unfold the full potentials for territorial cohesion, competitiveness and employment. Furthermore, public authorities lack profound knowledge about the transferability of European good practices and have poor access to cutting-edge innovations in intelligent energies.

The overall OBJECTIVE of VISNOVA is to cover in the medium and long term up to 100% of the territory's energy demand by energy being produced off regional resources. Sustainability and a secured supply shall be turned into a location factor; the possibility to determine prices can be exploited as a new incentive to promote economic development. Moreover, regional added value and hence employment in the energy sector is strengthened.

With other words, the aim is to integrate instruments to promote energy efficiency ("Energy Efficiency Plan") based on EU good practices, new technologies and transnational learning into regional development policies. The project therefore assists rural regions to plan and to take action to create new value added in the renewable energy sector, to secure local energy supply, to improve energy efficiency performances, to strengthen their competitiveness as locations for economic activities, and to promote territorial cohesion comprehensively.

Furthermore, pilot investments and feasibility assessments subject to transnational peer review test and demonstrate new means to exploit endogenous energy sources in a sustainable way and enhance their efficiency.

Already existing energy/regional development agents (usually those participating in the project) will assume the competency of a regional sustainable energy centre to master the energy development plans' medium and long-term implementation.

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Introduction

Most of the renewable energy projects implemented thus far in the rural areas of less industrialised nations have concentrated on residential applications. A limited but growing number of rural projects are currently being implemented to use renewable energy for productive uses, one of them being VISNOVA.

In order to be able to realise a real carbon economy and diminish the green-house effect, renewable energy sources are crucial to be implemented, this fact consisting in the meantime the key component of the EU energy strategy.

The EU renewable energy policy is actually not so old, it's start being given by the White Paper adoption in 1997, document adopted due the need of energy sector decarbonising and reduction of fossil fuel import dependency from regions outside EU. Since then, there was defined and established legally binding targets supported by a comprehensive legislative framework, over passing the process of RE promotion just through indicative targets for the electricity and transport sectors, leading in the end to a reorientation of European energy infrastructure policy that facilitates renewable energy growth.

The new Renewable Energy Directives provide a strong and stable regulatory framework for the development of the renewable energy in Europe. With the transposition of the directive by all Member States by the deadline of 5th December 2010 and the adoption of National Renewable Energy Action Plans (NREAP), the foundations for determined EU action on renewable energy have been laid. Thus, the Commission's Energy 2020 Strategy¹ highlights how the European infrastructure along with innovation policies can and support in the same time the development of renewable energy sector, ensuring that renewable energy sources and technologies become economically competitive as soon as possible, thus support the growth of renewable energy to achieve our goals. However, as a continuous developing industry, these important challenges as well as the dimension of financing will have to be addressed in the coming years.

An important aspect of the EU policy to increase the share of renewable energy sources (RES) is the targets monitoring and evaluation and the progress achieved in 2010 and the assessment of realistic targets for the period up to 2020. The monitoring process concentrates on two main issues. Firstly, it examines the national adoption of EU legislation and its translation into legal and policy instruments in each

¹ COM(2010)639/3 Energy 2020: A strategy for competitive, sustainable and secure energy

of the 25 EU states. Secondly, it provides a framework with which to analyse the impacts of these national policies and measures and the extent to which each of the European states are realising the targeted deployment of renewable energy. Based on different assumptions with regard to the implemented policies, scenarios for the future implementation of renewables until 2020 can be calculated.

The European renewable energy market with its set of supporting measures is very dynamic. Countries are continuously monitoring their sets of policies and measures, which often results in the fine tuning of instruments and sometimes the introduction of a completely new set of instruments. For electricity, the formulation of the Renewable Electricity Directive has clearly had a strong influence on the amount and level of supporting policies. For biofuels, changes in the fiscal and agricultural policy can be observed as a result of the Biofuels Directive. For the heat sector, the recently formulated Directive on the Energy Performance of Buildings represents a starting point for policy setting on the European level. More significant policy changes are expected in the near future.

It is vital in terms of energy research and development in the entire world in general and Europe in particular to provide renewable energy options by making energy services available without huge or excessive costs, to reduce oil and natural gas dependence and to mitigate to climate change by developing competitive renewable energy technologies. All the countries share these concerns and compete together to find the new renewable energy technologies applicable to their own market (from regional to national level), ensuring them with technological advantages and economic benefits.

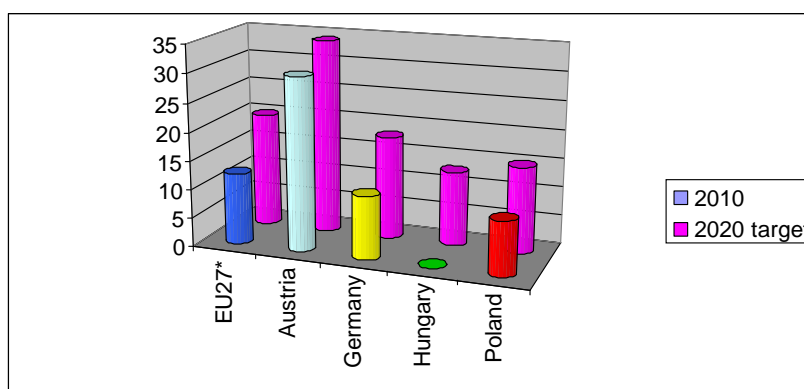


Figure 1 Comparison between 2010 level and 2020 target

The estimates by Eurostat², released during the EU Sustainable Energy Week (18 to 22 June 2012) which promotes energy efficiency and renewable energy, show how far some countries have still to go to reach their individual targets. The bar chart

² http://europa.eu/rapid/press-release_STAT-12-94_en.htm

above shows the share by member on each VisNova partnership countries (respectively Austria, Germany, Hungary and Poland) for 2010 and also the 2020 objectives.

Targets were set for all member states by the 2009 Directive on renewable energy. The EU target for 2020 was to establish a 20% share of total energy consumption from renewable sources. Factors such as the different starting points, renewable energy potential and economic performance of each country are taken into account in the targets.

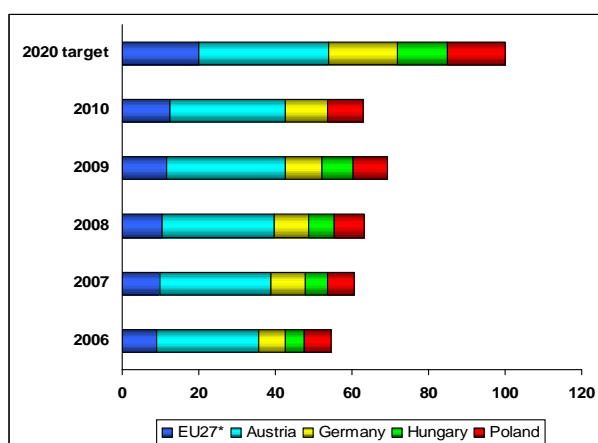


Figure 2 Share of renewable energy evolution (% of gross final energy consumption)

So what do the figures show?

- All member states increased their share of renewable energy in total consumption during 2006-2010. The EU has increased from 9% in 2006 to 12.4% in 2010, Energy obtained from renewable sources is estimated to have contributed to 12.4% of the European Union's (EU) overall energy consumption in 2010, up from 11.7% in 2009.
- Austria manage to reach the highest values for the RE shares in the total consumption (30.1%), Germany recorded the largest increase in share of renewable energy in total consumption between 2006-2010 from 6.9% in 2006 to 11% in 2010 (4.1%). Hungary has not the lowest share of renewable energy in total consumption in 2010, but the figures are not available on Eurostat, so calculations were made up to 2009 year level. The lowest share of renewable energy during 2006-2010 period in total consumption was recorded in Poland (2.4%).

	2006	2007	2008	2009	2010	2020 target
EU27*	9	9,9	10,5	11,7	12,4	20
Austria	26,6	28,9	29,2	31	30,1	34
Germany	6,9	9	9,1	9,5	11	18
Hungary	5,1	5,9	6,6	8,1	-	13
Poland	7	7	7,9	8,9	9,4	15

Table 1 Share of renewable energy (in % of gross final energy consumption)

1. European Energy Strategy 2020³

The Union is facing unprecedented challenges resulting from increased dependence on energy imports and scarce energy resources, and the need to limit climate change and to overcome the economic crisis. Energy efficiency is a valuable means to address these challenges. It improves the Union's security of supply by reducing primary energy consumption and decreasing energy imports. It helps to reduce greenhouse gas emissions in a cost-effective way and thereby to mitigate climate change. Shifting to a more energy-efficient economy should also accelerate the spread of innovative technological solutions and improve the competitiveness of industry in the Union, boosting economic growth and creating high quality jobs in several sectors related to energy efficiency.

The Commission Communication of 10 November 2010 on Energy 2020 places energy efficiency at the core of the Union energy strategy for 2020 and outlines the need for a new energy efficiency strategy that will enable all Member States to decouple energy use from economic growth.

One of the initiatives of the Europe 2020 Strategy is the flagship resource-efficient Europe adopted by the Commission on 26 January 2011. This identifies energy efficiency as a major element in ensuring the sustainability of the use of energy resources. The Conclusions of the European Council of 4 February 2011 acknowledged that the Union energy efficiency target is not on track and that determined action is required to tap the considerable potential for higher energy savings in buildings, transport, products and processes. Those conclusions also provide that the implementation of the Union energy efficiency target will be reviewed by 2013 and further measures considered if necessary.

The EU Renewables Directive is a unique creation which addresses two of the biggest challenges of our time - energy security and climate change. The 20% renewables target for 2020 is now firmly embedded in the psychology of Europeans decision makers. To reach this ambitious target is a call for the full mobilisation of Europe's resources, expertise and innovation. No even one single business can afford to miss out on the opportunities and technical advances which the shift towards a renewable energy economy will bring.

In this context it was necessary to update the Union's legal framework for energy efficiency with a Directive pursuing the overall objective of the energy efficiency

³ DIRECTIVE 2012/27/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC

target of saving 20 % of the Union's primary energy consumption by 2020, and of making further energy efficiency improvements after 2020. To that end, this Directive should establish a common framework to promote energy efficiency within the Union and lay down specific actions to implement some of the proposals included in the Energy Efficiency Plan 2011 and achieve the significant unrealised energy saving potentials it identifies.

It would be preferable for the 20% energy efficiency target to be achieved as a result of the cumulative implementation of specific national and European measures promoting energy efficiency in different fields. Member States should be required to set indicative national energy efficiency targets, schemes and programmes. These targets and the individual efforts of each Member State should be evaluated by the Commission, alongside data on the progress made, to assess the likelihood of achieving the overall Union target and the extent to which the individual efforts are sufficient to meet the common goal.

1.1. Scope and Prospects of Renewable Energy Sources

Within just a few years, we need to generate more than one third of our power from renewable sources of electricity. A significant part of our heating and transport must be based on renewable fuels. It is not enough to tinker around the edges. We need huge practical and concrete initiatives involving society as a whole. And we need to persuade our international partners to follow the same track. The switch to renewable energy calls for investments in the order of billions of Euros. Cost cutting in the public and private sectors risks reducing the flow of investments in renewable technologies, which could have serious consequences for our future security.

However, current economic conditions are not favourable to this. New energy sources also call for new networks to bring them to customers. Variable generation calls for new approaches to balancing demand and supply. Investors and financial institutions need the confidence to trust relatively new and expensive technologies. Customers must be convinced that their future prosperity lies in renewable energy.

The National Renewable Energy Action Plans make the bridge between ambition and reality. The Commission is determined that these plans should be coherent, comprehensive and effective. Done well, these plans will take us towards a new era of energy security. If we fail, we will be paying the price for generations to come. The REPAP project has been providing essential support for Member States to prepare, and deliver, high quality and effective National Renewable Energy Action Plans. Within REPAP, the EU Industry Roadmap provides a vital insight into how policy and

practice connect from the industry's point of view. It provides a crucial guide to policy makers and technology developers on the impact of EU renewables legislation on industry.

Europe's industry and particularly its renewable energy industry, including many small and medium companies, are major players in our policies. We would never have got this far without them. They will ultimately deliver the renewables targets. Close collaboration between the EU, Member States and business is the key to generate the low-carbon revolution and creating the jobs, skills and prosperity Europe needs.

1.2. European Energy Policy and the role of Renewables

Renewable energy is crucial to any move towards a low carbon economy. It is also a key component of the EU energy strategy. The European industry leads global renewable energy technology development employs 1.5 million people and by 2020 could employ a further 3 million⁴. The promotion of renewable energy also develops a diverse range of mostly indigenous energy resources. The Commission's Energy 2020 Strategy⁵ highlights how EU infrastructure and innovation policies are supporting the renewable energy sector's development, ensuring that renewable energy sources and technologies become economically competitive as soon as possible and thus support the growth of renewable energy to achieve our goals. However, as a young and developing industry, these important challenges as well as the dimension of financing will have to be addressed in the coming years.

This Communication presents an overview of the renewable energy industry in Europe, its prospects to 2020 and addresses the outstanding challenges for the development of the sector. The background analysis underpinning this Communication is provided in three reports reviewing the European and national financing of renewable energy, the recent progress in the development of renewable energy sources and the use of biofuels and other renewables in transport as well as the operation of the mass balance verification method for the biofuels and bioliquid sustainability scheme Taken together, these four documents form the Commission's response to the reporting requirements set out in the relevant EU legislation.⁶

⁴ Commission (ECOFYS) EmployRES study, gross employment effects

⁵ COM(2010)639/3 Energy 2020: A strategy for competitive, sustainable and secure energy

⁶ SEC xx Recent progress in developing energy from renewable sources and technical evaluation of the use of biofuels and other renewable fuels in transport. Commission report in accordance with Article 3 of Directive 2001/77/EC and Article 4(2) of Directive 2003/30/EC ; SEC xx Review of European and national financing of renewable energy. Commission Report in accordance with Article 23 (7) of Directive 2009/28/EC; SEC xx Commission report on the operation of the mass balance verification method for the biofuels and bio-liquids sustainability scheme. Commission Report in accordance with Article 18 (2) of Directive 2009/28/EC

The inadequate rate of progress towards agreed targets, and the need to foster renewable energy development in all Member States and not only in a few, were among the reasons that prompted a change in policy approach marked by the adoption of the Renewable Energy Directive in 2009⁷. The new Directive covers energy consumption as a whole, including for heating and cooling, and lays down legally binding rather than indicative national targets such that the EU achieves a 20% share of renewable energy by 2020. It also contains a much-reinforced set of provisions to facilitate the development of renewable energy, such as a legal requirement for the Member States to prepare NREAPs, reform planning regimes, and develop electricity grids. The need to improve planning regimes (whilst respecting the precautionary principle and mitigating environmental impacts) was another element also discussed in the Commission's Communication on infrastructure priorities. Further efforts are needed both for renewable energy infrastructure and for energy infrastructure overall.

The review of Member States plans shows that the new approach is starting to pay off. A comprehensive and binding regulatory framework is proving catalytic in driving forward renewable energy development to achieve the ambitious targets that the EU has set itself.⁸ The recent high growth rates have resulted in renewable energy constituting 62% of 2009 energy generation investments.

Member States projections show that renewable energy will grow at a faster pace in the years up to 2020 than in the past. Almost half of the Member States are planning to exceed their own targets and be able to provide surpluses for other Member States. For other Member States, a small part of the renewable energy needed to reach their target is planned to come from "imports" in the form of statistical transfers from Member States with surpluses or third countries (see the annexed progress report for details). If all these production forecasts are fulfilled, the overall share of renewable energy in the EU will exceed the 20% target in 2020.

Combined Member States expect to more than double their total renewable energy consumption from 103 Mtoe in 2005 to 217 Mtoe in 2020 (gross final energy consumption). The electricity sector is expected to account for 45% of the increase, heating 37% and transport 18%. Following biomass, wind power will account for 27% projected increase in renewable energy consumption, which will generate demand for Europe's wind turbine manufacturers and associated support industries. Similarly, the solar energy industry will grow, notably for photovoltaics. Other technologies where

⁷ Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources

⁸ The National Renewable Energy Action Plans can be found on the Commission's transparency platform: http://ec.europa.eu/energy/renewables/transparency_platform/action_plan_en.htm. Source of the following data on the National Renewable Energy Action Plans except where shown otherwise are Renewable Energy Projections as Published in the National Renewable Energy Action Plans of the European Member States, ECN/EEA report

quantities are currently small face even higher growth rates. Thus Europe’s industrial players must be ready to respond to this growing demand.

Thus, each European Union member state developed and submitted National Renewable Energy Action Plans (NREAPs) in 2010, according to Article 4 of the renewable energy Directive (2009/28/EC), documents expressing the way in which each of the states will implement the Directive and reach the targets established for 2020. The NREAPs had to present sectorial targets, technology mix expected, and the measures and reforms applied in order to overcome the identified barriers in developing and implementing renewable energies sources.

1.2.1. Electric system

Under the present state of market progress and the political support given to electricity generation from RES, the overall target can be reached through a higher contribution by some of the more successful technologies. The figures of Table 3 outline the new targets for 2020 with the expected annual growth rates and the necessary growth rate to increase the share of RES-Electricity significantly.

Type of energy	2002 Eurostat	2006 Eurostat	Annual growth rate 2002-2006	Projection 2010	Annual growth rate 2006-2010	Projection 2020	Annual growth rate 2010-2020
Wind	23.1 GW	47.7 GW	19.9	80 GW	13.8	180 GW	8.5
Hydro	105.5 GW	106.1 GW	0.2	111 GW	1.1	120 GW	0.8
Photovoltaic	0.35 GWp	3.2 GWp	73.9	18 GWp	54.0	150 GWp	23.6
Biomass	10.1 GWe	22.3 GWe	21.9	30 GWe	7.7	50 GWe	5.2
Geothermal	0.68 GW	0.7 GW	0.7	1 GW	9.3	4 GW	14.9
Solar thermal elect.	-	-	-	1 GW	-	15 GW	31.1
Ocean	-	-	-	0.5 GW	-	2.5 GW	17.5

Table 2 Renewable Electricity Installed Capacity Projections

If the projected growth rates were achieved Renewable Energies would significantly increase their share in electricity production. The estimations below are based on the rather moderate growth rate projections. Depending on the development of the total electricity generation, renewable energies will be able to contribute between 33% and 40% to total electricity production. Assuming that the EU will fulfil its ambitious energy efficiency roadmap, a share of over 40% of renewables in electricity production by 2020 is realistic.

The Energy 2020 Strategy highlighted how the rise of electricity produced from renewable sources also has implications for the electricity market as a whole. Multiple, flexible, smaller scale distributed forms of electricity generation need different grid and market design rules compared to traditional large, centralised power sources. The market integration of renewable energy should ideally occur in a

manner that ensures resources are developed where it makes most economic and environmental sense. Factors such as distance to consumption centres, implied grid needs and issues related to public acceptance and job creation clearly also play a role and cannot be ignored. In any event, support schemes should over time be adapted to apply best practice so as to avoid undue market distortions and excessive costs.

	2005 Eurostat TWh	2006 Eurostat TWh	2010 Projections TWh	2020 Targets TWh
Wind	70.5	82.0	176	477
Hydro	346.9	357.2	360	384
Photovoltaic	1.5	2.5	20	180
Biomass	80.0	89.9	135	250
Geothermal	5.4	5.6	10	31
Solar thermal elect.	-	-	2	43
Ocean	-	-	1	5
TOTAL RES	504.3	537.2	704	1370
Total Gross Electricity Generation EU27 (Trends to 2030-Baseline) (Combined RES and EE)	3320.4	3361.5	3568	4078 3391
Share of RES	15.2%	16.0%	19.7%	33.6 - 40.4%

Table 3 Contribution of Renewables to Electricity Consumption

Based on Member States' plans, renewable energy should constitute 37% of Europe's electricity mix by 2020. The projected expansion of electricity from renewable sources carries a number of implications. First, it highlights the need to accelerate the modernisation of the electricity grid.

The Communication on Energy infrastructure highlighted that urgent action is necessary to prepare the grid for the integration of significant volumes of electricity produced from renewable sources, facilitating grid balancing, flexibility and distributed generation. Electricity systems have to become more interconnected and flexible, and new infrastructure development and reinforcement will be necessary, including the deployment of smart grid technologies⁹. One of the greatest challenges regarding the grid infrastructure is to connect the offshore potentials, mainly wind, foreseen in the Northern Seas of Europe, developing the electricity network both off- and onshore.

1.2.2. Heating & cooling

As for the heating and cooling sector, the graph below gives an indication of the expected growth of technologies in the next decade. Biomass will remain the dominant technology, with 50% of the growth up to 2020 occurring in energy

⁹ COM(2010) 677 Energy infrastructure priorities for 2020 and beyond - A Blueprint for an integrated European energy network

produced from this source (half of that in heating, a third in transport and the rest in electricity).

In the past, there was only modest market development in the heating sector due to the lack of an adequate support framework in most Member States. However this will clearly change in the next years following the inclusion of the heating and cooling sector in the new EU renewable energy framework. Member States are already planning reforms to their grants, feed in tariff regimes or other instruments in the heating sector. Thus development and investments in Europe's biomass pellet industry, in biomass boiler technology, co-firing power plant technology and biofuels refining can be expected.

The heating / cooling sector consumes 49% of the final energy in the EU, or almost as much as transport and electricity combined. Most of this thermal energy is produced from fossil fuels (oil, gas, coal). In 2004 renewable sources of energy such as biomass, solar and geothermal energy provided 49 Mtoe: 8.4% of total heat consumption. RES heating and cooling in the EU is dominated by biomass (>50% of which is household heat), which with the enlargement to EU-27 technically could provide for at least 133 Mtoe by 2020. As regards solar thermal, in the period up to the end of 2005 there have been over 16 million m² of collectors installed in the EU, but over 70% of this capacity has been installed just in 3 European countries (Germany, Greece and Austria). In 2005, the share of geothermal energy sources (both deep and ambient sources) was below 0.5% of the overall consumption of thermal energy in the EU-25 providing around 1,8 Mtoe. However, in order to reach the RES targets for 2010 of the EU White Paper on Renewable Energy COM(97)599 final this production of heating/cooling from geothermal sources of energy in the EU-25 should grow to 3.2 Mtoe.

The European policy framework clearly promotes renewable energy sources although unlike in the area of RES electricity or liquid biofuels for transport, the sector of renewable heating and cooling is not subject to dedicated European legislation. Difficulties with the development of EU legislation on RES heating and cooling are partly related to the fact that there is no common European market for heat as this commodity (or service) is by nature a local issue with major differences in heating/cooling demands, existing infrastructure, and availability of RES sources between EU countries and even between regions within the same Member States.

The EU existing legislation that already promotes renewable energy heating includes Directive 2002/91/EC on the energy performance of buildings (OJ L1/65, 4.1.2003), which for example, imposes a requirement on Member States that technical, environmental and economic feasibility of alternative systems are made for any new

buildings with a total useful floor area over 1000 m² covering RES and district or block heating or cooling, if available.

Another directive 2004/8/EC on the promotion of cogeneration (OJ L52/50, 21.2.2004) also indirectly promotes RES-H as it requires that analyses of national potentials referred to in Article 6 shall consider the type of fuels that are likely to be used to realise the cogeneration potentials, including specific considerations on the potential for increasing the use of renewable energy sources in the national heat markets via cogeneration. Yet, the lack of a favourable political framework in Europe for the renewable heating and cooling sector up until now was preventing higher market penetration so far. With the creation of such a political framework the expectations can be raised and the contribution of RES heating is especially significant in the biomass sector. But geothermal and solar thermal energy will also be able to increase their shares significantly.

Type of energy	2002 Eurostat Mtoe	2006 Eurostat Mtoe	Annual growth rate 2002-2006	Projection 2010 Mtoe	Annual growth rate 2006-2010	Projection 2020 Mtoe	Annual growth rate 2010-2020
Biomass	51.2	60.0	4%	75	5.7%	120	4.8%
Solar thermal	0.51	0.77	10.8%	1.5	18.1%	12	23.1%
Geothermal	0.59	0.68	3.6%	3		7	8.8%

Table 4 Renewable Heat Consumption Projections

Depending on the development of the total electricity generation, renewable energies will be able to contribute between 33% and 40% to total electricity production. Assuming that the EU will fulfil its ambitious energy efficiency roadmap, a share of over 40% of renewables in electricity production by 2020 is realistic.

	2005 Eurostat Mtoe	2006 Eurostat Mtoe	2010 Projections Mtoe	2020 Targets Mtoe
Biomass	57.5	60.0	75	120
Solar thermal	0.68	0.77	1.5	12
Geothermal	0.63	0.68	3	7
TOTAL RES	58.8	61.45	79.5	139
Total Heat Generation EU27 (Trends to 2030-Baseline) *	579.2	570.1	583.5	606
(Combined RES and EE) **				541
Share of RES	10.2%	10.8%	13.6%	22.9-25.7%

Table 5 Contribution of Renewables to Heat Consumption

If the projected growth rates were achieved Renewable Energies would significantly increase their share in electricity production. The estimations below are based on the rather moderate growth rate projections.

1.2.3. Transportation

The plans also indicate how Member States expect to meet their 10% renewable energy in transport target. First generation biofuels will be the predominant energy source over the period to 2020. Europe has the strictest criteria in the world for biofuels sustainability and the Commission has provided guidelines for their application in June 2010. Second generation biofuels and electric vehicles are expected to make only a small contribution by 2020.

The EU depends heavily on imported energy for running its economy. For the transport sector there is hardly any diversification of energy sources: crude oil fuels more than 98% of the EU's transport sector. Biofuels have a major role to play both in improving energy security and tackling climate change, which are the core objectives of the EU's biofuels policy.

The current Biofuels Directive sets an indicative target of 5.75% in 2010. In 2007 the EU consumed between 2.5% and 3% of biofuels for road transport. Giving the fact that the European biofuels industry experienced strong double-digit annual growth rates during the past several years, Europe is well on track to reach the 5.75%. With the 10% binding target for the transport sector the Renewable Energy Directive sends a clear signal to investors and confirms the EU's strong commitment to renewable transport fuels. The 10% target is ambitious but feasible without any adverse effects on the environment or food availability.

Type of energy	2002 Eurostat Mtoe	2006 Eurostat Mtoe	Annual growth rate 2002-2006	Projection 2010 Mtoe	Annual growth rate 2006-2010	Projection 2020 Mtoe	Annual growth rate 2010-2020
Transportation Biofuels	1.05	5.38	50.5%	16	31.0%	34	7.8%

Table 6 Biofuels Production Projections

The Renewable Energy Directive will set an important framework for the future growth of the industry and will pave the way for a stable investment climate. New technologies and applications of biofuels will be developed and marketed up to 2020.

	2005 Eurostat Mtoe	2006 Eurostat Mtoe	2010 Projections Mtoe	2020 Targets Mtoe
Transportation Biofuels	3.13	5.38	16	34.0
Gasoline and oil consumption (Trends to 2030-Baseline) *	297.2	300.4	317.3	349.5
(Combined RES and EE) **				323.9
Biofuels' Share %	1.05	1.79	5.0	9.7-10.5

Table 7 Contribution of Renewables to Transport Fuel Consumption

With this stimulation of the industry and a further coordinated development of biofuels throughout the EU and the possibilities of significantly reducing the oil dependence in the transport sector over the next years, the European biofuels industry is committed to reach the share of 10 % biofuels by 2020.

1.3. Instruments to foster the use of Renewable Energies

To achieve the 2020 targets in an economical and resource efficient manner, and to pave the way for much bigger shares of renewable energy in the years after, the EU needs to continue to invest in research for advanced renewable energy technologies, and needs to continue to bring down the costs of offshore wind; photovoltaic power; electric cars; and second-generation biofuels. Win-win solutions to develop renewable energy projects that bring wider environmental benefits will be promoted through research programmes such as the SET Plan¹⁰. Building up the mass deployment and roll out of current technologies to reach the EU 2020 targets and developing and deploying advanced technologies for a decarbonised energy sector will require major effort and significant investments. For this reason it is essential that there is a stable and predictable environment for the financing of renewable energy.

Furthermore, beyond the technological and regulatory aspects, Member States, regions and cities need to step up their efforts to strengthen skills, knowledge and capacities, in particular within the relevant administrations and agencies (such as through the EU Covenant of Mayors), to ensure adequate governance for the efficient delivery of renewable energy investment programmes and projects.

1.3.1. Harmonization aspects in a single European market for energy

The Commission's Communication on infrastructure priorities has signalled that European investment of more than one trillion Euros is needed between today and 2020 to achieve the EU energy policy goals. Of this, approximately half is needed for replacing or investing in new electricity generation capacity. As the new EU Energy Strategy notes¹¹, priority should be given to renewable electricity investments – achieving levels higher than the 62% of all new power installations in 2009. Further analysis undertaken for the Commission suggests that whilst annual capital investment in renewable energy today averages €35bn, this would need to rapidly

¹⁰ COM(2007)723 A European Strategic Energy Technology Plan

¹¹ COM(2010)639/3 Energy 2020: a strategy for competitive sustainable and secure energy, p6

double to €70bn to ensure we achieve our goals¹². Such outlays must be funded, as they are today, chiefly through private sector investment, financed finally by energy consumers.

The benefits of encouraging the renewables industry were widely acknowledged as the global financial crisis took hold in 2009, when "clean tech" stimulus packages worth billions were implemented in the United States and China, as well as across the EU¹³. Indeed the growth of the sector in the US, China other Asian countries shows that, around the world, it is seen as a crucial industry for the future to achieve innovation, energy security and deliver on a low carbon economy. As noted in the new EU Energy Strategy¹⁴, the challenge facing Europe is to stay at the forefront of this industry, to ensure it grows, at a time when governments are simultaneously faced with the need to curtail spending.

Climate policies that set a carbon price, such as the EU Emission Trading System, to achieve the 20% greenhouse gas reduction target by 2020 compared to 1990, are important drivers to promote renewable energy. Likewise, much can be done to streamline complex authorisation and planning procedures and to remove non-cost barriers to the growth of renewable energy, simply making planning regimes more transparent and faster while respecting existing environmental legislation can improve uptake of renewable energy. Ensuring that installers are qualified, and providing more product information to consumers can also improve deployment rates¹⁵.

But at this time of major fiscal constraint, more can also be done to ensure that the money spent on renewable energy is used cost effectively. Effective selection and coordination of financing tools at national and EU level is essential in this respect. The choice of a financing instrument to support renewable energy development depends on the state of technology and project development¹⁶. Instruments include grants, loans and loan guarantees, equity funds, feed in tariffs, premiums, quota/certificate schemes, fiscal incentives and tenders. All of these instruments can play a role in the right circumstances without altering the competitiveness of the market. They alleviate different forms of project risk – technology, construction, regulatory – and depend in particular on the maturity of a project or technology. R&D funding for instance traditionally consists of grants for significant portions of project capital costs, as the cost and uncertainty surrounding the technology render them too

¹² ECOFYS, Ernst & Young, Fraunhofer ISI, TU Vienna, 2010. The least cost electricity investment component of this, consist least cost electricity investment component of this, consistent with the analysis of COM(2010)677 ranges from €310bn-370bn

¹³ European Economic Recover Package: http://ec.europa.eu/energy/eepr/index_en.htm

¹⁴ COM(2010)639/3 Energy 2020: a strategy for competitive sustainable and secure energy

¹⁵ ECORYS: Assessment of non-cost barriers to renewable energy growth in EU Member States, http://ec.europa.eu/energy/renewables/studies/renewables_en.htm

¹⁶ "Support schemes for renewable electricity in the EU" European Commission Economic Papers 408, April 2010 and "Financing Renewable energy in the European Energy market", ECOFYS et al, October 2010

risky for the private sector to finance alone. Once a technology is more established, grants can still be useful to finance demonstration projects, with a move to venture capital – bearing high risks – when technology is nearly established. Results can already be seen: wind production costs have declined by 20% over the 9 years to 2006 and solar PV by 57%¹⁷. For wind energy, low operating costs increasingly lead to falling market prices (the so-called "merit order effect"). This entails cost savings for all electricity consumers and may to a significant extent compensate for the extra costs of support schemes.

Once a technology is capable of being deployed but not yet competitive, support tends to shift from capital to operating support and here again there is a continuum of instruments, depending on circumstances. Whatever the instrument, it is important that it has a predictable and transparent way of adapting support levels so as to avoid "stop and go" policies or political calls for retroactive changes to conditions (such as in certain photovoltaics markets recently) allowing adjustments to reflect the falling production costs of renewables thus avoiding excessive returns on capital. It is also important to note that operating support is more commonly financed by energy consumers rather than from taxation.

The costs of developing our energy sector vary, depending on a wide variety of factors, including technology costs, oil and gas prices, technological progress, grid and transport costs and administrative barriers. Yet, due to the still-fragmented single European energy market, traditional infrastructure, and with fossil fuels still receiving four times the level of subsidies¹⁸, renewable energy is still often more expensive than traditional sources. This is unfortunate and efforts should be pursued to provide incentives to allow Member States to reach the renewable energy targets. Until such market conditions are met and the barriers are reduced, continued support for renewable energy will be needed. Clearly, financial support for renewable energy can be phased out only when renewable energy costs have further declined, market failures have been corrected and they can operate in a competitive market.

1.3.2. Ecological effectiveness and economic efficiency

The limited and fragmented growth of Europe's renewable energy industry in the decade to 2008 resulted partly from the limited EU regulatory framework. Recognising that renewable energy will form the heart of any future low carbon energy sector, the EU introduced a comprehensive and robust supportive legislative framework. The challenge is now to move from policy design to implementation at

¹⁷ EWEA "The economics of wind energy" and EPIA "Set for 2020"

¹⁸ Globally, the IEA has recently estimated fossil fuel subsidies at \$312bn (<http://www.worldenergyoutlook.org/subsidies.asp>), and the most recent figures (2004) for the EU 15 had put fossil fuel subsidies at €21.7bn compared to €5.3bn for renewable energy (EEA Technical report 1/2004).

national level, with concrete action on the ground. The implementation of the Directive and the presentation of plans are encouraging signs of progress that need to be sustained.

In the current context of macro-economic fragility and fiscal consolidation, it is important to recognise the financing for renewable energy as growth-enhancing expenditure that will provide greater return in the future. It is equally important to ensure the quality of the expenditure, applying the most efficient and cost effective financing instruments. As with energy infrastructure, there is a need for European action, to speed up the efficient delivery of renewable energy production and its integration into the single European market.

At national level, any revision of financing instruments should be pursued in a way that avoids creating investor uncertainty and takes into account other Member States' policies to ensure an approach coherent with the creation of a genuine European market. The Commission will actively support national cooperation on financing renewables, based on the new framework for Member State cooperation contained in the Renewable Energy Directive and promote the integration of renewable energy into the European market. At European level, EU funds should be directed to ensure cost effective renewable energy development and providing technical assistance while ensuring the most effective means of lowering the cost of capital investments in the sector, including in collaboration with the EIB and provision of technical assistance.

The Commission therefore invited Member States to:

- implement the National Renewable Energy Action Plans;
- streamline infrastructure planning regimes while respecting existing EU environmental legislation and strive to conform to best practice;
- make faster progress in developing the electricity grid to balance higher shares of renewable energy;
- develop cooperation mechanisms and start integrating renewable energy into the European market;
- ensure that any reforms of existing national support schemes will guarantee the stability for investors, avoiding retroactive changes.

To support such efforts the Commission will continue to work in partnership with Member States on the implementation of the Directive, to review and improve the effectiveness of EU funding for renewable energy projects and facilitate the convergence of national support schemes in order to ensure the best conditions for the development of renewable energy in Europe.

1.3.3. Strengthening partnerships for sustainable and competitive energy

A further element of reform in some Member State has been to develop private financing mechanisms that both attract capital and increase local acceptance of renewable energy projects (thus helping to overcome other barriers such as planning permission). The most common instrument used for this is "local ownership" whereby local communities can take a financial share in the investment of the project in return for cheaper electricity or a share in the profit of the project¹⁹. The development of local public-private partnerships can also be an effective means of reducing the cost of projects and achieving greater public acceptance while contributing to local and regional socio-economic development.

Such reforms work when they are planned and anticipated by investors in accordance with a clear government strategy. Sudden changes are disruptive and undermine all renewable energy investment strategies. These have to be avoided as they undermine investor confidence and efforts to achieve the targets. Retroactive changes to support schemes in particular must be avoided given the negative effect such changes have on investor confidence. The Commission has already expressed concern about recent developments in certain Member States in this respect and will continue monitoring this issue closely with a view to consider further action from or at EU level if necessary.

These changes improve the efficiency of the instruments, but more needs to be done. Most Member States have continued to focus on national resources to achieve their 2020 targets on their own. They have not sought to reduce costs by developing cheaper resources in other parts of the single market. Commission analysis²⁰ estimates that up to 10 billion Euro annually could be saved if Member States treated renewable energy as a commodity in a single European market rather than in national markets. Thus the move to market integration, in particular the evolution to feed in premiums is too slow, too fragmented and needs to be reinforced.

As the EU Energy Strategy notes, a greater convergence of national support schemes to facilitate trade and move towards a more pan-European approach to development of renewable energy sources must be pursued²¹. This repeated call for convergence is not new, and is to flag up the need to start adjusting to a European electricity market in particular, where over a third of power will come from renewable energy. In some situations, such as offshore wind development, the need for an

¹⁹ RESHARE report, available on www.reshare.eu

²⁰ SEC xx Review of European and national financing of renewable energy. Commission Report in accordance with Article 23 (7) of Directive 2009/28/EC

²¹ COM(2010)639/3 Energy 2020: a strategy for competitive sustainable and secure energy, p10

integrated strategy is imminent. Beyond this priority, a medium to long term EU strategy should be developed in order to make the energy sector function cost effectively. One first step in integrating renewable energy is the development of the new cooperation mechanisms created by the Directive.

The Renewable Energy Directive establishes "cooperation mechanisms" by which Member States can join together to develop renewable energy sources. These include:

- "statistical transfers" whereby one Member State with a surplus of renewable energy can "sell" it statistically to another Member State, whose renewable energy sources may be more expensive. One Member State gains a revenue, at least covering the cost of developing the energy, the other gains a contribution towards their target at low cost.
- "joint projects" whereby a new renewable energy project in one Member State can be co-financed by another Member State and the production shared statistically between the two. Again, there is a mutual benefit and cost saving from such cooperation. Joint projects can also occur between a Member State and a third country, if the electricity produced is imported into the EU, e.g. from North Africa.
- "joint support schemes" whereby two or more Member States agree to harmonise all or part of their support schemes for developing renewable energy, to clearly integrate the energy into the single market, and share out the production according to a rule such as where the financial support is coming from.

Using such mechanisms will generate a European rather than a national perspective to the development of renewable energy, ensuring that Europe reaches its renewable energy target cost effectively. In addition, the scope for trade, joint projects and common support schemes constitute clear steps towards integrating renewable energy into the European energy market.

Member States created the cooperation mechanisms of the new Renewable Energy Directive, allowing them to control how their renewable energy resources are jointly developed, co-financed, and their support schemes joined or harmonised. Thus when the level playing field of a single energy market is created and renewable energy producers are able to compete fairly, Member States should be more prepared for renewable energy to be promoted in a pan European approach, exploited efficiently across the Union in Member States where it is feasible and makes most economic sense.

The forums and projects established by the Commission to help Member States develop the cooperation mechanisms²² can also be used to steer other aspects and reforms of national support schemes. Other initiatives could include common technology banding, annual revision dates, cost calculation methodologies/indices, more coherent conversion of feed in tariffs to feed in premiums as technologies mature and ongoing work on the creation of regional clusters for joint support schemes, such as the joint green certificate regime just agreed between Norway and Sweden. The mechanisms also provide scope for supporting the development of renewable energy production in third countries. Thus these mechanisms can facilitate real progress in the convergence of European support schemes, ensuring greater coherence with a single market.

The Commission will be assessing the effective functioning of support schemes and cooperation mechanisms in the light of the 2014 review foreseen by the Directive. It will prepare guidelines for more harmonised reforms, facilitate the development of cooperation mechanisms and prepare the ground for the development of renewable energy in the southern Mediterranean. These actions will provide a platform for exchanges on the reforms on going in Member States and help to avoid a subsidy race.

²² Concerted Action on the Implementation of the Renewable Energy Directive, Member States' "International feed in cooperation group" and numerous projects under the Intelligent Energy Europe Programme

2. Transnational Energy Strategy for Rural Regions

2.1. Framework for Implementing Innovative Renewables Strategies

Transposing the strategy from European level to national and furthermore to regional or local level, in order to implement innovative renewable strategies, there were identified four main core functions and enumerated the characteristics of some innovative implementation strategies, described also in the following lines.

Thus, the four main core functions are:

- Understanding consumer needs, preferences, and capacity to pay
- Demonstrating the value of a new technology or energy service delivery model
- Building and maintaining consumer trust in the product and the supply chain
- Designing financing and payment schemes that fit consumer energy demands and budgets.

As characteristics of an innovative implementation strategy were identified the following attributes:

- Considers the interests of consumers, particularly those living in remote communities, from the beginning stages of product and service design through the follow-up stages, such as maintenance and servicing
- Contributes to skills development and livelihood generation in the community
- Tailors specific financing mechanisms and financing instruments to the consumers' circumstances
- Builds a strong network of local organizations and delivery service mechanisms
- Represents different renewable energy sources and varied applications
- Demonstrates long-term growth potential
- Integrates a renewable energy, climate-friendly focus in its business model, such as generating profits "through products, services, or production processes that seek to reduce GHG emissions and the consumption of fossil fuels."

2.1.1. Innovative implementation strategies for renewable energy services

Understanding consumer needs, preferences, and capacity to pay

Energy access practitioners emphasized that consumer energy use transitions require tailored solutions that respond to the consumer's needs, preferences, and budgets.

Thus, were identified multiple factors that inform energy access solutions for rural areas, whether for use by households, businesses or community facilities. These factors are largely contextual and include:

- Cultural practices (particularly involving cooking)
- Employment and seasonal income patterns
- Socio-economic status and budget limitations
- Enabling equal energy access for women
- Costs and characteristics of existing technologies and service providers
- Capacity of enterprises to provide after-sales service
- Strength of the supply chain
- Overcoming scepticism about distributed renewable energy solutions: national policies and investments prioritize grid access, leading many consumers to believe that off-grid solutions are inferior, which is a wrong believe
- Availability of alternative energy resources
- Geography
- Infrastructure
- Access to financial institutions (when products and services are oriented to consumer energy use and budget demands, consumers are quick to adopt them).

Budget limitations are a paramount consideration for rural consumers; due to competing priorities and variations in income schedules, they may need to pay for energy in small increments. In these situations, renewable energy instalment payment plans are helpful. In addition, rural consumers often lack access to institutional loans, such as those provided by community banks. These consumers can only engage in short-term financial planning.

Inclusive business strategies that prioritize consumer involvement are essential for fostering understanding, identifying solutions, and avoiding problems. Consumer stewardship, from first contact through a sale and extending into product servicing, is also useful for attracting new customers, and can facilitate data collection on

consumer preferences. Consumer renewable energy use transitions require tailored solutions that respond to the consumer's needs, preferences, and budgets.

Demonstrating the value of a new technology or energy service delivery model

In this direction, there is an acute need to provide energy products and services specifically tailored to consumers' needs and within a household's existing energy demand and budget, not matter is about public institutions or private householders. Although economic considerations are paramount, quality of life advancements such as saving time, and cleaner, safer, non emissions and green houses, are valued by consumers as well.

In cases where switching to a clean renewable energy product or service does not provide a clear upfront economic advantage - such as improved cook- stoves in regions where fuel is gathered instead of purchased - quality considerations are especially important. Energy providers seeking to facilitate consumer implementation of renewable energy must demonstrate that the overall financial and nonfinancial benefits are significant enough for the consumer to warrant a capital expenditure.

Building and maintaining consumer trust in the product and the supply chain

Many communities and financial institutions are sceptical about renewable energy products and services and consider them risky investments. Communities and financial institutions may be unfamiliar with renewable energy products, making it difficult for them to discern quality. Alternatively, they may have had negative experiences with unreliable or under-serviced renewable energy solutions.

Rural households are risk-averse because they have little margin for financial error. Accordingly, to introduce (or re-introduce) renewable energy products and services to rural communities, socially oriented energy enterprises and organizations must prioritize building and maintaining trust with the people they seek to serve.

Designing financing and payment schemes that fit consumer energy demands and budgets

Even seemingly modestly priced renewable energy services can be prohibitively expensive for rural consumers who are accustomed to purchasing energy in small increments. Accordingly, providers have had to design innovative financing and payment schemes to help consumers purchase their products.

2.1.2. Models to provide solutions for renewable energy consumers

In order to gain the possibility to implement renewable energy sources in rural areas, there are proposed some different business models for providing finance to energy consumers, listed below.

One-Stop-Shop Model

In this model, sustainable energy products and finance are provided by the same organization. This happens when a finance provider decides to offer energy products, or when an energy enterprise decides to offer finance.

- Key advantage: The finance provider or energy enterprise maintains complete control over both aspects of their business.
- Key disadvantage: The organization has to develop new areas of skills and expertise to be able to implement this model effectively.

Financial Institution Partnered with Energy Provider Model

In this case, an energy enterprise enters into a partnership with a local financial institution to sell sustainable energy products. This model typically involves a financial institution providing credit to an end-user and managing the monitoring and repayment processes, while the energy company provides the energy product, installation (if necessary), service and maintenance.

- Key advantage: Both organizations stick to the business area that they know best.
- Key disadvantage: It relies on a good partnership to make sure that both organizations deliver their side of the partnership effectively.

Umbrella Partnership Model

The energy enterprise enters into a partnership arrangement with an “apex institution” that manages a network of local financial institutions (e.g. a union or organization of credit cooperatives, credit unions, or other village - based financial institutions). The apex institution lends money to the local finance providers, who then lend to an end-user and manage the monitoring and repayment processes. The energy enterprise provides the energy product, installation (if necessary), service and maintenance.

- Key advantage: Both organizations stick to the business area that they know best, and the energy enterprise is able to reach many more clients than with a local partnership.
- Key disadvantage: Compared to a local partnership, it is more difficult to manage partnership and make sure that all activities are being implemented effectively across the network.

Franchise/Dealership Model

The energy enterprise provides credit to dealers and/or franchises to allow them to sell to clients on an instalment basis. This particular model is common for relatively inexpensive products (e.g., solar lanterns, treadle pumps, or efficient cook stoves).

- Key advantage: A simple way of increasing the reach of an energy enterprise and expanding the market.
- Key disadvantage: It requires upfront cash investment from the energy enterprise, and relies on effective dealers who can provide quality services to customers and collect repayments.

Brokering Model

A third-party organization or individual is paid by the finance provider and the energy enterprise to market energy products and assess customers' suitability for financing. They will then bring viable customers forward to buy energy products. The broker may also be involved with loan payment collection, after-sales service, and technical upkeep.

- Key advantage: A simple way of increasing reach and expanding the market, and brokers are usually paid a finder's fee after the product is sold, so it doesn't require upfront cash investment.
- Key disadvantage: It relies on brokers who can effectively market products and screen customers.

Pay-As-You-Go Model

Consumers purchase energy services on a pay-as-you-consume schedule. This is similar to the business model common for grid-connected electricity consumers, but can be adapted to fit the technology and financing circumstances of rural consumers of distributed generation. Frequently, the payment is scheduled as an advance on service, rather than retroactive billing. Mini may set flat rates for periodic services that reflect expected energy demand, or rates that release a metered quantity of

electricity. The success of mobile phone penetration through prepaid scratch cards combined with SMS communications to remotely unlock service provides an additional template for energy service providers that offer decentralized generation options such as solar home systems.

- Key advantage: This model can minimize transaction costs and accommodate increments preferred by consumers, while also paying down capital and maintenance costs of renewable energy technologies.
- Key disadvantage: The enterprise must provide 100 percent of finance and therefore requires access to substantial equity and working capital.

2.2. Recommendations to increase the use of Renewable Energies

As general recommendation is investing in access to cleaner energy technology options and a climate-resilient future for all and the need to improve access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services and resources for sustainable development. This desiderate offers a fitting call and essential guidelines for collective work to support expansion of scalable solutions for distributed, renewable energy services for rural region populations. A core challenge would remain on how to get to scale and at the right speed? By encouraging those developing energy access programs, whether local, regional, national, or european, to learn from enterprises and organizations and integrate their expertise and inputs into the design of the programs and projects. Areas to focus on include:

Fostering Innovation

Innovative strategies are needed to enable socially, environmentally, and economically beneficial energy access solutions for underserved communities. This innovation should take place not only in technology and finance, but also in the implementation of core business functions. Energy access initiatives supported by local government, philanthropies, bilateral development cooperation and private sector investment should consider the multiple factors outlined that inform energy access solutions for rural areas.

Harnessing the voices of enterprises and organizations

A new generation of enterprises and nongovernment organizations has emerged over the last few years. Some of them strive to implement business strategies anchored on investing in the rural environment while promoting community

development. The most relevant and beneficial innovation for achieving universal energy access comes from this sector. Governments as well as regional and international development and finance organizations should ensure the participation of these enterprises and organizations in decision making.

Enabling sustained peer-to-peer learning

Enterprises and organizations focused on the delivery of energy services need to consistently learn from each other. Initiatives have to be taken to enable enterprises and organizations to exchange views, share expertise, and expand their professional networks. Regular peer-to-peer learning opportunities including workshops, conference and online knowledge sharing platforms should be prioritized and supported by all stakeholders.

Establishing updated and inclusive sets of metrics for determining success

We have to highlight the necessity of metrics when presenting information about the extent of impact of the enterprises' and organizations' strategies, such as the number of individuals or households served. Metrics is a prominent topic of discussion due the need for more appropriate ways to measure progress and success than the number of households reached. Measures of installed capacity or households connected, for instance, do not necessarily reflect the quality-of-life improvements that renewable energy services provide. Further research is needed on how to measure performance that is inclusive and cognizant of the other cobenefits to the consumer, the household and the local community.

Analyzing challenges faced by enterprises and organizations

Overcoming barriers to delivering energy access to rural consumers, and directing consumer spending to high-quality, safe, and economical solutions will require developing an ecosystem of enabling conditions able to facilitate innovative delivery channels, and enhance affordability of the products and services. This issue brief surfaced some of the difficulties faced by enterprises and organizations in the conduct of their business and implementation of programs.

Examining and documenting successful financing strategies and effective, sustainable models

Significant business opportunities exist to provide distributed renewable energy services to rural communities. However, this seemingly attractive market faces barriers from high transaction costs, market failures and distortions, and financing constraints. Hence, exist the need to focus on specific financing strategies to overcome risks and various financial instruments for expanding delivery of renewable energy services, outlining the roles of various stakeholders - including governments, the private sector, civil society organizations and local, national, and multilateral

financial institutions - in delivering scaled up, affordable energy access solutions that are socially and environmentally responsible.

In conclusion, meeting the energy needs of rural communities requires effective knowledge management, policies and regulations, standards, capacity building, and access to finance. Innovative strategies are needed to enable socially, environmentally, and economically beneficial energy access solutions for rural communities.

Although the energy access solutions presented still face obstacles for scale up, several energy enterprises and organizations have proven that with the right delivery mechanisms and effective and efficient financing, many consumers can have access to affordable, cleaner renewable energy services.

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