OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as "developed", "industrialized" and "developing" are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

Report work stream 1

GF/UKR/11/004 (financed by UNIDO)

Title: Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine (UKREERE)

Daniel Weiss, adelphi; Walter Kahlenborn, adelphi; Gabriele Brandl, Austrian Energy Agency, Cornelia Schenk, Austrian Energy Agency

As at: 25.07.2014

SECOND PROGRESS REPORT

On behalf of

Cover picture: Light Bulb Sapling, © Richard Newstead

IMPRINT

Caspar-Theyss-Strasse 14a T +49 (0)30-89 000 68-0 www.adelphi.de
14193 Berlin F +49 (0)30-89 000 68-10 office@adelphi.de

Mariahilfer Straße 136, A-1150 Vienna, Phone +43 (1) 586 15 24, Fax +43 (1) 586 15 24 - 340

E-Mail: office@energyagency.at, Internet: http://www.energyagency.at

Table of Contents

List of Figures VI

List of Tables VI

List of Abbreviations VIII

1 General project description 1

2 Introduction 2

2.1 Objective of the report 2
2.2 Contents of the report 2

3 Methodology 4

3.1 Scope 4
3.2 Assessment criteria for best practice section 4

4 EU energy policy framework 6

5 Renewable energy policies 8

5.1 Introduction 8
5.2 Status quo in the European Union 8
5.3 Analysis of renewable energy best practice policy instruments 10
5.3.1 Investment policy instruments 12
5.3.1.1 Feed-in systems and quota systems 12
5.3.1.2 Supportive investment policies 30
5.3.2 Supporting measures 35
5.3.2.1 Administrative processes and permitting procedures 35
5.3.2.2 Grid connection and priority dispatch 37
5.3.3 Focus topic: Biomass policies 37
5.3.4 Country examples: performance of policy instruments 41
5.3.4.1 Austria – biomass situation and best practice policy instruments 41
5.3.4.2 Germany – general overview of policy framework 43
5.3.4.3 Spain – general overview of policy framework 47
5.4 Summary of analysis of renewable energy policy instruments 49

6 Energy efficiency policies 50

6.1 Introduction 50
6.2 Status quo in the European Union 50
6.3 Analysis of energy efficiency best practice policy instruments 51

6.3.1 Financial instruments 55
6.3.2 Institutional framework 63
6.3.3 Framework conditions for energy efficiency programmes 64
6.3.3.1 Long-term targets and policy development 64
6.3.3.2 Voluntary agreements 65
6.3.3.3 Energy efficiency obligations 65
6.3.3.3.1 White certificate schemes 67
6.3.3.4 Legal framework for energy efficiency services 68
6.3.4 Industry focus: Energy audits and EnMS 72
6.3.5 Country examples 73
6.3.5.1 Austria 73
6.3.5.2 Denmark 74
6.3.5.3 Finland 75
6.3.5.4 Germany 76
6.4 Summary of analysis of energy efficiency policy instruments 77

7 Comparative analysis of Ukrainian and EU policy instruments 79

7.1 Introduction 79
7.2 Renewable energy 80
7.2.1 Appraisal of Ukrainian renewable policies 80
7.2.2 Comparison of Ukrainian and EU/internal policy approaches 82
7.2.2.1 Investment policy instruments 82
7.2.2.1.1 State of play in Ukraine 82
7.2.2.1.2 Comparison of Ukrainian policies with EU best practice approaches 84
7.2.2.2 Supporting measures 88
7.2.2.2.1 State of play in Ukraine 88
7.2.2.2.2 Comparison of Ukrainian policies with EU best practice approaches 89
7.2.2.3 Focus topic: Biomass policies 92
7.2.2.3.1 State of play in Ukraine 92
7.2.2.3.2 Comparison of Ukrainian policies with EU best practice approaches 93
7.2.3 Assessment & conclusion 96
7.3 Energy efficiency 96
7.3.1 Appraisal of Ukrainian energy efficiency policies 96
7.3.2 Comparison of Ukrainian and EU/international policy approaches 99
7.3.2.1 Financial policy instruments 99

7.3.2.1.1 State of play in Ukraine 99
7.3.2.1.2 Comparison of Ukrainian policies with EU best practice approaches 101
7.3.2.2 Institutional framework 105
7.3.2.2.1 State of play in Ukraine 105
7.3.2.2.2 Comparison of Ukrainian policies with EU best practice approaches 105
7.3.2.3 Framework conditions for energy efficiency programmes 107
7.3.2.3.1 State of play in Ukraine 107
7.3.2.3.2 Comparison of Ukrainian policies with EU best practice approaches 108
7.3.2.4 Industry focus: Energy audits and EnMS 111
7.3.2.4.1 State of play in Ukraine 111
7.3.2.4.2 Comparison of Ukrainian policies with EU best practice approaches 111
7.3.3 Assessment & conclusion 113

8 Annex – Best practice elements for feed-in systems 115

Bibliography 117

List of Figures

Figure 1: Planned (blue) versus estimated (red/dotted) trend in EU renewable energy 8
Figure 2: Overview evolution of RES-E support instruments 12
Figure 3: Recent developments of feed-in systems in the EU 14
Figure 4: RAI for onshore wind support policies in OECD and BRIC countries, 2008/09 19
Figure 5: Investors' implicit willingness-to-accept certain policy risks for wind energy investments 20
Figure 6: Assessment of the administrative procedures in EU Member States 36
Figure 7: Solid biomass – primary energy consumption, gross electricity consumption and heat consumption 38
Figure 8: Gross Domestic Consumption of RES, 2011 41
Figure 9: Number of measures in EU industry by type in%age and impact evaluation of energy efficiency measures since 1990 51
Figure 10: Effective energy efficiency policy packages in the building sector 54
Figure 11: Prototypical process for policy development in energy efficiency 64
Figure 12: Typical modular structure of EPC projects. 69

List of Tables

Table 1: Overview of EU climate and energy policy initiatives 6
Table 2: Data on the availability and performance of renewable energy types 9
Table 3: Overview of main RES-E policy instruments 14
Table 4: Summary of assessment 25
Table 5: Strengths and weaknesses of feed-in systems and quota schemes 26
Table 6: Performance data of main RES policy instruments in selected EU Member States 27
Table 7: Examples of grant schemes in selected EU Member States 32
Table 8: Examples of soft loan measures in selected EU Member States 33
Table 9: Examples of tax measures in selected EU Member States 35
Table 10: Policy instruments focussing on mobilising up-front investment 55
Table 11: Examples of tax measures in selected EU Member States 57
Table 12: Example of subsidy measures in selected EU Member States 58
Table 13: Examples of soft loan measures in selected EU Member States 60
Table 14: Examples of funding measures in selected EU Member States 62
Table 15: Examples of grant measures in selected EU Member States 63
Table 16: Comparison of investment policy instruments 85

Table 17: Comparison of supportive policy measures 90
Table 18: Comparison of biomass policies 94
Table 19: Comparison of financial policy instruments 102
Table 20: Comparison of policy measures with regard to the institutional framework 106
Table 21: Comparison of policy measures regarding framework conditions for energy efficiency programmes 109
Table 22: Comparison of policy measures with regard to energy management 112

List of Abbreviations

BAFA	Federal Office of Economics and Export Control (Germany)
BDEW	Bundesverband der Energie- und Wasserwirtschaft
CHP	Combined heat and power
DEA	Danish Energy Agency
ECA	Enhanced Capital Allowances (UK)
EED	Energy Efficiency Directive
EEG	German Renewable Energy Act, in German: Erneuerbare-Energien-Gesetz
EEMB	Austrian Energy Efficiency Monitoring Body
EERSF	Energy Efficiency and Renewable Source Fund (Bulgaria)
EES	Energy Efficiency Services
EIA	Tax Deduction Scheme (in the Netherlands)
EnMS	Energy Management System
EPC	Energy Performance Contracting
ESCO	Energy service company
ESD	Energy Services Directive
EU	European Union
E5P	The Eastern Europe Energy Efficiency and Environmental Partnership Fund
FIP	Feed-in premium
FIT	Feed-in tariff
IEA	International Energy Agency
IFC	International Finance Corporation
MAP	Market Incentive Programme for Renewable Energies on the Heat Market (policy initiative in Germany)
MIA	Milieu-investeringsaftrek
NEEAP	National Energy Efficiency Action Plan

NERC	National Commission for State Energy Regulation (Ukraine)
NREAP	National Renewable Energy Action Plan
PV	Photovoltaic
RES	Renewable energy sources
RES-E	Renewable energy sources for electricity
RES-H	Renewable energy sources for heating and cooling
RES-T	Renewable energy sources for transport
SAEE	State Agency on Energy Efficiency and Energy Saving (Ukraine)
TGC	Tradable Green Certificates
UK	United Kingdom
UNDP	United Nations Development Programme

1 General Project Description

The main objective of the project is to develop a market environment for introducing energy efficiency (EE) and enhanced use of renewable energy (RE) technologies in the agro-food[1] and other energy intensive small and medium-sized enterprises (SMEs) in Ukraine. Companies should utilize this as a basis for promoting their competitiveness while ensuring an integrated approach to lower carbon intensity, and improving their productivity and local environment.

The project is composed of three workstreams, which aim to (1) assess the EE and RE policy framework, (2) formulate recommendations to strengthen the framework to promote EE and RE in SMEs and (3) support public authorities in promoting the integration of EE and RE into the industrial development agenda.

Ukraine has been a contracting party of the Energy Community since February 1st, 2011. The Energy Community is an international organisation dealing with energy policy and extending the EU internal energy policy to South East Europe and the Black Sea region on the grounds of a legally binding framework. The Treaty establishing the Energy Community extends the acquis communautaire to the territories of the contracting parties. The Energy Community acquis comprises core European Union (EU) energy legislation in the areas of electricity, gas, environment, competition, renewables, energy efficiency, oil and statistics. Within this framework, Ukraine has developed a draft national renewable energy action plan according to EU Directive 2009/28/EC, as well as a draft National Energy Efficiency Action Plan according to EU Directive 2006/32/EC, which are both relevant for the current project. So far, the EU Energy Efficiency Directive 2012/27/EU has not become part of the Energy Community acquis.

Project work throughout the whole timeframe of workstream 1 was influenced by the current political situation in Ukraine, from the suspension of negotiations on the EU-Ukraine Association Agreement to major uprisings, the resignation of the government and the subsequent presidential election, the annexation of Crimea and ongoing armed conflicts in Eastern Ukraine as well as the signature of the association agreement on June 27, 2014. Within the project, constant communication between UNIDO, adelphi and the Austrian Energy Agency (AEA) was ensured via skype conferences, working meetings in Vienna and Kyiv, and email exchange. Within workstream 1, four tasks were fulfilled, namely the evaluation of Ukrainian energy policies vs. best practice, the comparison of the effectiveness and efficiency of policy instruments, the presentation of lessons learnt in other countries regarding the EE and RE regulatory and legislative framework, as well as a review of the findings presented by a team of Ukrainian experts.

Based on the completion of the first workstream, the project will further focus on strengthening the framework and supporting public authorities in order to promote energy efficiency and renewable energy use in Ukrainian agro-food and other SMEs. A study tour to Berlin, Germany, and Vienna, Austria, has already been organised for Ukrainian government representatives to learn from the energy policy experiences of both countries.

[1] The agro-food sector includes the agro-food industry, not the agricultural production.

2 Introduction

Ukraine heavily depends on imported fuels and faces environmental pollution caused by its use of outdated production machinery. According to the International Energy Agency (IEA), Ukraine's energy intensity is 10 times higher than the OECD average (IEA 2012a: 17). Furthermore, the 2% share of renewable energy in Ukraine's total primary energy supply also falls short of the international average (IEA average: 8%). It is widely acknowledged that current and planned Ukrainian energy policies need to be reviewed and revised and/or new policies launched.

The objective of this report is to identify "best practice" in renewable energy and energy efficiency policies in the European Union (EU) and other countries and to compare it to current energy policy approaches in Ukraine. Ukraine is a member of the Energy Community, a regional union of South-Eastern European countries, created among the Contracting Parties and the European Union for socio-economic stability and security of supply. Contracting Parties are required to harmonise their legal frameworks with the EU standards and implement the Second and Third Energy Packages. The objective of the Energy Community is to create integrated energy markets across the region. Having become a full member of the Energy Community, Ukraine committed itself to implement a set of EU Directives and Regulations (DiXi 2013: 2).

Against this background, Ukrainian current and planned energy policies can be evaluated in order to identify areas where existing policies should be revised or new ones developed.[2] The latter step will be both important and challenging, given that a vast regulatory mosaic of energy policy initiatives exists on EU and Member State level. The reason for this is that the persecuted and targeted control approach specifically depends on the respective national conditions relating to the use of individual energy carriers as well as national regulatory traditions.

2.1 Objective of the Report

The objective of this report is to outline the policy instruments currently implemented in Ukraine with regard to the promotion of renewable energy and energy efficiency and to compare the policies to best practice policy approaches in the EU. Ukrainian renewable energy and energy efficiency policies will be assessed against identified best practice approaches, particularly in light of their effectiveness and efficiency.

2.2 Contents of the Report

This report covers the following tasks of work stream 1 of the project "Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine":

[2] The evaluation of Ukrainian energy policies against the background of best practice approaches is not part of this report.

- Task 1: Evaluation of Ukrainian energy policies vs. best practice
- Task 2: Comparison of the effectiveness and efficiency of policy instruments
- Task 3: Lessons learnt in other countries on energy efficiency and renewable energy regulatory/legislative framework
- Task 4: Review of the national team's findings summary report

Chapters 2 to 5 focus on the best practice analysis. The report sheds light on renewable energy and energy efficiency policy instruments which are relevant in the context of Ukrainian energy policies. With regard to analysing "best practice" approaches for renewable energy and energy efficiency, the following steps have been taken in this report:

As the first step, literature was analysed with regard to existing renewable energy and energy efficiency policies. Desk research focused on literature that already identified and analysed best practice policy approaches. During the second step, criteria, which allow assessing the identified policy approaches, were identified in the literature and further developed. During the course of the third step, policy schemes were assessed according to criteria, such as effectiveness and (cost) efficiency and several others. For the fourth and final step, short country case studies highlighting best practice approaches were carried out.[3]

The best practice report focuses both on renewable energy and energy efficiency policies. With regard to renewable energies, the focus is on policies that aim to increase the generation of renewable electricity (RES-E). Policies for renewable energy sources for heating and cooling (RES-H) are covered to a lesser extent; renewable energy policies for transport (RES-T) are not covered in this report.[4] Regarding the types of renewable energy sources (RES), the best practice approaches presented in this report focus on wind power (on- and offshore), solar power and biomass.[5] Concerning energy efficiency, the report sheds light on policy instruments which are applicable in a wide range of sectors, including the agro-food as well as the industry and the buildings sectors.

In **Chapter 6**, the report builds upon the findings of reports compiled by the national experts, Ms. Kostyshena, Ms. Polishchuk, Mr. Pepelov and Mr. Matveichuk, in the context of this project. In this chapter, existing and planned Ukrainian policy initiatives are outlined and compared to best practice approaches in the EU.

[3] Country cases are used throughout the report to illustrate best practice policy instruments or elements thereof.

[4] The selection is based on the project proposal and feedback given by the UNIDO Kyiv team.

[5] This corresponds to the finding that Ukraine has strong potential in wind, solar and biomass (IEA 2012b: 13).

3 Methodology

3.1 Scope

With regard to the geographical scope, the focus is on best practice approaches in EU Member States (and Norway) in order to ensure that revised or new Ukrainian energy policies can be linked to the EU policy framework.

Where applicable, the report will focus on policy instruments which are particularly relevant in the agro-food sector and other SMEs.

3.2 Assessment Criteria for Best Practice Section

For the assessment of policy instruments and the identification of best practice policy approaches as well as the comparison with Ukrainian policies, a set of criteria has been developed. The selection of the set of criteria is based on previous works in this context, which facilitates the comparability of results (IEA 2011; Mitchell et al. 2011; IRENA/IISD 2012). Effectiveness and (cost) efficiency will be applied as primary assessment criteria, given that they are relevant in the evaluation of Ukrainian energy policies in light of best practice approaches. However, details for all policy instruments with regard to the criteria are not available, which makes it difficult to obtain an overview of the performance of the policy instruments.[6]

Effectiveness

Achieving this criterion, relates to the validity or effectiveness of an instrument in terms of actually meeting a given target. Deviations from the target can mean that the respective requirements are exceeded or not met. In the context of the deployment of renewable energies, this refers to reaching the RE targets. The international debate often refers to "effectiveness" (Mitchell et al. 2011; IRENA/IISD 2012).

(Cost) Efficiency

The criterion cost-effectiveness is commonly held to mean static efficiency, i.e. the ability of an instrument to achieve a defined objective at the lowest possible cost under the given technologies and other fixed conditions. It does not matter (initially) whether these costs are incurred by producers or consumers.

Openness to Technology and (Innovation) Dynamics

This criterion refers to the question whether an instrument also provides incentives for medium- to long-term innovation and thus is open to new technologies. Unlike in the case of cost efficiency, which is deemed to be static, the temporal dimension is explicitly taken into account in this context. This criterion is often described as "dynamic efficiency" (Fritsch et al. 2007; Mitchell et al. 2007; IRENA/IISD 2012).

[6] Please note that the entire set of criteria may not be used for all instruments analysed with the same level of detail throughout this study, but rather specific criteria that are deemed most relevant with regard to the given policy instrument. Assessment criteria are not only used to compare and assess the strengths and weaknesses of two policy instruments, but also to analyse which design elements support the effectiveness of a selected policy instrument.

Feasibility and Replicability

The extent to which an instrument is enforceable depends on whether it is deemed to be legitimate, accepted and implemented. The greater the degree to which an instrument fits in with the existing institutional arrangements, needs and preferences of the relevant stakeholders, the greater its enforceability (Mitchell et al. 2011). In this context, the grandfathering of existing property rights and the path dependency of many decisions that often build on already carried out and pre-defined discussion and decision-making processes have to be taken into account. In addition, the capacities of the involved actors (such as the administration) and the compatibility with existing markets are relevant.

Since the available range of instruments may have different distributional effects, the degree to which they can be communicated or are politically feasible varies (Mitchell et al. 2011). In the international discussion, this criterion is mentioned under the heading justice/fairness ("equity") (Mitchell et al. 2011). Thus, one aspect of enforceability is also how costs of a particular instrument can be distributed between different groups such as producers and consumers, or electricity consumers, or taxpayers.

Investment Risk

This criterion asks to what extent an instrument requires flexibility and willingness to deal with uncertainty from market players. In general, risks for market players can occur in terms of costs or income. Which risk is relevant depends on the particular instrument.

4 EU Energy Policy Framework

In order to understand EU Member State policy approaches, it is important to outline the policy framework set up by the EU (on EU level; initiated by the EU Commission), since EU initiatives have direct or indirect influence (through regulations, directives and decisions) on Member States' policy paths. The EU has launched a large set of policy initiatives to promote renewable energies and energy efficiencies, which are listed in Table 1 below:

Table 1: Overview of EU Climate and Energy Policy Initiatives[7]

EU Renewable Energy, Energy Efficiency and Climate Policy Initiatives		
Regulatory Initiative	**Name**	**Description**
Directive on the promotion of the use of energy from renewable sources	Directive 2009/28/EC	EU targets, known as "20-20-20" targets, have been introduced with this Directive.
Decision on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020	Decision 406/2009/EC	This Decision sets out minimum contributions for Member States in terms of greenhouse gas emissions.
Directive on industrial emissions	Directive 2010/75/EC	The objective of the Directive is to reduce environmental pollution as a result of industrial activities.
Decision as regards sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage	Decision 202/498/EU, amending Decisions 2010/2/EU and 2011/278/EU	The Decision amends the existing list of sectors and subsectors.
Council Directive on restructuring the Community framework for the taxation of energy products and electricity	Directive 2003/96/EC	EU scheme for minimum levels of taxation was extended to coal, natural gas and electricity.
Energy Services Directive (ESD)	Directive 2006/32/EC, repealing by Directive 2012/27/EC	Adopted in 2012, the Directive established a common framework of measures for promoting energy efficiency within the EU.
Directive on the energy performance of buildings	Directive 2010/31/EU	The main legislative instrument to reduce the energy consumption of buildings.
Council Decision concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United	Decision 2002/358/EC	With this Decision, the EU agreed to the Kyoto protocol.

[7] Regulations focusing on climate and/or buildings are not directly relevant for this project.

Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder.		
EU ETS Directive	Directive 2003/87/EC, amended through Directives 2008/101/EC and 2009/29/EC	Directives lay out specifications for a scheme for greenhouse gas emission allowance trading within the EU.
Establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms with EEA relevance	Directive 2004/101/EC	Through this Linking Directive certificates of the Kyoto protocol have been integrated in the ETS.

Source: Author’s illustration, information compiled from the website of the European Commission.

5 Renewable Energy Policies

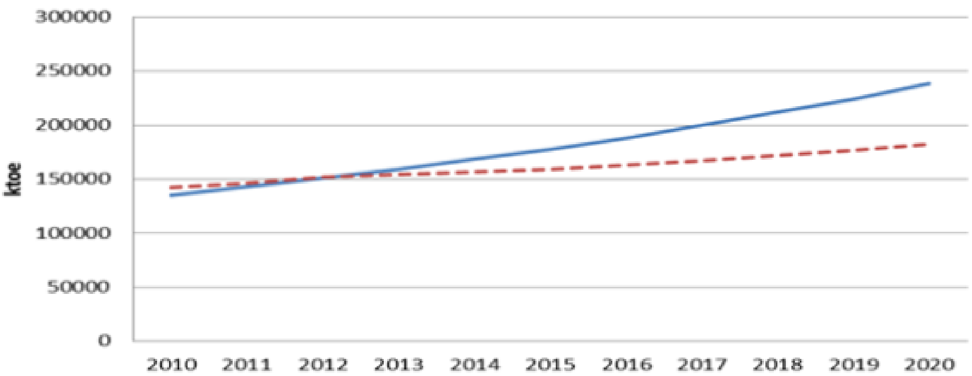
5.1 Introduction

In the following chapter, best practice approaches of renewable energy policy instruments are analysed. The chapter starts by introducing the status quo in the EU, followed by a comparative analysis of the main policy instruments, feed-in-tariffs and quota systems. In addition, supporting measures such as investment policies and biomass policies are covered. The chapter ends with country examples of Austria (focus on biomass policies), Germany (general overview) and Spain (general overview) regarding their approach to promoting renewable energies.

5.2 Status Quo in the European Union

The Renewable Energy Directive 2009/28/EC established a European framework for the promotion of renewable energy. It sets targets for all Member States, such that the EU will reach a 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy specifically in the transport sector. According to the latest European Commission progress report (2013b), the EU as a whole is on its trajectory towards the 2020 targets. However, some Member States need to take additional steps to reach their individual targets (see Figure 1).

Figure 1: Planned (blue) Versus Estimated (red/dotted) Trend in EU Renewable Energy



Source:

European Commission 2013a: 3f.

Furthermore, according to the report, there are reasons for concern about future progress (European Commission 2013c: 12). The report concludes that the significant change in economic circumstances in Europe will result in current policies being insufficient to spur the required renewable energy deployment in a majority of Member States (European Commission 2013c: 13). Concerns, which need to be addressed by Member States, are deviations from their own National Renewable Energy Action Plans (NREAPs). These deviations reduce clarity and certainty for investors. Additionally, the report identified barriers on Member State level to the uptake of renewable energy, including administrative burdens and delays, slow infrastructure development, delays in connection, and grid operational rules that disadvantage renewable energy producers (European Commission 2013c: 13).

With regard to sectoral developments in electricity and heating and cooling, 15 Member States failed to reach their national 2010 targets for the share of renewable energy in the electricity mix (European Commission 2013c: 4). There are no indicative targets in the heating and cooling sector, and growth has been slow since 2005. According to European Commission projections, the share of renewable energy in the heating and cooling sector may actually decline in the coming years (European Commission 2013c: 4).

In the following table (Table 2), the capacity of different renewable types is listed for the year 2011:

Table 2: Data on the Availability and Performance of Renewable Energy Types

Type of Renewable Energy	Performance
Wind energy	Together, Germany and Spain account for more than 50% of the capacity installed within the EU (27214 or 20.759 MW respectively, at a total 84761 MW). In 2010, they also produced more than 50% (82 TWh at a total capacity of 149 TWh).
Solar energy (photovoltaic)	Germany alone accounts for more than 50% of the capacity installed in Europe (7411 MWp; Europe: 13392 MWp) and also produces 50% (11 683 GWh).
Geothermal energy	Hungary and Italy account for just under 50% of the installed capacity in MWth (1290) and just over 50% in terms of production (314 ktoe at a total production of 660.9).
Biogas	Germany accounts for more than half of the production (16 205 GWh at a total production of 30339 GWh in Europe).
Solid biomass	Germany, Finland and Sweden each produced about 10,000 TWh of electricity from biomass in 2010. The EU produced almost 70,000 TWh (list can be continued if necessary)

Source: Euro'bserver 2011.

According to the European Commission, failure to comply with national action plans is most evident in the wind sector (European Commission 2013c: 4). For biomass, the trend is also negative, though not as significant as for wind energy (European Commission 2013c: 5). Photovoltaic (PV) deployment has seen a strong growth in the last few years, which has, in some instances, led to overcapacity. National support schemes have been adjusted, which may, in the long term (year 2020) lead to curtailing investments and deficits in the level of installed capacity (European Commission 2013c: 6).

5.3 Analysis of Renewable Energy Best Practice Policy Instruments

With regard to the evolution of the main renewable energy sources for electricity (RES-E) policy instruments, many EU Member States did experience a major shift (especially during the period of 2005-2011) (see Figure 2). As for RES-E policy instruments, the current discussion within EU Member States revolves around two approaches – feed-in systems (feed-in tariffs – FITs, and feed-in premiums – FIPs), which are price-based instruments, and a quota regulation in combination with a Tradable Green Certificate (TGC)-market, which is a quantity-based instrument. All instruments can be used in different forms.

Other instruments, such as tender schemes, production tax incentives and investment incentives, are not used as dominant policy schemes (any longer). However, the latter two are frequently used as supplementary instruments (for further information on the EU Member States' preferred policy instruments for the different sectors, see Appendix 2). In the following sections/sub-chapters, the two key policy approaches – feed-in systems and quota regulations – are assessed against the criteria introduced at the beginning of this report.

For this report, two different types of support measures will be distinguished:

Main policy instruments/investment policies for RES-E include (Mitchell et al. 2011):

- Feed-in systems (FITs and FIPs)
- Quota obligations with TGC
- Loan guarantees
- Soft loans
- Investment grants
- Tax incentives to support renewable energy deployment
- Tendering schemes

It is difficult to conclude which instrument or policy approach constitutes best practice, due to the fact that in almost all countries an instrument mix is used in the RES-E policy area. Furthermore, a certain policy instrument may be considered to be best practice with regard to a specific criterion (e.g. efficiency), but not for another (effectiveness) or for a specific sector (electricity; heating & cooling).

Supporting measures include a smooth planning and permitting process, broader environmental management and public acceptance (e.g. NIMBY-phenomenon), grid integration and priority access, market diversification and continued support for innovation and RD&D (IEA 2012b: 30). Among the "overarching policy principles", which spur renewable energy deployment, are: a transparent and predictable policy framework, a balanced portfolio (avoid over-funding and concentration on one instrument), a dynamic approach (continuous monitoring, evaluation and adaptation if necessary) and a promotion of grid integration (IEA 2012b: 21).

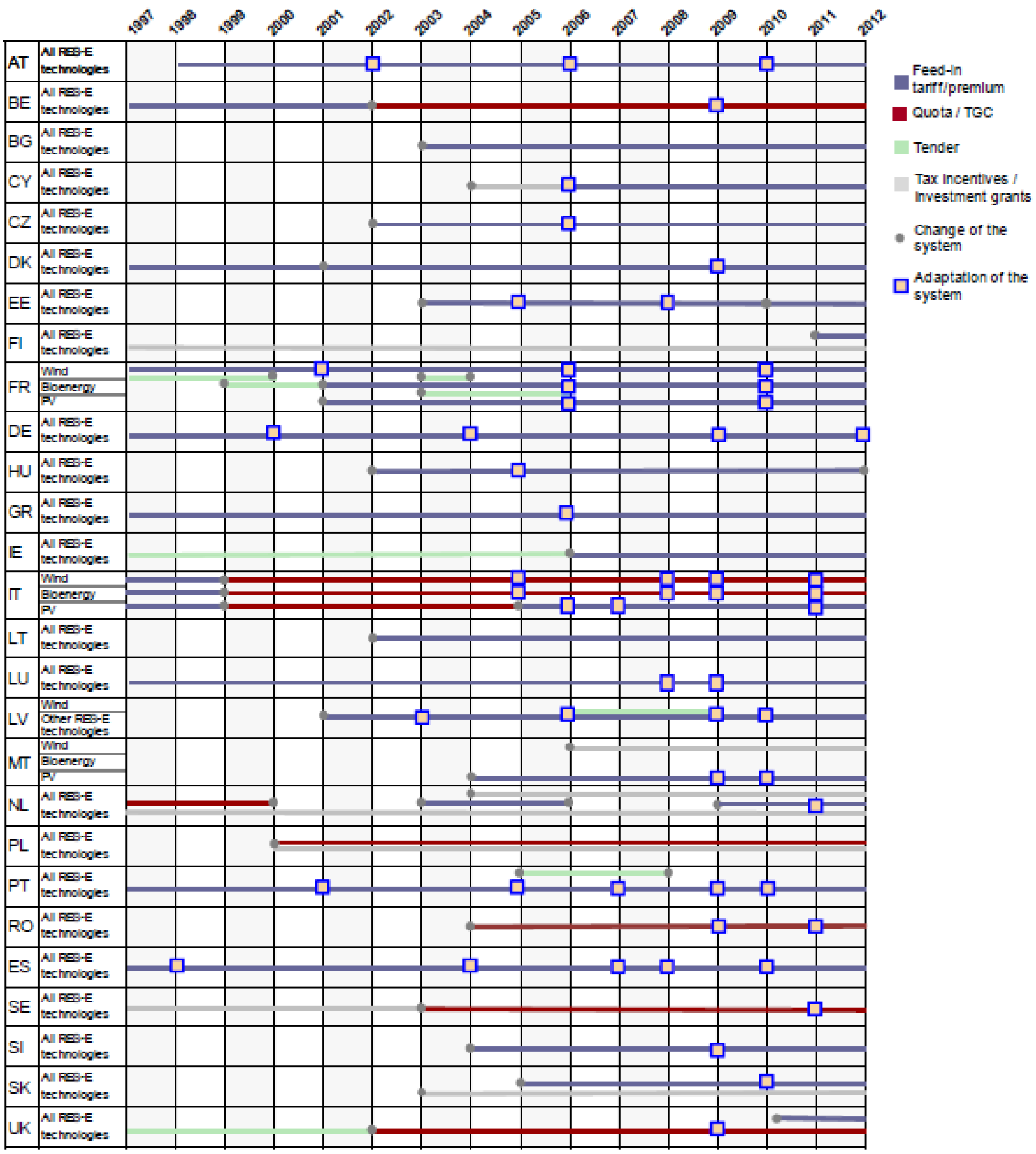
Irrespective of the policy instruments chosen, RES-E policies must be designed in such a way that they keep pace with technological cost reductions in order to keep policy costs for governments moderate and to maintain investors' confidence (IEA 2012b: 30).

In general, the European Commission (2013a: 5) considers the following elements to be best practice in the context of policy interventions:

- Long-term legal commitments on the timing and phasing out of support
- Devising a support scheme that is flexible enough to account for changes in the development of costs and technologies

- Announcement of automatic reductions in support depending on specified caps and/or lower technology costs
- Planned review periods and no unannounced interim changes
- Clear commitments to avoid changes that alter the return on investments already made and undermine investors' legitimate expectations
- Wide and public consultation on scheme design
- Stable scheme financing in line with the EU-acquis linked to consumption and off-budget financing to avoid fiscal impacts and uncertainty
- Keep costs transparent and separate from other system costs

Figure 2: Overview of the Evolution of RES-E Support Instruments



Source: Winkel et al. 2011: 7.

5.3.1 Investment Policy Instruments

5.3.1.1 Feed-In Systems and Quota Systems

In this chapter, three predominantly used support schemes are analysed: FITs; FIPs and quota obligations. Given their importance in the policy mix, they are analysed in detail by using the entire set of assessment criteria introduced in Chapter 2: effectiveness; (cost) efficiency; openness to technology and (innovation) dynamics; feasibility and replicability; and investment risk.

With regard to RES-E, the most frequently used policy instruments in the EU-27 are FIT (see Figure 3). FIT are generation-based, price-driven incentives. The price that a utility, supplier or grid operator is legally required to pay from RES-E produced is determined by the system, meaning that the government regulates the tariff rate (Resch et al. 2007: 26).

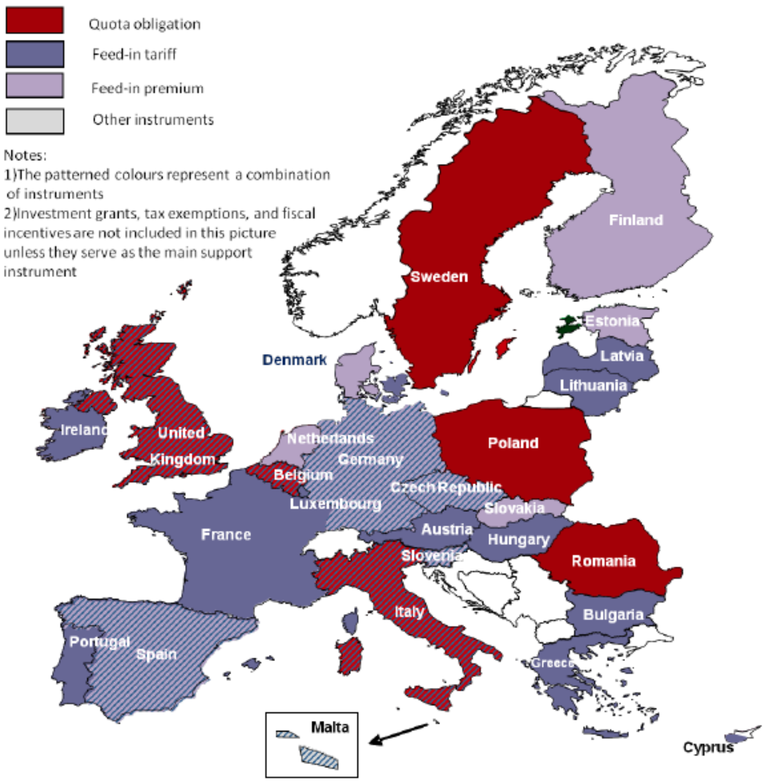
Generally, two feed-in options are possible: firstly, a FIT, which guarantees a fixed price per kWh electricity (used e.g. by France, Latvia and Lithuania), or, secondly a FIP, which is paid on top of the market price for electricity (used e.g. by Finland, the Netherlands, Slovakia and Estonia). In recent years, a trend towards the second option can be observed (Ragwitz et al. 2012b: 3; European Commission 2013a). However, most FIPs are still very young. Hence, best practice for FIP is difficult to identify (Ragwitz et al. 2012b: 3).

Several EU Member States use a FIT/FIP mix, including Germany, Spain, Malta, Czech Republic and Slovenia. Overall, the number of countries using feed-in systems has increased from 9 in 2000 to 24 in 2012. 20 out of the 27 EU Member States use feed-in systems as main policy instrument (Ragwitz et al. 2012b: 4). In many cases, feed-in systems are supplemented by other policy instruments such as tax incentives or investment grants.

A quota obligation based on TGCs is a generation-based, quantity-driven policy instrument. The government defines targets for RES-E deployment. The target must be fulfilled by an actor in the electricity supply chain. As part of the quota system, a market for renewable energy certificates is established, and their price is set following supply and demand. As a result, RES-E producers can generate revenue from selling certificates (in addition to revenues from selling electricity). It is also possible that a technology-specific promotion (technology-banding) in TGC systems is set up (Resch et al. 2007: 26). Among the EU-28 Member States, six countries use a quota obligation system (United Kingdom, Sweden, Poland, Italy, Romania and Belgium). Recently, Member States (such as Italy and United Kingdom) have mixed feed-in systems with a quota system (Ragwitz et al. 2012b: 5).[8]

[8] Both Italy and United Kingdom decided to switch from the quota obligation system to a feed-in system.

Figure 3: Recent Developments of Feed-In Systems in the EU



Source: Ragwitz et al. 2012b: 5

Overall, two policy options, including four different approaches, can be identified in the field of RES-E (see Table 3):

Table 3: Overview of Main RES-E Policy Instruments

	Price-based mechanism		Quota model	
Elements	**Feed-in tariff**	**Feed-in premium**	**Quota**	**Quota with Banding**
Type of remuneration	Fixed feed-in compensation, irrespectively of the current market price	FIP as fixed payment in addition to the price of electricity	Price of electricity and price of electricity	Price of electricity and price of electricity

Determination of financing rate	Administrative	Administrative	Endogenous market price (administrative fixing of amount of certificates/quota)	Endogenous market price (administrative fixing of amount of certificates)
Variation / Adaptation of funding	Declining; flexible cap	Declining; flexible cap	Endogenous. In practice: risk premium	Endogenous. In practice: risk premium; maximum price limit possible
Technology differentiation	Yes	Yes	No	Partly (e.g. offshore wind and PV)
Form of marketing	By customer (obligation)	Direct marketing (producer)	Direct marketing (producer)	Direct marketing (producer)
Responsibility for stability of system	Not with producer	Premium for stabilisation of system	With producer	With producer
Responsible level	Binding targets on Member State level	EU-wide targets	EU-wide targets	EU-wide targets
Potential for connection	National reduction contingents are set off against caps (carve-outs)	EU wide harmonisation of premiums, reductions are set off against caps	Tradable EU wide, direct linkage with ETS & white certificates	Tradable EU wide, direct linkage with ETS & white certificates

Source: Author's Illustration.

In the following sections, the three RES-E policy instruments outlined above will be assessed against the criteria introduced in Chapter 2.

EFFECTIVENESS

In the area of wind energy deployment, the positive impact of FIT can be seen particularly in Spain, Germany, Denmark and Portugal. For example, in Denmark 24% of the electricity supply was provided by wind. With regard to PV deployment, the vast majority of installations have taken placed after FITs were introduced. For example, in the United Kingdom (UK) PV capacity increased from 30 MW in 2009 to 75 MW in 2010.

The growth rates and target accuracy of a feed-in system depend strongly on the particular configuration. For example, the FIT increases the willingness to invest by reducing investment risks. This can be supported additionally through design options such as an extended warranty or modified capping mechanisms. For that reason, most studies assume that such payments contribute more to the growth rates than quota models or tendering. (IRENA/IISD 2012: 12). Such an interpretation of effectiveness – as realised and/or anticipated potential to develop renewable energy sources – is also the subject of several evaluations (IRENA/IISD 2012; Frontier Economics 2012; Ragwitz 2012a: 24).

90% of all onshore wind power plants and almost 100% of the PV systems that were built in Europe in 2010 resulted from the incentives produced by a FIT. In general, FITs played a central role in the expansion of renewable energies in Europe: 78% of the electricity generated from renewable energy sources between 1999 and 2009 were generated in countries with FITs (Ragwitz et al. 2012a: 6). In Germany, for example, the set expansion targets were exceeded. The target set in 2004 to reach a 12.5% share of the electricity supply by 2010 was met in 2007. In terms of achieved growth rates, the instrument has thus proven to be effective (Frontier Economics 2012: 25). The obligation to connect to grids and the guaranteed purchase (priority feed-in) entail additional incentives for investments and thus contribute to the achievement of the target (European Commission 2008).

A World Bank study has analysed the expansion of wind energy in the context of FIT systems in Europe empirically and found that the levels of remuneration influence the growth rates as follows: first, the remuneration level contributes significantly to the increase if a particular FIT level is exceeded. From a certain minimum remuneration rate onwards, a further increase does not necessarily contribute to a further expansion and is therefore inefficient. This may be due to, inter alia, non-economic barriers and producer surpluses. In turn this means that the expansion rates are mainly determined by factors other than the remuneration rates. The length of the funding period and the extended warranty are more crucial: thus, funding a period extended by 10% empirically leads to 3% higher installation and generation rates (Zhang 2013).

In terms of target accuracy, FITs are less effective (Held et al. 2014: 35). By definition, price-controlled instruments are inferior to the quantity-controlled instruments. However, a tailored readjustment, which should be incorporated in the construction of the instrument, allows a significant increase in accuracy. The flexible cap reacts to too rapid capacity expansion and slows it down by reducing the rates (Diekmann et al. 2012: 17). A less elegant method is the "manual" readjustment through legal adjustments of the FITs. In extreme cases, the support can be suspended upon reaching the targets as it has happened recently in Spain.

FIPs must be assessed similarly with regard to the achievement of objectives. To improve the accuracy, the mechanisms mentioned above can be used for readjustment purposes. However, since the compensation depends on the electricity price, the investment risk is higher here. This can be circumvented by a "Contract for Difference" as it is foreseen in the UK.

In terms of accuracy, the quota system is theoretically optimal. The price of the certificates settles in a way that ensures that the exact expansion targets are reached. At which political level the quota targets are set (international/national) should be irrelevant in this respect. However, in practice, the target achievement is influenced by several different factors so that the ambitious expansion quotas are frequently either exceeded or undercut. This can be caused, for example, by a faulty construction of the quota. One of the relevant factors is the design of the buy-out. This penalty payment that a company will have to pay in case of missing its quota can make sense economically if, for example, the penalty is too close to or even below the allowance prices so that the company has no good reason for putting efforts in reaching the quota (Frontier Economics 2012: 102). This can be circumvented by a reasonably high deterrent penalty, which can be determined, for example, in relation to the certificate price. Penalties that are too low, as in the case of UK, can lead to problems in goal achievement. Furthermore, the targets can be missed also when existing plants are partially eligible for certificates and make stronger use of them than anticipated (Berget et al. 2010: 28; Woodman et al. 2011).

Also, an overshoot of the expansion target is possible with green certificates and has occurred in several cases (Italy, Sweden) (Ofgem UK Office of the Gas and Electricity

Markets 2012; Frontier Economics 201). From a corporate perspective, this is useful when banking, i.e. transferring certificates to subsequent periods, is possible - this should generally be the case in order to reduce the price volatility and investment risk.

In case of a quota with banding, the target achievement is not identical to that of a technology-neutral quota. If separate expansion targets are set for different energy sources and different certificates issued, as it is the case in Poland, each of these rates is subject to the same mechanisms as described above. However, since such a procedure often entails very thin, volatile markets, the multiplier model is chosen more often. This model only has one type of certificate and the amount of certificates issued per unit of electricity is adjusted with the help of a technology-specific multiplier (Diekmann et al. 2012: 16). When using such a model it is important to ensure that the target accuracy is still guaranteed: If CO_2 savings in different technologies can be considered with different factors when determining the overall CO_2 reduction targets, they have to be re-calibrated in dependence of the actual installation rates unless technology shares are defined statically. Thus, a readjustment is required.

Regardless of the system, some general limitations to target accuracy are inevitable. So far, expansion targets have been determined in relation to the energy consumption. During the economic crisis, however, this consumption rate decreased significantly so that almost all states exceeded their growth targets regardless of the instrument. This failure to meet the target is difficult to avoid in the short term. In the long term, however, it does not constitute a major problem because the market reacts to these conditions. Banking options can help, inter alia, to reduce surpluses during one period throughout future periods. Furthermore, it is possible to establish legal limitations that do not depend on the support scheme (as is the case in the UK), where lengthy and restrictive approval process for affordable energy have resulted in too small increases so that the rigidities of the market made it impossible to provide a sufficient supply, despite the existing demand. In technology-neutral compensation systems, such bottlenecks can have a stronger impact in the short term because of the less diversified supply; in the long run, however, the supply should be covered by alternative energy sources and the targeted increase should be met.

EFFICIENCY

Theoretically, a technology neutral quota with green electricity certificates is superior to the other instruments listed here in terms of its static efficiency. The market for green certificates creates a price that corresponds to the costs of power generation through renewable energies and is the same for all market participants. Due to its technology and location neutrality, a quota provides the market participants with incentives to choose the cheapest of the competing renewable energy technologies and locations. Furthermore, the quota has the potential to incite demand-driven feed-ins and investments in storage technologies via the electricity price (Monopolkommission 2011: 237; Sachverständigenrat 2011: 256; Sachverständigenrat 2012b: 282).

Despite this characteristic operation it has been empirically shown that the advantages of such an ideal-typical rate model have not yet developed equally in practice.

In case of FITs, fixed fees for different technologies are set by the state. The fees are subject to a temporal degression. These rates are meant to cover the costs of the renewable energy technology and include a certain amount of return for investors. In that context, attention must be paid to three challenges in pricing: 1. information needs and expenses for a central definition by the state of technology-specific tariffs; 2. he uncertainty as to whether the costs of each technology were assessed correctly; and 3. the cost differences between plant sites of varying quality. Depending on the configuration of the FIT rates, it is possible that plants at certain locations are subject to an excessive or insufficient support. In the case of an insufficient promotion of plants, no facilities will be built on the sites concerned, so that it may be necessary to resort to more expensive technologies to achieve a certain expansion target (Frontier Economics 2012).

Overall, the cost efficiency of a FIT is heavily dependent on the specific design and in particular on whether the cost savings of a technology can be accurately simulated over time (Verbruggen et al. 2012).

The cost efficiency of a FIP model also depends heavily on its specific design. Compared with the FIT, it has the disadvantage in terms of cost efficiency that the investment risk is partially transferred to the investor. Thus, the requested premiums are higher on average, which may increase the overall costs as shown below. This is also consistent with the experience gained in countries that have both FITs and FIPs. In practice, the disadvantage is sometimes mitigated through measures such as a guaranteed option to switch to the fixed FIT or by a guaranteed minimum remuneration in the event of decreasing electricity prices. On the other hand, the cost could potentially increase due to the fact that market price signals are considered to a greater extent.

A quota with banding is a characteristic feature of technology-specific promotion and therefore has a lower static efficiency in general than a technology-neutral rate. In this case, plants are provided with different amounts of green electricity certificates per TWh of electricity generated from renewable energies, depending on the respective technology. Determining these allocations is subject to similar challenges as the determination of FITs (see above) (Frontier Economics 2012). For that reason, the cost efficiency depends significantly on the respective design.

Analyses provided, inter alia, by the IEA can be used in order to verify the factual superiority of one instrument in terms of cost efficiency. The IEA has compared the experiences of a number of OECD and BRIC countries with different remuneration systems such as FIT/FIP systems, quotas and other instruments for the year 2009. The adequacy of the remuneration was used as a comparison indicator (RAI: "Remuneration Adequacy Indicator"; measured in USD/MW per year). In that regard, the "remuneration" includes – in accordance with the particular instrument - the components of wholesale electricity price, green electricity certificate price, FITs or FIP. The RAI aims at a fair comparison between countries. It takes the various renewable energy resources and the state of the global renewable energy cost development into account and normalises them so that remaining differences can only be attributed to local features. These include the maturity of a renewable energy market, including the supply chain, confidence in and experience with administrative procedures, the integration of the financial sector, etc.[9] In order to sufficiently consider these influential factors, the IEA defines a reference area with a range of remuneration costs, which are

[9] Three factors have to be considered in particular for a fair comparison:

1. Payment modalities of the remuneration systems. For this purpose, the remunerations in the respective systems are compared for a fixed time and at a fixed discount rate.

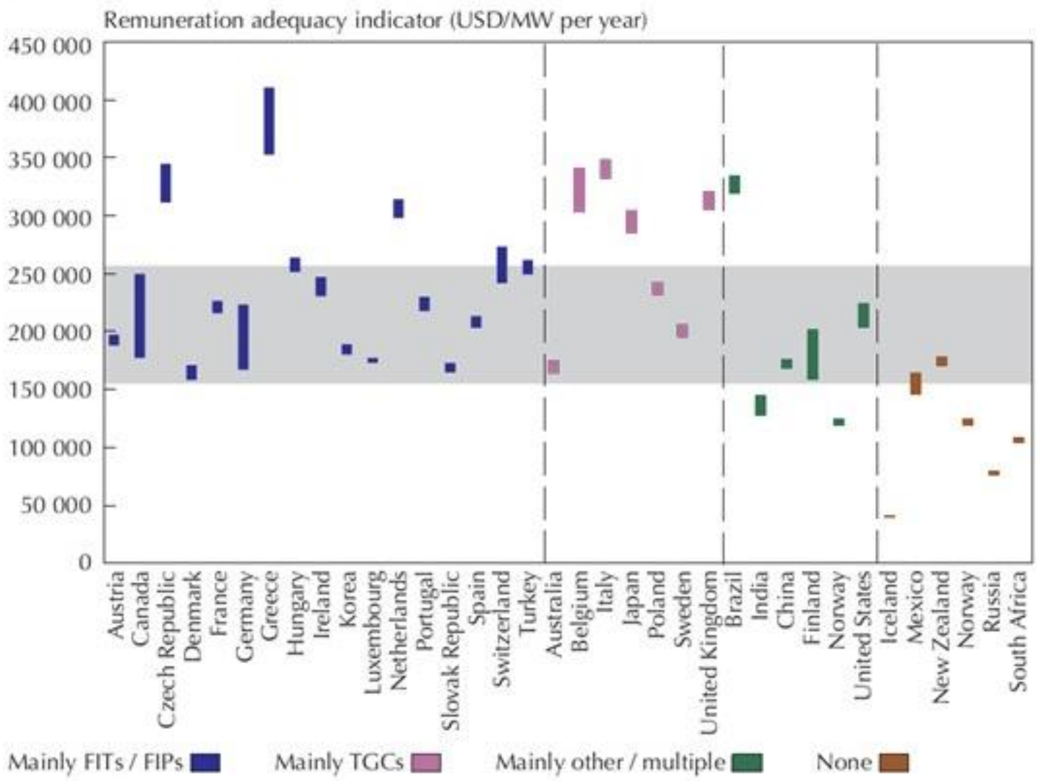
2. Impact of resource availability. This country-specific factor is neutralised due to the fact that the RAI refers to performance (USD/MW) and not to the amount of power produced (USD/MWh). This neutralisation is necessary since the aim of the study is to be able to make a comparative statement on the effect of the different instruments - and not on the resource availability of the countries. Otherwise, the effect that is meant to be measured would be overshadowed by the resource availability.

3. Interactions between incentives and system prices. Since renewable energy system providers try to maximise the margin, they include the offered (surplus) remuneration in their pricing. These three effects are considered in the RAI.

deemed to be adequate. The upper and lower limit of this range is defined by assumptions regarding capital and system costs.

In view of onshore wind plants, the IEA comes to the following conclusion: while the majority of the considered OECD and BRIC countries have a RAI that lies within the reference range, four out of six countries with quota systems (Belgium, Italy, Japan, Sweden, UK, Australia) have a RAI that is far above the reference range. Especially in a well-developed market like the UK, the RAI is higher than anticipated. In case of quota systems, the RAI generally exceeds the RAI of FITs by an average of 20% (see Figure 4) (IEA 2011a).[10] In sum, this means that the costs of quota systems are higher than the costs of FIT/FIP systems.

Figure 4: RAI for Onshore Wind Support Policies in OECD and BRIC Countries, 2008/09



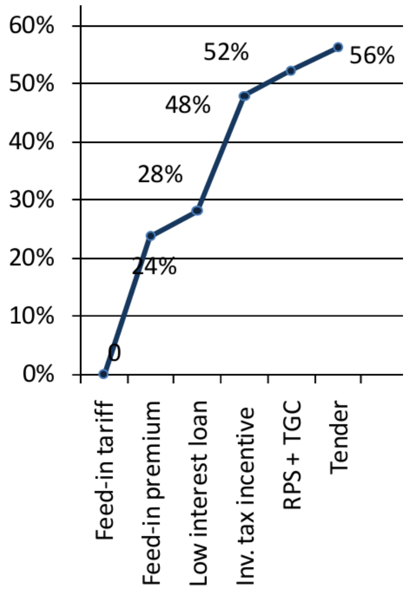
Source: IEA 2011a: 124.

The IPCC Special Report on Renewable Energy also mentions a number of studies showing that quota systems are more expensive in practice than feed-in systems. Thus, an important reason for this are risk premiums (including price risks due to fluctuating electricity and green electricity certificate prices), which increase the cost of capital in a quota system (Mitchell et al. 2011). An empirical indication is provided by an IEA study in which wind energy investors were asked about their "willingness-to-accept" in view of certain risks. The study shows that

[10] The quota systems ("Mainly TGC") have been adjusted here in terms of colour (purple). In the original publication of the IEA, they were green, which is obviously wrong. Moreover, it remains unclear why the preceding text (which was paraphrased from the IEA publication) did not include Poland. Therefore, the text refers to six TGC countries. In the figure, however, four out of seven (not six) TGC countries lie outside the reference range.

the highest risk premiums are demanded in the case of low legal certainty, political uncertainty and in the case of promotion instruments such as quota systems and tenders. The following chart (see Figure 5) from the IEA study illustrates which levels of risk premium investors ask for in comparison to the reference system of a FIT with regard to which risk is seen to be the lowest (corresponds to 0% here): For a FIP, the premium amounts to a 24% surcharge, for a quota (Renewable Portfolio Standard + TGC) it amounts to 52%, and a tender entails a 56% surcharge (IEA 2011a: 94).

Figure 5: Investors' Implicit "Willingness-to-Accept" Certain Policy Risks for Wind Energy Investments



Source: IEA 2011a: 94.

TECHNOLOGICAL OPENNESS AND INNOVATION DYNAMICS

The principle of openness to a broad portfolio of different technologies is reflected in the various forms of technology-specific promotion, which include FITs, market premium systems and quota with banding. All three can provide a pricing incentive to also use such renewable energy technologies that currently do not constitute the cheapest technology. In this way, learning curves and cost reductions can be dealt with, so that the respective technologies are available inexpensively at a later stage when they are needed in order to achieve more ambitious climate policy objectives and when alternative renewable energy potentials are limited (Mitchell et al. 2011).

However, the innovation process should not be limited to this reduced perspective that merely considers R&D aspects as this does not sufficiently take into account the diverse interaction between research and practical application. Instead, the close connection between the criteria "dynamics" and "target achievement" in the sense of "efficiency" should be taken into account. When going through learning curves of renewable energy technologies it is important to distinguish "learning by research" from "learning by doing". While the former can be influenced by spending on R&D, the latter is induced by stimulated demand. In an analysis of these two forms of "learning", the IEA emphasises that renewable energy promotion is most effective when it includes *both* types and – depending on the state of a given technology in the innovation chain – links them. This complementarity that allows positive feedback is highlighted as "one of the most robust results" in the IPCC Special Report on Renewable Energy (own translation from Mitchell et al. 2011). Such an innovation approach then contributes to a sustainable improvement of cost efficiency (Resch et al. 2012).

In the context of significantly decreased costs of PV modules, it is important to ask who covers the costs incurred during the learning curves. In that regard, a comparison to climate change can be drawn: the protection of the global climate commons faces the problem that it is cheaper for each individual state to reduce climate protection activities and leave protection measures to the other states. To overcome this unfavourable initial situation, which resembles the prisoner's dilemma, it is necessary to implement a binding international climate agreement. Similarly, one could argue that all countries are already contributing to R&D measures. However, this has not yet been taken up in a binding agreement.

Overall, the characteristic property of a technology-neutral quota is to incite the development of new RE technologies at the currently lowest possible cost. By definition, its performance period is thus relatively limited. If dynamic cost savings and learning curve effects are sought in the case of market-distant technologies it is necessary to resort to technology-specific promotion (e.g. quota with banding, market entry premiums), especially to reduce the problem of positive innovation externalities. It should be noted that the considered systems primarily provide "learning by doing" incentives. "Learning by research" and related basic research is promoted indirectly and can be inherent in the system due to an operation of the banding or the funding rates, which takes into account the disadvantages of immature technologies. However, a direct basic research does not take place in the analysed systems.

FEASIBILITY AND REPLICABILITY

The political feasibility is interrelated to criteria such as goal achievement, cost-effectiveness and cost distribution. The technology-neutral promotion is held to be more cost-efficient in theory. This raises the question whether the systems will survive long-term. Here, the mentioned criteria such as the effectiveness and cost efficiency play an important role. The issue of cost distribution is also relevant in this regard: higher profit margins of investors partly result in higher production costs. As mentioned, these profit margins are used to compensate risks.

Disadvantages of the technology-neutral promotion are potential dead-weight effects or windfall profits that are not socially acceptable - just like inefficient high RE expansion costs. Furthermore, the risk structure means that established electricity providers are favoured (Woodman et al. 2011). Property owners are not incited to invest by a quota to engage in additional expansions, which is why countries with quotas have separate remuneration models for small amounts of fed-in electricity. This could further strengthen the dominant position of some providers, thus reducing competition in the energy market and at the same time increase the assertiveness of their interests at the political level (Sachverständigenrat 2012b).

If a system permanently burdens public budgets (as it is the case in Spain) this may endanger its survival in the face of limited public funds. In principle, all four instrumental approaches can be designed so as to ensure that public budgets or the electricity consumers bear the costs, whereas funding via the electricity consumers is generally considered to be more stable (Resch et al. 2012).

This burden increases if the producer surpluses are, ceteris paribus, higher. Limitations on the surpluses can therefore stabilise the system (but it should not lead to lower cost efficiency, because otherwise the total costs increase). The three instruments FIT, FIP and quota with banding make it possible to limit the returns for investors and producer surpluses by technology - in the context of the uncertainties in the determination of remuneration rates which were already described above with regard to “cost efficiency” (Frontier Economics 2012).

It is not possible to have such a limitation in the case of a technology-neutral quota (in so far as underdeveloped technologies are not funded specifically). For that reason, power generators may retain producer surpluses when the used RE technology is cheaper than the respective price-setting (marginal) technology in the market for green certificates (Frontier Economics 2012).

Instruments with low complexity are easier to implement. Since FITs tend to entail lower administrative requirements than quotas, they are often also easier to implement (Haas et al. 2011). The establishment of functioning certificate markets is complex and can overwhelm the capacity even of some developed countries as an evaluation carried out by IRENA revealed (IRENA/IISD 2012). Even here, however, existing experience may have a positive impact on feasibility in the context of the ETS as well as in national green quotas.

INVESTMENT RISK

Investment security is a key factor for the reduction of the production costs, which are significantly influenced by risk premiums. In a study on renewable energy markets, the United Nations Development Programme (UNDP) recommended a risk mitigation strategy to increase cost efficiency. Before using public funds for subsidising purposes, investment risks should be reduced as far as possible. These are divided into political and financial risks.

The political risk can be reduced through greater transparency and extensive communication of policy objectives, but also through concrete requirements of the promotion, such as the obligation to connect to grids and purchase guarantees.

Financial risks can be reduced through the transfer of economic risk to the state. Fixed FITs, particularly if they are degressive, but also credit guarantees are suitable in that respect (UNDP GEF 2012). The FIT minimises the investment risk by the guaranteed funding rate. This price guarantee system is also used in the case of the “Contract for Difference” which will soon be applied in the UK, because the sum of electricity price and promotion is fixed in advance (Winkel et al. 2011).

The investment risk that plays a particularly important role due to the high initial investment can be further reduced in the FIT with the help of so-called “front-end loaded models”. The degressive design of the funding rates over the duration of the feed-in leads has the effect that a greater proportion of revenues is generated during the first years and thus enables a more favourable repayment of investment loans (Couture et al. 2010: 956). While this investment security promotes the expansion, the fact that the state takes over business risks is sometimes criticised as being counterproductive for the efficient, market-based allocation of goods. For that reason, it does not seem reasonable to pursue the aim of ensuring full security and eliminating all risk. It therefore has to be carefully considered in which cases it appears advantageous to assume certain risks.

However, the FIT can also involve specific political risks, depending on the distribution of burdens: ff it is funded directly from the budget rather than through an electricity price apportionment (as it is the case in Germany), there is the risk that – due to the economic situation, policy change or due to excessive use of state budget – the burden is deemed to be too high, which then leads to a subsequent amendment of the legal framework. Such shock-like corrections as they have taken place in Spain, where new funding was suspended, unsettle investors especially if regulations are revoked again. In Spain, the FIT for solar energy was even changed retroactively, which has affected the market negatively and also raised some judicial questions (FreshfieldsBruckhausDeringer 2011).

Although fixed capacity limits (as planned for the future in Italy) are easier to predict, they also lead to interruptions in the investment activity and constitute a planning risk for the investor. In return, they reduce the risk to the state budget. In contrast, flexible caps have less impact on investment risks. They allow for a gradual adjustment of the rates depending on the installed capacity. In case of market premiums, the investor is subject to the electricity price volatility, which increases the uncertainty of expected revenues

Using the quota as a financing instrument entails a higher investment risk (and therefore higher risk premiums) than FITs and market premiums due to the price volatility of the certificates. In the existing quota systems, the risk premiums are often high and undermine the cost efficiency of the system. In cases in which the risk premiums are relatively low, like in Sweden for example, this results to a great extent from the availability of the less risky biomass. The main reason is the relatively low initial investment required in the case of co-combustion of biomass in conventional power plants. Basically, large, liquid markets with banking option that even out supply and demand also inter-temporally, can contribute to a reduction of price fluctuations and thus the investment risks (Sachverständigenrat 2012a). Depending on the respective design, a quota with banding leads to greater volatility due to the separation of the markets.

SUMMARY EXAMINATION AGAINST CRITERIA USED

The in-depth examination above shows for renewable energy:

- **Effectiveness:** In all examined countries except the United Kingdom (UK), renewable energy expansion targets were exceeded, regardless of the type of subsidy. A precisely targeted development does not exist in any of the countries. Both of these circumstances are mainly due to the unpredictable (and weaker than expected) economic development. Higher expansion rates (and thereby higher total costs) can be observed with FITs (see graphic on page 137). These do not only depend on subsidy rates, but also e.g. on local conditions (see comparison of Spain and France). These developments are taking place against the background of an expected failure to reach the targets for 2020 in most countries (European Commission 2013).
- **Efficiency:** The costs of renewable energy expansion vary considerable from country to country. Particularly countries with FITs for solar energy are less cost efficient. Markets for certificates need to be sufficiently liquid – this is supported by multipliers in the case of technology differentiation.
- **Innovation dynamics:** Technology-specific types of subsidies have shown to be beneficial.
- **Enforceability and transferability:** Empirically, FITs are more wide-spread. However, cross-border cooperation on the basis of a common instrument thus far only exists for the technology-neutral quota in Sweden and Norway.
- **Investment risk:** Investment security is especially important in connection with long amortisation periods. Thus far, feed-in systems are most likely to ensure this kind of security. In the case of short amortisation periods (biomass in Sweden, Poland), this is less relevant. This positions quota systems relatively more favourably.

In addition, the following trends can be detected in a cross-country comparison:

- **Hybrid subsidy schemes:** More and more often, both models exist parallel to one another. A particularly popular solution seems to be to supplement a quota system with a FIT for smaller scale facilities.
- **Blurred boundary between price and quantity-based instruments:** FITs are increasingly incorporating elements from quantity controls, e.g. by linking subsidy quotas to the already developed capacities, or by introducing more competitive market premiums. Quota systems are increasingly incorporating elements of FITs, e.g. by technology-specific differentiation (multipliers of different certificates) and price limits.
- Some countries recently opted to replace their quota systems with FITs; the opposite is not the case.

OVERALL SUMMARY

Although FITs have been used by many EU Member States, challenges have appeared during the past few years (Held et al. 2014: 35). Among them is an overheated growth of solar PV in some countries, including Germany, Italy and Spain, which has led to strongly increasing policy costs (Held et al. 2014).

The European Commission recommends that FITs are phased out and FIPs are used (European Commission 2013a: 12). On the basis of its analysis of support schemes, the European Commission concludes that premium schemes have several advantages compared to other instruments, especially with regard to providing market exposure for energy operators (European Commission 2013a: 8). In fact, the general trend is a move from FITs to FIPs. However, FITs may still be adequate to support less mature technologies or small scale applications (Held et al. 2014: 35). FITs can also still be adequate in non-functioning markets (Held et al. 2014: 35).

According to Held et al. (2014: 29), the key advantage of FITs, compared to FIPs and quota obligations, lies in the long-term certainty of receiving a fixed level of support, which lowers investment risks considerably. It can be observed that in countries with established tariff systems, costs of capital are significantly lower than in countries which use other instruments (Held et al. 2014: 29). However, the cost-efficiency decreases when policy makers overestimate the cost of producing renewable electricity, given that tariff levels are based on future expectations of the generation cost of renewable electricity. When these are lower, producers receive a windwall profit, which, in turn, may hinder technology learning. It is thus important that tariffs are reviewed regularly (Held et al. 2014: 29).

FIPs have gained ground over the last years. They are used as main support policy instrument in Denmark and the Netherlands.[11] The key advantage of FIPs is that producers of renewables are stimulated to adjust their production according to the price signals on the market, because renewable energy producers participate in the wholesale electricity market.

Quota obligations have been introduced in several EU Member States, including Belgium, Italy, Sweden, UK, Poland and Romania. Quota obligations with certificates expose producers to market signals, which can be beneficial from a power system operation perspective (Held et al. 2014: 31). Another relative advantage compared to feed-in systems is that support is automatically phased out once the technology manages to compete. TGC represent the value of the renewable electricity at a certain time. When the costs of renewable technologies come down through learning, this is represented by the adjustment of the price of certificates. However, there is an uncertainty about the current and future price

[11] In other countries, they are used in parallel to FITs.

of certificates, which increases financial risks faced by developers. This uncertainty can have a negative impact on the developers to invest. This in turn increases the level of risk premiums and costs of capital. As these costs are usually transferred to consumers, the societal costs of renewable energy development under quotas are usually higher than under feed-in systems (Held et al. 2014: 31).

In terms of promoting innovation, technology banding or a combination of support instruments could address specific learning rates for less mature technologies, while at the same providing adequate support for more mature technologies. Since quota obligations tend to stimulate the development of lower-cost technologies, less mature technologies are best supported under a quota system with technology or band specifications (which is the case in e.g. Italy). Alternatively, promoting less mature technologies can also be achieved by mixing quota obligations with FITs or FIPs as more targeted support for more expensive technologies. This policy mix has been introduced e.g. by UK for solar PV (Held et al. 2014: 31).

In the following table (Table 4), the key conclusions of the best practice analysis with regard to RES-E policy instruments are summarized. As specified in the introduction, the analysis has focused on the two key policy instruments in this context – feed-in systems and quota models.

Table 4: Summary of Assessment

Assessment of renewable energy policy instruments	Price-based mechanism		Quota model	
	Feed-in tariff	Feed-in premium	Quota	Quota with banding
Effectiveness	O (readjustment necessary)	O (readjustment necessary)	+	+
Efficiency	O (empirically partly inefficient)	O (empirically partly inefficient)	O (theoretically optimal, empirically oftentimes inefficient)	O (depending on banding, empirically so far inefficient)
Innovation dynamics	+	+	-	+
Feasibility	+ (with regard to the complexity of administrative implementation)	+ (with regard to the complexity of administrative implementation)	-	-

Investment risk	**+**	**+**	**-**	**-**
Potential to link with other instruments/initiatives	**O** (indirect)	**O** (indirect)	**+** (direct)	**+** (direct)

Key: **o** = no clear tendency/depending on implementation/average; **+** = good; **-** = poor;

Source: Author's illustration.

Supplementing Table 4, the following table (Table 5) lists pros and cons of the three policy instruments with regard to the two key aspects – investment risk and exposure to market and promoting technologies:

Table 5: Strengths and Weaknesses of Feed-In Systems and Quota Schemes

Topic	Feed-in tariff	Feed-in premium	Quota scheme
Investment risk and exposure to market	**Strength:** FITs insulate new market entrants from price risk (from the market), which lowers their costs of capital and enables private investment. **Weakness:** Recently, the low investment risk has been put in doubt, as regulatory risk in certain countries resulted in higher than previous capital costs for investors under such schemes. In addition, overestimating the cost of producing renewable electricity may hinder technology learning.	**Strength:** A well designed FIP will limit costs and drive innovation by granting support based on a competitive allocation process or including automatic and predictable adjustments on cost calculations, giving investors market signals coupled with foresight and the necessary confidence to invest. A premium's effectiveness in terms of market exposure varies depending on whether premiums are fixed or variable, and, in the latter case, how often the premium is adjusted and whether there is a cap and floor price.	**Weakness:** Exposes energy producer to market prices, since they must market and sell the energy themselves on the relevant market and, if its renewable characteristic is identified separately with a green certificate, also sell and receive a market price for its "greenness". Offers significantly less revenue certainty for investors, in particular if there is no minimum certificate price. Rise in revenue risk raises the cost of capital, in some cases to such an extent that debt financing of some projects is not available. Hence, in certain circumstances, these schemes can raise the cost of renewables. However, the price risk for investments under quota schemes can be

			reduced by setting a floor price for the TGC (with the level of the penalty usually forming a price gap).
Promoting technologies	**Strength:** Supporting small scale activities (with de minimis market impact) involving investors who cannot reasonably be expected to participate in wholesale markets. **Weakness:** Limiting growth to certain technologies and sizes of installations.	**Strength:** There is a preference for FIP over FIT for technologies that are approaching maturity. Compared to green certificate schemes, FIP can provide a more predictable revenue stream for investment in new technologies which are not fully market ready.	**Strength:** Obligations can be created that are technology neutral, for maximizing competition to drive down technology costs in the short term. Technology neutral quota obligations appear to be more effective in stimulating more mature technologies, such as biomass-based renewable power plants, than in promoting less mature technologies such as offshore wind. Obligations can also be introduced with technology banding, which allows setting different support for different RES technologies.[12]

Source: European Commission 2013a: 12f.; Ragwitz et al. 2012a: 19; Held et al. 2014: 29.

In the following table (Table 6), key elements of the most important policy instruments are listed with regard to their efficiency. As regards the selection, countries were chosen which either use feed-in systems or a quota model.

Table 6: Performance Data of Main RES Policy Instruments in Selected EU Member States

[12] Some Member States offer in the electricity sector extra certificates for more expensive technologies (e.g. PV, offshore wind) or impose separate technology-specific obligations for innovative, more expensive technologies. Technology banding is also used by several Member States to avoid over-compensating cheaper technologies that enter the market at high prices set by more expensive technologies.

Country Policy instrument	Budget and costs		Average expansion costs 2008/09[13]		Power generation RES-E 2012 (excluding water power) Capacity share wind; PV/other of total renewable energy (Eurostat, data from 2010)[14]	Effectiveness / target achievement expansion of renewable energy
	Total costs of expansion and subsidies p. a. 2009	Cost to industry	Onshore Wind	Photovoltaic		
Italy **Green certificates**	EUR 2,5 billion (electricity price + price of certificates / FIT) Costs to state for purchase of certificates: ca. EUR 500 billion p.a.	Above-average electricity prices Certificate price 2012: EUR 77,87/MWh	EUR 149,61/MWh	EUR 553,44/ MWh	41.135 GWh output Capacities: wind: 17,2 %, PV: 17,7 %	Share 2010: 10,1 %; Target exceeded Will be replaced by feed-in tariff
Poland **Green certificates**	EUR 320 billion (electricity price + price of certificates)	Fluctuating certificate prices cause uncertainty regarding costs Certificate price 2012: EUR 64,5/MWh	EUR 89,91/MWh	EUR 89,91/ MWh	4.303 GWh output Capacities : wind 30,9 %, PV 2,3 %	Share 2010:9.4 %; Target exceeded Disputed eligibility of co-firing of biomass in coal-fired power plants
Spain **Feed-in tariff**	Subsidies: EUR 3,8 billion	1 GWh more RE empirically lowers electricity prices in Spain by EUR 2/MWh	EUR 64,51/MWh	EUR 383,50/ MWh	60.059 GWh output Capacities : wind 46,3 %, PV 11,2 %	Share 2010: 13,8 %; Target exceeded

[13] Converted from US Dollar to EUR (exchange rate: USD/EUR = 0,733) (as of 25 May 2014).

[14] Share was calculated by author. PV includes other energy sources besides water, wind and biomass.

Germany Feed-in tariff	Costs of expansion: EUR 6,1 billion (in 2013 according to BDEW – Bundesverband der Energie- und Wasserwirtschaft) EUR 20 billion Erneuerbare- Energie-Gesetz (EEG)	EEG apportionment ca. EUR 6 billion (estimate BDEW 2013)	EUR 73,50/MWh	EUR 438,19/ MWh	75.883 GWh output Capacities : wind 43,7 %, PV 35,3 %	Share 2010: 11 %; Target exceeded
Sweden Green certificates	EUR 143 billion (electricity price + price of certificates)	Certificate price 2012: EUR 21,37/MWh	EUR 63,71/MWh	EUR48,98/ MWh	7121 GWh output Capacities: wind 8,9 %, PV 3 %	Share 2010: 47,9 %; Target exceeded

Source: IEA 2011: 119; 126; OECD/IEA 2013; Eurostat 2012; Ecofys et al. 2011

5.3.1.2 Supportive Investment Policies

Reaching the 20% renewable energy share in gross final energy consumption in 2020 (based on the EU Directive 2009/28/EC) will require a huge mobilization of investments in renewable energies (de Jager et al. 2011: 9). Renewable energy investment support takes various forms. Often, investment support is not the main instrument to spur renewable energy deployment (see Chapter 4.4):

Main types are: grants, preferential loans and tax exemptions or reductions (European Commission 2013a: 11). Investment support decouples production from the sales price. Hence, it can be appropriate in cases where production incentives are not necessary or desired (for example, when the objective is to avoid producing excessive heat generation during summer months when demand is low). In fact, this is the big advantage over operating or production based financial support, because the latter maximizes production irrespective of price (European Commission 2013a: 11). Investment support is also a useful approach in cases where the market provides an adequate and efficient production signal, which is the case for more mature technologies with high up-front investment costs. Investment support also has the advantage that operating costs are in principle not affected. Further, it is a one-off measure which does not need to be readjusted at a later stage due to developments in technology or markets to avoid overcompensation (European Commission 2013a: 11).

Many EU Member States provide investment support at the sub-national level (regions or municipalities). Investment support is particularly relevant in EU Member States in renewable energy heating, above all at household level. Technology demonstration plant funding is also more common as a type of investment support (European Commission 2013a: 11). Additionally, many EU Member States use EU-funded investment instruments such as the European Agricultural Fund for Rural Development or the European Development Fund.

According to the European Commission, urgent efforts are needed in EU Member States to reform support schemes to ensure they are designed in a cost effective, market oriented manner (European Commission 2013a: 9).

GRANTS

In 2011, only Finland, Malta (for wind), the Netherlands and Poland used investment policy instruments for RES-E (Held et al. 2014: 82). In order to increase the share of renewables in the heating & cooling sector, most EU Member States use investment grants (Held et al. 2014: 82). However, only in Finland, investment grants and subsidies for RES-E (in combination with tax incentives) are the sole support available at national level (Held et al. 2014: 32) (see Table 7 for a selection of approaches).

With regard to renewable heating & cooling, Poland has set up (inter alia) the thermo-modernisation grant support scheme which increases the use of renewable energy sources for heating purposes or energy efficiency. Lenders receive grants to pay off part of the loan. All renewable energy sources used in heat generation are eligible. The amount of the grant is equal to 20% of the loan received for the implementation of thermo-modernisation activities. However, the subsidy cannot exceed 16% of the total costs of modernization work and may not exceed twice the amount of the anticipated annual savings in energy costs, which were identified through an energy audit. The grant scheme addresses owners or managers of building in which refurbishment works are conducted (RES Legal 2013).

In Finland, the so-called “energy aid” is a state grant for investments in RES production facilities and related research projects. Grants are available for projects which promote the use or production of renewable energies, advance energy efficiency and reduce the environmental effects caused by energy production and use. At least 25% of the projects’ financing must come from non-governmental funds. Energy aid is granted to companies, municipalities and other communities. All technologies are eligible for grants. The amount of subsidy depends on the aim of the project in question. The support allocated to investments in renewable energy production facilities can make up to 30% of the project's overall cost, but can increase up to 40% in case the project involves the use of new technology. The support allocated to research can make up to 40% of the project's total cost (RES Legal 2013). Grants amount to 43%% of the eligible costs (§ 5 par. 1 Regulation No. 2009:689). Eligible costs include labour costs, costs of materials and planning costs (§ 6 Regulation No. 2009:689). Costs of the connection to an external electricity grid are excluded from the eligible costs (§ 6 Regulation No. 2009:689). The maximum grant per installation is approx. EUR 130,000 (§ 5 par. 3 Regulation No. 2009:689). The total eligible costs must not exceed EUR 4,000 (plus VAT) per kW of installed maximum capacity. The eligible costs for hybrid installations must not exceed EUR 9,800 per kW of installed maximum capacity. If the solar system was funded by insurance payments, aid shall be reduced by an amount corresponding to the remuneration (§ 5 par. 4 Regulation No. 2009:689). The total budget for the scheme for the timeframe from 2009 until the end of 2016 is approx. EUR 25 m).

Generally, grants can be used at different project stages: R&D; capital/project grants; and contingency grants (de Jager et al. 2011: 229).

R&D grants are provided by EU Member States to research organisations and laboratories to fund research in RE technologies (de Jager et al. 2011: 229). Given that private organisations are often reluctant to finance in the early stages of technology information, R&D grants are an important source. However, the level of investment required for early stage development is not as significant when compared with capital required for the next stages, including construction of prototypes and pre-commercialisation (de Jager et al. 2011: 229). Of course, R&D grants are not the most cost effective policy instrument given that no return on investment can directly be linked to the expenses. However, R&D grants allow potential private investors to better perceive the interest of public entities for selected technology segments (Held et al. 2014: 229). It is to be noted that excessive use of public grants to stimulate R&D can lead to a financial dependence of recipient companies. This dependence can be problematic when public funding is withdrawn at the pre-commercialisation stage (de Jager et al. 2011: 229).

Capital or project grants are used to build prototypes and to operate them in real-market conditions. This development stage is highly time- and capital-intensive, which is challenging in particular for smaller companies. A key success factor is, similar to R&D grants, to identify the most promising technologies. Well-grounded selective criteria are an important feature (de Jager et al. 2011: 230).

Contingency grants are subsidies that are converted into loans when a project turns out to be successful and profitable. Normally, conditions are defined on a case-by-case basis. They are more likely to be used after the prototype stage, once the technology has been introduced into real-market conditions. Hence, this instrument is best applied to technologies for which the innovation continuum has reached the end of its demonstration phase or the early stage of commercialisation (de Jager et al. 2011: 230). Contingency grants can play an important role in guaranteeing investors that a return on investment can be achieved for a given technology, which eventually leads to private investments in similar projects. As a matter of fact, the selection of grant recipients is crucial, since they take on a lead function in the market (de Jager et al. 2011: 230).

Table 7: Examples of Grant Schemes in Selected EU Member States

Country	Measure	Target group	Maximum grant per project	Financing conditions
Finland	Energy aid	Companies, municipalities and other communities	Up to 30% of the project's overall cost; up to 40% in case the project involves the use of new technology. The support allocated to research can make up to 40% of the project's total cost	All technologies are eligible for grants. At least 25% of the projects' financing must come from non-governmental funds
Poland	Thermo-modernisation grant	Owner or manager of buildings in which refurbishment works are conducted	May not exceed 16% of the total costs of the modernisation work	All renewable energy sources used in heat generation are eligible
Sweden	Grants for the installation of photovoltaic installations	Private individuals, municipalities and enterprises planning to install a photovoltaic installation	Grants amount to 43 % of the eligible costs	Grants are available for the installation of PV installations only

Source: Own Illustration based on RES Legal 2013.

On the international level, the Global Environmental Facility (GEF) is involved in providing contingency grants (de Jager et al. 2011: 231).

PREFERENTIAL LOANS

Financial incentives play an important role in the promotion of renewables. Preferential or soft loans are loans which are available at an interest rate below the market rate (Held et al. 2014: 82). Other benefits may include longer repayment periods or interest holidays. This leads to reduced investment-related costs, which, for example, account for the majority of electricity generation costs of most RE-technologies (Held et al. 2014: 82). A major benefit of preferential loans is the transfer of part of the financing risk to the creditor. In most cases, risk is transferred to public actors (de Jager et al. 2011: 82).

In EU Member States, preferential loans have mostly been used to support RE-technologies in the electricity and in the heating sector. Whilst preferential loans in combination with investment incentives have been used as key policy instrument to support RE-heating, preferential loans in the electricity sector have mainly been used as a supportive instrument in combination with other policy measures, such as feed-in systems or quota obligations (Held et al. 2014: 83).

On a national level, preferential loans have been used e.g. in Bulgaria, Croatia, Czech Republic, Denmark, Germany, Lithuania, the Netherlands, Estonia, Malta and Poland (de Jager et al. 2011; see Table 8 for a selection). For example, Lithuania through its Fund of the Special Programme for Climate Change supports projects which aim to reduce greenhouse gas emissions. The Ministry of Environment is responsible for administering the fund. The fund is used to finance the promotion of RES, the introduction of environmentally friendly technologies as well as energy efficiency projects (Winkel et al. 2011: 180). The fund provides support for RES projects in the form of loans and subsidies. Loans are granted to natural persons and legal entities conducting commercial activities. A loan is granted through a credit institution, which has entered into a cooperation agreement with the Ministry of

Environment. There is no restriction on the total amount of a loan per applicant. However, the share of the funds of a credit institution in the total amount of a loan shall comprise no less than 20%. The maximum term for repayment of a loan shall not exceed six years (Winkel et al. 2011: 180).

Table 8: Examples of Soft Loan Measures in Selected EU Member States

Country	Measure	Target group	Maximum loan per project	Financing conditions
Bulgaria	Bulgarian Energy Efficiency and RES Credit Line (BEERECLI)	Small-scale RES and industry energy efficiency	Max EUR 2.5 Million	No information available
Denmark	Loan guarantee	Local initiatives in the wind sector	Max. guarantee is 500,000 DK (approx. EUR 67,000) per project	No information available
Germany	KfW Renewable Energy Programme	RES-E and Combined heat and power (CHP) plants	100% (excl. VAT) up to EUR 25 Million per project	Duration 5 to 20 years
	Loan KfW financing initiative Energiewende	Large scale residential RES and energy efficiency	EUR 25-100 Million for each project and 50% of capital needs	Interest rates set by local banks
Lithuania	Fund of the Special Programme for Climate Change Mitigation	Natural persons and legal entities conducting commercial activities	No maximum limit established	Maximum term for repayment of a loan shall not exceed 6 years.

Source: Own illustration based on RES Legal 2013.

TAX EXEMPTIONS AND REDUCTIONS

Tax incentives or exemptions are often complementary to other policy instruments. They are highly flexible instruments which can be targeted to encourage specific renewable energy technologies and to impact selected market participants (Held et al. 2014: 32). In most EU Member States, they are used as secondary policy instrument to complement other instruments. An exemption is Finland, where tax measures combined with investment subsidies are the main support instrument for the development of renewables (Held et al. 2014: 227). A wide range of tax incentives are used by EU Member States (see Table 9 for a selection).

According to the European Commission, tax exemptions and reductions should be used with caution, given that they are financed indirectly by all taxpayers – since public revenues are reduced (European Commission 2013a: 12). It is to be avoided that frequent policy changes risk the success of projects. It is thus important that fiscal incentives are announced and guaranteed for several years in advance (Held et al. 2014: 227). Theoretically, they can be financed through a surcharge on energy consumption, which adapts automatically to the amount of support paid. This measure would likely increase stability and reduce regulatory risk (Held et al. 2014: 227).

Tax exemptions and reductions are used extensively in the EU energy sector (European Commission 2013a: 12). In the renewables industry, they are used at industry level often to encourage biofuel production, and at household level to encourage household investment (e.g. rooftop PV). Tax exemptions are, besides investment grants, the main support instrument for RES heating & cooling (Held et al. 2014: 82).

Tax exemptions or reduction for RES-E are seen as a policy instrument which is complementary to other types of incentives instruments. The instrument can be used to encourage specific renewable energy technologies and to impact selected renewable energy market participants (Held et al. 2014: 82).

Investment or production tax exemptions reduce the tax burden of a project. The former support is linked to installed production capacity while the latter is in relation to the amount of energy production. The effect of investment tax exemption is similar to that of an investment subsidy as it benefits the project. Production tax exemptions only increase the profit for the equity provider (Held et al. 2014: 228). The following aspects have an impact on the risk profile and hence the access to and cost of capital:

- Consistency with preferred debt-equity ratio: some tax measures only focus on the equity (provider) within a project. However, the majority of project developers strive to minimize the equity within a project (while maximizing the debt) in order to maximize return on equity. As a result, only entities with other higher income can benefit from this scheme and not those with a lower equity share (Held et al. 2014: 228f.)
- Support of capacity versus production: in cases where the amount of investment tax exemptions of a project is linked to installed capacity, project developers tend to focus on capacity rather than production. In order to avoid this, a capacity-based support should be combined with any form of production incentive (Held et al. 2014: 229).
- Non-taxpaying companies benefiting from tax measures: in order to make sure that companies which are not (yet) taxpayers also profit from tax measures, flow-through shares can be applied. Eligible companies issue these equity shares to investors, who receive an equity interest in the company and income tax deductions associated with new expenditures incurred by the company on exploration and development (Held et al. 2014: 229).

Investment and production tax exemption are most prominently used in EU Member States. Several EU Member States, including Spain, the Netherlands, Finland, Greece and Belgium provide tax incentives related to investments. This includes: income tax deductions or credits for some fraction of the capital investment made in renewable energy projects, or accelerated depreciation (Held et al. 2014: 82).

For example, in the Netherlands, the Tax Deduction Scheme (EIA) is aimed at tax-paying entrepreneurs who are required to pay income tax or corporate taxes. Renewable energy projects can deduct 41,5% of the total investment costs from annual profit in the year of installation considered by the corporate tax up to a maximum of EUR 116 million per installation. Roughly 10% of the total investment costs can be subsidised in this way. In this sense, the EIA constitutes a reduction in investment costs. It is controlled by the Ministry of Economic Affairs and administered and monitored by the Ministry's agency. The EIA budget is revised annually. In 2011, the total budget was EUR 151 Million. Applications are continuously reviewed. They have to be submitted no later than three months after the investment has been made. For wind turbines (>25 kW), in 2011 the maximum investment amount eligible under the EIA was EUR 600/kW for onshore wind and EUR 1,000 for offshore wind. For solar PV of at least 90 Wp, the maximum amount was EUR 3,000/kWp. It is no requirement under the EIA to use certified equipment and/or certified installers (Winkel et al. 2011: 211f.).

Other EU Member States, including Latvia, Poland, Slovakia and Sweden, have devised production tax incentives that provide income tax deductions or credits at a set rate per unit of produced renewable electricity, which reduces operational costs (de Jager et al. 2011).

Generally, investment and production tax exemptions are most prominently used in the EU (Held et al. 2014: 32).

For example, in Sweden, for each MWh produced by renewable sources (solar, geothermal, wind, wave, biofuels or hydro), the producer receives a tradable renewable energy certificate. A distributor is obliged to purchase RECs up to a certain%age of the power distributed (KPMG 2012: 41).

In Poland, electricity consumption is subject to a tax. The tax is collected from the electricity producer after electricity is provided. Producers of RES-E, who are registered, are exempt from the tax, which is regulated by the Tax Act. All technologies which are used for the generation of RES-E are eligible for tax exemption. The amount of the subsidy equals the amount of taxes that entitled persons are exempt from. In 2011, the consumption tax on electricity amounted to ca. EUR 5 per MWh (Winkel et al. 2011: 223).

Table 9: Examples of Tax Measures in Selected EU Member States

Country	Measure	Target group	Maximum tax deduction per project	Financing conditions
The Netherlands	Tax Deduction Scheme (EIA)	Entrepreneurs who are required to pay income tax or corporate tax	RE projects can deduct 41,5% of the total investment costs from annual profit	Regulation does not make support conditional to the use of certified equipment and/or certified installers
Poland	Exemption from consumption tax	Electricity producers	The amount of taxes that entitled persons are exempt from. In 2011, the consumption tax on electricity amounted to ca. EUR 5 per MWh	Registration required
Sweden	Operating subsidies	Renewable energy producers	No information available	No information available

Source: Own Illustration based on RES Legal 2013; KPMG 2012.

5.3.2 Supporting Measures

One important supporting measure that has already been discussed is the importance of support for innovation and RD&D. In addition to that, additional measures are mentioned in the literature:

5.3.2.1 Administrative processes and permitting procedures

The previous European Commission progress report has identified authorisation and planning procedures as important challenges to renewable energy growth (European Commission 2013: 7). According to the Renewable Energy Directive, Member States need to ensure that permitting procedures are transparent, proportionate, coordinated and limited in time, and are facilitated for smaller or decentralised projects. The European Commission has analysed that progress in removing the administrative barriers is still limited and slow (European Commission 2013: 7; Figure 6).

Figure 6: Assessment of the Administrative Procedures in EU Member States

Member State	"One Stop Shop"?	One permit? (Nr. of permits?)	Online application for permit?	Max time limit for procedures?	Automatic permission?	Facilitated procedure for small-scale?	Identification of geographic sites?	Automatic entry into financial support scheme?	Overall assessment
Austria	Yes	No (?)	No	No	No	Yes	No	No	☹
Belgium	No	No (4)	n.a.	Partly (6 mths – 1 yr)	No	No	n.a.	n.a.	☹
Flanders	No	Partly (2)	n.a.	Yes (15 days - 4 mths)	No	Yes	Yes	No	☺
Walloon Region	No	Partly (2)	n.a.	Yes (90-140 days)	No	Yes	Yes	No	☺
Brussels	Yes	Partly (2)	n.a.	Yes (20-450 days)	No	Yes	n.a.	n.a.	☺
Bulgaria	No	No (?)	No	No	No	Yes	Yes	Yes	☺
Czech Republic	No	No (3)	n.a.	Yes (60 days – 72 mths)	No	Yes	No	n.a.	☹
Cyprus	Yes	No (5)	No	Yes (2-3 months)	n.a.	Yes	Yes	n.a.	😐
Denmark	Yes	Yes	n.a.	No	n.a.	Yes	n.a.	Yes	😐
Estonia	No	No (2)	No	No	No	No	Yes	No	☺
Finland	No	No (3)	n.a.	n.a.	n.a.	Yes	Yes	n.a.	☺
France	No	No (3)	Partly	Partly (?-1 yr)	No	Yes	n.a.	No	☹
Germany	Partly	Partly (2)	Partly	Partly (?-10 months)	n.a.	Yes	Yes	Yes	☺
Greece	Yes	No (3)	No	Yes (n.a.)	n.a.	Yes	n.a.	n.a.	☺
Hungary	Yes	Partly	Partly	Yes (n.a.)	n.a.	Yes	n.a.	No	😐
Ireland	No	No (2)	No	Partly (6 – 8 weeks)	n.a.	Yes	Yes	No	☹
Italy	Yes	Yes	No	Yes (30-90/180 days)	Partly	Yes	n.a.	No	☺
Latvia	No	No (8)	No	Partly (30 - 180 days)	n.a.	n.a.	n.a.	No	☹
Lithuania	Partly	No (2)	n.a.	Partly (10-30 days)	Partly	Yes	n.a.	No	☺
Luxembourg	No	No (2)	n.a.	Partly (3-5,5 months)	n.a.	Yes	n.a.	n.a.	☺
Malta	No	Partly	No	Partly (4 weeks)	n.a.	Yes	n.a.	No	☺
The Netherlands	Yes	Yes	Yes	Partly (6 months)	n.a.	Yes	Yes	No	😐
Poland	No	No (4)	No	Partly (30-65 days)	Partly	Yes	n.a.	n.a.	☺
Portugal	Yes	Partly (2)	Partly	Yes (120-250 days + 30 days for connection)	n.a.	Yes	Yes	n.a.	😐
Romania	No	No (7)	n.a.	Partly (30 days)	n.a.	No	n.a.	No	☺
Slovakia	No	No (3)	No	Partly (n.a.)	n.a.	Yes	Yes	n.a.	☺
Slovenia	No	No (>5)	n.a.	No	No	Yes	n.a.	n.a.	☹
Spain	No	No (>5)	n.a.	Yes (3 mths)	Yes	Partly	n.a.	No	☺
Sweden	Partly	Partly (2)	Partly	Partly (n.a.)	n.a.	Yes	Yes	No	☺
UK	No	No (3)	n.a.	Partly (1 yr)	n.a.	Yes	Partly	No	☹

Source: European Commission 2013a: 34.

The availability of a single administrative body for dealing with renewable energy project authorizations and assistance to applicants is still limited. So far, only Greece and Portugal reported newly established “one-stop-shop-agencies”. A few Member States have had them in place for particular technologies (e.g. wind) or in some parts of the country (e.g. Denmark, Germany or Sweden). A good practice example can be found in Denmark (Held et al. 2014: 62f.) There, the organisation of new wind offshore tenders includes several elements with the aim of providing a secure investment framework and to simplify administrative processes for bidders (Held et al. 2014: 62). The Danish Energy Agency acts as a one-stop-shop for permits. Denmark, Italy and the Netherlands are the only countries with a single permit system for all projects (European Commission 2013: 8). The latter is particularly relevant in the heating and cooling sector, where the diversity of different technologies stands against developing a uniform administrative approach (European Commission 2013: 8).

For energy transmission infrastructure projects, defining responsibilities for coordinating and overseeing the permit granting process, setting minimum standards for transparency and public participation, and fixing the maximum allowed duration of the permit granting process are important measures (European Commission 2013: 8).

5.3.2.2 Grid Connection and Priority Dispatch

Renewable energy for electricity generation must be integrated into the market. However, renewable energy sources, in particular wind and solar power, have different characteristics from conventional sources of energy in terms of cost structure, dispatch ability and size. This means they cannot simply be integrated into the existing market. Adjustments need to be made. As a result, infrastructure investments are needed, and electricity grid operations also need to be updated (European Commission 2013: 8).

According to the European Commission, most Member States have made some progress in tackling their grid barriers. However, further progress on improving transparency and consistency of network rules is still needed (European Commission 2013: 8). One of the areas where improvement is needed is the adaptation of the electricity grid and system operation. This includes improving storage capacity, better system controls and forecasting (European Commission 2013: 8). Another area is the modernisation of arrangements and cost sharing rules for using the grid to reflect the changing nature of the electricity generation mix (European Commission 2013: 9).

The Danish example mentioned above in the previous section (4.3.2.1) is also useful as a reference in light of grid connection: costs related to grid connection are borne by electricity consumers and the Danish TSO guarantees the grid connection to the offshore plants for the large projects only. In case of connection problems, clear compensation rules have been defined. Priority access to the grid is granted to successful projects. No local content rules apply for offshore tenders (Held et al. 2014: 62).[15] As regards local content rules, they should only be applied if required for reasons of social acceptance (Held et al. 2014: 64).

5.3.3 Focus Topic: Biomass Policies

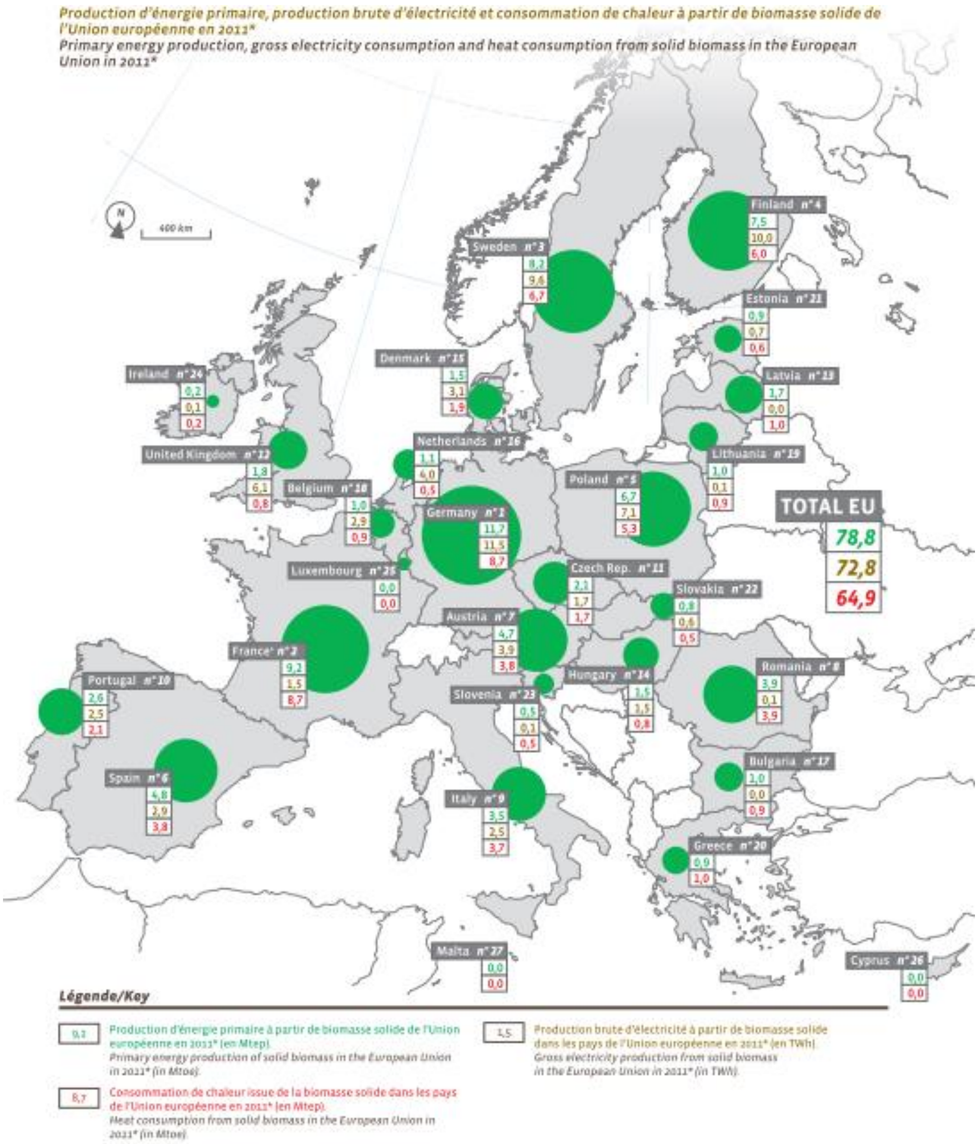
Biomass stems from different types of organic matter: energy plants (e.g. oilseeds or plants) and forestry, agricultural or urban waste including wood and household waste. Biomass can be used for producing electricity and heat as well as for transport biofuels.[16]

[15] Local content in the Ukrainian context means that a certain share of raw materials, capital assets, etc. must be of the country’s origin in which promotion schemes apply for those who meet the local content clause.

[16] In this report, biomass is analysed in the context of electricity generation and heating.

Biomass is faced with high expectations with regard to its future potentials (Held et al. 2014: 24). According to the European Commission (2014a), based on current knowledge it is reasonable to assume that biomass could account for two-thirds of the renewable energy target in 2020. With regard to NREAPs, biomass for energy supply will provide about 53% of the 20% renewable energy target by 2020. The majority would stem from the heat sector, and thereby in particular from solid biomass (Ragwitz et al. 2012a: 80) (see also Figure 7 for additional data). On 7 December 2005, the European Commission presented the Biomass Action Plan (BAP). The EU BAP identified 32 key activities for boosting the bioenergy market and encourages Member States to establish national Biomass Action Plans.

Figure 7: Solid Biomass – Primary Energy Consumption, Gross Electricity Consumption and Heat Consumption



Source: Eur'observer 2012: 59.

Biomass in Electricity Generation

The main support instruments for the promotion of biomass are feed-in schemes and/or quota schemes with green certificates (Council of European Energy Regulators 2013: 16).

As mentioned above, with regard to wind power and PV, feed-in systems appear to be more suitable than quota obligations (Ragwitz et al. 2011) as main RES support schemes. For biomass (and wind on-shore) this cannot be said. Here, technology-uniform quota obligations are equally successful (Ragwitz et al. 2012a: 19). Particularly relevant in this context is investment security. Biomass is a considerably low-cost and mature technology for which a long time period for amortisation is not needed. Generally, analyses have shown that technology-uniform quota obligations seem to be more effective in stimulating more mature technologies such as biomass (or onshore wind) than less mature technologies such as solar PV (Ragwitz et al. 2012a: 19).

Several EU Member States, including Belgium, Sweden, Denmark, Austria and Germany show high policy effectiveness in biomass with regard to RES-E (Ragwitz 2011; 2012a: 20). Belgium has achieved the most effective policy support in recent years due to its low domestic potential (Ragwitz 2012a: 21).

Belgium uses quota obligations with green certificates for co-firing of biomass in coal plants, biogas production from bio degradable, solid or liquid biomass and other technologies (Winkel et al. 2011: 23). The quota obligation system is implemented in three regions with different minimum prices. For example, as of 2011, the minimum price for biomass waste was 90 EUR/MWh for ten years. The regulators issue certificates. Installations producing RES-E receive certificates for ten years (Winkel et al. 2011: 23). Green certificates can be traded between suppliers and producers and trading corps. Suppliers have a monthly obligation to surrender certificates to the regulators (Winkel et al. 2011: 23).

In Germany, a floating premium was introduced as an optional support instrument for renewables in 2012. From 2014, biomass and biogas plants with a capacity of > 750 kW will be eligible only for the premium options. Plants under the FIP scheme receive a market premium and a management premium on top of the market price (Klobasa et al. 2013).

Several types of support mechanisms are applied in EU Member States. In the Brussels region, energy premiums (capital grants) are offered. Since 2011, these premiums are granted for biomass (in addition to other technologies). For biomass, the maximum of the subsidy is 25% of the invoice for investments and studies. The condition to obtain the subsidy is that the equipment must be installed by a certified installer (Winkel et al. 2011: 30). The budget available is adjusted every year. The maximum reimbursement is 30% (industrial) and 40% (households, collective housing) of the total eligible costs.

In Sweden, RES-E is also promoted through fiscal measures. Biomass used for electricity production is tax-free (Winkler et al. 2011: 292). Electricity is not taxable provided it is produced at (inter alia) a power plant with installed capacity less than 100 kW by a non-commercial producer.

Biomass in Heating

The use of biomass in centralised heating plants or in combined heat and power (CHP) play an important role in Scandinavian countries as well as in Austria and Lithuania (Ragwitz 2011: 7). Several factors, including an existing infrastructure of district heating networks, biomass availability and a heat demand have a positive impact on district heating (Ragwitz 2012a: 22). In Austria, the FIT for biomass electricity is exclusively available for CHP as otherwise the requested total conversion efficiency standards (> 60%) cannot be met (Winkler et al. 2011: 15).

Biomass in decentralised non-grid connected applications is by far the most dominant renewable energy source in the heating sector, followed by grid connected biomass. Austria, Czech Republic, Germany and Romania have shown the most effective support policies for decentralised biomass heating (Ragwitz 2012a: 22).

As a supporting measure, investment incentives are given in Austria. Austria has been successful in recent years in developing sustainable energy technologies like biomass heating systems. Amounts and sets of conditions vary depending on the region. Some regions pay fixed amounts, whereas others investment incentives account for a certain proportion of the total eligible cost (Winkler et al. 2011: 17). Typical capacities in Austria are between 15 to 25 kW. The impact of measures was that old and inefficient single stoves and boilers have been replaced by modern low emission systems (Winkler et al. 2011: 17).

Germany has introduced a financial incentive programme (Market Incentive Programme for Renewable Energies on the Heat Market - MAP) that offers investment subsidies and grants as well as long-term, low-interest loans with a fixed interest rate and redemption-free grace periods and an additional repayment bonus (financed from federal funds) for installations. The supervising authority is the Federal Ministry of Environment, in accordance with the Federal Ministry of Finance. The Federal Office of Economics and Export Control (BAFA) manages the execution of the law. The programme is financed from the federal budget. For 2011, a budget of EUR 380 million was allocated to the MAP. The MAP is divided into two parts:

1) Investment grants and subsidies

BAFA provides investment grants and subsidies for the extension of already existing installations. Eligible technologies are (inter alia) biomass such as automatically fed installations for the incineration of solid biomass for heat supply up to 100 kW heat power. Support is granted to private individuals, self-employed professionals, small and medium-sized enterprises, municipalities and non-profit organisations. Large scale enterprises only benefit from the support in specific cases (Winkel et al. 2011: 116). In 2011, the base support for pellet boilers & stoves (<100kW) was 36 EUR/kW with a minimum of 1000EUR.

2) KfW Renewable Energies Programme

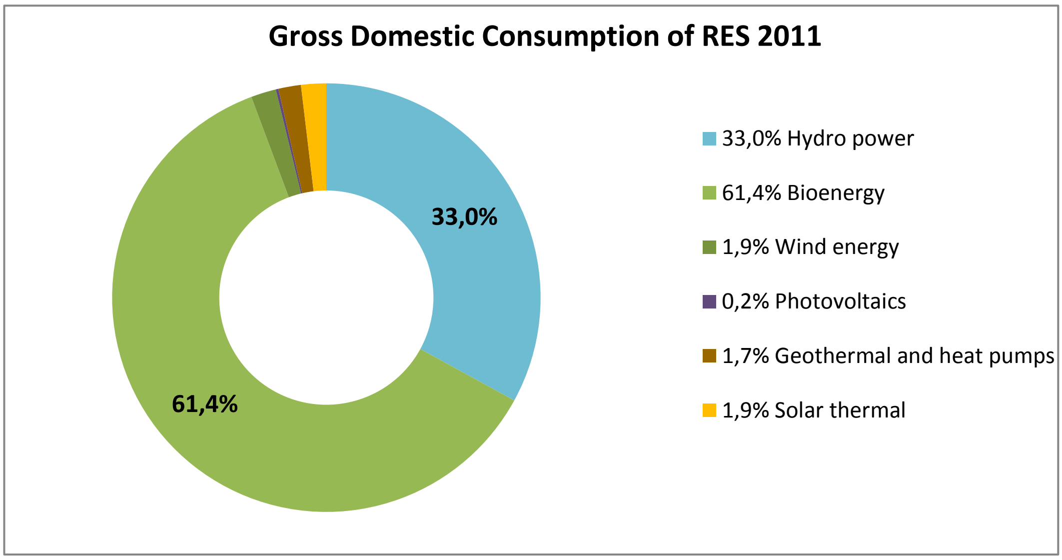
For large RES-H plants, the KfW programmes offers long-term, low-interest loans with fixed interest rates, grace years in the start-up phase (up to three years) and repayment subsidies from governmental funds. Small enterprises receive more favourable interest rates (Winkel et al. 2011: 116f.).

5.3.4 Country Examples: Performance of Policy Instruments

5.3.4.1 Austria – Biomass Situation and Best Practice Policy Instruments

In 2011, gross domestic consumption of renewable energy sources amounted to 372.6 PJ, which was dominated by energy from bioenergy (61.4%, taking account of energy from solid, liquid and gaseous biomass, Figure 8). The total share of renewable energy sources amounted to 26.12%of gross domestic energy consumption. Overall, the amount of bioenergy produced from biomass is larger than that of all other RES (hydropower, wind energy, geothermal energy, solar heat and PV) together. Since the 1970s, gross domestic consumption of bioenergy almost quintupled, and the use of biogenic fuels and combustibles (sawmill by-products, woodchips, biodiesel, bioethanol, etc.) continuously increased as well. In 2010, fuel wood remained the most important biogenic source of energy with a 27% share of the total use of bioenergy. Nonetheless, in the same year, wood chips, bark and sawmill by-products together supplied more primary energy (35%) than fuel wood (AEA 2013).

Figure 8: Gross Domestic Consumption of RES, 2011



Source: AEA 2013, data from Statistics Austria.

Gross domestic heat consumption accounted for 567 PJ in 2011. Natural gas remained the most important energy source (35.4%), followed by bioenergy with a share of 27.7%. Bioenergy used for heating purposes was predominantly wood-based (80%, 125 PJ). Biofuels (biodiesel, bioethanol, other liquid biogenic fuels) had a share of 6.5% in gross final energy consumption in transport in the same year. Next to the traditionally high importance of hydropower, biomass had the most significant share of renewable energy sources in gross final electricity consumption in 2011 (7.3% or 16 PJ) (AEA 2013).

The low temperature heat market has traditionally been (and remains) by far the most important market for biomass in Austria. Small scale heating systems are fuelled by logwood, briquettes, woodchips or pellets, and district heating systems are fuelled either by woodchips from forestry or the wood-processing industry, or by bark (Schmidl and Schilcher 2009).

High temperature and process heat is being used for industrial purposes in the wood-processing industry as well as in the paper and pulp industry (Schmidl and Schilcher 2009).

SUPPORT SCHEMES FOR THE PROMOTION OF THE USE OF BIOMASS

Austrian energy policy is planned and implemented both at federal and regional level, which is a result of the allocation of competences according to the Federal Constitution. The process of energy policy formulation and implementation is conducted in close cooperation with the social partner organisations (representing important groups of society) and including a consultative process with non-governmental organisations and the public at large.

Consequently, a number of support mechanisms for the promotion of the use of biomass exist on different levels.

National level:

- The Green Electricity Act 2012 encourages electricity production from biomass via FITs and investment subsidies: electricity from renewable energy sources is predominantly supported via a FIT. The operators of RES plants are entitled to the conclusion of a contract with a governmental purchasing agency (Clearing and Settlement Agency), upon the purchase of and payment for the electricity generated as long as funds are available.
- The Environmental Aid Act (UFG, 1993, last amended 2012) regulates support schemes to protect the environment. It is divided into several fields of action; incentives to use energy from RES in the heating and cooling sector are provided in the Environmental Assistance in Austria (UFI) field of action. The most substantial form of promoting small-scale RES heating and cooling is applied on the level of the individual federal states. Special investment incentives exist for solar thermal installations, heat pumps, geothermal and biomass heating plants. The funding guidelines are published separately for each federal state; however, they do not differ in eligibility criteria and respective amounts.
- The Environmental Support Scheme for Austrian Enterprises (since 2001): subsidies for the use of renewable energies, for the enhancement of energy efficiency and for other climate related measures, managed by Kommunalkredit Public Consulting GmbH (www.kommunalkredit.at)
- The Fuel Order Regulation (2004, last amendment 2012) entails a substitution obligation to ensure a certain share of biofuels in annual fuel sales, blending requirements, accounting methods and further provisions in implementation of relevant EU legislation.
- The Mineral Oil Tax Act (1995, last amended 2012) provides tax reductions for petrol and diesel with a minimum content of 4.6% and 6.6% respectively, of biogenic material. Mineral oil from biogenic material and E85 are completely exempt from the mineral oil tax. The Bioethanol Blending Ordinance (2005, last amended 2007) regulates tax exemptions for high blends of bioethanol (65-75% in winter, and 75-85% in summer)
- Federal Promotion of Extraordinary Efficiency in Residential Buildings, according to Article 1a of the Federal Constitution (2006, regulatory instrument by regional governments)
- Klima:aktiv Programme (2004, soft measure: innovative programme for active climate protection by the Federal Ministry of the Environment, introducing target-group oriented programmes for the market integration and dissemination of climate friendly technology and services in the areas of energy efficiency, building construction and refurbishment, mobility, communities and renewable energy sources)
- The subsidy scheme wood heating (and solar installations) for private households (2012) of the Climate & Energy Fund, is directed at the implementation of pellet and woodchip

heating systems and pellet stoves (excl. log-wood boilers) substituting fossil fuel based heating systems. Investment subsidy.

- Financial incentives for rural biomass energy generation (in force, Ministry of the Environment, investment grant for rural biomass energy projects such as district heating from wood chips and biogas CHPs)
- Biomass is subject to 10% VAT, which means a reduced tax rate as compared to the regular rate of 20% VAT (WIPO 2012)
- Aside from support measures, standards like ÖNORM M 9466 (Standard on emission limits for air pollutant emissions from wood incineration plants with a nominal heat output of or above 50 kW), or structural and energy related provisions for the construction sector regulate technical specifications.

Regional level:

- Each of the nine federal states has a support scheme for the construction of new houses or the refurbishment of existing buildings, which differ from each other in the details: support schemes for residential buildings, or direct/loophole subsidies (for all plants which do not meet the minimum investment volume requested by the support schemes for residential buildings) all of these encourage the use of renewable energy in one way or another
- Subsidies for biomass district heating plants (investment grant offered to companies or agricultural cooperative societies that produce district heat from biomass)
- Subsidies for private companies investing in RES for heating (investment grants)
- Subsidies for sports complexes in the framework of construction or refurbishment of sports complexes
- Energy consultancy services offered by regional governments

Local level:

At a local level, cities or municipalities are responsible for planning and implementing certain energy measures, e.g. related to land-use planning and measures concerning energy supply, mobility and internal organisation. A number of Austrian municipalities offer investment grants for the use of RES for heating.

5.3.4.2 Germany – General Overview of Policy Framework

MAIN LEGISLATION AND POLICY

Germany is considered one of the “best practice” countries for onshore wind, PV and biogas (Ragwitz 2012a: 20).

RES-E is supported through a FIT scheme. The criteria for eligibility and the tariff levels are set out in the German Renewable Energy Act (Erneuerbare-Energie-Gesetz – EEG), which is one of the centrepieces of German climate and energy policy. In the electricity sector, the EEG is supplemented by the Combined Heat and Power Act (Kraft-Wärme-Kopplung-Gesetz) and by emission trading.

The EEG was first adopted in 2000 and amended several times subsequently. At present, the EEG is applied in its version of 30 June 2011. The changes of the amendment entered into force on 1 January 2012. Generally, the EEG has the task to enable a sustainable development of the energy supply and increase the share of renewable energies in the electricity supply to 35% in 2020 and to 80% in 2050. Furthermore, the EEG regulates the preferred feed-in of electricity from renewable energy sources and their connection to the network. The EEG 2012 is accompanied by the so-called compensation mechanism regulation (AusglMechV), which regulates the direct marketing of electricity from renewable energy sources. The significant aspects of the EEG including the AusglMechV will be explained hereinafter.

According to the EEG, operators of renewable energy plants are statutorily entitled to payments by the grid operator for electricity exported to the grid. The EEG also introduced the so-called market premium and the flexibility premium for plant operators who directly sell their electricity from renewable sources. Moreover, low interest loans for investments in new plants are provided for by different KfW-Programmes (Renewable Energy Programme – Standard, Programme offshore wind energy, Programme geothermal exploration risk).

Under the EEG, a power producer can either directly market the electricity or he can request remuneration for the electricity over a certain number of years by means of fixed FITs. If the producer chooses the first option, he may request a so-called market premium from the network operators, which covers the difference between actually realized revenue and production costs. If the producer chooses the second option, he also receives a fixed FIT from the network operators; this tariff - depending on the energy source – amounted to an average payment of 16.55 c/kWh in 2012, with different payments for different energy sources. The market premium is also flexible in so far as it reduces the electricity price risks, which in some cases also relativizes the incentive effect of market signals, because in practice it does not occur that this establishes a less favourable position than the fixed remuneration. Furthermore, switching back to the fixed compensation system is possible at any time. In addition, there is a management premium, which is meant to cover the transaction costs of direct marketing. However, when compared with the market premium, the management premium is relatively low. In 2013, it lay between 0.275 and 0.75 cents/kWh.

In addition to these two options, the legislature has introduced another incentive tool for direct marketing, namely the so-called green electricity privilege. Electricity distributors that generate their electricity from at least 50% renewable energies as well as at least 20% from wind and solar energy, benefit financially from the EEG apportionment. This EEG apportionment is one of the main mechanisms of the EEG and primarily affects the transmission system operators, who purchase electricity from renewable energy sources of the EEG from those producers who do not directly sell their renewable electricity on the market and therefore receive a FIT. However, since transmission system operators also pay more for electricity from renewable energy sources, they can pass on the difference between FIT, market premium and market price to the consumer as an EEG apportionment. The EEG apportionment is redefined annually. In 2013, it was calculated to amount to 5,227 c/kWh and had thus increased by about 50% compared to the previous year. In addition, certain sectors (energy or energy-intensive companies, railways) are largely exempted from the EEG apportionment. Naturally, these rules have operational and economic consequences.

The EEG is a controversial instrument of German energy and climate policy. On the one hand, the actually achieved increase in the share of renewable energy in the national gross domestic electricity consumption are 7% in 2010 and 23% in 2012 (BDEW 2013: 11). On the other hand, negative consequences such as a disproportionate promotion of PV systems in the relatively sunless Germany, fluctuations in power generation with possible effects on network stability, the high economic costs due primarily to the EEG apportionment as well as the friction with the ETS are criticised (RWI 2012: 32; Frondel et al. 2010: 4051; Sachverständigenrat 2012b: 2). The development of wind and PV systems approximately cost 65.5 billion euro between 2000 and 2009. Also, the multiple burdens placed on electricity consumers through different, partially overlapping instruments (ETS, electricity tax, EEG apportionment) are deemed to be unfavourable (Institut der deutschen Wirtschaft 2009: 46).

Proponents of the EEG such as Weber or Diekmann meet this criticism by emphasising that long-term FITs make a significant contribution to investment safety (Weber et al. 2012: 13; Diekmann et al. 2012). They point out that investments in “leaps in technology” in the field of renewable energy are required to successfully drive the energy transition (Weber et al. 2012). While these new technologies initially entail high production costs, they could soon compete with fossil fuels through a steep learning curve (Viebahn et al. 2011). However, the Expert Commission on Research and Innovation has come to the conclusion in its latest report that at least in view of some energy sources the learning curves are insufficient in the medium term to establish a direct competitiveness (EFI 2013).

Supporters of the EEG also criticise several exemptions for German industry, which promote the fact that production costs are passed on to non-privileged electricity customers (mostly private households) and point out that withdrawals or reassessments would have a lowering effect on the electricity price paid by end consumers (Rieseberg et al. 2012; Küchler 2012). Representatives of the energy-intensive industry, however, argue that even a small change in the price of electricity would lead to a disproportionately large increase in costs and thus bring a competitive disadvantage, and that this alone justifies the exemptions (Bolay et al. 2012: 35). For 2013, the BDEW predicted costs for the EEG amounting to 20.4 billion euros of which private households had to carry the largest share (7.2 billion euros), followed by the industry (6.1 billion euros), commerce, trade, services (4.0 billion euros) and public facilities (2.4 billion euros) and to a lesser extent, agriculture and transport. The industrial enterprises pay the full EEG apportionment for 47% of their electricity consumption. The remaining power consumption is either exempted from the apportionment or lower than the apportionment limit or reduction (BDEW 2012: 23-24).

In order to take account of this discussion, the federal government has made some changes to the EEG in June 2012 (BMU 2012). Thus, a delivery stop for all PV systems upon reaching 52 GW of installed capacity was established (in 2012, 32.4 GW) were installed, with 1.3 million PV systems (RWI 2012:34). Furthermore, the remuneration rates were lowered. The so-called flexible cap (gradual reduction of funding the faster the solar expansion progresses) and the expansion corridor were retained. The support of electricity-intensive industry has also been upheld. The EEG has exceeded the predetermined target range of an annual expansion of PV plants by 2.5 to 3.5 GW with 7.6 GW in 2012. Thus, it was not possible to ensure a tailored target achievement under the EEG with a flexible cap (RWI 2012: 34).

Currently, the German government is reforming the EEG. A key element is the reduction of strongly increasing policy costs which result from overheated growth of renewable technologies. The objective is to reduce current tariff levels. Among other things, the introduction of auctions is planned to achieve marked-based pricing. Another key element is the feed-in priority for renewable energy, which foresees that the promotion scheme under the EEG shall in the future oblige operators of new renewable power plants to sell the energy themselves (mandatory direct marketing).[17]

[17] Further information on the EEG revision is available on the website of the Federal Ministry for Economic Affairs and Energy at http://www.bmwi.de/EN

SUPPORTING SCHEMES

As regards RES-E, low interest loans for investments in new plants are provided for by different KfW-Programmes (Renewable Energy Programme –Standard, Programme offshore wind energy, Programme geothermal exploration risk).[18]

Furthermore, Germany provides policies for the promotion of renewable energy sources covering training, certification and research programmes, a self-commitment of public authorities, the support of district heating networks and the introduction of building obligations regarding the use of heat produced from renewable energy. For example, with regard to the training programme.[19]

With regard to heating & cooling, in the MAP support schemes for the promotion of heat produced from renewable energy are listed. Another part of the policy package is the Renewable Energies Heat Act (Erneuerbare-Energien-Wärmegesetz). In addition, BAFA is providing investment support and KfW offers low-interest loans (Renewable Energy Programme–Premium, Programme Geothermal Exploration Risk) (RES Legal 2013).

For example, KfW provides low-interest loans with grant payback support for the development and expansion of heat installations/plants (RES Legal 2013). In the framework of the KfW Programme Renewable Energy – Premium, KfW provides low-interest loans with grant payback support for the development and expansion of heat installations/plants. The installations need to be erected in Germany and have to be operating for at least seven years. Eligible technologies are biogas, biomass, geothermal energy and solar thermal energy (RES Legal 2013).

BAFA provides investment support for heat produced in existing buildings. The investment support is divided into basic support, bonus support and innovation support. Installations need to be erected in Germany and have to be operating for at least seven years. Supported technologies are biomass, geothermal energy and solar thermal energy. Eligible are private persons, freelancers, small and medium size companies, municipalities/local authorities, non-profit organisations, and companies of which the public authority has a share of > 25 % with a turnover less than SME threshold (RES Legal 2013).

GRID ISSUES

In Germany, plants for the generation of electricity from renewable sources are given priority connection to the grid. Additionally, grid operators are obliged to give priority to electricity from renewable sources when purchasing and transmitting electricity. Furthermore, those interested in feeding in electricity can demand that the grid operator expand his grid. These special provisions are set out in the EEG (ES Legal 2013).

STATE LEVEL

Energy and climate policies of the federal states include (Federal Republic of Germany 2010: 141ff.):

- Climate protection plans/Action Plans: including reduction goals.
- Energy plans: including energy policy objectives for mid- and long term.
- Institutions: energy agencies are being set up on state level (e.g. Hamburg)

[18] Some policy initiatives have already been described in Chapter 4.3.1.2.

[19] Further information is available in RES Legal 2013.

- Specific activities due to regional/state focus: including coaching of bioenergy villages, information campaigns to promote the use of renewable energies, development of local heating networks.

5.3.4.3 Spain – General Overview of Policy Framework

MAIN LEGISLATION

In Spain, the main support scheme (the "Régimen Especial") operated until the end of 2011 and was suspended at the beginning of 2012.

In Spain, the generation of electricity from renewable sources is mainly promoted through a price regulation system. Plant operators may choose between two options: a guaranteed FIT and a guaranteed bonus (premium) paid on top of the electricity price achieved on the wholesale market. FIT and FIP are currently suspended, i.e. no new installation can access the scheme. The reason for this suspension is (inter alia) the high growth of RES-E in the past years, even beyond the set goals. Hence, all support schemes for RES-E were suspended. As of now, no other support schemes for RES-E are in place (RES LEGAL 2013).

In terms of predictability and stability of the policy framework, the decision in Spain to abruptly stop the FIT is seen critically (Held et al. 2014: 24). With Royal Decree-Law 1/2012 (from 27 January 2012) the Spanish Feed-in System (FIS) had been abruptly stopped. In July 2012, Spain passed an Energy Reform which included severe cuts in support for renewables in comparison to the former FIT. In addition, this reform repealed all Royal Decrees that had regulated RES retribution previously, thereby implementing a retroactive change. Details of the support granted for already existing installations have not been published and, thus, currently (as of 7 November 2013) RES producers have no certainty regarding remuneration through the support scheme for existing RES power plants (Held et al. 2014: 24).

FEED-IN SCHEME

Even though the feed-in scheme was temporarily suspended in 2012 for projects beginning operation after January 2013, Spain is considered to be one of the best practice countries with regard to onshore wind energy (Ragwitz et al. 2012a: 20). The country had opted for a FIT since 1994. In addition, there was also a system of FIPs which were paid in addition to the current electricity price. This means that electricity from renewable energy sources could either be fed directly into the grid at a fixed price or it could be sold on the market. In the latter case, the price was made up of the market price and the respective subsidy rate (Ciarreta et al. 2010: 10), with upper and lower limits set for the resulting price. This measure was taken primarily as a result of the temporarily very high profitability of the FIP in combination with considerable electricity price increases, which was also the reason for the market premium being the more commonly chosen model. In 2013 (after the temporary suspension), Spain abolished the FIP scheme and reverted back to a FIT.

A purchase guarantee only existed for FITs (Klein 2010: 23). Differentiated rates were in place for FITs as well as for additional premiums. The rates depended on the time period (15-25 years), plant size and technology. For instance, the FIT for wind energy lay at 6-7 cents per kWh, but 18-44 cents per kWh for solar energy. The tariffs were adjusted quarterly or annually, depending on factors such as inflation, energy demand and technology costs (Klein et al. 2010: 22). In addition, capacity contingents existed for different technologies. Since 2009, plants had to be recorded in a register to be eligible for subsidies (Teckenburg et al. 2011: 288).

This was criticized because, inter alia, the law did not contain a reasonable mechanism to adapt the rates (such as fixed degression) to control the rapid development of renewable energy. In 2008, this had the effect that due to the cost explosion, the solar capacity expansion was unexpectedly limited to 500 MW (this was applied temporarily; until the end of 2010, 4 GW capacity have been installed) (Moss et al. 2012). In connection with the economic crisis, this paralysed the PV market (Del Rio et al. 2012: 5562).

However, the strong use of the promotion of new installations in Spain was not per se a result of particularly high funding rates, but also a consequence of the relatively cheap production cost: wind and solar power benefit from fairly good site conditions; in addition, the investment costs are relatively low (European Commission 2008).

Although the promotion of PV in Spain is often described as a success story because of its effectiveness, it should not be forgotten that the expansion phase (until 2007) was followed by a slump in development (European Commission 2008: 5557). Parallel to the expansion of capacity, also the total cost of production increased, which made demands for greater cost control more frequent. Since 2009, this problem was mingled with the more general problem of the tariff deficit in the electricity system (European Commission 2008: 5561).

The Spanish FIT has contributed significantly to the expansion of new capacity and entailed high certainty for investors. However, this contribution also entailed a high cost (Ciarreta et at. 2011: 17-18). A study criticised that energy efficiency was not taken into account in the current policy, while the main focus was on the development of renewable energies. Thus, emission reductions through energy efficiency measures would have been more cost effective in the short- and medium-term (Ciarreta et al. 2011: 17-18).

This was also due to the specific structure of the promotion. If more control over the total cost was sought, more frequent tariff revisions, for example, should have been provided for. The flexible degression which established an adjustment for photovoltaic in Spain every three months, however, could also lead to high administrative costs (Ciarreta et al. 2011: 17-18). Nonetheless, flexible revision mechanisms can in principle help to avoid an overly rapid capacity expansion, as it was the case in Spain. Mandatory long-term development goals can contribute to investment safety, regardless of the funding regime. The anticipation of restrictions to the favourable funding conditions led to a short-term expansion boom in Spain - with the according deadweight effects (Ciarreta et al. 2011: 17-18).

Currently, much uncertainty remains over the policy developments around FITs in Spain, with the country having passed a series of measures over the past two years in view of cutting renewable energy subsidies (Reuters 2014). It remains to be seen which features the emerging system will have.

SUPPORTING SCHEMES

As regards tax regulation mechanisms, until 31 December 2012, all entities with an income below EUR 71,007.20 per year were entitled to a tax credit equal to 20% of all investments related to the use of renewable energy or similar measures in their building of residence (RES Legal 2013).

Policies for training and certification of solar panel installers are in place. Buildings should satisfy a minimal solar contribution of warm sanitary water. An overarching RD&D plan is in place that directs support to RES-E, RES-H and RES-T (RES Legal 2013).

5.4 Summary of Analysis of Renewable Energy Policy Instruments

Major findings of the literature analysis are (e.g. IEA 2012b, Ragwitz et al. 2012b; Held et al. 2014):

MAIN POLICY INSTRUMENTS/INVESTMENT POLICIES

- **FITs** have been historically and currently still are the main instrument to support renewable development in the EU.
- However, **FIPs** have gained ground and are increasingly used.
- For **PV** and **wind power**, **FITs** have proven to be a useful instrument, less for biomass.
- With regard to **biomass**, feed-in systems do not seem to have a comparative advantage against other policy instruments. Quota systems are considered to be equally successful in incentivising biomass-based RES-E generation. The reason for this is that due to the high share of fuel costs in total generation costs the long term investment security, which characterises feed-in systems, is less relevant in the case of biomass technologies.
- Overall, in the electricity sector **FIT, FIP** or **quota obligation systems with TGC** and combinations of these are the predominantly used support schemes.
- The latter is applied in Belgium, Italy, Sweden, the United Kingdom, Poland and Romania, often in combination with FIT for small-scale projects or specific technologies (Belgium, Italy and United Kingdom). Belgium offers minimum tariffs for each technology as an alternative to the revenues from the TGC trade and the electricity market price.
- Instruments such as **tender schemes** are not used anymore in any Member State as dominating policy scheme, but they are used in certain Member States for specific projects/technologies (e.g. wind off-shore in Denmark).
- The **European Commission recommends that FITs should gradually be phased out**. Member States should move towards other instruments tied more closely to market pricing, such as auctions and tenders, FIPs, and quota obligations.

SUPPORTING MEASURES

- Further policy measures such as **production tax incentives** and **investment grants** represent the dominating measures in Finland and in Malta. In some other countries, they are used as a kind of supplementary support, which in some cases contributes (e.g. tax incentives in the Netherlands) essentially to the economic viability of projects.
- The majority of EU Member States are not using a single instrument, but a **combination of different policy instruments**.
- Markets with a **higher development status** tend to grow faster. Nevertheless, experience shows that **markets with a low development status** can grow quickly.
- Generally, support schemes which are both **technology-specific** and **avoid unnecessary risks** in project revenue, are more effective and efficient than those which are technology-neutral or yield higher revenue risk.

6 Energy Efficiency Policies[20]

6.1 Introduction

The EU is aiming for a 20% cut in Europe's annual primary energy consumption by 2020. It is widely acknowledged that the energy efficiency potential is still largely untapped. In sum, financial benefits are higher than costs. However, amortization time may differ, which can lead to depreciation periods that are not financially viable without supporting measures by governments. Several barriers exist, including lack of information, unclear responsibilities and unbalanced incentive systems (e.g. landlord-tenant or investor-user) (Lehr et al. 2012: 8).

In the following chapter, best practice approaches of energy efficiency policies are analysed. The starting point of the analysis is the reflection on key barriers to energy efficiency and how they are addressed by policy instruments in specific ways. The chapter will focus on best practice approaches in:[21]

- Financial instruments such as tax rebates, loans, special tariffs, credits and subsidies
- Institutional capacity
- Incentives for energy suppliers (White certificates)
- Energy efficiency obligations
- Energy Performance Contracting

The chapter ends with country examples of energy efficiency policy instruments in Austria, Denmark, Finland and Germany.

6.2 Status Quo in the European Union

The EU has updated or recast a number of relevant directives (see Chapter 3). At EU level, the two key instruments are the Energy Efficiency Directive (EED; European Commission 2012) and the Energy Efficiency Plan (European Commission 2011). In these two documents, the European Commission proposes various energy efficiency measures. For example, all EU Member States are required to set energy efficiency targets as well as to establish some form of energy savings obligations on energy supply companies. EU Member States are also required to implement measures addressing specific energy consumption sectors (e.g. buildings).

[20] The chapter on energy efficiency policy instruments focusses on measures applied in the industry and buildings sectors. By doing so, the authors follow the requests of the UNIDO Kyiv team as regards the selection of policy instruments in this best practice section of the report.

[21] The selection and order of priority have been made, respectively chosen by the UNIDO Kyiv team.

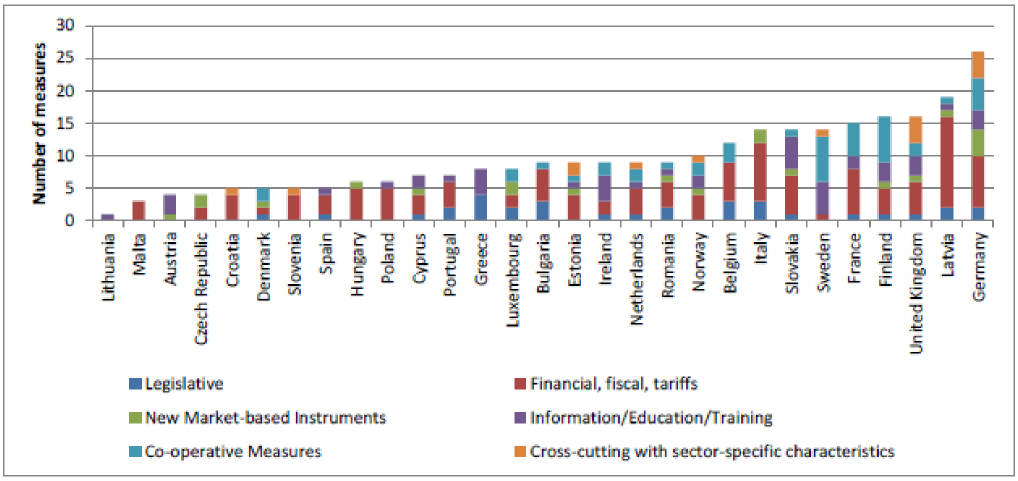
6.3 Analysis of Energy Efficiency Best Practice Policy Instruments

There are, according to studies, various structural, economic, social and psychological barriers to energy efficiency, which need to be considered when designing policy instruments (Schüle et al. 2011: 12). Best practice policy instruments focus on making energy efficiency as easy and attractive as possible for all market actors (Schüle et al. 2011: 12). Key barriers include:

- **Lack of information:** there is a widely acknowledged lack of information about energy efficiency solutions to realise energy and cost savings – both on the demand (customer) and supply side (e.g. energy companies, installers, architects).
- **Financial restrictions:** a major challenge is access to capital, mainly in the residential and public sector. In the industry and commercial sector, investments in the core business may be prioritized over energy efficiency measures.
- **Split incentives:** it may be the case that there is an investor-user dilemma, meaning that the one investing in a measure is not the one benefiting from the results.
- **Risk aversion:** long payback periods for long-term investments constitute a risk to end-users. In addition, suppliers of energy efficiency solutions may be reluctant to provide (innovative) energy efficiency solutions when it is not clear if the market will accept them. With regard to the role of companies' investment in energy efficiency measures, it has been argued that the often costly investments in efficiency measures run counter to the profit maximising strategies of the companies. Energy savings indeed have steady but long-term effects. However, companies often expect fast results and great saving margins. Thus, they usually shy away from making greater efforts to improve efficiency (Reinaud et al. 2011: 18).

As far as best practice energy efficiency policies are concerned, voluntary/negotiated agreements and new market-based instruments seem to have the highest effectiveness. This is also illustrated in the following graphic chart (Figure 9).

Figure 9: Number of Measures in EU Industry (by type and percentage) and Impact Evaluation of Energy Efficiency Measures Since 1990.



Source: Gynter et al 20120: 13.

Individual instruments or the policy mix used in these categories may vary depending on the sectoral focus they have. Generally, sectors covered by policy interventions in EU Member States are: energy supply; public sector; building/housing sector; appliances; industry and tertiary sector; transport sector. These measures are generally supplemented by an **overarching government framework**, including (Schüle et al. 2013b: 17):

- Institutions such as energy agencies; also at regional and local level
- Institutional and organisational framework conditions for energy efficiency programmes (e.g. obligation/white certificate schemes)
- Legal framework (e.g. for energy efficiency services/energy performance contracts)
- Participatory process involving stakeholders in national energy efficiency policy

According to Schüle et al. (2013b: 17), a few EU Member States already have substantial experience in setting up overarching policy frameworks. Such overarching frames are set up to provide stable conditions for investment or services provided to increase energy efficiency (Schüle et al. 2013b: 17).

Various studies indicate that a policy mix, in which various types of policy instruments are combined in sectoral policy packages and supplemented by overarching policies, constitute the best means to overcome the barriers for increased energy efficiency (Schüle et al. 2013a: 7).

The EED proposes a set of measures (e.g. energy efficiency obligations, mandatory audits) for the **industry sector**, which requires additional efforts in EU Member States (Odyssee-Mure 2013: 6). It is widely agreed that spurring energy efficiency in the industry sector is only possible when using a policy mix (Odyssee-Mure 2013: 6). The most successful measures combine four elements:

- Energy management Systems (EnMS)
- Energy audits
- High-efficiency industrial equipment and systems
- Energy efficiency services for SMEs
- Complementary policies to support industrial energy efficiency

Financial instruments are especially vital in industry and the tertiary sector, because “the impact of a policy package is determined by the influence it has on the investment decisions made by management of individual companies” (Schüle et al. 2011: 29). In practice, many EU Member States rely on a rather limited mix of policy instruments (Odyssee-Mure 2013: 6). Economic incentives are frequently used to address financial barriers. However, not only financial barriers exist, but also other barriers such as split incentives (inefficient electric motors integrated into machines and sold in package to users). Those non-financial barriers require other policy instruments such as energy audits or agreements between suppliers and users. There is a focus on energy management in EU Member States; however, the increasing need for energy advice in all sizes of industry is not fully reflected in policy instruments (Odyssee-Mure 2013: 6). Negotiated and voluntary agreements are used in several EU Member States, compared to norms and standards as well as obligation schemes, which are not used frequently. Information measures are also used in EU Member States. However, more information (and advice, see above) is needed particularly with regard to energy management. As long as price signals are low (see EU ETS), there is a specific need for financial initiatives to promote energy efficiency investments in the industry sector. Monitoring and evaluation schemes are used most commonly in the context of measures involving tax exemptions. In addition, they are used in the context of subsidy schemes, audit programmes, voluntary/negotiated agreements and legislative initiatives related to energy management (Odysee-Mure 2013: 6).

In the **buildings sector**[22], an ideal policy package would take into account both the demand and supply side (Figure 10). As regards the demand side, final energy consumers or end-use technologies would be addressed in the different sectors. With regard to the supply side, policy packages would focus on measures and services, such as energy companies, energy service companies (ESCOs), architects, installation contractors, manufactures, homeowner associations etc. In EU Member States, policy instruments so far have rather focuses on the demand side.

[22] This report focuses on the industry sector. However, wherever certain policy instruments, which have been selected as relevant by the UNIDO Kyiv team, focus on other sectors, they will be taken into account as well.

Figure 10: Effective Energy Efficiency Policy Packages in the Building Sector

Source: Schüle et al. 2013b: 17.

The measures mentioned in Figure 10 included a third policy package category: institutional measures. These institutional measures are important in that they provide stable conditions for investments and services. Institutional measures include (Schüle et al. 2013b: 17):

- Institutions such as energy agencies; also at regional and local level
- Institutional and organisational framework conditions for energy efficiency programmes (e.g. obligation/white certificate schemes)
- Legal framework (e.g. for energy services/contracts)
- Participatory process involving stakeholders in national energy efficiency policy

The need for economic incentives for energy efficiency measures in the building sector has been widely recognized by many EU Member States (Schüle et al. 2013b: 28). Substantial up-front investment is one of the key issues policy makers have to approach. Options for providing the required investment are listed in the table below (Table 10). In the context of up-front investments, energy savings obligations/white certificates and energy service companies will be analysed in detail in this chapter.

Table 10: Policy Instruments Focussing on Mobilising Up-Front Investment

Type of Financing	Drawbacks	Advantage
State budgets	Difficult to provide for investment when budget is tight.	Can be used for comprehensive refurbishment and renovation.
State-like budgets (e.g. ETS)	Heavily dependent on CO_2 price, which may lead to difficulties financing large-scale deep renovation.	Independent from the state budgets.
Energy savings obligations/White certificates	Deep renovations are not favoured until specific measures are taken.	Considerably stable financing sources. A marked for energy service companies may develop.
Energy service companies	Preferred are measures which pay-off quickly, deep renovation is hampered.	Financing is done by private sector.
Financing through a levy on energy consumption ("Feed-in tariff for energy efficiency")	Charge on energy may lead to other charges; e.g. from renewables, but has broader basis than just electricity to charge.	Financing stability and risk-lowering. Deep renovation can be financed.
Combining different sources in an Energy Efficiency Fund	In most cases, the final consumer/tax payer would carry the financial charges.	More flexibility in promoting innovative technologies.

Source: Odyssee-Mure 2013: 5.

Against the background of the summary provided in the table, it is obvious that a policy mix is necessary to spur investments in (deep) renovations. Additionally, relying on state budgets alone is not sufficient (Odyssee-Mure 2013: 5).

6.3.1 Financial Instruments[23]

Financial restrictions (e.g. access to capital) are among the key barriers when it comes to implementing energy efficiency measures (Schüle et al 2013a: 7). In turn, financial incentives are an important instrument for spurring investment in energy efficient technologies and services. Investment support takes various forms. The main types are tax exemptions or reductions, subsidies, loans, funds and grants (European Commission 2013a: 11).

A study conducted on behalf of the European Commission looked at 25 financial support schemes for energy efficiency (Rademaekers et al. 2012). The study concluded that most successful programmes are based on preferential loans, often complemented with a grant scheme and/or a technical assistance package (Rademaekers et al. 2012). According to the European Commission (2013b: 20), the success of financial policy instruments in the energy efficiency field depends on a set of diverse factors which go beyond financial terms and conditions, including:

- Simplified administrative procedures to reduce entry barriers and bureaucracy ("one-stop-shops")

[23] In chapter 6, financial instruments will be analysed in the context of specific sectors.

- Involvement of local actors (e.g. municipalities, banks, companies) to build trust and capacity
- Providing information to citizens in order to generate interest and demand
- Flexibility in funding conditions to adapt the national scheme to the specific barriers and opportunities in sectors or regions and to adapt to changing markets
- Imposing minimum performance thresholds for eligibility, to create incentives

Financial measures dominate in energy efficiency promotion in industry (Schlomann et al. 2013: 61). This is mainly due to the fact that financial feasibility is a key argument for companies when considering an investment in energy efficiency measures/technologies (Schlomann et al. 2013: 52, 61). According to a survey from 2011 among manufacturing companies in six European countries, a four-year pay-back time is acceptable (Schlomann et al. 2013: 61). Policy makers need to take into account not only investment and operating costs but also hidden costs of energy efficiency measures. This is particularly the case for energy efficiency projects which are small in scale but result in disproportionately high transaction costs (Schlomann et al. 2013: 62).

ECO TAXES & TAX REBATES

Among 26 tax measures implemented in EU Member States, which have been evaluated in a study, the results are quite mixed. Measures ranked low in terms of their impact are those which are purely financial measures. In turn, high-impact measures are those which feature a mix of different instruments (Schlomann et al. 2013: 62).

Among others, Denmark, Finland, Germany, the Netherlands, Sweden and the United Kingdom have introduced green tax reforms over the last decade (Schlomann et al. 2013: 62; see a selection in Table 11). Despite interest in recent years in several countries, including Czech Republic and Slovenia, environmental tax revenues have not been growing in recent years at the EU average level (Schlomann et al. 2013: 62).

Tax benefits are available in several EU Member States, e.g. Denmark, UK, Norway and Sweden, with varying success. In many cases, they are connected to voluntary agreements (linked to the ESD). Taxes are used as an incentive to attract companies to enter these agreements. For example, in Norway, pulp and paper companies may apply for participation in a programme for energy efficiency. Participating companies are given a full exemption from the electricity tax (Schlomann et al. 2013: 60).

In another example, the UK Enhanced Capital Allowances (ECA) scheme provides businesses with a 100% tax allowance on designated energy efficient equipment investments (Schlomann et al. 2013: 69). Capital allowances enable businesses to write off the capital cost of purchasing new plant or machinery (e.g. boilers, motors), against their taxable profits. The general rate of capital allowances is 18% a year on a reducing balance basis. Some technologies supported by the ECA Scheme (e.g. boilers, lighting) are included in a special capital allowances pool where the general rate of capital allowances is 8%. (Department of Energy & Climate Change 2014; Odysee-Mure 2014).

The Netherlands are offering tax rebates for the purchase of energy efficiency equipment (Schüle et al. 2013b: 36). Companies in the Netherlands can also apply for a deduction of up to 36% of investments in energy efficient equipment under the environmental investment allowance “Milieu-investeringsaftrek” (MIA) (KPMG 2013). In addition, the EIA (mentioned in chapter 4.3) provides a deduction of 41.5% of investment costs in energy efficient and renewable energy equipment, resulting in a net benefit of around 10% of the total investment. The EIA and the MIA cannot be applied simultaneously to the same assets (KPMG 2013).

It needs to be kept in mind by policy makers that price incentives such as energy taxes are important instruments but certainly not sufficient to unlock the full energy efficiency in different sectors (Schüle et al. 2011: 16). Viewed negatively by experts are energy tax exemptions for industrial companies, applied by e.g. Germany (Schüle et al. 2013b: 75).

Table 11: Examples of Tax Measures in Selected EU Member States

Country	Measure	Target group	Tax benefit	Conditions
UK	Enhanced Capital Allowance	Businesses	100% first year capital allowance	Investments in certain energy saving equipment, against the taxable profits of the period of investment.
The Netherlands	Milieu-investeringsaftrek (MIA)	Businesses	Deduction of up to 36% of investments	Assets granted a MIA deduction must be retained for at least 5 years

Source: Own illustration ; KPMG 2013; Odyssee-Mure 2014.

SUBSIDIES

Subsidies directly influence financial drivers of investment in energy efficiency. The impact of subsidies depends on the proportion of the subsidy out of the total project cost. That is: by how much subsidies actually reduce the costs of energy efficiency measures (Schlomann et al. 2013: 62). When it comes to technology-specific subsidies, the effect of “free riders” can be reduced when the list is targeted and updated on a regular basis. In addition, “free rider” behaviour can be lessened e.g. by giving subsidies only to projects exceeding certain pay-back times (Schlomann et al. 2013: 62).

International experience indicates that subsidies as a stand-alone policy instrument can be counterproductive to realise energy efficiency potentials, because they do not promote the uptake of (voluntary) energy management approaches. The latter is needed to achieve a corporate “DNA” of continuous improvement (IEA 2012c: 48.). In some cases, subsidy schemes have been designed to attract companies to join voluntary agreements (Schlomann et al. 2013: 60). However, this link to voluntary agreements has also been criticised in that economic incentives such as subsidies are not accompanied by regulations or obligations, but only rely on voluntary targets (Schüle et al. 2013b: 75).

Denmark is showing a good practice approach in this context: The Danish Energy Agency pledges payment of subsidies for partial coverage of a company’s CO_2 tax liabilities when it signs a voluntary agreement. The agreement obligates a company to undertake a number of energy-saving measures and to implement a certified EnMS (Schlomann et al. 2013: 60).

Table 12: Example of Subsidy Measures in Selected EU Member States

Country	Measure	Target group	Benefit	Conditions
Denmark	Green taxes on energy use in industry	Industry	Partial coverage of CO_2 tax liabilities	Support when voluntary agreement is signed and a company undertakes energy-saving measures and implements an EnMS

Source: Own Illustration; Odyssee-Mure 2014; Schlomann et al. 2013.

(SOFT) LOANS

Soft loans reported in National Energy Efficiency Action Plans (NEEAPs) take the form of preferential loan guarantee conditions or reduced interest rates (e.g. for investments in energy efficiency measures).

Soft loans are a typical policy instrument in the building sector. France and Germany are considered to be countries in which this instrument works very effectively (Schüle et al. 2013b: 33; see Table 13). In order to promote energy efficiency within existing building stocks, France has introduced an interest free loan (Schüle et al. 2013b: 34). In Germany, the state-owned development bank KfW promotes low-interest financing for energy efficiency in buildings (see below descriptions). It applies for both single measures and deep renovations (retrofits) as well as for new constructions. The level of incentives increases with the energy performance level achieved (Schüle et al. 2013b: 34).

The 0% eco-interest loan was established in 2009 in France. It aims at helping owners and landlords finance extensive renovations in their properties. The maximum loan cap is EUR 30,000. It has a repayment period of ten years (Build Up 2013). The eco-loan covers all required works, the management of the project and any insurance costs. Eligible works include high thermal performance insulation of walls or roofs (Build Up 2013).

Since January 2012, the German KfW has introduced two programs, the KfW Energy Efficiency Programme and KfW Environment Programme, which are designed to provide loans for the financing of environmental protection and energy saving investments for private companies and self-employed persons. Activities can be financed as long as they have a positive impact on the environment. The loan application is done via local banks. Interest rates are set by the local bank according to a risk assessment (including the financial situation of the company and the quality of securities). In the energy efficiency programme the maximum amount loaned is EUR 25 million. The financing share can be up to 100 % for small companies. Lenders can receive up to three repayment-free start-up years (Institute for Industrial Productivity 2013a).

With regard to the building sector, the KfW cluster “financial promotion of constructing energy efficient buildings” comprises of ten programmes. Half of the programmes are directed at the construction of residential buildings, the remaining target other building types, such as commercial and municipal buildings. Some programmes have further restrictions on the specific eligible target group, such as families and elderly people. The promotional mechanism applied is mainly the provision of low interest loans; in some cases (additionally) a grant is provided.

The Energy Efficient Construction Programme is the most common and known programme in the cluster. It provides low interest, long-term loans and grants for the construction of residential buildings achieving the KfW Efficiency House Standard. KfW Efficiency House Standards are based on and significantly go beyond the National Building Codes. In 2012, the Energy Efficient Construction programme (jointly with the Energy Efficient Refurbishment programme) achieved energy savings of approximately 2,623 GWh, whereby public funds of about EUR 1,420 million were used to provide the financial incentives to building owners (Diefenbach et al. 2013). The KfW Energy Efficient Refurbishment Programme is considered to be good practice in light of the European Commission's general recommendations listed above. It applies a mixture of soft loans and grants, and the more efficient the house becomes after refurbishment, the less of the loan the building owner has to repay (European Commission 2013b: 20). According to a study conducted by KfW on the impacts of the programme, significant benefits were achieved not only in terms of energy saved but also with respect to wider societal gains mainly in the form of jobs created (European Commission 2013b: 21). It was estimated that for every euro invested in these programmes two to five euros were flowing back to the state budget, as a result of increased tax revenues and reduced unemployment benefit payment (European Commission 2013b: 21).

In the industry sector, loans are used e.g. for energy savings investments. For example, Poland has set up the Polish Sustainable Energy Financing Facility (PolSEFF). It is a EUR 180 million fund to help SMEs to invest in energy efficient technologies. Three types of projects are funded:

- Simple investments based on a list of eligible materials and equipment
- More complex investments achieving an energy saving of at least 20%
- Investments by suppliers

By the end of July 2013, PolSEFF had funded over 1,300 projects for a loan volume of EUR 116 million. The corresponding primary energy savings amounted to approx. 260 GWh/year (European Energy Network 2014: 31; Odyssee-Mure 2014). The programme was developed by the European Bank for Reconstruction and Development, supported by the European Commission. Four Polish banks cooperate with the European institutions (Odyssee-Mure 2014). Projects eligible include (Odysee-Mure 2014):

- Energy efficiency projects using LEME technologies (financing value not exceeding EUR 250.000)
- Complex projects improving energy efficiency based on individual solutions, achieving minimum 20% of energy savings (financing cannot exceed EUR1 million)
- Investments for capacity expansion by suppliers of energy efficient (or renewable energy) equipment

The technical eligibility of a project is checked by a PolSEFF consultant. Several financing rules apply, including:

- Loans can be up to 100%
- Maximum financing amount of up to EUR1 million for energy efficiency (and renewable energy) projects
- Loans may not be used to refinance the existing debt of a borrower
- Only one EU grant can be used per project

Table 13: Examples of Soft Loan Measures in Selected EU Member States

Country	Measure	Target group	Maximum loan per project	Financing conditions
France	0% eco-interest loan	Owners and landlords	EUR 30,000	Payment period of 10 years
Germany	KfW Energy Efficient Construction Programme	For everyone who is building or purchasing an energy-efficient home	Loans of EUR 50,000 per housing unit are available at favourable conditions	The better the energy standard, the higher the repayment bonus
	KfW Energy Efficient Refurbishment Programme	For everyone who is investing to make an older residential building more energy-efficient or purchasing a newly refurbished home	For individual measures up to EUR 50,000 per housing unit (also grants available)	No information available
Poland	PolSEFF	SMEs	Up to 100% of project cost; maximum amount is EUR1 million	Companies which fall into SME category

Source: Own Illustration; KfW 2014; Odyssee-Mure 2014.

FUNDS

Energy efficiency funds offer more flexibility in promoting innovative technologies and solutions than other financing sources (Schlomann et al. 2013: vii; for an overview see Table 14).

According to Schüle et al. (2013b: 36), EU Member State policies show problems in practice as regards the industry sector. Germany, France and UK have set up different funds. In the industry sector, funds for research and innovation on energy savings technologies, implementation of energy savings measures and other instruments set up in France can be considered good practice initiatives (Schüle et al. 2013b: 36).

In the building sector, energy efficiency funds have been set up in a considerable number of Member States, including Bulgaria, Czech Republic, Lithuania, Denmark, Germany, Greece, Malta, Norway, Slovakia, Slovenia and UK (Schlomann et al. 2013: 19).

Few EU Member States have provided details on the effectiveness of financial support schemes, such as grants. Several EU Member States have shown good practice with regard to linking EU and national funds to support energy efficiency in buildings (European Commission 2013b: 19).

In Lithuania, the Jessica Holding Fund blends cohesion policy funding with national funds. The fund offers long term loans through two Lithuanian banks, with a fixed interest rate (3%) for the improvement of energy efficiency in multifamily buildings (European Commission 2013b: 19). 15% of the loan can be deducted from tax if a certain energy efficiency level has been achieved upon completion. For families with low income, up to 100% of the loan can be converted into a grant, allowing the programme to mitigate against the risk of energy poverty (European Commission 2013b: 19). According to the European Commission (2013b: 20), the

Lithuanian and other experiences show that it is important for governments to plan the combination of cohesion policy and national funds well in advance.

For example, Bulgaria launched the Energy Efficiency and Renewable Source Fund (EERSF) in 2004 (Odysee-Mure 2014). The initial capitalisation of EERSF was entirely with grant funds, its major donors being: the Global Environment Facility through the International Bank for Reconstruction and Development (the World Bank) - USD 10 million; the Government of Austria - EUR 1.5 million; the Government of Bulgaria - EUR 1.5 million and several private Bulgarian companies. EERSF has the combined capacity of a lending institution, a credit guarantee facility and a consulting company. It provides technical assistance to Bulgarian enterprises, municipalities and private individuals in developing energy efficiency investment projects and then assists their financing, co-financing or plays the role of guarantor in front of other financing institutions (Odyssee-Mure 2014). Types of investment include investments in improving energy efficiency in industrial processes (e.g. purchase of equipment, machinery and tools, transportation and logistics services) and rehabilitation of buildings in all sectors (e.g. modernisation of heat exchanger substations) (Odyssee-Mure 2014). In the Odyssee-Mure database (2014), the impact of the system was rated “medium”. Eligibility criteria are: 10% equity contribution by end-user if co-financing provided by commercial bank; 25% equity contribution by end-user for standalone financing by EERSF. Individual per project guarantees are capped at BGN 800,000 (USD 500,000) (Institute for Industrial Productivity 2012). One of the lessons learnt from the programme was that small projects are not attractive for co-financing models for local banks due to their small size. Another barrier/lesson learnt was that the banking structure in Bulgaria was not favourable to energy efficiency financing given that a low market competition in the banking sector meant that banks could charge very high interest rates and require a high level of collateral for loans made. In addition, the absence of energy service companies was seen as a barrier (Institute for Industrial Productivity 2012).

Table 14: Examples of Funding Measures in Selected EU Member States

Country	Measure	Target group	Maximum funding per project	Financing conditions
France	Fund for research and innovation	Industry	No information available	No information available
Bulgaria	Energy Efficiency and Renewable Source Fund (EERSF)	Enterprises and private persons, municipalities, hospitals and universities	10% equity contribution by end-user if co-financing provided by commercial bank; 25% equity contribution by end-user for standalone financing by EERSF. Individual per project guarantees capped at BGN 800,000 (USD 500,000)	No information available
Lithuania	Jessica Holding Fund	Home owner associations of multi-family apartment buildings	Relative low interest rates fixed at 3%; grace period of 2 years; long tenors: max. 20 year loans; lenders put in 5% of own capital; addition tax deduction of 15% off loan amount; low income families	EUR 227 Million

Source: Own illustration

GRANTS

In October 2012, the German Ministry of Economics and Technology launched a grant programme focused on SMEs that supports investment in highly efficient cross-sectoral technologies that improve energy efficiency. Companies that undertake investments (new or replacements) meeting the criteria mentioned above can apply for the grants. Grants are possible when single technologies are exchanged or for providing a systemic approach. Maximum 30% of net investment costs are covered by the grant for SMEs and maximum 20% for bigger companies. The programme is implemented by government authorities (Institute for Industrial Productivity 2013c).

In the building sector, the majority of financial instruments by EU Member States are grants (European Commission 2013b: 17). Over three quarters are grants (and loans), with tax incentives making up the remainder (European Commission 2013b: 18). In the building sector, financial tools (in particular grants and tax reliefs) are most often used to encourage installations of individual energy-efficient components in buildings, rather than more comprehensive retrofits (European Commission 2013b: 18).

The Lithuanian Jessica Holding Fund (mentioned in the “funds” sub-section above) also includes a grants option, which is available for low income families. They receive a grant instead of a loan (Rademaekers 2012: 54).

Table 15: Examples of Grant Measures in Selected EU Member States

Country	Measure	Target group	Grant structure/ approach	Max. grant volume
Germany	Promotion of highly-efficient cross-sectoral technologies	Mainly SMEs but also bigger companies with up to 500 employees and up to EUR 100 Million annual turnover	Two options: 1) Exchange of single technology 2) Systemic approach Also covers 60% of the costs for energy advice related to the establishment of the energy saving concept, with a maximum amount of EUR 3000; Maximum grant volume of EUR 100,000 per company for systemic approaches	Maximum 30% of net investment costs are covered by the grant for SMEs and maximum 20% for bigger companies
Lithuania[24]	Jessica Holding Fund	Home owner associations of multi-family apartment buildings	Relative low interest rates fixed at 3%; grace period of 2 years; long tenors: max. 20 year loans; lenders put in 5% of own capital; addition tax deduction off 15% of loan amount; low income families	EUR 227 Million (incl. fund)

Source: Own Illustration; Rademaekers 2012: 54; Odysee-Mure 2014.

6.3.2 Institutional Framework

As mentioned above, energy agencies are an important element of functioning framework conditions. Energy agencies play an important role in promoting energy efficiency in different sectors. A strong institutional setting is important particularly to monitor compliance and enforcement of legislation (Schüle et al. 2013b: 112). Almost all EU Member States have established an energy agency, a fact that is considered to be a good practice (Schüle et al. 2013b: 28). Many also have agencies not only on national, but also at regional and/or local levels. They are considered to be important agents for co-ordinating energy efficiency policies and for awareness-raising. In addition, they offer expertise in the field of demonstration, market integration, audits & advice and R&D. In fact, R&D support is a strong driver to foster energy efficiency. According to Schüle et al. (2013b: 29), a continuous energy efficiency development on the basis of the latest research is vital to reach emission goals.

Denmark is cited as a good practice example when it comes to linking national and regional energy efficiency policies through co-ordinating efforts of the Danish Energy Agency (DEA) (Schüle et al. 2013b: 31). For example, education and information provided by the DEA addresses different actors such as end-consumers and businesses. In addition, companies have to report savings to the DEA, which contributes to transparency (Schüle et al. 2013b: 31).

[24] The instrument is a mixture between a fund and a grant scheme. Further information under “funds”.

6.3.3 Framework Conditions for Energy Efficiency Programmes

6.3.3.1 Long-Term Targets and Policy Development

LONG-TERM TARGETS

Another important element of an overarching framework, which is frequently mentioned in the literature, is setting long-term targets. Germany is referred to as a good example in the context of its overarching governance framework, particularly its long-term energy efficiency targets for both 2020 and 2050. The effect of a missing long-term target is uncertainty on energy efficiency policy developments, which affects markets (including financial, educational and informational suppliers) (Schüle et al 2013b: 29).

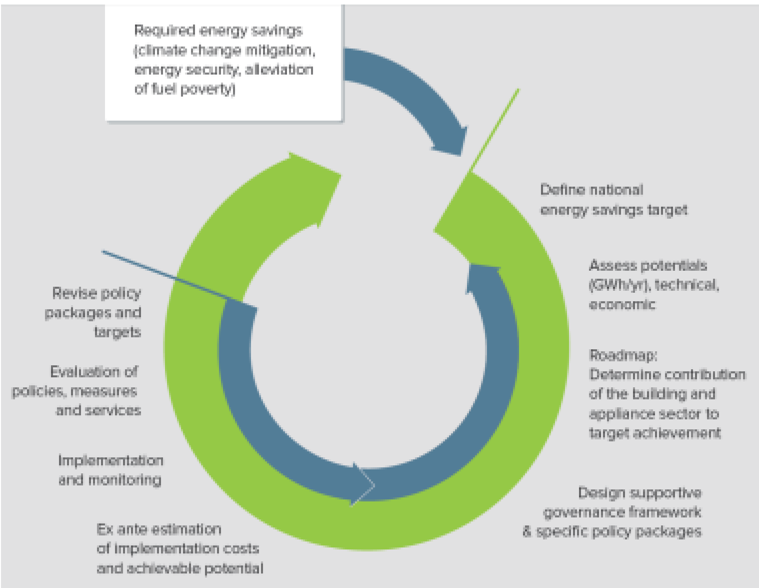
Bulgaria, another good practice case in this context, has adopted a strategy for the entire energy sector ("Energy Strategy of the Republic of Bulgaria up to 2020"). The strategy sets a reduction goal of 50% in primary energy intensity compared to 2005. The strategy is complemented by the National Energy Efficiency Strategy (Schüle et al 2011: 31). Another good practice which is used in Bulgaria is the setting of energy saving targets for companies (Schüle et al. 2013b: 37). Bulgaria sets individual energy saving targets for industrial systems (with an annual consumption over 3.000 MWh). In addition, these entities have to carry out energy audits every three years.

PROCESS FOR POLICY DEVELOPMENT

In many NEEAPs a gap was identified between national target setting and the development, implementation and evaluation of measures (Schüle et al. 2011: 18).

Wuppertal Institute (2012) has developed a prototypical process for policy development in energy efficiency (see Figure 11) on how to align the process of national target setting with the development, implementation and evaluation of policy instruments/programmes.

Figure 11: Prototypical Process for Policy Development in Energy Efficiency



Source: Wuppertal Institute 2012.

Key steps are the assessment of energy savings potentials in each sector, followed by a strategic plan. Only then supportive framework conditions and sectoral policy instruments should be designed in order to tap the full energy efficiency potential (Schüle et al. 2011: 18). An ex ante evaluation of potential costs and effects serves the purpose of assessing the total anticipated effects of savings compared to national targets (Schüle et al. 2011: 18).

6.3.3.2 Voluntary Agreements

Voluntary agreements between industry and the state are an alternative to regulations. Industrial companies agree to define energy efficiency objectives and to set up an action plan to achieve these objectives. In return, governments encourage companies to join agreements by implementing specific incentive schemes and/or offering tax exemptions (European Energy Network 2014: 28)

The Finish energy efficiency agreement has been labelled as a good practice example (Schüle et al. 2013b: 71). The agreement is based on the ESD[25], which has put a 9% energy savings target on Finland for the period 2008-2016. The policy instrument is the cornerstone of Finland's commitment to meet the 9% target (Institute for Industrial Productivity 2013b).

The Finish approach has foreseen negotiating with key actors rather than following an approach of regulatory steering. Of the energy efficiency agreement sectors, business (e.g. hotel and restaurant service; commerce sector) and industry (e.g. energy intensive companies; medium-sized companies in the food and drink or technology sector) are the largest, including the entire industrial sector, the service sector, energy production as well as district heating, and the electricity transmission, distribution and retail market. The energy efficiency agreement in business and industry works on the basis of a framework agreement signed between the Ministry of Employment and Economy, the Confederation of Finnish Industries, and industrial associations, specifying the mutual obligations of the signatories as well as measures targeted at companies adhering to the agreement scheme. A company joins the agreement scheme voluntarily by signing an accession document, by which the company commits itself to implementing the measures included in the action programmes. Companies set their own targets for improving their energy use. Participants of these agreements report annually on the realization of the energy efficiency measures and other activities aimed at an improvement. Subsidies are provided by the government for energy audits and energy efficiency investments (Institute for Industrial Productivity 2013b).

6.3.3.3 Energy Efficiency Obligations

In the building sector both the supply and demand side need to be covered when designing a policy package. With regard to the supply side, several energy services and measures are possible. Energy efficiency services for the overall coordination and financing are considered to be good practice. Two general approaches can be distinguished: energy efficiency obligations and mandatory saving targets (with or without certificate trading; see 5.1.2.3.1 for information on white certificates), or energy saving trusts and funds. In both approaches (particularly the first), energy companies play a far greater role in realising energy efficiency improvements than in "conventional" policy instruments (Schüle et al. 2011: 17f.). In a

[25] In the meantime replaced by the EED.

growing number of countries, obligations for energy companies promote end-use energy efficiency and energy savings.

A set of key questions should be considered when setting obligatory targets (Staniaszek and Lees 2012: 4):

- Who should be obligated? (A variety of successful approaches; e.g. should it apply to energy distribution companies or retail energy supply businesses, or both?)
- How should the target be constructed? (e.g. what metrics should be used to specify the target? Over what period should the target be set?)
- How should energy end-users and institutional issues be addressed? (e.g. which end-uses should qualify? Which sectors should it apply to?) Should trading between obligated parties be permitted?)

Several administrative arrangements have to be considered when designing an obligation scheme (Staniaszek and Lees 2012: 14f.; Cowart 2013):[26]

- *Baseline issues:* The actual measured saving should be calculated (or estimated) as accurately as possible. However, the cost of calculation should be kept to a reasonable level. Three basic calculation methods exist.[27]
- *Gross savings adjustment:* For example, rebound effects or increased amenity need to be taken into account. The same applies to normalization and conversion factors.
- *Attribution of energy savings:* Questions such as how to deal with free riders or whether energy efficiency measures with an already high market share should be counted need to be addressed.
- *Reporting, Monitoring and Verification:* Monitoring, reporting and verification schemes are working successfully in almost all EU Member States (Schüle et al. 2013b: 31). Countries, which are ranked lower often show only top-down measures and have problems with quality assurance (Schüle et al. 2013b: 31). Several countries, among them France, Spain and Cyprus, are considered to be good practice examples. In general, it is of utmost importance that obligated parties are performing in accordance with the schemes rules, that claimed measures have actually been implemented, and that those measures are delivering the expected savings. An approach is to set up a random sample of properties receiving energy saving measures, which is monitored in order to ensure that measures have been implemented in accordance with the claims of the obligated parties. It is recommended that a statistically significant number of installations are inspected.
- *Encouraging innovation:* it may be desirable to promote new products or technologies that represent a significant improvement. In this context, there may be a role for an independent technical group in dealing with complex questions around potential saving measures. Such groups exist e.g. in the Danish and French schemes.
- *Policy issues:* It may be useful to install quotas for certain measures, especially when less cost effective measures should be promoted. Another option is to take into account social objectives; meaning that there is a requirement to deliver a minimum proportion of the target among specified customer groups (e.g. low income, elderly).
- *Funding:* Public investment is needed to remove barriers and leverage sufficient private investment in energy efficiency measures. Funding should be stable in order to establish a reliable system as well as not to interfere with competition.

[26] Further information is available in Staniaszek and Lees 2012: 15.f.

[27] Calculation methods are described in more detail in Staniaszek and Lees 2012: 14f.

6.3.3.3.1 White Certificate Schemes[28]

In practice, different arrangements are in place for white certificates (regarding obliged companies, inclusion of energy suppliers, methods for calculating savings). White certificates are considered to be one of the key, rather effective, financial policy instruments (Schüle et al. 2013b: 37). In energy efficiency obligation systems, energy companies play a greater role in supporting energy efficiency improvements (Schüle et al. 2013b: 17f). In the basic form of white certificate schemes, an authority places an obligation on an actor to deliver a set amount of energy savings (e.g. energy supplier). Energy efficiency gains are translated into certificates, which can be traded. The policy instrument has the potential to help overcome many of the barriers mentioned in 5.1.1.

A white quota leaves it up to energy suppliers to decide which measure they want to take. The likelihood that they will implement the most cost-efficient and targeted measures tends to be higher than when the state selectively applies individual regulative interventions, of which there would be an unmanageably high number considering the multiplicity of possible energy efficiency measures. Compared to the price mechanism, the climate policy goal is pivotal here, not a “penalty” such as a CO_2 tax or levy.

The quota system that obliges energy suppliers to achieve energy savings creates a clear incentive for suppliers to make offers that will get consumers themselves to save energy.

Several EU Member States, including France and Italy have already gained experience with white certificates.

In France, the white certificates system (système des certificats d’économie d’énergie (CEE)) has been in place since 2005 and is considered to be a good practice example (Schüle et a. 2013b: 37). It makes energy savings mandatory for energy suppliers and grid operators.[29] The objective is to tap the diffuse potential sources of energy savings (especially in the building sector) (Staniaszek and Lees 2012: 8). These are to be achieved by means of more energy efficient technology in buildings, improvements in industrial and agricultural energy consumption, as well as energy savings by consumers. The first three-year period (2006-2009) was seen as a learning exercise.

Key actors in the system are (Staniaszek and Lees 2012: 8):

- *Ministry of Ecology, Sustainable Development, Transport and Housing*: sets the scheme’s rules and level of obligation.
- *Energy Environment Technical Association (a forum in which actors in the energy savings market cooperate to propose new standardised actions)*: provides feedback on the savings system and contributes to the adaptation and evolution of the system over time.
- *Agency for Environment and Energy Management*: provides “back office” services incl. technical analysis, expert advice and evaluation.
- *A national administrative centre*: awards and records the certificates and controls the programme.
- *Obligated parties*: electricity suppliers, district heating and cooling suppliers, etc.

[28] White certificates are also relevant in sector-specific campaigns. See chapter 6.

[29] MEDDETL 2011a: Politiques climat et efficacité énergétique. Synthèse des engagements et résultats de la France.

Several parties are involved since the launch of the second phase (2011-2013). They are not obliged to participate, but can earn energy savings credits in their own right. Obligated energy suppliers have a variety of options for meeting their commitments, including (Staniaszek and Lees 2012: 8):

- implementing energy savings programmes (within their customer base);
- buying certificates on the market;
- paying a penalty (far higher than delivering savings);
- combination of the above.

Energy savings that qualify for white certificates are specified in individual sheets. Savings are categorized into six end-use categories.

In Italy, the system of white certificates proved to be successful after some initial difficulties (IEA 2009: 53). In total, three different types of white certificates are traded on the emissions market there: the first type is allocated for achieved savings in the energy sector, the second for savings in the natural gas sector, and the third for other energy sources (ICF International 2013: 173).[30] The certificates are distributed to energy suppliers and to other companies in the energy sector. In the past few years, the system was expanded to include smaller suppliers. In addition, stricter targets were set as well as criteria, conditions and procedures defined in order to increase the overall effectiveness of the system. To encourage the development of major projects (e.g. infrastructure or industry), premiums are given in terms of multiplicative coefficients of white certificates issued (Mure II 2014). Similar to the French system, both obligated parties (distributors of electricity/natural gas) and voluntary subjects (such as energy service companies and companies with the obligation to appoint an energy manager) respectively have to or can access the white certificate mechanism.

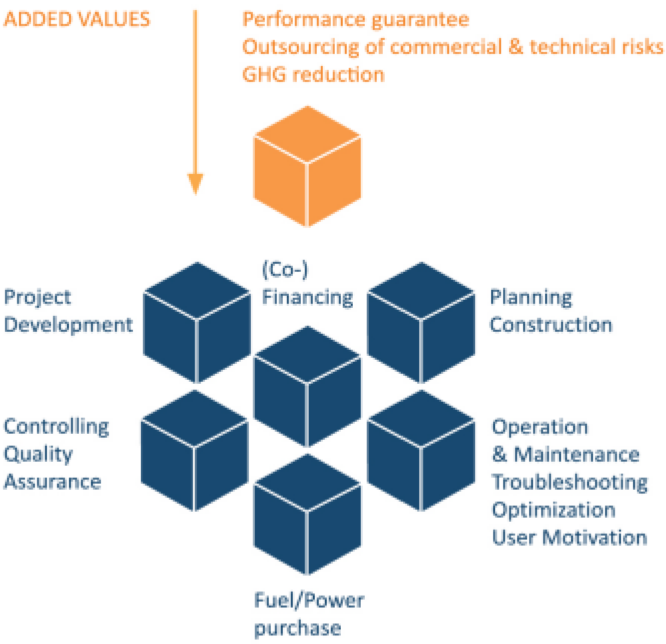
6.3.3.4 Legal Framework for Energy Efficiency Services

Many EU Member States have enhanced the market-based improvement of energy efficiency with the help of energy efficiency services (EES) (Schüle et al 2013b: 18). The involvement of market actors is seen as a key element in setting up a successful overarching governance framework. Different types of EES exist, including energy performance contracting (EPC) (Rochas 2012). Under an EPC, an energy service company is required to bring about energy savings and is paid with their financial value in return. EPC can be implemented in different ways. The ESCO concept is considered to be the typical example. It is promoted in countries such as Austria, Belgium, Germany, Poland and UK (Odysee 70) to tap energy savings potentials in the building sector.

The contract between an ESCO and building owner contains guarantees for cost savings and takes on/assumes financial and technical risks of implementation and operation for the entire project duration of typically 5 to 15 years (Berliner Energieagentur 2012b: 9). Typical elements of services provided by ESCOs are financing, planning and installation of energy generation components, distribution and usage, as well as their operation and maintenance (see Figure 12).

[30] ICF International 2012: An International Comparison of Energy and Climate Change Policies Impacting Energy Intensive Industries in Selected Countries. Final Report, S. 173.

Figure 12: Typical Modular Structure of EPC Projects.



Source: Berliner Energieagentur 2012b: 9, after Bleyl, Schinnerl 2008.

There are several key issues which need to be considered when developing and implementing EPC projects (Berliner Energieagentur 2012b: 10f.).

- Energy audits
- Determination of the energy cost baseline
- Public tender
- Energy Performance Contracts
- Energy Savings Verification
- Financing

In the following, the key issues will be described in detail.

When preparing an energy savings project, it is important to analyse and determine the status quo. Based on such an analysis, improvement measures can be development. An **energy audit** is one approach to carry out such an initial analysis. It is important that the energy audit is carried out by the ESCO (or by an external auditor, reflecting the needs of an EPC), because the audit is more focused on the specifics of an EPC than in a "regular" audit.[31]

[31] Further information on the content of energy audits is available in Berliner Energieagentur 2012b: 11.

The **energy cost baseline** is the energy consumption in a reference year (e.g. past year before implementation of EPC) in connection with the energy supply prices applicable to the client at a certain key date (e.g. 31.12. reference year).[32] The baseline is to be communicated to all bidders as they will prepare their savings forecasts on this. Key aspects to consider when setting the baseline are:

- The baseline should be above a certain threshold (above EUR 200,000 in most countries) for a project to be suitable for an EPC. Only when the financial benefits are attractive (relation between basic expenditure and achievable savings), the project will be interesting for ESCOs.
- Higher energy prices are a better refinancing basis for energy efficiency measures, which is particularly relevant when there are price fluctuations or foreseeable price increases.
- Normally, maintenance costs (and corresponding savings) are not counted in the savings guarantee.
- All consumption units should be stated in kWh. When calculating CO_2 emissions, current CO_2 emissions have to be displayed in the baseline.

When an EPC is implemented at a public administration, a **public tender** is usually required. This approach may also prove useful for private customers to select the best EPC bid. With regard to public tenders, experience has shown that invitations for tenders for public contracts take place in the form of a negotiated procedure with disclosure, which allows the contracting authority to discuss the final terms with the best tenderers even after the bids have been submitted. Pre-selection criteria are useful given that EPC is a complex energy efficiency service.[33]

Energy Performance Contracts should include the following components (Berliner Energieagentur 2012b: 16):

- *Guarantee of savings:* ESCOs guarantee a certain amount of savings to be achieved during the contract period. The contract also has to clearly define what happens if savings are not achieved or if guaranteed savings are exceeded.
- *Volume of investment*: the volume to realize guaranteed savings and a commitment by the client to pay for the investment after its installation (via the fee to the ESCO) need to be specified.
- *Clear definition of a baseline (reference scenario) of future energy consumption:* the baseline is set in physical units (e.g. kWh). For financial and economic purposes, the reference scenario is calculated in prices of the reference year.
- *Reporting obligation of the ESCO:* the ESCO should send documentation to the client about the actual amount of achieved savings in the respective year.
- *Responsibility of ESCO:* the ESCO needs to ensure correct design of the measure and its realization.
- *Responsibility of the client:* the client is obliged to provide proper conditions for realization of the energy savings measures.

[32] In some EPC projects, it may be useful to add other media such as water supply or sewage disposal (Berliner Energieagentur 2012b: 12).

[33] Further information on the schedule of EPC tender procedure is available in Berliner Energieagentur 2012b: 14.

- *Schedule:* the planned duration of the investment needs to be communicated.
- *Transfer ownership:* the transfer of ownership of the savings technology to the beneficiary needs to be ensured.
- *Means of payment for the services and savings*: payments are usually set up as monthly fixed advanced payment agreed by both parties. The payments are settled after the evaluation has been carried out.
- *Declaration of purpose:* the purpose of operation of the facility on which the Energy Performance Contract is effectuated needs to be clear.
- *Duration of the contract.*
- *Method of recalculation of the guaranteed savings:* this is relevant when the input parameters differ from the presumptions defined in the energy cost baseline.

Regarding **Energy Savings Verification**, in each contract year, the ESCO has to provide a proof of energy savings (based on energy bills for the contract building; reports of energy management tools may also be suitable). The ESCO then needs to determine the adjusted net amount of savings actually achieved using calculation methods specified in the contract. It is important that the calculation rules are understandable for the client.

Access to financial resources is undoubtedly one of the key success factors for the implementation of an EPC project. **(Pre-) financing** must be customised to the project background. A good financing package takes into account the borrower's background, subsidies as well as the specific project cash flow. Relevant categories with regard to financial implications are:

- Direct financing costs (financing conditions, interest rates, fees, etc.)
- Legal aspects (e.g. ownership, contract cancellation)
- Required collateral (securities) by financing institutions
- Taxation implications (e.g. VAT and purchasing tax)
- Balance sheet and accounting implications
- Management expenditures (transaction costs, etc.)

When setting up an EPC scheme, policy makers should take into account several recommendations (Berliner Energieagentur 2012b: 61f.):

- *Supportive policies and legislation:* e.g. obligatory energy audits in the public sector or in EnMS; improvement of data quality e.g. through ISO 50001; mandatory checks whether EPC is economically feasible.
- *Availability of information and know-how:* website with key information; standardised EPC tools to all interested parties (incl. model contracts); training sessions for officials in public authorities; forum for customer exchange (to level out knowledge asymmetries).
- *Provision of financing:* provide low-interest loans to local financing institutions; establishment of public risk-sharing facility (e.g. government agency); investment subsidies.

When it comes to good practice examples, several EU Member States can be highlighted.

The energy performance contracting approach in the Czech Republic can be considered to be good practice (Schüle et al. 2013b: 56).[34] More than 150 projects have been realized. ESCOs have taken a very active role in promoting the instrument and have recently formed an association (Schüle et al. 2013b: 56).

In France, the use of EPC is encouraged. Setting ambitious targets for reducing consumption (building refurbishments to achieve an objective of 38% of savings by 2020) has positively influenced the EPC market. Public contracting regulations have also been changed, as well as mode contracts have been published. In order to overcome financial barriers (lack of investment capacity; long payback times for private investors), some regional French authorities are setting up public ESCOs to support and finance EPC projects (Berliner Energieagentur 2012b: 27).

Germany is seen as one of the pioneers of EPC in Europe. The share of EPC contracts is about 10% of all energy service contracts. The public sector is and remains the most favourable customer group given that there is an annual total energy cost for public buildings of almost EUR4 billion (Berliner Energieagentur 2012b: 21).

6.3.4 Industry Focus: Energy Audits and EnMS[35]

Energy Audits and EnMS are very useful tools to improve the energy efficiency in industry.

Especially an EnMS, according to ISO 50001, can support companies in systematically identifying the main energy users and setting appropriate measures in relation to the main energy consumption. This helps achieve a continuous improvement of their energy performance and causes a reduction of their energy consumption.

The ISO 50001 standard does not contain a requirement for a certification through an external auditor. In practice it is nonetheless recommended to carry out an external audit for the certification, because in this way companies get the outside view and it is ensured that the EnMS is operated in the right way.

In addition, energy audits can help companies to determine further energy saving potentials. It is important that energy audits are comprehensive and contain all energy relevant topics of a company. These may be buildings, transport, services and processes.

In practice, energy audits are not subject to a continuous improvement process, which is why it is recommended to combine an EnMS with energy audits.

The obligation to promote energy audits and EnMS for companies was introduced by EU directive 2012/27/EU. Furthermore, all EU Member States have to implement at least the obligation for large companies to carry out energy audits every four years. The minimum criteria contained in the directive are to (Article 8, Annex VI):

“(a) be based on up-to-date, measured, traceable operational data on energy consumption and (for electricity) load profiles;

(b) comprise a detailed review of the energy consumption profile of buildings or groups of buildings, industrial operations or installations, including transportation;

(c) build, whenever possible, on life-cycle cost analysis (LCCA) instead of Simple Payback Periods (SPP) in order to take account of long-term savings, residual values of long-term investments and discount rates;

[34] Good practice projects can be found in Berliner Energieagentur 2012b:

[35] Not considered in the comparative analysis in Chapter 6.

(d) be proportionate, and sufficiently representative to permit the drawing of a reliable picture of overall energy performance and the reliable identification of the most significant opportunities for improvement.

Energy audits shall allow detailed and validated calculations for the proposed measures so as to provide clear information on potential savings.

The data used in energy audits shall be storable for historical analysis and tracking performance."

It is very important to also determine criteria for energy auditors (internal and external), the quality of audits and the monitoring of the energy savings achieved.

Regulatory approaches are seldom used in industry. Only a few EU Member States have set up mandatory energy audits for large energy consumers (e.g. Bulgaria, Slovakia and Romania) (European Energy Network 2014: 28). However, in the future these measures will become more widespread due to the introduction of the EED, which makes it mandatory for large companies to conduct an energy audit every four years (European Energy Network 2014: 28). For example, Bulgaria has introduced a law in 2008, which makes it mandatory to conduct energy audits for companies consuming more than 3,000 MWh/year, to be done every three years. Once audits are completed, companies have two years to start the implementation of improvement measures identified in the first phase (European Energy Network 2014: 28).

6.3.5 Country Examples

According to Schüle et al. (2011: 30), the closest to a coherent policy package for the industry sector can be seen in countries such as Finland and Denmark, which have created a combination of grants for energy audits to identify concrete actions for energy efficiency, their costs and benefits; negotiated agreements with the individual industrial companies for implementation of the actions identified in the energy audits; financial incentives (direct, or as a reduction of energy tax debt); and monitoring and tracking individual actions from the energy audits through the negotiated agreements of the implementation. Austria's energy efficiency measures in different sectors can also be considered as sound and comprehensive (Schüle et al. 2012b: 57f.)

6.3.5.1 Austria

MAIN LEGISLATION/POLICY MEASURES RELEVANT FOR THE INDUSTRY SECTOR[36]

The Austrian Energy Agency was mandated by the Federal Ministry for Economy, Family and Youth to monitor the national implementation of the ESD, and thereby to act as the Austrian Energy Efficiency Monitoring Body (EEMB). The EEMB assesses the energy savings accomplished through energy services and other energy efficiency measures in order to give evidence of the target achievement pursuant to the ESD. The Federal Government, the Austrian federal states and the companies register their energy efficiency improvement programs in a database, and the EEMB then calculates the energy savings, which are directly disclosed in the database.

In order to improve energy efficiency, Austria uses a mix of economic instruments, regulatory measures and voluntary agreements. Environmental and energy-relevant taxes levied in

[36] Measures are also relevant for other sectors.

Austria comprise: electricity duty, natural gas duty, mineral oil tax, FITs for green electricity, toll charge for the federal roads, and a car registration tax for cars purchased in Austria.

OVERVIEW OF MAIN POLICY INSTRUMENTS IN THE INDUSTRY SECTOR

Incentive-based instruments like investment subsidies or favourable loans have long been applied. On a federal level, these include the Corporate Environmental Support in Austria, the Building Refurbishment Offensive (a building refurbishment cheque), support measures of the Climate and Energy Fund and support provided according to the Green Electricity Act. On the level of the Austrian federal states, support measures focus on energy efficiency measures in the private and commercial housing sector, and on electricity and heat supply (housing subsidies or energy subsidies). Regulatory measures cover standard setting measures, such as the directives issued by the Austrian Institute for Housing, or the deployment of smart meters according to the Austrian "Smart Meter Initiation Regulation". Austrian labelling systems correspond to the EED. Energy efficiency measures in the public sector are well established, e.g. concerning public building refurbishment, federal real estate contracting, and optimisation of energy consumption by federal departments through special representatives for energy, or regarding public procurement. Furthermore, in Austria (and Finland), a special form of voluntary agreements exists, where energy companies commit to assist their clients in implementing energy efficiency measures.

6.3.5.2 Denmark

MAIN LEGISLATION/POLICY MEASURES RELEVANT FOR THE INDUSTRY SECTOR[37]

In 2012, a new Energy Agreement was reached in Denmark. The initiative is based on the Danish government plan "Our Future Energy" and includes a set of energy measures for 2012-2020 (Odyssee-Mure 2014).

OVERVIEW OF MAIN POLICY INSTRUMENTS IN THE INDUSTRY SECTOR

In the Energy Agreement, it was decided to increase the annual energy savings obligations of energy companies by 75% in 2013, and by 100% from 2015 to 2020, relative to obligations in the period 2010-2012. As a result, grid and distribution companies within electricity, natural gas, district heating and oil will remain key players in energy-savings efforts in the future. Since 2006, energy companies have had annual targets for energy savings which they must help realise. From 2010, this target was doubled. So far, companies have annually exceeded their obligations (Odysee-Mure 2014).

In addition, a voluntary agreement programme for energy intensive industries was introduced. The current system has been revised in 2010. The scheme is administered by the Danish Energy Agency and financed through the national budget with about 5.4 billion EUR each year (Reinaud et al. 2012: 55f.). Companies joining the system get a rebate on the energy tax. Voluntary agreements are made between companies and the Danish Energy Agency. They are valid for a period of three years. The system applies to electricity for heavy industrial processes and for space heating in industry. In order to join the programme, companies need to carry out specific activities, including implementing a certified EnMS and carrying out improvement measures with a payback horizon of less than four years. If a company fails to comply with the requirements of the system, the agreement is cancelled,

[37] Measures are also relevant for other sectors.

and the company must pay back the tax rebate. The Danish approach is based on self-reporting, with external verification and investigations. For example, each company reports data on energy consumption and other indicators to the Danish Energy Agency. The approach of self-reporting is complemented by random spot checks on company EnMs to ensure compliance with the agreement (Reinaud et al. 2012: 55f.).

In the political agreement of 22 March 2012, the Danish Parliament decided that renewable energy must account for 35% of the final energy consumption in 2020. Due to domestic tax policy toward the industry, fossil fuels are less expensive than renewables and incentives to convert to renewables are absent. To compensate industry a subsidy scheme has been set up to promote energy-efficient use of renewable energy in industrial production processes (Danish Energy Agency 2014). An integral part of the scheme involves support for energy efficiency improvements made in direct connection with the conversion to renewable energy or district heating. Companies are supported financially when purchasing energy efficient equipment (Odyssee-Mure 2014).

6.3.5.3 Finland

MAIN LEGISLATION/POLICY MEASURES RELEVANT FOR THE INDUSTRY SECTOR[38]

In 2013, the Finish Ministry of Employment and the Economy passed the Energy and Climate Strategy 2013. The strategy contains 131 measures, including a set of measures on energy efficiency (Odyssee-Mure 2014):

- An energy efficiency act will be prepared, particularly for implementing the EED
- The possibility of establishing an energy efficiency obligation scheme for energy companies will be examined
- The energy efficiency agreement scheme and strategic centres for science, technology and innovation will be harnessed to strengthen the international energy efficiency business

OVERVIEW OF MAIN POLICY INSTRUMENTS IN THE INDUSTRY SECTOR

Current or recent measures are based on the Energy and Climate Strategy of 2008 (predecessor the 2013 strategy).

Finland is one of the EU Member States, which is ranked highest by national experts in terms of its aspiration to design and implement ambitious energy efficiency policies (Egger et al. 2012: 82). The policy mix in the industry sector is considered to be well balanced, with subsidies, funding schemes and information tools being in place. A lack is identified with regard to further regulation and standards for industry or businesses that are beyond EU requirements (Schüle et al. 2013d).

In Finland, industry has improved its energy efficiency, which has happened mainly on the basis of voluntary savings. The Energy Efficiency Agreement scheme running over the period 2008 to 2016 is Finland’s key instrument to increasing its energy efficiency. It covers approximately 80% of Finland’s total energy consumption. Companies that have joined the agreement scheme set their own targets for improving their energy efficiency, implement an Energy Efficiency System (similar to an Energy Management System), implement the

[38] Measures are also relevant for other sectors.

measures necessary to reach their targets, and report annually on progress (Institute for Industrial Productivity 2013b).

These voluntary agreements were supported by accompanying measures such as subsidies and energy audits at the government level. National experts consider Finland to be a country in which the efficiency measures have been most successful (Egger at al. 2012). Energy audits and smart metering are deemed to be especially effective measures.

6.3.5.4 Germany

MAIN LEGISLATION/POLICY MEASURES RELEVANT FOR THE INDUSTRY SECTOR[39]

Germany's energy efficiency policies are embedded in the EU policy framework. With regard to the industry sector, an important instrument to achieve Germany's energy efficiency target is the Act on Energy Services and Energy Efficiency Measures (Gesetz über Energiedienstleistungen und andere Energieeffizienzmaßnahmen – EDL-G), which implements the Energy Service (ESD).[40] The law is aimed at increasing energy end-use efficiency through energy services and other energy efficiency measures in a cost-effective way. To this end, the government will set a national energy savings target for May 2017 of 9% in accordance with Directive 2006/32/EC.

EDL-G also obliges utilities to inform their customers about the available services. If necessary, the companies have to establish energy audit services wherein the possibilities to save energy are identified and quantified. As the public sector shall play an exemplary role with regard to energy savings efforts, EDL-G stipulates that the public sector shall set a good example in using energy services and carrying out energy improvement measures (German Energy Blog 2010).

OVERVIEW OF MAIN POLICY INSTRUMENTS

Experts see a relatively high overall ambition of energy efficiency policies (Egger et al. 2012: 40). The German government framework consists of an overarching framework, and sectoral policies and supporting measures respectively. As regards the overarching government framework, German industry is (partly) covered by the EU ETS, which is a cornerstone of the EU's policy against climate change (Institute for Industrial Productivity 2013d). In addition, voluntary agreements with German industry exist (Institute for Industrial Productivity 2013d). Voluntary agreements with energy intensive industry exist since 1996. The latest agreement came into force in 2013. While former measures focused on emission savings, latest measures focus on setting annual energy intensity reduction targets. Additionally, participating companies are incentivized to implement EnMS. Participating industries, which comply with the targets set out in the voluntary agreements, can apply for rebates on energy taxes. Evaluations in 2011 were showing that most industry branches were on track to achieve the targets and some where even outperforming the trajectory (Institute for Industrial Productivity 2013d).

These overarching policy measures are supplemented by various (sector-specific) support measures, including financial measures such as funds, loans and grants.[41]

[39] Measures are also relevant for other sectors.

[40] Repealed by Directive 2012/27/EC, which needs to be implemented by EU Member States by 5 June 2014.

[41] Several measures have been presented in Chapter 5.3.1.1.

In addition to financial instruments, key information and awareness raising programmes are presented in this study, as awareness raising and information campaigns for the general public are an important pillar of the German policy mix to enhance efforts in energy efficiency. For example, the energy advice programme for SMEs is a programme developed by the Federal Ministry of Economics and Technology and implemented by the German Development Bank KfW. Through this programme, independent audits and consulting are offered to identify energy efficiency potentials in SMEs. The objective is to increase the level of information on these potentials for SMEs (Institute for Industrial Productivity 2013d).

6.4 Summary of Analysis of Energy Efficiency Policy Instruments

The EU has further developed the energy efficiency policy framework over the past years (Schlomann et al. 2013: v). On EU Member State level, the following conclusions can be drawn from the literature review (Schlomann et al. 2013: 64; Gynter 2012):

- **Economic instruments** are frequently used to address financial drivers.
- **Information measures** play a significant role.
- **Norms and standards** as well as **various obligations** have not been used extensively.
- **Supportive frameworks** (incl. energy agencies, energy efficiency mechanisms) are important complementary measures. According to Schüle, an **ideal overarching framework** entails: energy agencies (for initiating and coordinating initiatives); energy efficiency obligations or white certificates (imposing obligations to meet a certain energy saving target on energy utilities); energy efficiency trusts or funds (supply of financial support necessary for investments); favourable conditions for energy services (to facilitate investments); and a participatory process (to involve stakeholders) (Schüle et al. 2013a: 8).
- There seems to be a consensus that, similar to the renewable energy case, a **policy mix** is the most appropriate answer to overcome the various barriers. This is not only important to design suitable individual policy instruments, but also to ensure they fit together in order to avoid that the different elements of the policy package eliminate one another or aim at the same target from different directions.
- Most EU Member State measures analysed in studies are those described in the first (2007) and second (2011) **NEEAP**.
- A **long-term strategy** with regular tightening and/or revision of regulations and goals is an important driver to foster energy efficiency development. In the literature, Denmark (with its vision of becoming independent of fossil fuels by 2050) is referenced as a best practice example (Schüle et al. 2013b: 30).
- Particularly in the **industry sector**, there is a **reluctance against mandatory measures** due to the fact that companies want to remain competitive. This makes policy design challenging (Schüle et al. 2013a: 14).
- Hence, in the **industry sector**, there are **few regulatory or fiscal measures**. Widely used are financial support measures. Policies also give priority to flexible tools such as voluntary agreements, information and market-based instruments, which leaves a considerable amount of autonomy with industrial companies (European Energy Network 2014: 27).
- **Energy efficiency measures in the industry sector** in EU Member States receive **low ratings** (compared to other sectors such as buildings) (Schüle et al. 2013b: 36). Measures in addition to the EU ETS are limited. Only a few good practice examples can be found.

For example, **Denmark** is mentioned as a **good example**, as the policy package focuses on both the demand and supply side of energy efficiency markets with energy savings obligations and high tax rates for energy. Energy companies are asked to provide advice and subsidies in order to increase energy efficiency in households and businesses (Schüle et al. 2013b: 67). **Finland**, another good practice example (Schüle et al. 2013b: 71), uses an energy efficiency agreement scheme for businesses and energy audits. For energy audits, there is an obligation. The policy mix is considered to be balanced since there are subsidies, funding schemes and information tools in place. 70% of Finland's total energy use is covered by these agreements (Schüle et al. 2013b: 71).

Following the literature (Odysee: 65), **large industrial companies** take into account the following **drivers** when making **investment decisions**:

- Financial imperative of a company.
- Policy obligations placed on the company to achieve environmental compliance.
- Knowledge of energy-savings opportunities within the company.
- Commitment of the company to the environment and energy efficiency.
- Demand of the public and market to improve the company's environmental and energy performance.

7 Comparative Analysis of Ukrainian and EU Policy Instruments

7.1 Introduction

The following chapter will focus on two activities:

1) **Qualitative appraisal** of the inventory of existing and planned Ukrainian energy policies in light of specific assessment criteria.

In this section, a general appraisal of the Ukrainian energy policies will be made. This will be done by using the following parameters:[42]

- Their compatibility with aims and strategies of the state in the future
- Their completeness, mutual compatibility and consistency
- Compliance with EU aims and goals in this field
- State of enforcement of laws and barriers preventing enforcement
- Availability, sufficiency and modernity of regulatory and other subordinate acts
- Sufficiency and effectiveness of instruments for the implementation of existing laws

These criteria are relatively unspecific and thus applicable for various policies and across different sectors. Findings will be linked to EU/international energy policies on a general level (no specific linkage to policy instruments). In order to be able to compare Ukrainian and EU/international energy policies in the next section, this section will take up the assessment criteria introduced for the best practice analysis (Chapter 2) of EU/international policy approaches. Effectiveness and (cost) efficiency will be applied as primary assessment criteria where possible.

2) **Comparison** of Ukrainian polies with EU/international best practice policy approaches with a focus on effectiveness and efficiency.

Based on the analysis of best practice policy approaches and lessons learnt in EU Member States and other countries, in this section best practice policies and policy mixes respectively, are used as references to which Ukrainian policies are compared. However, it is not within the scope of this study to compare Ukrainian policies to all best practice approaches presented in this study. The best practice examples introduced in the previous chapters will form the basis for a comparison to the inventory of existing and planned Ukrainian energy policies.[43] Information on Ukrainian policy was compiled by national experts in four reports:

Kostyshena, N. 2013: Recommendations on Launching of Market Mechanisms and Financial and Fiscal Instruments to Improve Energy Efficiency and Promoting Renewable

[42] The extent to which the parameters will be addressed in the assessment may vary due to different levels of available information.

[43] The selection for this section has been done based on feedback given by the UNIDO Kyiv team.

Energy. Kyiv: UNIDO/GEF Project "Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine".

Matveichuk, O. 2012: Analysis of the Draft Laws in the Area of Energy Efficiency, Energy Savings and Renewable Sources of Energy. Kyiv: UNIDO/GEF Project "Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine".

Pepelov, O. 2012: Analysis of current policy, legislative and regulatory framework in Ukraine on operationalization of policies and laws to scale up EE and use of renewables in energy intensive industrial sector with specific focus on SMEs. Kyiv: UNIDO/GEF Project "Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine".

Polishchuk, N. 2012: Situation and prospects for development in the agro-food and other small and medium sized enterprises (SMEs) in Ukraine in the aspect of efficient use of fuel and energy and introduction of renewable sources of energy. Kyiv: UNIDO/GEF Project "Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine".

It was complemented by publicly available information, e.g. from IEA reports.

7.2 Renewable Energy

7.2.1 Appraisal of Ukrainian Renewable Policies

According to the IEA, Ukraine has made significant progress in the area of renewable energies in the past several years (IEA 2012c: 197). In 2013, the installed capacity of electricity generation from renewable energy sources increased by 55% (Kostyshena 2014: 17). Policy measures taken have attracted private investment. For example, several major renewable energy projects have been implemented, mainly in the fields of solar and wind energy (DiXi 2013: 57). However, the overall share of renewables in the Ukrainian energy mix remains low (compared to IEA average) (IEA 2012c: 197).

The Ministry of Energy and Coal is responsible for overall energy policy, including renewable energy. The Ministry of Agriculture has an important role in the promotion of bioenergy (IEA 2012c: 202). The National Commission for State Energy Regulation (NERC) is responsible for (inter alia) issuing licences for electricity generation and sets FITs (IEA 2012c: 203). The State Agency on Energy Efficiency and Energy Saving of Ukraine (SAEE) is the central government body for renewable energy (and energy efficiency) policy. It also serves as the co-ordination body for international matters in the renewable energy sector (IEA 2012c: 203).

THEIR COMPATIBILITY WITH AIMS AND STRATEGIES OF THE STATE IN THE FUTURE

One of the declared priorities in Ukraine is the promotion of renewables to reduce dependence on natural gas (IEA 2012c: 197). On the legislative level, FITs have been introduced. Experts see large potential for further development of renewable energy sources (IEA 2012c: 200).

Based on Ukraine's membership in the Energy Community, Ukraine has to implement Directive 2009/28/EC on the promotion of electricity from renewable energy sources. This includes that the share of renewable energy sources in total consumption for Ukraine should be 11% in 2020.

The draft Updated Energy Strategy of Ukraine to 2030 sets a renewable energy target of 10% of installed electricity generating capacity (IEA 2012c: 200). The target is not in line with the Energy Community target of 11% by 2020, which means that the Energy Strategy needs to be revised (Dixi 2013: 50).

In addition, Ukraine's Energy Strategy and the main provisions of the strategy document are not correlating with the NREAP (and the NEEAP). The updated strategy was published on 4 February 2014 by the Ministry of Energy and Coal Industry. The implementation of the strategy foresees an increase of the share of renewable sources of energy in the total balance of installed capacities to the level of 12.6 % until 2030.

As regards specific sectoral programmes, the National Targeted Economic Programme on Energy Efficiency and Renewable and Unconventional Energy for the period 2010-2015 sets targets to increase the share of renewable and alternative energy in primary energy supply to 10% by 2015 (IEA 2012c: 202).

THEIR COMPLETENESS, MUTUAL COMPATIBILITY AND CONSISTENCY

At present, the fuel and energy sector legislative framework is not fully systematic and is missing a framework law that would set the main principles (Matveichuk 2012: Preface). The legislative framework in Ukraine consists of ten laws (IEA 2012c: 202). The main legislative acts governing renewable energy are (Rehbock 2012: 316):

- Law of Ukraine "On Alternative Energy Sources" (No 555-IV dated 20 February 2003)
- Law of Ukraine "On Alternative Types of Fuel" (No 1391-XIV dated 14 January 2000); and
- Law of Ukraine "On Electrical Power Industry" No 575/97-BP dated 16 October 1997)

According to Kostyshena (2014: 17), opportunities for projects on renewable energy sources application within SMEs require more intensive promotion. Given a wide range of incentives and governmental guarantees, it is feasible to develop an individual programme of promoting the use of renewable energy sources for SMEs in the framework of the National Renewable Energy Action Plan until 2020. SMEs require additional regulations due to significant initial capital investments and rather long payback periods.

COMPLIANCE WITH EU AIMS AND GOALS IN THIS FIELD

As part of its accession to the Energy Community Treaty, Ukraine is asked to carry out activities (on a voluntary basis) to meet Ukraine's obligations regarding the treaty. This includes transposing directives into national law (IEA 2012c: 203).

So far Ukraine has not been able to align its legislation with EU law. For example, there is still no clear position as regards the implementation of the EU's Third Energy Package (DiXi 2013: 8). According to a study carried out by the Ukrainian NGO DiXi (2013: 8), changes being implemented do not yet meet the EU's requirements in a full and consistent way. Directives which need to be transposed into national law include:

- Directive 2001/77/EC on creating favourable conditions for electricity produced from renewable sources on the internal electricity market (transposition deadline 1 July 2011)
- Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

STATE OF ENFORCEMENT OF LAWS AND BARRIERS PREVENTING ENFORCEMENT

According to the DiXi study (2013: 8), coordination between and cooperation among Ukrainian ministries and departments is far from being optimal as they "fight for objectives of strategic importance (e.g. the share of renewable energy sources in the future energy balance) instead of reconciling positions".[44] The NGO DiXi concludes that "despite the efforts of separate agencies, such disorder delays in time and affects the quality of reforms to be implemented to meet Ukraine's commitments in the Energy Community" (DiXi 2013: 8).

In addition, there is, according to the DiXi study (2003: 9), a problem of inadequate public information by the Ukrainian government regarding the course of implementing commitments in the Energy Community.

SUFFICIENCY AND EFFECTIVENESS OF INSTRUMENTS FOR THE IMPLEMENTATION OF EXISTING LAWS

Legislation on FITs is considered to be useful since it offers attractive guaranteed tariffs, stipulates a guaranteed connection of renewable-based generating facilities to electricity networks, and makes mandatory the purchase of all electricity produced from the certified generation from renewables (IEA 2012c: 209). In addition, Ukraine has adopted several fiscal incentives for renewable-based electricity. According to the IEA (2012c: 209), this has started to attract private investments (IEA 2012c: 209). However, further actions should be taken, including setting clear strategic targets for the renewables sector (IEA 2012c: 209).

Cost-effectiveness should play a more important role, given that current green-tariff rates are higher than in many EU Member States. More cost-efficient technologies such as biogas or waste should be promoted. Ukraine has considerable biomass resources, especially in the agricultural sector (IEA 2012c: 2010).

7.2.2 Comparison of Ukrainian and EU/Internal Policy Approaches

7.2.2.1 Investment Policy Instruments

7.2.2.1.1 State of Play in Ukraine

FEED-IN TARIFFS

The latest changes made to the green tariff option in Ukraine date back to 2009, when the Law of Ukraine on Amendments to the Law of Ukraine on Electric Energy and to Promotion of Alternative Energy Sources Use was introduced (Pepelov 2012: 23; IEA 2012c: 204).

The green tariff volume is established for each business entity producing electricity from renewable energy sources. NERC approves FIT rates on a case-by-case basis. The green tariff is calculated by multiplying a retail tariff for consumers of second class voltage in January 2009 (Pepelov 2012: 23) by a special ratio of the green tariff for each type of renewable energy sources. The green tariff ratio varies from 0.8 (for electric power produced by small hydropower plants) to 4.8 (for electric power produced by surface energy generating facilities from solar energy). The green tariff is set for the period up to 1 January 2030 (Pepelov 2012: 23).

Tariffs can only be obtained after the completion of a power plant. Minimum FIT rates are applicable until 2030 and are established for solar, wind, small hydro and some biomass

[44] This analysis is also relevant in the context of energy efficiency policies.

resources (IEA 2012c: 204). For biomass, only electricity generated at power plants 100% fuelled by biomass are eligible. NERC does not authorise green tariffs for co-firing of biomass or organic waste with other fuels (IEA 2012b: 204).[45]

As regards the purchase of electricity, all electricity produced by eligible renewable energy power plants and not sold under direct contracts must be purchased at green tariff rates on the Wholesale Electricity Market (IEA 2012b: 206).[46]

Electricity network companies are obliged to connect power produced from renewable energy to existing networks (IEA 2012b: 207). There is currently no official standardised grid connection procedure for all renewable-based generating units. In practice, usually investors finance all expenses related to the grid connection (should be split between project developers and grid companies) and then transfer some of the assets to the grid company. There are no standard procedures outlined for reimbursing developers’ costs or including these costs in the budgetary process of the grid operators (IEA 2012b: 207).

Licensing, permitting and approval procedures for obtaining the green tariff are quite complex and bureaucratic. According to the International Finance Corporation (IFC), it can take more than two years to progress through all steps (IEA 2012b: 208). One of the key barriers, as reported by IFC, is obtaining land access (IEA 2012b: 208).

In addition, FIPs are used. According to Kostyshena (2014: 4), the FIP is not exempt from taxes, which means that a proportion of the funds go to the state budget. This makes it necessary to increase the FIP and to increase tariffs respectively, to which the FIP applies.

Since the introduction of the green tariff into the Energy Law, the development of renewable energy in Ukraine (except maybe for Solar PV) has barely evolved (Mercados et al. 2013: 5).

The following challenges exist with regard to the Green Tariff (Mercados et al. 2013: 5f.; Pepelov 2012: 22):

- The Green Tariff is provided on ex-post basis.
- It does not cover several key technologies, e.g. biogas.
- The local share content rule poses risks to investors, because investors have to prove that they have reached the local content threshold after the project has been constructed.
- If the threshold is not met, the project is not eligible for the Green Tariff.
- The latter has an impact on the risk assessment as part of the investment decision, given that the risks may easily surpass the expected level.
- Currently, consumer purchase gas and electricity at below the cost of production (Rehbock 2012: 324).

On the other hand, Solar PV is relatively successful due to the fact that it has a high Green Tariff rate. Additionally, it is not affected by the local content rule (Mercados et al. 2013: 8).

[45] A law which would extend the eligibility for green tariffs e.g. to mixed generation or to biogas has not yet been passed. The draft Law (No. 10183) on Amendments to the Law on Electric Power Industry is still pending.

[46] In practice, direct contract purchases do not happen because economic or administrative incentives for consumers to purchase electricity at higher green tariff rates do not exist. In addition, no secondary legislation governing such contracts exists (IEA 2012c: 206).

SUPPORTIVE INVESTMENT POLICIES

Ukraine has set up several measures which focus on providing financial incentives. The State tax policy is seen as an important lever to promote renewable energy deployment, including (IEA 2012b: 203: Rehbock 2012: 317; Pepelov 2012: 21f.):

- Exemption from corporate profit tax until 2020 on income e.g. production of electricity and/or heat from biofuels and sale of biofuels.
- Tax reduction of 75% for land used for renewable energy facilities.
- Exemption from the surcharge on electricity and heat tariffs for electricity generated from renewable sources.
- Exemption from VAT until 2019 for the import of equipment for generating electricity from renewable energy, provided that similar goods are not manufactured in Ukraine.
- Reduction of 80% in the corporate tax for five years for the sale of equipment that operates on renewable energy sources and/or that is used for producing alternative fuels.

The measures are based on the Law of Ukraine on Taxation of Corporate Profit. According to Kostyshena (2014: 16), the instruments of funding and tax preferences are sufficient to spur investments.

7.2.2.1.2 Comparison of Ukrainian Policies with EU Best Practice Approaches

Table 16: Comparison of Investment Policy Instruments

Policy Instrument	Description	Best Practice[47]	Ukraine
Feed-in tariff (FIT)	• With regard to RES-E, the most frequently used policy instrument in the EU-27 are FITs • FITs are generation-based, price-driven incentives. The price that a utility, supplier or grid operator is legally required to pay from RES-E produced is determined by the system, meaning that the government regulates the tariff rate	• FITs, although increasingly viewed critically, may still be adequate to support less mature technologies or small scale applications.	• Green Tariff is operational. However, a set of problems exist: • Green Tariff does not cover all renewable energy technologies. • Green Tariff can only be obtained after plant is constructed, which poses risks on investors. • Local content rule is hampering investments made in projects. • Current administrative procedures (e.g. permits) are complex and time consuming • No technology-specific targets exist
Feed-in premiums (FIP)	• FIP is paid on top of the market price for electricity.	• FIPs are increasingly used over the past few years (endorsed by European Commission). • Several EU Member States use a FIT/FIP mix. • The key advantage of FIPs is that producers of renewables are stimulated to adjust their production according to the price signals on the market, because renewable energy producers participate in the wholesale electricity market.	• Set in place; however, premium is not exempt from taxes, which means that a share of the premium goes to the state budget • This results in the need to increase FIP and tariff respectively

[47] Further information available in the annex.

Grants	• Investment grants for RES-E are available in several EU Member States and are often devised to stimulate the take-up of less mature technologies such as PV. • Often investment support in the form of grants is not the main instrument to support renewable energy deployment. • Furthermore, investment support is more often available for RES-H than for RES-E. • For RES-H almost all EU Member States have investment mechanisms in place, • Whereas for RES-E only a few EU Member States (Finland, the Netherlands, Malta and Poland) have investment grants.	• As regards renewable heating & cooling, Poland has set up the thermo-modernisation grant support scheme which increases the use of renewable energy sources for heating purposes or energy efficiency. Lenders receive grants to pay off part of the loan. All renewable energy sources used in heat generation are eligible. The amount of grant is equal to 20% of the loan received for the implementation of thermo-modernisation activities. • In Finland, the so-called "energy aid" is a state grant for investments in RES production facilities and related research projects. Grants are available for projects that promote the use or production of renewable energies, advance energy efficiency and reduce the environmental effects caused by energy production and use. At least 25% of the projects' financing must come from non-governmental funds. Energy aid is granted to companies, municipalities and other communities. All technologies are eligible for grants.	• No grants available
Preferential loans	• Preferential or soft loans are loans which are available at an interest rate below the market rate. • Other benefits may include longer repayment periods or interest holidays. This leads to reduced investment-related costs, which, for example, account for the majority of electricity generation costs of most RE-technologies. • In EU Member States, preferential loans have mostly been used to support RE-technologies in the electricity and in the	• On a national level, preferential loans have been used e.g. in Bulgaria, Croatia, Czech Republic, Denmark, Germany, Lithuania, the Netherlands, Estonia, Malta and Poland. • Through its Fund of the Special Programme for Climate Change, Lithuania supports projects which aim to reduce greenhouse gas emissions. The Ministry of Environment is responsible for administering the fund. The fund is used to finance the promotion of RES, the introduction of environmental-friendly technologies as well as energy efficiency projects.	• No preferential loan available.

	heating sector. • Whilst preferential loans in combination with investment incentives have been used as key policy instrument to support RE-heating, preferential loans in the electricity sector have mainly been used as a supportive instrument in combination with other policy measures such as feed-in systems or quota obligations		
Tax exemptions and reductions	• Tax incentives or exemptions are often complementary to other policy instruments. • They are highly flexible instruments which can be targeted to encourage specific renewable energy technologies and to impact selected market participants.	• Investment and production tax exemptions are most prominently used in EU Member States. • Several EU Member States, including Spain, the Netherlands, Finland, Greece and Belgium provide tax incentives related to investments. • This includes: income tax deductions or credits for some fraction of the capital investment made in renewable energy projects, or accelerated depreciation.	• Tax policy is seen as an important measure to promote renewable energy deployment. • Exemptions and tax reductions exist, mainly for production of electricity from renewables and the import of equipment generating electricity from renewable energy.

Source: Resch et al. 2007: 26; Held et al. 2014: 29ff.; IEA 2012b: 203: Rehbock 2012: 317; Pepelov 2012: 21f.; RES Legal 2013; Winkel et al. 2011: 180; de Jager et al. 2011.

7.2.2.2 Supporting Measures

7.2.2.2.1 State of Play in Ukraine

ADMINISTRATIVE PROCESSES AND PERMITTING PROCEDURES

Ukrainian energy policy currently lacks a monitoring scheme, which helps assess the development of each renewable energy technology and helps prevent fraudulent activities (Mercados et al. 2013: 8).

As regards permitting procedures, there is not yet a regulation which would ensure transparency of the investor selection process for granting the right to construct and operate renewable energy facilities (Kostyshena 2014: 15).

The local content rule, which requires domestic origin of a certain scope of works and materials in renewable energy facilities to make them eligible for the green tariff (increasing from 15% to 50% during 3 years), is supposed to encourage domestic manufacturers. However, due to low domestic manufacturing capacities, the rule is counterproductive and hampering the development of renewable energy capacities (further information below in Chapter 6.2.2.3).

Concerning the local content rule (mentioned above in the context of FIT), in November 2013 the Ministry of Economic Development and Trade launched a discussion on the draft law of Ukraine "On Amendments to Article 173 of the Law of Ukraine 'On Electric Power Industry'" concerning the size of the local component for electric power facilities. The discussion revolves around adjusting the share of local components for power generation facilities that produce electricity from wind, biomass and solar radiation for constructions/machines for which construction started after 1 January 2012 (and are commissioned after 1 July 2014), to 25%. In addition, it is currently discussed to fix the share of local components to no less than 25% for power generation facilities that produce electricity from biogas, the construction of which commenced after 1 January 2012 and which are commissioned after 1 January 2014.

GRID CONNECTION AND PRIORITY DISPATCH

Under current legislation, all electric power generated by power generating companies and transmitted to the power network of power transmission organisations is purchased from the power plants by the State enterprise "EnergoRynok" (Energy Market) under unregulated tariffs (from combined heat and power plants) and under tariffs regulated by NCSRPI (from nuclear power plants, hydraulic power plants, and renewable energy sources). Consumers purchase electric power from "EnergoRynok" and receive it from the network of power transmission organisations under the average market tariffs at the time (SAEE 2013b: 57).

According to amendments to the Law of Ukraine "On Electrical Power Industry", as of 1 April 2009, energy suppliers using their network for the transmission of electricity are not entitled to deny access to this network for companies producing electricity using alternative energy sources, and have to include a cost for such a connection in their investment plans. The general, this rule of connection of electricity-producing installations is also applicable to installations producing electricity from renewables (Rehbock 2012: 318). The state-owned enterprise "Energorynok" performs full settlements on a monthly basis, operating as a wholesale supplier of electricity. This means that the electricity purchase from a manufacturer is guaranteed and a manufacturer gets full payment for the electricity sold to the wholesale electricity market of Ukraine in monetary form, without application of any types of debts set off against the electricity bills. However, the problem is that the method of connection of electricity producers to the grid, which concerns local and main networks, is not regulated with any subordinate regulatory legal acts (Rehbock 2012: 318; Pepelov 2012: 17). In addition, if the company producing electricity from renewables is constructing a new electrical network, it is faced with vague regulatory issues, including that it is not clear who is paying for the construction of new networks (Rehbock 2012: 318f.).

According to expert opinion, the integrated energy system of Ukraine is not yet ready for putting into operation the large scope of capacities that do not fall under dispatch and do not have sufficient standby capacities to ensure stable and reliable operation of the energy system. This is a limiting factor (Kostyshena 2014: 16). It is suggested that Ukraine develop and publish the development plans of the integrated energy system of Ukraine as provides the Law of Ukraine "On the Principles of Electricity Market Operation" in order to make a risk assessment of the situation described above (Kostyshena 2014: 16). According to Kostyshena (2014: 16), it is impossible to forecast the sustainable development of renewable energy sources and the meeting of any targets unless the energy system capacity and the amount of funding required for creation of the standby capacity are clearly defined.

7.2.2.2.2 Comparison of Ukrainian Policies with EU Best Practice Approaches

Table 17: Comparison of Supportive Policy Measures

Policy Instrument	Description	Best Practice	Ukraine
Administrative processes and permitting procedures	• Authorisation and planning procedures are key challenges to renewable energy growth • According to the Renewable Energy Directive, EU Member States need to ensure that permitting procedures are transparent, proportionate, coordinated and limited in time, and are facilitated for smaller or decentralised projects.	• Good practice examples can be found in e.g. Denmark. • There, the organisation of new wind offshore tenders includes several elements with the aim of providing a secure investment framework and to simplify administrative processes for bidders. • The Danish Energy Agency acts as a one-stop-shop for permits. Denmark, Italy and the Netherlands are the only countries with a single permit system for all projects. • The latter is particularly relevant in the heating and cooling sector, where the diversity of different technologies stands against developing a uniform administrative approach. • For energy transmission infrastructure projects, defining responsibilities for coordinating and overseeing the permit granting process, setting minimum standards for transparency and public participation, and fixing the maximum allowed duration of the permit granting process are important measures. • Local content rules should only be applied for reasons of social acceptance.	• No regulation exists which would ensure transparency of the investor selection process for granting the right to construct and operate renewable energy facilities. • Local content rule applies to renewable energy technology; considered as counterproductive
Grid connection and priority dispatch	• Renewable energy for electricity generation	• Who bears costs is clearly regulated	• Unclear who bears costs for grid

	must be integrated into the market. • However, renewable energy sources, in particular wind and solar power, have different characteristics from conventional sources of energy in terms of cost structure, dispatch ability and size. • This means they cannot simply be integrated into the existing market.	• Guarantee of grid connection • In case of connection problems, clear compensation rules apply • Priority access to the grid is granted for successful projects (in tender approaches).	connection • No clear regulation which clarifies grid connection.

Source: IEA 2012b; Held et al. 2014; Kostyshena 2014; Rehbock 2013; European Commission 2013: 7f.

7.2.2.3 Focus Topic: Biomass Policies

7.2.2.3.1 State of Play in Ukraine

Bioenergy/biomass holds great potential as a renewable energy source in Ukraine (Pepelov 2012: 19). The following types of biofuel are applied in Ukrainian industry: biomass used by directly firing it in boilers; biogas that could be derived from manure and at solid household waste landfills and by anaerobic fermentation as well as bioethanol and biodiesel (Polishchuk 2012: 10). In Ukraine, renewable energy stemming from biomass and waste is used for heat production in private households and public buildings in rural areas, as well as for heating and processes in the wood products industry (IEA 2012: 199). Real consumption of biomass products is said to be higher than official statistics indicate (IEA 2012: 199). According to a 2011 study of the energy potential of biomass, the technical potential of forest biomass was 89.08 petajoules (2.1 million tonnes of oil equivalent [Mtoe]) and that of agricultural waste was 501.43 petajoules (12 Mtoe equivalent) (Lakyda et al. 2011). Ukraine has considerable biomass resources, particularly in the agricultural sector (IEA 2012: 210).

Key barriers to the development of bioenergy in Ukraine exist with regard to four mechanisms (Geletukha and Zheliezna 2013: 3f.):[48]

1) Market price of conventional energy sources vs. bioenergy:

- Subsidizing internal prices of natural gas for population and housing-communal sector makes biomass uncompetitive in these sectors.

2) Eligibility of biomass in feed-in or quota obligations/green certificate schemes:

- Non-working mechanism for the support of power production from biomass according to the Law of Ukraine “On amending the Law of Ukraine ‘On Power Industry’ regarding stimulation of power production from alternative energy sources” (¹5485-VI of 20.11.2012).
    - Unreasonably low Green Coefficient for power produced from biogas.
    - Incorrect definition of the term “biomass”.
    - Unjustified requirement concerning the domestic share of equipment, materials and services in the total project cost.
    - Terminological mistakes in the description of main pieces of equipment for electric-power objects which use energy of biomass and biogas
    - Discriminatory approach to the biogas plants which were put into operation before 01.04.2013.
    - No Green Tariff for power produced from municipal waste.
    - No Green Tariff for power produced by co-firing biomass and fossil fuels.

3) **Absence of subsidies on energy saving equipment and equipment for energy production from renewable energy sources:**

- No subsidies for purchasers of bioenergy equipment.

4) **Absence of ambitious biomass targets:**

- No working state program for bioenergy development.

[48] This is relevant for both biomass in electricity production and heating.

- Potential of bioenergy was almost disregarded when elaborating the draft updated Energy Strategy of Ukraine until 2030.
- Underdeveloped market of biomass as fuel.
- Steep ecology demands for biomass boilers.
- Complicated procedure for obtaining privileges for the import of bioenergy equipment.

As regards the heat sector, the draft Updated Energy Strategy of Ukraine to 2030 mentions the option to replace the consumption of natural gas with consumption of heat produced from renewables, specifically biomass combustion. The strategy document emphasises that high technology costs need to be reduced in order to scale up the market; however, the draft strategy does not suggest measures to support the use of renewables in the heating sector (IEA 2012b: 208).

With regard to the agro-food sector, currently a local content requirement applies to construction projects of biomass-based power generation facilities (Kostyshena 2014: 21). It is suggested that the period of launching the mandatory 50% local content be extended to 2016. Furthermore it is suggested that the amendment should cover the creation of individual approaches to the development of power generation from biomass (Kostyshena 2014: 15). The local content requirement is criticised in general against the background of the absence of high-tech national manufacturing of wind turbines and solar modules which would satisfy the demand of the renewable energy sector (Rehbock 2012: 322).

Currently, agro-food enterprises are not allowed to sell the surplus of generated power to power transmission organisations (Kostyshena 2014: 15).

7.2.2.3.2 Comparison of Ukrainian Policies with EU Best Practice Approaches

Table 18: Comparison of Biomass Policies

Policy Instrument	Description	Best Practice	Ukraine
Biomass in electricity sector	• Biomass best practice policy approaches consist of four key elements: Energy taxation of conventional energy sources; “Green tariffs” for biomass; subsidies for equipment; and ambitious policy targets	• Energy taxes increase the price of conventional sources of energy and thereby promote use of renewables. • Ideally, biomass used for electricity production is tax-free, which is the case in Sweden. • Green tariffs (or Green Certificates) are used to promote renewables such as biomass. • The policy effectiveness in quota-using countries in the last years shows improving values for low-cost technologies such as biomass. • Subsidies are paid for renewable energy/bioenergy equipment (up to 40%; installation by a certified installer). • With regard to subsidies, the energy premium example of Belgium (see chapter 4.3.3) can be seen as a best practice example. Grants are offered for biomass equipment, which cover up to 40% of the total eligible costs. • Ambitious targets are set for the promotion of renewables such as biomass. • Clear definition of biomass exists.	Several barriers exist, including: • Subsidising prices of conventional energy sources (in particular natural gas) • Incomplete definition of biomass • Exclusion of some types of biomass and of biogas and waste from the list of technologies that can benefit from green tariffs. However, system is partly working. • Co-firing of biomass not covered under FIT scheme; however, it holds great potentials. • No subsidies for biomass equipment exist. • Targets for bioenergy set in the Energy Strategy for 2030 are low.

Biomass in heat sector		• Energy taxes
		• Promotion of biomass via favourable pricing and subsidy policy (e.g. Austria, Poland; Germany)
		  ○ For example, in Austria for the purchase and substitution of boilers, up to 30% of the costs are subsidized.
		  ○ Germany has set up a subsidy scheme which supports small and large scale installations by financial means
		• Stakeholder interests must be balanced (e.g. between fuel and farming concerns)
			• Several projects are carried out; e.g., to install mini CHP for heat and electricity
			• Expensive equipment (biomass boilers are on average three times more expensive than gas boilers) and no substantial financial support.

Source: IEA 2012b; Polishchuk 2012; Geletukha and Zheliezna 2013; Mercados et al. 2011; Ragwitz et al. 2012a: 19.

7.2.3 Assessment & Conclusion

ASSESSMENT

- In light of EU best practice approaches, **only one instrument** ("Green Tariffs") partly works in Ukraine, according to expert opinions (Geletukha and Zheliezna 2013: 16f.).
- A **green tariff exists** as the main policy instrument – similar to EU Member States' policy mixes. However, several barriers exist, e.g. the tariff does not apply to all renewable energy technologies.
- In addition, the **role of FIPs** has **not yet been fully explored**.
- Currently, **tax measures are the most important financial policy instrument** to promote the use of renewable energy sources.
- The **local content rule** is supposed to encourage domestic manufacturers. However, due to low domestic manufacturing capacities, the rule is counterproductive and hampering the development of renewable energy capacities.
- **Underdeveloped local networks** are seen as another barrier to the development of renewable energy capacities.
- **Biomass holds great potential** for Ukraine. **However, barriers exist**, including local content requirements for equipment, materials and services in the biomass sphere and a lack of a green tariff for electricity produced via co-firing of biomass with fossil fuels.

CONCLUSIONS

- As regards the **green tariff mechanisms**, the **stronger use of FIPs**, which is seen as a best practice policy approach in the EU, should be considered.
- As regards financial instruments, **supportive investment policies** such as grants and funds **could be set up**.
- **Access to the grid** needs to be based on clear rules and procedures, which currently is not the case.
- As regards **biomass**, room for improvement exist, including setting up a **subsidy scheme for biomass equipment**.

7.3 Energy Efficiency

7.3.1 Appraisal of Ukrainian Energy Efficiency Policies

Ukraine is one of the most energy-intensive countries in the world, mainly because of its large share of energy-intensive industries (IEA 2012b: 33). Key sectors according to the IEA are industry and buildings, with 75% of buildings been built before 1970 and 70% of them in need of full modernisation (IEA 2012b: 33). At present, there is a large set of laws and regulations related to energy issues in Ukraine, including the tax code. The Law of Ukraine on Energy Saving is the basic regulatory document in the energy efficiency sphere (Pepelov 2012: 8). Many laws are in the drafting process.

THEIR COMPATIBILITY WITH AIMS AND STRATEGIES OF THE STATE IN THE FUTURE

Several (different) energy efficiency targets exist in Ukraine. In 2011, the *National Targeted Economic Programme on Energy Efficiency and Development of the Sphere of Energy Production from Renewable Energy Sources and Alternative Fuels for 2010-2015* was developed. Projected results for 2015 (from 2008 levels) are (IEA 2012b: 35):

- 20% decrease in the energy intensity ratio
- 20% reduction in natural gas consumption
- 20% reduction of the energy intensity of gas transportation, storage, and distribution
- 15% to 20% reduction of harmful emissions; and
- 50% decrease in the national budget expenditures for energy supply to public organisations

In order to achieve these objectives, sector initiatives, regional programmes as well as programmes in public institutions were developed.

An Energy Strategy has been drafted, which includes energy efficiency measures to achieve the set target of a 40% increase in energy efficiency by 2030. According to the DiXi study (2013: 92), the measures seem to be sufficient to achieve this target. However, according to the study, the description of the measures is not detailed enough for a proper analysis (DiXi 2013: 92). It is criticised that for improving energy efficiency in the industry sector, only technical improvements in industrial process and audit schemes are specifically mentioned, while policies combining voluntary agreements and investment subsidies are not discussed (DiXi 2013: 93).

A NEEAP is currently being drafted, which includes different targets. It is currently unclear whether the different targets will be aligned with the Energy Strategy (IEA 2012b: 35).

As regards meeting commitments and deadlines in the context of Ukraine's Energy Community, the country is not on track (DiXi 2013: 91 (see section "Compliance with EU aims and goals in this field" for further information).

THEIR COMPLETENESS, MUTUAL COMPATIBILITY AND CONSISTENCY

A large set of strategies, action plans, programmes as well as an extensive body of legislation exist. However, progress in improving energy efficiency has been limited so far (IEA 2012b: 33). Improving the legislative and regulatory framework is considered to be one of the stepping stones towards increased energy efficiency (Matveichuk 2012: Preface). Many laws – both on renewable energy and energy efficiency – are currently pending in draft status. Some of them focus on policy instruments (e.g. energy audits, energy efficiency services), which are considered to be important elements in functioning policy packages. However, their actual adoption is unclear.

Similar to renewable energy policies, Ukrainian energy efficiency policies are currently focusing on supply-side issues (IEA 2012b: 33).

In order to increase energy efficiency in different sectors, price signals must be strengthened. They are currently weak due to energy subsidies (IEA 2012b: 34).

COMPLIANCE WITH EU AIMS AND GOALS IN THIS FIELD

In 2010, Ukraine signed the Energy Community Accession Protocol, which signals Ukraine's political will to align the principles of its energy policy with that of the EU and to achieve a reduction of energy demand of 9% by 2020. In order to meet the targets under the protocol, SAEE developed a draft plan to transpose EU Directives into national legislation, including (IEA 2012b: 36):

- Energy End-use Efficiency and Energy Services Directive (2006/32/EC) (transposition deadline 31 December 2011);
- Energy Performance of Buildings Directive (2010/31/EC) (transposition deadline 30 September 2012); and
- Labelling and Standard Product Information on the Consumption of Energy and Other Resources by Energy-related Product Directive (2010/30/EC) (transposition deadline 31 December 2012)

According to the IEA (2012b: 36), transposition deadlines have been missed. However, some transposition work is under way.

A timeframe for the transposition of the European Ecodesign Directive has not yet been established (IEA 2012b: 36).

As regards the NEEAP, it is still in the drafting phase.

STATE OF ENFORCEMENT OF LAWS AND BARRIERS PREVENTING ENFORCEMENT

A couple of draft laws have not been adopted so far or need updating (DiXi 2013: 85; IEA 2012b: 36), including:

- The Law on Energy Audit
- The Law on Energy Efficiency
- The Law on Energy Balance of Ukraine
- The draft Law On Regulation in the Field of Energy Saving
- the Law on Energy Conservation of 1994 (need for update to reflect the changing energy policy objectives);
- the Energy Labelling Regulation of 2010 (requires amendment); and
- the draft Law on Efficient Utilisation of Fuel and Energy Resources of 2010

According to a study carried out by the NGO DiXi (2013: 86), Ukraine has developed a number of draft regulations in the energy field. However, the study concludes that no real progress has been made in three main priorities recommended by the Energy Community. The study refers to: the NEEAP, which was not adopted; effective coordination among numerous authorities in the field of energy efficiency, which is not ensured; and the prospects of adopting the draft law on energy efficiency in buildings, which are still uncertain (DiXi 2013: 86).

AVAILABILITY, SUFFICIENCY AND MODERNITY OF REGULATORY AND OTHER SUBORDINATE ACTS

The current legal framework is considered to be both complex and contradictory (IEA 2012b: 34). There are more than 200 laws related to energy (renewable and energy efficiency). Ukraine has state rules, regulations and standards in the field of efficient use of energy resources, including method definition, energy labelling, energy auditing and management and energy performance standards for certain types of equipment (IEA 2012b: 36).

SUFFICIENCY AND EFFECTIVENESS OF INSTRUMENTS FOR THE IMPLEMENTATION OF EXISTING LAWS

According to the IEA, Ukraine lacks effective governance in the energy efficiency area (IEA 2012b: 33). One of the key challenges for Ukrainian policy makers is creating the framework conditions to ensure that investments in buildings and industry for energy efficiency technologies and systems are spurred (IEA 2012b: 33).

The institutional framework for energy efficiency has undergone several changes in the past (IEA 2012b: 34). For example, the National Agency of Ukraine on Ensuring of Efficient Use of Energy Resources, which was established in 2006, was replaced by SAEE in 2011. SAEE has a dual role in that it promotes energy efficiency and renewable energy deployment. The responsibility on energy efficiency was removed from the Cabinet of Ministers to the Ministry of Economics and Trade (IEA 2012b: 34). The Ministry is responsible for approving draft legislation. Each Ministry has its own energy efficiency programme. In addition, local authorities are developing regional energy efficiency plans. According to the IEA, co-ordination related to energy efficiency is mainly on an ad-hoc basis. No formalized structure for on-going co-ordination and information sharing has been established so far (IEA 2012b: 34).

7.3.2 Comparison of Ukrainian and EU/International Policy Approaches

As outlined above, the ideal energy efficiency governance framework includes elements such as long-term targets, institutions like energy agencies, and mechanisms for overall financing like energy obligation schemes as well as horizontal measures like investments into research and technology and tools to monitor, report and verify progress.

7.3.2.1 Financial Policy Instruments

7.3.2.1.1 State of Play in Ukraine

According to Pepelov (2012: 10), one of the fundamental challenges in Ukraine is to spur investment in the sphere of energy efficiency and energy savings technologies and equipment.

To date, Ukrainian legislation foresees several types of state financing support in the field of energy efficiency (SAEE 2013a: 64):

- Direct budget funding
- Exemption from VAT and import duty, exemption from profit tax of part of the profit
- Establishment of the special tariff for electricity
- Provision of state guarantees for credit lines, taken from credit institutions

TAX REBATES

The following tax benefits have been introduced in Ukraine (Kostyshena 2014: 10):

- VAT benefits and import duty benefits for energy saving equipment imports, provided that such equipment is not manufactured in Ukraine. A detailed list has been defined by a Resolution of the Cabinet of Ministers of Ukraine (No. 444 dated May 14, 2008 “Issues related to import of energy saving materials, equipment and components to the customs territory of Ukraine”) (Pepelov 2012: 11).

- Profit tax benefits for energy efficiency equipment manufacturers and enterprises implementing energy efficiency measures (based on the Law of Ukraine on Taxation of Corporate Profit). The list mentioned above applies in this context as well (Pepelov 2012: 11).

SUBSIDIES

Based on the Law of Ukraine "On Energy Saving" (from 1994), government subsidies are available for energy efficiency research and development measures. The Cabinet of Ministers of Ukraine is responsible for establishing a procedure of granting governmental subsidies and non-repayable allocations (Kostyshena 2014: 6)

(SOFT) LOANS

The Resolution of the Cabinet of Ministers of Ukraine dated 13.04.11 No.439 approves the Procedure of the National Budget Disbursement for Governmental Support to Energy-Saving Measures via a Loan Easing Mechanism. Pursuant to item 3 of this Procedure, the budget funds are allocated to reimburse the expenditures related to interests on national currency loans for the implementation of energy efficiency projects; in particular those related to reducing consumption of natural gas. The reimbursements are granted against the interests actually paid within the current budget period at the National Bank's discount rate, effective as of the date of interest payment.

According to Kostyshena (2014: 4), the State Programme for Mainstreaming of Economic Development for 2013-2014 has been developed to set up financing mechanisms, including soft loans. One of the programme's specific features is the involvement of banks in funding of projects that will be focused on energy efficiency improvement.

The programme also envisages that banks will become a filter at the selection stage of the interests or guarantees under the loans. They will be responsible for monitoring the proper use of the disbursements.

According to the IEA (2012b: 38), local banks' financing activities are limited. The banks focus on short-term loans. The majority of commercial loans are aimed at working capital purposes with maturities of up to one year, which is not ideal, since energy efficiency financing may need longer (see Chapter 5 for further information) (IEA 2012b: 38). According to the IEA, access to finance is limited due to a lack of capacity to develop bankable energy efficiency projects in municipalities and companies (IEA 2012b: 38).

FUNDS

Three national funds exist in Ukraine:

- The Energy Saving Fund, through which energy savings projects are funded; however, funding sources are limited (Kostyshena 2014: 5) .
- At local level, an Energy Saving Fund exists as well. Through the initiative, enterprises' efficiency initiatives are financed. The money from the Energy Saving Fund is transferred directly to enterprises. The funding can be utilised to finance energy savings measures included in the local programme of housing and utilities development or to repay interests on the loans for energy savings solutions. Again, low budgets, at the local level, threaten the success of the measure (Kostyshena 2014: 5f.).
- The Special Fund of the State Budget of Ukraine is operational as well. It is based on the draft Law of Ukraine "On 2014 State Budget of Ukraine". It focuses on supporting energy

efficiency technologies in the manufacturing sector (Kostyshena 2014: 5). Again, the risk of insufficient funding is a problem (Kostyshena 2014: 13).

In addition, several funding schemes exist, which rely on the involvement of international institutions, including the Eastern Europe Energy Efficiency and Environmental Partnership Fund (E5P): the fund, based on a Swedish Initiative, provides direct investments in energy efficiency, including central heating installations and power generation facilities. As of February 2012, E5P has mobilised approximately EUR 52 million of the EUR 91.8 million committed SAEE 2013a: 65f.). International organisations/actors such as the World Bank and the Nordic Environment Finance Corporation are also providing funding to energy efficiency projects in Ukraine (SAEE 2013a: 67ff.).

GRANTS

Order No. 64 of the Ministry of Economic Development dated 27.09.2011 (registered with the Ministry of Justice on 04.10.2011, No. 1137/19875) approves the procedure of competitive selection of energy efficiency projects which are granted governmental aid from the national budget item “Governmental Support to Energy-Saving Measures via Loan Easing Mechanism Program”.

7.3.2.1.2 Comparison of Ukrainian Policies with EU Best Practice Approaches

Table 19: Comparison of Financial Policy Instruments

Policy instrument/category	Description	Best practice	Ukraine
Tax rebates	• Tax incentives or exemptions are often complementary to other policy instruments. They are highly flexible instruments which can be targeted to encourage specific renewable energy technologies and to impact selected market participants	• Tax benefits are available in several EU Member States, e.g. Denmark, UK, Norway and Sweden, with varying success. In many cases, they are connected to voluntary agreements (linked to the ESD). • For example, in Norway, pulp and paper companies may apply for participation in a programme for energy efficiency. Participating companies are given a full exemption from the electricity tax. • Viewed negatively by experts are energy tax exemptions for industrial companies, applied by e.g. Germany	• Several tax rebates are available; one of the key policy instruments in Ukraine in the energy efficiency sphere. • No links to voluntary agreements though.
Subsidies	• Subsidies directly influence financial drivers of investment in energy efficiency. • The impact of subsidies depends on the proportion of subsidy out of the total project cost. That is: by how much do subsidies reduce the costs of energy efficiency measures	• International experience indicates that subsidies as a stand-alone policy instrument can be counterproductive to realise energy efficiency potentials, because they do not promote the uptake of (voluntary) energy management approaches. • Denmark is showing a good practice approach in this context: the Danish Energy Agency pledges payment of subsidies for partial coverage of a company's CO_2 tax liabilities when it signs a voluntary agreement. The agreement obligates a company to undertake a number of energy-saving measures and to implement a certified EnMS.	• Government subsidies are available for energy efficiency research and development measures. • No measures linked to voluntary agreements aimed at industry energy efficiency gains

(Soft) loans	• Soft loans reported in NEEAPs take the form of preferential loan guarantee conditions or reduced interest rates (e.g. for investments in energy efficiency measures) • Soft loans are a typical policy instrument in the building sector.	• In Germany, the state-owned development bank KfW promotes low-interest financing for energy efficiency in buildings. • In the industry sector, loans are used e.g. for energy savings investments. For example, Poland has set up the Polish Sustainable Energy Financing Facility (PolSEFF). It is a EUR180 million fund to help SMEs to invest in energy efficient technologies. • General success factors include: ○ Simplified administrative procedures to reduce entry barriers and bureaucracy (“one-stop-shop”). ○ Involvement of local actors (e.g. municipalities, banks, companies) to build trust and capacity. ○ Providing information to citizens in order to generate interest and demand. ○ Flexibility in funding conditions to adapt the national scheme to the specific barriers and opportunity in sectors or regions and to adapt to changing markets. ○ Imposing minimum performance thresholds for eligibility to create incentives.	• The State Programme for Mainstreaming of Economic Development for 2013-2014 has been developed to set up financing mechanisms, including soft loans. • One of the programme’ specific features is the involvement of banks in funding of projects that will be focused on energy efficiency improvement. • The programme also envisages that banks will become a filter at the selection stage of the interests or guarantees under the loans. They will be responsible for monitoring the proper use of the disbursements. • Local banks’ financing activities are limited. • According to the IEA, access to finance is limited due to a lack of capacity to develop bankable energy efficiency projects in municipalities and companies • The majority of commercial loans are aimed at working capital purposes with maturities of up to one year, which is not ideal, since energy efficiency financing may need longer.
Funding	• Energy efficiency funds offer more flexibility in promoting innovative	• In the industry sector, funds for research and innovation on energy savings technologies, implementation of	• Three national funds exist in Ukraine • In addition, several international funding

	technologies and solutions than other financing sources.	energy savings measures and other issues set in place in France can be considered to be a good practice initiative. • Several EU Member States (e.g. Bulgaria, Lithuania) have shown good practice with regard to linking EU and national funds to support energy efficiency in buildings. • For example, in Lithuania, the Jessica Holding Fund is blending cohesion policy funding with national funds. The fund offers long term loans through two Lithuanian banks, with a fixed interest rate (3%) for the improvement of energy efficiency in multifamily buildings.	schemes are available • Barrier: low state budgets limit funding possibilities based on government budgets.
Grants	• In the building sector, the majority of financial instruments by EU Member States are grants	• The German Ministry of Economics and Technology has launched a grant programme focused on SMEs that supports investment in highly efficient cross-sectoral technologies which improve energy efficiency. Grants are possible when single technologies are exchanged or for providing a systemic approach. Maximum 30% of net investment costs are covered by the grant for SMEs and maximum 20% for bigger companies. • The Lithuanian Jessica Holding Fund mentioned in the “funds” sub-section also includes a grants option, which is available for low income families. They receive a grant instead of a loan.	• Order No. 64 of the Ministry of Economic Development dated 27.09.2011 approves the procedure of competitive selection of energy efficiency projects which are granted governmental aid from the national budget item “Governmental Support to Energy-Saving Measures via Loan Easing Mechanism Program”. • International funding schemes (e.g. via European Bank for Reconstruction and Development) provide grants in addition to funding.

Source: Own Table after Schlomann et al. 2013: 60; IEA 2012b: 38; IEA 2012c: 48; Kostyshena 2014: 4ff; European Commission 2013b: 17ff; Rademaekers 2012: 54; Institute for Industrial Productivity 2013c.

7.3.2.2 Institutional Framework

7.3.2.2.1 State of Play in Ukraine

SAEE is in charge of activities aimed at increasing both energy efficiency and the effectiveness of energy savings. The operation of the (reorganised) headquarters started in January 2012. However, according to the DiXi study (2013: 92), activities of regional branches are still very limited, reportedly due to a lack of financing.

An analysis carried out by the IEA comes to similar conclusions. According to IEA (2012b: 47), local authorities, which can play an important role in promoting energy efficiency, are currently lacking capacity, e.g. to apply for donor funding and leveraging private funding. In addition, there are currently no state guarantees that local governments can act as guarantors.

According to the IEA (2012b: 38), energy efficiency activities as well as financing are seriously hampered by a lack of data. Data (especially end-user data) on energy efficiency improvements is particularly important when calculating energy efficiency gains or setting targets (cf. Chapter 5.3.2 on energy efficiency obligations) (IEA 2012b: 38).

7.3.2.2.2 Comparison of Ukrainian Policies with EU Best Practice approaches

Table 20: Comparison of Policy Measures with Regard to the Institutional Framework

Policy instrument	Description	Best practice	Ukraine
Energy agencies	• Energy agencies are an important element of functioning framework conditions. Energy agencies play an important role in promoting energy efficiency in different sectors. A strong institutional setting is important particularly to monitor compliance and enforcement of legislation	• Almost all EU Member States have established an energy agency. • Many also have agencies not only at national but also at regional and/or local levels. They are considered to be important agents for co-ordinating energy efficiency policies and for awareness-raising. • They offer expertise in the field of demonstration, market integration, audits & advice and R&D.	• SAEE is in charge at a national level. • However, no activities at regional level • Local authorities are currently lacking capacity

Source: Schüle et al. 2013: 28f.

7.3.2.3 Framework Conditions for Energy Efficiency Programmes

7.3.2.3.1 State of Play in Ukraine

LONG-TERM TARGETS

As mentioned in Chapter 6.3.1, several targets exist with regard to energy efficiency. However, key targets – outlined in the Energy Strategy and the draft NEAP – differ from each other. It is thus unclear for industry and other key actors which targets apply.

VOLUNTARY AGREEMENTS

Currently, voluntary agreements do not exist (Kostyshena 2014: 20).

WHITE CERTIFICATES

Currently, there is no white certificate system in place. There is neither a legislative framework nor are institutional principles set (Kostyshena 2014: 3).

ENERGY EFFICIENCY SERVICES/ESCOS

The Ukrainian market for energy efficiency services as well as building insulation technology is considered to be relatively small (IEA 2012b: 41). Even though tax breaks exist for measures to decrease the costs of energy efficiency equipment and products, it remains unclear whether this has had an impact on the uptake of products (IEA 2012b: 41). However, a substantial market potential has been identified (Pepelov 2012: 10).

SAEE has explored the possibility of establishing the system of ESCOs. Several ESCOs exist, especially in the context of projects supported by international organisations/institutions (SAEE 2013a: 55). According to SAEE (2013: 55), an example of a good experience of working through ESCOs is the joint project of the European Bank for Reconstruction and Development, UkrESCO and Dnipropetrovsk municipal energy company.

However, overall, the market for ESCOs is limited. Several barriers and challenges exist, both on a legislative and a financial level (SAEE 2013a: 56):

- No legislative act on energy services has been adopted, thus gaps exist in current legislation.

A draft law of Ukraine “On Specifics of Energy Service Procurement” has been developed. It is applicable to all customers of energy services paid from the state budget funds (fully or partly). Energy services are purchased according to the order established by the Law of Ukraine “On Public Procurement”. Pursuant to this draft law, the Cabinet of Ministers of Ukraine is responsible for the development and approval of the Model Contract for Energy Service Procurement (energy service contract) and Procedure of Payment Calculation under Energy Service Contracts and the Procedure of Calculating the Reduction of Customer’s Expenditures for Consumption of Public Utility Services and Fuel and Energy and/or Maintenance of Relevant Networks, Devices and Equipment under Energy Service Contracts. The National Action Plan foresees the introduction of several measures related to energy services as well (Kostyshena 2014: 3).

- Legislation gives no definition of the energy service agreement; no description of the basic objectives, functions, features of such contracts and fails to establish rights of local governments to conclude and implement performance contracts through investment programmes;
- No instructions on how to apply performance contracts within the budget investment programmes in the public sector;
- Low level of investments due to high risks of project failure;
- Lack of clear financial mechanisms to implement projects which involve ESCOs/energy services;
- No guarantee of the performance of the contract;
- Lack of state or municipality guarantees to secure loans;
- Uncertainty with regard to commitment of public authorities to make use of energy services/ESCOs, which leads to low motivation of financing institutions to invest in energy efficiency projects through ESCOs in the public sector;
- Unclear tariff setting procedures.

7.3.2.3.2 Comparison of Ukrainian Policies with EU Best Practice Approaches

Table 21: Comparison of Policy Measures Regarding Framework Conditions for Energy Efficiency Programmes

Policy Instrument	Description	Best Practice	Ukraine
Long-term targets	• Setting long-term policy targets is an important element of an overarching governance framework. • The effect of a missing long-term target is uncertainty on energy efficiency policy developments, which affects markets (including financial, educational and informational suppliers).	• Bulgaria is a good practice example, as it has adopted a strategy for the entire energy sector • The strategy is complemented by the National Energy Efficiency Strategy • Bulgaria sets individual energy saving targets for industrial systems (with an annual consumption over 3.000 MWh). • In addition, these entities have to carry out energy audits every three years.	• Several targets exist; however they are not in line with each other.
Voluntary agreements	• Voluntary agreements between industry and the administration are an alternative to regulations. • Industrial companies agree to define energy efficiency objectives and to set up an action plan to achieve these objectives. • In return, governments encourage companies to join agreements by implementing specific incentive schemes and/or offering tax exemptions	• The Finish energy efficiency agreement has been labelled as a good practice example. • The agreement is based on the ESD (now EED). • The policy instrument is the cornerstone of Finland's commitment to meet the 9% energy savings target.	• Voluntary agreements do not exist.
White certificates	• In the basic form of white certificate schemes, an authority places an obligation on an actor to deliver a set amount of energy savings (e.g. energy supplier).	• France and Italy deliver good practice examples • In the French and the Italian scheme, both obligated parties (distributors of electricity/natural gas) and voluntary subjects such as energy	• No white certificate scheme in place.

	• Energy efficiency gains are translated into certificates, which can be traded.	service companies and companies with the obligation to appoint an energy manager respectively have to or can access the white certificate mechanism.	
Energy efficiency services/ESCOs	• The contract between ESCO and building owner contains guarantees for cost savings and takes over financial and technical risks of implementation and operation for the entire project duration of typically 5 to 15 years • Typical elements of services provided by ESCOs are financing, planning and installation of energy generation components, as well as distribution and usage, as well as their operation and maintenance	• Several key issues which need to be considered when developing and implementing EPC projects: ○ Energy audits ○ Determination of the energy cost baseline ○ Public tender ○ Energy Performance Contracts ○ Energy Savings Verification ○ Financing In addition, framework conditions need to be put in place: • Supportive policies and legislation: e.g. obligatory energy audits in public sector. • Availability of information and know-how: e.g. website with key information and best practice approaches. • Provision of financing: e.g. low-interest loans.	• Project experiences have been gathered; UkrESCO seen as successful example • However, overall the market for ESCOs is limited, due to several reasons (on legislative and financial level; see above) • Main barriers: Incomplete legislation is hampering the scheme. • Unclear contract procedures • Additionally, no mechanism for state support in financing energy savings projects. • Requirements for energy audits are covered in the draft law “On Energy Audit”; however, the prospects of the law being adopted are vague

Source: SAEE 2013a: 55f; Berliner Energieagentur 2012b: 9ff; IEA 2012b: 42; 55ff; Schüle et al. 2011: 31ff.; Schüle et al. 2013b: 71; European Energy Network 2014: 28; Industry for Industrial Productivity 2013b; IEA 2009: 53; Staniaszek and Lees 2012: 8.

7.3.2.4 Industry Focus: Energy Audits and EnMS

7.3.2.4.1 State of Play in Ukraine

Today about 50 national standards exist in Ukraine (SAEE 2013a: 53). Maintenance of the energy audit system operation and introduction of the EnMS are functions of the SAEE. Currently, no law has entered into force which would regulate energy audit procedures. In addition, no national standards based on ISO 50001 (or a national version of ISO 50001) exist (Kostyshena 2014: 9).

Pursuant to the legislation of Ukraine, an energy audit procedure is to be established via adoption of the law. Therefore, a relevant draft law has been developed. The draft law determines the conditions and procedures of initiative (voluntary) and essential energy audit, conditions of energy auditor certification and establishes liability for violation of the law.

7.3.2.4.2 Comparison of Ukrainian Policies with EU Best Practice Approaches

Table 22: Comparison of Policy Measures with Regard to Energy Management

Policy Instrument	Description	Best Practice	Ukraine
EnMS	• Energy Audits and EnMS are very useful tools to improve the energy efficiency in industry. • Especially an EnMS according to ISO 50001 can support companies in systematically identifying the main energy users and to set appropriate measures in relation to the main energy consumption.	• Regulatory approaches are seldom used in industry. Only a few EU Member States have set up mandatory energy audits for large energy consumers (e.g. Bulgaria, Slovakia and Romania) (European Energy Network 2014: 28). • Mandatory energy audits (for large companies) will be relevant in the context of the EED	• About 50 national standards exist in the area of energy efficiency • No national introduction of ISO 50001 so far (transposition into national standard) • No obligation for large companies to carry out energy audits every 4 years (cp. obligation in EED)

Source: IEA 2012b; Held et al. 2014; Kostyshena 2014; Rehbock 2013; SAEE 2013a: 53.

7.3.3 Assessment & Conclusion

ASSESSMENT

- **Diverging long-term targets** exist.
- Overall, there are **not many market-based instruments** but rather regulations (Kostyshena 2014: 14)
- **Several laws are currently pending** at draft status in Ukraine, which focus on key policy initiatives such as energy audits or energy savings schemes (Kostyshena 2014: 14). However, their chances of being implemented are unclear.
- Additionally, **several provisions** (e.g. in the draft Law of Ukraine "On Efficient Use of Fuel and Energy") are **rather vague** and of declarative nature (Matveichuk 2012: 6). It is thus highly questionable whether they are effective and efficient policy instruments.
- In the literature, the following key barriers to increasing energy efficiency have been identified: **insufficient financing** and a **lack of coordination and inadequate communication between various actors** involved in the energy efficiency policy development and implementation (DiXi 2013: 93).
- **Tax rebates** are one of the **key policy instruments** in the energy efficiency sphere; similar to EU best practice they aim at energy efficiency technologies, etc.
- In addition to tax measures, **other financial measures have been introduced**.
- However, even though energy efficiency financing is provided by the State Target Programme for Energy Efficiency for 2010-2015, as well as by sectoral and regional energy efficiency programmes (DiXi 2013: 93), a **lack of financing possibilities** has been diagnosed (DiXi 2013: 93).
- **SAEE holds role similar to EU Member States' energy agencies**; however, **no strong regional representation** due to lack of capacity on the side of local authorities
- Ukraine is using **energy efficiency services and ESCOs to promote renewable energy**. Already a few projects have been launched, but EU best practice shows that room for improvement exists.
- With respect to **enforcement mechanisms** policy makers could use the NEEAP of **Denmark as an orientation**. Here, energy agencies do have strong links to regional activities. Additionally, DEA is responsible for providing financing and economic incentives (Schüle et al. 2013c: 7)
- **No white certificate scheme** and **voluntary agreement** are in place.
- With regard to **energy management and audits,** standards exist; however, no introduction of international benchmark ISO 50001 so far.
- **Energy audit law** is currently in draft status.

CONCLUSIONS

- Overall, Ukraine could **expand the spectrum of policy instruments** used, as well as set **unambiguous long-term targets**.
- In addition to tax measures, other financial measures could be initiated. Indeed, both the comprehensiveness of individual measures as well as the spectrum of measures could be expanded, e.g. focus on financial incentives linked to **voluntary agreements** for industry.

- **Regional authorities should be strengthened** to promote energy efficiency (e.g. with regard to R&D, monitoring, enforcement, etc.).
- **Voluntary agreements** and **white certificates**, both seen as important instruments to increase energy efficiency, could be used.
- **EPC standards** for the promotion of energy services could be strengthened.
- With regard to **energy management**, **mandatory audits** for industry could be foreseen.

8 Annex – Best Practice Elements for Feed-In Systems

Feed-in systems are both efficient and effective – when they are designed and implemented adequately. In the following section, best practice elements are present, which help control support costs:

Regular degression of tariffs: the tariff/premium level depends on the year in which a plant starts to operate. Each year the level for new plants is reduced by a certain percentage. Hence, the later a plant is installed, the lower the reimbursement received. Tariff degressions are considered to be useful to spur technological innovation and cost reductions. Ideally, the rate of degression is linked to the empirically derived progress ratios for the different technologies. Some countries have established mechanisms to regularly reduce the tariff rate, other countries have fixed a regular yearly degression. Some countries decide about the reduction in tariff rates on a yearly basis. The latter option, however, adds an element of uncertainty to the system (Ragwitz et al. 2012b: 10).

Growth corridor and caps: in order to avoid focussing too narrowly on one specific technology, countries choose to support a wide array of technologies, even those which are currently less cost efficient. However, this may lead to increased support costs. In order to avoid this, two options are available: firstly, caps can be used to limit the amount of annual installations to a certain amount (e.g. based on a financial limit). However, the disadvantage of caps is that investment stability is reduced. Additionally, installing caps may lead to stop-and-go in the market. A second option are growth corridors with continuous automatic adjustments of tariffs, which constitute the amount of renewable capacity a country would like to see installed in a given year. In case growth is higher than envisioned a tariff degression would apply. The advantage against caps is that investment stability can be preserved – provided that tariff degression adjustments are not taking place at a high rate. However, the instrument may be less effective in reducing support costs.

Stepped tariff design: this approach is used when specific resource conditions are factored in. For example, with regard to wind energy, the wind yield is taken into account by the tariff design. In several countries a reference yield is established, including in the Netherlands, France, Denmark and Germany. If wind turbines produce a higher amount of the reference yield, the tariff level will be reduced. If a wind turbine only reaches 75% of the reference wind yield, a higher tariff will be paid. By doing so, locations with less ideal conditions can also be exploited.

Support for autoproducers through net metering: a producer is able to compensate the value of electricity produced in a given period with the value of the electricity produced in other periods. The most prominent example for this approach is Italy, which introduced a law which allows RES-E plants with different power levels to apply net metering.

Tenders to establish the level of support: in the Netherlands the main instrument used is a FIP. The innovative component is that a certain budget for renewables is reserved each year. The selection of the producer depends on the premium which has to be paid to the bidder. Generators are incentivised to bid in the market at low costs, which favours more mature and cost effective technologies. The system is financed through a levy on the energy bill of end consumers (Norton Rose Fulbright 2011). In general, tender schemes are no longer used in any Member State as a dominating policy scheme (Sachverständigenrat 2012c).

Handling of waiting lists: in Austria, a number of renewable installations are on a waiting list due to a budget ceiling. The government gives the option to accept a lower tariff for these installations, instead of remaining of the waiting list.

Bibliography

Altmann, Mattias; Jan Michalski; Anthony Brenninkmeijer and Perrine Tisserand 2010: Overview of Energy Efficiency measures of European industry. Brussels: European Parliament, enerfrom http://www.lbst.de/ressources/docs2010/EP-05_Energy-Efficiency-Industry_DEC2010_PE-451-483.pdf

Austrian Energy Agency 2013: Basic Data Bioenergy 2013. Vienna: AEA.

BDEW Bundesverband der Energie- und Wasserwirtschaft e.V. 2013: Erneuerbare Energien und das EEG: Zahlen, Fakten, Grafiken 2013, from http://www.bdew.de/internet.nsf/id/17DF3FA36BF264EBC1257B0A003EE8B8/$file/Energieinfo_EE-und-das-EEG-Januar-2013.pdf

Bergek, Anna und Staffan Jacobsson 2010: Are tradable green certificates a cost-efficient policydrivingtechnical change or a rent-generating machine? Lessons from Sweden 2003-2008. In: Energy Policy 38(3), 1255-1271.

Berliner Energieagentur 2012a: European Energy Service Initiative. Improving building energy efficiency by Energy Performance Contracting. Berlin: Berliner Energieagentur GmbH: http://www.berliner-e-agentur.de/sites/default/files/uploads/pressematerial/eesibrochurefinal.pdf

Berliner Energieagentur 2012b: European Energy Service Initiative. Publishable Report. Berlin: Berliner Energieagentur GmbH. Available at: http://www.european-energy-service-initiative.net/fileadmin/user_upload/bea/Documents/EESI_Final_Publishable_Report.pdf

Bolay, Sebastian; Corinna Grajetzky; Hermann Hüwels; Kathrin Andrea and Susanne Lechner 2012: Faktenpapier Strompreise in Deutschland. Bestandteile - Entwicklungen – Strategien, from www.dihk.de/presse/jahresthema-2012/faktenpapier-strompreise.pdf

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit 2012a: Die wichtigsten Änderungen der EEG-Novelle zur Photovoltaik 2012, from http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/aenderungen_eeg_120628_bf.pdf

Ciarreta, Aitor Antuñano, Carlos Gutierrez-Hita and Shahriyar Nasirov. 2011: Renewable Energy Sources in the Spanish Electricity Market: Instruments and Effects.

Council of European Energy Regulators 2013: Status Review of Renewable and Energy Efficiency Support Schemes in Europe. Brussels: Council of European Energy Regulators. Available at: http://www.ceer.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/Electricity/Tab2/C12-SDE-33-03_RES%20SR_25%20June%202013%20revised%20publication.pdf

Couture, Toby and Yves Gagnon 2010: Analysis of feed-in tariff remuneration models. In: Energypolicy 38, 955-965.

Coward, Richard 2013: Energy Savings Obligations. Global Experience, Lessons Learned. Workshop on experience and policies on energy saving obligations and white certificates. Scanno, Italy, 9 April 2013. Available at: http://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/files/documents/events/1.3_rap_cowart_eeos_-_global_review_jrc_varese_italy-april_9_2013ag2.pdf

Del Río, Pablo and Pere Mir-Artigues 2012: Support for solar PV deployment in Spain: Some policy lessons. In: Renewable and Sustainable Energy Reviews 16, 5557-5566.

Deutsche Welle 2013: Germany plans to curb energy transition. Retrieved 9 December 2013, from http://www.dw.de/germany-plans-to-curb-energy-transition/a-17263482

Diefenbach, Nikolaus; Britta Stein; Tobias Loga; Markus Rodenfels; Jürgen Gabriel and Max Fette 2013: Monitoring der KfW-Programme „Energieeffizient Sanieren“ und „Energieeffizient Bauen“. KfW Bankengruppe. Available at: https://www.kfw.de/PDF/Download-Center/Konzernthemen/Research/PDF-Dokumente-alle-Evaluationen/Monitoring-EBS-2012.pdf

Diekmann, Jochen; Claudia Kempfert; Karsten Neuhoff; Wolf-Peter Schill and Thure Traber. 2012: Erneuerbare Energien: Quotenmodellkeine Alternative zum EEG. In: DIW Wochenbericht Vol. 79, Iss 45, 15-20.

DiXi Group 2013: Ukraine and Energy Community: Two Years of Waiting. Kyiv: DiXi Group.

De Jager, David; Corinna Klessmann; Eva Stricker; Thomas Winkel; Erika de Visser; Michèle Koper; Mario Ragwitz; Anne Held; Gustav Resch; Sebastian Busch; Christian Panzer; Alexis Gazzo; Thomas Roulleau; Pierre Gousseland; Marion Henriet; Arnaud Bouillè 2011: Financing Renewable Energy in the European Energy Market. Utrecht: Ecofys.

Egger, Christiane; Reinhold Priewasser; Michaela Kloiber; Lucia Bezáková; Nils Borg; Dominique Bourges and Peter Schilken 2012: Progress in energy efficiency policies in the EU Member States – the experts perspective: Findings from the Energy Efficiency Watch Project. Available at: http://www.energy-efficiency-watch.org/fileadmin/eew_documents/EEW2/EEW_Survey_Report.pdf

Eur'observer 2011: État des ènergies renouvelables en Europe 2011, from http://www.eurobserv-er.org/pdf/barobilan11.pdf

Eur'observer 2012: Solid biomass barometer, from: http://www.eurobserv-er.org/pdf/baro212biomass.pdf.

European Commission 2008: The support of electricity from renewable energy sources. Accompanying document to the Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources.

European Commission 2010: Report on sustainability requirements for the use of solid and gaseous biomass resources in electricity, heating and cooling. (COM 2010/11).

European Commission 2011a: Communication on Energy Efficiency Plan 2011 COM/2011/0109 final.

European Commission 2011b: Communication on Energy Roadmap. SEC(2011) 1565final.

European Commission 2013a: European Commission guidance for the design of renewables support schemes. SWD(2013) 439 final.

European Commission 2013b: Financial support for energy efficiency in buildings (COM2013) 225 final. Available at: http://ec.europa.eu/energy/efficiency/buildings/doc/swd_2013_143_accomp_report_financing_ee_buildings.pdf

European Commission 2013c: Renewable energy progress report (SWD2013) 102 final.

European Commission 2014: Biomass potential. Retrieved 19 March 2014, from http://ec.europa.eu/agriculture/bioenergy/potential/index_en.htm

European Energy Network 2014: Energy efficiency in Europe: Overview of policies and good practices. Algés: European Energy Network. Available at: http://www.enr-network.org/assets/files/news_and_events/EnR-EEE-Broch-PaP-web.pdf

Eurostat 2012: Energy, transport and environment indicators, from http://www.eds-destatis.de/downloads/publ/KS-DK-12-001-EN-N.pdf

Expertenkommission Forschung und Innovation 2013: Gutachten zu Forschung, Innovation und technologischer Leistungsfähigkeit Deutschlands 2013. Berlin: EFI.

Federal Republic of Germany 2010: National Renewable Energy Action Plan in accordance with Directive 2009/28/EC on the promotion of the use of energy from renewable sources. Available at: http://ec.europa.eu/energy/renewables/action_plan_en.htm

Finish Ministry of Employment and the Economy 2010a: Press release 032/2010. Available at: https://www.tem.fi/files/26318/Press_release_4_February_2010_final.pdf

Freshfields Bruckhaus Deringer (without date): Tariff changes for photovoltaic power in Spain. Retrieved at 4. December, from http://www.mondaq.com/x/126100/Renewables/Tariff+Changes+For+Photovoltaic+Solar+Power+In+Spain

Fritsch, Michael; Thomas Wein and Hans-Jürgen Ewers 2007: Marktversagen und Wirtschaftspolitik. 7. Auflage. Vahlen.

Frondel, Manuel et al. 2010: Economic impacts from the promotion of renewable energy technologies: The German experience. In: Energy Policy 38(8), 4048–4056.

FrontierEconomics 2012: Die Zukunft des EEG – Handlungsoptionen und Reformansätze. Bericht für die EnBW Energie Baden-Württemberg AG. November 2012.

FrontierEconomics 2011: Study on market design for a renewable quota scheme. A final report prepared for Energie-Nederland.

Geletukha Georgiy and Tetiana Zheliezna 2013: Barriers to the Development of Bioenergy in Ukraine. UABio Position Paper N3. Kyiv: Bioenergy Association of Ukraine.

Gynter, Lea 2012: Energy Efficiency Policies in Industry. Lessons Learned from the ODYSSEE-MURE project, from: http://www.odyssee-indicators.org/publications/PDF/Industry-policies-brochure.pdf

Haas, Reinhard; Christian Panzer; Marion Ragwitz; Gemma Reece and Anne Held 2011: A historical review of promotion strategies for electricity from renewable energy sources in EU countries. In: Renewable and Sustainable Energy Reviews 15(2),1003-1034.

Held, Anne; Mario Ragwitz; Malte Gephart; Erika de Visser and Corinna Klessmann 2014: Design features of support schemes for renewable electricity. Utrecht: Ecofys. Available at: http://ec.europa.eu/energy/renewables/studies/doc/2014_design_features_of_support_schemes.pdf

IEA 2009: Energy Policies of IEA countries: Italy 2009 Review. Paris: IEA Publications, from http://www.iea.org/publications/freepublications/publication/italy2009.pdf

IEA 2011a: Deploying Renewables 2011. Best and future policy practice. Paris: IEA Publications.

IEA 2011b: Renewable Energy. Policy considerations for deploying renewables. Paris: IEA Publications.

IEA 2012a: Ukraine 2012. Energy Policies Beyond IEA Countries: Executive Summary, Key Recommendations, Introductory Chapter. Paris: IEA. Available at: http://www.iea.org/publications/freepublications/publication/UK_Summaryplus.pdf

IEA 2012b: Tracking Clean Energy Progress: Energy Technology Perspectives 2012 excerpt as IEA input to the Clean Energy Ministerial. Paris: OECD/IEA.

IEA 2012c: Ukraine Energy Policy Review 2012. Energy Policies Beyond IEA Countries. Paris: IEA Publications.

Institut der deutschen Wirtschaft Köln 2009: Grundzüge einer effizienten Klimapolitik - weist die ökologische Industriepolitik den richtigen Weg? Gutachten für den Deutschen Industrie- und Handelskammertag (DIHK). Köln: Institut der deutschen Wirtschaft, fromhttp://www.muenchen.ihk.de/de/innovation/Anhaenge/Klimapolitik_Gutachten_092.pdf

Institute for Industrial Productivity 2012: Bulgaria Energy Efficiency And Renewable Sources Fund – Fact Sheet. Available at: http://www.iipnetwork.org/IIP-FinanceFactsheet-4-EERSF.pdf

IRENA/IISD 2012: Evaluating policies in support of the deployment of renewable power. Policy brief. Abu Dhabi: IRENA, from http://www.irena.org/DocumentDownloads/Publications/Evaluating_policies_in_support_of_the_deployment_of_renewable_power.pdf

Klein, Caroline 2012: Climate Change Policies in Germany. OECD Economics Department. Working Papers 982, from http://search.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP(2012)59&docLanguage=En

Klein, Caroline et al. 2010: Evaluation of different Feed-in tariff design options. Best Practice Paper for the International Feed-In Cooperation. EEG/Fraunhofer ISI.

Klein, Caroline. et al. 2008: Evaluation of different feed-in tariff design options – Best practice paper for the International Feed-In Cooperation. EEG/Fraunhofer ISI.

Klobasa, Marian; Jenny Winkler; Frank Senssfuss and Mario Ragwitz 2013: .Market integration of renewable electricity generation – the German market premium model. In: Energy and Environment 24 (1-2), 127-146.

Kostyshena, N. 2013: Recommendations on Launching of Market Mechanisms and Financial and Fiscal Instruments to Improve Energy Efficiency and Promoting Renewable Energy. Kyiv: UNIDO/GEF Project “Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine”.

KPMG 2012: Taxes and incentives for renewable energy. KPMG International. Available at: http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/taxes-incentives-renewable-energy-2012.pdf

Küchler, Swantje and Juri Horst 2012: Strom- und Energiekosten der Industrie. Pauschale Vergünstigungen auf dem Prüfstand. FÖS, Greenpeace, IZES, from http://www.greenpeace.de/fileadmin/gpd/user_upload/themen/energie/2012-FOES-IZES-Verguenstigungen-Industrie.pdf

Lakyda, P.; G. Geletukha; R. Vasylyshyn et al. 2011: Energy Potential of Biomass in Ukraine: Kyiv: Publishing Center of NUBiP.

Lehr, Ulrike; Christian Lutz and Martin Pehnt 2012: Volkswirtschaftliche Effekte der Energiewende: Erneuerbare Energien und Energieeffizienz. GWS, IFEU, Osnabrück,

Heidelberg: BMU, from
http://www.bmu.de/files/pdfs/allgemein/application/pdf/studie_effekte_energiewende.pdf

Matveichuk, O 2012: Analysis of the Draft Laws in the Area of Energy Efficiency, Energy Savings and Renewable Sources of Energy. Kyiv: UNIDO/GEF Project "Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine".

Mercados EMI; Exergia and Rambokk 2011: Assistance to the National Energy Regulatory Commission of Ukraine – Regulatory Support Programme: Subtask I: Full implementation of the existing Green Tariff Law and Methodology. Report prepared for Ukrainian National Electricity Regulatory Commission.

Mercados EMI; Exergia and Ramboll 2013: UREDLF – Regulatory Support Programme: Final Report prepared for Ukrainian National Commission that Implements the State Regulation in the Energy Sector.

Mitchell, Catherine. et al. 2011: Policy, Financing and Implementation. In: IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation. Cambridge University Press: Cambridge and New York, 865-950.

Monopolkommission 2011: Energie 2011: Wettbewerbsentwicklung mit Licht und Schatten, Sondergutachten 59 der Monopolkommission gemäß § 62 Abs. 1 EnWG, from
http://www.monopolkommission.de/sg_59/s59_volltext.pdf

Moss, Diane and Angelina Galiteva 2012: Comments on Spain's Recent Renewable Energy Policy Decisions. Retrieved 4 December 2013, from
http://www.renewableenergyworld.com/rea/blog/post/2012/02/comments-on-spains-recent-renewable-energy-policy-decisions

MURE II 2014: Market incentives: the white certificates system. Available at:
http://www.muredatabase.org/public/mure_pdf/general/ITA2.PDF

Odyssee-Mure 2013: Key messages on energy efficiency in EU. Lessons from the ODYSEE MURE project. Summary. Available at: http://www.odyssee-mure.eu/publications/br/summary-about-energy-efficiency-trends-and-policies-by-sector-in-Europe.pdf

OECD/IEA 2013: Monthly Electricity Statistics. February 2013. Available at:
http://www.iea.org/stats/surveys/mes.pdf

Ofgem UK Office of the Gas and Electricity Markets 2012: Electricity Capacity Assessment. London: Ofgem. Available at: http://www.ofgem.gov.uk/Markets/WhlMkts/monitoring-energy-security/elec-capacity-assessment/Documents1/Electricity%20Capacity%20Assessment%202012.pdf

Orthen, Stephan and Robert Brückmann 2009: BAP Driver. Development of Integrated National Bioenergy Action Plans. Operational Guide for Policy Makers working on template for National Renewable Energy Action Plans. Available at: http://www.repap2020.eu/fileadmin/user_upload/bapdriver_policyguideline.pdf

Orthen, Stephan, Robert Brückmann and Katrin Kirchert 2009: BAP Driver. European Best Practice Report. Comparative assessment of national bioenergy strategies & biomass action plans in 12 EU countries. Berlin: eclaron. Available at: http://www.repap2020.eu/fileadmin/user_upload/090929_bapdriver_wp2_bpreport_final_website.pdf

Pelkmans Luc 2013: Do national policies address the efficient use of biomass resources? Biomass Policies workshop "Efficient use of biomass resources", Brussels, 26 November

2013. Berlin: eclaron. Available at: http://www.biomasspolicies.eu/wp-content/uploads/2013/11/20131126-Policies_Pelkmans.pdf

Pepelov, Olexander 2012: Analysis of current policy, legislative and regulatory framework in Ukraine on operationalization of policies and laws to scale up EE and use of renewables in energy intensive industrial sector with specific focus on SMEs. Kyiv: UNIDO/GEF Project "Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine".

Polishchuk, Nataliya 2012: Situation and prospects for development in the agro-food and other small and medium sized enterprises (SMEs) in Ukraine in the aspect of efficient use of fuel and energy and introduction of renewable sources of energy. Kyiv: UNIDO/GEF Project "Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine".

Rademaekers, Koen; Roel van der Veen; Rob Williams; Sil Boeve; Gideon van Toledo; Jan Bleyl; Jos Sijm; Paul Vethman; Laura Würtenberger; Bronia Jablonska; Xander van Tilburg and Raouf Saïdi 2012: Local investments options in Energy Efficiency in the built environment. An overview of good practices. Report for DG Energy. Rotterdam: Ecorys. Available at: http://ec.europa.eu/energy/efficiency/buildings/doc/local_investments__energy_efficiency_built_environment_case_studies.pdf

Ragwitz, Mario; Anne Held; Barbara Breitschopf; Max Rathmann, Corinna Klessmann; Gustav Resch; Christian Panzer; Sebastian Busch; Karsten Neuhoff; Martin Junginger; Ric Hoefnagels; Niccolò Cusumano; Arturo Lorenzoni; Jitske Burgers; Maroeska Boots; Inga Konstantinaviciute; Botond Weröes 2011: Review report on support schemes for renewable electricity and heating in Europe. A report compiled within the European research project RE-Shaping (work package 3), from http://www.reshaping-res-policy.eu/downloads/D8%20Review%20Report_final%20%28RE-Shaping%29.pdf

Ragwitz, Mario; Anne Held; Barbara Breitschopf; Max Rathmann, Corinna Klessmann; Gustav Resch; Christian Panzer; Sebastian Busch; Karsten Neuhoff; Martin Junginger; Ric Hoefnagels; Niccolò Cusumano; Arturo Lorenzoni; Jitske Burgers; Maroeska Boots; Inga Konstantinaviciute; Botond Weröes 2012a: RE-Shaping: Shaping an effective and efficient European renewable energy market. Final report, from http://www.reshaping-res-policy.eu/downloads/Final%20report%20RE-Shaping_Druck_D23.pdf

Ragwitz, Mario; Jenny Winkler; Corinna Klessmann; Malte Gephart and Gustav Resch 2012b: Recent developments of feed-in systems in the EU – A research paper for the International Feed-In Cooperation. A report commissioned by the Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), from http://www.feed-in-cooperation.org/wDefault_7/download-files/research/101105_feed-in_evaluation_update-January-2012_draft_final_ISI.pdf.

Rehbock, Wolfram 2012: Ukrainian Energy Overview 2012. In: Journal of Energy & Natural Resources Law. Vol. 30 No. 3, 301-324.

Reinaud, Julia; Amélie Goldberg and Vida Rozite 2012: Energy Management Programmes for Industry: Gaining through savings. Paris: IEA Publications. Available at: http://www.iea.org/publications/freepublications/publication/policypathwaysindustry.pdf

Resch, Gustav; Mario Ragwitz; Anne Held; Thomas Faber and Reinhard Haas 2007: Feed-in tariffs and quotas for renewable energy in Europe. In: CESifo DICE report 4/2007, from http://webcache.googleusercontent.com/search?q=cache:rI27wLHQhk8J:www.cesifo-group.de/DocCIDL/dicereport407-forum5.pdf+&cd=2&hl=de&ct=clnk&gl=de

Resch, Gustav; Christian Panzer; André Ortner; Sebastian Busch; Pablo del Rio; Mario Ragwitz; Simone Steinhilber; Marian Klobasa; Jenny Winkler; Malte Gephart; Corinna

Klessmann; Isabelle de Lovinfosse; Jana V. Nysten; Dörte Fouquet; Angus Johnston; Carlos Batlle; Pedro Linares; Jaroslav Knapek; Tomas Kralik; Thomas Faber; Bugra Borasoy; Felipe Toro, Ilja Lifschitz 2012: Design and impact of a harmonised policy for renewable electricity in Europe. D7.1 Report. Inception report beyond2020 - approaches for a harmonisation of RES(-E) support in Europe. A report compiled within the European IEE project beyod2020, from http://www.res-policy-beyond2020.eu/

Reuters 2013: German coalition agrees on energy reform. Retrieved 9 December 2013, from http://uk.reuters.com/article/2013/11/27/germany-coalition-energy-idUKL5N0JC27D20131127

Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI) 2012: Marktwirtschaftliche Energiewende: Ein Wettbewerbsrahmen für die Stromversorgung mit alternativen Technologien, from http://www.rwi-essen.de/media/content/pages/publikationen/rwi-projektberichte/PB_Marktwirtschaftliche-Energiewende.pdf

Rieseberg, Sarah and Christine Wörlen 2012: Befreiungen der energieintensiven Industrie in Deutschland von Energieabgaben.

Rochas, Claudio 2012: Energy Efficiency Services. Good Practice Business Models and Succesful Market Developments. Report as part of the ChangeBest project. Available at: http://www.eaci-projects.eu/iee/page/Page.jsp?op=project_detail&prid=1860

Sachverständigenrat 2011: Jahresgutachten 2011/12. Kapitel sechs: Energiepolitik: Erfolgreiche Energiewende nur im europäischen Kontext, from http://www.sachverstaendigenrat-wirtschaft.de/fileadmin/dateiablage/download/gutachten/ga11_vi.pdf

Sachverständigenrat 2012a: Bei der Energiewende mehrMarktwirtschaftwagen, Jahresgutachten 2012/13.

Sachverständigenrat 2012b: Energiepolitik: Erfolgreiche Energiewende nur im europäischen Kontext. Arbeitspapier 03/2012, from http://www.sachverstaendigenrat-wirtschaft.de/fileadmin/dateiablage/download/publikationen/arbeitspapier_03_2012.pdf

Sachverständigenrat 2012c: Stabile Architektur für Europa – Handlungsbedarf im Inland. Jahresgutachten 2012/2013.

Schilcher, K. and J. Schmidl 2009: Country study on political framework and availability of biomass. Report of Austrian Energy Agency for 4Biomass. EU project. Available at: www.4biomass.eu

Schlomann, Barbara and Wolfgang Eichhammer 2013: Energy Efficiency Policies in the EU. Lessons from the Odyssee-Mure Project, from: http://www.odyssee-indicators.org/publications/PDF/MURE-Overall-Policy-Brochure.pdf

Schüle, Ralf; Vera Höfele; Stefan Thomas and Daniel Becker 2011: Improving National Energy Efficiency Strategies in the EU Framework. Findings from Energy Efficiency Watch Analysis. EEW-Publication Nr. 1/2011.

Schüle, Ralf; Thomas Madry; Vera Aydin; Jonas Fischer; Jan Kaselofsky; Thorsten Koska; Carolin Schäfer-Sparenberg; Lena Tholen; Daniel Becker; Nikolas Bader and Doris Johnsen 2013a: Good practice ways out of energy dept. Implementation of energy efficiency policies in EU Member States. Brussels: EUFORES.

Schüle, Ralf; Vera Aydin; Jonas Fischer; Thomas Madry; Stefan Thomas; Daniel Becker; Nikolas Bader and Christiane Egger 2013b: Improving and Implementing National Energy Efficiency Strategies in the EU Framework. Findings from Energy Efficiency Watch II Analyses. Brussels: EUFORES. Available at: http://www.energy-efficiency-watch.org/fileadmin/eew_documents/images/Event_pictures/EEW2_Logos/EEW-Final_Report.pdf

Schüle, Ralf; Thomas Madry; Vera Aydin; Jonas Fischer; Jan Kaselofsky; Thorsten Koska; Carolin Schäfer-Sparenberg; Lena Tholen; Daniel Becker and Christiane Egger 2013c: Energy Efficiency in Europe. Assessment of Energy Efficiency Action Plans and Policies in EU Member States 2013c. Country Report Denmark. Brussels: EUFORES. Available at: http://www.energy-efficiency-watch.org/fileadmin/eew_documents/Documents/EEW2/Denmark.pdf

Schüle, Ralf; Thomas Madry; Vera Aydin; Jonas Fischer; Jan Kaselofsky; Thorsten Koska; Carolin Schäfer-Sparenberg; Lena Tholen; Daniel Becker and Christiane Egger 2013c: Energy Efficiency in Europe. Assessment of Energy Efficiency Action Plans and Policies in EU Member States 2013d. Country Report Finland. Brussels: EUFORES. Available at: http://www.energy-efficiency-watch.org/fileadmin/eew_documents/Documents/EEW2/Finland.pdf

Schüle, Ralf; Thomas Madry; Vera Aydin; Jonas Fischer; Jan Kaselofsky; Thorsten Koska; Carolin Schäfer-Sparenberg; Lena Tholen; Daniel Becker and Christiane Egger 2013c: Energy Efficiency in Europe. Assessment of Energy Efficiency Action Plans and Policies in EU Member States 2013e. Country Report France. Brussels: EUFORES. Available at: http://www.energy-efficiency-watch.org/fileadmin/eew_documents/Documents/EEW2/France.pdf

Staniaszek, Dan and Eoin Lees 2012: Determining Energy Savings for Energy Efficiency Obligation Schemes. Montpelier, Vermont: RAP. Available at: http://www.eceee.org/RAPeceeeESOreportApril20121.pdf

State Agency on Energy Efficiency and Energy Saving in Ukraine (SAEE) 2013a: National Energy Efficiency Action Plan Through 2020 (Draft).

State Agency on Energy Efficiency and Energy Saving in Ukraine (SAEE) 2013b: National Renewable Energy Action Plan (Draft).

Szomolanyiova, Jana and Vladimir Sochor 2012: Accelerating the development of the energy efficiency service markets in the EU. Conclusions and policy recommendations from the ChangeBest project. Prag: SEVen. Available at: http://www.changebest.eu/images/stories/deliverables/changebest_policyconclusions_final.pdf

Teckenburg, Eva et al. 2011: Renewable Energy Policy Country Profiles. Ecofys, Fraunhofer ISI, EEG, LEI. Zuletzt eingesehen am 16.01.2013, from http://www.reshaping-res-policy.eu/downloads/RE-SHAPING_Renewable-Energy-Policy-Country-profiles-2011_FINAL_1.pdf

UNDP GEF 2012: Transforming On-GridRenewableEnergyMarkets. A Review of UNDP-GEF Support for Feed-in Tariffs and Related Price and Market-Access Instruments. UNDP-GEF: New York.

Verbruggen, Aviel and Volkmar Lauber 2012: Assessing the performance of renewableelectricity support instruments. In: Energy Policy 45.

Viebahn, Peter et al. 2011: The Potential Role of Concentrated Solar Power. In: Energy Policy (39, 2011).

Weber, Michael et al. 2012: Effektive und effiziente Klimapolitik. In: Wirtschaftsdienst 13, from http://www.wirtschaftsdienst.eu/archiv/jahr/2012/13/2733/hu/

Winkel, Thomas; Max Rathmann; Mario Ragwitz; Simone Steinhilber; Jenny Winkler; Gustav Resch; Christian Panzer; Sebastian Busch and Inga Konstantinaviciute 2011: Renewable Energy Policy Country Profiles. Prepared within the Intelligent Energy Europe project, from http://www.reshaping-res-policy.eu/downloads/RE-Shaping_CP_final_18JAN2012.pdf

Woodman, B. und C. Mitchell 2011: Learning fromexperience? The development of the Renewables Obligation in England and Wales 2002–2010. In: Energy Policy 39(7), pp. 3914-3921.

Wuppertal Institute 2012: How to design and implement efficiency policies. Available at: http://www.bigee.net/en/buildings/guide/

Zervos, Arthouros; Christine Lins; Lucie Tesnière and Eleanor Smith 2011: Mapping renewable energy Pathways towards 2020. EU Roadmap. Brussels: EREC, from http://www.erec.org/fileadmin/erec_docs/Documents/Publications/EREC-roadmap-V4_final.pdf

Zhang, Fan 2013: How fit are feed-in tariffpolicies ? Evidence from the European wind market. Policy Researchworkingpaper no. 6376. Washington, DC: World Bank.

Websites

Build Up 2013: L’éco-prêt à taux zéro (The 0% eco-interest loan) – France. Retrieved 13 May 2014, from: http://www.buildup.eu/links/36158

Danish Energy Agency 2014: RE for production process. Retrieved 12 May 2014, from http://www.ens.dk/en/consumption-savings/energy-consumption-production-industries/re-production-processes

Department of Energy & Climate Change 2014: What is the ECA scheme? Retrieved 13 May 2014, from https://etl.decc.gov.uk/etl/site/about.html

Federal Ministry for Economic Affairs and Energy: http://www.bmwi.de/EN

Finish Ministry of Employment and the Economy 2010b: Government Decision on Energy Efficiency Measures. Retrieved 11 May 2014, from https://www.tem.fi/files/26317/Government_Decision_on_Energy_Efficiency_Measures.pdf

German Energy Blog 2010: Act on Energy Services and Energy Efficiency Measures Enters into Force. Retrieved 9 May 2014, from: http://www.germanenergyblog.de/?p=4536#more-4536

Institute for Industrial Productivity 2013a: Industrial Efficiency Policy Database. GE-4: KfW Environmental and Energy Efficiency Programmes (formally ERP). Retrieved 22 February 2014, from http://iepd.iipnetwork.org/policy/kfw-environmental-and-energy-efficiency-programmes-formally-erp

Institute for Industrial Productivity 2013b: Industrial Efficiency Policy Database. FI-1: Energy Efficiency Agreements. Retrieved 22 February 2014, from http://iepd.iipnetwork.org/policy/energy-efficiency-agreements

Institute for Industrial Productivity 2013c: Industrial Efficiency Policy Database. GE-10: BMWi promotion of highly-efficient cross-sectoral technologies. Retrieved 22 February 2014, from http://iepd.iipnetwork.org/policy/bmwi-promotion-highly-efficient-cross-sectoral-technologies

Institute for Industrial Productivity 2013d: Industrial Efficiency Policy Database: Germany. Retrieved: 11 May 2014, from: http://iepd.iipnetwork.org/country/germany#relevant-policies

KfW 2014: Energy-efficient Construction and refurbishment. Retrieved 13 May 2014, from https://www.kfw.de/inlandsfoerderung/Unternehmen/Wohnwirtschaft/index-2.html

KPMG 2013: Energy efficiency. Retrieved at 11 May 2014, from http://www.kpmg.com/global/en/issuesandinsights/articlespublications/green-tax/pages/energy-efficiency.aspx

Odyssee-Mure 2014: Database. Retrieved at 13 May 2014, from http://www.measures-odyssee-mure.eu

RES LEGAL 2013: Legal sources on renewable energy. Retrieved at: 11 May 2014, from http://www.res-legal.eu

Reuters 2014: Spain close to approving new renewable energy rules: minister. Retrieved at: 29 May, from http://www.reuters.com/article/2014/05/29/us-spain-energy-idUSKBN0E91JA20140529