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

FAIR USE POLICY

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

AUSTRIAN ENERGY AGENCY

Improving EE and Promoting RE in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine

Workstream 2 Report

Interim Report

Authors:	Gabriele Brandl, AEA
	Robin Krutak, AEA
	Konstantin Kulterer, AEA
	Pavlo Rozen, UNIDO
	Cornelia Schenk, AEA
	Herbert Tretter, AEA

Client:	GEF UNIDO
Date:	Vienna, Jänner 2015

UNIDO gef adelphi

IMPRINT

Published and produced by: Österreichische Energieagentur – Austrian Energy Agency
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
Editor in Chief: DI Peter Traupmann | Project management: Gabriele Brandl | Reviewing: Leonardo Barreto-Gomez, Shruti Athavale | Layout: Margaretha Bannert
Produced and published in Vienna

Abstract

The 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 and other energy intensive small- and medium-sized enterprises (SMEs) in Ukraine. The project consists of three workstreams; this report is related to workstream 2, the formulation of recommendations to strengthen the framework to promote EE and RES. When considering the topics of EE and RE in Ukraine, the political situation must be also taken into account.

The political situation since November 2013 and the continuing conflict with Russia are challenges for the energy security and energy supply in Ukraine. This situation causes a much stronger political support for renewable energy and energy efficiency measures in Ukraine. Parliamentary elections took place in Ukraine on 26th of October 2014, which also influenced the project due to political and institutional restructuring.

As a contracting party of the Energy Community, Ukraine has committed to implement the Renewable Energy Directive 2009/28/EC. Within this framework, Ukraine has created a National Renewable Energy Action Plan (NREAP), which was formally approved by the Cabinet of Ministers at the beginning of October 2014. The NREAP is available in Ukrainian (with a summary in English), which was considered within this project report. Ukraine has also committed to implement the Energy End-Use Efficiency and Energy Services Directive 2006/32/EC within the Energy Community acquis. For implementing this Directive, Ukraine must create an Energy Efficiency Action Plan (NEEAP). The NEEAP is still a draft and needs to be formally adopted. So far, the EU Energy Efficiency Directive 2012/27/EU has not become part of the Energy Community acquis. The Energy Community Secretariat prepared proposals for adaptations of the Energy Efficiency Directive 2012/27/EU (EED) for adoption in the Energy Community regulations, which were discussed in the Permanent High Level Group meeting on the 17th of December 2014 (PHLG, 2014).

The Energy Community Secretariat recently questioned compliance of the Ukrainian local content requirements as a prerequisite for obtaining the „Green Tariff“ with the Energy Community acquis. In October 2014, the Energy Community Secretariat (ECS) sent an Opening Letter against Ukraine concerning the local content clause in the Electricity Law of Ukraine. In its Opening Letter, the ECS takes the preliminary view that the LCR violates Directive 2009/28/EC on the promotion of the use of RES, as well as Article 7 of the Treaty prohibiting discriminatory treatment. The national content requirement of Ukraine is discussed in the light of international law and by drawing on existing cases in this report. Actions to comply with Directive 2009/28/EC are still pending by Ukraine.

Against this political and legal background, and in consultation with the Ukrainian UNIDO project team, the content of this workstream and report was determined. The relevance for Ukraine and the relevance for agro-food enterprises were highlighted within all topics of the report.

In order to strengthen the framework to promote RES in industries in Ukraine the focus was set on transport and biofuel measures. Best practice examples on implementing measures regarding the car/truck pool of enterprises in Austria are also presented.

To strenghthen the framework to promote EE in industries and agro-food enterprises in Ukraine an EE measure-mix was shown. Important measures to improve energy efficiency in industries are mandatory energy audits for large companies (non-SMEs), voluntary energy audits for SMEs and the implemetation of minimum

energy performance standards (MEPS) for motors, fans and pumps. In this report, Austria's implementation of Article 8 of the EED regarding energy audits and instruments for supporting SMEs is also shown.

Contents

1 Introduction

The 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 and other energy-intensive small- and medium-sized enterprises (SMEs) in Ukraine.

The project consists of three workstreams:

1. Workstream 1: Assess the EE and RE policy framework;
2. Workstream 2: Formulate recommendations to strengthen the framework to promote energy efficiency (EE) and renewable energy sources (RES) in SMEs and
3. Workstream 3: Support public authorities in promoting the integration of EE and RE into the industrial development agenda.

This report is related to workstream 2, namely the formulation of recommendations to strengthen the framework to promote EE and RES. When considering the topics of EE and RES in Ukraine, the political situation has to be taken into account. The political situation since November 2013 and the continuing conflict with Russia are challenges for the energy security and energy supply in Ukraine. This situation causes a much stronger political support for renewable energy and energy efficiency measures in Ukraine. Parliamentary elections took place in Ukraine on 26th of October 2014, which affected political and institutional restructuring processes.

As a Contracting Party of the Energy Community, Ukraine has committed to implement the Renewable Energy Directive 2009/28/EC. Within this framework, Ukraine has created a National Renewable Energy Action Plan (NREAP), which was formally approved by the Cabinet of Ministers at the beginning of October 2014. The NREAP is available in Ukrainian (with a summary in English), which was considered within this project report.

Ukraine has also committed to implement the Energy End-Use Efficiency and Energy Services Directive 2006/32/EC within the Energy Community acquis. For implementing this Directive, Ukraine must create an Energy Effiicciency Action Plan (NEEAP). The NEEAP is still a draft and needs to be formally adopted. So far, the EU Energy Efficiency Directive 2012/27/EU has not become part of the Energy Community acquis. The Energy Community Secretariat prepared proposals for adaptations of the Energy Efficiency Directive 2012/27/EU for adoption in the Energy Community regulations, which were discussed in the Permanent High Level Group meeting on the 17th of December 2014 (PHLG, 2014).

The Energy Community Secretariat recently questioned compliance of the Ukrainian local content requirements as a prerequisite for obtaining the „Green Tariff“ with the Energy Community acquis. In October 2014, the Energy Community Secretariat (ECS) sent an Opening Letter against Ukraine concerning the local content clause in the Electricity Law of Ukraine. In its Opening Letter, the ECS takes the preliminary view that the LCR violates Directive 2009/28/EC on the promotion of the use of RES, as well as Article 7 of the Treaty prohibiting discriminatory treatment. The national content requirement of Ukraine is discussed in the light of international law and by drawing on existing cases in this report. Actions to comply with Directive 2009/28/EC are still pending in Ukraine.

Against this poitical and legal background, and in consultation with the Ukrainian UNIDO team, the content of this report was determined:

- Discussion of selected framework conditions for renewable energy and recommendations:
  Based on the Workstream 1 report and on two reports by a national policy expert, some framework conditions for renewable energy in Ukraine were discussed in more detail, and recommendations for improvement were given. This involves drawing on European Union experience with RES framework conditions. Ms Kostyshena, a Ukrainian EE and RES policy expert, has created two reports; in the first report the analysis of existing EE and RES policies in Ukraine was done and in the second report the recommendations for improvement were shown.
- Best-practice examples for implementing EU Directive 2012/27/EU:
  In this report, the general requirements of EU Directive 2012/27/EU (EED) and the Austrian implementation of the EED regarding energy audits, energy-/environmental management systems and qualification scheme for energy auditors are shown. The Austrian monitoring system for the measures was also introduced and recommendations for implementing such a monitoring system in Ukraine (institutional structure) were provided.
- Analysis and comparison of support mechanisms for biofuels (overview) and best-practice examples for energy-relevant measures regarding the car pool/truck pool of companies:
  As requested by the UNIDO project team, the report has a focus on biofuels and best-practice examples on implementing measures regarding the car/truck pool of enterprises.
- Recommendations regarding data collection and statistical processes (based on best-practice examples):
  The Energy Community has stated that Ukraine is still short of compliance with the Acquis of Statistics (Energy Community, 2014). Within workstream 2, the UNIDO project team was informed by an Austrian expert during a workshop in June 2014 in Vienna about creating the energy balance in Austria; this information is integrated in the report. A first analysis of the statistical process in Ukraine was done by Pavlo Rozen, a team member of the Ukrainian UNIDO project team. A comprehensive analysis of the Ukrainian energy balance and recommendations for improvement could not be included in this project due to a lack of substantive information.

For all topics covered in the report, their relevance for Ukraine in general and for agro-food enterprises were highlighted.

2 Supporting Renewable Energy Sources in Ukraine

This chapter describes selected aspects regarding the framework conditions for renewable energy sources in Ukraine, based on workstream 1 report and the two reports by the national policy expert N. Kostyshyna. Moreover, the methodology of and European experiences with calculating target achievement for the Renewable Energy Sources Directive 2009/28/EC (RES Directive), as well as the directive's targets for the transport sector are discussed. The relevance of these topics for Ukraine in general and agro-food industries in particular are highlighted where appropriate.

2.1 Framework Conditions for Renewable Energy Sources in Ukraine

Based on the analysis in the report of Workstream 1 (adelphi 2014), and on the report by national expert N. Kostyshena (Kostyshena 2014), several framework conditions for the deployment of renewable energy sources are addressed in the following.

2.1.1 Deployment of Renewable Energy Sources in Ukraine

(Kostyshena 2014) identified several challenges for the deployment of renewable energy sources in Ukraine, including the absence of benchmarks and targets, the lack of responsible bodies for the achievement of the RES target in the energy sector, and the still pending adoption/approval of the National Renewable Energy Action Plan.

The National Renewable Energy Action Plan of Ukraine up to 2020 was approved by the Cabinet of Ministers of Ukraine with Executive Order No. 902-p of 1st October 2014, which includes targets and trajectories for the share of renewable energy sources in Ukraine's energy mix, as well as for specific renewable energy technologies. The Progress Report on the Renewable Energy Directive 2009/28/EC was submitted by Ukraine to the Energy Community Secretariat in January 2015. As evaluated by the Energy Community Secretariat, „Ukraine has a comprehensive framework for the promotion of energy from renewable sources. However, more consistency is needed to comply with the requirements of Directive 2009/28/EC in primary and secondary legislation. Whilst the NREAP was adopted by the Council of Ministers on 1st Oct 2014, the local content requirement continues to remain an issue of concern" (Energy Community Secretariat 2015).

The framework for renewable energy deployment could be improved by streamlining authorisation and planning procedures, establishing relevant authorities and ensuring stability and reliability of framework conditions for investment in renewable energy sources. As stated in the Progress Report on the Renewable Energy Directive 2009/28/EC of January 2015, substantial progress has been made in evaluating and improving administrative procedures. This includes a clearer regulation of the procedure of setting, revision and termination of the Green Tariff for economic entities, amendments to the procedure of determining the local component for electric power facilities, and the rules of connecting electric installations to electric power networks (approved by NERC Resolution of 17 January 2013, No.32). Nonetheless, the national content requirement (as a requirement for the application for the Green Tariff) still remains in force and might not only

discourage potential investors, but might as well be violating WTO rules and cause problems for the local industry.

2.1.1.1 National Content Requirement

In line with the report by (Kostyshena 2014) it is proposed to review the local content norm for the construction of RES facilities. The suggestions to limit local content requirements (LCR) to 30 % until 2016, and to encourage the development of domestic production, should, on the other hand, be reviewed in light of the meaningfulness and rightfulness of the local content requirement overall.

Feed-in tariffs coupled with a local content requirement have a subsidizing effect in order to encourage local development of equipment production (Ukrainian Journal of Business Law 2013). To spur the manufacturing of RES technologies, and thereby increase employment opportunities, was also mentioned as a motivation of goverments to use LCRs in a recent study by the International Center for Trade and Sustainable Development (ICTSD). Nonetheless, the study argues that it may be possible to create innovative capacities in combination with LCRs, which does not indicate whether the LCR fosters medium-term innovation or whether this innovation happens in spite of LCR legislation (ICTSD 2013). To effectively create innovation capacity, the policy environment around LCRs needs to ensure that (1) attention is paid to the quality of technology in addition to learning-by-doing and that (2) LCRs are phased out when the former infant industries are mature enough to compete internationally. Furthermore, effectiveness of LCRs could be enhanced by slowly and gradually raising LCR levels to allow for technological learning and the build-up of the local market, which is also argued by (Kostyshena 2014) and (Ukrainian Energy 2013). Effectiveness could finally be advanced by encouraging more vertical cooperation (throughout the supply chain and with the industry) and less subsidization. In the end, political motivations and realities have to be factored into the LCR equation, such as the fact that green technologies are often not competitive with conventional technologies (which are often subsidized), and that high financial support for RES might not be publicly supported if there were no local benefits attached (ICTSD 2013).

In recent years, different support policies for the production of equipment of renewable generators such as local content requirements have been subject to stronger scrutiny according to WTO rules and other international and bilateral agreements.

In 2009, Ukraine introduced a Green Tariff (or feed-in tariff) applicable to electricity produced by electric power generators using alternative energy sources. Application of this Green Tariff is subject to certain conditions and limitations, of which a minimum required domestic content level with regard to works and materials used for the construction of the power plant (i.e. local content requirement) is one of the main eligibility criteria for approval[1]. In late 2012, this requirement became operative when the relevant regulations on determining the local content for renewable energy projects were enacted[2]. The 2012 amendment of the Energy Law introduced so-called „sub-limits“, i.e. minimum local content requirements for each item of equipment or works used in a specific energy project[3].

[1] Law of Ukraine „On Amending the Law of Ukraine „On Electric Energy“ regarding Stimulation of Usage of Alternative Energy Sources“ No 1220-VI of April 1, 2009

[2] Order on Procedure of Determination of the Specific Weight of Raw Materials, Materials, Fixed Assets, Works and Services of Ukrainian Origin in the Cost of Building of Objects of Electric Energy, which Produce Electric Energy Using Alternative Energy Sources, adopted by the resolution of the National Electricity Regulatory Commission of Ukraine No. 749 of June 15, 2012, and registered with the Ministry of Justice of Ukraine on October 2, 2012.

[3] Law of Ukraine “On Amending the Law of Ukraine “On Electric Energy” regarding Stimulation of Production of Electric Energy from Alternative Energy Sources” No. 5485-VI of November 20, 2012

From a legal perspective it is questionable whether the Ukrainian LCR may be considered as violating the country's obligations as a WTO member and other fair and equitable treatment (FET) standards set out in bilateral investment treaties (BITs) or the Energy Charter Treaty (ECT). As a member of the WTO, Ukraine assumed a number of obligations towards other members, inter alia national treatment rules under the General Agreement on Tariffs and Trade (GATT), the Agreement on Trade-Related Investment Measures (TRIMs Agreement). The WTO's Subsidy and Countervailing Duty Agreement (SCM Agreement) contains multilateral disciplines regulating the provision of subsidies and the use of countervailing measures to offset injury caused by subsidized imports. Under the WTO dispute settlement rules, a foreign investor's home government can request consultations, and, if necessary the establishment of a dispute resolution panel. If the local content requirement is found to be inconsistent with the WTO Agreements, the respective member shall bring its legislation in compliance (and thus cancel the LCR), nevertheless foreign investors are neither entitled to file a claim, nor to obtain compensation (damages) (Ukrainian Energy 2013).

The FiT programme of the Canadian province of Ontario was found inconsistent with WTO rules, as it mandates the use of domestic over foreign products to qualify for financial support offered by the programme[4]. The WTO Dispute Settlement Body found the local content requirement of Ontario to violate the national treatment obligation contained in Article III:4 of the GATT, and the prohibition of Article 2.1 of the TRIMs Agreement on the application of any trade-related investment measures that are inconsistent with Article III:4 of the GATT, and recommended Canada to bring its measures into conformity with these WTO Agreements[5]. After appeals by both the EU and Canada in case DS426, the Appellate Body confirmed the panel rulings regarding the violation of the GATT 1994 and TRIMs agreement. Canada informed the DSB to implement its recommendations and rulings within a reasonable period of time, and consequently informed the DSB about its compliance in June 2014 (WTO DSB 2014). Applying the same reasoning as with regards to Ontario's FIT pogramme, the Ukrainian measures could be qualified as violating Art. 2.1. of the TRIMs Agreement and Article III:4 of the GATT, as (1) the Ukrainian LCR requires the purchase or use of goods of Ukrainian origin or from Ukrainian source, (2) compliance with this requirement is necessary to obtain an advantage (i.e. necessary condition and prerequisite for obtaining the Green Tariff), and (3) the Green Tariff can be viewed as government procurement measure for commercial resale (Ukrainian Journal of Business Law 2013).

Under the WTO's SCM Agreement, subsidies contingent upon the use of domestic over imported goods (Art. 3.1(b) and 3.2) are prohibited. In order to qualify the Ukrainian policy as a subsidy, the Green Tariff payments have to (1) constitute a financial contribution by a government or any public body within the territory of a Member State, and (2) confer a benefit (Art 1.1)[6]. While government purchases (the state enterprise Energorynok is the commercial operator of the Wholesale Electricity Market and single buyer in Ukraine) can easily be seen as financial contribution, the „benefit" criterion is more critical to establish. In the Canadian case, the panel delivered a divided ruling. The panel majority denied the existence of a benefit due to the non-competitive market structure, which does not serve as an appropriate benchmark[7]. After an appeal process, the Appellate Body considered itself unable to complete the analysis as to whether the challenged measures confer a benefit within the meaning of Art 1.1.(b) of the SCM Agreement (WTO DSB 2014), (ICTSD 2013). Nonetheless, the situation could be seen as comparable to the WEM in Ukraine (Ukrainian Journal of Business

[4] Dispute DS412, Canada – Certain Measures Affecting the Renewable Energy Generation Sector; Dispute DS426, Canada – Measures Relating to the Feed-In Program
[5] DS426, Panel Report § 7.176, § 8.1.-8.9.
[6] According to WTO jurisprudence, the criterion of „benefit" must be established by determining whether the financial contribution makes the recipient better off vis-à-vis the market than it would have been in the absence of the financial contribution
[7] One member expressed a dissenting opinion, arguing that the challenged measures constitute subsidies because the FIT offered to relatively high cost energy sources enabled RES-E generators to enter the wholesale electricity market when they would otherwise not have been able to.

Law 2013). If another WTO member challenges Ukraine's local content requirement for application for a Green Tariff, the same findings as in the two Canadian cases (DS412 and DS426) might be stated by the WTO's Dispute Settlement Body.

Whether LCRs can be used to foster an infant industry together with creating a global innovator that is able to compete in global markets constitutes the central question for their success (ICTSD 2013). The ICTSD study identified five basic conditions for potential national value creation through the use of LCRs:

- The existence of a stable and sizeable market;
- LCRs cannot be too restrictive and must be coupled with learning benefits;
- LCRs seem to allow for more technology transfer when it is attached to some form of adequate financial support to those incurring the costs;
- LCRs work better when there is still a high learning-by-doing potential;
- The use of LCRs is likely prohibited by WTO law. Support schemes with LCRs attached are especially likely to be ruled as violating WTO law, whereas public procurement tenders are hardly disciplined by WTO law.

Furthermore, it will be important to abandon LCRs and the financial incentives to which they are attached in time, so that adolescent industries have to compete on the international market. Product quality is another important factor to be addressed in innovation policies (ICTSD 2013).

The Energy Community Secretariat as well questions compliance of the local content requirements with Energy Community rules. On 2nd October 2014, the Energy Community Secretariat sent an Opening Letter in Case ECS-7/13 against Ukraine concerning the local content clause in the Electricity Law of Ukraine. In its Opening Letter, the ECS takes the preliminary view that the LCR violates Directive 2009/28/EC on the promotion of the use of RES, as well as Article 7 of the Treaty prohibiting discriminatory treatment. With this letter, the Secretariat initiated a preliminary procedure to give Ukraine the possibility, whithin 2 months, to react to the allegation of non-compliance with Energy Community law, and enabling the ECS to establish the full background of the case.

2.1.1.2 Streamlining of Procedures to Support Renewable Energy Sources

In order to maintain the rate of RES deployment at the levels of 2012/2013, it is proposed to set key targets and benchmarks for RES development, and to appoint major implementation units and bodies responsible for target achievement (Kostyshena 2014). Implementing these recommendations can help to create a more stable policy and investment framework, to raise investor certainty and to create ownership and responsibility for the achievement of the defined targets.

An analysis and recommendations as regards the use of tendering procedures and quota can be found in Workstream 1 report.

(Kostyshena 2014) in the report on „Recommendations on Launching of Market Mechanisms and Financial and Fiscal Instruments to Improve Energy Efficiency and Promoting Renewable Energy", identified the need to review the **procedure of RES connection to the networks** with a view to enhance transparency and accessibility. This has been implemented through the rules of connecting electric installations to electric power networks approved by NERC Resolution of 17 January 2013, No. 32, which inter alia shall ensure implementation of the principle of a „one-stop-shop" for the customer[8].

[8] Progress Report on the Renewable Energy Directive 2009/28/EC, Ukraine, 2015

As a member of the Energy Community, Ukraine has assumed the obligation to transpose and implement the Renewable Energy Sources Directive 2009/28/EC, Article 13 of which obliges Member States to ensure that authorisation, certification and licensing procedures that are applied to plants and associated transmission and distribution network infrastructures for the production of electricity, heating or cooling from renewable energy sources, and to the process of transformation of biomass into biofuels or other energy products, are proportionate and necessary. Member States shall ensure that permitting procedures are transparent, proportionate, coordinated and limited in time, and are facilitated for smaller and decentralized projects.

Furthermore, the European Commission, in its 2013 progress report, identified authorisation and planning procedures as important challenges to renewable energy growth (European Commission 2013:7) (adelphi 2014).

Three categories of typical bottlenecks with regards to authorisation procedures for connecting RES plants to the grid were identified by Working Group 3 (Authorisation of plants and infrastructures) of the Concerted Action to support the implementation of the RES Directive 2009/28/EC (CA-RES). These bottlenecks and the appertaining suggestions for improvement also hold in the Ukrainian context:

1. Long lead times & complex procedures:

   Potential corrective measures include the introduction of qualitative deadlines and the issuance of a single authorisation for the building and grid connection of a RES plant. As already stated in the Workstream 1 report, Denmark serves as a good practice example for a one-stop-shop, i.e. a single administrative body dealing with RES project authorisations. Authorisation procedures may also foresee financial sanctions in case of delays. Some EU Member States have introduced a fast track approach for small plants to simplify and speed up the relevant processes, as well as a well-structured IT system for online application procedures (Falcucci 2013).

2. Lack of grid capacity or different pace of grid and RES development:

   It was proposed to tackle this issue through a better coordination between renewable energy and grid development. This can be managed by good and integrated grid development planning, which should identify areas where RES potential needs to be further exploited after taking into account the location of relevant consumption areas and generation potentials (Falcucci 2013). This aspect was also mentioned in (Kostyshena 2014).

3. Virtual saturation & speculation:

   This bottleneck is strongly related to the issues mentioned in 2. Lack of grid capacity/different place of grid and RES development. Within the European Union, reservation of network capacity has been tackled by measures such as reservation fees, concessions for RES capacities, deadlines and sanctions. Furthermore, a one-stop-shop was proposed for issuing licences to both grid and energy production, which is especially important in the case of wind power (Falcucci 2013).

Regarding energy transmission infrastructure projects, the 2013 EC progress report identified a number of measures to improve existing procedures: (1) defining responsibilities for coordinating and overseeing the permit granting process, (2) setting minimum standards for transparency and public participation and (3) fixing the maximum allowed duration of the permit granting process (European Commission 2013: 8) (adelphi, 2014).

Further recommendations by the European Commission towards faster and more transparent permitting procedures include:

- One-stop-shop approach: national coordinating authority;
- Maximum time limit for final decision (positive or negative);
- Overruling power of the national authority to decide in cases of persistent delays after expiry of the time limit;
- Early involvement of stakeholders and greater transparency;
- Minimum requirements for compensation of affected populations;
- Provide rewards and incentives that facilitate authorisation procedures.

2.1.1.3 Financial Support for Renewable Energy Sources

The funding and tax preferences applied in Ukraine were identified as sufficient for the development of renewable energy sources in Ukraine (Kostyshena 2014). Nonetheless, extra incentives and preferential instruments for agro-industrial enterprises using biomass of in-house origin and those generating and selling surplus electricity from biomass are proposed and can help to foster the implementation of energy efficiency measures and renewable energy deployment in industry.

Extra incentives and preferential instruments for agro-industrial small and medium-sized enterprises:

Proposed preferences for enterprises using biomass of in-house origin as renewable energy source and generating RES-E included the cancellation of the local content requirement, the right to obtain a guarantee of origin for the generated electricity, the right to sell the entire production of RES-E from biomass to power suppliers at the „Green Tariff“ rate.

The proposed measures are in line with support mechanisms for electricity from renewable energy sources in the European Union. The Austrian Eco-Electricity Act 2012, for example, stipulates the right of every facility generating RES-E to be connected to the grid of the TSO/DSO, in which area of concession the facility is located. The Clearing and Settlement Agency verifies, whether enough support budget is available for the application and, if so, concludes a power purchase agreement with the plant operator for a fixed feed-in tariff. The Austrian Eco-Electricity Act further regulates certain requirements and conditions for facilities generating RES-E as well as for the contractual period. Feed-in tariffs for facilities generating electricity from solid, liquid or gaseous biomass are provided for a period of 15 years (13 years for all other RES technologies) calculated on the basis of years of operation (§ 16.1. Eco-Electricity Act), with reduced subsequent tariffs until the end of the 20th year of operation. Since 2006, minimum fuel efficiency or an overall degree of energy utilisation of 60 % is necessary for facilities generating electricity from bioenergy in order to obtain funding (i.e. the feed-in tariff). Studies comparing this prerequisite with the criterion of highly efficienct CHP according to the EU CHP-Directive (2004/8/EC) (which demands a minimum of 10% primary energy savings) showed that depending on the size of the facility, fuel efficiency of up to 75% needs to be achieved to fulfil the requirements of the CHP-Directive. The German Energy Efficiency Act of 2012, in contrast, requires a minimum of 60% of the annual electricity production to be generated through combined heat and power in order to obtain the feed-in tariff. In case of facilities generating electricity from biogas, application for the feed-in tariff is possible as well if the mass-based share of manure in average substrate use amounts to 60%.

These requirements aim to raise the overall efficiency of biomass plants and reap the benefits of producing both heat and power. Especially its potential to replace heat produced from natural gas and thereby reduce

import dependency of Ukraine could make CHP plants an attractive option for Ukraine and should be studied in more detail.

On 9th of April 2014, the European Commission adopted new rules on public support for projects in the field of environmental protection and energy, which promote a gradual move towards market-based support for renewable energy sources.[9] The guidelines on state aid further provide criteria on how Member States can relieve energy-intensive companies that are particularly exposed to international competition from charges levied for the support of renewables. They also include new provisions on aid to energy infrastructure and generation capacity to strengthen the internal energy market and ensure security of supply.

2.1.1.4 Competitive Bidding Processes

Competitive bidding processes for allocating public support shall be gradually introduced to increase cost effectiveness and limit distortions for mature RES technologies, which shall be integrated into the market. Feed-in tariffs shall be gradually replaced by feed-in premiums, in order to increasingly expose renewables to market signals. Industrial competitiveness shall be promoted by reducing the burden (i.e. high energy bills due to the charges levied for the funding of RES support) for a limited number of energy-intensive sectors (defined for the whole EU) and by allowing Member States to reduce the burden on highly energy-intensive companies in other sectors.

A gradual move towards market-based support for renewable energy sources that are approaching market competitiveness should be considered as well in Ukraine. In the light of a potential violation of WTO rules by the local content requirement for the application for the Green Tariff, a revision of the feed-in tariff legislation is proposed, taking into account other support measures as well.

2.1.1.5 Awareness Raising Measures

Although the awareness level is deemed to be rather high, it is suggested to foster the promotion of RES deployment in small and medium enterprises, which could be incorporated in the NREAP until 2020 (Kostyshena 2014).

This could be accomplished through dedicated awareness raising or advice programmes or initiatives by responsible ministries or public sector institutions. The Austrian climate initiative klima**aktiv** can serve as an example of such a programme.

The Austrian Climate Initiative klimaaktiv of the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) is embedded in the Austrian Federal Climate Strategy and has proven itself as an important tool for enhanced climate and environmental protection in various sectors. The initiative consists of a bundle of voluntary and supportive climate protection measures in four thematic clusters: construction, energy efficiency, mobility and renewable energy with the primary objective to introduce and promote climate-friendly technologies and services. In each of the four thematic clusters, specific programmes are carried out, following a comprehensive and systematic approach in supporting the market introduction of climate-friendly technologies, services and activities, based on the idea of a market transformation including all relevant market players and stakeholders.

Core actions of the klimaaktiv initiative are:

[9] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0628%2801%29&from=EN

- Training of klimaativ professionals: klimaaktiv provides the qualifications needed in the thematic programmes and coordinates training and education in the various fields
- Setting standards and safeguarding quality by introducting quality standards for products and services and by establishing quality management systems (e.g. for biomass district heating systems, buildings)
- Providing information and raising awareness: klimaaktiv provides online and print information to empower consumers, companies and professionals (www.klimaaktiv.at), and participates in events
- Providing advice and support: consulting is offered to companies interested in improving energy efficiency of their production processes, renovating their facilities, introducing mobility management or switching to more efficient appliances and IT systems; consultants in the field may obtain tools, participate in specific trainings and use energy efficiency benchmarks
- Activating and networking with partners to create a climate protection network

In the **renewable energy cluster**, the programme targets questions like the choice of the most efficient energy resources for heating, the use of renewable raw materials for innovative products, biogas, quality management systems for biomass-based heating plants etc. It further provides information for the optimal and efficient supply and use of biomass (e.g. the Austrian wood-flow diagram), solar power or ambient heat. More information on specific parts of the klimaaktiv initiative can be found in the chapters on energy efficiency measures in industry and mobility.

2.2 Calculation Methodology for Target Achievement (2009/28/EC)

The Directive on the promotion of the use of energy from renewable sources 2009/28/EC (RES Directive) obliges Member States to reach the 20-20-20 targets and to provide evidence for their fulfilment, which similarly applies to the Contracting Parties of the Energy Community, which committed to implementing this Directive. Member States committed to achieving a certain percentage of renewable energy sources in gross final energy consumption by 2020. Pursuant to Decision D/2012/04/MC-EnC, Ukraine airms to achieve a share of 11 % of renewable energy sources by 2020[10].

RES Directive 2009/28/EC established accounting criteria for the 2020 RES-targets. EUROSTAT, the statistical service of the European Union, provided a calculation tool, SHARES (Short Assessment of Renewable Energy Sources), which focuses on the harmonized calculation of the share of energy from renewable sources. The SHARES tool is designed to collect and present the energy data needed for calculations as defined in Article 3 (transport target) and Article 5 (overall target) of the RES Directive. Additional calculations are needed for electricity in order to implement Article 3(4), as well as – for EU Member States - for heating and cooling as defined in the templates of the progress report on the website of DG Energy. The main benefit of this tool lies in using the exact same methodology in all Member States to calculate the desired values, so its application can prevent irregularities from varying parameters and rules used in different calculation methods. The latest version of the SHARES tool together with a user manual are available on the EUROSTAT website[11].

SHARES is based on the methodological framework using the information gained through annual statistics on energy as covered under EC-Regulation No. 1099/2008. Five annual energy questionnaires are necessary prerequisites for the utilization of this tool:

[10] National Renewable Energy Action Plan of Ukraine up to 2020, approved by the Cabinet of Ministers of Ukraine by Executive Order No. 902-p of 1st October 2014

[11] http://ec.europa.eu/eurostat/c/portal/layout?p_l_id=4703568&p_v_l_s_g_id=0

1. Coal (covering solid fossil fuels and manufactured gases)
2. Oil (covering crude oil and derived oil products)
3. Natural gas
4. Electricity and heat
5. Renewables (including waste)

Energy data are linked with formulas to calculate the various shares, although Member States have to provide some additional information that is not covered by these five questionnaires (Eurostat 2013).

Apart from renewable energy sources, these statistics are in principle available in Ukraine, so their suitability for application in the SHARES tool should be assessed by the State Statistical Service of Ukraine.

Several EU Member States faced difficulties in providing evidence for target achievement with established methods used for compiling energy statistics, as they did not obtain sufficient information on all renewable energy sources. Therefore, Working Group 2 (WG 2) within the Concerted Action on the Renewable Energy Sources Directive (CA-RES) addressed the calculation methodology to clear these statistical problems. The CA-RES is a structured and confidential dialogue process between national authorities responsible for the implementation of the RES Directive, in order to exchange experience and best practices, participate in a cross-learning process and develop common approaches. One of the challenges faced by this WG 2 was the different level of experience required for data collection to meet the reporting obligations defined by the RES Directive. Some Member States had, for instance, over 30 yearsof experience in data collection on wood fuel consumption, while others had just started data collection in this field. Regarding solar heat, WG 2 recommended focussing on prevailing technologies in Europe, i.e. solar water based heating systems, while active solar air heating systems should at the moment not be taken into account (Bittermann, W. and Suvorov, M., 2013). Solar heat also refers to the energy carrier used for cooling, whereas (solar) space cooling means a consumption purpose of solar heat consumption. For Member States that have not developed their own methodology for calculating solar heat, the IEA/ESTIF methodology[12] was proposed as a starting point (Bittermann, W. and Suvorov, M., 2013).

The methodology to calculate renewable heat from heat pumps is determined in Annex VII of the RES Directive, although a supplementary methodology had to be developed to satisfy all data needs. Discussion in WG 2 influenced the Commission Decision of 1st March 2013 establishing the guidelines for Member States on calculating renewable energy from heat pumps from different heat pump technologies pursuant to Article 5 of Directive 2009/28/EC of the European Parliament and of the Council[13]. Member States agreed to follow the methodology from Eurostat and DG ENER for the calculation of renewable energy from heat pumps but insisted on developing more reliable and usable factors. Furthermore, WG 2 developed a common quality standard for fuel wood consumption in household statistics by taking into account the relative importance of fuel wood consumption in different Member States. Furthermore, the use of the Eurostat tool SHARES 2011, which shall assist Member States in calculating the applicable share of renewables according to the RES Directive, was also welcomed in general (Bittermann, W. and Suvorov, M., 2013).

[12] Developed by IEA-Solar heat and cooling program and ESTIF (European Solar Thermal Industry Foundation)
[13] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D0114&from=EN

2.3 RES Targets for the European Transport Sector for 2005 and 2010

Under **Directive 2003/30/EC on the Promotion of the use of biofuels or other renewable fuels for transport**, the EU established the goals of reaching a 2% share of renewable energy in the transport sector by 31.12.2005 and of 5.75% by 31.12.2010. The Member States were to ensure that the minimum share of biofuels sold on their markets is 2% and 5.75% related to the final energy content of all diesel and gasoline fuels used in 2005 and 2010, respectively. Any Member State setting lower objectives had to justify this on the basis of objective criteria.

The different types of biofuels recognized by Directive 2003/30/EC include:

- Biodiesel: a methyl-ester produced from vegetable or animal oil and used frying oils, of diesel quality, to be used as biofuel;
- Bioethanol: ethanol production from the fermentation of plants rich in sugar/starch, to be used as biofuel;
- ETBE: etherised bioethanol;
- Biogas: a fuel gas produced by the fermentation of organic matter by bacterial populations in the absence of oxygen;
- Biomethanol: methanol produced from biomass;
- Bio-oil: an oil fuel produced through pyrolysis (molecular decomposition of biomass through the application of heat and in the absence of air).

2.3.1 2020 RES Targets for the European Transport Sector

Directive 2003/30/EC was replaced by **Directive 2009/28/EC on the promotion of the use of energy from renewable sources ("Renewable Energy Directive")**. Under Directive 2009/28/EC, the average share of energy from renewable sources used in all forms of transport must rise to a mandatory minimum 10 % of final energy consumption in every Member State in 2020. Energy from renewable sources used in the transport sector can be contributed from e.g. food-based (first generation) liquid biofuels, gaseous biofuels, bioliquids, green electricity and derivatives of the latter like hydrogen and methane (from power to gas processes).

Certain biofuels from wastes and residues as well as advanced biofuels of the second and third generation count double for demonstrating compliance with the 10 % target for the share of energy in all forms of transport in 2020. There exists no official definition for the terms "advanced biofuels of the second and third generation". In general, second generation means biofuels from agricultural, forestry wastes or residues, or purpose-grown non-food feedstocks (e.g. Short Rotation Coppice, energy grasses), whereas the third generation stands for production of biofuels from aquatic autotrophic organism (e.g. algae). Organic waste from agro-food industries falls into the category of second generation biofuels.

Electricity from renewable energy sources (RES-E) used in electric vehicles for road transport can be counted by the factor of 2.5 towards the 2020 10% target. Member States can choose if they take the RES-E share of the overall electricity in the Community or in their own country in 2018 for calculation of RES-E in transport in 2020.

Regarding the expansion of biofuels use in the EU, the Directive aims to ensure the use of sustainable biofuels only, which generate a clear and net GHG saving without negative impact on biodiversity and land use. Therefore, the Renewable Energy Directive sets out **sustainability criteria for biofuels** in its articles 17, 18 and 19. These criteria are related to greenhouse gas savings, land with high biodiversity value, land with high

carbon stock and agro-environmental practices. Biofuels and bioliquids should not be produced using raw materials from land with high biodiversity value or with high carbon stock. The entire biofuels' production and supply chain has to be sustainable.

Biofuels and bioliquids should contribute to a reduction of at least 35% of greenhouse gas emissions in order to be taken into account. From 1 January 2017, their share in emissions savings should be increased to 50% (and 60% in January 2018 for installations in which production started from 2017 onwards). The Renewable Energy Directive contains a methodology for calculating this saving ('actual value') as well as 'default values', including 'disaggregated default values', that can be used in certain cases to show compliance with the criterion. These rules for calculating the greenhouse gas impact of biofuels, bioliquids and their fossil fuel comparators can be found in Annex V of Directive 2009/28/EC.

The sustainability criteria apply to biofuels/bioliquids produced in the EU and to imported biofuels/bioliquids since December 2010. The European Commission (EC) has adopted a number of Decisions and Communications to assist the implementation of the EU's sustainability criteria.

The sustainability of biofuels needs to be checked "from field to vehicle tank" by a mass balance based approach by Member States or through voluntary schemes that have been approved by the European Commission (EC). The method by which a connection is made between information or claims concerning raw materials or intermediate products and claims concerning final products is known as the chain of custody. For the purpose of demonstrating compliance with the sustainability requirements, economic operators are currently required to use a mass balance chain of custody (Article 18(1)). The chain of custody normally includes all the stages from the feedstock cultivation up until the obligated economic operator or release of the fuels for consumption[14]. Member States need to define which economic operators need to submit the information concerned.

Finally, Member States are responsible for making sure that the sustainability criteria are met when biofuels/bioliquids:

- are counted towards their renewable energy targets under the Renewable Energy Directive[15];
- are used for compliance with renewable energy obligations[16];
- receive financial support for their consumption[17];
- are counted towards the target of the Fuel Quality Directive for reducing greenhouse gas emissions (biofuels only)[18];
- receive investment and/or operating aid in accordance with the Community guidelines on state aid for environmental protection (biofuels only)[19];
- are taken into account under the provisions for alternative-fuel vehicles of the Regulation on CO_2 from passenger cars ('E85' bioethanol only)[20].

[14] ECOFYS, Analysis of the operation of the mass balance system and alternatives, Final Report (Task 1), 2012
[15] Article 17(1)(a). Following from the scope of 'final energy consumption' as in Regulation (EC) No 1099/2008 this includes biofuels used in international aviation (when sold in a Member State), but not in international maritime transport.
[16] Article 17(1)(b). As defined in Article 2(l) of the Renewable Energy Directive.
[17] Article 17(1)(c). Typically as part of a national support scheme.
[18] Article 7a of the Fuel Quality Directive.
[19] OJ C 82, 1.4.2008, p. 1
[20] Article 6 of Regulation (EC) No 443/2009.

The **Fuel Quality Directive 98/70/EC** stipulates that suppliers of fuels (such as gasoline, diesel, oil, biofuels, blends, electricity and hydrogen) must reduce the greenhouse gas emissions produced during manufacturing development, transport and use, by 6% in carbon intensity of road transport in 2020.

The reductions could be achieved in addition to efficiency-enhancing measures along the production chain. Examples could be to reduce burning of residual gas in the oil production and processing, to improve efficiency in the processing of crude oil in refineries - or to use more biofuels and electricity from renewable energy sources, respectively.

2.3.1.1 Implementation of Sustainability Schemes

According to the Renewable Energy Directive 2009/28/EC as well as the Fuel Quality Directive 98/70/EC, biofuels have to fulfil certain sustainability criteria in order to be taken into account for national renewable energy targets. This is valid for all biofuels used in the EU, whether locally produced or imported.

The reason for introducing these criteria was to prevent the conversion of areas of high biodiversity and high carbon stock for the production of raw materials for biofuels. Not only producers, but also traders and marketers have to fulfil specific obligations.

The uniformity with the sustainability criteria can be checked in two ways:

1. by monitoring of the Member State itself, or
2. through a voluntary scheme which has been approved by the European Commission (EC).

Austria has chosen option 1 and introduced a national monitoring system for the sustainability of biofuels in January 2013. It is managed by the Austrian Environment Agency. All biofuels produced, traded or marketed within Austria is reported in this system. This data builds the basis for a number of reporting obligations of the member state.

Apart from the national monitoring system, Austria also offers a national certification system for biofuels. This system verifies compliance with sustainability criteria along the whole supply chain. It is also managed by the Austrian Environment Agency together with AMA, which observe the production process of biofuels.

Participation in the monitoring system is mandatory for all companies producing or trading countable biofuels in Austria. In contrast, participation in the certification system is not mandatory for engaged companies, as they can alternatively use a voluntary certification system accepted by the EC to obtain proof of sustainability.

So far the EC has recognised the following voluntary schemes:[21]

1. ISCC (International Sustainability and Carbon Certification)
2. Bonsucro EU
3. RTRS EU RED (Round Table on Responsible Soy EU RED)
4. RSB EU RED (Roundtable of Sustainable Biofuels EU RED)
5. 2BSvs (Biomass Biofuels voluntary scheme)

[21] http://ec.europa.eu/energy/renewables/biofuels/sustainability_schemes_de.htm

6. RBSA (Abengoa RED Bioenergy Sustainability Assurance)

7. Greenergy (Greenergy Brazilian Bioethanol verification programme)

8. Ensus voluntary scheme under RED for Ensus bioethanol production

9. Red Tractor (Red Tractor Farm Assurance Combinable Crops & Sugar Beet Scheme)

10. SQC (Scottish Quality Farm Assured Combinable Crops (SQC) scheme)

11. Red Cert

12. NTA 8080

13. RSPO RED (Roundtable on Sustainable Palm Oil RED)

14. Biograce GHG calculation tool

15. HVO Renewable Diesel Scheme for Verification of Compliance with the RED sustainability criteria for biofuels

16. Gafta Trade Assurance Scheme

17. KZR INIG System

18. Trade Assurance Scheme for Combinable Crops

19. Universal Feed Assurance Scheme

2.3.2 RES-T Implementation and Biofuel Strategy in Austria

In general, exist two forms of bringing biofuels into the transport market exist:

1. blending of fossil fuels with biofuels and
2. pure use of biofuels.

Most of the biofuels are brought into the market by blending. Regarding the degree of blending there are different fuel products on the market. Common blended products are diesel fuels with a share of 5% (B5) or 7% (B7) biodiesel.

Bioethanol is often blended in shares of 5% (E5) and 10% (E10). So-called Flexi-Fuel-Vehicles (FFV) are equipped with an engine that is suitable for a share of bioethanol of up to 85% (E85). For E85, special vehicle engines are needed.

Increasing the maximum shares of biofuels to B10/B15 for diesel and E20 for petrol is technically feasible, and fuel standards for these blends are under development (TNO 2013).

2.3.2.1 Technical Implementation of Biofuels in the Transport Sector

The Austrian path of introducing biofuels in the transport sector was the following (Austrian Environment Agency 2013): The marketing of biofuels in Austria primarily happened due to the addition of biodiesel to diesel since October 2005 and blending of bioethanol to petrol since October 2007. Until the beginning of 2009 the

obligation for the overall share of blending of biodiesel and bioethanol was 4.7 volume percent (vol %). In January 2009, the obligation of blending was increased to 7 vol %.

In 2012 in total 498,761 tons of biodiesel were placed on the market in Austria. Of this amount 440,938 tons were added to fossil fuels, and 57,823 tons were used as pure biofuel or as a diesel fuel with a higher biofuel content than 7 vol % e.g. via operation of gas stations at fleet operators. Bioethanol was sold mainly as biofuel blending to gasoline fuel, in total about 105,715 tons in 2012. The total amount of vegetable oil, which is mainly used in agricultural machinery and for road freight transport, amounted to 16,191 tons in 2012. In total the required substitution target for biofuels of 5.75 % measured by energy-content was significantly exceeded with 6.6 % in 2012 (BMLFUW, 2013).

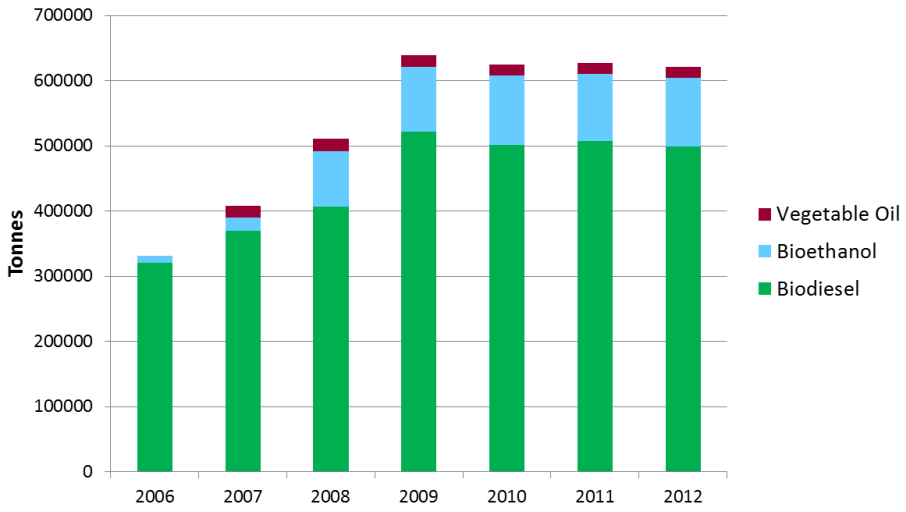

Figure 1: Yearly use of biofuels in Austria, 2006-2012; data source: BMLFUW, 2013

2.3.2.2 Financial Incentives for the Use of Biofuels in the Transport Sector in Austria

In general, biofuels are so far not competitive with fossil transport fuels without any kind of subsidy. States can choose whether they grant subsidies for market introduction of biofuels or not. Theoretically, they could just oblige distributors of fossil fuels to bring a certain share of biofuels on the market, without subsidies. This would increase pump-prices of the fossil transport fuels accordingly.

The Federal Government of Austria has chosen a market introduction with both, subsidies and making distributors of fossil transport fuels to obliged parties, guaranteeing a certain share of biofuels on the fuel market. The height of subsidies was set in a way that pump-prices for end-consumers would not be increased by the new biofuels due to be integrated on the vehicle fuel market.

Therefore, a number of subsidies to promote the use of biofuels exist in Austria.

Subsidy for Production Plants

A subsidy is granted for the installation of production plants for

- biodiesel, bioethanol or bio-oils

- bio-methane and
- biofuels of the 2nd generation.

The investment is supported with 20% of the eligible costs and 25% for fermentation plants. In addition, a subsidy of 5% is allowed, when regionally applied raw materials from an area not more than 50 km from the plant are used.

Subsidy for Vehicle Investments

The Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management offers subsidies for fleet operators when investing in vehicles that are suitable for the use of biofuels.

When fleet operators apply for a subsidy for less than 10 cars the subsidy is a lump sum for each vehicle bought or converted:

Table 1: Subsidies for Alternative Vehicles for Fleet Operators in Austria for Vehicles < 3.5 tons gross vehicle weight (www.umweltfoerderung.at)

TYPE OF VEHICLE	SUBSIDY IN EUR PER VERHICLE
Full Hybrid Vehicles	EUR 400 EUR 800 when at least 50% biofuels are used
Vehicles using at least 50% of bio-oil	EUR 500
Vehicles using at least 50% of biodiesel	EUR 200
FlexiFuel Vehicles (FFVs) for using up to 85 % of bioethanol	EUR 200 when at least 50% bioethanol is used
CNG Vehicles	EUR 500 EUR 1,000 when at least 50% biomethane is used
REX, REEV, PHEV (Range Extender, Range Extender Electric Vehicles, Plug-In Hybrid Electric Vehicles)	EUR 500 – 1,500 according to their specific CO_2-emissions EUR 1,500 – 3,000 according to their specific CO_2-emissions when electricity from renewable energy sources is used + EUR 200 when at least 50% biofuels are used

Table 2: Subsidies for Alternative Vehicles for Fleet Operators in Austria for Vehicles > 3.5 tons gross vehicle weight (www.umweltfoerderung.at)

TYPE OF VEHICLE	SUBSIDY IN EUR PER VERHICLE NEW VEHICLE	SUBSIDY IN EUR PER VERHICLE MODIFIED VEHICLE
CNG Vehicles	EUR 2,500	EUR 2,000
CNG Vehicles when at least 50% biomethane is used	EUR 5,000	EUR 4,000
Plant oil	-	EUR 1,500
Biodiesel	-	EUR 200
Hybrid	EUR 2,500	EUR 2,500
Hybrid when at least 50 % biofuels are used	EUR 5,000	EUR 5,000

For the proof of the specific biofuel shares, the used biofuels have to fulfil the sustainability criteria of Directive 2009/28/EC.

If a fleet operator applies for a subsidy for more than 10 vehicles, the investment is supported with 20% of the eligible costs for companies and 40% of the eligible costs for local authorities. The same rate of subsidy is used for the installation of fuel stations for biofuels on the real estate of a company or local authority.

Tax Reductions and Exemptions

The mineral oil tax in Austria amounts to EUR 515 for 1,000 litres of petrol, and is decreased to EUR 482 when at least 46 litres of biofuels are contained. For ethanol to be used in Flexi-Fuel-Vehicles with a share of up to 85% bio-ethanol, the tax amounts to EUR 442 for 1000 litres.

For diesel, the tax for 1,000 litres is reduced from EUR 425 to EUR 397 when at least 66 litres of biofuels are proven. Biofuels that are used in their pure form (not blended) are exempted from the mineral oil tax.

2.3.2.3 Eco-Driving & Electromobility Initiatives in Austria

The klimaaktiv mobil programme offers businesses and public administrations, cities, municipalities and regions, the tourism and leisure industry, property developers, fleet operators as well as schools and youth groups free advice and financial support for the development and implementation of climate protection measures in the transport sector. The klimaaktiv mobil subsidy program - which is supported by the Climate and Energy Fund – is the central pillar of the klimaaktiv mobil program. The focus lies on the promotion of environmentally friendly and constitutional mobility climate-friendly mobility management and the promotion of alternative driving systems, like electric mobility with renewable energy as well as the promotion of bicycling.

During its first program period 2007-2012, the klimaaktiv mobil program achieved the following results:

- Initiated 4,000 climate-friendly mobility projects, that were implemented by 2,800 businesses, 500 cities, municipalities and regions, 500 tourism facilities and 200 schools;
- As a result of these projects: annual saving of 540,000 tonnes of CO_2;
- Funding in the amount of 56.3 million euros for mobility projects that sparked a total investment sum of 412 million EUR;
- 4,600 so-called green jobs were secured/created;
- 12,400 alternative vehicles, including 10,900 electric vehicles and 1,700 additional E-charging stations, were sponsored;
- Promoted over 100 bicycling projects - including the expansion of the cycling infrastructure in all provinces and big cities;
- Trained 980 fuel-saving trainers.

In 2004, the Mobility Department of the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management in cooperation with the Austrian Energy Agency (AEA) and the Federal Branch Association of Driving Schools started the EcoDriving program in Austria. The program is part of the “klimaaktiv mobil” program aiming to reduce greenhouse gas emissions in the transport sector.

The fuel-saving modern style for driving vehicles, so called "EcoDriving", has great potential to make an important contribution to solve these problems:

- Saving of resources and climate protection:
  EcoDriving can contribute to a substantial reduction in fuel consumption, thus reduce exhaust gases and greenhouse gas emissions
- Reducing health risks:
  Fewer emissions of harmful substances through EcoDriving
- Enhance traffic safety:
  EcoDriving reduces the risk of accidents

The EcoDriving initiative consists of the following elements:

- EcoDriving certification for driver trainers:
  An EcoDriving certification scheme has been developed and implemented. More than 1,200 trainers for passenger cars, trucks & buses and tractors have been educated and certified as EcoDriving trainers. EcoDriving handbooks and teaching materials have been prepared for trainers to enable them to teach EcoDriving according to guidelines that guarantee the “klimaaktiv mobil” quality standard.
- EcoDriving training for novice drivers:
  Every year 90,000 drivers still in their learner’s phase complete a practical compact training in Austria. Measurements of fuel consumption during these trainings – before and after instruction – show an average reduction of 14 %, thirty percent of the young drivers achieve fuel reductions of more than 20 % over a test route of 20 km.
- Co-operation with fleet operators to train company drivers:
  Professional drivers are also subject to EcoDriving trainings, either voluntarily or during their mandatory further education for the renewal of their driving licence.
- EcoDriving Competitions for drivers:
  To further motivate and spread the idea of EcoDriving among drivers, competitions of EcoDriving with passenger cars, trucks, buses and agricultural tractors are organised on a regular basis.

Electromobility Initiative

The Federal Ministry of Agriculture, Forestry, Environment and Water Management of Austria pushes for electromobility from renewable energy sources. Therefore, the klimaaktiv mobil program offers funding and consulting services for businesses, municipalities, cities and associations. If electricity comes from renewable energy sources, the subsidy is higher.

In the first funding period from 2007 to 2012, more than 13,000 alternative-powered vehicles were funded with a grant total of approximately 13.6 million Euros; from this total, around 10,300 electric vehicles - mainly E-bikes and E-scooters, but also the first large numbers of E-cars and light commercial e-vehicles -, were funded with around 10.8 million euros. Furthermore, about 1,700 E-charging stations with renewable electricity were sponsored through a sum of 370,000 Euros. The special promotion campaign for E-bikes has considerably contributed to the e-bike boom in Austria and strengthens, in particular, the Austrian bike economy.

2.3.3 Discussed Amendments to the Renewable Energy Directive's RES-T Framework

2.3.3.1 Ongoing Discussion Process on Indirect Land Use Change (ILUC) affecting the RES Targets for Transport of the Renewable Energy Directive

After the adoption of the Renewable Energy Directive and an amendment to the Fuel Quality Directive, the European Parliament and Council asked the Commission to review the impact of indirect land-use changes on GHG emissions and to provide a legislative proposal to address these issues.

On 17 October 2012, the Commission published a proposal to limit global land conversion for biofuel production and raise the climate benefits of biofuels used in the EU. According to the Commission's view, the use of food-based biofuels should be limited to 5% in order to meet the 10% target of the Renewable Energy Directive (15189/12)[22].

On 13 June 2014, the Council of the European Union reached a political agreement on the draft version of the indirect land-use change directive, which is designed to help minimise the impact of indirect changes of landuse on GHG emissions, while not harming current investments in the production of biofuels. The 10% target for renewable energy in transport of the RES Directive has been changed as follows: 7% of final energy consumption in transport in 2020 should be covered by conventional biofuels, in order to mitigate indirect land-use change (ILUC) emissions. To encourage the transition to second and third generation ("advanced") biofuels, Member States should set national targets for advanced biofuels based on a reference value of 0.5 percentage points of the above-mentioned 10% target.

The agreement further comprises of an annex with a list of feedstocks for advanced biofuels that can be double-counted towards the targets, additional incentives for advanced biofuels through the extended use of statistical transfers, the provision of incentives to generate RES-E and details to the reporting process of the Commission.

The political agreement shall be followed by the Council's formal adoption of its position at 1st reading.

[22] European Commission Proposal COM(2012) 595 final; http://register.consilium.europa.eu/doc/srv?l=EN&f=ST%2015189%202012%20INIT

2.3.3.2 Amendment of the European Guidelines on State Aid for Environmental Protection

On 9 April 2014, the European Commission adopted the "Guidelines on State Aid for Environmental Protection and Energy 2014-2020"[23], which replace the 2008 guidelines and shall be in force as of 1 July 2014 until the end of 2020. These Environmental and Energy State Aid Guidelines support Member States in reaching their 2020 climate targets, while addressing the market distortions that may result from subsidies granted to renewable energy sources.

Key features of the new state aid guidelines include:

- Gradual introduction of market-based mechanisms: gradual introduction of competitive bidding processes for allocating public support with flexibility options to take account of national circumstances; gradual replacement of feed-in tariffs by feed-in premiums (except for already existing schemes and small installations)
- Promoting competitiveness of European industry: reduction of the charges levied for funding renewable energy support for a limited number of energy intensive sectors, which are defined for the whole EU; Member States may also reduce the burden on highly energy-intensive companies in other sectors
- Supporting cross-border energy infrastructure to advance the Single European Energy Market: through a set of criteria
- Permitting aid to secure adequate electricity generation when there is a real risk of insufficient electricity generation capacity. This allows Member States to introduce "capacity mechanisms".

Furthermore, several categories of environmental and energy aid measures were included in the revision of the General Block Exemption Regulation (GBER) by Commission Regulation (EU) No651/2014 of 17th June 2014, which declares certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty. New categories include, for example, operating aid for the production of renewable electricity, operating aid for small-scale RE installations, or certain forms of aid to facilitate the rehabilitation of buildings. Under the GBER, Member States can grant more aid measures and higher amounts without having to notify them to the Commission for prior authorization, since they are less likely to lead to undue distortions of competition in the European Single Market. This not only reduces administrative burdens for EU Member States and local authorities, but also provides more legal certainty to aid beneficiaries and allows faster deployment of aid for companies[24].

According to the State Aid Guidelines, investment aid can only be granted in favour of advanced biofuels, except for investment aid to convert food-based biofuel plants into advanced biofuel plants. Investment aid in new and existing capacity for food-based biofuel is not considered justified[25].

In line with the Commission view expressed in the new 2030 framework, operating aid to food-based biofuels can only be granted until 2020, and only to plants that started operation before 31 December 2013[26].

State aid cannot be granted to biofuels that are subject to a supply or blending obligation, unless it is limited to biofuels that are too expensive to come on the market with only a supply or blending obligation[27].

[23] COM(2014) 2322
[24] European Commission, DG Competition; Link: http://ec.europa.eu/competition/state_aid/legislation/block.html#gber
[25] COM(2014/C 200/01), chapter 3.3.1., (112)
[26] COM(2014/C 200/01), chapter 3.3.1., (113), (121)

2.3.3.3 Consequences of the Amendments of the RED/RES-T Framework to RES-T Markets

The lack of 2030 targets for RES-T fully leaves the further development of RES-T markets to the EU Member States. They may freely choose with which RES they achieve their self-defined and by the EC approved RES-2030 targets, whether the existing RES-T conditions are extended (grandfathering law, new investments) or altered, thus deteriorating the market for RES-T.

As argued above, under the new European Guidelines on State Aid for Environmental Protection, new investments in facilities for food-based biofuels of the 1st generation may not occur (at least as long as the market price difference between petroleum products and food-based biofuel feedstock does not allow the economical operation of biofuel production plants of the first generation).

2nd generation biofuels, still in the R&D stage, are not yet ready for the market and therefore cannot be promoted in terms of market introduction. There is still doubt whether or not they will reach that stage of development by 2020.

In the light of the new EU framework, Ukraine should accordingly reconsider its strategy regarding the development of bioethanol and biodiesel of the first generation. Hence, Ukraine will only be able to deliver certified food or feed as raw material for biofuels of the first generation to the rest of Europe for a limited time. However, the demand from the European RES-T industry for these commodities and related exports from Ukraine into the EU could be reduced (depending on the national strategies of the Member States in the field of RES-T).

2.3.4 Post-2020 RES Targets for the European Transport Sector

The new policy framework for climate and energy for 2030[28], published by the Commission on 22 January 2014, builds on the existing "climate and energy package" of 2020 targets, the Commission's Green Paper of March 2013 together with the outcomes of the public consultation process, as well as the Commission's 2050 roadmaps for energy and for a competitive low-carbon economy. These documents are in line with the European Union goal of reducing GHG emissions by 80-95% below 1990 levels by 2050. Among the key pillars of the new framework for 2030, the following goals have been set: a reduction in GHG emissions by 40% below the 1990 level and an EU-wide binding target for renewable energy of at least 27% in 2030, driven by a more market-oriented approach with enabling conditions for emerging technologies. Furthermore, Member States' ambitions for improving energy efficiency shall be reinforced, the EU Emissions Trading Scheme shall be reformed, and a governance system and a new set of indicators shall be introduced to ensure a competitive and secure energy system. The question of how best to deliver the optimal energy savings in 2030 will be analysed together with a review of the Energy Efficiency Directive. Nonetheless, the Commission's analysis revealed that a GHG emission reduction target of 40% would require an increased level of energy savings of approximately 25% in 2030[29].

The proposed EU-level target will not be translated into national binding targets, which leaves flexibility for Member States to set national objectives, meet their GHG reduction targets and transform the energy system

[27] COM(2014/C 200/01), chapter 3.3.1., (114)
[28] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A policy framework for climate and energy in the period from 2020 to 2030, European Commission, COM(2014) 15 final, 22 January 2014
[29] COM(2014) 15 final, p.8

according to national preferences and conditions. Thus, the 27% target should be fulfilled through clear commitments decided by the Member States themselves, which should be influenced by their current targets for 2020 and by the need to deliver collectively the EU target. More flexibility for Member States should be combined with a stronger emphasis on completing the internal market in energy, and Member States' policy frameworks have to foster the transformation of energy infrastructure with more cross-border interconnections, storage potential and smart grids. Achievement of the EU-target shall be ensured by the new governance framework based on national plans for competitive, secure and sustainable energy. If necessary, the national commitments would be complemented by further EU action and instruments to ensure target achievement[30].

The 2030 climate and energy framework contains **no new targets for renewable energy or the GHG intensity of fuels in the transport sector or any other sub-sector after 2020**[31]. The assessment of ways to minimize ILUC emissions showed the limited role of first generation biofuels in decarbonizing the transport sector. In the view of the Commission, **food-based biofuels should not receive public support after 2020**[32], so alternative renewable fuels and targeted policy measures based on the Transport White Paper will be necessary. In line with the alternative fuels strategy[33], the Communication recommends to set the **focus of policy development**

- on improving efficiency of the transport system,
- on further developing and deploying
  - electric vehicles,
  - second and third generation (advanced) biofuels and
  - other alternative, sustainable fuels in a holistic and integrated approach.

The Renewable Energy Directive will have to be revised for the period after 2020, in order to facilitate EU target achievement, as well as allow for an improvement of biomass policy to maximize the resource efficient use of biomass. This should include the sustainable use of land, the sustainable management of forests[34] and address indirect land use effects as with biofuels.

2.3.5 The Framework for Biofuels in Transport in Ukraine

Ukraine is a significant exporter of raw materials (e.g. rapeseed) for biofuel production for the EU. The Ukrainian regulatory framework for renewable energy in transport consists of the Law on Energy Savings, the Law on Alternative Energy Sources, the Law on Alternative Fuels, and the Order Arranging Production and Use of Biogas (Energy Community Secretariat 2013/2014).

In this chapter, parts of the Ukrainian National Renewable Energy Action Plan (NREAP, Ordinance no. 902 of the 1st of Octoer 2014) concerning the Ukrainian biofuels strategy in transport for 2013-2020 are shown. The NREAP was prepared by State Agency on Energy Efficiency and Energy Saving of Ukraine.

Ukraine has established targets with regard to biofuel production and use in transport. For the year 2013 these targets are recommended, but for the next succeeding years they are mandatory. These targets are set forth in the Law of Ukraine on Alternative Fuel Types. According to the law, renewable targets for the transport sector

[30] European Commission, COM(2014) 15 final
[31] European Commission, COM(2014) 15 final, p.6
[32] COM(2012) 595
[33] COM(2013) 17
[34] In line with the European forest strategy COM(2013) 659

are only defined in terms of bioethanol. The bioethanol content in transport fuels produced and/or sold within the territory of Ukraine must be as follows:

- in 2013: recommended content of at least 5% (volume)
- in 2014-2015: mandatory content of at least 5% (volume)
- in 2016: mandatory content of at least 7% (volume)

According to the Report on the Results of Stimulation and Use of Energy from Renewable Sources (Progress Report on the Renewable Energy Directive 2009/28/EC), submitted by Ukraine to the Energy Community Secretariat in January 2015, the share of renewables in transport was 1.21% in 2013, up from 0.55% in 2012.

The main instrument to support the development of this sector is a benefit related to taxation of bioethanol as excisable goods. Pursuant to the Tax Code of Ukraine (Article 229.1.1), excise tax exemptions apply to[35] :

- bioethanol, which is used by enterprises for production of mixture motor petrols with bioethanol, ethyl tertiary butyl ether (ETBE), other bioethanol-based additives content;
- bioethanol, which is used for biofuel production.

Moreover, 80% of the enterprise profit derived from the sale in Ukraine of its own produce is not taxed (Section 158.1 of Tax Code of Ukraine), subject to the list as approved by the Cabinet of Ministers of Ukraine (Regulation No. 1005 dated 28.09.2011). In particular, this list includes biodiesel internal combustion engines, internal combustion engines for biofuel with 85% content of ethanol for motor vehicles. According to the Annual Implementation Report (Energy Community Secretariat 2013/2014), this profit tax benefit may be considered protectionist.

The following table shows the estimated trajectory for the growing share of energy from renewable sources (RES) in the gross final consumption of energy in heating and cooling, electricity and transport according to the NREAP.

Table 3: Estimated Trajectory for the Growing Share of Energy from Renewable Sources (RES) in Gross Final Consumption of Energy in Heating and Cooling, Electricity and Transport (NREAP, 2014).

INDICATOR OF THE GROWING SHARE OF ENERGY FROM RENEWABLE SOURCES	2011 - 2012	2013 - 2014	2015 - 2016	2017 - 2018	2020
RES minimum trajectory (%)	5,3	6	7	8,5	11
RES minimum trajectory (ktoe)	3,630	4,240	5,110	6,260	8,590

The following table shows the share of energy from RES in the transport (RES-T) sector in 2009 and for the period from 2014 to 2020. In 2009, the only RES-T energy carrier was electricity.

[35] The tax is charged at the rate of UAH 0 per 1 liter of 100%-spirit

Table 4: Estimated Share of Renewable Energy in Transport (NREAP, 2014)

	2009	2014	2015	2016	2017	2018	2019	2020
Expected RES consumption in transport (ktoe)	52	174	331	298	351	395	445	505
Expected consumption of electricity from RES in transport (ktoe)	52	64	71	78	86	95	105	115
Expected consumption of biofuels from wastes, residues, non-food cellulosic and lingocellulosic material in transport (ktoe)	-	110	150	220	265	300	340	390
Expected RES contribution to transport for the RES Target	130	380	477	635	745	837	942	1068

Therefore, the contribution of biofuels to the total RES target is approximately12%.

According to the NREAP, there is no industrial-scale production of biodiesel in Ukraine. For bioethanol, the Law of Ukraine on Amending Some Laws of Ukraine concerning Production and Use of Motor Fuels Containing Biocomponents was adopted in 2012, and mandatory bioethanol content in motor petrols was introduced.

Article 17 of Directive 2009/28/EC has not been transposed into national legislation yet, so there is no certification scheme defined or relevant body established in line with the Directive's requirements. Certification is mostly sought by exporters of feedstock to EU countries for biofuel production. The State Agency on Energy Efficiency and Energy Saving of Ukraine issues certificates for labelling of alternative fuels, including information on the type of biofuel and blending. These certificates are not in conformity with the sustainability criteria of Directive 2009/28/EC, and requirements for monitoring, reporting obligations and information need to be more consistently addressed in legislation, and consequently enforced (Energy Community Secretariat 2013/2014). It is envisaged that the body responsible for monitoring of the fulfilment of the sustainability criteria mentioned in Directive 2009/28/EC will be defined in the process of drafting the Action Plan for implementation of the Directive in Ukraine. The drafting of the plan was already envisaged to be completed by November 2013.

The following certification systems have been recommended for application in Ukraine (GIZ, 2012):

- ISCC (International Sustainability and Carbon Certification): ISCC EU version is approved by the European Commission and the government of the Netherlands. ISCC DE version is recognized by the German government, although it is also in operation in other countries. The ISCC certification system may apply to any agricultural crop in the world. Besides EU RED criteria, ISCC includes social and environmental requirements. Certificates are issued by certification bodies accredited by authorized governmental bodies. A certificate is valid for 12 months.
- NTA8080 Sustainable biomass certification: This certification scheme is recognized by the government of the Netherlands to prove compliance with EU RED. NTA 8080 certification scheme has been submitted for consideration to the European Commission.
- Roundtable on Sustainable Biofuels (RSB): RSB certification scheme has been recognized by the European Commission and the German government as consistent with EU RED requirements. This standard can be used to certify any agricultural crop all over the world.
- Harmonised Calculations of Biofuels Greenhouse Gas Emissions in Europe (BIOGRACE): BioGrace is a tool to calculate greenhouse gas emissions aimed at harmonizing various methodologies and initial data used for EU RED implementation. BioGrace is managed by several research institutions and regulatory bodies of EU member countries. It is funded by the European Commission.

2.3.6 Relevance of Biofuels for the Agro–Food Industry

2.3.6.1 Biofuels for the Company Car/Truck Pool

Every company with a car/truck fleet can run its own fleet with biofuels; these biofuels could either be purchased or produced on site, which can add an extra benefit if generated waste can be reused for biofuels production. When using biofuel in a vehicle, the manufacturer's instructions must be considered.

2.3.6.2 Producing Biofuels from Organic Waste

The organic oil and animal fat waste generated in agro-food industries like meat processing, bakeries and vegetable oil production can be used for biodiesel production. Normally for investment security adequate financial incentives are required.

Whether organic waste is used for biofuel production or not depends on the price of the waste; the price can be determined by environmental legislation. If it is allowed to deposit the waste without costs for disposal and environmental restrictions, there is not much incentive to use waste for biofuel production. When a fee has to be paid for waste disposal and a separate waste collection system is implemented, then biofuel production could be interesting for an agro-food company.

Best-Practice Example: McDonalds (McDonald´s Austria, 2013):

About 1.2 million kilograms of frying oil are collected every year from McDonalds restaurants and converted into biodiesel. Since 2002, this biodiesel is fuelling the vehicle fleet of the transport partner HAVI Logistics.

2.3.6.3 Biofuels as an Additional Business Model

An agro-food company can use existing structures and facilities (logistics, suppliers etc.) for diversification and creating a new/additional business model, e.g. for producing biofuels. Normally, adequate financial incentives are required for investment security.

Best-Practice Example: AGRANA (AGRANA, 2015):

AGRANA is an internationally oriented Austrian company which adds value to agricultural commodities to produce a wide range of industrial products for the processing sector. In its three business segments, namely sugar, starch and fruit, AGRANA supplies local producers and large international players, particularly those in the food processing industry. In the sugar segment, AGRANA supplies both industrial and end customers with sugar products under the “Wiener Zucker” brand.

AGRANA also produces bioethanol from the fermentation of biomass rich in carbohydrates with an alcohol content of at least 99% by volume, making it practically water-free. In Europe, the most important raw materials used to produce bioethanol include any crops containing starch (wheat, corn) as well as concentrated sugar beet juice. In line with legal blending obligations, 5% bioethanol by volume (E5) is currently mixed with petrol in Austria. Plus, it is used as a separate, environmentally friendly fuel known as SuperEthanol E85, which is a mixture of petrol and up to 85% of bioethanol. Every year, a total of around 210,000 m^3 of bioethanol is produced at AGRANA’s facility in Pischelsdorf/Austria. This capacity would be sufficient to cover the total fuel demand of Austria if E10 were introduced in Austria.

During the bioethanol production, a by-product, called Dried Distillers Grains with Solubles (DDGS), an animal feed, is also produced. As a consequence, the import of animal feed can be reduced by the quantity of by-products that is produced.

AGRANA serves as a good example of using existing infrastructure efficiently for the double purpose of food production and bioethanol production: benefits can be drawn from existing logistical channels, short distances to suppliers and a good range of energy supply possibilities.

3 Measure Mix for Increasing Energy Efficiency in Agro-Food Industry

Regarding the annual implementation report of the Energy Community in 2014, Ukraine joined the Energy Community in 2011 and agreed to the energy efficiency acquis in 2012. With this acquis, Ukraine is also obliged to transpose the key provisions of the Energy End-Use Efficiency and Energy Services Directive 2006/32/EC. A new Ukrainian law on Efficient Use of Fuel and Energy Resources was drafted to transpose the key provisions of Directive 2006/32/EC on, for example, energy management, energy audits, labelling, etc. This law is still a draft and Ukraine is working on the adaption. The draft Energy Efficiency Action Plan of Ukraine (NEEAP) is in line with requirements of Directive 2006/32/EC but its adaption is also pending (Energy Community, 2014).

In the European Union, the Energy Efficiency Directive 2012/27/EU came in force in 2012 and replaced the Directive 2006/32/EC. The implementation of the Energy Efficiency Directive 2012/27/EU in the Energy Community regulations is under discussion. The Energy Community Secretariat prepared proposals for adaptations of the Energy Efficiency Directive 2012/27/EU for adoption in the Energy Community regulations, which were discussed in the Permanent High Level Group meeting on the 17th of December 2014 (PHLG, 2014).

This chapter includes information about a measure-mix for increasing energy efficiency in industry (also agro-food) which goes beyond the Directive 2006/32/EC and gives an outlook to further energy efficiency measures in industry. It includes measures which are relevant for industry regarding:

1. Manadatory energy audits in industry regarding the Energy Efficiency Directive 2012/27/EU,
2. Minimum Efficiency Performance Standards (MEPS) for motors, vans and pumps,
3. Benchmarking.

3.1 Energy Efficiency Directive 2012/27/EU

The EU mid-term evaluation of the ESD showed that the ESD was not successful in tapping the full energy savig potential of all sectors. That's why the EED was prepared and replaced the ESD. Regarding the Energy Community the EED is largely a recast of the ESD and therefore it would be very appropriate to take up the new Directive instead of continuing with the implementation of the old ESD (Energy Community 2013 Part A). In the Recommendation of the Ministerial Council of the Energy Community (Energy Community 2013 Part B) the steps for the Contracting Parties of the Energy Community to promote energy efficiency measures are mentioned. One of the recommended steps is to promote the availability of high quality energy audits to all final customers (Energy Community 2013 Part B).

The Energy Efficiency Directive 2012/27/EU (EED) entered into force on 4 December 2012. Most of its provisions had to be implemented by the Member States of the European Union by 5 June 2014. The EED establishes a common framework of measures for the promotion of energy efficiency within the European Union in order to ensure the achievement of EU's 2020 target on energy efficiency (20 %). All EU-28 countries are thus required to use energy more efficiently at all stages of the energy chain – from the transformation of energy and its distribution to its final consumption. The new Directive will help remove barriers and overcome

market failures that impede efficiency in the supply and use of energy and provides for the establishment of indicative national energy efficiency targets for 2020 (European Commission, 2012).

The measures of the Energy Efficiency Directive 2012/27/EU include information of the Website http://ec.europa.eu/energy/efficiency/eed/eed_en.htm:

- The legal definition and quantification of the EU energy efficiency target as the ''Union's 2020 energy consumption of no more than 1,474 Mtoe primary energy or no more than 1,078 Mtoe of final energy''. With the accession of Croatia, the target was revised to "1,483 Mtoe primary energy or no more than 1,086 Mtoe of final energy'';
- The obligation on each Member State to set an indicative national energy efficiency target in the form they prefer (e.g. primary/final savings, intensity, consumption) and, by 30 April 2013, to notify it together with its 'translation' in terms of an absolute level of primary energy consumption and final energy consumption in 2020;
- The obligation on Member States to achieve certain amount of final energy savings over the obligation period (01 January 2014 – 31 December 2020) by using energy efficiency obligation schemes or other targeted policy measures to drive energy efficiency improvements in households, industries and transport sectors;
- Major energy savings for consumers: easy and free-of-charge access to data on real-time and historical energy consumption through more accurate individual metering will now empower consumers to better manage their energy consumption;
- The obligation for enterprises which are not SMEs to carry out an energy audit at least every four years, with a first energy audit at the latest by 05 December 2015. Incentives for SMEs to undergo energy audits to help them identify the potential for reduced energy consumption.
- Public sector to lead by example by renovating 3% of buildings owned and occupied by the central governments starting from 01 January 2014 and by including energy efficiency considerations in public procurement – insofar as certain conditions are met (e.g. cost-effectiveness, economic feasibility) – so as to purchase energy-efficient buildings, products and services;
- Efficiency in energy generation: monitoring of efficiency levels of new energy generation capacities, national assessments for co-generation and district heating potential and measures for its uptake to be developed by 31 December 2015, including recovery of waste heat, demand side resources to be encouraged.

3.1.1 Energy Audits and Energy Management Systems Regarding the Energy Efficiency Directive 2012/27/EU

An important measure to increase energy efficiency in industry is the implementation of mandatory energy audits regarding Article 8 of the EED. Article 8 states that European Member States shall promote the availability to all final customers of high quality energy audits which are cost-effective and

1. are carried out in an independent manner by qualified and/or accredited experts according to qualification criteria or
2. are implemented and supervised by independent authorities under national legislation.

Austria has chosen option 1.

For the purpose of guaranteeing the high quality of the energy audits and energy management systems, Member States shall establish transparent and non-discriminatory minimum criteria for energy audits based on Annex VI of EED. The minimum criteria regarding Annex VI are:

- Energy audits must be based on up-to-date, measured, traceable operational data on energy consumption and (for electricity) load profiles;
- Energy audits must comprise a detailed review of the energy consumption profile of buildings or groups of buildings, industrial operations or installations, including transportation;
- Energy audits must be based on life-cycle cost analysis (LCCA) instead of simple payback periods, in order to take account of long-term savings, residual values of long-term investments and discount rates;
- 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.

The mandatory energy audits must be carried out by companies which are not SMEs of all branches every four years. Non-SMEs are defined as companies having at least 250 employees and an annual turnover of more than EUR 50 million or an annual balance sheet of more than EUR 43 million. Large companies with a certified energy- or environmental management system shall be exempted from the requirements regarding energy audits if it is ensured that they also meet the minimum criteria of Annex VI EED.

Another requirement of Article 8 EED is that EU Member States shall also bring the attention to SMEs and shall develop programmes to encourage SMEs to undergo energy audits and the subsequent implementation of the recommendations from these audits. On the basis of transparent and non-discriminatory criteria and without prejudice to Union state aid law, Member States may set up support schemes for SMEs.

These requirements of EED Article 8 are the minimum requirements for all countries; the implementation of Article 8 took place in different ways in EU Member States.

3.1.2 Implementation of Article 8 EED 2012/27/EU in Austria

To implement the EU Energy Efficiency Directive 2012/27/EU, Austria enacted the Law on Energy Efficiency (EE) (BGBl. I Nr. 72/2014). In paragraph 9 of this Austrian law, large companies (i.e. non-SMEs according to Directive 2012/27/EU) are obligated to

1. carry out an energy audit every four years or
2. implement an certified energy or environmental managements ystem (regarding ISO 50001 , EMAS III or ISO 14001) with an integrated energy audits.

If a company chooses option 1, the energy audit must be done by a qualified external auditor. If the company choses option 2, the energy audits can be carried out also by qualified internal auditors.

With the EE law, Austria also defined the qualification criteria for energy auditors. The qualification criteria include requirements on:

1. Education on energy efficiency:
   Energy auditors have to have an appropriate education with extended knowledge in the energy efficiency field and six months professional experience or
2. Practical experience on energy efficiency:
   Three years of professional experience and education has to be proven within six months.

The minimum criteria of Annex VI of the EED and also additional criteria for energy audits in Annex 3 are included in paragraph 18 of the Austrian EE law. All defined criteria must be considered within energy audits. An energy audit must be carried out relating to the process structure of the European Standard EN 16247-1 Energy Audits - General Requirements. The EN 16247-1 includes the process steps for the audit process, as data collection, involvement of interested parties, on-site visits, analysis of data and reporting.

Furthermore, each large company has to find out the relevant areas of energy consumption. Relevant areas could be production processes, buildings and/or transport. Each area which has more than 10% energy consumption in comparison to the total energy consumption of the enterprise must be considered in the energy audit. For relevant areas with more than 10% share on energy consumption the following criteria must be considered within the energy audit regarding Austrian EE law:

Energy Audit Criteria for Buildings:

The data collection procedure has to include the following:

- Ownership and user agreements, lease contracts;
- Outer shape of the building (e.g. L-shape, T-shape, H-shape);
- Floor plan of the building or group of buildings (e.g. orientation of the building, surrounding areas of the building);
- Building dimensions or room data sheet;
- Building utilisation (e.g. office building, production hall);
- Building envelope (U-values of the building components);
- Technical building services including schematic representations, control schemes or settings and data about the equipment (e.g. heating, ventilation and air conditioning, refrigeration, hot water processing, water systems for sanitary facilities, electrical systems, building control, elevators, sun protection measures, solar heat, photovoltaic, combined heat and power);
- Energy export to third parties;
- Enacted energy-relevant measures in the field of building maintenance;
- Target level of climatic conditions inside of the building (for example indoor room temperature, indoor humidity, exposure to light, exposure to shade);
- Where available: energy performance certificates and calculated energy certificates;
- Programs to raise the awareness for the user or group of users.

The building inspection shall include the following points (on-site visit):

- Assessment of the actual levels of the power supply system of the building, where the age, the storage ability and distribution as well as the emission system and control system should be taken into consideration (e.g. temperature, humidity, level of illumination);
- Comprehension of the factors driving the changes in technical systems, e.g. season-bound requirements.

In the context of policy recommendations, the following points should at least be addressed:

- Definition of the appropriate level for the output of each technical building service;
- Consideration of the interaction of the technical building services with the building envelope and the external environment;
- Age of the building and the technical systems whose condition and method of operation and maintenance;

- Comparison of existing technology systems and facilities with the most efficient market-available systems and equipment.

Energy Audit Criteria for Operational Processes:

The data collection and analysis must cover the following points:

- Manufacturing process (technical data on product and product quality, current operating conditions regarding nominal values) and associated utility processes (e.g. steam, hot water, compressed air, electrical propulsion, heat recovery systems, pumps, fans and ventilation systems, lighting, IT infrastructure);
- Other relevant processes (e.g. storage, packaging, logistics, offices, research centers, laboratories) and their utility processes;
- Current operating conditions (nominal values) of utility processes;
- Existing plan for data measurement;
- Special conditions and restrictions for processes and the environment (e.g. worker protection standards);
- Product-related energy performance indicator(s);
- Distribution of energy consumption by the different processes;
- Analysis of the energy balance of the sites on the basis of energy bills and the quantity of goods produced.

Field work (site visits) must include:

- Additional measurements for the current operating conditions (nominal values) for utility processes and manufacturing processes should be carried out in order to confirm the impacts, energy input and consumption.

In the context of recommendations of measures, the following points should be covered:

- Measures to reduce or recover energy losses;
- Replacement, modification or stockpiling of equipment;
- Improvement of energy management: efficient operation and continuous optimization;
- Improved maintenance;
- Development of programs for behavior modification;
- Plan for data measurement.

Energy Audit Criteria for Transport Processes:

The data collection process must include the following:

- Energy consumption or operating hours of each vehicle during the past year;
- Passenger transportation figure: share of the relevant modes of transport performance in % (unit: passenger kilometers);
- Commercial transport figure: share of each mode of transport to the transport line in % (unit: tonne-kilometers);
- Composition of the fleet and the vehicles: list of all vehicles with details of age and main technical characteristics (e.g. the permissible maximum weight, fuel consumption, fuel type, and especially for trucks the Euro class and engine size);
- Potential for route optimization;

- If the transport or part of the transport is outsourced: energy-related criteria for allocation of the haul capacity should be raised;
- Maintenance programs, checklists for inspection and acceptance and maintenance records;
- Regular driver training courses or courses for other relevant people to reduce the energy consumption including impact monitoring (e.g. fuel-saving training for drivers, tire pressure measurement during refueling);
- Energy-related procurement guidelines to vehicles;
- Code(s) for energy efficiency in the transport sector (at least concerning fuel consumption and CO_2 emissions);
- Energy-efficient travel management;
- Staff mobility management.

In the context of recommendations for measures, the following points should be covered:

- Improvement of the maintenance programs;
- Energy and CO_2-related procurement guidelines for vehicles;
- Energy and CO_2-related items in the allocation of transport services;
- Regular demonstrable driver training;
- Optimization of route planning;
- Reduction of emissions and energy consumption;
- Measurement by means of energy-efficient metrics;
- Alternative business travel management;
- Alternative employee mobility management;

The Austrian Energy Efficiency Law foresees the establishment of a national energy efficiency monitoring body which shall conduct and review inter alia the following topics regarding energy audits:

- Registers for obligated companies;
- Register for qualified energy auditors;
- Monitoring and evaluation of the energy audits and energy/environmental management systems in large companies.

This installation of a national monitoring body is not a requirement by the EED, but Austria has chosen this method of meeting the provisions of the EED.

3.1.2.1 Supporting SMEs

In the EED it is also foreseen to develop programmes to encourage SMEs to undergo energy audits and the subsequent implementation of the recommendations from these audits because SMEs are not obliged to carry out energy audits or implement certified energy or environmental management systems.

Austria has a long tradition in supporting SMEs. For example, the klimaaktiv programme and the *Umweltförderung im Inland* (supporting investments on RES and EE) of Austria are tailor-made instruments, also for SMEs. The klimaaktiv programme was installed in 2005, 7 years before the EED entered into force.

klimaaktiv is the Austrian climate protection initiative launched by the "Federal Ministry of Agriculture, Forestry, Environment and Water Management", embedded in the Austrian federal climate strategy. klimaaktiv is the umbrella for all voluntary measures regarding sustainable construction, energy efficiency, mobility and

renewable energy. It also intends to increase market shares of climate protecting products and services, to contribute to an innovative Austrian economy and to reduce greenhouse gas emissions at low cost.

The core activities are:

- Trainings: klimaaktiv provides the qualifications needed in the thematic programmes (e.g. energy efficiency) and coordinates training and education in the various fields e.g. in steam systems, compressed air, vans, pumps, lightning systems, green IT;
- Setting standards (e.g. energy auditing guidelines) and safeguarding quality (e.g. a quality management system for biomass);
- Providing information and raising awareness, e.g. with participation at specialized fairs and online http://www.klimaaktiv.at/english/about_klimaaktiv/aboutus.html,
- Benchmarking tools for companies;
- Providing advice and support: klimaaktiv mainly focuses on offering consulting to companies interested in making their production processes energy efficient, or renovating their facilities, or introducing mobility management, or changing over to energy efficient appliances and IT systems. klimaaktiv provides for the empowerment of the existing consultants by equipping them with new tools, by benchmarking energy efficiency and by offering further training on specific issues to consultants;
- Activating and networking partners (also companies) for voluntary agreements to improve energy efficiency.

The programme for energy-efficient companies is within this overall klimaaktiv programme, which has been active since 2005. Selected results for the overall klimaaktiv programme until now are:

- 660 GWh energy savings;
- 220,000 tonnes of CO_2 savings;
- 1100 participants in trainings;
- 170 best-practice examples online – from about 150 awarded companies;
- 12 pact 2020 partner.

3.1.3 Relevance of Energy Efficiency Directive 2012/27/EU for Industries in Ukraine

Regarding the report “Assessment and Recommendations on Ukraine’s National Energy Efficiency” (EUEA, 2014), the draft NEEAP of Ukraine demonstrates a lack of concrete mechanisms to attract conducting proper energy audit. The adoption of the Ukrainian law No. 3580 is also necessary. This report also highlighted that it is necessary to consider the provisions of the Energy Efficiency Directive 2012/27/EC in NEEAP. The Directive on Energy Efficiency in comparison with the Directive on Energy Services has higher requirements on ensuring energy efficiency and energy saving and also on energy audits (EUEA, 2014). The report of N. Kostyshena (2014) further highlightsthat a number of Ukrainian regulations regarding energy efficiency must be adopted, for example the Energy Strategy of Ukraine for the period up to 2030, the National Action Plan for Energy Efficiency up to 2020 and also regarding energy audits (Kostyshena, 2014).

Promoting energy audits in industries (including agro-food industries) could be done in different ways:

- Engagement through a law (e.g. for large enterprises)
- Subsidies for carrying out energy audits (e.g. for SMEs)
- Energy tax reductions for enterprises

Structures for energy audit trainings already exist in Ukraine, for example the National Technical University of Ukraine conducts energy audit trainings (http://kpi.ua/en/node/7469). The extent to which these trainings consider energy efficiency in industry was not reviewed within this project, but in any case there is already a structure for energy audit trainings existing in Ukraine.

The implementation and coordination of energy audits in industry should be coordinated by one organisation, e.g. by the State Agency on Energy Efficiency and Energy Saving of Ukraine.

3.2 Minimum Efficiency Performance Standards (MEPS) and Relevance for Ukraine

To increase energy efficiency in industry in general and in the agro-food sector in special, it is recommended to implement in Ukraine minimum efficiency performance standards (MEPS) for electric motors, pumps and fans. Motors, pumps and fans are used in the agro-food industry in various ways, e.g. for materials handling, bottling processes or packaging machines. According to a study of the International Energy Agency (IEA 2011) using the best available motors will typically save about 4% to 5% of all electric motor energy consumption. MEPS are specifications which stipulate the minimum level of energy performance that the product must meet. Where MEPS are mandatory, products that do not meet these requirements may not be offered for sale or, in some countries, used for commercial purposes. MEPS are usually implemented through national authority regulations for a defined list of products.

Once estabilished, the implementation of MEPS is complemented by a strong monitoring, verification and enforcement (MVE) regime. This checks that only eligible products are present in the market. In this context, some countries also use registration and certification schemes (Kulterer, 2014).

When implementing MEPS, the following topics should be considered (Kulterer, 2014):

- Raise national awareness for importance of energy efficiency, electricity use in industry with electric motor;
- Initiate legal process of having the authority to create market transparency (energy labels) and market transformation (MEPS) systems;
- Assign authority to entity responsible for setting targets, setting MEPS, define testing procedures, accredit testing laboratories, develop product registration database and define sanctions for violating products and industry;
- Set up a research team for market data and technology development, to calculate the environmental effects of more efficient products, and to evaluate the impact on market structure and burden for investments in industry.
- Involve all relevant stakeholder (government, standard maker, manufacturers, industry users, electric power utilities) in the process to define the time line for targeted values;
- Publish legal document (national law) setting the MEPS;
- Start monitoring & verification program with check-testing of compliance;
- Publish annual report on process and progress;
- Define update cycles of MEPS;
- Collaboration on the adaption of international MEPS within the International Electrotechnical Commission committee, IEC TC 2, working group 31 (http://www.iec.ch/dyn/www/f?p=103:14:0::::FSP_ORG_ID,FSP_LANG_ID:1491,25)

For support on these issues: http://www.clasponline.org/en/WhatWeDo/EnergyEfficiencyStandards.aspx).

The minimum efficiency performance standard for electric motors (MEPS) is defined in different countries by different regulations (see Figure 1). The basis for the implementation of the MEPS for energy using products is the EU Eco-Design Directive (2009/125/EC). This Directive is specified in commission regulations for each product.

MEPS for electric motors are defined in the Commission Regulation (EC) 640/2009 of 22nd July of 2009 (amended with Commission regulation (EU) No 4/2014 of 6 January 2014) with regard to eco-design requirements for electric motors. According to Article 3 of the Commission Regulation, they are set in three tiers:

- „Since 16th June 2011, the minimum efficiency level of motors must be IE2
- From 1st January 2015 for motors with a rated output between 7.5 kW and 375 kW, the minimum efficiency level must be IE3 or IE2 equipped with a variable speed drive (VSD)
- From 1st January 2017 for all motors with a rated output between 0.75 kW and 375 kW, the minimum efficiency level must be IE3 or IE2 equipped with a VSD
- The product information requirements on motors are as set out in Annex I.
- Compliance with ecodesign requirements shall be measured and calculated in accordance with requirements set out in Annex II".

IE1 = standard efficiency, IE2 = high efficiency, IE3 = premium efficiency.

In Annex I of the Commission Regulation (EC) 640/2009 of 22nd July of 2009, the nominal minimum efficiency requirements for motors are set out in Tables 1 and 2 (for IE2 and IE3 Motors).

In the EU there are also MEPS existing for other industrial relevant equipment:

- Integrated circulator pumps from 1 W up to 2,500 W (hydraulic circulators): Commission Regulation (EU) 622/2012 of 11th of July 2012 amending Regulation (EC) 641/2009 with regard to eco-design requirements for glandless standalone circulators and glandless circulators integrated in product; Commission Regulation (EC) 641/2009 of 22nd of July 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to eco-design requirements for glandless standalone circulators and glandless circulators integrated in products.
- Water pumps: Commission Regulation (EU) 547/2012 of 25th of June 2012 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to eco-design requirements for water pumps.
- Industrial fans: Commission Regulation (EU) 327/2011 of 30th of March 2011 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to eco-design requirements for fans driven by motors with an electric input power between 125 W and 500 kW.

In Figure 1, the different countries setting of MEPS for electric motors from 1997 to 2017 are presented. The US started to implement MEPS for electric motors with efficiency standards corresponding to IE2 level (as now defined in: IEC 60034-30-1) as early as 1997.

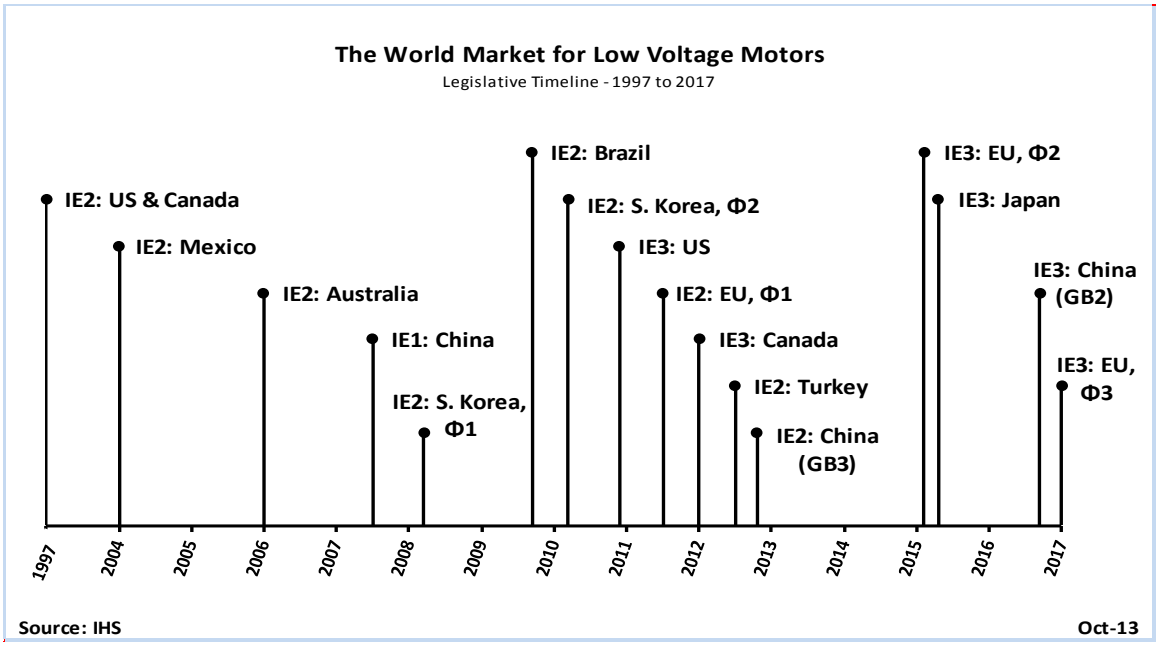

Figure 1: The world market for low voltage motors (Howell 2013)

3.3 Benchmarking in Industry

Improving energy efficiency in industry is used as a cost-effective way of helping supply-constrained developing and emerging economies to meet their growing energy demand. An energy efficiency benchmarking study in the Ukrainian agro-food industry (Lackner 2013) aimed to establish EE benchmark reports for nine selected sub-sectors of the Ukrainian agro-food industry in order to show first EE benchmark curves for each sub-sector and deliver first results of energy saving potentials. Benchmarking enables individual companies to assess their energy consumption levels in comparison to the respective sub-sector. When collecting industrial data, the project faced several constraints:

- Energy efficiency benchmarking was not well known in the Ukrainian industry at that time;
- Companies were not willing to participate in a benchmarking study;
- The shadow economy (black market) in Ukraine is very large;
- No energy audit programmes were available in Ukraine where data could be taken from.

The study thus relied on three different data sources in order to establish industry sector benchmarks in Ukraine:

- Data from individual companies: collected through energy audits and/or questionnaires, e.g. for dairy products, beverages, bakery products and chocolates and confectioneries; individual company data obtained within comprehensive energy audits proved to be the most reliable data source;
- Data from individual companies collected by sector associations, e.g. for the sugar industry and vegetable oil industry;
- Data from regional authorities: statistical data of medium and large companies (>50 staff members) collected annually by using „State Statistics Forms 11-MTP – Report on the Results of Fuel, Heat and Electricity Consumption for the Year XY“ and also including the annual production of the main products; data collected through statistical administration were least reliable, as no plausibility checks were

conducted and data on annual production and energy consumption did not take the black market situation and shadow economy in Ukraine into account.

4 Statistical Data on EE and RES for the Agro-Food Sector

The Energy Community has found out that the Ukraine is still short of compliance with the acquis of statistics (Energy Community, 2014). To support this process, a first analysis of the statistical process in Ukraine was done by Pavlo Rozen, a team member of the Ukrainian UNIDO team. Further information on the Austrian energy balance was also provided in this chapter.

4.1 Statistical Data Process in Ukraine

The state statistics authorities of Ukraine are entrusted with building the energy balance[36]. State statistics authorities independently choose the statistics data sources taking into account the quality of information and its timely submission (Law of Ukraine "On State Statistics"). Respondents are obliged by this law to provide data free of charge, in full, according to the approved statistics form, and within the specified terms.

Two types of data sources for energy balancing exist: statistical and administrative.

Relevant statistical data sources include:

1. Monthly statistical reports:

- State statistics report on industrial production (coal, oil, natural gas, motor gasoline, gas/diesel oil, LPG, electricity, etc.); No. of respondents: 2,100
- State statistics report on stocks and use of energy materials and oil products (coal, oil, natural gas, motor gasoline, gas/diesel oil, residual fuel oil); No. of respondents: 65,000
- State statistics report on light oil products sales through the filling stations (motor gasoline, gas/diesel oil, LPG, compressed natural gas); No. of respondents: 7,000

2. Quarterly household survey

3. Annual statistical reports:

- State statistics report on industrial production; No. of respondents: 4,200
- State statistics report on stocks and consumption of energy materials and oil products; No. of respondents: 110,000
- State statistics report on results of fuel, electricity and heat consumption; No. of respondents: 110,000
- State statistics report on actual fuel use for selected types of production and works; No. of respondents: 64,000
- State statistics report on production and utilization of secondary energy resources (blast furnace gas, other recovered gases, timber cutting waste, etc.); No. of respondents: 409
- Annual data on coal and fuel wood use from household survey; No. of respondents: 12,000

[36] Order of the Cabinet of Ministers of Ukraine, #1058-p, dated 28/11/2007

Administrative data sources include:

1. Monthly information:

- State customs' monthly statistics on the international trade (based on the customs freight declarations);
- NJSC "Naftogas of Ukraine" monthly information on natural gas imports;
- Ministry of Energy and Coal Industry of Ukraine: coal, crude oil, and natural gas production, electricity generation by sector enterprises;

2. Annual information:

Customs refined data on international trade;

- NJSC "Naftogas of Ukraine": information on natural gas production, import, export, reserves in underground gas storages, natural gas consumption, and transit volume;
- National Electricity Regulatory Commission of Ukraine (NERC): information on heat generation by licensed enterprises.

The State Statistics Service of Ukraine (www.ukrstat.org) publishes data on its official site monthly and annually, depending on the respective frequency of data collection. The energy balance is compiled and calculated annually by the State Statistic Service of Ukraine pursuant to the IEA recommendations. It is published on the official website and in the annual statistical report of Ukraine. Production statistics for the different sub-sectors of the agro-food industry are published as well.

A number of reports are submitted to the local state statistical administration using special standard forms, of which five (out of six) are submitted annually, and one report is submitted on a monthly basis:

Table 5: Statistical Reports by Ukraine (www.ukrstat.org)

NO.	NAME OF REPORT	DATA	PERIOD OF SUBMISSION	WHO IS REQUIRED TO SUBMIT A REPORT
1.	Report on balances and the use of energy materials and products of petroleum refining	Coal, Oil, Natural gas, Heavy oil fuels, Petroleum	Annually	Legal entities, subsidiaries, separate workshops of all types of economic activities that use and have remnants of energy materials and products of petroleum refining
2.	Report on balances and the use of energy materials and products of petroleum refining	Coal, Oil, Natural gas, Heavy oil fuels, Petroleum	Monthly	Legal entities, subsidiaries, separate workshops of all types of economic activities that use and have remnants of energy materials and products of petroleum refining
3.	Report on the use of fuel, heat and electricity	Coal, Oil, Natural gas, Heavy oil fuels, Petroleum , Heat, Electricity	Annually	Legal entities, subsidiaries, separate workshops of all types of economic activities with the average daily consumption of equivalent fuel ≥ 2 tce, or ≥ 15 Gcal of heat, or with connected electrical capacity of ≥ 100 kW
4.	Report on the fuel, heat and electricity consumption	Coal, Oil, Natural gas, Heavy	Annually	Legal entities, subsidiaries, separate workshops of all types of economic activities with the average daily consumption of equivalent fuel ≤ 2 tce, or ≤

		oil fuels, Petroleum , Heat, Electricity		15 Gcal of heat, or with connected electrical capacity of less than 100 kW and which do not consume fuel and energy for production process but use energy for heating and lighting.
5.	Actual fuel consumption for production of specific types of products and operations		Annually	Together with the report N° 3. Legal entities, subsidiaries, separate workshops of all types of economic activities
6.	Production and use of secondary energy resources		Annually	Together with the report N° 3. Legal entities, subsidiaries, separate workshops of all types of economic activities

Data quality assessment is ensured in the following ways:

The population of enterprises is recorded on the national level, which includes all enterprises that are subject to statistical observation and is based on the enterprises' active/non-active status in the Unified State Register of Enterprises and Organizations of Ukraine (USREOU). In this register, the active population and newly created enterprises are recorded. Logical and arithmetical data control is exercised in accordance with the electronic data processing software.

Data quality assessment includes several stages:

1. Regional level: different logical and arithmetical data controls are applied, using special data processing software, which allows a method to review the enterprises' reports: comparison of indicators in time series, comparison of the totals etc.
2. State level: review of indicators by regions, types of economic activities, types of fuels etc.
3. Review of the total data on the main fuels by aggregating a balance. The following equation is applied to verify data: Production –Export +Import +/- Stock changes = Consumption.

In consultations with Ukrainian experts in statistics, the following main areas should be evaluated regarding the statistical process:

- Check of plausibility of all data;
- Received data should be verified at random;
- Not enough resources (experts); and
- Training for experts.

4.2 Data Collection and Balancing in Industry in Austria

Data collection and balancing processes in Austria can serve as a good practice example for how comprehensive data collection and aggregation in conformity with international rules is conducted.

Austrian energy statistics provide data on a broad spectrum of energy-related data. They comprise information about the energy flow in the Austrian economy from the primary energy supply[37] through transformation processes[38] to final energy consumption and the useful energy obtained, which is subdivided again into

[37] Including production, foreign trade and changes in deposits
[38] E.g. from coal into electricity, wood chips to district heat or crude oil into petrol and diesel

categories of useful energy[39]. Furthermore, information about the prices of energy sources and energy-source-specific taxes is provided by Statistics Austria, the Austrian national statistical service. With the EU Energy Services Directive 2006/32/EC, energy efficiency was introduced into the statistical work programme as well. Under this Directive, Austria is obliged to realise savings amounting to 80.4 peta joules (PJ) in 2016, to be attained by means of energy services and other energy efficiency measures. This corresponds to savings of 9% of the annual average final energy consumption for the period 2001-2005 (excluding ETS companies and the federal armed forces). Energy efficiency indicators include energy intensity in Austria from 1990 onwards, energy intensity of the manufacturing industry (excluding traction), energy intensity of households and energy intensity of domestic transport (passenger cars) (Gollner 2014).

The data compilation and calculation of the Austrian energy balances follow – for the most part – international concepts, as they also serve as the basis for assessing energy-based green-house gas emissions and for international energy reporting to EUROSTAT and the International Energy Agency (IEA).

Energy balancing in the Austrian energy balance (and thus also in the industrial sector) applies the following energy balance equation (Figure 2) (Gollner 2014).

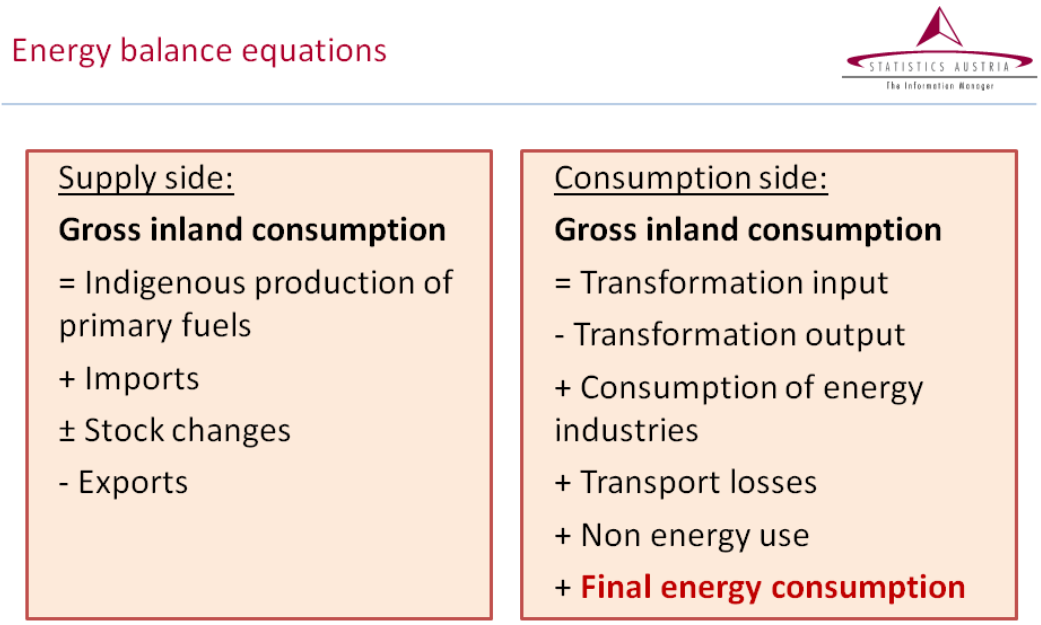

Figure 2: Energy Balance Equations (Gollner, 2014)

The energy balance for the industrial sector is based on three main data sets (Gollner 2014):

- Statistics about the EU Emission Trading System (ETS) – energy-intensive industrial installations with relevant emissions according to Directive 2003/87/EC, provided by the Austrian Environment Agency (UBA)
- Statistics of combined heat and power plants (CHP), provided by the Austrian regulator of energy markets (E-Control)
- Material input statistics in industry, provided by Statistics Austria

[39] These categories include lighting and IT, air conditioning, steam production and industrial furnaces

These are used to break down the total input of energy sources into transformation input and final energy consumption, to obtain detailed information on certain energy sources and on calorific values.

Next to these, two supplementary data sources are incorporated, which are the Short Term Statistics (STS) and the energy consumption of small- and medium-sized enterprises, provided by Statistics Austria. Those data sources contain additional information on energy sources (e.g. district heat) and on SMEs, which are not covered by the main data sources. The material input statistics (sample size 2,300) contain data on the biggest companies (> 20 employees) representing 80% of the market (in terms of annual turnover), whereas the energy consumption in SMEs includes information about all companies not included therein (Gollner 2014).

Table 6: Overview of the Data Sources used for Energy Balancing in the Industrial Sector (Gollner 2014)

SURVEY/ SATISTICS	OBESERVATION UNIT	TYPE/SAMPLE SIZE	PERIODICITY	INFORMATION CONTENT
ETS statistics	Industrial installation level	Obligatory/ ~200*)	Annually	Total input of energy sources Renewable share of each energy source Practical calorific values (CV)
CHP Statistics	Plant level	Obligatory/ ~220*)	Annually	Transformation input of energy sources to CHP plants (installed electrical power > 1 MWel) Transformation output (=generation) of electricity and district heat of these CHP plants
Material input statistics	Company level	Obligatory/ ~2,300	Annually	Transformation input and final energy consumption of energy sources Non-energy use of energy sources
Short term statistics	Company level	Obligatory/ ~12,000	Monthly	Generation of district heat Information to assess the economic development of Austria
Energy consumption in small & medium industries	Company level	Voluntary/ ~3,000	Past: every 2 years Future: every 5 years	Information on industries not included in the material input statistics Final energy consumption of energy sources

The material input statistics uses both paper-based and web-based questionnaires for data collection, although the focus shifts more and more towards online data collection processes[40]. Data for the short term statistics are compiled as well through an online questionnaire[41].

In order to raise the rate of response, the questionnaire for the energy consumption in SMEs is clearly structured, simple and short. Every data set need to be identified, so each establishment of an enterprise is referred to with its number of the Austrian Business Register (ABR). Coding of the industry sector is done in accordance with the reporting instructions of the EURSTAT/IEA Joint Questionnaires42, and information about the NACE (Statistical Classification of Economic Activities in the European Community) is provided. Data is broken down to the Austrian federal states either by the data providers themselves, or using information of the ABR. If unrealistically high/low amounts/prices/calorific values are reported, plausibility checks are carried out using average values and limits. Interviewers thus contact the respondents either by telephone or email to correct data according to average values and limits. Imputation of missing data is carried out using average consumption amounts or prices. Fuels that can be reported in specific units have to be converted to units compatible with energy balances. Wood chips, pellets or bark, for instance, can be reported in tons absolutely dry, solid cubic meters or loose cubic meters. For the compilation of energy balances, they have to be converted to tons dry air and terajoule, based on net calorific values (TJ NCV) and by means of conversion factors.

The material input statistics is central to the calculation of the final energy consumption in the industry sector. The three main data sources are synchronized with the short time statistics, delivering the „ETS-CHP-STS-synchronized material input statistics“, which contains all establishments of the ETS and CHP statistics. The total input of each energy source per establishment in the synchonized material input statistics is equal to or higher to the ETS. To deliver the final energy consumption in industry, the final energy consumption must be reduced by the CHP transformation input for electricity and district heating, and by the STS transformation input for district heating.

Final energy consumption in industry is composed of the final energy consumption in the ETS-CHP-STS-synchronized material input statistics and the final energy consumption in small- and medium-sized industries.

Energy intensity of the manufacturing industry (without traction) is calculated as final energy consumption (FEC) per gross value added at constant prices, see next figure (Gollner 2014).

[40] https://www.statistik.at/statistik.at/equestneu/gast/?0-1.ILinkListener-rootform-currentView-rows-5-row-rspId
[41] https://www.statistik.at/statistik.at/equestneu/gast/?0-1.ILinkListener-rootform-currentView-rows-6-row-rspId

[42] http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/questionnaires

Year	Final energy consumption (FEC)	Gross value added at constant prices[1])	FEC	Gross value added at constant prices[1])	Energy intensity
					FEC per Gross value added at constant prices[1])
	TJ	Mio. Euro	1990 = 100		
1990	216.562	42.162	100	100	100
1995	218.402	47.614	101	113	89
2000	253.629	54.775	117	130	90
2005	303.500	59.388	140	141	99
2006	307.040	62.453	142	148	96
2007	311.793	66.788	144	158	91
2008	318.923	67.157	147	159	92
2009	306.096	59.403	141	141	100
2010	328.867	62.367	152	148	103
2011	337.488	66.439	156	158	99
2012	331.797	67.108	153	159	96

S: STATISTICS AUSTRIA, National accounts, Energy statistics: Energy balances 1970 to 2012. Compiled on 23 January 2014. – 1) at basic prices, volume chained series, reference year 2005.

Figure 3: Calculation of Energy Intensity of the Manufacturing Industry (Gollner, 2014)

5 Literature

adelphi & AEA (2014): Report of workstream 1 of the UNIDO GEF project Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and Other Small and Medium Enterprises (SMEs) in Ukraine.

AGRANA 2015: http://www.agrana.com

Austrian Environment Agency (2013): Biofuels in Austria; Vienna, Austria.

BIOGRACE Calculation Tool: web-link http://biograce.net/home

Bittermann, W. and Suvorov, M., 2013: Concerted Action on the Renewable Energy Sources Directive (CA-RES), Working Group 2: Calculation Methodology,

BMLFUW, 2013: Renewable Energy in Figures – The Development of renewable energy in Austria in 2012, Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, 2013

British Embassy Ukraine & EUEA (2014): Assessment and Recommendations on Ukraine's National Energy Efficiency Action Plan (NEEAP).

Energy Community Secretariat (2014): Annual implementation report on 1st of August 2014; Vienna, Austria.

European Commission (2012): The Energy Efficiency Directive 2012/27/EU (EED) http://ec.europa.eu/energy/efficiency/eed/eed_en.htm

Energy Community (Part A) (2013): ANNEX 4 – Part A/29th PHLG/27-05-2013; Vienna, Austria.

Energy Community (Part B) (2013): ANNEX 4 – Part B/29th PHLG/27-05-2013; Vienna, Austria.

Energy Community Secretariat (2015): https://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/Implementation/Ukraine/Renewable_Energy, 15th January 2015.

Eurostat (2013): Eurostat, SHARES Tool Manual, Version 2013.41022

Falcucci, N., & Gerbeti, A. (2013): CA-RES Working Group 3: Authorisation of plants and infrastructures.

GIZ (2012): Biomass sustainable production and certification for the EU biofuel market, Guidance for manufacturers and traders.

Gollner, M. (2014): Energy balancing and data collection in the industrial sector, presentation 5th of June 2014 at the AEA.

International Energy Agency, Brunner C. U. & Waide, P. (IEA 2011): Energy-Efficiency Policy Opportunities for Electric Motor-Driven Systems.

ICTSD (2013): „Local Content Requirements and the Renewable Energy Industry - A Good Match?".

Kostyshena, N. (2014): Analysis of the Effectiveness and Performance of Existing Financial Mechanisms and Fiscal Rules in the Sphere of Energy Efficiency and Renewable Sources of Energy; Kyiv Ukraine.

Kostyshena, N. (2014): Recommendations on Launching of Market Mechanisms and Financial and Fiscal Instruments to Improve Energy Efficiency and Promoting Renewable Energy; Kyiv Ukraine.

Kulterer K., Werle R., Lackner P., Brunner C. U. & Ellis M. (2014): Policy Guidelines For Electric Motor Systems; Part 2: Toolkit for Policy Makers.

Lackner, P., Kulterer K., Brandl G. (2013): Final report of the GEF UNIDO project Benchmarking and Energy Management Schemes in Small and Medium Enterprises in (SMEs) in Ukraine.

McDonald´s Austria (2015): Sustainability Report 2013, Austria.

PHLG (2014): 35th PERMANENT HIGH LEVEL GROUP Meeting Protocol of Energy Community; Vienna 17 December 2014.

TNO (2013): Bringing biofuels on the market; Delft 2013.

Ukrainian Energy (2013): „Ukrainian feed-in tariff: global issues, local content requirement and possible international remedies against Ukraine".

Ukrainian Journal of Business Law (2013): „Ukraine's Local Content Requirement in the Light of WTO Rules: is a Win-Win-Win Approach Possible?", 03rd March 2013.

WTO (2014): DSB „DS426" World Trade Organization; http://www.wto.org/english/tratop_e/dispu_e/cases_e/ds426_e.htm (Zugriff am 13. 08 2014).

6 Abbreviations

AEA	**Austrian Energy Agency**
AMA	**Agrarmarkt Austria**
ABR	**Austrian Business Register**
BIT	**Bilateral Investment Treaties**
BMLFUW	**Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management**
CA-RES	**Concerted Action on the Renewable Energy Sources Directive**
CHP	**Combined Heat and Power**
CNG	**Compressed** Natural Gas
CO_2	**Carbon Dioxide**
DSO	**Distribution System Operators**
DG	**Directorate-General**
EC	**European Commission**
ECS	**Energy Community Secretariat**
ECT	**Energy Charter Treaty**
EE	**Energy Efficiency**
EED	**Energy Efficiency Directive**
EN	**European Norm**
ESD	**Energy End-Use Efficiency and Energy Services Directive**
ETBE	**Etherised bioethanol**
ETS	**Emission Tranding System**
EU	**European Union**
FEC	**Final Energy Consumption**
FET	**Fair and Equitable Treatment**
FFV	**Flexi-Fuel-Vehicles**
GATT	**General Agreement on Tariffs and Trade**
GHG	**Greenhouse Gas**
IE	**International Efficiency**
IEA	**International Energy Agency**
ILUC	**Indirect Lande Use Change**
ISCC	**International Sustainability and Carbon Certification**
LCR	**Local Content Requirement**
LPG	**Liquefied Petroleum Gas**
MEPS	**Minimum Energy Performance Standard**
MVE	**Monitoring, Verification and Enforcement**
NACE	**Statistical Classification of Economic Activities in the European Community**
NCV,	**Net Calorific Value**
NEEAP	**National Energy Efficiency Avction Plan of Ukraine**
NREAP	**National Renewable Action Plan of Ukraine**
PHEV	**Plug-In Hybrid Electric Vehicles**

RBSA	**Abengoa RED Bioenergy Sustainability Assurance**
R&D	**Research & Development**
RED	**EU Directive on Renewable Energy**
RE	**Renewable Energy**
REEV	**Range Extender Electric Vehicles**
RES	**Renewable Energy Sources**
RES-E	**Renewable Energy Sources**
RES-T	**Renewable Energy Sources Target**
REX	**Range Extender**
RSB	**Roundtable of Sustainable Biofuels**
RSPO	**Roundtable on Sustainable Palm Oil**
RTRS	**Round Table on Responsible Soy**
SME	**Smart and Medium Enterprise**
STS	**Short Term Statistics**
SQC	**Scottish Quality Farm Assured Combinable Crops (SQC) scheme**
TJ	**Terajoule**
TSO	**Transmission System Operator**
VSD	**Variable Speed Drive**
W	**Watt**
WG	**Working Group**
WTO	**World Trade Organisation**

7 List of Figures

8 List of Tables


AUSTRIAN ENERGY AGENCY