ENERGY EFFICIENCY AND RENEWABLE ENERGY SECTORAL POLICIES

Energy intensity in European countries (IEA, 2016)

- **Germany**: 0.09
- **Romania**: 0.08
- **Lithuania**: 0.09
- **Croatia**: 0.1
- **Hungary**: 0.11
- **Slovak Republic**: 0.1
- **Poland**: 0.1
- **Bulgaria**: 0.15
- **Belarus**: 0.16
- **Ukraine**: 0.29

**Households**
- State and local programs of co-financing of energy efficiency
- Households stimulation on installation of wind and solar plants
- Energy labelling systems
- Full metering of energy consumption
- Stimulation of recipients of subsidies to save energy

**Industry**
- Stimulation through energy tax
- Energy Performance Contracts

**Services, Public Entities and Agriculture**
- Energy Performance Contracts
- The mechanism of energy management

**Transport and Non-energy use**
- Stimulation of liquid biofuels production
- Extension of electric vehicles usage
MAIN PRIORITY: NATURAL GAS SAVING

Dynamics of natural gas consumption in 2014-2018*

- 6 billion m³ (or -24 %)

Achievements in 2014 – Q3 2019:

Invested in Ukrainian "clean“ energy projects

\[ \Sigma \approx 4.1 \text{ billion } \varepsilon \]

IN RENEWABLE ENERGY:

- 2 282 MW of new heat capacities
  Investments – 524 million €
- 3 899 MW of new renewable energy capacities
  Investments – 3.3 billion €, including:
  - 11 888* of households installed SPP with total capacity – 276 MW
    Investments – 240 million €

IN ENERGY EFFICIENCY:

- 682 609 of families implemented energy efficiency measures via "warm" loans in the residential sector
  Investments – 278 million €
- 361 ESCO-contracts are concluded in the public sector
  Investments – 19,2 million €

* according to operational data of NJSC “Naftogaz of Ukraine” and PJSC “Ukrtransgas” (without temporarily occupied territories)

*Q2 2019
CURRENT STATUS OF ENERGY EFFICIENCY AND RENEWABLE ENERGY IN UKRAINE

National Renewable Energy Action Plan-2020
- 11% of Renewables in final energy consumption

Energy Strategy of Ukraine till 2035
- 25% of energy, produced from RES in the structure of primary energy supply

Potential directions of investment
Necessary investments by 2035 for: attraction

- Construction of renewable energy facilities (SPP, WPP, small HPP, CHP, biomass boiler station, biogas facilities, etc.)
- Construction of capacities for production of equipment for renewable energy facilities
- Construction of biofuel production plants (solid, liquid)
- Growing of energy crops

National Energy Efficiency Action Plan-2020
- 9% of energy saving comparing to the average final energy consumption in 2005-2009

Residential sector – continuation of state program for stimulating households to implement energy efficiency measures
- € 44 – 74 bln – investment potential

Industry – state support for realization of energy efficiency measures
- € 2,3 bln – investment potential

Public sector – development of EPC market
- € 8 bln – investment potential
INSTALLED CAPACITY OF RENEWABLE ENERGY OBJECTS WORKING UNDER THE "GREEN" TARIFF, MW

From the beginning of 2015, 3 899 MW were introduced and around € 3.3 bln were invested.

*information on SPP households as of Q2 2019
DYNAMICS OF SOLAR INSTALLATIONS IN PRIVATE HOUSES

Number of private households

Installed capacity, MW

Around 240 mln EURO invested.

The number of private houses eligible for solar panels installation is 6,5 mln.
From the beginning of 2012 about € 112 mln were invested
NEW RENEWABLE ENERGY INCENTIVES INTRODUCTION

- Conducting pilot auctions
- Revision of the auctions conducting order
- Auctions holding period

07.2019 Law adoption 2020 2030

PPA terms
20 years

Obligatory participation:
from 2020:

SPP ≥ 1 MW;
WPP ≥ 5 MW;

Other key points:

- All types of RES will participate in auctions
- Electronic Trading System
  PROZORRO
- Bank guarantee 15 000 € for 1 MW
  Land and Specifications for accession
- Premium for the use of Ukrainian equipment 5% - 10% (current law)
- Specifications are valid:
  SPP – up to 2 years;
  WPP, CHP on biomass, small HPP – up to 3 years
### «FEED-IN» TARIFF

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>Law 2712-VIII</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>2020</td>
</tr>
<tr>
<td>SPP (ground based)</td>
<td>15,02</td>
<td>11,26 (-25%)</td>
</tr>
<tr>
<td>WPP (&gt; 2,0 MW)</td>
<td>10,18</td>
<td>9,05 (-10%)</td>
</tr>
<tr>
<td>SPP households</td>
<td>18,09</td>
<td>16,26 (-10%)</td>
</tr>
<tr>
<td>Hybrid (SPP+WPP) households</td>
<td>-</td>
<td>Introduction of “feed-in&quot; tariff (12,28 €ct/kW*h)</td>
</tr>
<tr>
<td>Biomass</td>
<td>12,39</td>
<td>The tariff is unchanged and stays at the fixed level of 2019 (12,39 €ct/kW*h)</td>
</tr>
</tbody>
</table>
On February 24, 2018, Ukraine became a member of the International Renewable Energy Agency (IRENA).

**WEBINAR with IRENA**

On the introduction of an auction system to support renewable energy

**Joint International Conference**

«Auction Support Scheme in Ukraine for Renewable Energy Deployment»

Date: October 31, 2018  
Date: February 21, 2019

The result: the proposals made by IRENA experts with appropriate practical advice are sent to the Verkhovna Rada Committee on Fuel and Energy Complex for consideration during drafting the Law.

On February 24, 2018, Ukraine became a member of the International Renewable Energy Agency (IRENA).
DRAFTING LAW ON SOLID BIOFUEL MARKET DEVELOPMENT

GOAL

CREATING LEGISLATIVE BASIS FOR SOLID BIOFUEL MARKET ESTABLISHMENT

MAIN PROVISIONS:

» creating a market mechanism for biofuels trading (electronic system for biofuels trading);
» assigning the obligation to trade through the electronic system for biofuels trading on designated entities;
» administrative responsibility for non-compliance of obligations on trade in biofuels set.

EXPECTED RESULTS FROM THE LAW ADOPTION:

- Transparent biofuel market
- Lower prices on biofuels
- Creating new jobs
- Growth of the solid biofuel volumes production
- Fuels provision for generating facilities
- Attracting investments for biofuel production
DRAFT LAW OF UKRAINE ON DEVELOPMENT OF THE PRODUCTION OF LIQUID BIOLOGICAL FUELS SPHERE

Creating legislative basis for liquid biofuel production and its use in transport

Draft Law provides:

Obligatory quotas on the biocomponent share in the volume of sold motor fuel:

For Gasoline

- From January 1, next year after the adoption - not less than 5 % volume (3.4 % energy)
  (Proposition: not less than 7 % volume (4.8% energy))
- From January 1, two years after adoption - not less than 7 % volume (4.8% energy)
  (Proposition: not less than 10 % volume (6.8% energy))

For Diesel

- From January 1, next year after the adoption - not less than 3 % volume (2.7 % energy)
  (Proposition: not less than 7 % volume (6.3% energy))

From next year after the adoption biocomponents must meet sustainability criteria.

Import of crude oil and refined products*

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (bln $)</th>
</tr>
</thead>
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<tr>
<td>2017</td>
<td>4.2</td>
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<tr>
<td>2018</td>
<td>5.5</td>
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</tbody>
</table>

Prices for traditional gasoline and with the addition of bioethanol in August 2019**

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Price per L (2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-95 traditional</td>
<td>$1.23</td>
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<tr>
<td>A-95 E40 (40% bioethanol)</td>
<td>$0.86</td>
</tr>
</tbody>
</table>

* According to the State Fiscal Service of Ukraine
** 23 of September 1$=24.43 UAH
Current situation in Ukraine with generation of household solid waste (HSW)

Annually:

300 – 350 kg of household solid waste is produced by one person in Ukraine.

10 mln tons of household waste is removed to the landfills in Ukraine.

- Gas equivalent: $\approx 1$ bln m$^3$
- 3.5 mln Gcal of thermal energy
- 1.2 billion kWh of electric energy
EXAMPLES OF SUCCESSFUL RENEWABLE PROJECTS

Combined Heat & Power (CHP) on renewable fuels

CHP provides heat and electricity: 190 residential buildings (22 000 dwellers); 3 kindergartens; 5 schools.
City: Kamyanets-Podilsky
Capacity: 45 MW including:
15 MW – solid bio fuel boiler (5 and 10 MW);
1.8 MW – turbine with ORC module (solid bio fuel);
Fuel: wood chips, pellets
Substitution: 8.4 mln m³ of natural gas annually
Investments: 8.2 mln EUR

Solar panel production plant

The largest solar panel production plant in Ukraine
City: Vinnytsia
Power: 200 MW - 1st stage (total - 400 MW)
Put into operation: 2019
New working places: 120
Investments: 5 mln EUR
Investor: KNESS Group

Wind power turbines production plant

Under license of German company Fuhrlaender AG
City: Kramatorsk
Power of turbines: 2.5 - 3.2 MW
Planned: 4.1-4.5 MW
Built: 77 turbines in Ukraine and 22 turbines in Kazakhstan
EXAMPLES OF SUCCESSFUL RENEWABLE PROJECTS

**Teofipol biogas complex 15 MW**
- **Town**: Teofipol, Khmelnytskyi region
- **Type of fuel**: sugar beet pulp, corn silage
- **Electricity production**: 15 MW
  - 5 MW (first line working on sugar beet pulp)
  - 10 MW (second line working on corn silage)
- **Heat production**: 15 MW
- **Investments**: 40 mln EUR
- **Equipment**: Jenbacher (Austria)

**Plant for landfill gas degassing**
- **City**: Khmelnytskyi
- **Start of operation**: 2017
- **Capacity**: 659 kW
- **Electricity production**: 5,13 kWh/year
- **Investments**: 34 mln UAH (1,1 mln EUR)
- **Investor**: Biogas Energy (Ukraine)

**Energy willow (SALIX energy)**
- **Region**: Volyn and Lviv
- **Company**: «SALIX energy»
- **Plantations area**: 1,700 ha
- **Crop capacity**: 20 t/ha
- **Annual growth**: 34,000 t/year
- **Crop capacity cycle**: 25 years
- **Heat of combustion**: 17,3-18,0 MJ/kg
UAMAP comprises detailed information on 103 implemented and 112 potential projects that require investments & soft loans more than € 4,2bln

www.uamap.org.ua
GIF UA: SCHEME OF OPERATION IN BRIEF

1. Customer appeals to GIF and selects interesting project(s) or offers his own.
2. Application Form is processed by Technical Office of GIF.
3. Decision on the type of financing and interaction model with a project.
4. GIF assesses and offers its equity share in RES project.
5-6-7. Stakeholders invest in GIF UA.
8. Banks give loans to the new projects.

PROJECT OWNER/INITIATOR
- who is ready to implement the project but lacks funding

GIF UA
- Share of GIF in projects - 30%
- GIF UA
- Lending Institution
- Private investor
- Project owner/initiator

Supervisory Board (ITA, …)

Executive Committee

Technical Office

Supervisory Board

Recommendation to finance the project

Cooperation

GIF UA

Application Form is processed by Technical Office of GIF.

Decision on the type of financing and interaction model with a project.

GIF assesses and offers its equity share in RES project.

Stakeholders invest in GIF UA.

Banks give loans to the new projects.

Solar
Wind
Hydro
Biomass, Biogas
WTE
ESCO

Investment projects (with feasibility study)
Investment projects (without feasibility study)

Loan (up to 70% for ex. NEFCO)

Provision with project documentation

APPLICATION
CREATION OF CONDITIONS FOR GREEN BOND MARKET INTRODUCTION IN UKRAINE

**Green bonds world market development indicators**

- **Renewables** 43%
- **Energy efficiency in buildings** 24%
- **Clean transport** 13%
- **Water resources management** 6%
- **Waste research** 4%
- **Other** 10%

<table>
<thead>
<tr>
<th>Year</th>
<th>Renewables</th>
<th>Energy efficiency</th>
<th>Clean transport</th>
<th>Water resources</th>
<th>Waste research</th>
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**Key world issuers**

- **International Financial Institutions** 49%
- **Corporations** 25%
- **Bonds guaranteed by IFIs and states** 1%
- **Banks** 17%
- **States and municipalities** 8%
- **Waste management** 6%
- **Energy efficiency** 24%
- **Clean transport** 13%
- **Other** 10%
- **Renewables** 43%

**Creation of conditions for implementation of green bonds market**

- Draft of Resolution of Cabinet Of Ministers Of Ukraine «To approve Concept of Green Bond Market Introduction in Ukraine and Affirm Action Plan of Its Implementation»
- Establishing legal preconditions for green bond market introduction
- Attracting investments to the green bond market
- Contributing green bond market development

**Next stages**

- Introduction of guidelines key procedures and incentives for the green bonds market (in accordance with international)
- Preparation and implementation of pilot projects for the issue of green bonds by different issuers
- Arranging information campaigns and attracting stakeholders on Ukrainian green bonds market
INVEST in UKRAINE!

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