

**VTT**

**Development for  
Opportunities for Utilisation  
of Biomass Residues in the  
Renewable Sector of Ukraine  
– Gap Analysis and  
Recommendations. Bioenergy  
Roadmap**

**Seminar-presentation of the project  
results/Kyiv/05.02.2020**

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**ДЕРЖЕНЕРГОЕФЕКТИВНОСТІ**

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# Task III: Roadmap for biomass-to-energy future market growth

## *Objectives of the Roadmap:*

- ✓ To suggest ways to tackle the identified technical and regulatory gaps, problems and bottlenecks in the sector.
- ✓ To define next steps required for the sector growth from technical, economical, legal and institutional perspective.

## *Integration and synergies of the Roadmap with other existing policies:*

Bioenergy Roadmap until 2050 is closely interconnected and coherent with the existing and planned strategic documents in Ukraine's energy sector. Based on this:

- Materials of the Roadmap can be used for the development of new NREAP until 2030; revised Energy Strategy of Ukraine until 2050; Concept of state policy in energy and environmental protection.
- Roadmap will show how to achieve the existing bioenergy targets until 2035 fixed in the Energy Strategy of Ukraine until 2035.
- Roadmap will facilitate contribution of bioenergy to Ukraine's international commitments to reduce greenhouse gas emissions under the 2015 Paris Climate Agreement.
- Bioenergy Roadmap until 2050 is in line with key objectives and points of Ukraine Green Deal Concept until 2050.

# Task III: Roadmap for biomass-to-energy future market growth (2)

## *Basic approach and features:*

- Starting point: 2020.
- Roadmap is in line with the scenario of up to **70% RES** in the energy balance in 2050 provided that TPES in 2050 will be 33% less than that in 2018 (~ 63 Mtoe in 2050) and the final energy consumption will increase by 8% (~ 55 Mtoe in 2050) .
- Total installed capacity of bioenergy equipment in 2050: **36 GW<sub>th</sub>** and **3.5 GW<sub>el</sub>**.
- Total consumption of biofuels in 2050: **23 Mtoe**.
- Utilisation of biomass potential of 2050 (~**43 Mtoe**): up to **60%**.

## Factors for increased biomass potential in 2050:

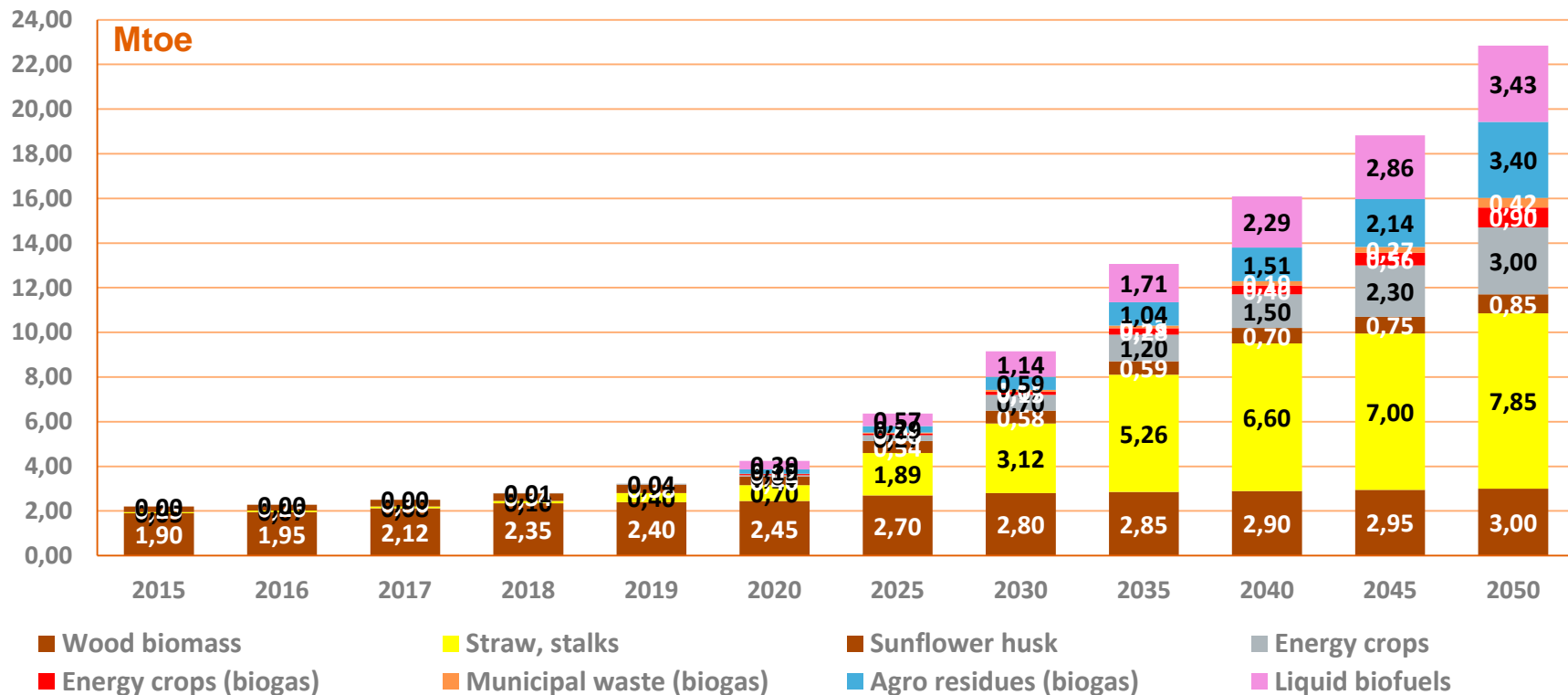
- increasing yield of crops;
- increasing share of wood increment cutting in forests;
- rising economic potential of biogas from different types of feedstock;
- enlarging areas under energy crops and increasing yield of energy crops.

## Task III: Roadmap for biomass-to-energy future market growth (3)

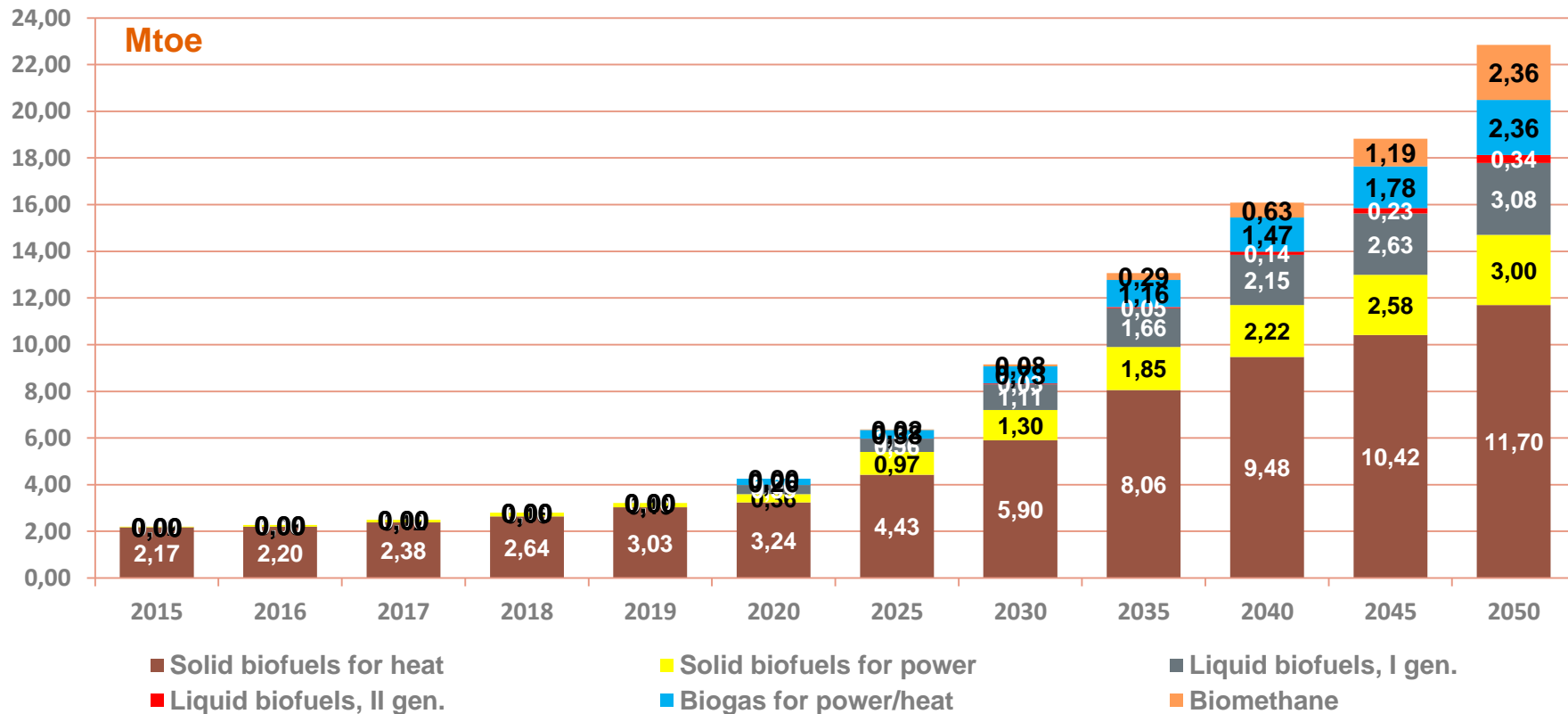
### *Key trends during 2020-2050:*

- Increasing shares of agro-residues and energy crops in the structure of solid biofuels consumption: up to **60%** and **20%** of the total, respectively, by 2050.
- Minimal rise in the consumption of wood biofuels:  
**1.2** times by 2050 (against **8** times for agro-residues).
- Considerable increase in the production of **biogas** and **liquid biofuels**:  
up to 4.7 Mtoe/yr and 3.4 Mtoe/yr, respectively, by 2050.
- Launching and rising production of **biomethane** and **II generation** transportation fuels:  
up to 2.4 Mtoe/yr and 0.34 Mtoe/yr, respectively, by 2050.

# Roadmap: Suggested structure of biofuel consumption in Ukraine by type until 2050



# Roadmap: Suggested structure of biofuel consumption in Ukraine by the type of energy carrier produced



# Assessment of budget and resources for implementing Roadmap until 2050

Implementation of Bioenergy Roadmap until 2050 requires investments in the range of **37.5 – 132.5** billion EUR depending on individual specific capital costs of equipment to be installed.

## *Division of investments between different types of bioenergy equipment/technologies is:*

- Biomass boiler plants: 4 – 24 billion EUR.
- Biomass CHP plants: 8 – 29 billion EUR.
- Biogas CHP plants (agro-residues and MSW): 10 – 35 billion EUR.
- Biogas to biomethane: 11 – 38 billion EUR.
- Production of liquid biofuels of I generation: 2.5 – 5 billion EUR.
- Production of liquid biofuels of II generation: 1.0 – 1.5 billion EUR.

## *Envisaged sources of financing include:*

- funds of private players (network operators, private investors);
- loans and grants from Ukrainian and international banks, other financial establishments and programs such as Ukrgasbank, EBRD, GEF, IFC, USAID, GIZ, NEFCO, UNDP and others;
- state funds within some relevant support mechanisms and programs.

# Task II: Gap analysis and recommendations

## *Ukrainian and Finnish policies and institutional framework*

Item	Ukraine	Finland
Biofuel market	Poorly developed	Some development
FIT for electricity from biomass/biogas	123.9 EUR/kWh without VAT	83 EUR/MWh
Heat prices	90% of the tariff for the supplier of heat from NG	50% premium for heat
Investment support	No support	20-30 % for biogas investment
Biomethane support	No support	Investment support, 1.5 EUR/kg CH <sub>4</sub> as motor fuel
Investor interest	Low level	Medium/high
DH systems status	Old style monopoly, bad technical condition	Local monopoly, loosing market for geothermal
Agribiomass «collection-supply» chains	Logistic chain should be developed	Gate payment for biowaste
Machinery to collect crop by-products	Lack of specialized equipment	Farm machinery good
Access to forest for private companies	Limited	High
Organic fertilizer application	Limited	Still low



# Task II: Gap analysis and recommendations

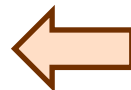
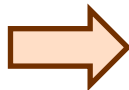
Ukraine: Key policy gaps and barriers to bioenergy development	Recommendations for Ukraine based on European experience
1. Underdeveloped biofuel/biomass market. (Gap impact = 25)*	Introduction of <b>biomass exchange</b> similar to Lithuanian Baltpool.
2. Low market attractiveness of biomass/biogas projects (Gap impact = 20)	<b>Extension of FIT</b> for electricity produced from biomass/ biogas. Implementation of <b>special tariff</b> for small-scale projects and extending the FIT validity period. To ensure non-discriminatory access to DH networks for biomass-to-heat producers.
3. Complicated procedure of project development in parallel with high degree of non-transparency. (Gap impact = 20)	Preparation of well thought out projects based on the strong project team in order to ensure smooth project development and minimize institutional challenges risks.
4. Complicated access to biomass of forest origin (felling residues). (Gap impact = 16)	Development, introduction and optimization of operations for <b>felling residues collection</b> with the use of effective specialized equipment.
5. Practical problems and lack of experience to use agribiomass as fuel or raw materials. (Gap impact = 12)	To use straw mainly for boiler plants with the application of modern specialized boilers. To follow fuel characteristics requirements and keep optimal operating modes.
6. Underdeveloped organic farming and digestate application. (Gap impact = 12)	Development of <b>organic fertilizer market</b> . Accelerated implementation of new law No. 2496-VIII "On the basic principles and requirements for organic production, circulation and labelling of organic products".
7. Lack of support for biomethane production and use. (Gap impact = 16)	Establishment of <b>strategic targets</b> for biomethane production. Adaptation of legal framework for biomethane production and consumption <b>support</b> .

\* Approach to the estimation of Gap Impact is the same as in *Benchmark analysis of case studies between BAT and Ukrainian practices*.

# Proposals to legislation for biomass-to-energy future market growth

Barriers to bioenergy development	Proposals
<p><i>1. Underdeveloped biofuel/biomass market.</i></p>	<ul style="list-style-type: none"> <li>❖ Draft Concept of State Policy in the Fields of Energy and Environmental Protection. The program of activity of the Cabinet of Ministers of Ukraine envisages the creation of a transparent and <b>competitive market for solid biofuels</b> by 30.06.2020.</li> <li>❖ In addition to amending the laws, a number of by-laws are required:               <ul style="list-style-type: none"> <li>✓ <b>The Rules for the electronic trading with solid biofuels.</b></li> <li>✓ <b>The Procedure for the operator competitive selection.</b></li> <li>✓ <b>The quality requirements for solid biofuels.</b></li> <li>✓ <b>The methodology for operator’s services threshold price formation.</b></li> <li>✓ <b>The Procedure for the consideration of operator’s and participants reports and approval of its forms.</b></li> </ul> </li> </ul>
<p>There is no specific legislation</p>	
<p>Amendments to the Law of Ukraine “On alternative fuel types” and other laws</p>	

# Proposals to legislation for biomass-to-energy future market growth



- ✓ Optional trading for all biomass producers;
- ✓ Obligatory trading for state and municipal enterprises that produce biofuels.

- ✓ Optional trading for all biomass buyers;
- ✓ Business entities with «green» tariff granted;
- ✓ Business entities that received a stimulating tariff for heat energy from RES in accordance with the Law of Ukraine “On Heat Supply”



**An annual increase of the mandatory percentage for trading via ETS (from 20% to 100%).**

Possibility for buyers not to use ETS in some cases.

**SAEE**

**Enterprises annually report on compliance with mandatory percentages.**

Barriers to bioenergy development	Proposals
<p><i>2. Low market attractiveness of biomass/biogas</i></p>	<ul style="list-style-type: none"> <li>❖ Extension of FIT for electricity produced from biomass/ biogas.</li> <li>❖ Implementation of special tariff for small-scale projects and extending the FIT validity period.</li> <li>❖ Draft Concept of State Policy in the Fields of Energy and Environmental Protection. Program of activities of the Cabinet of Ministers of Ukraine. Introduction of market mechanism and modern instruments of regulation of heat supply market. Adoption of the Law of Ukraine "On Amendments to Certain Laws of Ukraine Concerning the Introduction of Competition in District Heating Systems" – by 31.12.2021.</li> <li>❖ Competitive heat energy market with “single-buyer model”.</li> <li>❖ Clear mechanism and non-discrimination rules for IHP connection to heat networks.</li> <li>❖ Competition at the stage of heat energy production.</li> <li>❖ <b>The Procedures of bidding for heat energy purchase and form of a model heat energy purchase contract in the competitive heating systems.</b></li> <li>❖ <b>The Methodology of operator’s heat energy production threshold tariff formation.</b></li> <li>❖ <b>The Procedure for balancing, dispatching control, reserving of heat generating installations and the reservation fee calculation in the competitive heating systems.</b></li> </ul>
<p>Amendments to the Law of Ukraine “On alternative energy sources”,</p>	
<p>Amendments to the Law of Ukraine "On Heat Supply". Heat energy market creation</p>	

Barriers to bioenergy development	Proposals
<p><i>2. Low market attractiveness of biomass/biogas</i></p>	<ul style="list-style-type: none"> <li>❖ Introduction the legal definition of "energy crops".</li> <li>❖ Lease of unproductive and degraded agricultural land of state and communal property for the purpose the cultivation of energy crops - without auctions.</li> <li>❖ The term of lease of state and communal agricultural land for the purpose of the cultivation of energy crops may not be less than 20 years.</li> <li>❖ Implementation of state support for the cultivation of energy crops (per 1 ha).</li> <li>❖ <b>The amount of compensation</b> (25 thousand UAH / ha, payable in 2 stages).</li> <li>❖ <b>Frequency of compensation</b> (in the 1st and 3rd year of plantation establishment).</li> <li>❖ <b>Compensation conditions</b> (area not less than 100 hectares, not less than 85% and height of energy plants not less than 1 m in the first year, not less than 80% and height of energy plants not less than 2 m in the third year of plantation existence).</li> <li>❖ <b>Control</b> - formal verification of submitted documents and field checks.</li> </ul>
<p>Amendments to the Law of Ukraine “On Alternative Energy Sources”. Introducing of state support for the cultivation of energy crops</p>	

Barriers to bioenergy development	Proposals
<p><i>3. Complicated procedure of project development in parallel with high degree of non-transparency.</i></p> <p><b>Changes to the Rules of connection to heat networks.</b></p>	<ul style="list-style-type: none"> <li>❖ Procedure for providing the technical terms for the connection. Set of minimum requirements to technical terms of connection.</li> <li>❖ Exceptional instances when rejection of connection to heat network can take place.</li> <li>❖ Procedure for publishing information on the main characteristics of the heat supply system, associated heat load, potential points of connection to heat networks, structure and actual volumes of heat energy production and consumption and other information required for connection.</li> </ul>
<p><i>4. Complicated access to biomass of forest origin (felling residues).</i></p> <p><b>Amendments to the Forest Code of Ukraine</b></p>	<ul style="list-style-type: none"> <li>❖ Obligation for forest owners and permanent forest users to transport 80% of logging residues to the nearest roads with the purpose of solid biofuels production.</li> </ul>
<p><i>7. Lack of support for biomethane production and use.</i></p> <p><b>Amendments to the Law of Ukraine "On Alternative Energy Sources"</b></p>	<ul style="list-style-type: none"> <li>❖ Introduction of the concept of biomethane, guarantee of origin of biomethane, green tariff for biomethane.</li> <li>❖ Development and adoption of the Order of functioning of the register of production and consumption of biomethane.</li> <li>❖ Introduction of FIT for electricity produced from biomethane at least at 0.123 Euro/kWh without VAT.</li> </ul>



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