

# Strategic guide for biomass heat policy in Ukraine

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# Purpose

To develop strategic guidance for future policy interventions targeting biomass heat in Ukraine.

The work includes:

- an overview of demand and key influencing factors for biomass heat;
- estimates of availability for biomass cost supply from forest and agriculture;
- an overview of current policies in Ukraine and the ones for biomass heat in other EU countries; and

provides recommendations for future policy interventions that will facilitate market development.

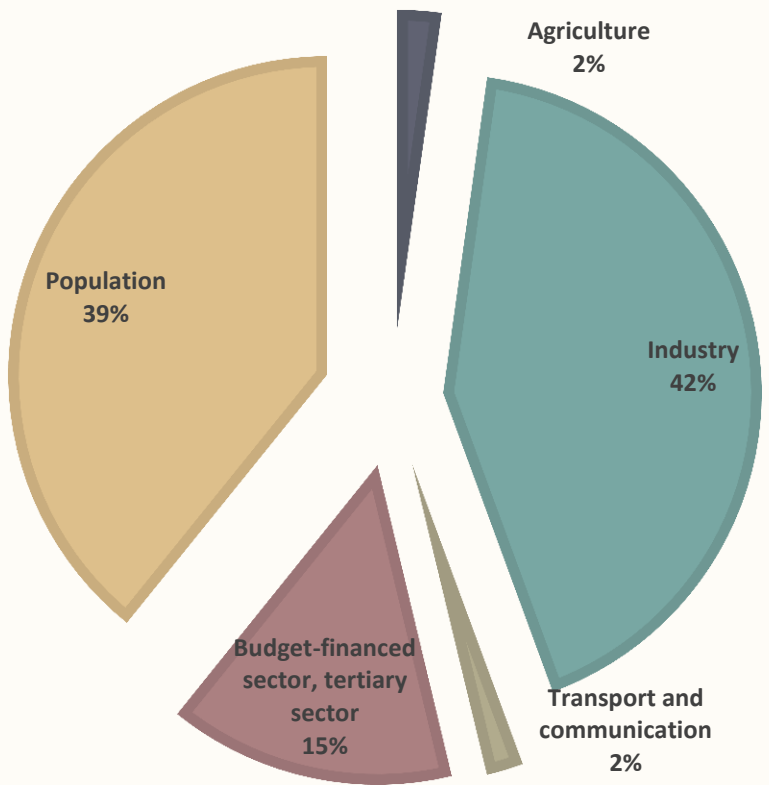
# Demand & key influencing factors for biomass heat in Ukraine

- Biomass heat in Ukraine is a practical and sometimes the only feasible option to replace fossil fuels or to provide heating for buildings lacking easy access to other heat supply options.
- A lot of heat consumers are aware of this option and willing to convert to biomass heat.

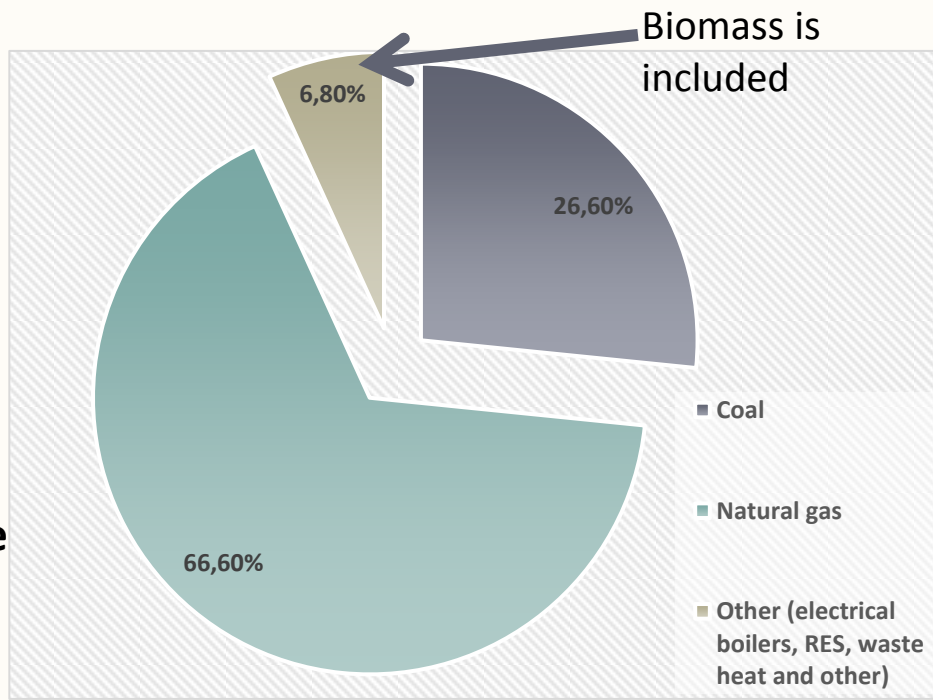
This guide aims to complement ongoing efforts in the country towards the formation of an effective policy for biomass heat in the domestic, industrial and tertiary (commercial & public buildings) sectors.

# Overview of the heat market in Ukraine (2012)

Heat consumption by sectors



Heat consumption by fuel type



Total heat consumption in Ukraine: 14.03 Mtoe

# Contribution of biomass to heat production by 2020 in ktoe (indicative NREAP\* targets)

Heat energy production from	2015	2016	2017	2018	2019	2020
Biomass	2700	3100	3580	4050	4525	5000
including solid biomass	2660	3040	3500	3950	4400	4850
biogas	40	60	80	100	125	150
<b>Total</b>	<b>3083</b>	<b>3576</b>	<b>4139</b>	<b>4692</b>	<b>5261</b>	<b>5850</b>
including district heating systems	2130	2560	3050	3550	4080	4650
private households	953	1016	1089	1142	1181	1200

\* National Renewable Energy Action Plan

# Key influencing factors for biomass heat-Technical

high priority (green); average priority (amber); low priority (red)

	Domestic	Tertiary	Industrial
Level of infrastructure (forest roads, forestry mechanization, and logistic fleet) necessary to support the wood biomass fuel supply is low.	Green	Amber	Amber
Prevailing harvesting technologies currently applied in agriculture make it difficult or even impossible to collect agro-residues	Green	Green	Green
Forestry operations, like thinning and collection of loggin residue are environmentally friendly and financially viable.	Green	Green	Green
High level of unregistered logging pose threat to the forests in my country.	Amber	Green	Green
Low fuel quality: Wood is mostly used with high humidity and freshly cut	Amber	Green	Green
Poor forest road infrastructure prohibits the collection and handling of biomass	Amber	Green	Green
There is lot of unused/abandoned agricultural land in my country, which could be used for growing biomass for energy purpose.	Amber	Green	Green
Prevention, monitoring, and mechanization for fighting forest fires should be improved.	Amber	Green	Green
Low presence of efficient DH/ CHP and heat technologies while high shares of the used biomass are being converted with old and inefficient equipment	Amber	Green	Green
Grid connection requires improvement for the implementation of CHP	Red	Amber	Amber
Heat load at medium to large CHP is problematic as it requires substantial investment in long distances of underground district heat pipework, which brings economic challenges	Green	Amber	Amber
Biomass heat technologies have a slower response than gas or oil fired systems, similar to that of coal systems	Red	Green	Green
Biomass heat systems require more space than fossil fuels for the boiler itself as well as for fuel storage, and for fuel delivery vehicles' access	Amber	Amber	Amber

# Key influencing factors for biomass heat-Economic

high priority (green); average priority (amber); low priority (red)

	Domestic	Tertiary	Industrial
Capital costs for installing biomass heat systems are higher than the coal/oil/gas equivalent systems	Amber	Amber	Amber
Biomass heat requires slightly more maintenance than oil and gas ones (including for ash disposal and fuel supply), similar to coal systems	Amber	Amber	Amber
Biomass feedstock costs will increase as competition among the various end uses (heat, electricity advanced biofuels) increases	Green	Green	Green
Administrative/ transaction costs linked to power grid connection, and the power production licensing process, can be a burden for smaller scale or decentralised projects, where they represent a higher percentage of the investment costs	Green	Amber	Green
Lack of heat revenues in a CHP plant reduces the attractiveness and payback period of such investments	Green	Green	Green
Efficient biomass heat technologies have high upfront investment costs and lack of affordable financing	Amber	Green	Green
Lack of consistent grant systems targeting biomass heat, CHP, DH	Amber	Green	Green
Lack of incentives for decentralised small to medium scale energy from biomass (heat; CHP, etc.)	Amber	Red	Amber
Bioenergy systems are still considered risky investments, and the cost of capital for such projects is thus higher than for other fossil fuel systems	Red	Red	Red
Low availability of financial assistance in the form of low-interest or no-interest loans, long-term loans, and / or loan guarantees	Amber	Amber	Amber
Capital costs for installing biomass heat systems are higher than the coal/oil/gas equivalent systems	Amber	Amber	Amber
Biomass heat requires slightly more maintenance than oil and gas ones (including for ash disposal and fuel supply), similar to coal systems	Amber	Amber	Amber
Biomass feedstock costs will increase as competition among the various end uses (heat, electricity advanced biofuels) increases	Green	Green	Green
Administrative/ transaction costs linked to power grid connection, and the power production licensing process, can be a burden for smaller scale or decentralised projects, where they represent a higher percentage of the investment costs	Green	Amber	Green

# Key influencing factors for biomass heat-Institutional

high priority (green); average priority (amber); low priority (red)

	Domestic	Tertiary	Industrial
Lack of harmonisation with European standards for biomass and boilers	Amber	Amber	Amber
Lack of secure, reliable regulatory framework conditions for biomass heat over a medium/longer term	Amber	Amber	Amber
Lack of long-term targeted (e.g. heat premium, investment grants, etc.) economic incentives in place for biomass heat and electricity	Green	Amber	Green
Limited availability of affordable high efficiency boilers in local market	Green	Amber	Amber
Low level of local knowledge and experience on operation and maintenance of biomass to heat and power systems prevents market development	Amber	Green	Green
Administrative process is complicated and lengthy for the construction of new heat facilities	Green	Green	Green
Concentration of small scale biomass heat cause pollution (especially in urban areas) with potential consequences on public health	Red	Amber	Green
In the case of large quantities of biomass needed, the fuel delivery can create additional traffic-induced noise and emissions (notably when compared to gas)	Amber	Amber	Amber
Implementation of heat consumption metering is low	Red	Red	Red
Implementation of heat consumption metering per building does not provide incentives for energy efficiency in dwellings	Amber	Amber	Green
Scarcity and inconsistency of data on the availability, typology and geographical distribution of various biomass resources constrains investments	Green	Green	Amber
Fragmented and unreliable data on biomass consumption hinder the development of concrete and realistic targets and create difficulties to the international reporting for biomass consumption for energy use	Amber	Amber	Amber
Significant effort is required across the region to improve national statistics on buildings, heat as well as integration of respective questions to the Census procedures	Amber	Amber	Amber
Low awareness across stakeholders groups from policy, supply and demand for cost efficient biomass technologies and the related benefits	Amber	Amber	Amber

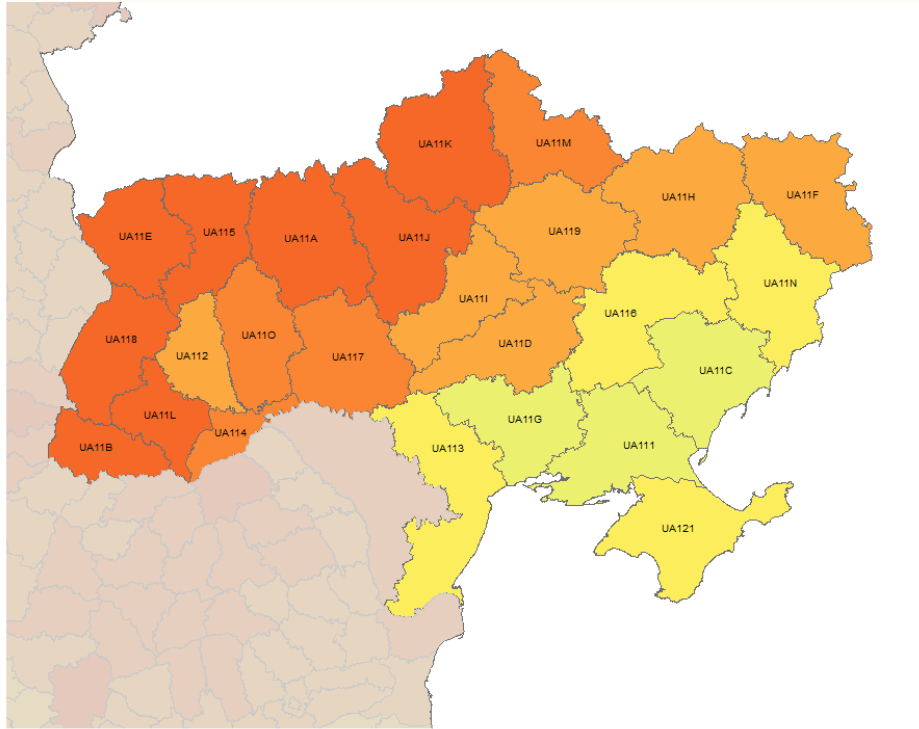
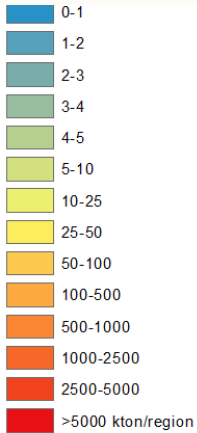


# Availability of forest & agricultural biomass estimated by S2Biom

# Forest biomass: Which types are included?

Forest biomass in this analysis includes:

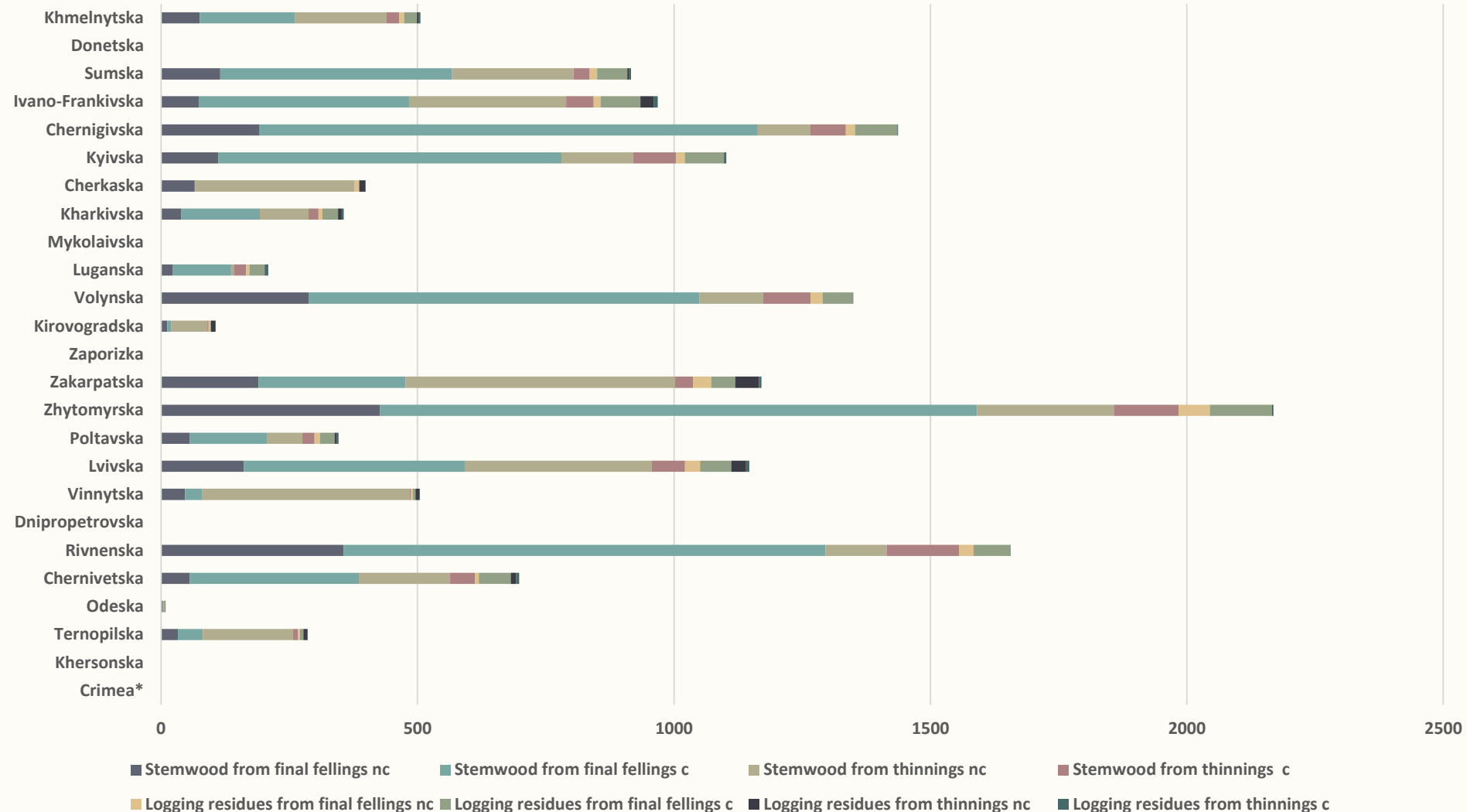
- i) primary forestry production from thinnings & final fellings, stem and crown biomass from early thinnings,
- ii) primary forest residues from logging residues and stumps from final fellings,
- iii) secondary forest residues from wood industries (sawmill and other wood processing).



# Forest biomass sustainable potentials

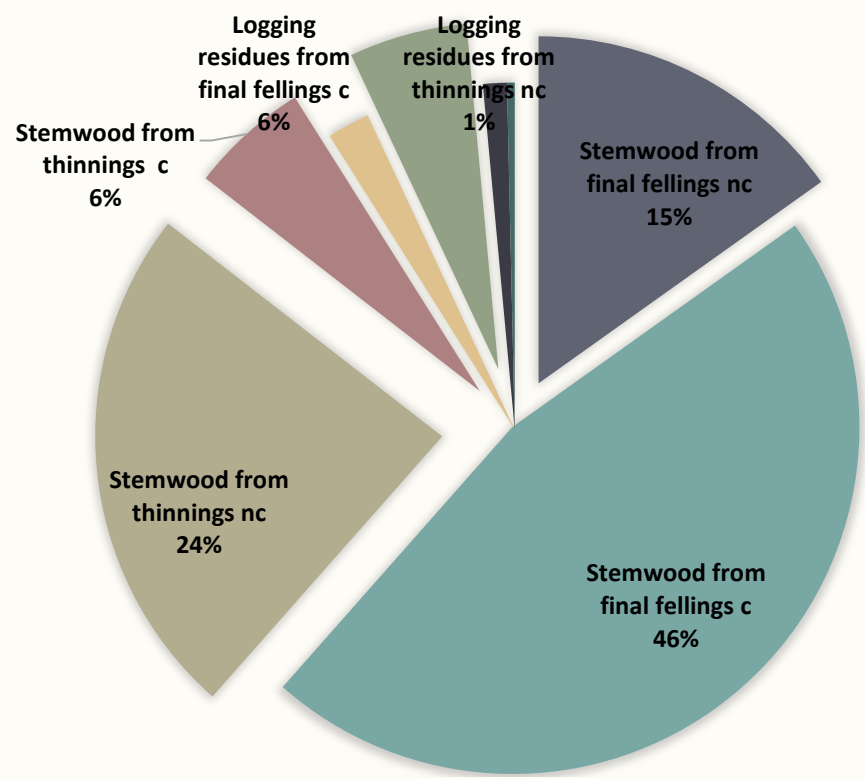
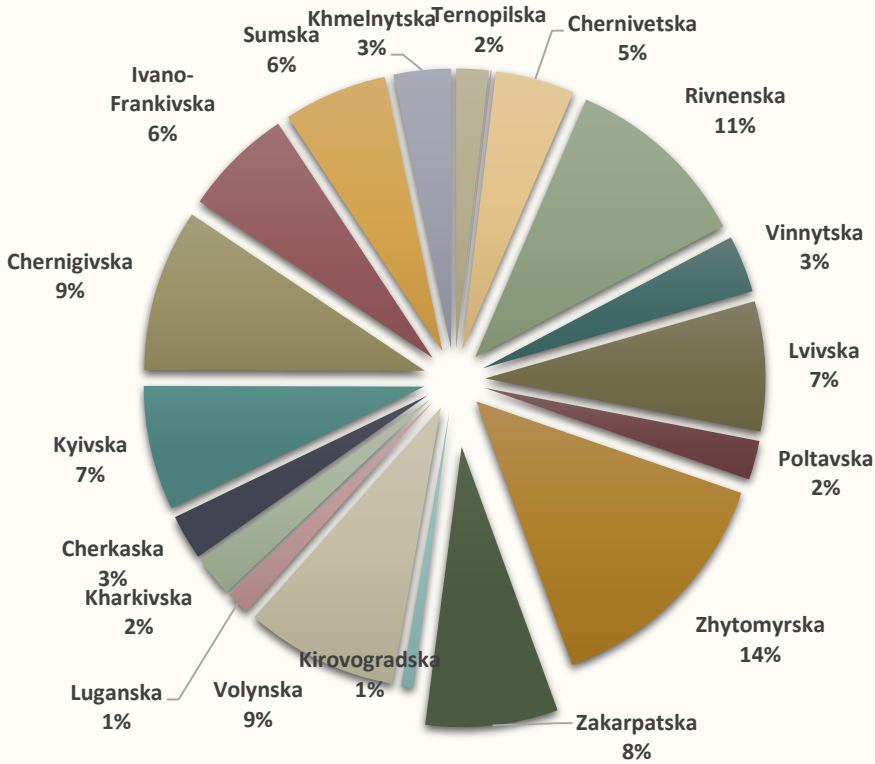
- Total estimated sustainable potential can reach up to 17.14m dry tonnes/ year
- Primary forestry production is estimated at 12.3m dry tonnes/ year
- Primary forest residues are estimated at 1.82m dry tonnes/ year
- Secondary forest residues are estimated at 3m dry tonnes/ year

# Forest biomass availability in Ukrainian regions by 2020 ('000 dry tonnes/ year)



c: conifers; nc: non conifer species

# Forest biomass availability in Ukraine in 2020 by region and forest biomass type

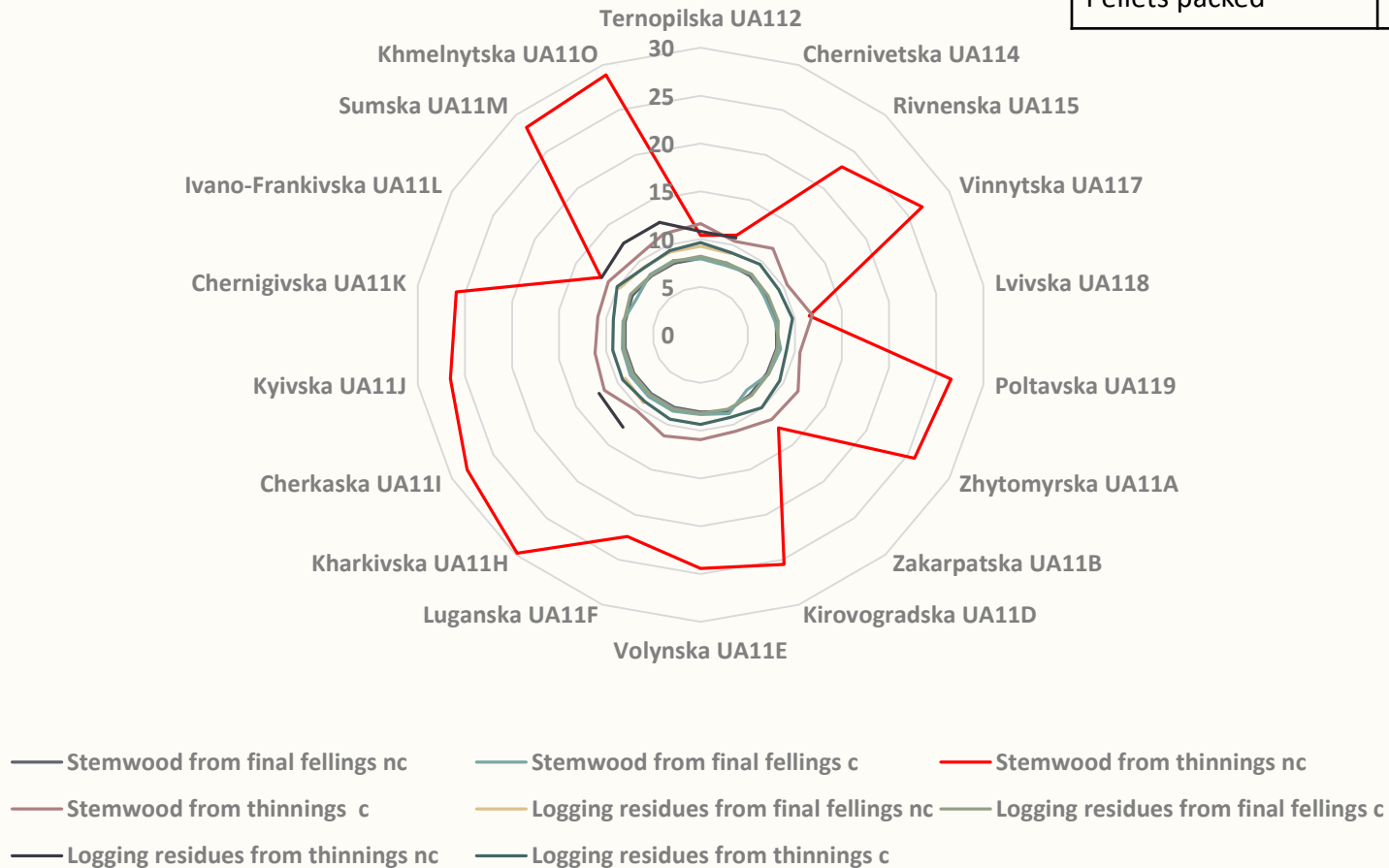


c: conifers; nc: non conifer species

# Costs\* and market prices of feedstocks

(€/t dry matter; including VAT)

Type	Price (€/t dry matter) including VAT
Wood chips	25
Pellets loose	40
Pellets packed	50

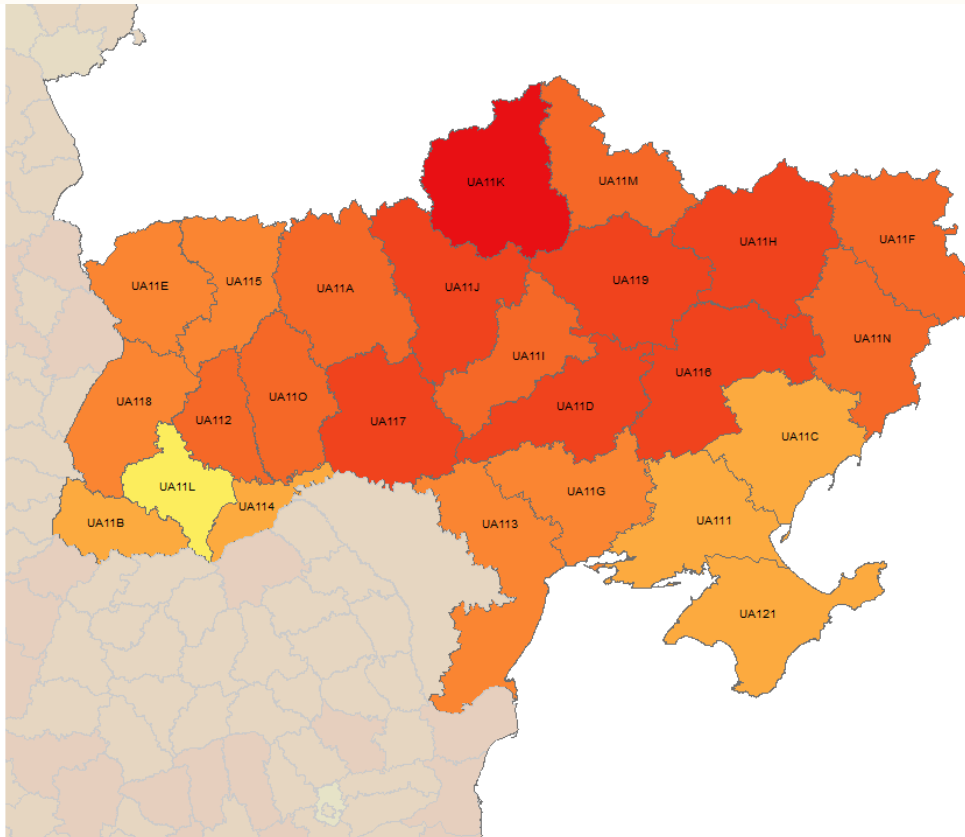
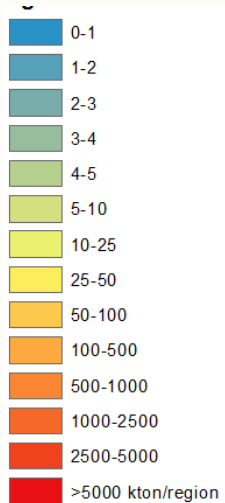


\* Costs in figure refer to roadside production costs

# Agricultural biomass: Which types are included?

Agricultural biomass in this analysis includes:

- i. agricultural biomass includes straw & stubbles;
- ii. woody pruning & orchards residues;
- iii. grassland cuttings not used for feed purposes;
- iv. biomass from road side verges;
- v. by-products and residues from food and fruit processing industry.

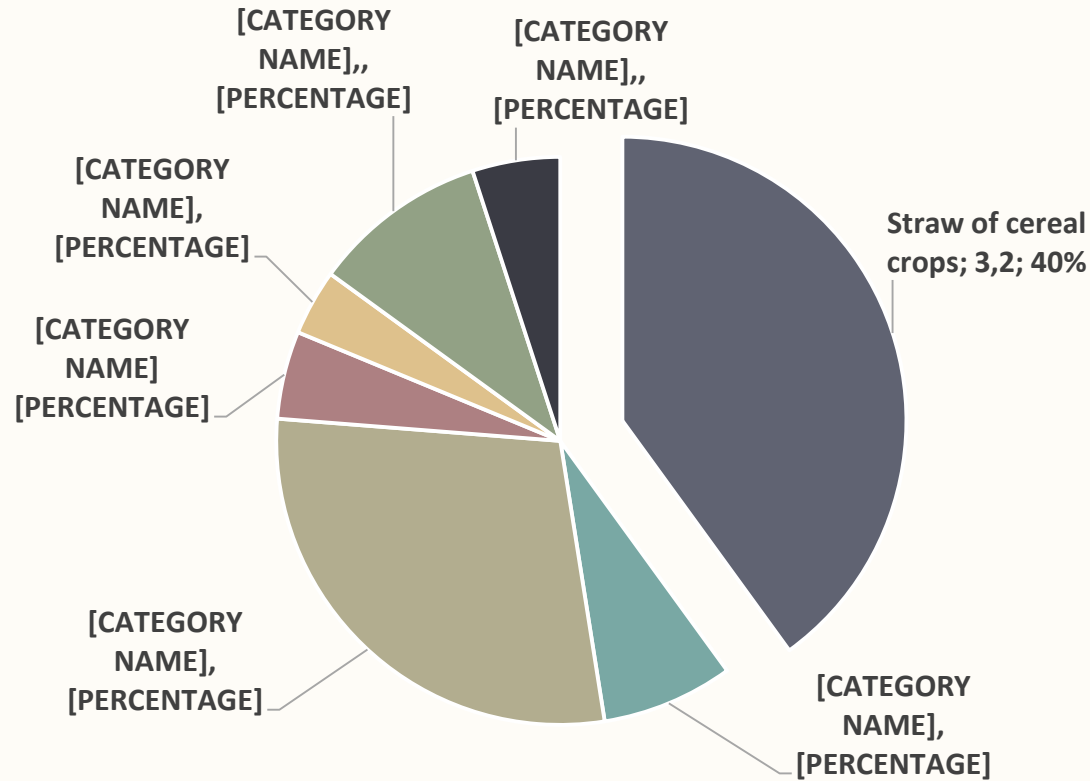


# Agricultural biomass sustainable potentials

- Total estimated sustainable potential can reach up to 70m dry tonnes/ year
- agricultural biomass includes straw & stubbles reach up to 43.16m dry tonnes/ year;
- biomass from road side verges can reach up to 0.25m dry tonnes/ year;
- by-products and residues from food and fruit processing industry can reach up to 26.5m dry tonnes/ year



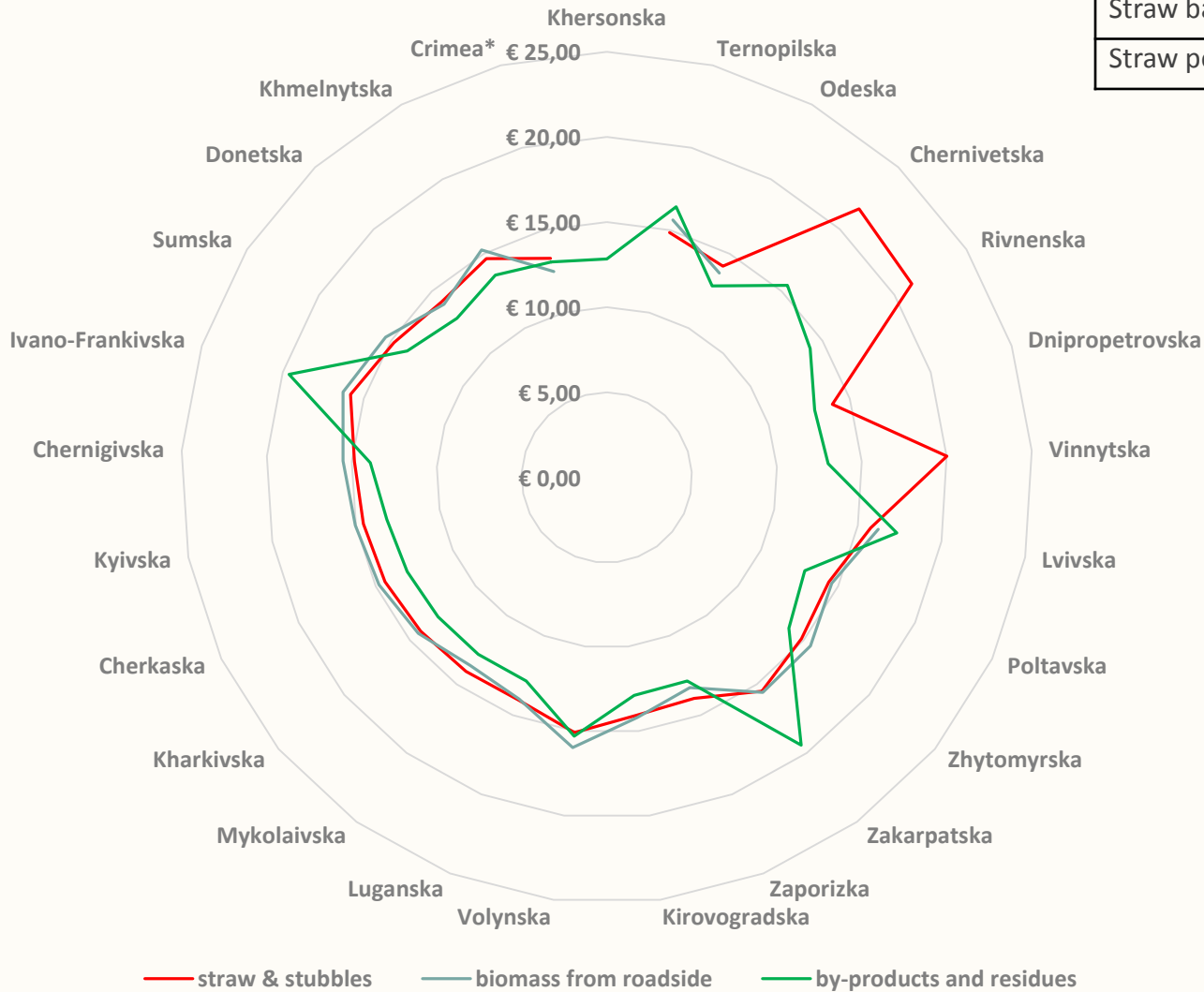
# Agricultural biomass availability in Ukraine in 2020 by biomass type



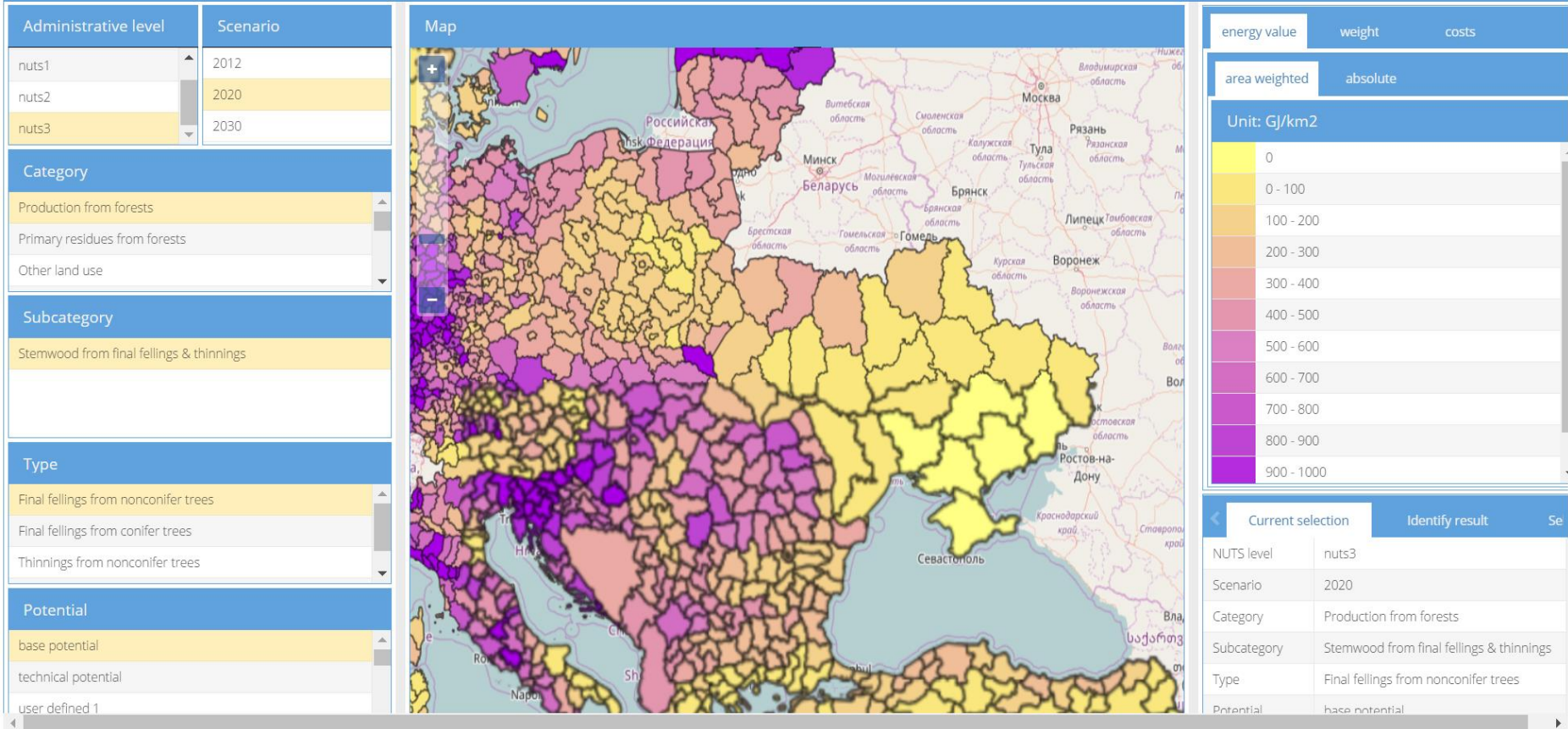
# Costs\* and market prices of feedstocks

(€/t dry matter; including VAT)

Type	Price (€/t dry matter) including VAT
Straw bales	30
Straw pellets	40



\* Costs in figure refer to roadside production costs

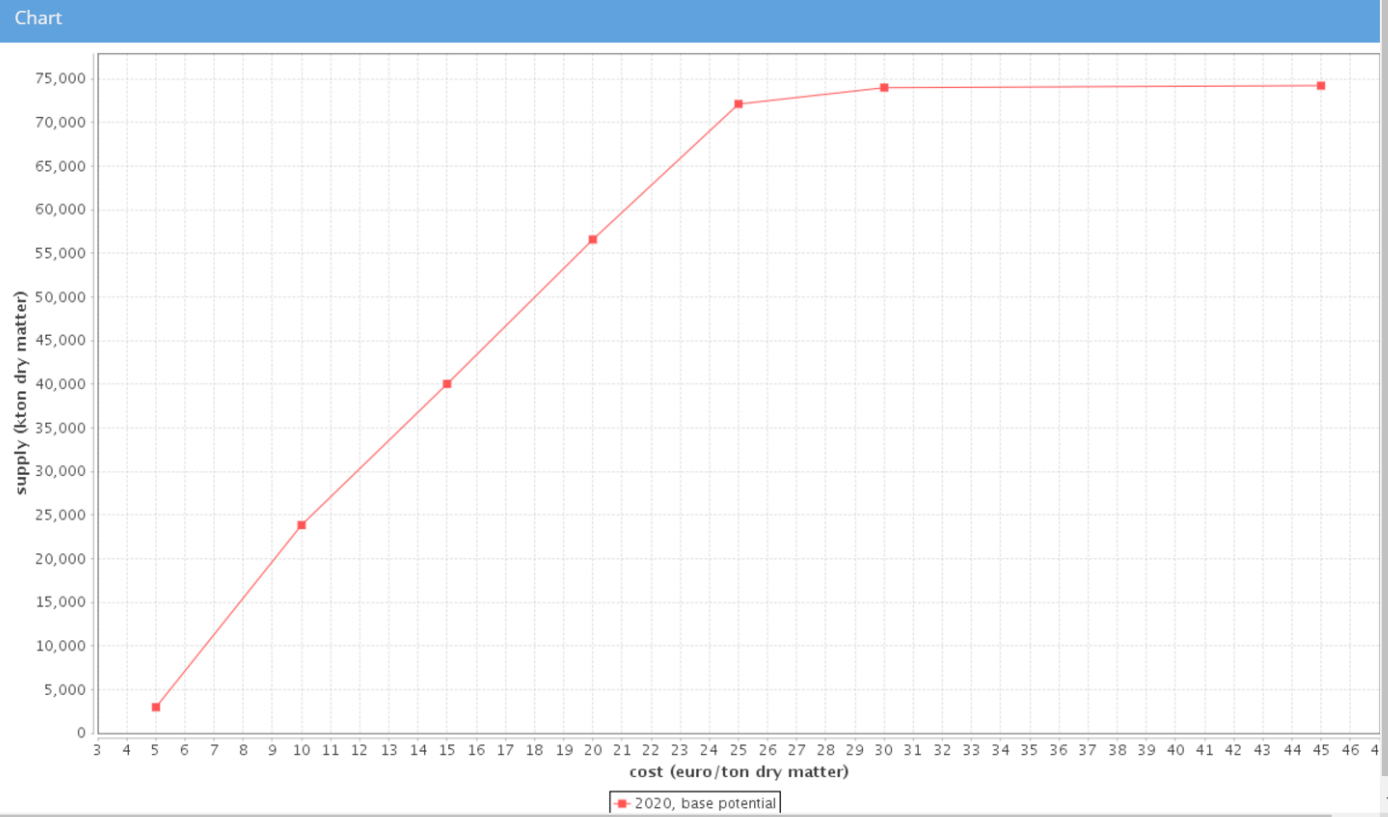


More detailed information can be viewed & downloaded

Country ?	Scenario ?
SLOVAKIA	2012
SLOVENIA	2020
SPAIN	2030
SWEDEN	
TURKEY	
UKRAINE	
UNITED KINGDOM	

Type ?
Stemwood from final fellings originating from nonconifer tr...
Stemwood from final fellings originating from conifer trees
Stemwood from thinnings originating from nonconifer trees
Stemwood from thinnings originating from conifer trees
Logging residues from final fellings originating from noncon...
Logging residues from final fellings originating from conifer ...
Logging residues from thinnings from nonconifer trees

Potential ?	Unit ?
base potential	Euro/ton dry matter
technical potential	Euro/GJ
user defined 1	



More detailed information can be viewed & downloaded

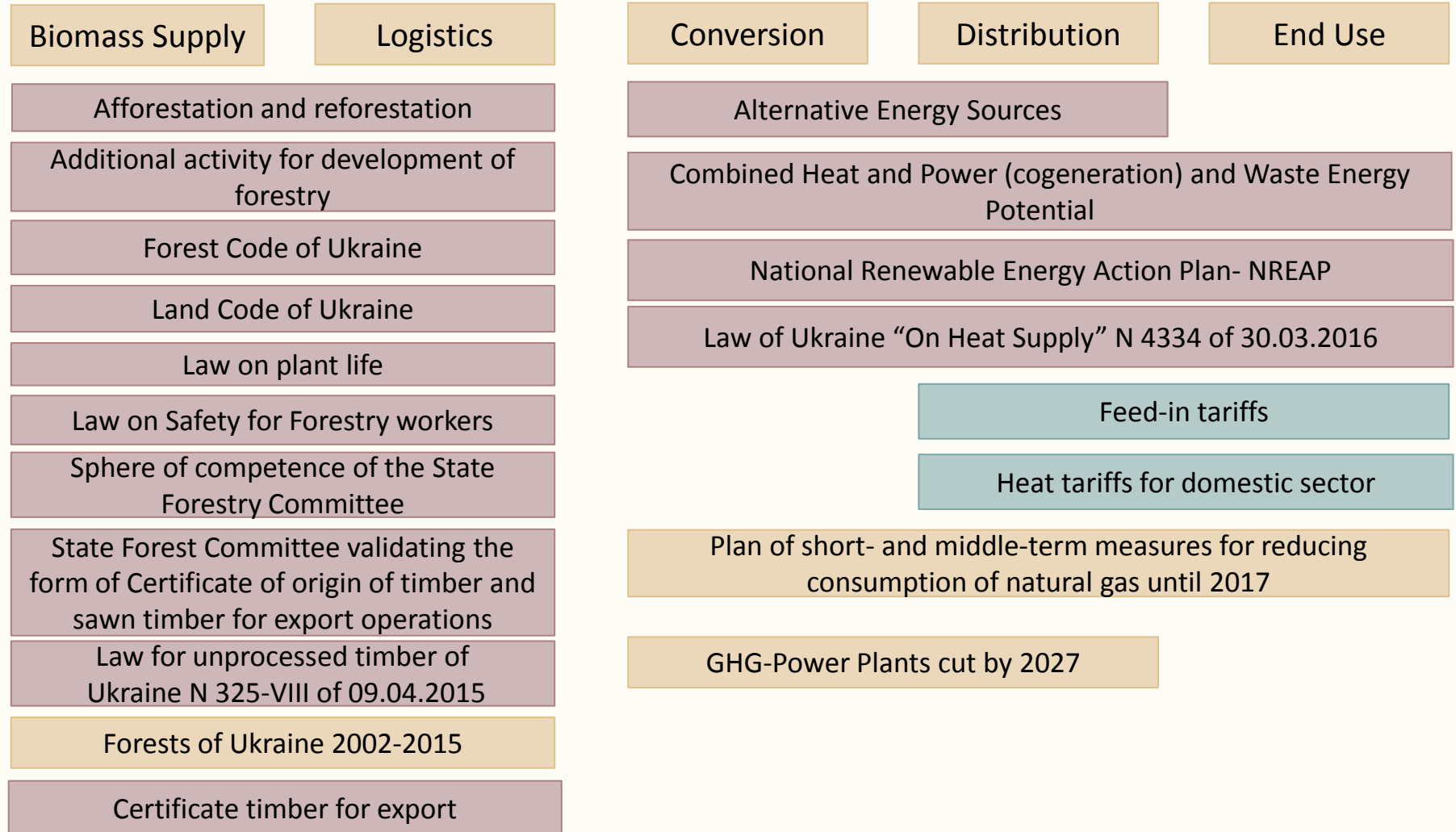
# Current policies for biomass heat in Ukraine and EU

# Current policies in Ukraine

- At present there are no incentives for biomass heat except for partial state compensation when purchasing domestic biomass boilers (with bank credit) for population.
- The working group attached to the State Agency for Energy Efficiency and Energy Saving is elaborating specific amendments to the Law of Ukraine “On heat supply”. The new version of the law will create preconditions for the competitive heat market in the country that in its turn will create favorable conditions for biomass heat development.

The following slides present details of existing policy that influences the biomass heat sector.

# Current Ukrainian policy influencing biomass heat from forest, agriculture & dedicated crops



Regulations

Financing

Information

# Ukrainian policy for biomass heat (I)

- Resolution of the Cabinet of Ministers of Ukraine (CMU) “On stimulation of replacing natural gas in heat supply area”<sup>24</sup> (2014) introduced a supporting mechanism for using biomass in heat supply for population. Without the mechanism the use of biomass in this area is not feasible yet due to the artificially low price of NG for population and therefore a low heat tariff. The mechanism consists in covering by the state the difference between the actual heat production tariff and the heat production tariff established for population.



# Ukrainian policy for biomass heat (II)

Ukrainian Government elaborated and approved **“Plan of short- and middle-term measures for reducing consumption of natural gas until 2017”**. One of main activities planned is replacement of natural gas by renewable energy sources, the major of which is biomass. Among others the Plan envisages the following measures:

- The state will partly cover credits raised by entities for purchasing energy-saving equipment including heat-generating equipment running on any fuel except for NG (2015-2017).
- The state will partly cover credits raised by population for purchasing energy-efficient equipment and materials (2015-2017).
- The state will provide guarantee of credits raised by entities for the implementation of projects aimed at reduction or replacement of natural gas consumption (2015-2017).
- Definition of “biomass” in Ukrainian legislation will be harmonized with that in the European Directive 2009/28/EC.
- Technical specifications for the admission of biomethane into Ukraine’s gas-transport system will be elaborated; stimulating mechanisms for the production and consumption of biomethane will be developed.

# Ukrainian policy for biomass heat (III)

- An important draft law **“On amending the Law of Ukraine “On Heat Supply” as for encouraging heat production from alternative energy sources”** (N 4334 of 30.03.2016) was adopted in the first reading on 22.09.2016.
- The core of the draft law is that heat tariff for alternative fuels (including biomass) for the consumers financed from the state and local budgets and also for population is fixed at 90% of the existing heat tariff for natural gas. Consequently, biomass to heat and power plants are expected to become more competitive than fossil fuel ones.

# Policy mechanisms for biomass heat in EU

- Most common policy mechanism in EU for biomass heat is investment support through direct subsidies and low interest loans.
- Austria and Finland are the top Member States for design, implementation and monitoring biomass heat policy mechanisms which have high effectiveness on market deployment.
- Tailored support, in the form of tax reliefs, feedstock premiums and/ or technology prioritisation through efficiency and emissions grading, is required to foster:
  - mobilisation of dedicated feedstock types, such as agricultural and forest residues streams as well as biowastes;
  - market uptake of new, high efficiency boilers and CHP systems.
- Biomass heat policy must also consider energy efficiency policies and that future frameworks should be designed to act synergistically with them.

The following slide provides an overview of the main policy mechanisms applied in EU countries for the uptake of biomass heat.

# Overview of policy mechanisms for biomass heat in EU

Member State	Tax relief	Subsidy	Low-interest loan	District heat support	Energy-based payment	Obligation in public sector buildings	Obligation in new-build (or renovated) buildings
Austria							
Belgium							
Bulgaria							
Cyprus							
Czech Republic							
Denmark							
Estonia							
Finland							
France							
Germany							
Greece							
Hungary							
Ireland							
Italy							
Latvia							
Lithuania							
Luxembourg							
Malta							
Netherlands							
Poland							
Portugal							
Romania							
Slovenia							
Slovakia							
Spain							
Sweden							
UK							

# Overview of successful policy mechanisms for biomass heat in EU Member States

Regulations

Financing

Information

Country	Policy mechanisms (regulations, financing, information)	Key success factors
<p>Germany: Three policy mechanisms work hand in hand to increase renewable heat and achieve the 14% RES target in 2020 in Germany.</p>	<p>The Energy Saving Ordinance ("Energieeinsparverordnung (EnEV)") focuses on the increase of overall energy efficiency and energy savings.</p> <p>The Renewable Energy Sources Act (EEG) requires to use a minimum of 60% of the waste heat from electricity production. Within this, the Renewable Energies Heat Act (EEWärmeG) obliges a part of heating and cooling demand of buildings to be covered by renewable energies. The obligation concerns new erected buildings, existing public buildings as well as fundamentally renovated buildings. Regarding biomass the obligation is fulfilled if 50% of the final heat consumption is covered by liquid or solid biomass, which is used in high efficiency boilers. Alternatively, gaseous biomass can be used to cover 30% of the final heat consumption, if it is used for combined heat and power production.</p> <p>The repayment bonus from the market incentive program (MAP) and the soft loans with low interest rates offered by the public sector bank KfW encourages realisation of biomass heating plants, biogas pipelines and heat storages.</p> <p>In the framework of the Market Incentive Programme (MAP) BAFA provides investment support for heat produced in existing buildings. Installations in new buildings are only eligible if process heat is used. The investment support is divided into basic support, bonus support and innovation support.</p>	<p>Complementarity between energy efficiency and renewable energy measures.</p> <p>Synchronisation and alignment of regulatory and financing mechanisms.</p> <p>Exogenous success factors include: high level of available forestry resources and a strong biomass industry in terms of suppliers, manufacturers, etc.</p>
<p>Spain</p>	<p>BIOMCASA II Resolution dated December 12, 2012, establishing the regulatory basis and call for the authorization of collaborating companies in the programme for the implementation of projects on the use of biomass for heating in buildings (BIOMCASA II) [1]. The Biomcasa II programme is a continuation of the Biomcasa programme. The aim of the programme is to establish a funding mechanism that promotes quality and is tailored to the specific needs of users of biomass systems. Private or public companies dealing in the supply and installation of biomass systems and Energy Service Companies may participate in this scheme and gain access to funding, as long as they can demonstrate a certain level of quality in technical services and organisational structure. The total available budget of the programme is EUR 5 million. 100% of the project costs can be covered, but there is a maximum limit of EUR 350,000 per individual project and a maximum of EUR 1 million per qualified company.</p>	

# Overview of successful policy mechanisms for biomass heat in EU Member States

Regulations

Financing

Information

Country	Policy mechanisms (regulations, financing, information)	Key success factors
Netherlands	Energy Investment Allowance (EIA): Biomass fired boilers or energy efficient cogeneration plants intended for the heating of buildings or processes are eligible for tax deduction. The amount of tax credit may be up to 41.5% of the total investments made in renewable energy or energy-efficiency technologies within one year.	High percentage of tax credit stimulates high efficiency technologies. Tax credits and direct premiums are considered as strong stimulation mechanisms when the markets are well developed and there is high awareness
	Since 2012, the SDE+ scheme also grant a premium on top of the market price to the producers of renewable heat.	
Austria	Energy Fund-Subsidy scheme wood heating.	A combination of expenditure mechanisms which refine scales of applications and target specific sectors and biomass resource types and end uses. These policy mechanisms are effective in mature markets with high awareness in biomass heat. Exogenous success factors include: high level of available forestry resources and a strong biomass industry in terms of suppliers, manufacturers, etc. Well established network of district heating.
	CHP Act: The annual support budget until 2020 is 12 billion Euro per year. Thereof, 7 billion Euro are reserved for plants in industrial and commercial enterprises. Eligible are newly constructed as well as existing plants being modernized, provided that the modernisation costs amount to at least 50% of the entire cost for a new station.	
	Rural Development Programme for Austria: One of the priorities is resource efficiency and climate. Under this topic, investments in new biomass heat and CHP plants and heat grids, renovation of existing plants, measures to improve the efficiency of heat grids and facilities for the production for biomethane and biogas not intended for electricity generation are supported by investment subsidies.	
	“Environmental Assistance in Austria” (“UFI”) programme: Investment grants depend on the technology and the size of the facility: i) a flat rate of de minimis support is calculated. “De minimis” allows for aid up to € 200,000 to be provided from public funds over a period of three years; or ii) ‘standard reimbursement rate’ which mostly amounts to 25% of the environment-related investment costs and can be increased through awards (sustainability and gas-cleaning awards, etc.) to a maximum of 35%.	
Climate & Energy Fund (Klima- und Energiefonds): investment subsidy depends on the type of system being installed and the one being replaced and ranges from 500 Euro to 2,000 Euro. Only pellet and wood chip heating systems are eligible for funding.		

# Overview of successful policy mechanisms for biomass heat in EU Member States

Regulations

Financing

Information

Country	Policy mechanisms (regulations, financing, information)	Key success factors
Finland	<p>Heat bonus in CHP: The main support mechanism for heat produced from RES, is a “heat bonus” allocated to CHP plants working on biogas and forest fuel. In addition to that, various investment supports are made available.</p> <p>Also fossil fuels in heat production have to pay CO2 taxes.</p> <p>Dedicated support for farmers, including both solid biomass and biogas plants (Regulation No. 855/2013: The aid can be in the form of either a state investment subsidy, lowered interest rates for loans or state acting as a guarantee for a loan. The exact amount of subsidy varies from the action supported, details for each action are provided in the annex of the Regulation No. 855/2013.</p>	<p>Direct premiums in the form of bonus are considered as strong stimulation mechanisms when the markets are well developed and there is high awareness. This on to with taxation for fossil based heat generation shifts interest towards biomass.</p> <p>Exogenous success factors include: strong position of the forestry sector and the available (and leading) capabilities of innovations in this area.</p>
UK	<p>The Renewable Heat Incentives (RHI), introduced in 2011 in the UK, initially only applied to non-domestic installations in the public, industrial and business sectors. Since 2013, the scheme is also open for the residential sector where the eligible applications include biomass boilers, solar water heating and certain heat pumps. Payments are made for 7 years and are based on the amount of renewable heat made by the heating system.</p>	<p>During 2011, the number of anaerobic digesters in the UK rose by about a third to 78, not counting those used in the wastewater treatment industry. The reason for this surge in interest is the implementation of the new legislation “Renewable Heat Incentives” (RHI) to promote renewable heat.</p>

# Recommendations for future policy interventions to stimulate biomass heat uptake in Ukraine

The following slides provide an overview of the main recommendations per feedstock and selected heat market segments in domestic, industrial and tertiary sectors.



# Recommended policy interventions for biomass heat from forest feedstocks

Regulations

Financing

Information

Market segment	Value chain	Suggested policy interventions		Barrier/ gap/ specific challenge the intervention will address		Added value expected from their implementation	
		Early markets	Mature markets	Early markets	Mature markets	Early markets	Mature markets
Households	Residential wood chips boilers - small scale (10 kW)	Loans Credit lines Investment grants  Capacity building	Certification/ Standardisation	Market is not developed  High shares of low & polluting stoves used	Good integration of efficient stoves  Competition for feedstock requires measures to mobilise other indigenous biomass streams	Develop the market  Share the costs with medium to low income population in rural areas	Mobilise indigenous resources with low competition from non-energy industries
Services	Wood chip boilers-large size (50 kW)		Premiums targeting specific indigenous feedstocks				
Industry	CHP using solid biomass > 10 MW	Investment grants	Feed in premiums with banding for feedstock choice	Market is not developed	Mobilise unused biomass streams with low competition	Develop the market	
	CHP using solid biomass 0.5 - 10 MW		Technology & innovation bonus prioritising agricultural biomass stream				

# Recommended policy interventions for biomass heat from agricultural feedstocks

Regulations

Financing

Information

Market segment	Value chain	Suggested policy interventions		Barrier/ gap/ specific challenge the intervention will address		Added value expected from their implementation	
		Early markets	Mature markets	Early markets	Mature markets	Early markets	Mature markets
Households Services	Straw and agricultural residues for small scale local heating plant (0.15 MW)	<p>Feedstock premium</p> <p>Capacity building</p>	<p>Certification/ Standardisation</p> <p>Premiums targeting specific indigenous feedstocks</p>	<p>There is no or very low market uptake for straw and agricultural residues</p> <p>Lack of knowledge on straw for bioenergy</p>	<p>Good market development for agricultural residues</p> <p>Competition for feedstock requires measures to mobilise other indigenous biomass streams</p>	<p>Develop the market</p> <p>Provide renewable energy heating option to rural populations</p> <p>Support income diversification for farmers</p>	<p>Mobilise indigenous resources with low competition from non-energy industries</p>
Industry	Straw and agricultural residues for CHP > 10 MW	<p>Feedstock premium</p> <p>Investment grant for biomass trade centers</p>	<p>Feed in premiums with banding for feedstock choice</p>	<p>Lack of infrastructure for straw storage and logistics</p>	<p>Competition for feedstock requires measures to mobilise other indigenous biomass streams</p>		
Utility	Direct co-firing coal process	<p>Capacity building</p>	<p>Technology &amp; innovation bonus prioritising agricultural biomass stream</p>				

# Recommended policy interventions for biomass heat in selected segments of domestic, tertiary and industry sectors

Regulations

Financing

Information

Market segment	Value chain	Suggested policy interventions		Barrier/ gap/ specific challenge the intervention will address		Added value expected from their implementation	
		Early markets	Mature markets	Early markets	Mature markets	Early markets	Mature markets
Domestic	Residential batch fired logwood stove for heat (10-20 kW)	Loans Credit lines Investment grants  Capacity building	Certification/ Standardisation  Premiums targeting specific indigenous feedstocks	Market is not developed  High shares of low & polluting stoves used	Good integration of efficient stoves  Competition for feedstock requires measures to mobilise other indigenous biomass streams	Develop the market Share the costs with medium to low income population in rural areas	Mobilise indigenous resources with low competition from non-energy industries
	Residential wood chips boilers - small scale (10 kW)						
Tertiary	Wood chip boilers-large size (50 kW)	Capacity building	Premiums targeting specific indigenous feedstocks	Market is not developed  Technologies have low efficiencies	Competition for feedstock requires measures to mobilise other indigenous biomass streams	Develop the market Share the costs with medium to low income population in rural areas	Mobilise indigenous resources with low competition from non-energy industries
	Local heating plant for straw small scale (0.15 MW)						
Industry	CHP using solid biomass > 10 MW	Investment grants	Feed in premiums for electricity	Market is not developed  Technologies have low efficiencies	Improve efficiencies in existing plants  Add new capacities in existing plants  Diversify feedstock	Certification/ Standardisation	Increase mobilisation of unused resources streams and reduce competition with non-energy markets
	CHP using solid biomass 0.5 - 10 MW						
	Waste combustion - heat only	Capacity building	Technology and/ or innovation bonus				
	Pyrolysis oil in CHP combustion engine						
	Pyrolysis oil production						

# Concluding remarks

- Policy mechanisms should cover two or more value chain steps to ensure they facilitate uptake and market development.
- The most common combination in biomass heat is expenditure measures for the conversion part with simultaneous support at local/ regional levels for farmers and foresters to develop/ improve the supply chains on site (e.g. biomass trade centers, provision of equipment such as chippers, pelletisers, etc.).
- Loans, credit lines and investment subsidies are very effective for the development of new market capacity. In countries with low market development of resource (appropriate seasoning of forest biomass, etc.) and energy efficient (modern boilers, stoves) biomass heat, they function better if they are combined with information provision activities such as capacity building, awareness campaigns, etc.
- Taxation in the form of tax credits for biomass or tax for the fossil fuel counterpart (e.g. heating oil, etc.) is an effective mechanism once the market is established but requires careful monitoring and periodic adjustments.
- Premiums are effective only in mature markets with high awareness and provide a means for policy makers to refine both the market sub segments (e.g. residential boilers, specific scales of CHP with certain feedstocks, etc.) and the scales to be promoted.

# Further reading

- [www.s2biom.eu](http://www.s2biom.eu)
- <http://s2biom.alterra.wur.nl/web/guest/biomass-characteristics>
- <http://s2biom.alterra.wur.nl/web/guest/country-downloads>
- <http://uabio.org/en/>
- <http://www.s2biom.eu/en/publications-reports/s2biom.html>

**Assessment of sustainable lignocellulosic feedstock potentials in the Ukraine  
and perspective conversion pathways, including recommendations for the  
strengthening of the biomass market**  
*FINAL*

October 2016

## Project coordinator



## Scientific coordinator



## Project partners

