Біоенергетична асоціація України

# Development and Prospects of Bioenergy for Heat Production in Ukraine

**Georgiy Geletukha, PhD**

**Head of the Board, Bioenergy Association of Ukraine (UABio)**

***We are greening the energy!***

Bioenergy Association of Ukraine

# UABio Members

Scientific-Engineering Centre “Biomass”

LLC «Salix Energy»

NGO “Renewable Energy Agency”

LLC “Kolbe Power Group”

LLC “Volyn Kalvis»

LLC “Kotloturboprom”

LLC “ENERSTENA Ukraine”

Foreign Enterprise “Agro-Wild Ukraine”

Private Enterprise «Kramar»

LLC «ACCORD-LTD»

LLC “Teplodar PV”

LLC “Boiler factory “Kriger”

LLC «Kyiv Green Energy»

Ukrainian heat generating company "Ukrteplo"

LLC “Smilaenergopromtrans”

DP «Siemens Ukraine»

LLC “Metropoliya Science and Technology Company”

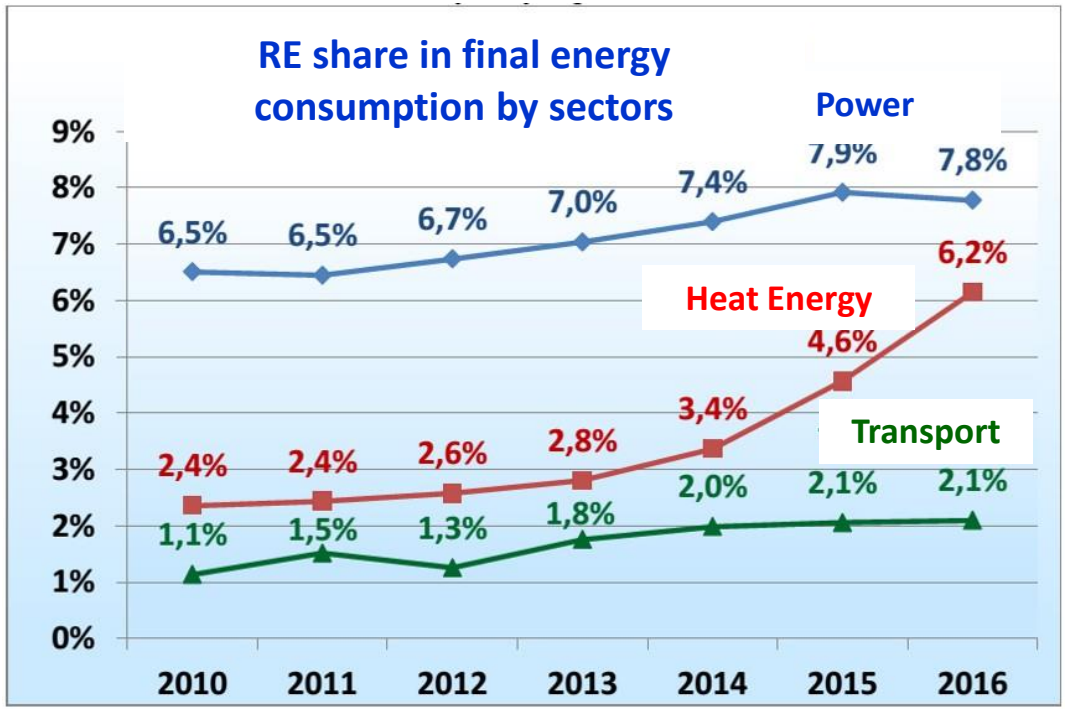
LLC “Engineering Centre “EkoEnergoProekt”

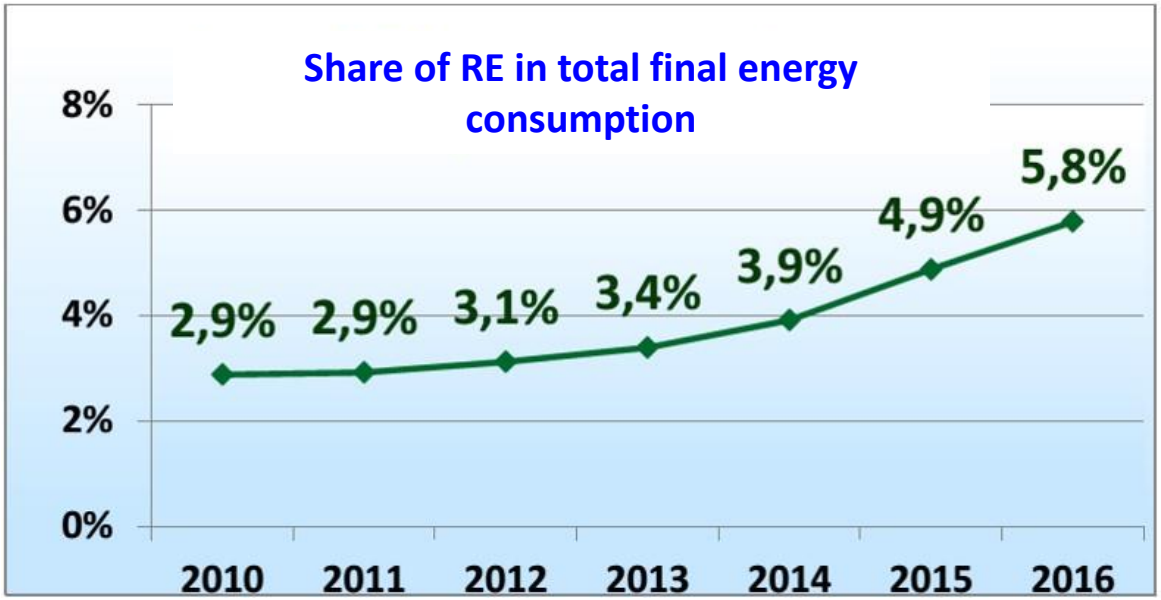
Institute of Engineering Thermophysics of NAS of Ukraine

ЕНЕРГО-ПРОМИСЛОВА ГРУПА «ЮГЕНЕРГОПРОМТРАНС»

**Physical persons:** Maraykin R., Petrov Ya., Ilchuk M., Bereznytska M., Epshtein Yu., Galchynska Yu., Teush S., Gres O., Stupak S., Romanyuk O., Kotsar O., Moroz O.

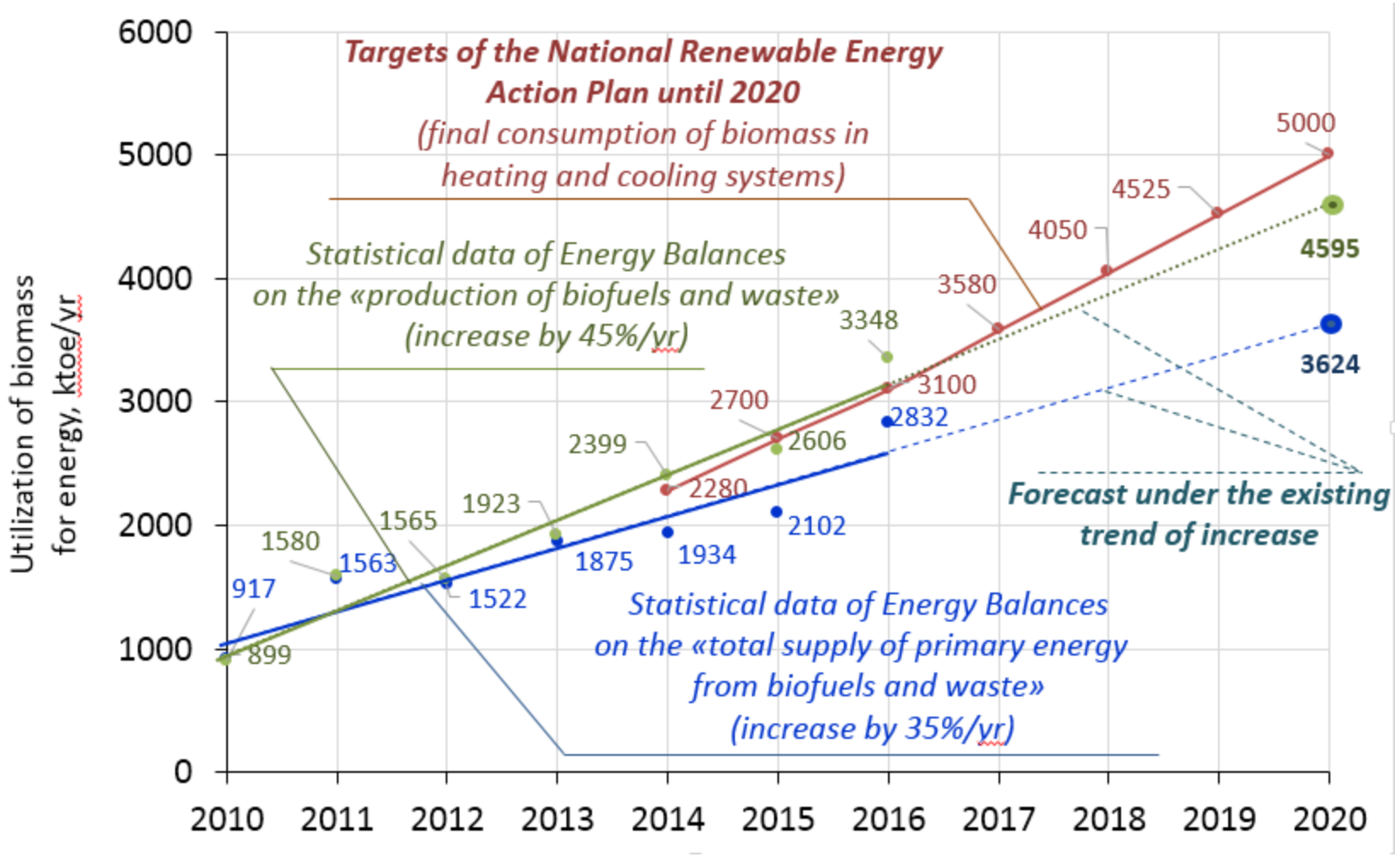
# Production of Renewable Energy in Ukraine according official Energy Balances (2010-2016).




Bioenergy Association of Ukraine

# Trends of bioenergy development in Ukraine




**Energy Balance of Ukraine for 2016:**

- **Share of biofuels in the final energy consumption – 3.3%**
- **Share of biofuels in the structure of RES production – 81%**

Bioenergy Association of Ukraine

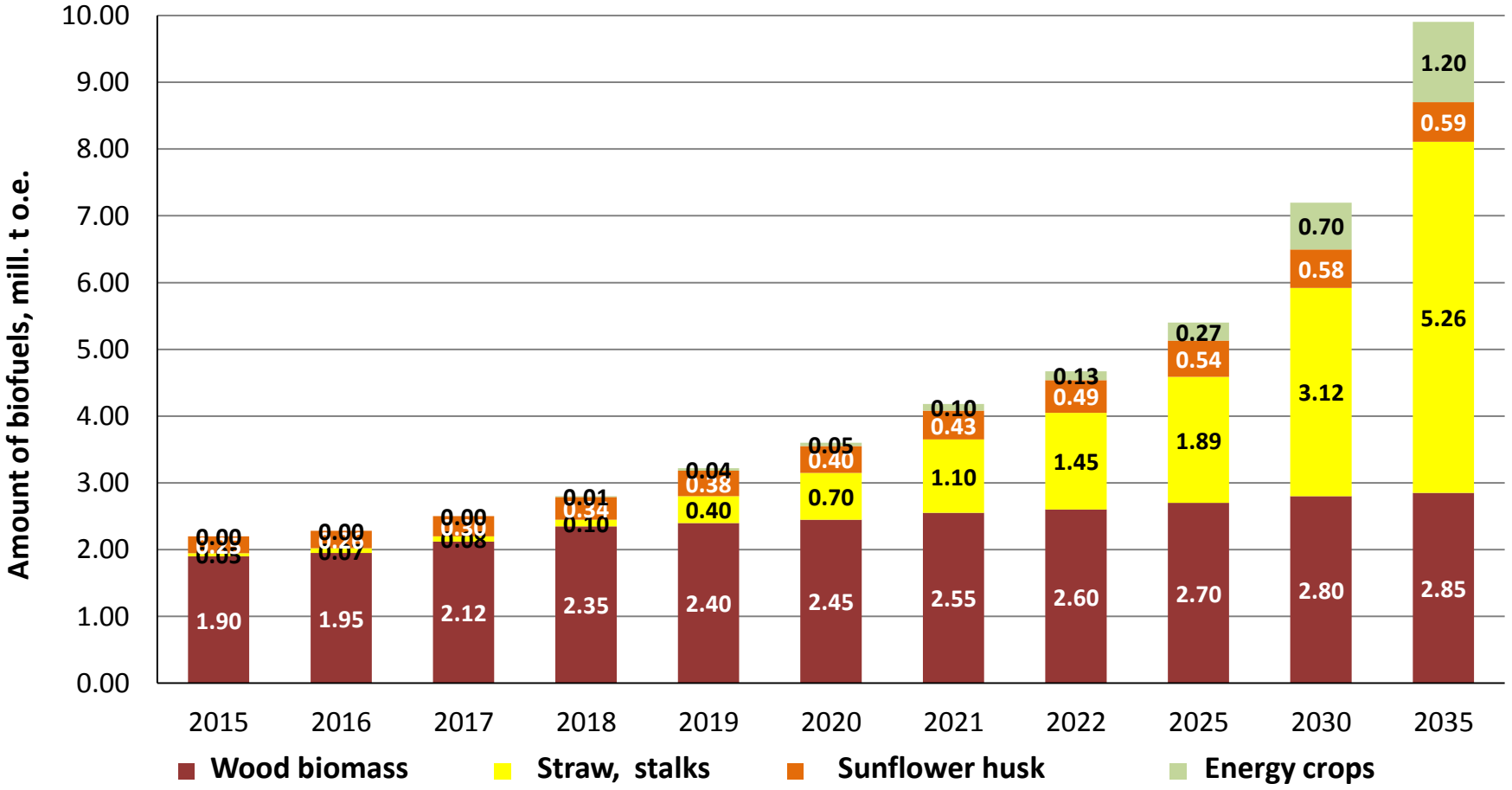
# Structure of Total Primary Energy Supply According New Energy Strategy of Ukraine till 2035

| Type of energy source | 2015 (fact) | 2020 (forcast) | 2025 (forcast) | 2030 (forcast) | 2035 (forcast) |
|---|---|---|---|---|---|
| Coal | 27,3 | 18 | 14 | 13 | 12 |
| Natural Gas | 26,1 | 24,3 | 27 | 28 | 29 |
| Oil Products | 10,5 | 9,5 | 8 | 7,5 | 7 |
| Nuclear Energy | 23 | 24 | 28 | 27 | 24 |
| **Biomass, Biofuels and Wastes** | **2,1** | **4** | **6** | **8** | **11** |
| Solar and Wind Energy | 0,1 | 1 | 2 | 5 | 10 |
| Hydro Energy | 0,5 | 1 | 1 | 1 | 1 |
| Thermal energy | 0,5 | 0,5 | 1 | 1,5 | 2 |
| **TOTAL, mill t o.e.** | **90,1** | **82,3** | **87** | **91** | **96** |

http://mpe.kmu.gov.ua/minugol/control/uk/publish/article?art_id=245234085&cat_id=35109

Bioenergy Association of Ukraine

# Total Amount and Structure of Solid Biofuels in Ukraine (90% from all biofuels and wastes)




| Type of biomass | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2025 | 2030 | 2035 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wood fuels | 1,90 | 1,95 | 2,12 | 2,35 | 2,40 | 2,45 | 2,55 | 2,60 | 2,70 | 2,80 | 2,85 |
| Straw, stalks | 0,05 | 0,07 | 0,08 | 0,10 | 0,40 | 0,70 | 1,10 | 1,45 | 1,89 | 3,12 | 5,26 |
| Sunflower husk | 0,25 | 0,26 | 0,30 | 0,34 | 0,38 | 0,40 | 0,43 | 0,49 | 0,54 | 0,58 | 0,59 |
| Energy crops | 0,00 | 0,00 | 0,00 | 0,01 | 0,04 | 0,05 | 0,10 | 0,13 | 0,27 | 0,70 | 1,20 |
| **TOTAL, mill. t o.e.** | **2,20** | **2,28** | **2,50** | **2,80** | **3,22** | **3,60** | **4,18** | **4,67** | **5,40** | **7,20** | **9,90** |

# Prospects of Renewable Heat Production in Ukraine

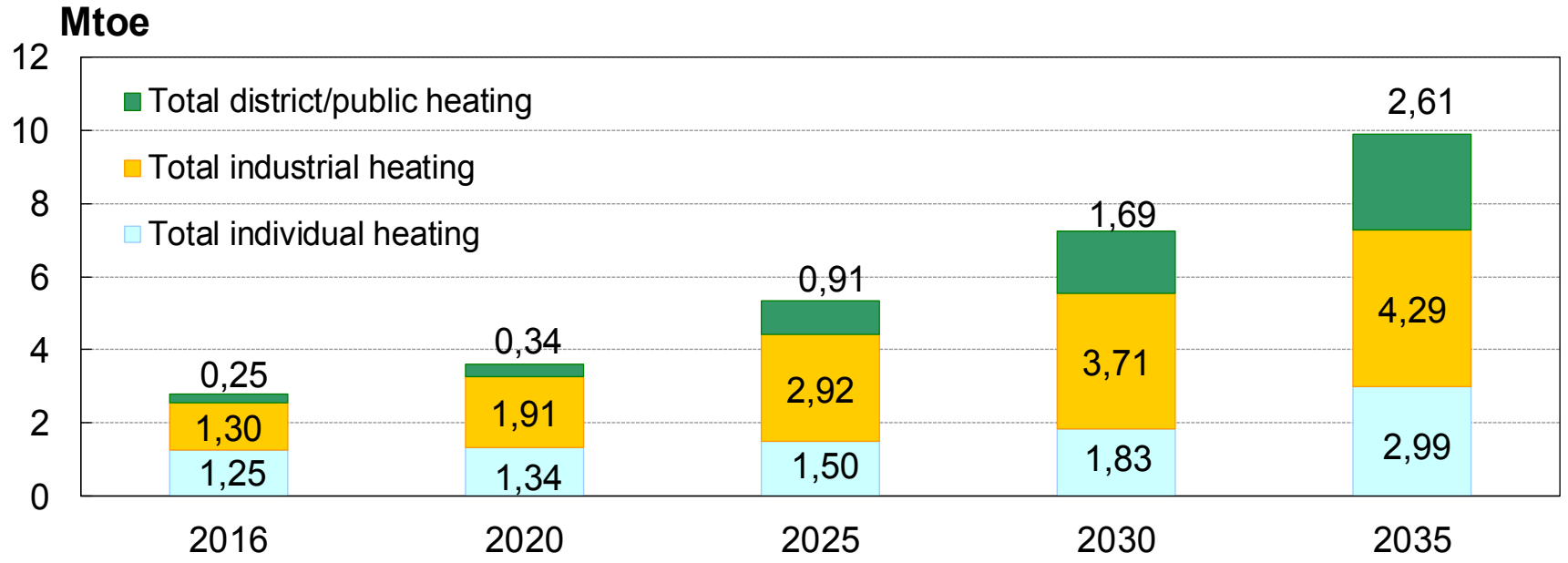
| Year | MW, heat | MWe | Mtoe | NG replacement, billion m3 | Share of RES | CO2 reduction, MtCO2/y | Total investments, million Euro | Total new jobs |
|---|---|---|---|---|---|---|---|---|
| **2016** | 5000 | 45 | 2,8 | 3,5 | 6,2% | 6,2 | 1 000 | 13 000 |
| **2020*** | 7 000 | 250 | 3,6 | 4,4 | 12% | 8,6 | 1 800 | 22 000 |
| **2025** | 11 250 | 800 | 5,3 | 6,6 | 22% | 12,9 | 3 800 | 42 000 |
| **2030** | 16 200 | 1260 | 7,2 | 8,9 | 30% | 17,5 | 5 700 | 64 000 |
| **2035**** | 24 000 | 1780 | 9,9 | 12,2 | 40% | 24,0 | 8 000 | 97 000 |

* according Renewable Energy Action Plan till 2020.
** according Energy Strategy of Ukraine till 2035.

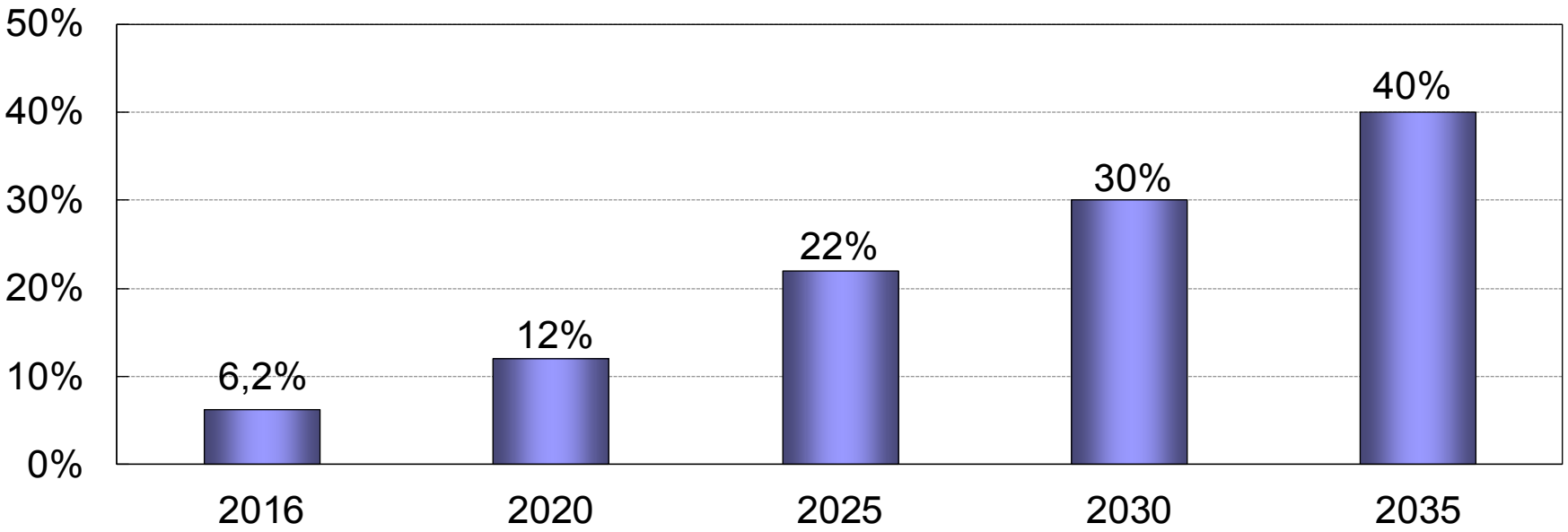
Without the involvement of agro biomass usage in heating sector, it is impossible to reach the goals of the new Energy strategy of Ukraine till 2035 and to ensure the sustainable development of bioenergy after 2035.

Біоенергетична асоціація України

# Prospects of Renewable Heat Production in Ukraine (2)




## RES share in heat production, %



# Potential of biomass available for energy in Ukraine (2016)

| Type of biomass | Theoretical potential, Mt | Potential available for energy | | |
|---|---|---|---|---|
| | | Share of theoretical potential, % | Mtoe | |
| Straw of grain crops | 36.1 | 30 | 3.70 | |
| Straw of rape | 2.1 | 40 | 0.28 | |
| By-products of grain corn production (stalks, cobs) | 36.5 | 40 | 2.79 | |
| By-products of sunflower production (stalks, heads) | 25.9 | 40 | 1.48 | 43% |
| Secondary agricultural residues (sunflower husk) | 2.0 | 86 | 0.84 | |
| Wood biomass (firewood, felling residues, wood processing waste) | 6.6 | 94 | 1.55 | |
| Wood biomass (dead wood, wood from shelterbelt forests, pruning) | 8.8 | 44 | 1.03 | |
| Biodiesel (rapeseed) | - | - | 0.16 | |
| Bioethanol (corn and sugar beet) | - | - | 0.66 | |
| Biogas from waste and by-products of agricultural sector | 1.6 bln $m^3$ $CH_4$ | 50 | 0.68 | |
| Landfill gas | 0.6 bln $m^3$ $CH_4$ | 34 | 0.18 | |
| Sewage gas (industrial and municipal wastewater) | 1.0 bln $m^3$ $CH_4$ | 23 | 0.19 | |
| Energy crops: | | | | |
| - willow, poplar, miscanthus (1 mln ha*) | 11.5 | 100 | 4.88 | |
| - corn for biogas (1 mln ha*) | 3.0 bln $m^3$ $CH_4$ | 100 | 2.57 | 35% |
| TOTAL | - | - | 21.01 | |

** In case of growing on 1 mln ha of unused agricultural land .*

Bioenergy Association of Ukraine

# Feasibility study for biomass boiler and CHP plant running on wood chips / baled maize stalks in district heating

| Indicator | Boiler plant, 10 MW | CHP plant (condensing turbine with steam extraction)**, 6 $MW_e$ + 18 $MW_{th}$ | TPP**, 6 $MW_e$ |
|---|---|---|---|
| Price of wood chips/baled maize stalks with delivery, EUR/t without VAT | **25** | **25** | **25** |
| Fuel consumption, kt/year | 14.1 | 80.9 | 61.8 |
| **Economic indicators:** | | | |
| Gas saving in heat production, million $m^3$/year | 5.2 | 9.60 | - |
| Total investment, million EUR | 2.2 | 16.2 | 15.9 |
| ***Implementation by own funds:*** | | | |
| IRR, % | 28 | 23 | 13 |
| **Simple payback period**, years (tariff for heat production: 950 UAH/Gcal without VAT *) | **3.4** | **4.1** | **6.0** |
| ***Implementation by own and credit funds: (credit is 60% of capital costs by 8% per annum for 8 years with deferred capital repayments for 1 year)*** | | | |
| IRR, % | 25 | 20 | 10 |
| **Simple payback period**, years | 3.9 | 4.8 | 7.2 |

* Tariff rate is 0.9 of the natural gas heat tariff, it is assessed according to the Law of Ukraine N 1959-VIII of 21.03.2017 http://zakon3.rada.gov.ua/laws/show/1959-19

** "green tariff" (FIT) for power from biomass is 12,3 Eurocents/kW*h without VAT.

Bioenergy Association of Ukraine

# Feasibility study for biomass boiler and CHP plant running on straw bales in district heating

| Indicator | Boiler plant, 10 MW | CHP plant (condensing turbine with steam extraction)**, 6 $MW_e$ + 18 $MW_{th}$ | TPP**, 6 $MW_e$ |
|---|---|---|---|
| Price of straw bales with delivery, EUR/t without VAT | **25** | **25** | **25** |
| Fuel consumption, kt/year | 13.5 | 77.1 | 59.6 |
| **Economic indicators:** | | | |
| Gas saving in heat production, million $m^3$/year | 5.2 | 9.60 | - |
| Total investment, million EUR | 2.5 | 23.1 | 19.8 |
| ***Implementation by own funds:*** | | | |
| IRR, % | 25 | 15 | 9 |
| **Simple payback period**, years (tariff for heat production: 950 UAH/Gcal without VAT *) | **3.9** | **5.6** | **7.3** |
| ***Implementation by own and credit funds: (credit is 60% of capital costs by 8% per annum for 8 years with deferred capital repayments for 1 year)*** | | | |
| IRR, % | 22 | 12 | 6 |
| **Simple payback period**, years | 4.4 | 6.7 | 8.7 |

* Tariff rate is 0.9 of the natural gas heat tariff, it is assessed according to the Law of Ukraine N 1959-VIII of 21.03.2017 http://zakon3.rada.gov.ua/laws/show/1959-19

** "green tariff" (FIT) for power from biomass is 12,3 Eurocents/kW*h without VAT.

Bioenergy Association of Ukraine

# Main drivers and barriers for bioenergy for heat development

**Drivers:**

1. Market prices on natural gas for industry and public organizations. Considerable increase of natural gas prices for population and for DH companies heating population from May 2016 (but they are ~40% less than market prices yet).
2. Improvement of tariff system for heat energy from Alternative Energy Sources (AES incl. RE): transition from "self cost + 6%" model to new model from April 2016. Now tariff on heat energy from AES = tariff on heat energy from natural gas - 10%.
3. Removing of discrimination of heat producers from alternative energy due to existence of bank accounts with a special regime of use for payments for heat energy (from March 2018).
4. First step in monetization of subsides for population (from January 2018).

**Barriers:**

**1.** Not market prices for natural gas for population and for DH companies heating population (~40% less than market prices yet).

*Their increase are possible from June 2018 (IMF's request to Ukraine for next credit).*

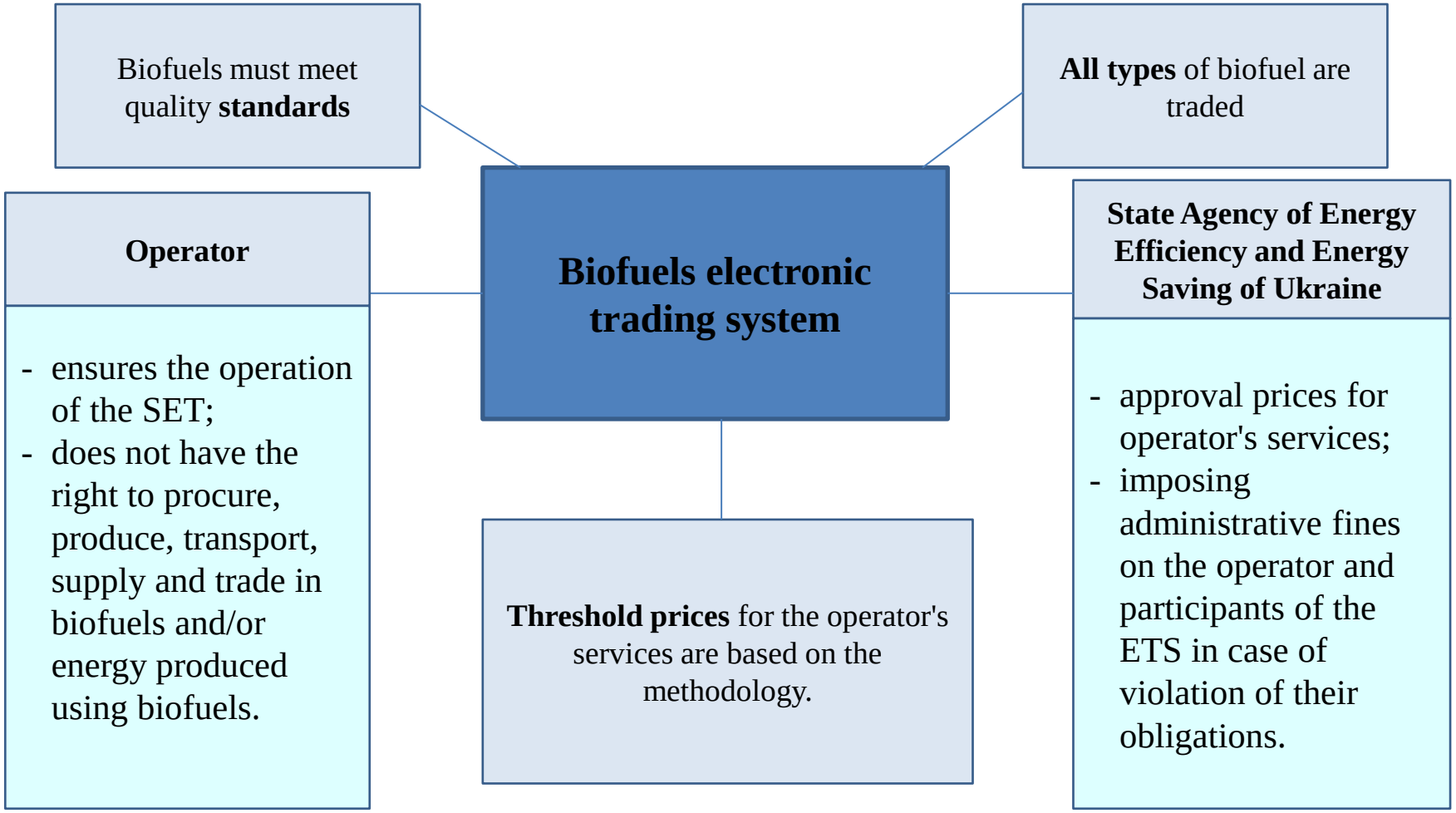
**2.** Lack of biofuel market development.

*Establishment of biofuel trading system is in progress – drafting of needed legislation (similar to Lithuanian Biofuel Exchange Baltpool).*

**3.** Imperfect model of DH supply (monopoly position of DH companies, problems with third party access to heating networks). *Improvements are developed and under discussion – drafting of needed legislation.*

Bioenergy Association of Ukraine

# Biofuels Electronic Trading System Establishment in Ukraine




USAID ВІД АМЕРИКАНСЬКОГО НАРОДУ

Держенергоефективності

# Suggested Improvements in Third Party Access (TPA) and Introduction of Competition in Heat Generation in DH.

**Auctions** – bids on TE Quantity & Price, early

Incumbent GEN unit

*Generation, Reserves*

Incumbent GEN unit

*Generation, Reserve*

IHP

IHP

IHP

Incumbent – OPERATOR

*Functions:*

*transport of TE,*

*dispatching and other system services,*

*executing auctions,*

*connecting to network;*

*regular network maintenance;*

*transparency on development.*

Incumbent – SUPPLIER

*no changes suggested*

**TPA to infrastructure** – non discrimination IHPs v. own GEN units

USAID ВІД АМЕРИКАНСЬКОГО НАРОДУ

Держенергоефективності

# Conclusions

- Bioenergy sector has replaced 3.5 billion $m^3$/year of natural gas in Ukraine in 2016. About 5000 MW thermal on biomass is operated, including 2500 MW in private houses, 500 MW in public sector and DH, 2000 MW in industry.

- National RE Action Plan up to 2020, sets the target of 12% for renewable heat production that is equal to gas replacement on 4.4 billion $m^3$/year in 2020. New Energy Strategy target - 12.3 billion $m^3$/year in 2035.

- This requires significant increase of biomass heat generating equipment: from 5000 MW th in 2015 to 7000 MW th in 2020 and to 24000 MW th in 2035.

- This requires significant increase of agricultural by-products and energy crops consumption. Capacity of boilers working on agricultural by-products and energy crops should be increased from about 500 MW th (10%) in 2015 up to 1400 MW th (20%) in 2020 and to 16800 MW th (70%) in 2035 .

- Art. 20 of Law “On Heat Supply” (in force from April 2016) establish tariff on heat energy from AES = tariff on heat energy from natural gas - 10%.

- Market is open and projects are feasible in the next sectors:
  - heat production from biomass for private buildings;
  - heat production from biomass for public, industrial and commercial consumers;
  - power production from biomass (CHP is more feasible option).

- It is expected establishment of Biofuel Exchange and improvement of Third Party Access to heat networks in 2019.

UABIO
Bioenergy Association of Ukraine

## PROGRAMME

The two-day Conference programme includes:
- Panel discussion with the participation of representatives of government and business
- Plenary lectures and oral presentations
- Profile seminars

## REGISTRATION FEES

Registration form is available on the Conference web-site.

The registration fee covers attendance, conference bag, invitation to coffee breaks, lunches, networking reception for one delegate and Conference Proceedings.

Registration fee: **350 EUR**
Early bird discount: **50 EUR** before 1 September 2018

## SPONSORSHIP

Organizing committee will be very grateful for your sponsorship of the conference. The details are available on the conference web-site.

## WORKING LANGUAGES

English, Ukrainian, Russian.
Simultaneous translation will be provided.

## CONFERENCE VENUE

Great Conference Hall of the National Academy of Sciences of Ukraine, Kyiv, Volodymyrska street 55.

www.uabioconf.org

# BIOMASS for ENERGY

## International Conference "BIOMASS FOR ENERGY 2018" September 25-26, 2018 Kyiv, Ukraine

## SUPPORT

Ministry for Regional Development, Construction, Housing and Communal Services of Ukraine

Ministry of Energy and Coal Industry of Ukraine

Ministry of Agrarian Policy and Food of Ukraine

Ministry of Ecology and Natural Resources of Ukraine

Committee of Verkhovna Rada of Ukraine for Fuel and Energy, Nuclear Policy and Nuclear Safety

AEBIOM
EUROPEAN BIOMASS ASSOCIATION

WORLD BIOENERGY ASSOCIATION

www.uabioconf.org

BIOMASS for ENERGY

International Conference "BIOMASS FOR ENERGY 2018" September 25-26, 2018 Kyiv, Ukraine

## ORGANIZERS

UABIO
Bioenergy Association of Ukraine

Держенергоефективності України

ABE

imnp

BIOMASS

*Deadline for receipt of abstracts: 1 August 2018*

www.uabioconf.org

**Thank you for attention!**

**Welcome to Ukraine and to UABio!**

Georgiy Geletukha

tel./fax: +380 44 332 9140
E-mail: geletukha@uabio.org
www.uabio.org

*We are greening the energy!*

Bioenergy Association of Ukraine