



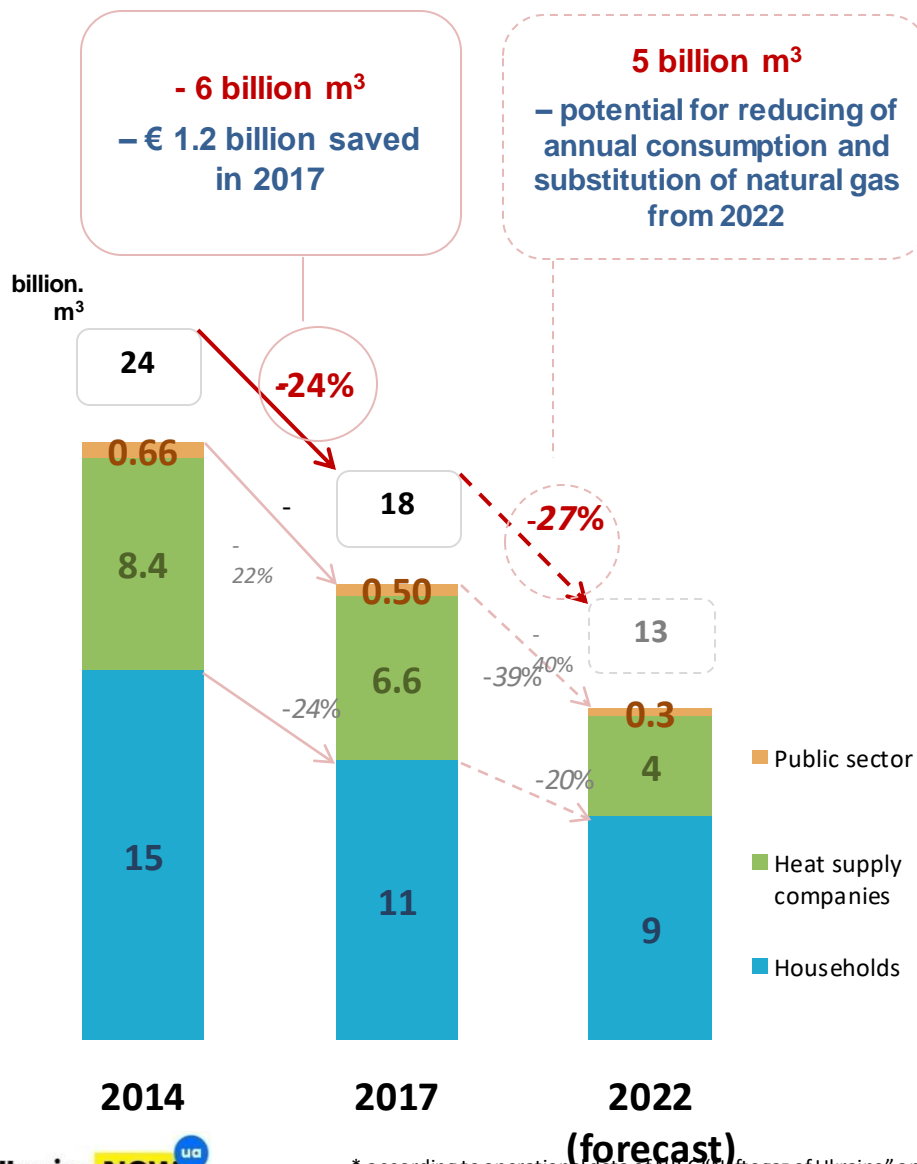
UKRAINE:

RENEWABLE ENERGY

State Agency on Energy Efficiency
and Energy Saving of Ukraine



Dynamics of natural gas consumption in 2014-2017*



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

Achievements of 2014 - III quarter of 2018:

IN RENEWABLE ENERGY:

2 000 MW of new heat capacities

Investments – **460 million €**

958 MW of new renewable energy capacities

Investments – **910 million €**

→ **6 031** of families installed SPP total capacity - **121 MW**

Investments – **120 million €**

**Invested in Ukrainian "clean"
energy projects**

$\Sigma \approx 1.4$ billion €





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

€ 30 bln

Potential directions of investment attraction

Necessary investments by 2035 for:



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**



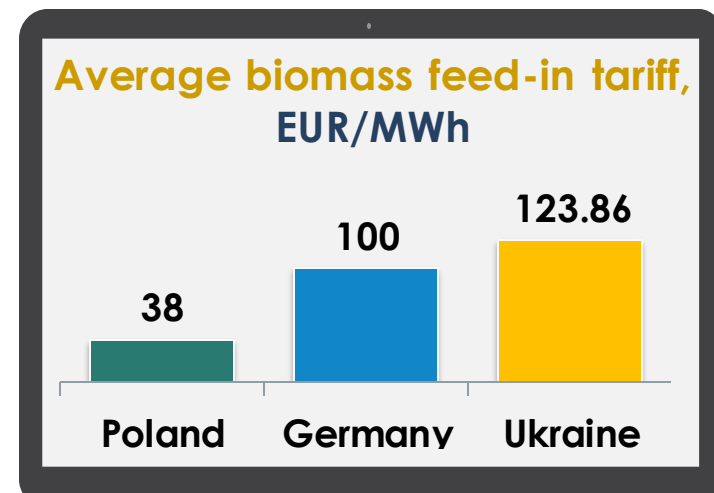


LAW OF UKRAINE

«ON FOSTERING RENEWABLE ENERGY DEVELOPMENT»

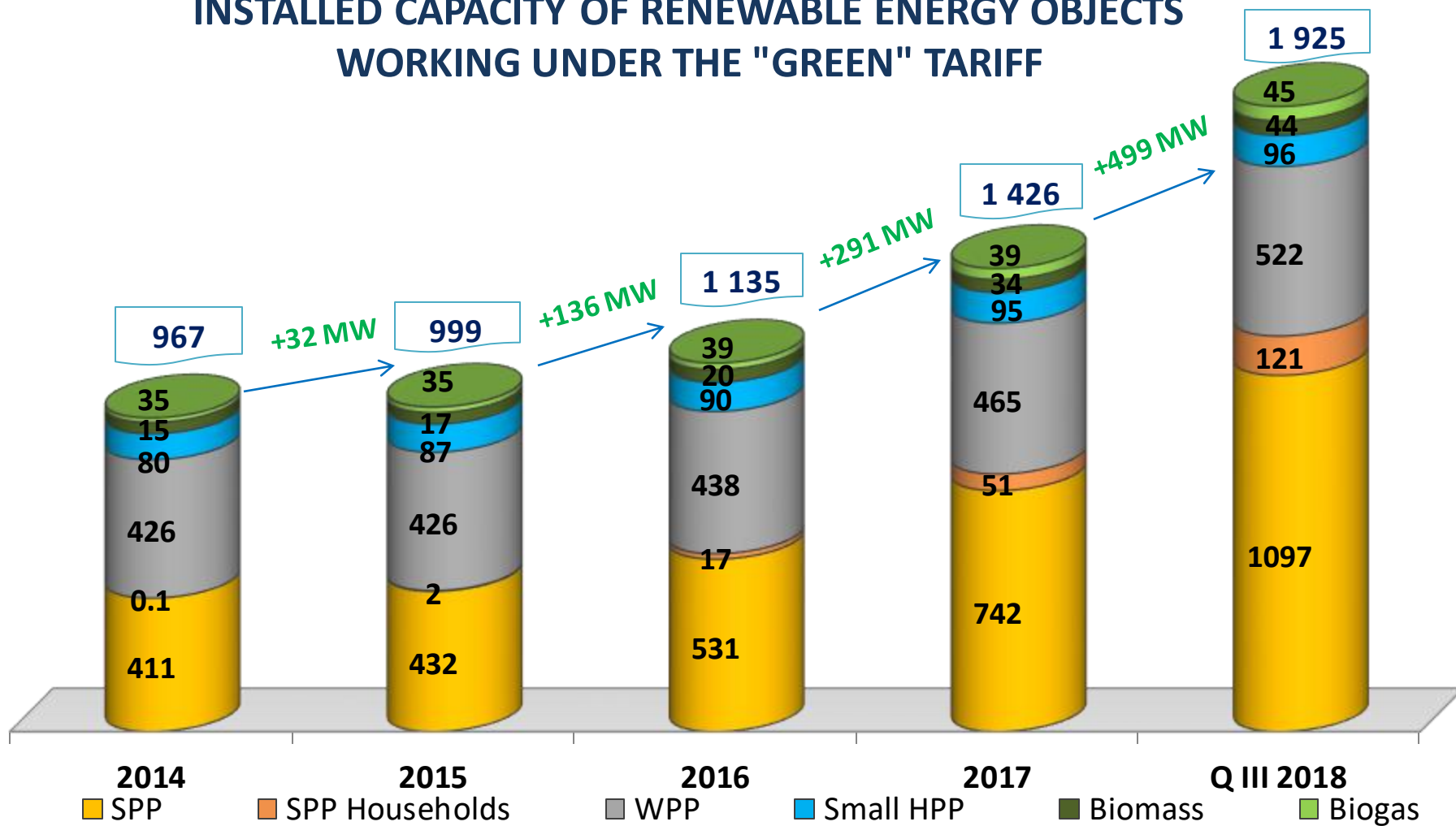
Technology/Comm.Year	EUR/MWh				
	2015	2016	2017-2019	2020-2024	2025-2029
Biomass	123.86	123.86	123.86	111.48	99.09
Biogas	123.86	123.86	123.86	111.48	99.09
Geothermal	150.25	150.25	150.25	135.17	120.09
Small Hydro (0.2-1MW)	139.48	139.48	139.48	125.48	111.48
Small Hydro (1-10MW)	104.47	104.47	104.47	94.24	83.47
Solar (ground based)	169.64	159.94	150.25	135.17	120.09
Solar (roof based)	180.41	172.33	163.71	147.56	130.86
Wind (>2MW)	101.78	101.78	101.78	90.47	79.16
Solar (private households)	200.32	190.09	180.94	162.63	144.86
Wind (private households)	116.06	116.06	116.06	104.47	93.16

- Feed-in tariffs are fixed in EUR till 2030;
- Premium for Ukrainian equipment usage is provided – 5-10% to existing tariff;
- Signing of bankable long-term Power Purchase Agreement (PPA) with feed-in tariff till 2030;
- Stimulating tariffs for heat produced from alternative sources envisaged.





INSTALLED CAPACITY OF RENEWABLE ENERGY OBJECTS WORKING UNDER THE "GREEN" TARIFF



From the beginning of 2015, 958 MW were introduced and around € 910 mln were invested.

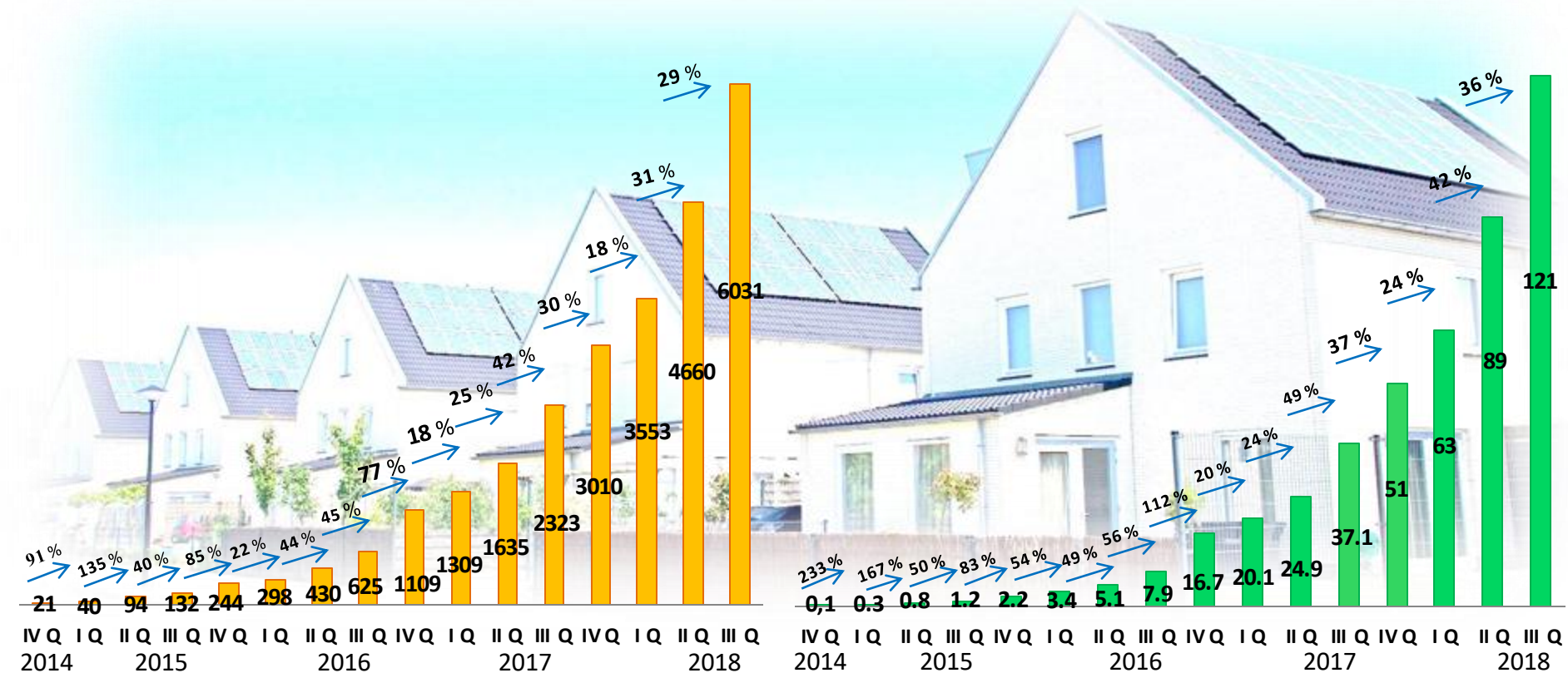




DYNAMICS OF SOLAR INSTALLATIONS IN PRIVATE HOUSES

Number of privat households

Installed capacity, MW



Around **120 mln EURO** invested.

The number of private houses eligible
for solar panels installation is 6,5 mln.

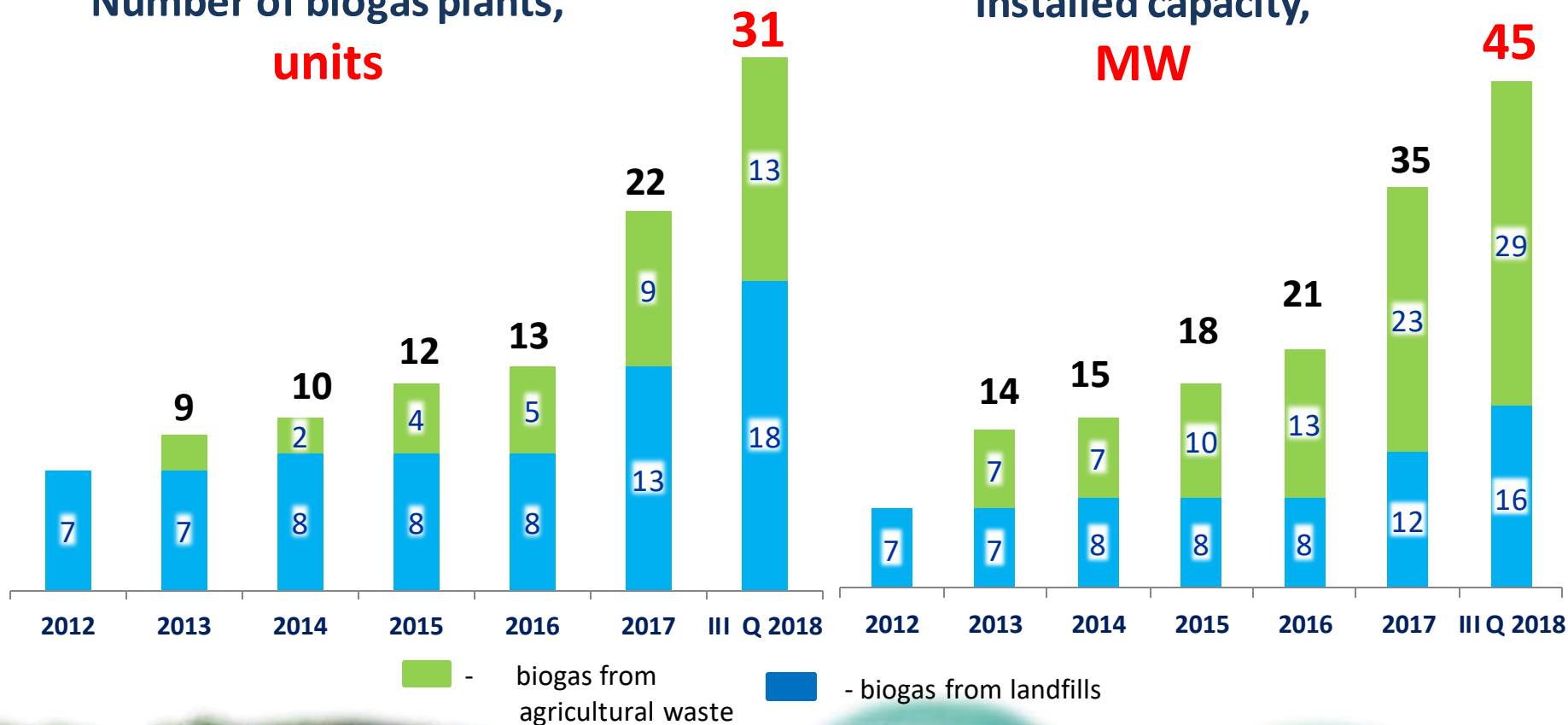


BIOGAS CAPACITY INCREASE IN UKRAINE

(biogas plants operating under the feed-in tariff)

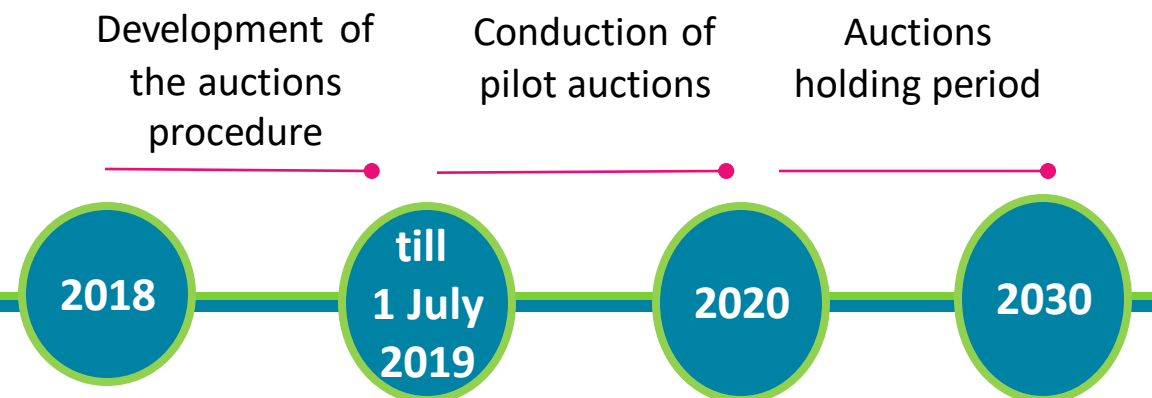
Number of biogas plants,
units

Installed capacity,
MW





New renewable energy incentives introduction



PPA terms
20 years

Obligatory participation:

in 2020: SPP ≥ 10 MW and WPP ≥ 20 MW;
in 2021-2022: SPP ≥ 5 MW and WPP ≥ 10 MW;
in 2023: SPP ≥ 1 MW and WPP ≥ 1 MW.



In auctions can take part other kinds of RES stations regardless of capacity

The capacity of solar station in private houses increases from 30 to 50 kW.

DETERMINATION OF AUCTIONS QUOTA

Cabinet of Ministers approves

- ✓ *national and regional quotas;*
- ✓ *conditions for conducting auctions.*



Auctions are held at least twice a year



DRAFT LAW OF UKRAINE on improving investment opportunities in power production from alternative sources (as of 13.02.2017 № 6081)



1,9 GW

installed capacity
of RES *

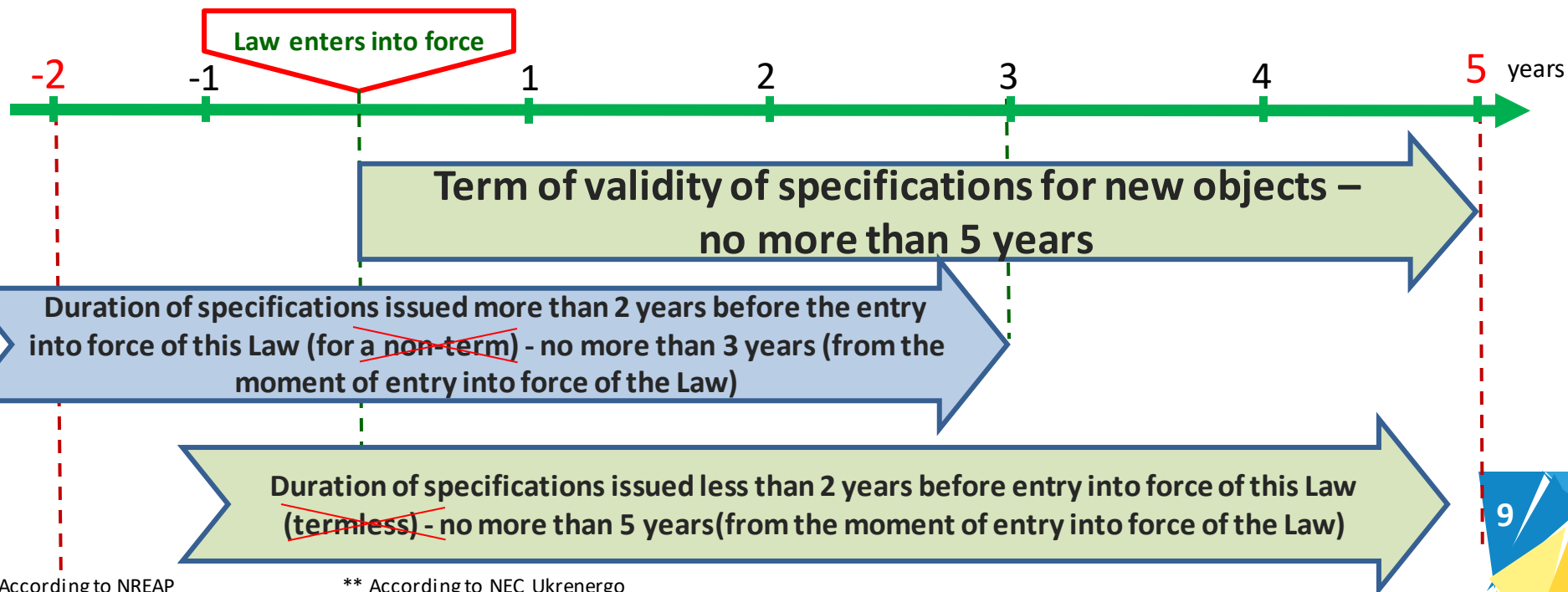
3 GW

power limit of RES
objects **

7,4 GW

power of objects REE for
which have technical
specifications**

Specifications are termless
*valid until the end of
construction)*





DRAFTING OF LAW ON DEVELOPMENT OF SOLID BIOFUEL MARKET

GOAL

CREATION OF LEGISLATIVE BASIS FOR ESTABLISHMENT OF SOLID BIOFUEL MARKET

MAIN PROVISIONS:

- creation of 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;
- access to chopping scraps.

EXPECTED RESULTS FROM THE LAW ADOPTION:

Transparent biofuel market



Lower prices on biofuels



Creating new jobs



Growth of the production volumes of solid biofuel



Provision of fuel for generating facilities



Attraction of investments for biofuel production





DRAFT LAW OF UKRAINE ON DEVELOPMENT OF THE PRODUCTION OF LIQUID BIOLOGICAL FUELS SPHERE

GOAL:

Creating legislative basis for liquid biofuel production and use in transport

Draft Law provides :

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

For Gasoline

From January 1, 2019 - not less than **3,4 %** (energy)

From January 1, 2020 - not less than **4,8 %** (energy)

For Diesel

From January 1, 2019 - not less than **2,7 %** (energy)

» Responsibility for non-compliance with quotas

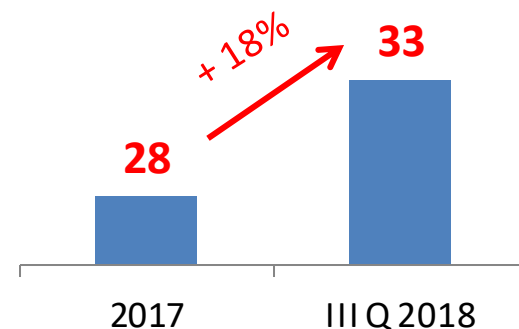
» From January 1, 2020 biocomponents must meet sustainability criteria

In 2017 Energy Resources Import - **8 bln \$**:

- Oil products – **4,2 bln \$**;

- Natural gas – **3,8 bln \$**

Gasoline A-95, UAH



source: <https://index.minfin.com.ua>



NEW PRIORITY OF STATE ENERGY POLICY IN UKRAINE: WASTE TO ENERGY

Annually:

**300 – 350 kg
of household solid waste**



is produced by
one person in
Ukraine

**10 mln tons
of household waste**



is carried out to the
landfills in Ukraine

gas equivalent
 $\approx 1 \text{ bln m}^3$



**3,5 mln Gcal
of heat energy**



**1,2 billion kWh
of electric energy**



New legislation for electric and heat energy production from waste is under development



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.

Capacity: **45 MW** including:
15 MW – solid fuel boiler (5 and 10 MW);
1,8 MW – turbine with ORC module (solid fuel);
3 MW – electric power.

Fuel: **wood chips, pellets**

Investments: **9,6 mln \$**

Substitution: **8,4 mln m³ of gas annually**

Solar power plant 72 MW “Yavoriv-1”



The largest solar power plant in Ukraine

Region: **Lviv**

Capacity: **72 MW** (1st - 36 MW)

Project Investors: **EBRD, NEFCO, IFU, CFT, World Bank**

Investments: **65 million €**

Equipment: **Trina Solar** (China)

Commissioning: **November 2018**

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

Teofipol biogas complex 15 MW (PJSC “Orel-Lieder”)



Town: **Teofipol, Khmelnytskii 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: **Khmelnytskii**
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

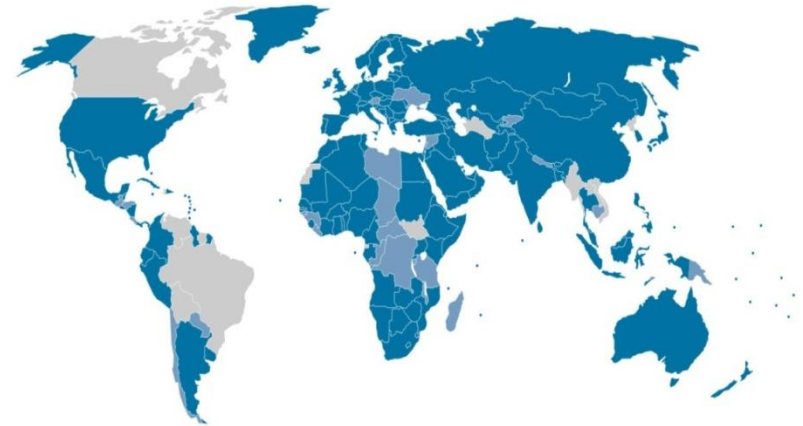


LAW OF UKRAINE «ON UKRAINE'S ACCESSION TO THE STATUTE OF THE INTERNATIONAL RENEWABLE ENERGY AGENCY (IRENA)» (REG. № 2222-VIII AS OF 05.12.2017)

On February 24, 2018 Ukraine officially became IRENA's member!

Ukraine's membership at IRENA:

- ✓ renewable projects financing by the Abu Dhabi Fund for Development (ADFD) under 1-2% for up to 20 years;
- ✓ legislation improvement;
- ✓ "green" investment attraction;
- ✓ additional guarantees to investors;
- ✓ cooperation with development countries in renewable energy;
- ✓ access to the IRENA's database.



- **159** IRENA's members
- **24** countries started the accession procedure



UAMAP comprises detailed information on more than **79** implemented and **101** potential projects that require investments & soft loans in amount of

€ 4 bln

www.uamap.org.ua

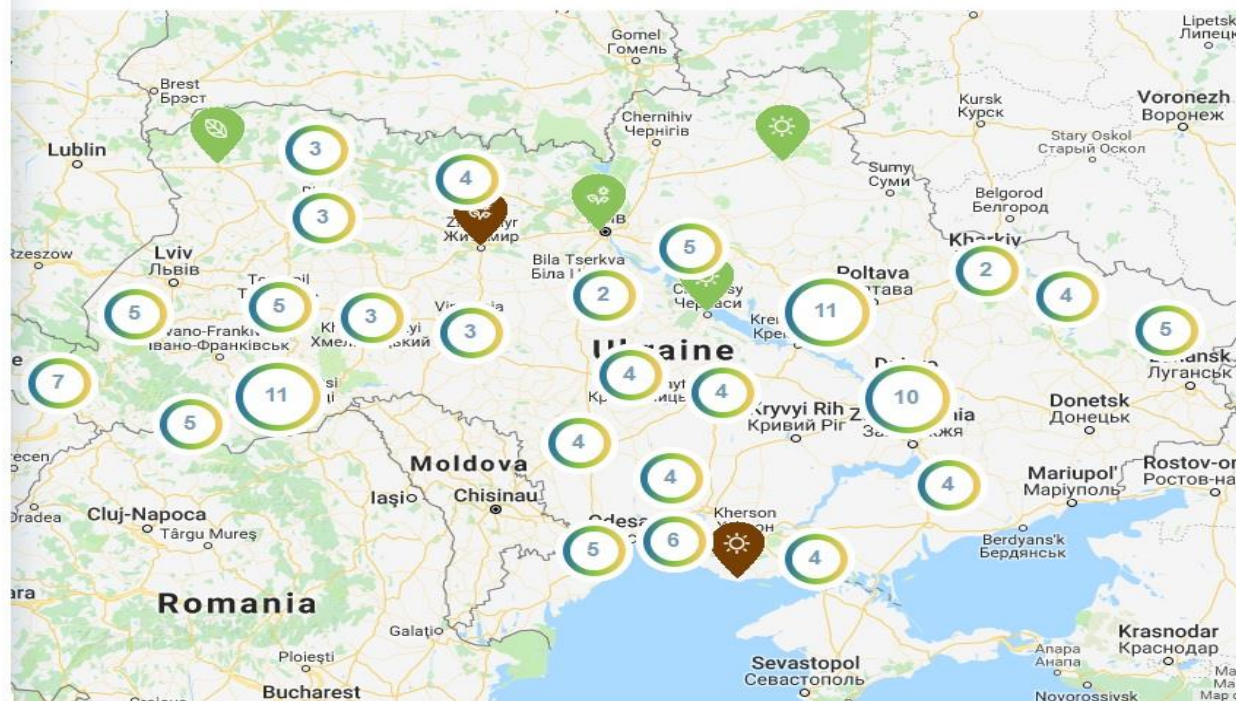
COMPLETED PROJECT

- Hydropower ✓
- Biomass ✓
- Biogas ✓
- Solar power ✓
- Wind power ✓
- Energy efficiency ✓
- Other ✓

POTENTIAL PROJECTS

- Hydropower ✓
- Biomass ✓
- Biogas ✓
- Solar power ✓

Legislative base Contacts Events Blog Old website version





INVEST in UKRAINE!

State Agency on Energy Efficiency and Energy Saving of Ukraine

Phone: +38 (044) 590 59 64

E-mail: office.saeel@gmail.com