



RENEWABLE ENERGY SECTOR DEVELOPMENT IN UKRAINE

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Ukraine: Introduction

Installed Capacity of RES Power Plants, MW

Years	2013	2014	2015	2016**
Solar PVs	748	819/ 411*	839/ 432*	891/ 484*
Wind plants	334	514/ 426*	514/ 426*	523/ 435*
Small hydropower	75	80	87	90
Biomass	17	35	35	39
Biogas	7	14	17	20
Total	1181	1462/ 966*	1492/ 997*	1563/ 1068*

Electricity Production by Types of RES, mln kWh

Years	2013	2014	2015	2016**
Solar PVs	563	485	475	476
Wind plants	637	1172	974***	797***
Small hydropower	286	251	172	172
Biomass	32	60	77	72
Biogas	5	40	64	81
Total	1523	2008	1762	1598



* - without AR Crimea, where WPP – 87.768 MW, SPP – 407.09 MW.

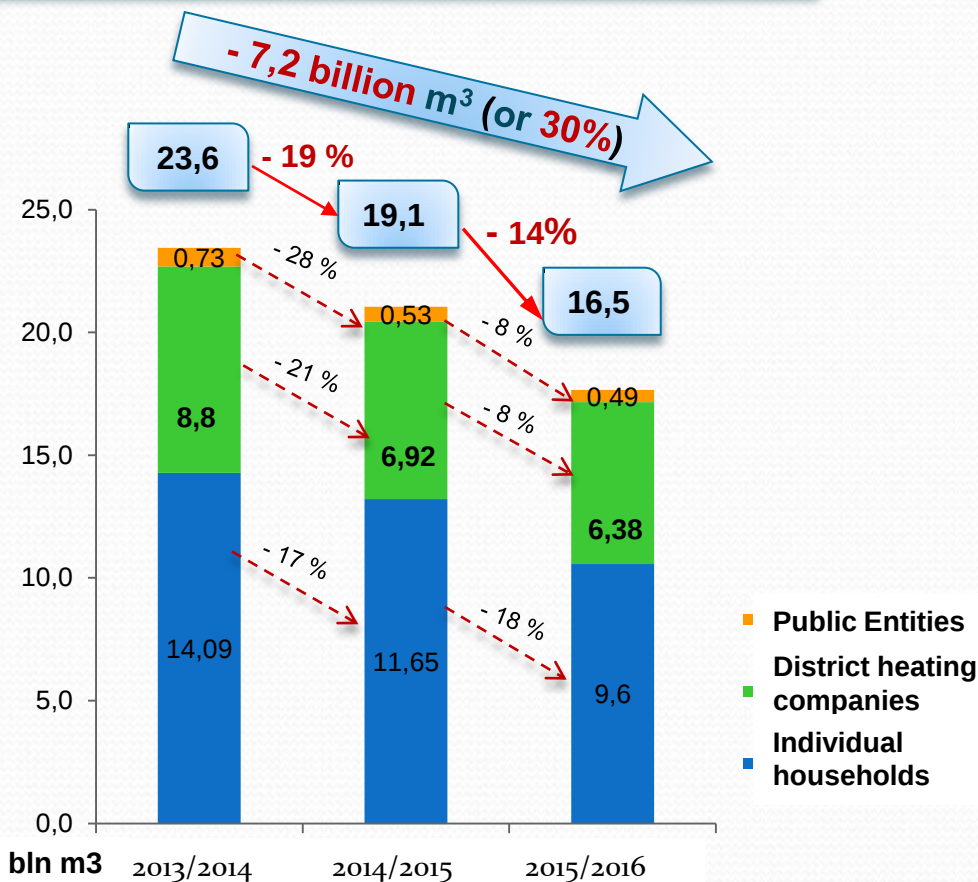
** - as for 1st December 2016.

*** - 138 MW of WPP are situated on the territory of combat zone.



Key priority: Substitution of Natural Gas

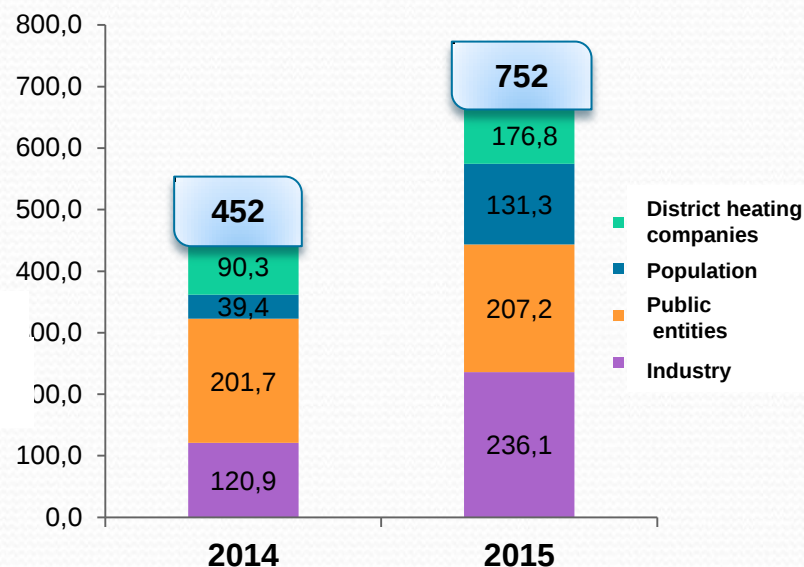
Reduction of gas consumption for the years 2013/2014/2015 *



*According to "Naftogaz Ukraine"
(Excluding ARC, Luhansk and Donetsk regions).

Dynamics of natural gas substitution during 2014/2015 years **

Σ 1,204 MW
introduced during 2 years



**According to regional state administrations



National Renewable Energy Action Plan till 2020 (NREAP)

Law of Ukraine on Fostering Renewable Energy Development



Introduced feed-in tariff
till 2030 for:

- on-ground solar power stations: 15,99 €ct/kWh;
- wind power plants above 2 MW: 10,18 €ct/kWh;
- biomass power stations: 12,38 €ct/kWh;
- hydro-power stations up to 10 MW: 10,45 €ct/kWh;
- geothermal power installations: 15,03 €ct/kWh;
- private household PVs up to 30 kW:
19,01 €ct/kWh;
- private household wind turbines up to 30 kW:
11,63 €ct/kWh.

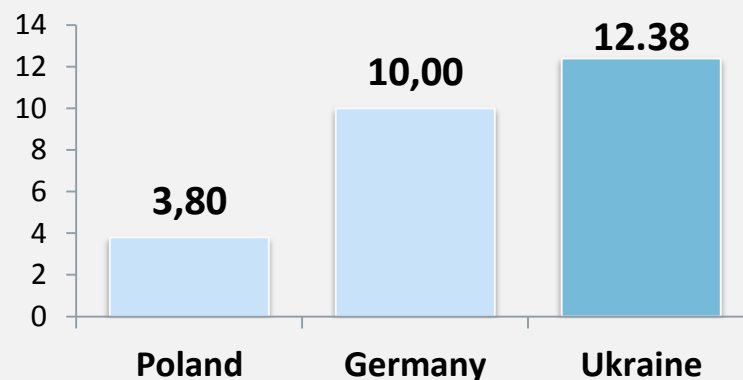


Premium for Ukrainian equipment
usage is provided
(5-10% to existing tariff)

GOAL:

**11% of RES in Ukrainian gross final
energy consumption by 2020**

Average biomass feed-in tariff, €ct/kWh



*approved by Order of the Cabinet of Ministers of Ukraine
№902-p dated October 1, 2014

**as for the year of 2016

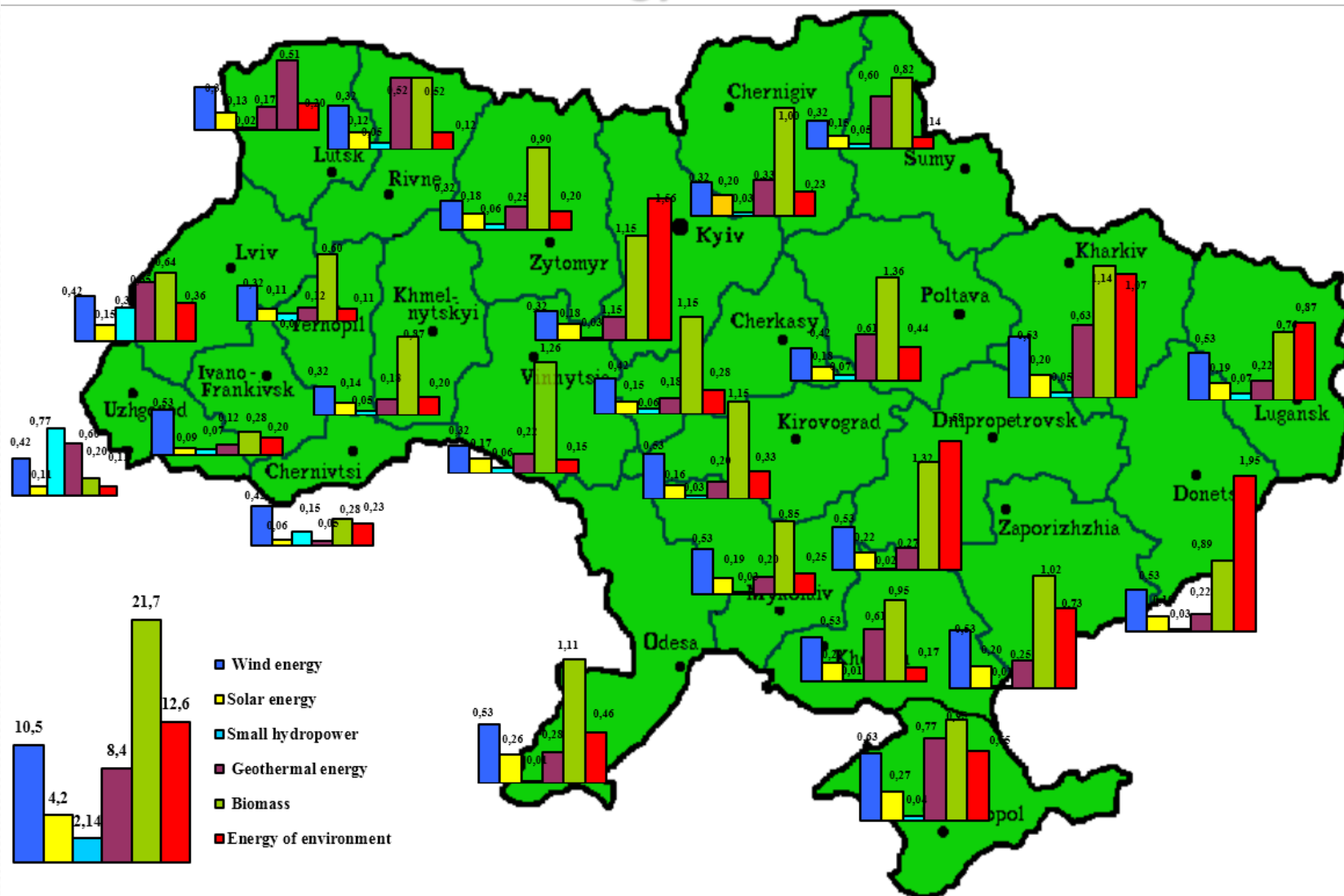


Targets of NREAP 2020

	2009	2016	2020
<u>Power generation</u>	4 625 MW	7 977 MW	10 900 MW
	11 471 GWh	18 726 GWh	26 000 Gwh
<u>Heat and Cooling</u>	1 473 thou. t.o.e.	3 576 thou. t.o.e.	5 850 thou. t.o.e.
	14 730 thou. Gcal	35 760 thou. Gcal	58 500 thou. Gcal
<u>Transport</u>	52 thou. t.o.e.	298 thou. t.o.e.	505 thou. t.o.e.



Total technically accessible potential of renewable energy sources in Ukraine





Examples of Successful Renewable Projects

Boiler station on renewable fuels



The boiler station provides heat and hot water for 4 municipal medical institutions

Installed capacity: **10,5 MW**
Type of fuel: **pellets**
Investments: **47,3 mln UAH**
Put into operation: **2015 year**
Investor: **APS Power Technology**

Botievska wind power station



Electricity output to the Integrated Power System of Ukraine – **634 mln. kWh**

Installed capacity: **200 MW**
Ratio of equipment availability: **98,9%**
Ratio of capacity usage: **36,2 %**
Total investment: **340 mln. €**
The level of "green" tariff: **11,3 €ct/kWh**

Plant for wind power units assembly



Cooperation with the German company **Fuhrlaender Wind Technology LLC**

Installed capacity of unit: **2,5 MW**
Mass of unit: **285 tone**
Height: **100 m**



Examples of Successful Renewable Projects

Biogas plant 5.5 MW (PJSC "Orel-Lieder")



Recycling 100% of chicken manure
Energy supply of poultry
Reduced CO2 emissions: **270 000 tonnes**
Produced **Biogas - 35 million m³**
Produced "Green" electricity: **70 million kWh**
Produced "Green" heat: **10000 Gcal**
Replaced of natural gas: **1.2 million m³**

Energy willow (SALIX energy)



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**
Substitution of gas: **10 mln m³ gas/year**

Boiler Plant on Alternative Fuel



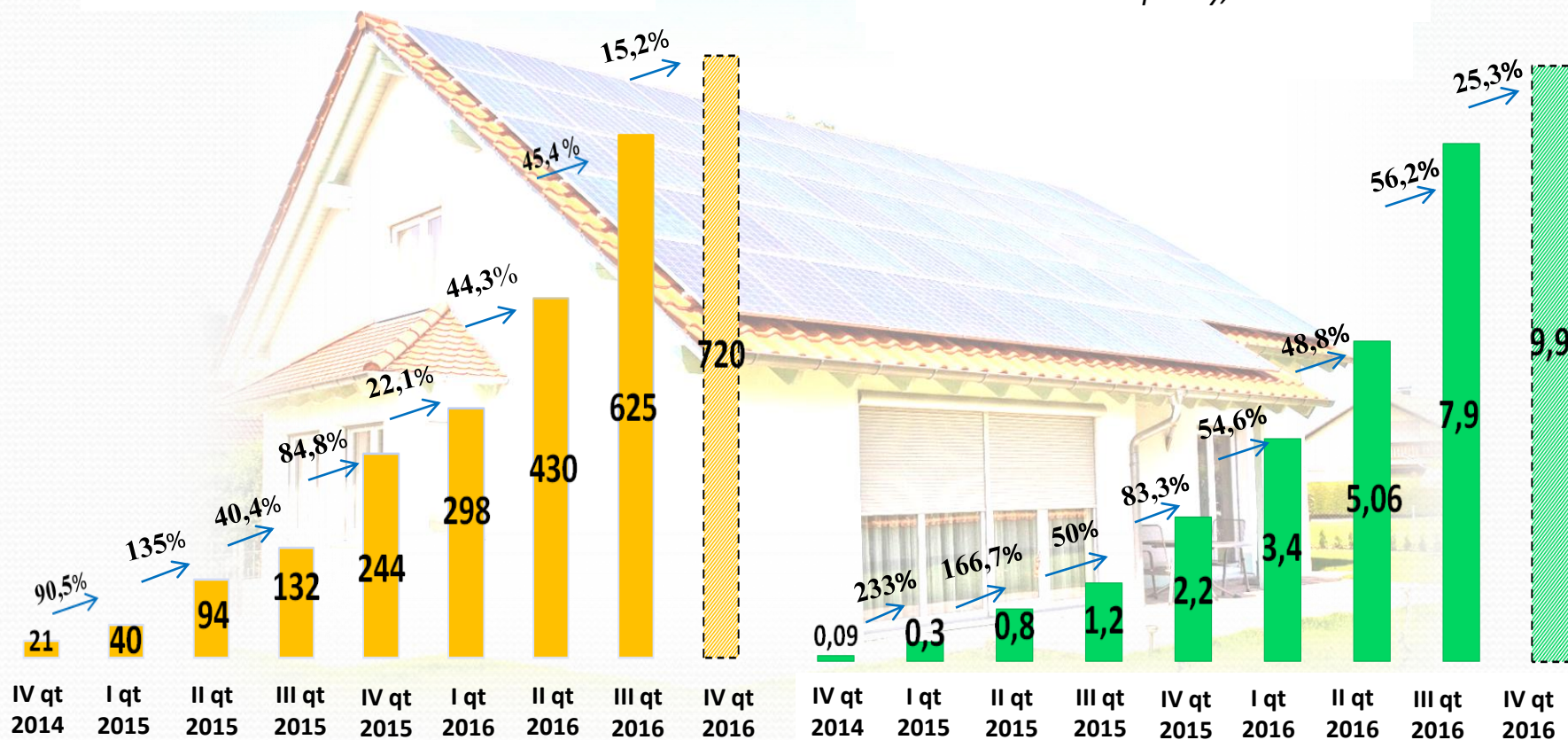
City: **Vinnitsa**
Start of operation: **2016**
Capacity: **23.2 MW**
(5.2 MW on wood chips, 18 MW on gas)
Type of fuel: **wood chips**
Investments: **3,6 mln EUR**
Producer: **VIESSMANN (Germany)**



Dynamics of Solar Installations Number Growth in Private Households

Number of private households

Installed capacity, MW



The number of private houses applicable for solar panels
installation is 6.5 million



WELCOME TO UKRAINE

State Agency on Energy Efficiency and
Energy Saving of Ukraine (SAEE)

<http://saee.gov.ua>