Investment attractiveness of renewable energy in Ukraine
ENERGY EFFICIENCY AND RENEWABLE ENERGY SECTORAL POLICIES

Energy intensity in European countries (IEA, 2014)

- **Germany**: 0.09
- **Romania**: 0.09
- **Lithuania**: 0.1
- **Croatia**: 0.1
- **Hungary**: 0.1
- **Slovak Republic**: 0.11
- **Poland**: 0.11
- **Bulgaria**: 0.15
- **Belarus**: 0.17
- **Ukraine**: 0.31

**Households**
- State and local programs of co-financing of energy efficiency
- Households stimulation on installation of wind and solar plants
- Energy labelling systems
- Full metering of energy consumption
- Stimulation of recipients of subsidies to save energy

**Industry**
- Stimulation through energy tax
- Energy Performance Contracts

**Services, Public Entities and Agriculture**
- Energy Performance Contracts
- The mechanism of energy management

**Transport and Non-energy use**
- Stimulation of liquid biofuels production
- Extension of electric vehicles usage

33% 32% 8% 17% 10%
KEY PRIORITY: SUBSTITUTION OF NATURAL GAS


- 7,2 billion m³ (or 30%)

New biomass heat generation facilities launched in 2014, 2015, 2016 **

Σ 1 670 MW

More than 400 mln EUR investments attracted

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

**According to regional state administrations.
11% of Renewables in final energy consumption

-9% (6.5 mln t.o.e.) of energy saving comparing to the average final energy consumption in 2005-2009

Ukraine was the 20th country to ratify the Paris Agreement

The share of renewables in primary energy supply should be 25% according to New Energy Strategy till 2035
<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2016</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power plants installed capacity</strong></td>
<td>4 625 MW</td>
<td>7 977 MW</td>
<td>10 900 MW</td>
</tr>
<tr>
<td><strong>Power generation</strong></td>
<td>11 471 GWh</td>
<td>18 726 GWh</td>
<td>26 000 GWh</td>
</tr>
<tr>
<td><strong>Heat and Cooling</strong></td>
<td>1 473 thou. toe</td>
<td>3 576 thou. toe</td>
<td>5 850 thou. toe</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td>52 thou. toe</td>
<td>298 thou. toe</td>
<td>505 thou. toe</td>
</tr>
</tbody>
</table>

**TARGETS OF NATIONAL RENEWABLE ENERGY ACTION PLAN TILL 2020 (NREAP)**

€ 12 BLN—REQUIRED INVESTMENTS TILL 2020 FOR NREAP IMPLEMENTATION
- 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.

### Average biomass feed-in tariff, EUR/MWh

- **Poland**: 38 EUR/MWh
- **Germany**: 100 EUR/MWh
- **Ukraine**: 123.86 EUR/MWh

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From the beginning of 2015, 353 MW were introduced and more than € 345 mln were invested.
DYNAMICS OF SOLAR INSTALLATIONS IN PRIVATE HOUSES

Number of private houses

Installed capacity, MW

€ 34,7 mln investments attracted

The number of private houses eligible for solar panels installation is 6,5 mln
EXAMPLES OF SUCCESSFUL RENEWABLE PROJECTS

Biogas plant 5.5 MW (PJSC “Orel-Lieder”)

Recycling 100% of chicken manure for energy generation
Produced Biogas: 35 million m³/year
Produced “Green” electricity: 70 million kWh/year
Produced “Green” heat: 10000 Gcal/year

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

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: € 1,5 mln
Put into operation: 2015 year
Investor:
APS Power Technology
GLOBAL AVERAGE ANNUAL NET CAPACITY ADDITIONS BY TYPE

<table>
<thead>
<tr>
<th>2010-2016</th>
<th>2017-2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>Coal</td>
</tr>
<tr>
<td>65 GW</td>
<td>17 GW</td>
</tr>
<tr>
<td>Gas</td>
<td>Gas</td>
</tr>
<tr>
<td>48 GW</td>
<td>48 GW</td>
</tr>
<tr>
<td>Nuclear</td>
<td>Nuclear</td>
</tr>
<tr>
<td>2 GW</td>
<td>4 GW</td>
</tr>
<tr>
<td>Renewables</td>
<td>Renewables</td>
</tr>
<tr>
<td>128 GW</td>
<td>160 GW</td>
</tr>
</tbody>
</table>

*www.iea.org

*Solar PV | Wind | Other renewable
CURRENT SITUATION ON WASTE IN UKRAINE

Status: 93% of waste are sent to landfills
Aim: more than 90% of waste to be sent to “waste to energy” plants

300 – 350 kg of household waste is produced by one person in Ukraine

10 mln tonnes of generated household waste is annually collected in Ukraine

700 mln cubic meters of natural gas

3500 thousand Gcal of thermal energy

1170 million kWh of electricity

6 148 landfills
32 984 unauthorized landfills
Example of Khmelnitsky city:
- produced 80 thsd tonnes. Solid waste/annually
- Investments into recycling complex – 12 mln EURO;
- 1,2 MW electricity;
- 10 MW heat power;
- recoupment from 6 years.
INVEST in UKRAINE!