



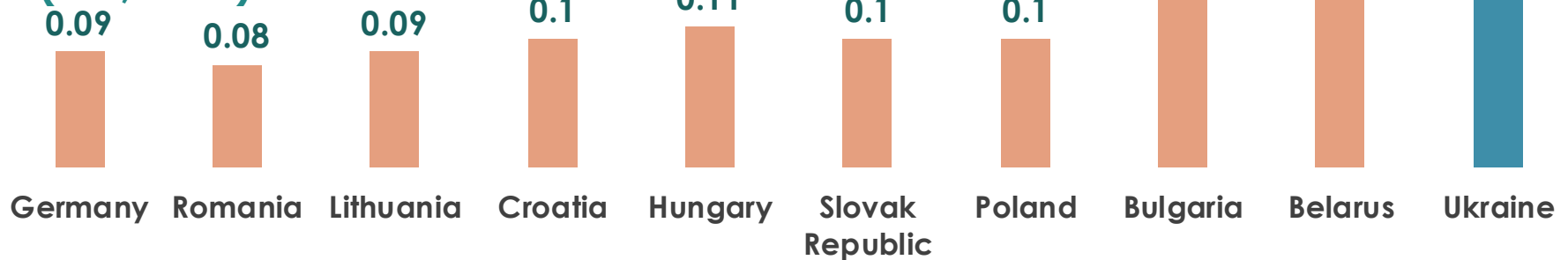
Investment Opportunities of Renewable Energy in Ukraine

State Agency on Energy Efficiency
and Energy Saving of Ukraine



ENERGY EFFICIENCY AND RENEWABLE ENERGY SECTORAL POLICIES

Energy intensity in European countries (IEA, 2016)



33%

32%

8%

17%

10%

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



KEY PRIORITY: SUBSTITUTION OF NATURAL GAS

Reduction of natural gas consumption

2014 - 2017*

New biomass heat generation facilities

2014 – 2017**



Σ 2 GW

More than 460 mln EUR
investments attracted

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

**According to regional state administrations.



National RENEWABLE ENERGY Action Plan till 2020

11% of energy, produced from RES
In total energy consumption



National ENERGY EFFICIENCY Action Plan till 2020

9% of energy saving comparing
to the average final energy consumption in 2005-
2009



Energy Strategy of Ukraine till 2035

25% of energy, produced from RES in
the structure of primary energy supply





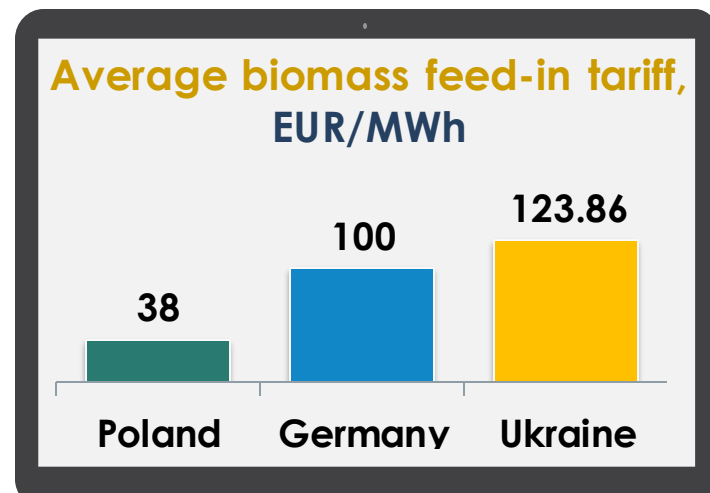
LAW OF UKRAINE

«ON FOSTERING RENEWABLE ENERGY DEVELOPMENT»

EUR/MWh

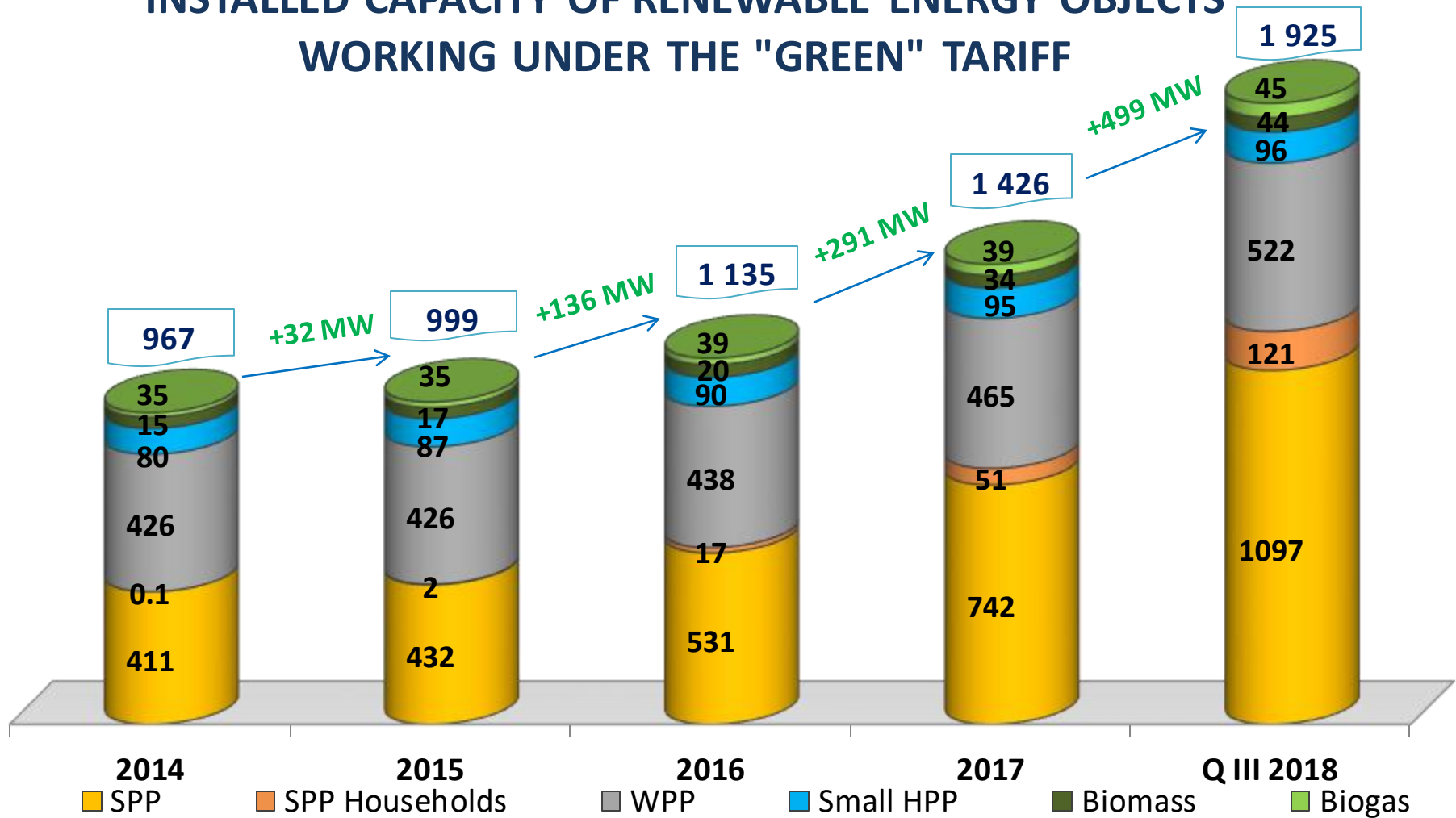
Technology/Comm.Year	2015	2016	2017-2019	2020-2024	2025-2029
Biomass	123.86	123.86	123.86	111.48	99.09
Biogas	123.86	123.86	123.86	111.48	99.09
Geothermal	150.25	150.25	150.25	135.17	120.09
Small Hydro (0.2-1MW)	139.48	139.48	139.48	125.48	111.48
Small Hydro (1-10MW)	104.47	104.47	104.47	94.24	83.47
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



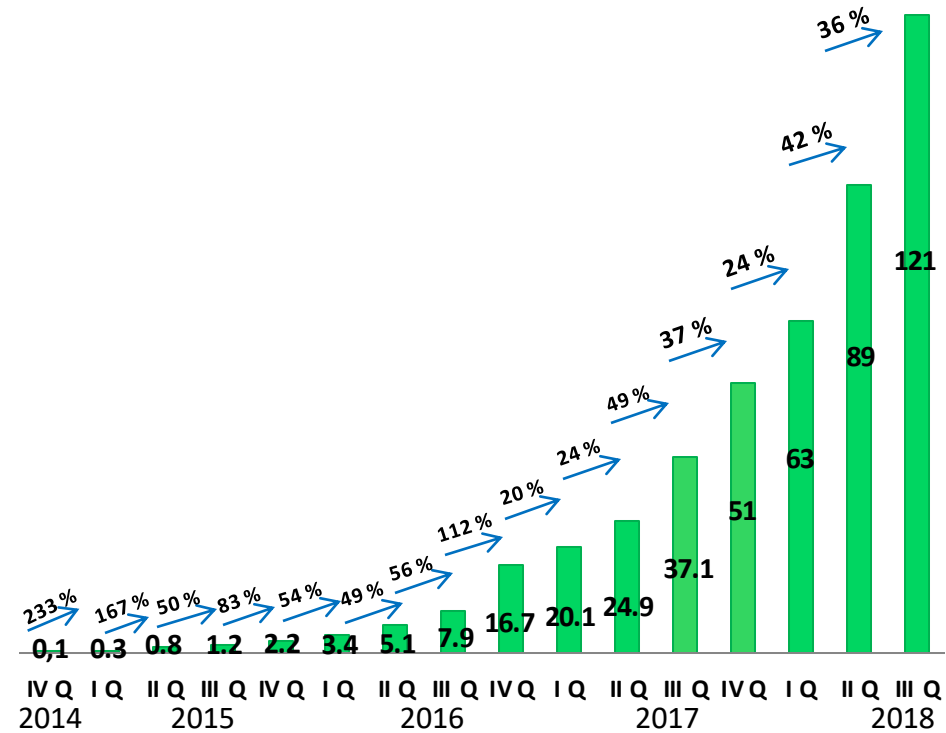
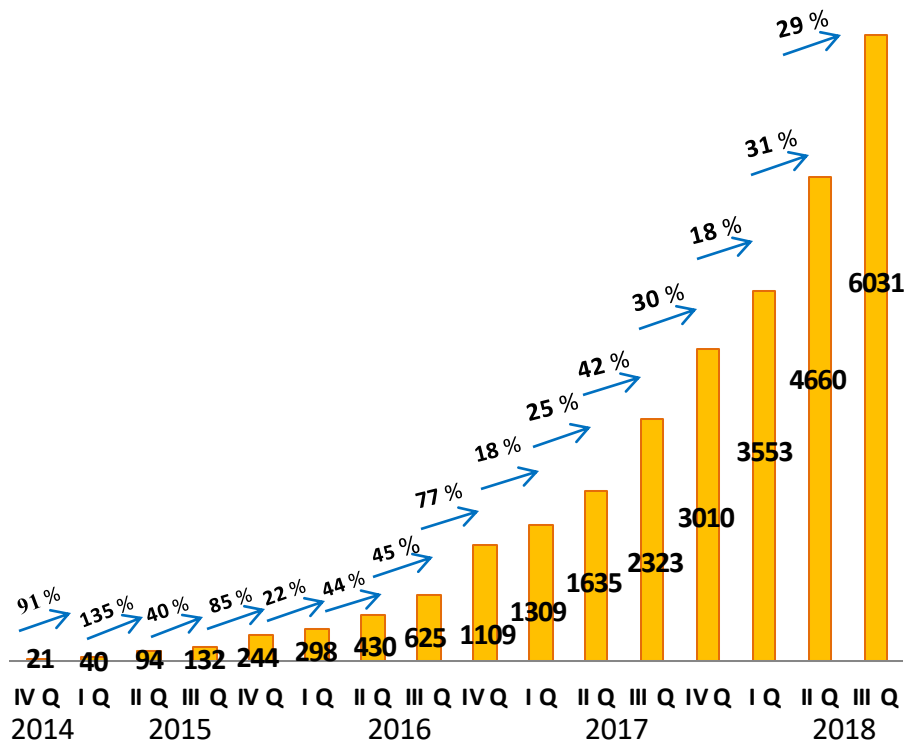
From the beginning of 2015, 958 MW were introduced and around € 910 mln were invested.



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



Current situation in Ukraine with generation of household solid waste (HSW)

Annually:

300 – 350 kg
of household solid waste



is produced by one
person in Ukraine

10 mln tons
of household waste



removed to the landfills in Ukraine

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



3,5 mln Gcal
of thermal energy



1,2 billion kWh
of electric energy





EXAMPLES OF SUCCESSFUL RENEWABLE

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 (on solid fuel);

3 MW – electric power.

Fuel: **wood chips, pellets**

Investments: **8,2 mln EUR**

Bohivska wind power station



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

Installed capacity: **200 MW**

Total investment: **€ 340 mln**

The level of "green" tariff:

11,3 €ct/kWh

Wind power turbines production plant



Under license of German company Fuhrlaender AG

Capacity of turbines:

2,5 MW, 3,2 MW

Height: **100 m**



EXAMPLES OF SUCCESSFUL RENEWABLE

Teofipol biogas complex 15 MW



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: **Khmelnitskii**
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)



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



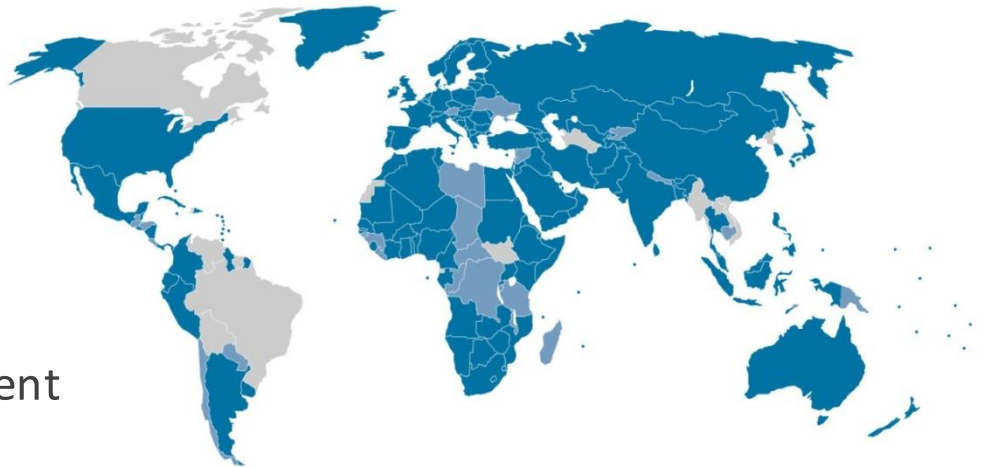
Law of Ukraine «On Ukraine's Accession to the Statute of the International Renewable Energy Agency (IRENA)»

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

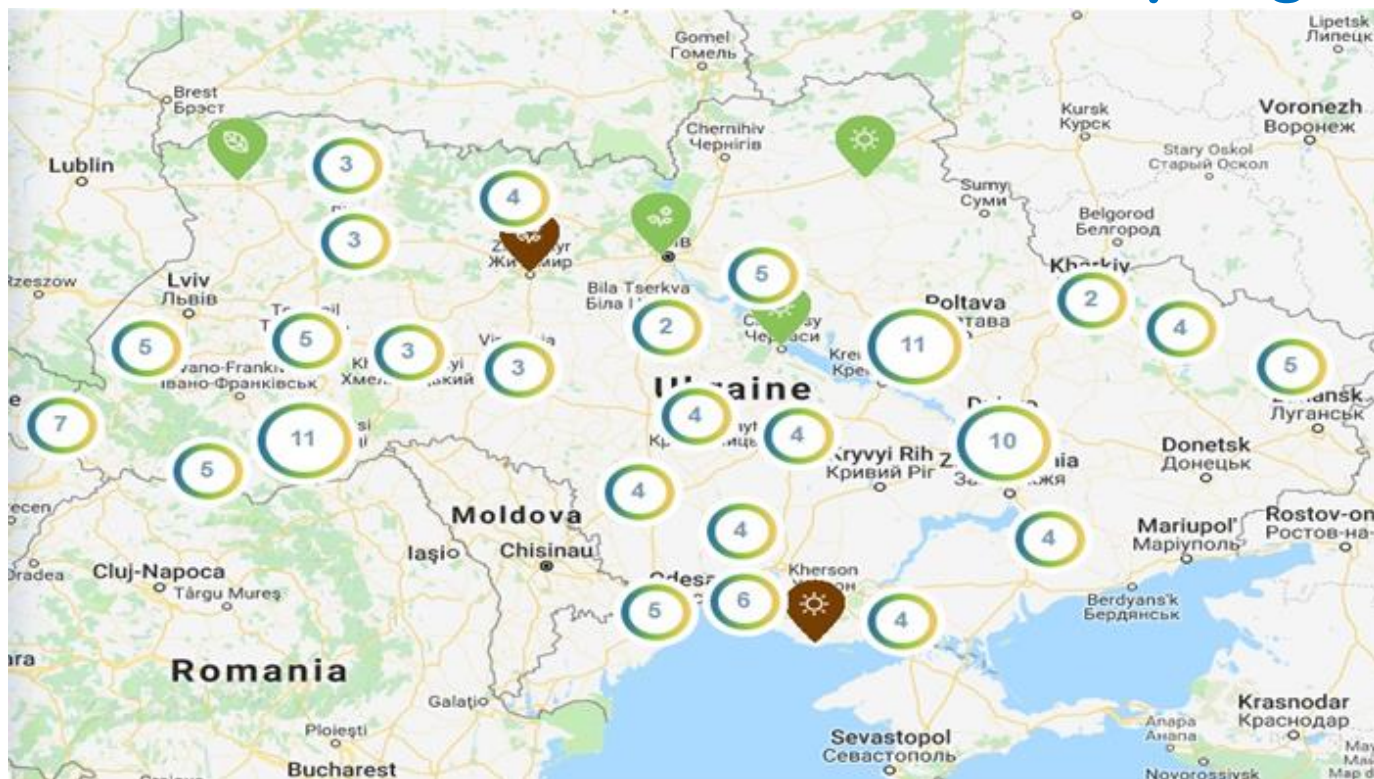


UAMAP comprises detailed information on more than 79 implemented
and 101 potential projects that require investments & soft loans in amount of

€ 4 bln

www.uamap.org.ua

- Hydropower ☒
- Biomass ☒
- Biogas ☒
- Solar power ☒
- Wind power ☒
- Energy efficiency ☒
- Waste energy ☒
- Other ☒



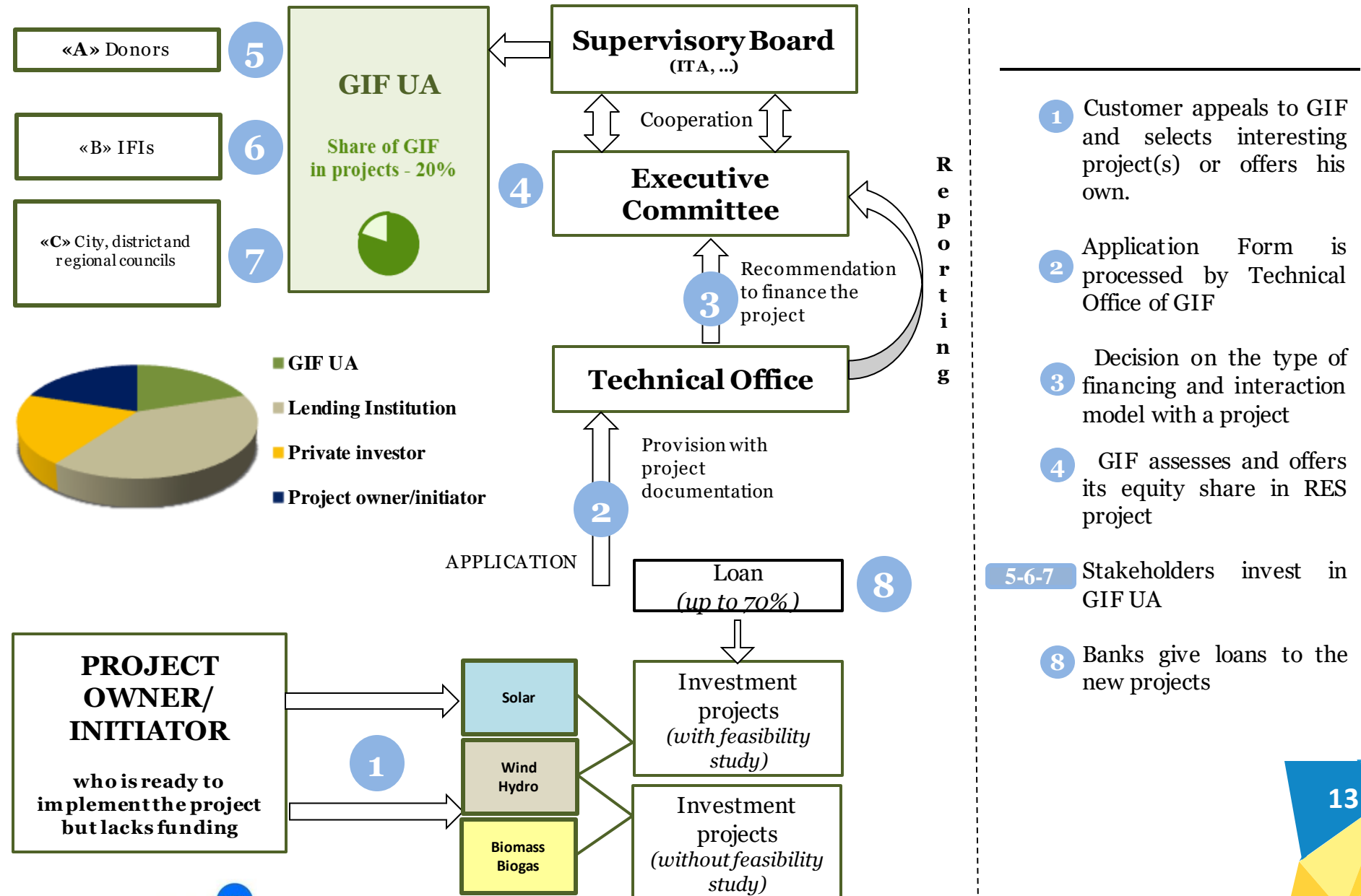
On behalf of:



of the Federal Republic of Germany



GIF UA: SCHEME OF OPERATION IN BRIEF





ROADMAP ON THE IMPLEMENTATION OF GREEN BONDS MARKET IN UKRAINE

Action Plan for
Implementation
of the "Energy Sector
Reform 2020" of the Energy
Strategy of Ukraine
till 2035



Creation of conditions for
implementation of green bonds
market in Ukraine as an
instrument to attract investment
in renewable energy and energy
efficiency projects



State Agency on Energy
Efficiency and Energy Saving
and other public authorities
2019 - 2020

Development of legislation



Introduction of the green
bonds notion into Ukrainian
legislation and establishment of
legal regime of their issue in
the context of issuers;

Development of guidelines,
procedures and incentives for
the green bonds market.

Realization of pilot projects



Feasibility studies preparation for
green projects and cost calculation
in the context of issuers;

Conducting an independent
valuation of issuers;

Estimation of bonds certification
according to the international
standards.

Attracting green financing



Preparation and holding of a large-
scale marketing session (RoadShow)
on the internal and external capital
markets;

Partners involvement for
cooperation (International Financial
Institutions, Green Climate Fund,
Green Bond Fund for Developing
Markets, Institutional Investors,
etc.)



INVEST in UKRAINE!

State Agency on Energy Efficiency and Energy Saving of Ukraine

Phone: +38 (044) 590 59 64

E-mail: office.sae1@gmail.com