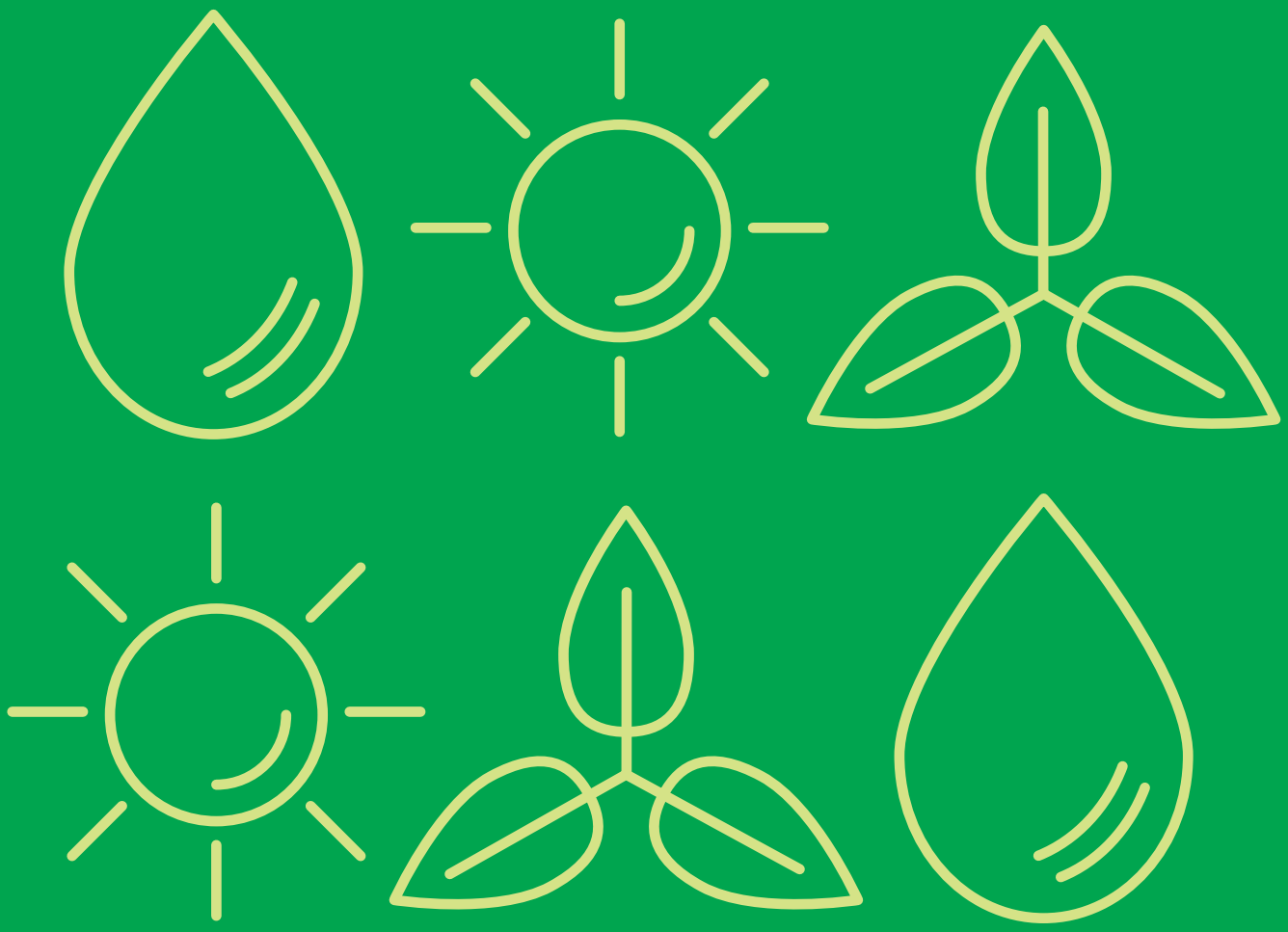
Post-feed-in tariff Ukraine

New renewable power support mechanisms



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The information presented in this publication derives from an analysis of publicly available data, expert opinions expressed by participants of the Ukrainian RES market and their interpretation by the author. The author's position does not necessarily reflect the opinion of Friends of the Earth Germany (BUND), Centre for Environmental Initiatives Ecoaction, a non-governmental organisation, and the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety of Germany.

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Glossary and abbreviations

Alternative energy sources — any energy sources being alternative to conventional fossil fuels (coal, natural gas, uranium, etc).

RES (renewable energy sources) — energy sources that use continuously active natural energy flows and renew in the natural way (for instance, solar, wind, hydro, and biological energy).

Renewable power sector — energy sector that provides for the use of renewable energy sources to meet economic needs.

WPP (wind power plant) — facility generating electricity from wind energy.

Developer — company that is responsible for searching and analysing sites, developing design documents, obtaining relevant approvals, and, as the case may be, searching for sources for financing the construction of renewable power projects.

Energy transition — transition of nations towards sustainable economies through deployment of renewable energy, energy efficiency measures and sustainable development.

EBRD — European Bank for Reconstruction and Development.

Energy Community — international organisation whose members are the EU's Member States and emerging nations and which aims to extend the EU's energy market to North-East Europe and other countries.

IFC — the International Financial Corporation.

NEURC — the National Energy and Utilities Regulatory Commission (the 'Regulator').

SPP (solar power plant) — facility generating electricity from solar radiation.

NEFCO — Nordic Environment Finance Corporation (NEFCO) established in 1990 by five Nordic countries Denmark, Finland, Iceland, Norway and Sweden.

PPA — power purchase agreement.

Why does support for renewables matter?

Global context

Climate change is one of the greatest global challenges for humanity in the 21st century. It is spoken of by countries, corporations and all influential international structures. According to the calculations by Moody's Analytics, the total economic loss driven by adverse effects of climate change may reach USD 69 trillion[1] by 2100. However, the Global Commission on the Economy and Climate estimates that a prompt and comprehensive transition to a 'green' economy will bring additional USD 26 trillion into the global economic system over the same period.[2]

Some forms of policies and declarations on the prevention of, and the adaptation to, climate change exist in all countries, including Ukraine.

The renewable power sector is at the forefront of combating climate change. According to the analytics of Our World In Data[3], the production and use of energy in the industry, housing and transport sectors are responsible for 73.2% of global greenhouse gas emissions. Given that the use of solar, wind and some types of biomass energy does not cause significant greenhouse gas emissions, its multidirectional application will help humanity to overcome the climate change threat.

Ukraine has reaffirmed its support for the development of renewable energy at various levels. In 2016, we were one of the first countries to ratify the Paris Climate Agreement.[4]

Ukraine has been a member of the European Energy Community since 2011, as part of which it has committed itself to the development of renewable energy sources (RES). The Energy Strategy of Ukraine, as approved by the Government, provides for achieving 25% of renewables in the total primary energy supply by 2035, including measures to increase energy efficiency and to reduce the energy intensity of the economy.[5]

To achieve these goals, the country should have legislative mechanisms in place to stimulate new RES projects and a regulatory framework to ensure that these laws are implemented.

Why is there a need for renewable power?

In addition to its key role in the tackling of the climate crisis, renewable power helps people in solving many other problems, in particular:

1) Develops the energy democracy. Solar, wind, and bio-power plants are easy to scale and combine. These technologies involve large and small businesses and individuals in the energy transition.

2) Reduces inequality and contributes to social justice. Revenues and other benefits offered by production and use of renewable energy are shared by many participants in the process without being concentrated in the hands of large businesses.

3) Improves the security of supply. Own generating capacities allow for becoming independent from the national grid or having stand-by systems for emergencies.

4) Promotes energy independence. The country and communities become less reliant on the imports of fuels and energy.

[1] Moody's Analytics. The Economic Implications of Climate Change. URL: https://www.moodysanalytics.com/-/media/article/2019/economic-implications-of-climate-change.pdf

[2] The Global Commission on the Economy and Climate. Unlocking the inclusive growth story of the 21st century. URL: https://newclimateeconomy.report/2018

[3] Our World in Data. URL: https://ourworldindata.org/ghg-emissions-by-sector

[4] Act No. №1469-VIII ratifying the Paris Agreement. URL https://zakon.rada.gov.ua/laws/show/1469-19#Text

[5] Ukraine's Energy Strategy for the period until 2035. URL: http://mpe.kmu.gov.ua/minugol/control/uk/doccatalog/list?currDir=50358

5) Reduces local air (less coal is burned) and water (there is no need to extract coal and, accordingly, neighbouring reservoirs are not heated with waste waters) pollution; and reduces related chronic disease incidence in the population.

6) Helps to protect ecosystems, threatened by exploration and extraction of fossil fuels (example – offshore wind parks serve as marine wildlife sanctuaries).

7)Last but not least, increasing electricity production from RES is the key to decarbonising other sectors, such as transport, heating and industry.

Why are the new RES support mechanisms in demand now?

Ukraine's renewable power sector has grown rapidly over the past five years. The installed generating capacities developed under feed-in remuneration scheme have increased from 1,242 MW in 2014 to 8,185 MW as of December 1, 2020.[6]

On the other hand, the rapid installation of new plants (especially solar), some aspects of introduction of the new electricity market model and the Government's decisions have led to technical problems with the connection of new facilities to the grids and delays in 'feed-in' payments to companies.

The retrospective cut of tariffs for existing SPPs and WPPs and the limitation of the period for commissioning new projects had a significant effect. This led to around 68% reduction in the new RES installations in 2020[7], which threatens Ukraine's transition to sustainable development and compliance with its international commitments.

However, in many countries RES markets move from artificial support systems, such as the feed-in tariff, to mechanisms that are more integrated into common energy markets. These are the markets where renewable energy producers compete in common marketplaces with each other or with other types of energy.

Given the introduction of the new liberalized market model in Ukraine, it is worth to assess opportunities for new and existing RES projects from a perspective of inclusive participation in the model, and to identify obstacles that should be addressed for the further development of the clean energy sector in Ukraine.

New electricity market

Before 1 July 2019, the electricity market in Ukraine operated under the common pool model (like British electricity market in 1990s). All generating companies sold electricity to Energorynok State Enterprise at prices set by the government. Energorynok further sold it to regional distribution companies. They, in turn, sold the electricity to individuals and legal entities at the regulated prices, too. Such structure of the market led to the establishment of monopolies in the production and supply of electricity, the inability to attract investments in the sector, progressive aging of

[6] The Ministry of Energy of Ukraine. Conducting 'green' auctions in 2021. URL:http://mpe.kmu.gov.ua/minugol/doccatalog/document?id=245495495

[7] State Agency for Energy Efficiency and Energy Saving of Ukraine The share of renewable energy in the final energy consumption in 2019. URL: https://cutt.ly/yk619CV

equipment, deterioration of reliability of electricity supply and occasional electricity shortages.

In accordance with the key principle of the new electricity market[8], market prices should be determined, either in full or in part, by a balance between demand for, and supply of, electricity. The government regulation should be reduced to a necessary minimum. The model provides for the operation of five distinctive segments that are analysed below. Market participants have different operating models depending on a forecast horizon and energy needs. This specific attribute should promote the development of new mechanisms of the operation of renewables and support for new projects.

Bilateral agreements market. In this case, companies purchase and sell electricity under long-term contracts (also known as forward contracts) directly concluded between power consumers and producers. Contracts are signed for a long period of time: a month, quarter, year, or even longer. The electricity price is usually fixed for the entire term of the contract.

Day-ahead market is a fully-fledged energy stock market where power is purchased and sold for the next day. Trade in this segment is the most liquid and competitive and market participants use it as an indicative energy price.

The intraday market is used to trade electricity within the same day. This market starts operating immediately after the execution of all agreements in the 'day-ahead' market. In this market, power is sold at prices that are higher than prices in the two previous segments.

The balancing market, where suppliers purchase deficient quantities of electricity to ensure a balance between the levels of production, import, export and consumption. This market is the most expensive and should therefore be normally used less often than the other markets – under force-majeure circumstances, such as accidents at power generating units. Given that this market is used for the sale of power that is needed urgently, this segment can be an option for power plants (or energy storage facilities) that are expected to provide necessary capacity in a short period of time.

The auxiliary service market is used by the grid operator to receive from power producers services that are necessary to ensure a reliable and stable operation of the grid and compliance with the requirements for its operational safety and the quality of electricity. These services include the dispatch of electricity, the regulation of frequency and voltage, balancing power, and emergency support services.

Despite the advantages of the new electricity market, today there are problems in its operation. They are primarily related to artificial and politically motivated restrictions for some players and market segments, including maximum electricity prices in some segments (price caps), regulated fixed low tariffs for household consumers, etc. Such restrictions and distortions result in significant debts to 'green' power producers and the lack of funds in state-owned enterprises such as Guaranteed Buyer, NEC Ukrenergo and NNEGC Energoatom.

The new mechanisms for supporting 'green' power, as described in this paper, are designated, among other things, to facilitate resolution of these issues, to balance the electricity market, and to facilitate the further integration of renewable power into the Ukrainian grid.

[8] Ukrainian Electricity Market Act. URL: https://zakon.rada.gov.ua/laws/show/2019-19#Text

Existing RES support mechanisms

Feed-in tariff

The feed-in tariff system has been used in Ukraine since 2009. In accordance with the Ukrainian Alternative Energy Sources Act[9], special fixed incentive tariffs are set for the purchase of electricity produced by power generating facilities from alternative energy sources.

In other words, the government undertakes to purchase all electricity produced by RES projects at a fixed rate, which is indexed to the Euro in Ukraine.

It therefore follows that renewable power investors can build sound financial models for their projects and be confident in the return on their investments over the long term.

In the world

Today, feed-in tariffs are still in use as an instrument to promote the development of RES in more than 50 countries all over the world. On the other hand, clean generation technologies have become competitive with conventional power sectors[10] (for example, nuclear or coal) in many markets. The world therefore gradually switches from feed-in tariff systems to mechanisms enabling competition between market participants.

In Ukraine

The story of the Ukrainian feed-in tariff began with a scandal. In fact, it is the close associates of the then President Viktor Yanukovych who lobbied for the laws supporting 'green' power projects in 2009. The laws provided for the setting of extra-high tariffs for electricity generated by large solar power plants, exemption from the payment of the income tax until 2020 and VAT on imports of specialized equipment and materials. Independent project developers were restricted to enter the market as a result of introduction of the 'local component' requirement – the obligatory share of products and materials of Ukrainian origin in the cost of construction of a power-generating facility.

In 2015, amendments were passed in the parliament to balance the sector's tariff setting and to create possibilities to boost its development.

The 'local component' requirement was replaced with incentive tariff premiums and the unreasonably high tariff for solar was reduced. In addition, the statutory provisions on the feed-in tariff for households took effect in 2014. This enabled not only businesses but also individuals to invest in solar energy (Fig. 1).

These amendments enabled an unprecedented growth of Ukraine's renewable power sector. According to the NEURC data, 1,362 RES generating companies with an aggregate installed capacity of 7,352 MW were active in Ukraine as of September 2020. This included 5,795 MW generated by solar power plants, 1,252 MW of wind generating capacities, and 189 MW produced by bio-power installations.[12]

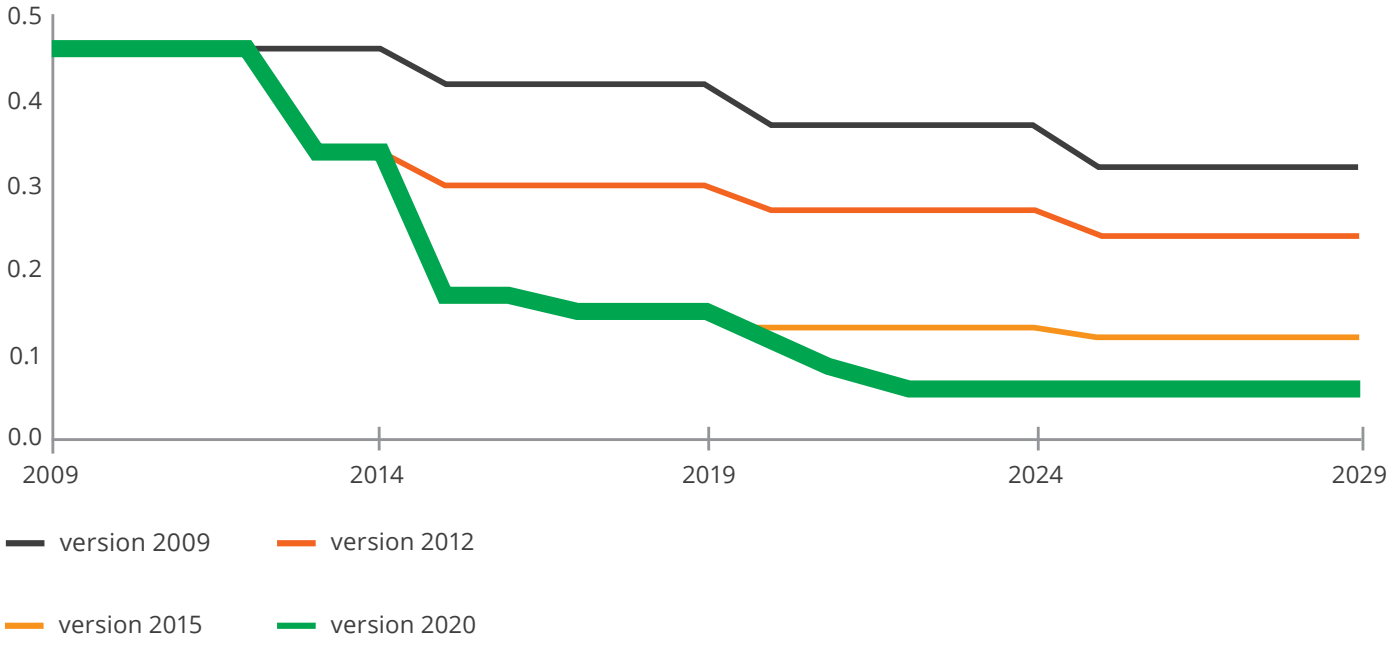
The renewable energy sector attracted more than USD 10 billion of investments over five years – result that no other sector of the Ukrainian economy has ever achieved. Dozens of small and large businesses emerged to serve the sector, including developers, installation companies, equipment manufacturers, service providers and logistics companies. Ukrainian law and consulting firms gained experience that allows them to successfully provide services at a level comparable to that of strong foreign competitors. State-owned and commercial banks and international financial institu-

[9] Ukrainian Alternative Energy Sources Act No. 555-IV dated 20 February 2003. URL: https://zakon.rada.gov.ua/laws/show/555-15#Text

[10] Lazard. Levelized Cost of Energy and Levelized Cost of Storage – 2020 URL: https://cutt.ly/Plqq9kU

[12] The National Energy and Utilities Regulatory Commission. Statistics on alternative power facilities enjoying the feed-in tariff. URL: http://www.nerc.gov.ua/?id=26435

Figure 1.
Dynamics of feed-in tariff reduction for solar power plants, subject to a number of revisions[11]



tions, such as the EBRD, the IFC and the NEFCO, participated in the development of the sector.

According to the estimates of the European-Ukrainian Energy Agency, the solar and wind power sectors of Ukraine provided employment for almost 25 thousand people in the period 2014 to 2019, without taking into consideration workers engaged in the manufacturing of equipment. Since the commencement of development of the RES sector, Ukraine has seen the emergence of businesses that manufacture equipment for solar, wind and bio-power plants (photovoltaic modules, inverters, transformers, fastenings, wind turbine parts, biogas reactors, boiler equipment, etc.). The total number of people employed in the sector, including manufacturing, is estimated at 45,000 persons.[13]

In addition, as of 1 October 2020 more than 27,000 Ukrainians installed solar power plants with an aggregate generating capacity of 712 MW in their households. Together, they invested nearly EUR 560 million in the renewable power sector.[14] Many local companies provide installation services, execute design, prepare documentation and maintain private SPPs in all regions of Ukraine.

[11] Ukrainian Renewable Energy Association URL: https://www.youtube.com/watch?v=MS-ZqtEIZck&feature=emb_logo

[13] The European-Ukrainian Energy Agency. Study of jobs created in the energy efficiency and renewable energy sectors in Ukraine. URL: https://euea-energyagency.org/wp-content/uploads/2020/07/DOSLIDZHENNYA.pdf

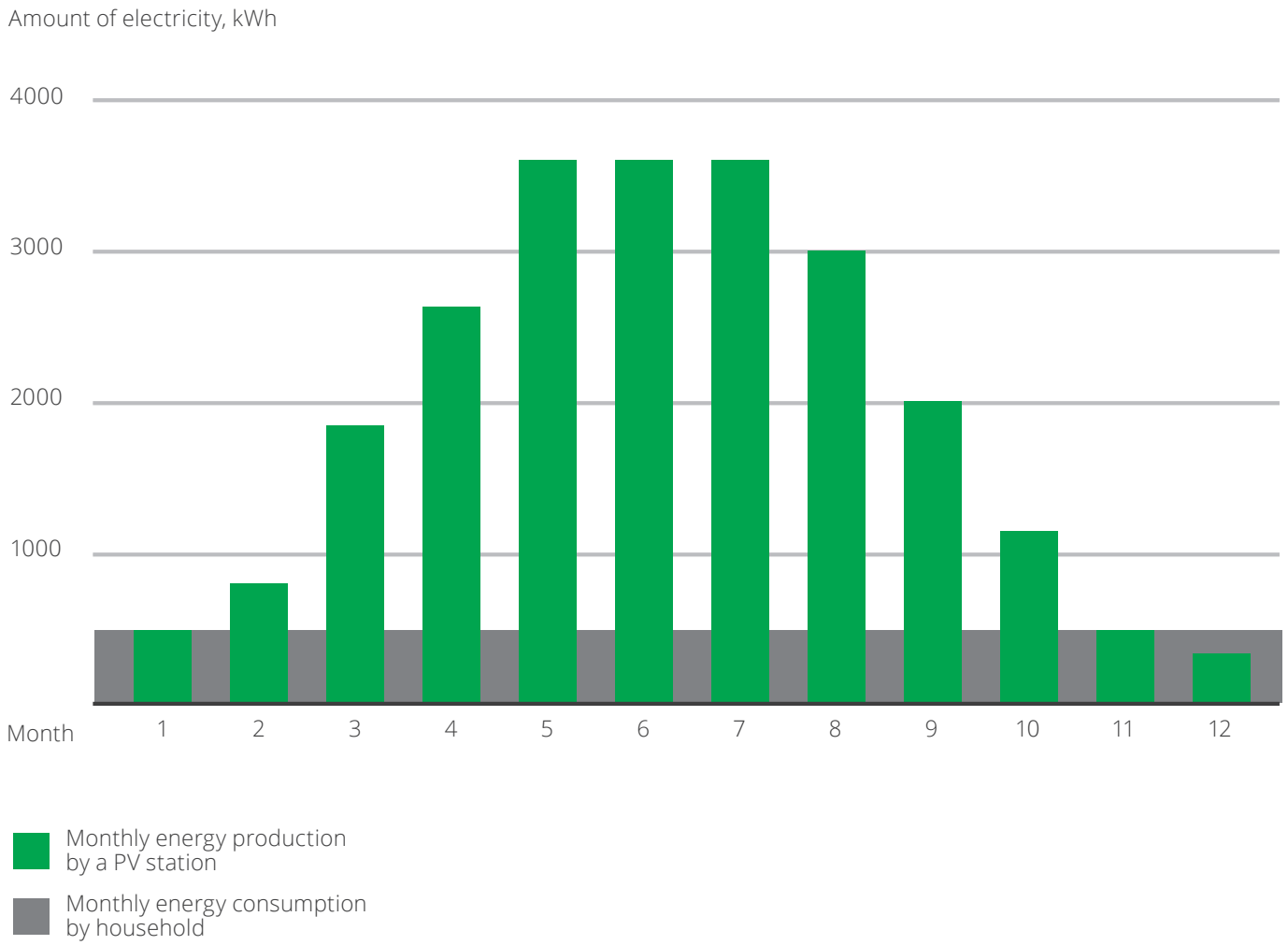
[14] State Agency for Energy Efficiency and Energy Saving of Ukraine URL: https://saee.gov.ua/uk/news/3527

Example

For illustrative purposes, let's analyse the installation of a 20-kW solar power plant with feed-in tariff for a house, residents of which consume an average of 400 kWh monthly (Fig. 2).

Please note that the total annual power output of the SPP significantly exceeds the consumption of the household. However, in the period from November to December, the generation of power either equals or is less than the quantities consumed. During that period, the owner of the power plant either pays nothing for the electricity (if the consumption equals the generation) or pays a bill issued by the regional distribution company (if the consumption exceeds the generation), which is the payment for a difference between these indicators expressed in kilowatt hours.

Figure 2.
Approximate performance indicators for household solar power plant[15]



[15] Rentechno. Power plant calculator. URL: https://rentechno.ua/ua/solar-calc.html

How to calculate a payback period for a household SPP operated at the feed-in tariff?

To estimate performance of private solar power plant in Ukraine a simple calculation tool can be used to derive economic indicators from input data (Table 1).

Table 1.
Calculation of the household solar PV station performance

Power capacity of solar installation	20	**1.** Select the capacity of your power plant.
SPP's power output, kWh	23542,00	**2.** Determine the quantity of power it is able to generate in your region (depending on geographic latitude and a tilt of solar panels).
Power consumption, kWh	4800,00	**3.** Estimate your expected annual consumption of electricity in kWh.
Quantities sold at the feed-in tariff, kWh	18742,00	**4.** Subtract self-consumed quantities from the amount of power generated by the SPP. Remember that the feed-in tariff is only calculated for the difference between these indicators.
Feed-in tariff, Eurocent/kWh	16,3	
Feed-in tariff payments, Euro	3054,95	**5.** Multiply the quantities sold in kWh by the applicable feed-in tariff.
Taxes, 19.5%	595,72	**6**. Subtract from this amount the taxes that you pay—the personal income tax (18%) and the military tax (1.5%) to determine your net income from the sales of electricity at the feed-in tariff.
Net income under the feed-in tariff, Euro	2459,23	
Tariff for household consumers, UAH/kWh	1,68	
Electricity self-consumption savings, Euro	240,72	**7.** Multiply the electricity consumed by the effective household tariff for electricity supplied from the grid (if it was fully covered by generation of your SPP). In so doing, you will define extra savings due to the cost of electricity that you have consumed.
Net income, Euro	2699,95	**8**. Add the quantities saved to your net annual income under the feed-in tariff to assess the total income generated by the installed solar power plant.
Cost of the power plant, Euro	12000	**9.** Determine the approximate cost of the solar power plant. This can be done through comparison between commercial offers available on-line.
Simple payback period, years	4,45	**10.** Divide the cost of the SPP by the total annual income generated by it. This will be the simple payback period for the solar power plant.

These calculations disregard some other factors, such as the natural degradation of photovoltaic modules, possible extra costs for maintenance, and the dynamics of increase in household electricity tariffs. However, they are quite suitable to obtain an overall evaluation and to understand the algorithm.

NB

The owner of a private SPP only sells, at the feed-in tariff, a difference between generated and consumed electricity. Compensation for the consumed electricity can be regarded as power savings. Accordingly, it is factored in the model following its multiplication by the regular household electricity tariff.

Although the legislation enshrines the principle of the gradual reduction of feed-in tariffs and the abolition of benefits for businesses starting from the end of 2019, the existing renewable power support system has been under constant pressure. This manifests in the retrospective cut of 'green' tariffs, the deterioration of the business environment, and delayed payments to 'green' power producers. There are a number of reasons behind that. They include, in particular, the immaturity of the new electricity market, the ill-considered decisions of the government authorities, and pressure from conventional energy sectors and large industrial consumers of electricity. This leads to the suspension or postponement of construction of a great number of new RES projects.

Despite this, the feed-in tariff system still remains the only form of government support and remuneration for electricity production from RES, which, according to applicable legislation, should subsist at least until 2030. The private household SPP sector continues to grow rapidly. The bio-power sector (provided that it is sustainable), which has huge untapped capacity, shows promises. Small commercial solar power plants having a generating capacity of up to 1 MW and being installed on roofs or on the ground become increasingly popular. New forms of project co-financing emerge, including energy cooperatives.[16]

[16] Solar Town Energy Cooperative. URL: https://solartown.com.ua/

Table 2.
Applicable feed-in tariff rates as of November 2020, Euro/kWh[17]

Plant type		Commissioning date					
		1.11.20 – 31.12.20	1.01.21 – 31.03.21	1.04.21 – 31.12.21	1.01.22 – 31.12.22	1.01.23 – 31.12.24	1.01.25 – 31.12.29
Ground-mounted SPPs	< 1 MBт	0,1097	0,1061	0,1061	0,1024	0,0987	0,0950
	1–75 MBт	0,0788	0,0761	0,0435	0,0420	0,0405	0,0390
	> 75 MBт	0,0450	0,0435	0,0435	0,0420	0,0405	0,0390
Roof/facade SPPs		0,1185	0,1185	0,1147	0,1147	0,1104	0,1066
Private SPPs		0,1800	0,1630				0,1450
WPPs	< 0,6 MBт	0,0504	0,0494	0,0494	0,0483	0,0478	0,0441
	0,6–2 MBт	0,0588	0,0578	0,0578	0,0567	0,0557	0,0515
	> 2 MBт	0,0882					0,0772
Private WPPs		0,1160	10,5000				0,0930
Biomass		0,1239*				—	—
Biogas		0,1239*				—	—
HPPs	< 0,2 MBт	0,1573					0,1395
	0,2–1 MBт	0,1255					0,1115
	1–10 MBт	0,0942					0,0835
Geothermal power		0,1352					0,1201

* Electricity generating facilities that produce electricity from biomass and/or biogas will be entitled to a feed-in tariff if they are put into operation before 1 January 2023.

Which projects are eligible for the use of the mechanism?

— household SPPs
— household WPPs
— commercial SPPs
— commercial WPPs
— biogas installations
— biomass installations
— geothermal power

[17] DLF Attorneys-at-Law. Ukrainian feed-in tariffs cut. URL: https://dlf.ua/ua/znizheno-zeleni-tarifi-v-ukrayini/

Self-consumption of electricity

'Self-consumption' means an economic model, in which an individual or a legal entity receives power, either in full or in part, from renewable sources, which are installed directly at the place of consumption.

In most countries, such facilities also include those that have the ability to sell or supply power to the national grid and to provide demand management services (the so-called prosumers), etc. But the production and sale of electricity should not be the main activity of such consumers. For example, a plant that manufactures industrial products and has solar panels mounted on its roof.

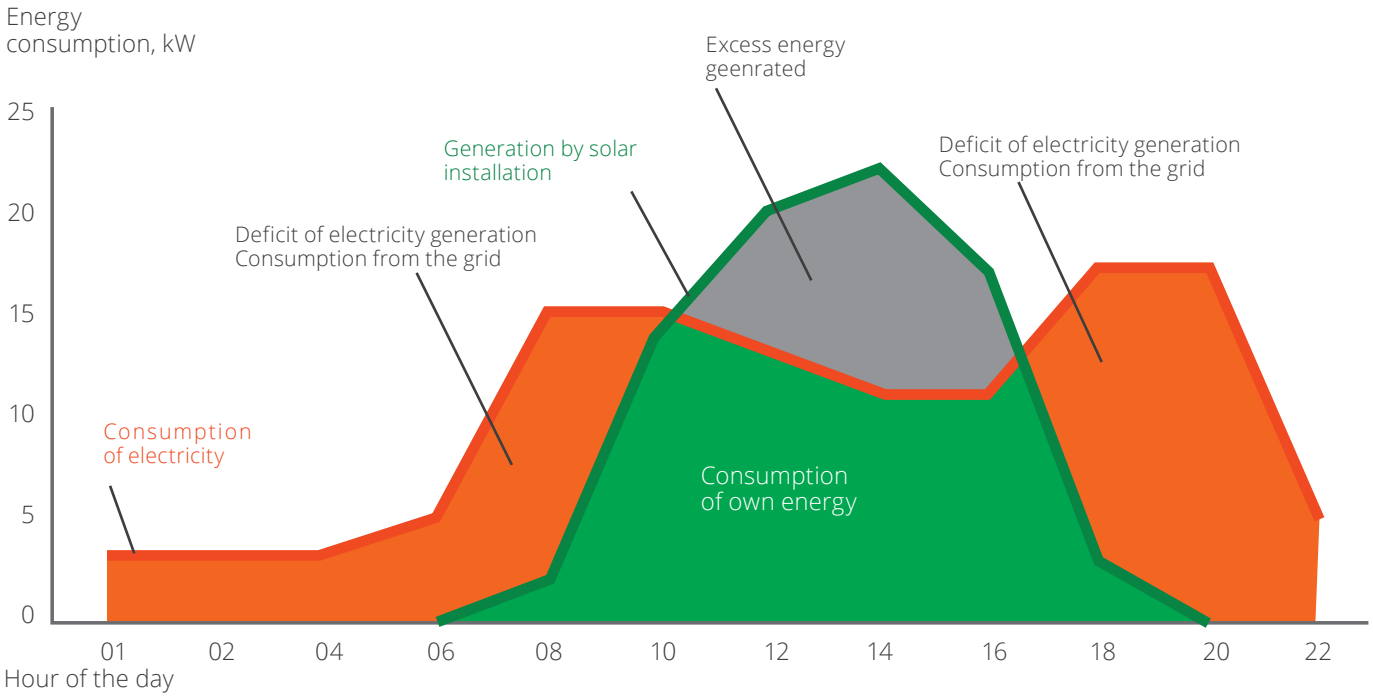
In this guide, we use the term 'self-consumption' in respect of power consumers who only use renewable energy sources for their own needs, without selling power at a feed-in tariff or enjoying any other form of government support.

Please note that we have not analysed in detail the use of battery storage for such projects. The market for this technology has not yet been established in Ukraine, and there is no appropriate regulatory framework that would allow for assessing their prospects from a perspective of RES-based self-consumption projects.

Ukrainian law allows households or businesses to consume electricity produced within their own networks without any restrictions provided that the power produced is not supplied to the national grid. Actually, this means that the patterns of generation and consumption should match as close as possible to ensure that RES generation is used efficiently.

This , however, is often impossible to achieve in practice. The patterns of solar and wind generation can fluctuate significantly throughout the day depending on the season and weather conditions. For instance, Figure 3 reflects a common situation for many consumers.

Figure 3.
Comparison between the daily patterns of solar generation and consumption by businesses or households



Without battery storage the problem of overgeneration can be solved in two ways:

1) to set the generating capacity of the plant at an optimal level that will cover only part of your power needs and allow for the consumption of 100% of the produced solar or wind power; or

2) to install equipment that will limit power output if your RES installation, when it generates more power than can be consumed. The quantities of power so limited will be lost in this case.

Households using RES (solar or wind power plants) to cover their electricity needs

For the time being, more than 27,000 Ukrainians have installed solar power plants in their households, which sell electricity to the grid at the feed-in tariff and are listed in registries. On the other hand, the exact number of power plants generating electricity for self-consumption is impossible to determine due to lack of data. Usually, these are low-power systems that comprise batteries and are used as stand-alone or back-up plants in cases where the owner does not have reliable access to the national grid.

The economic factor is critical, as it prevents households from installing such systems. As household electricity tariffs have been artificially kept low, the payback period of such plants is measured in decades. On the other hand, as tariffs increase and equipment cost decreases, these projects will become economically viable in the near future.

The need to supply electricity to remote facilities (such as country houses or cottages), for which connection to the grid is technically impossible or prohibitively expensive, is often a reason for installing stand-alone RES plants. In this case, stand-alone solar or wind power plants (or hybrid ones) would be a good alternative to generation with the use of fossil fuels.

Stand-alone and hybrid facilities can also provide the required electricity supply parameters for homeowners in areas with unstable power supply.

Businesses using RES to cover their own electricity needs

In the long run, such projects may show the greatest growth among all segments of the renewable power sector.

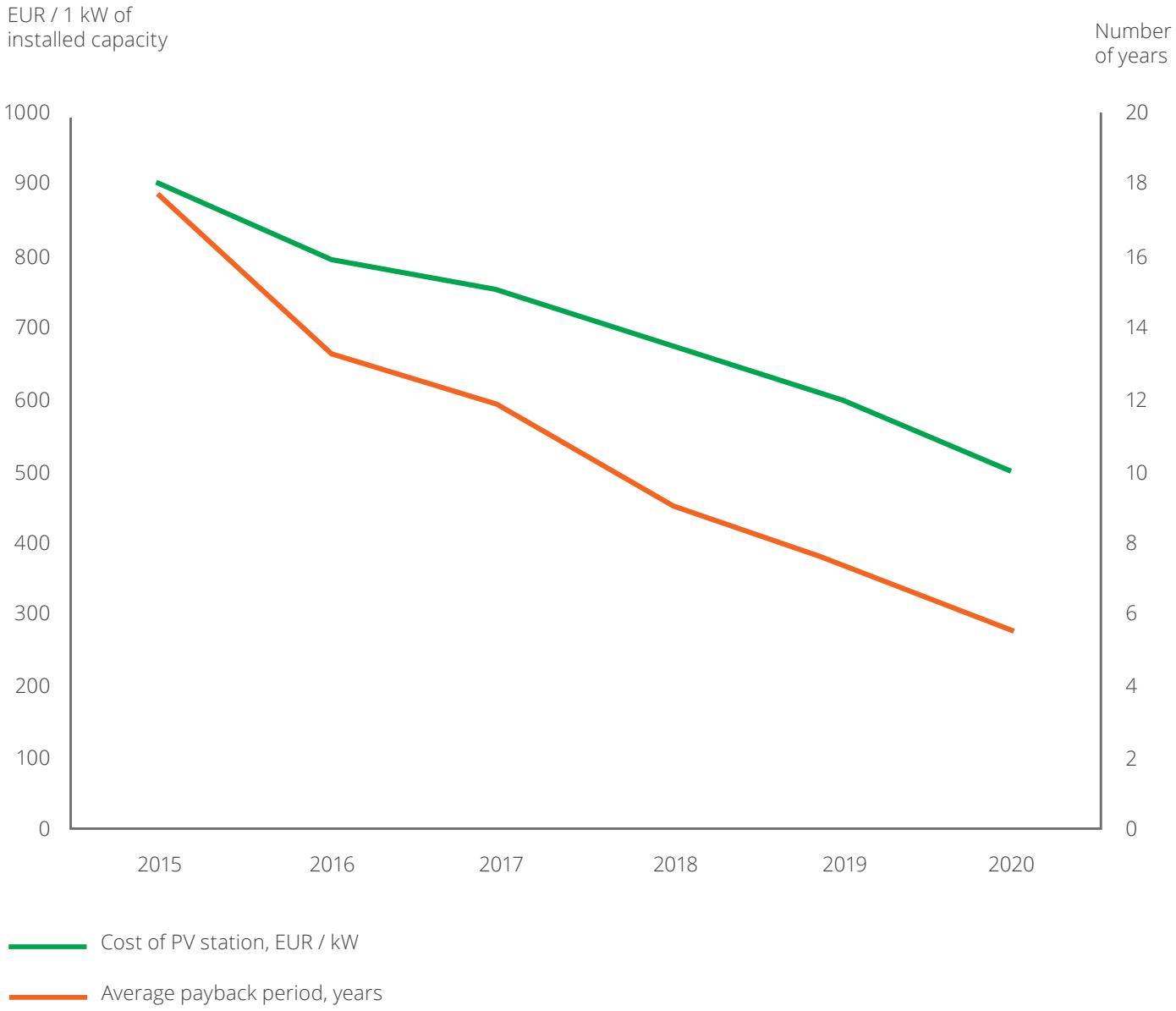
Each technology has its own reasons for active development. In the case of solar plants, now such reasons relate to the economic factor. If previously their development was constrained by low electricity tariffs and the high cost of generating equipment, now this gap has significantly decreased.

In many cases, provided that all the generated quantities are self-consumed, a company can now have return on its investment in a solar power plant in five to six years.

The wind generation also demonstrates a continuous decrease in the cost of equipment. In addition, the recent years have seen an increased number of projects involving previously used and refurbished wind turbines.

The use of bio-power installations for self-consumption offers additional benefits to their owners. In addition to the electricity required to cover the needs of the company, they produce thermal power and organic fertilizers that can be used for agricultural production or sold. Bio-power also helps companies solve problems with the disposal of agricultural and processing wastes.

Figure 4.
Reduction of the payback period for commercial SPPs in Ukraine and decrease in equipment cost from 2015 to 2020.



Example

A Kyiv-based manufacturing business has relatively stable power consumption patterns and its required power supply capacity has been never below 100 kW between 7:00 am to 10:00 pm. By installing a 100-kW solar power plant at the roof of its building this enterprise can ensure 100% self-consumption of electricity produced. (Table 3)

Table 3.
Project's performance indicators

Cost of the SPP, Euro*	50 000
Annual generation, kWh (in Kyiv)	110 000
Commercial tariff, kopiikas/kWh	270
Annual savings, UAH	297 000
Annual savings, Euro***	9 000
Average payback period, years	5,56
Cost of 1 kWh generated by the SPP, kopiikas****	76

* Average price for SPPs in Ukraine as of the end of 2020.
** Average commercial tariff as of October 2020.
*** at the exchange rate set by the NBU as of 26 October 2020.
**** a 2-year estimated period of operation of the solar power plant.

Advantages offered by RES from a perspective of commercial self-consumption:

— economic viability — investments in projects may be recouped as early as in five years;

— the company controls its bills — stable power costs over 15 to 20 years;

— the power is consumed close to the place of its production — lower transmission and distribution losses.

Mechanisms expected to become available in the near future

Renewable energy auctions

As clean energy markets 'mature' and prices for equipment decrease, many countries are shifting to the methods of RES support that involve more competition between market participants. One of such methods is known as the renewable energy auctions.

This mechanism is primarily implemented in the following manner. First, the government announces an aggregate capacity of new facilities to be offered to companies wishing to invest in RES projects. Sometimes, this quota is broken down by technologies or regions. In turn, the companies submit their bids that include information on the capacity of future facilities and the price at which they are willing to sell electricity to the government. Relevant government authorities examine these bids on the basis of the prices so offered and other criteria. The winning bidders are those who have offered the lowest electricity price (the auction bid price), at which they are willing to produce and sell power to the grid, and have satisfied other selection criteria.

The winning bidders become entitled to government support and sign long term (usually, for 15 to 20 years) power purchase agreements (PPAs) with the government.

Such mechanism as auctions is very flexible, as it can be structured and adapted depending on the needs of the grid in a given period. Quotas may be distributed between regions to promote the development of RES in places where they are missing or to regulate the distribution of capacities of various technologies (solar, wind or bio-power) within the limits of an overall quota. This allows the government to respond to fluctuating operational conditions of the grid through a better planning of its development.

The main advantage of RES auctions relates to their ability to create competition between investors and to provide incentives to the companies that offer the lowest prices for their electricity.

In the world

According to the International Renewable Energy Agency (IRENA), 55 countries conducted RES auctions in 2017 to 2018. During its entire history, this incentive mechanism has been used in 106 countries.[18] Auctions have certain aspects determined by the structure of a given electricity market and the goals of a certain country. In particular, they are broken down by technologies, their frequency, restrictions on overall or special quotas, etc.

In Ukraine

In 2019 to 2020, Ukraine passed legislative amendments[20] regarding the operation of the renewable power market. Instead of the feed-in tariff, the new legislation introduces auction prices for electricity produced by solar facilities with a capacity over 1 MW and by wind generation installations with a capacity higher than 5 MW. Other types of RES (small hydro power, bio-power) remain part of the feed-in tariff system, but they may participate in auctions in the future.

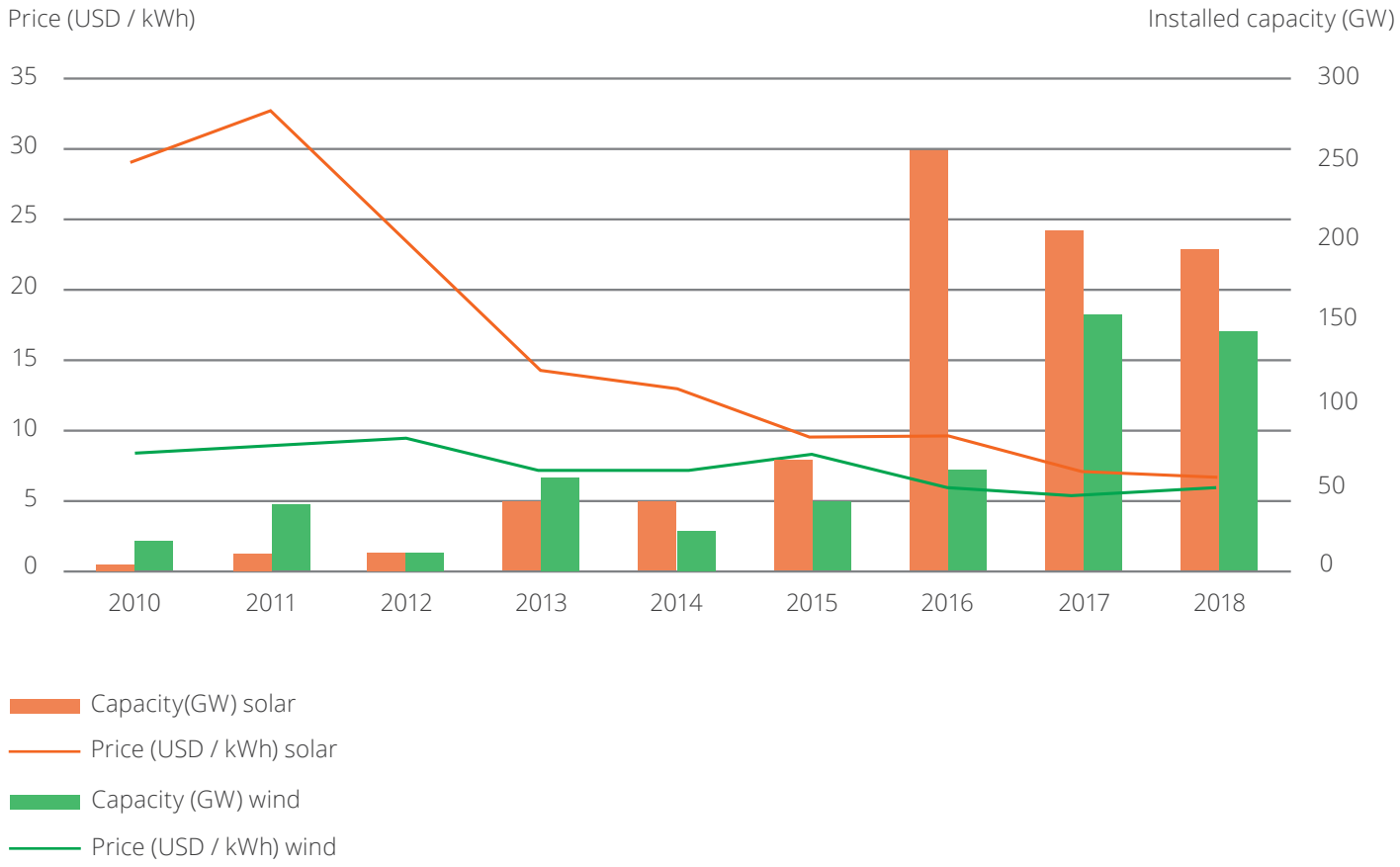
On the other hand, the law provides that the highest auction price may not exceed the effective feed-in tariff. This secures the required reduction of prices for 'green' power in the future.

The winning bidder for solar facilities is required to complete construction works and to have the facility commissioned within two years.

[18] IRENA. Renewable energy auctions: Status and trends beyond price. URL: https://irena.org/publications/2019/Dec/Renewable-energy-auctions-Status-and-trends-beyond-price

[20] Ukrainian Act No. 2712-VIII, dated 25 April 2019. URL: https://zakon.rada.gov.ua/laws/show/2712-19#Text

Figure 5.
Global prices and capacity resulting from RES auctions, 2010-2018[19]



The winning bidders for other RES facilities are required to do so within three years. After construction of the RES facility is completed, the investor enjoys the government-guaranteed purchase of electricity at the auction price indexed to the Euro over a 20-year period.

It therefore follows that investors willing to enter the 'green' power market should calculate economic performance of a project at the effective feed-in tariff, and then decide as to whether a reduction in their price would be economically viable subject to their own assessments of profitability and a payback period of the project.

The new legislation offers two undeniable advantages to investors. The first advantage is that the period of the government guaranteed purchase of electricity is set at 20 years. This is more than 10 years longer than the feed-in tariff term, which will remain in effect until 2030. Second, the investor gets the government guaranteed purchase of electricity at the auction price before the commencement of construction of the facility applying for government support, unlike in the case of the feed-in tariff, when such guarantees become available after the construction of the facility.

To participate in an auction, an investor is required to provide:

1. an irrevocable bank guarantee issued in for the guaranteed buyer. The value of the bank guarantee is set at EUR 5 per 1 kW of the capacity of the facility applying for government support;

2. a copy of the grid connection agreement for the facility;

3. copies of the documents evidencing the title to, or the right to use, the land plot.

[19] IRENA. Renewable energy auctions: Status and trends beyond price. URL: https://www.irena.org/publications/2019/Dec/Renewable-energy-auctions-Status-and-trends-beyond-price

The auction-based model of implementing projects offers a number of important advantages to investors, such as:

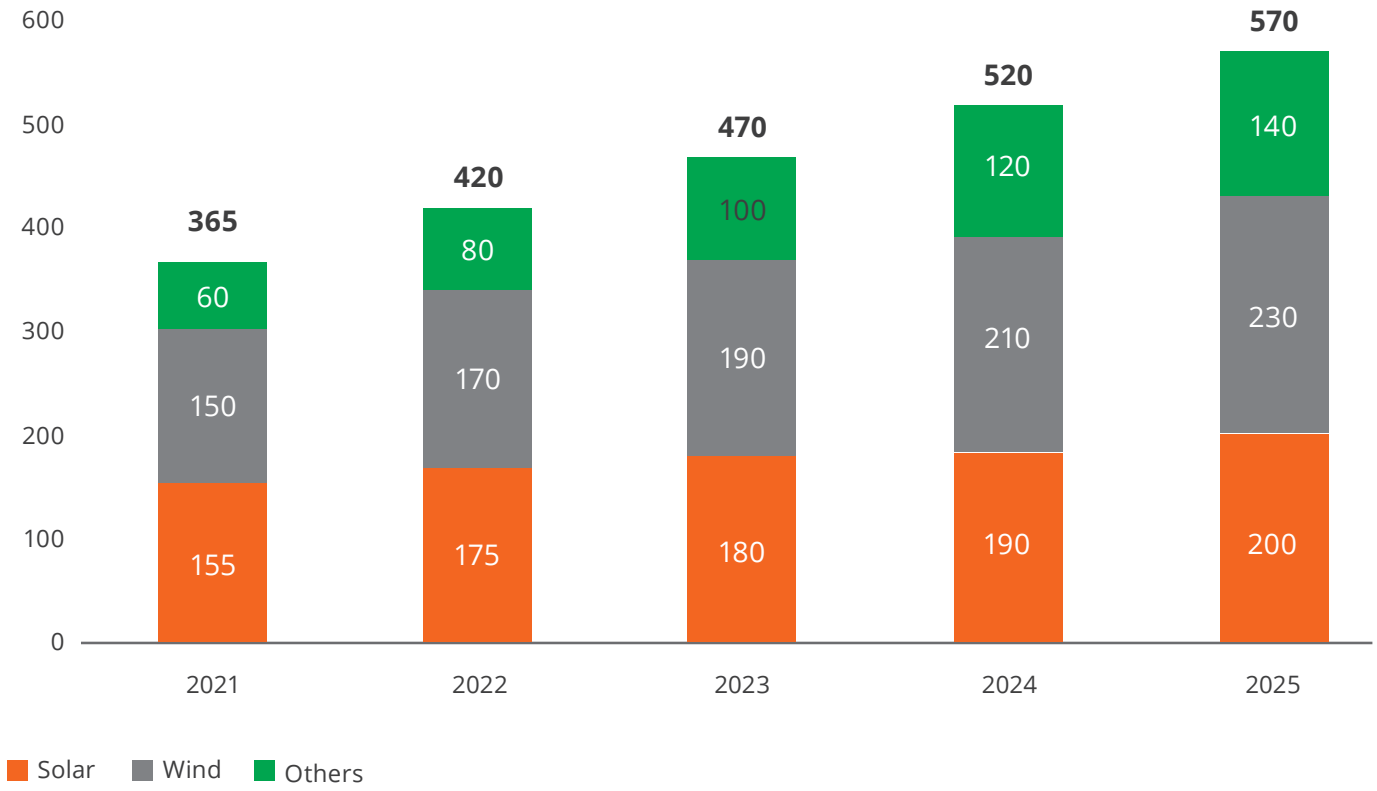
— the availability of a fixed auction price for 'green' electricity for a 20-year period effective from the commissioning date of the facility. This period is sufficient to not only recoup their investment but also to earn income. It is important to note that the feed-in tariff will only be available until 2030.

— the winning bidder enjoys government support in the form of the auction price prior to the construction of the RES facility. The existing feed-in tariff system provides for the receipt of such support only after the construction of the RES facility, i.e. after the investment is made. It is not infrequently that in the case of improper execution of the documents and failure to comply with the procedures the investors are not able to enjoy the feed-in tariff after the construction of the RES facility.

— the guaranteed purchase from the winning bidders of the entire quantity of electricity supplied at the auction price. Though, following an auction, such price is lower than the feed-in tariff, the actual fixed auction price will in the medium term may exceed the future feed-in tariffs, which are cut for new RES facilities every year.

At the end of 2020, the Ministry of Energy presented draft quotas to support the production of electricity from renewable sources, the auction schedule for 2021 and indicative forecasts for annual support quotas in 2022 to 2025. Details of the proposal are available at the website of the Ministry of Energy.[21]

Figure 6.
Ministry of Energy's annual support quota for 2021 and indicative forecasts for the period 2020 to 2025.



[21] URL: http://mpe.kmu.gov.ua/minugol/control/publish/article?art_id=245495260

Figure 7.
Auction schedule for 2021.

Type	Type	Jan.	Feb.	Mar.	Apr.	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	General					50					50		100
Solar	up to 1 MW **									5			5
	Regional***									50			50
Wind	General					50					100		150
Others	General****									60			60
						100				115	150		365

* The first (pilot) auctions, acquaintance of investors with the procedure.
** Promotion of the development of small solar distributed generation. The total installed capacity of up to 1 MW – 152 MW. Number of installations 394. The average capacity 0,38 MW.
*** Separate auction in energy-surplus regions: Zhytomyr, Poltava, Kharkiv, Chernihiv, Sumy, Cherkasy, Kirovohrad, Kyiv regions and in Kyiv.
**** Interest in the development of biopower and small hydro (capacity of bioenergy facilities is currently 194 MW, small hydro – 116 MW). Lack of demand does not allow to offer a larger quota (pre-PPA agreements for bioenergy facilities concluded at only 76 MW). The proposed quota of 60 MW per year is one third of the total installed capacity of bioenergy facilities in 10 years. Given that the preparation of biopower and small hydro projects take time, the auction has been postponed to autumn. Based on the results of the actual demand at auctions, decisions will be made on the future annual support quota and auction schedule for 2022.

What projects are eligible for the use of the mechanism?

— commercial SPPs — biogas installations — geothermal power

— commercial WPPs — biomass installations

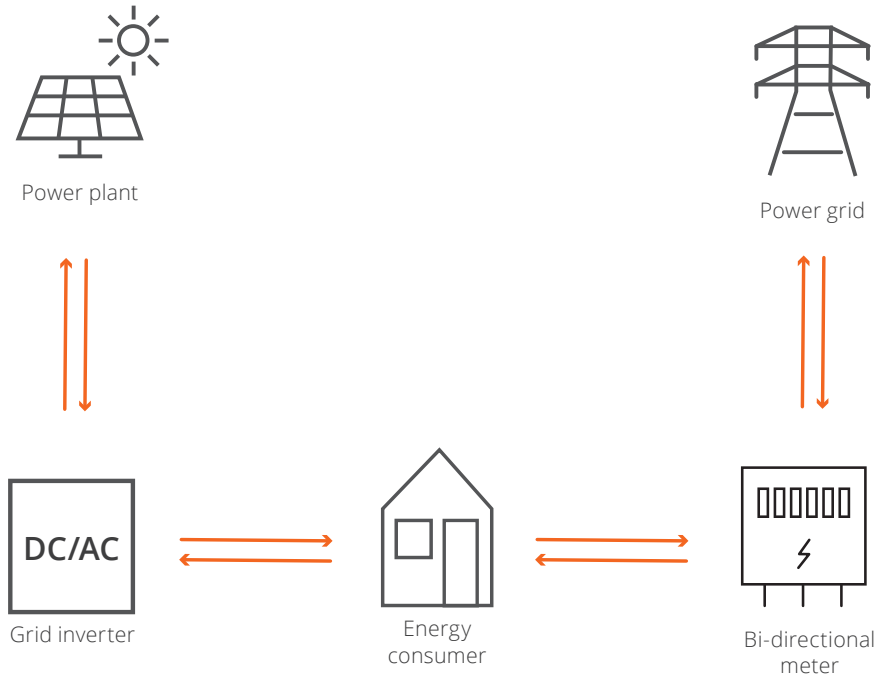
Net metering

The net metering mechanism allows the owners of RES facilities to use the grid to store surplus generated power for a long time and to consume it later, as needed.

A correct calculation of the parameters of the power plant allows to produce enough energy to cover annual needs. However, the generation of solar power, for instance, will fluctuate throughout the year. The clean metering mechanism allows you to take this difference into account and use it to compensate for your consumption.

If your power plant generates more power than you consume, the surplus quantity is supplied to the grid and metered accordingly. In the periods when you consume more power than you produce, you take power from the grid, which is, however, compensated by the quantities you have earlier supplied.

Figure 8.
Net metering mechanism



How does the net metering mechanism operate in the case of household solar power plants?

Most solar power plants generate the largest quantities of electricity at noon. But it is at this time that household consumption is low, as most household members are at work, school, kindergarten, etc. Generally, household consumption reaches its peak in the mornings and evenings. The net metering allows solving the problem of a difference between consumption and generation.

Surplus quantities of electricity are supplied to the national grid if you generate more power than you consume. When your power plant does not generate enough electricity, you can take the necessary quantity from the grid.

At the end of each billing period (usually, a month or a year), you receive a bill specifying the quantities taken from, and supplied to, the grid, and a difference between such quantities. If you have generated more electricity than you have consumed, this quantity will be included in the next billing period. If the opposite is true — your consumption exceeds your generation – you have to pay for it at market prices.

How does the net metering mechanism operate in the case of commercial solar power plants?

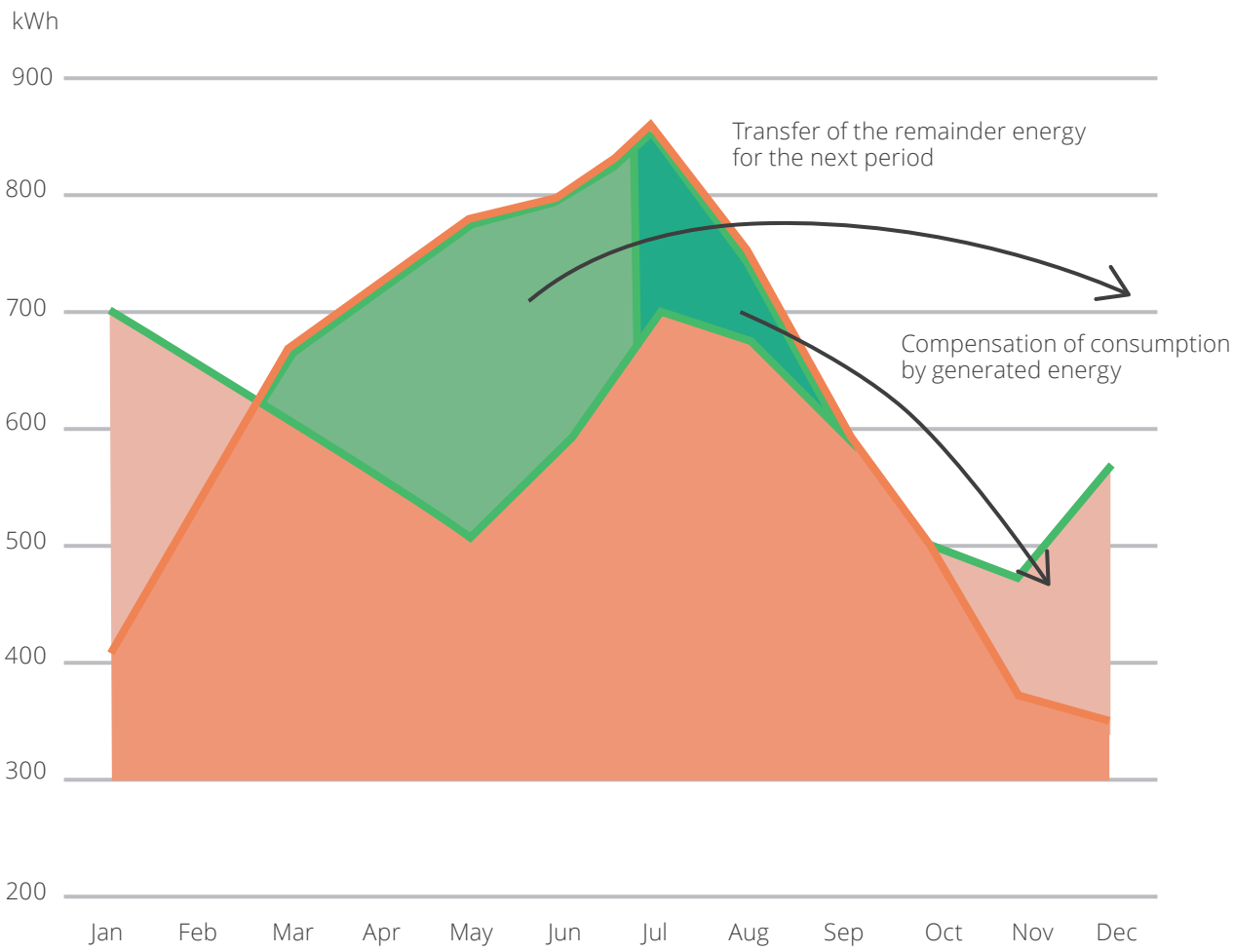
Net power metering can also be used for commercial electricity consumers — industrial companies, office centres, shops, institutions, etc.

The main difference from households is that the power consumption patterns of companies can vary radically from constantly stable to continuously changing.

It is important to note that the principles of operation of the mechanism remain unchanged irrespective of power consumption patterns.

Figure 9.
Balancing power consumption with the use of net metering

How net metering helps balance your energy consumption



Household energy consumption

Solar energy generation

More electricity is produced than consumed. The rest of the energy is given to the grid

More electricity is consumed than produced. Energy is consumed from the grid

Energy is produced and consumed for own needs

In the world

Net metering is one of the most popular ways for accounting of power produced from RES in the world, especially when it comes to small facilities. The United States and Western Europe started applying this method as early as in the 1970s. Today, 70 countries use this mechanism.

In Ukraine

As of the end of 2020, there was no legal or regulatory framework in Ukraine that would govern the application of netmetering. It should, however, be noted that the existing feed-in tariff available to households is, in fact, similar to a form of net metering — net billing.

According to estimates by the State Agency for Energy Efficiency and Energy Saving of Ukraine (State Agency for Energy Efficiency – SAEE)[22], the market potential for the use of net metering in Ukraine is impressive.

This is why the State Agency for Energy Efficiency and Energy Saving develops, in cooperation with other stakeholders, drafts of legislation that will enable the launching of the net metering mechanism in the near future.

Figure 10.
Market potential

Market potential of net metering implementation	
380 598 enterprises **78,293** electricity consumption, bln kWh / year	**6,5 million** households **19,5** electricity consumption, bln kWh / year
Potential to replace the energy received from the grid with the energy of own production from renewable sources	
16 bln kWh / year Which can generate either 16 GW solar, or 5.5 GW wind	**6** bln kWh / year Which can generate either 6 GW solar, or 2 GW wind

[22] Webinar titled 'How can the EU's 4th Energy Package can be applied for the development of small RES generation in Ukraine?' URL: https://www.facebook.com/watch/?v=3603278519724941

Corporate power purchase agreements (corporate PPAs)

The renewable energy sector development experience in Europe and the United States shows that the countries are gradually shifting from the feed-in tariff-based system of support for RES producers to more competitive support mechanisms, such as auctions and corporate electricity purchase agreements (the so-called 'corporate power purchase agreements' or 'corporate PPAs').

Corporate PPAs are long-term agreements for the purchase of power produced from RES, under which the purchaser of the power is not a designated state-owned enterprise (like Guaranteed Buyer State Enterprise in Ukraine at this point) but a private company.[23]

There are different types of corporate PPAs, each of which has its own implementation prospects in Ukraine.

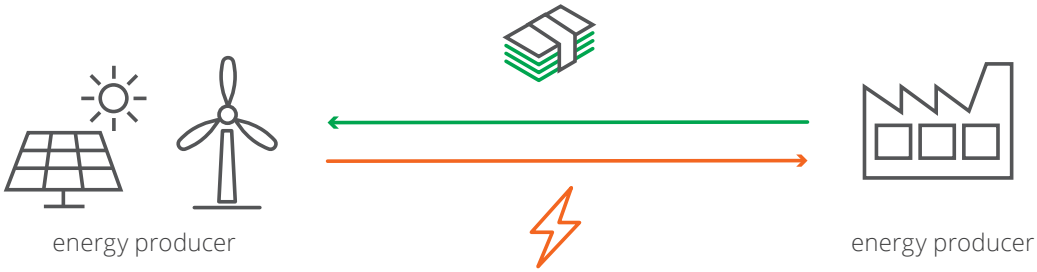
Physical corporate PPAs

Under a physical corporate PPA, a company purchases power directly from a RES producer if its power plant is located directly next to the corporate purchaser's facilities. An analysis of the mechanism of physical corporate PPAs is set forth below.

1) The purchaser and the RES producer fix a price for electricity produced for the entire term of the agreement (usually, for 10 to 15 years).

2) The owner of the power plant produces and supplies power, using its own networks, directly to the purchaser's place of consumption. Importantly, this process takes place without the involvement of the grid operator. This is possible due to the power plant's location in close proximity to the place of power consumption.

Figure 11.
Physical corporate PPAs



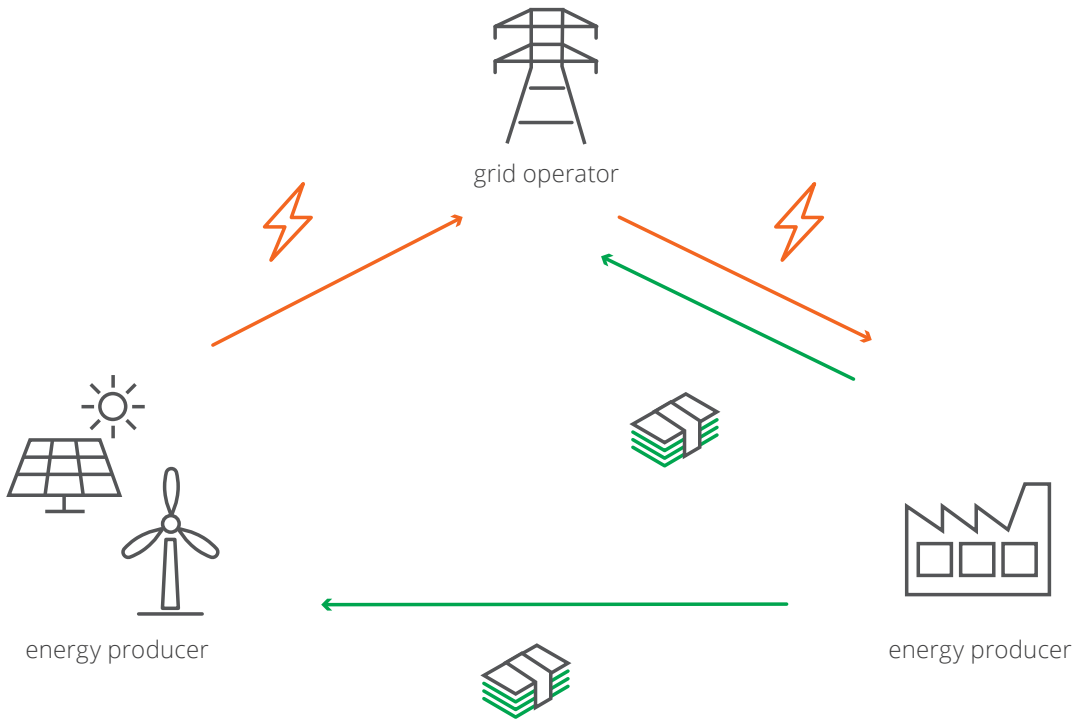
[23] Vitalii Radchenko, Kateryna Korneliuk, Maryna Ilchuk. Corporate PPAs: on the way toward implementation in Ukraine URL: https://getmarket.com.ua/ua/news/korporativni-rra-na-shlyahu-do-vprovadzhennya-v-ukrayini

Sleeved PPAs

If a consumer is not located near the facilities of a power producer and the consumer's transmission lines cannot directly be connected to the producer's network, then there will be a need to involve the grid operator as an intermediary. In this case, the grid operator will receive a fee for the physical transmission of the power between the companies. The grid operator provides a 'sleeve' that makes it possible to exchange the power between producer and consumer, hence the name of this type of PPAs.

Under this scheme, settlements in respect of the power produced will, however, take place directly between the RES producer and the corporate consumer.

Figure 12.
Sleeved PPAs

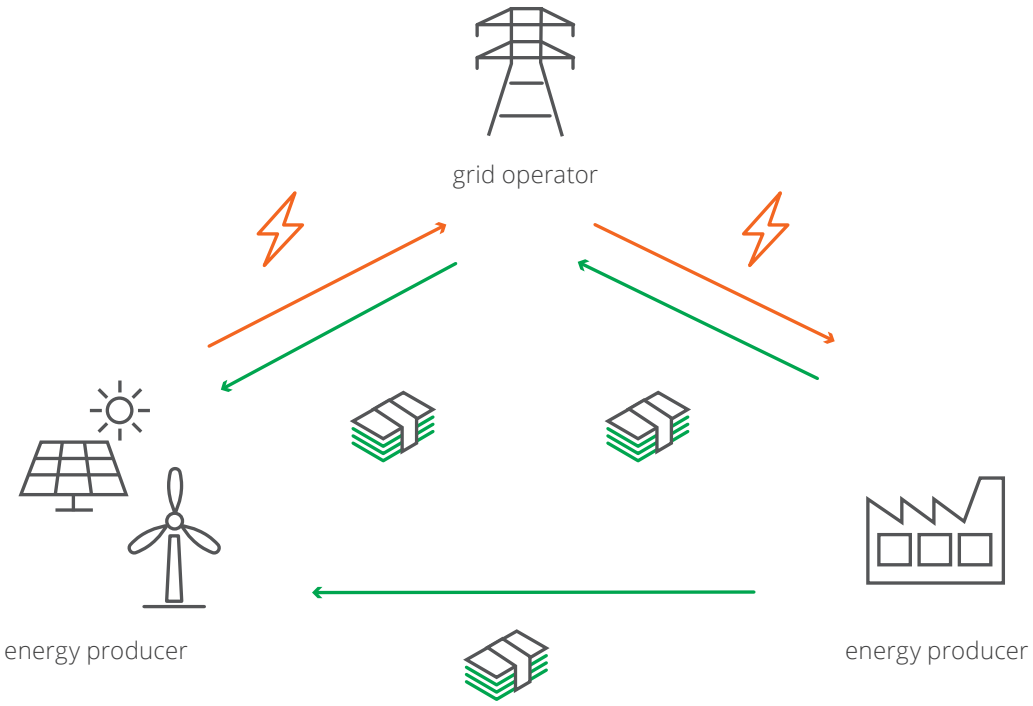


Synthetic or virtual PPAs

This financial instrument (which, in fact, is a form of hedging[24]) is used in many mature RES markets. The parties (a RES producer and a power consumer) each individually purchase and sell electricity in a market at market prices but additionally enter into a contract containing certain arrangements in respect of prices. A virtual PPA can be structured, among other things, through executing contracts for difference, the mechanism of which is described below. Under such an agreement, the parties negotiate a price of electricity and, when required, make settlements, depending on the dynamics of market prices. This allows both the RES producer and the corporate consumer to be confident of a stable electricity price throughout the term of the contract for difference.

[24] An agreement that provides for mutual obligations of its parties and aims to avoid risks or maintain them at an acceptable level. Hedging instruments available in a stock market are derivatives, including forwards, options or futures.

Figure 13.
Synthetic/virtual PPAs



Advantages offered by corporate PPAs:

1. Reduced financial risks

Ukrainian RES producers sell electricity directly to SE 'Guaranteed Buyer', which already owes significant amounts of money to them. In the case of corporate PPAs, RES producers interact directly with consumers. In other words, the producers will immediately receive funds paid for the electricity and, depending on the aspects of their contracts, may receive additional remuneration from the government. It therefore follows that this market instrument is less risky for RES producers from a financial point of view.

2. Stability and predictability

The multinational experience of executing corporate PPAs demonstrates that they are, generally, entered into for 10 to 15 years and are, therefore, long-term contracts. This allows the parties to plan their activities with the purchaser enjoying a stable electricity price and the RES producer receiving a stable income.

3. Brand name and sustainable development

To comply with their sustainable development commitments and to achieve their decarbonisation targets, many countries enact laws that require that a certain percentage of electricity consumed by companies and businesses should be 'green'. Such regulation encourages companies to either start generating 'green' electricity themselves or look for RES producers in the market and conclude corporate PPAs with them. In most countries, such as the United Kingdom, Germany or Norway, it is possible to conclude various PPAs with private companies and to participate in auctions for the signing of PPAs with the government. There are also a number of companies that have internally decided to switch to 'green' power supply in their activities.

In the world

Today, large corporations operating around the world, including hi-tech companies, implement development policies and strategies based on social responsibility and environmental conservation. The consumption of 'green' power has become common practice in their day-to-day activities.

For example, Apple has committed to become 100 percent carbon neutral or to fully offset its carbon emissions by 2030[25] and plans to purchase electricity for its own offices and outlets only from RES producers. In addition, the company requires that its suppliers and contractors (including factories manufacturing components used in Apple's products and located around the world) use renewable energy. This encouraged the introduction of corporate PPAs in Taiwan and resulted in the signing by a micro-processor manufacturer (an Apple supplier) of the largest-ever 20-year contract for the purchase of the entire quantity of electricity generated by a new offshore wind power plant, which construction is in progress near the coast of Taiwan.[26] Other large corporations, such as Walmart[27], Amazon[28], Target[29], and Google[30], set very ambitious renewable energy goals, too.

The global corporate PPAs market has grown significantly over the past few years. In 2019 alone, corporations signed PPAs for a total capacity of 19.5 GW, according to Bloomberg NEF[31]. Global dynamics for the generating capacities, in respect of which PPAs were signed in the period from 2009 to 2019, can be seen at Figure 14 with breakdown by regions.

In Ukraine

For the time being, Ukrainian law does not provide necessary specific regulation of corporate PPAs from a perspective of RES projects. Their implementation requires certain regulatory amendments that are described in more detail in the Recommendations section.

[25] Apple commits to be 100 percent carbon neutral for its supply chain and products by 2030. URL: https://www.apple.com/newsroom/2020/07/apple-commits-to-be-100-percent-carbon-neutral-for-its-supply-chain-and-products-by-2030/

[26] Greentech Media. Microchip Giant TSMC Signs 'World's Largest' Corporate Renewables Deal — for Offshore Wind. URL: https://www.greentechmedia.com/articles/read/orsted-signs-worlds-largest-corporate-ppa

[27] Solar Power World. Walmart plans to go 100% renewable by 2035. URL: https://www.solarpowerworldonline.com/2020/09/walmart-plans-to-go-100-renewable-by-2035/

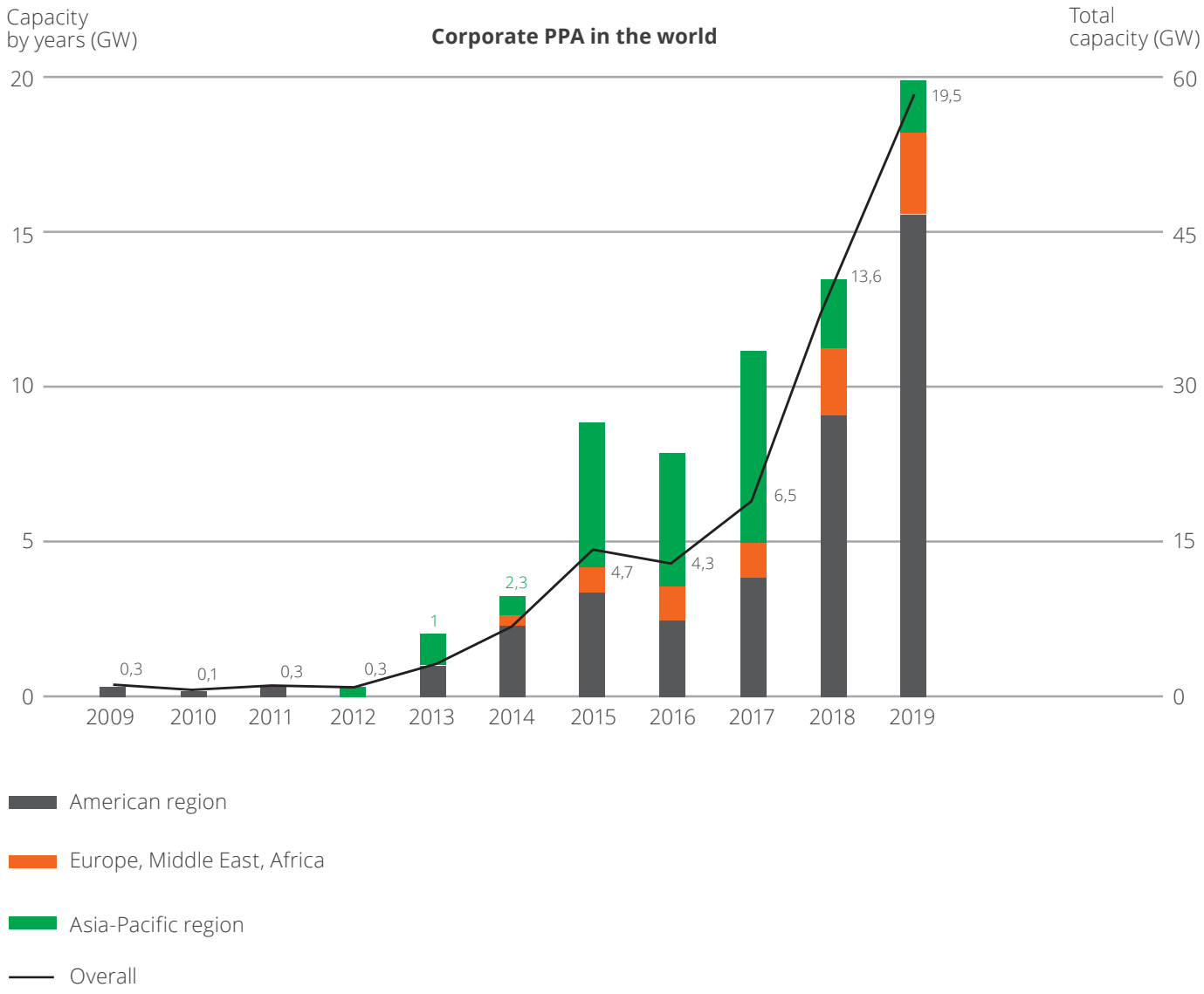
[28] Amazon. Renewable Energy. URL: https://sustainability.aboutamazon.com/environment/sustainable-operations/renewable-energy?energyType=true

[29] Target.com. Target's Renewable Electricity Goal Makes Way For a Brighter Future. URL: https://corporate.target.com/article/2019/06/renewable-electricity

[30] Google. 100% renewable is just the beginning. URL: https://sustainability.google/progress/projects/announcement-100/

[31] Bloomberg NEF New Energy Outlook 2020. URL: https://about.bnef.com/

Figure 14.
Dynamics of the global growth in the quantity of corporate PPAs signed[32]



What projects are eligible for the use of the mechanism?

— commercial SPPs
— commercial WPPs
— biogas installations
— biomass installations
— geothermal power

[32] Bloomberg NEF New Energy Outlook 2020. URL: https://about.bnef.com/

Feed-in premiums

Under this mechanism, RES producers sell power in the market according to general rules but additionally receive a premium for each kilowatt-hour sold. Feed-in premiums can be either fixed or sliding.

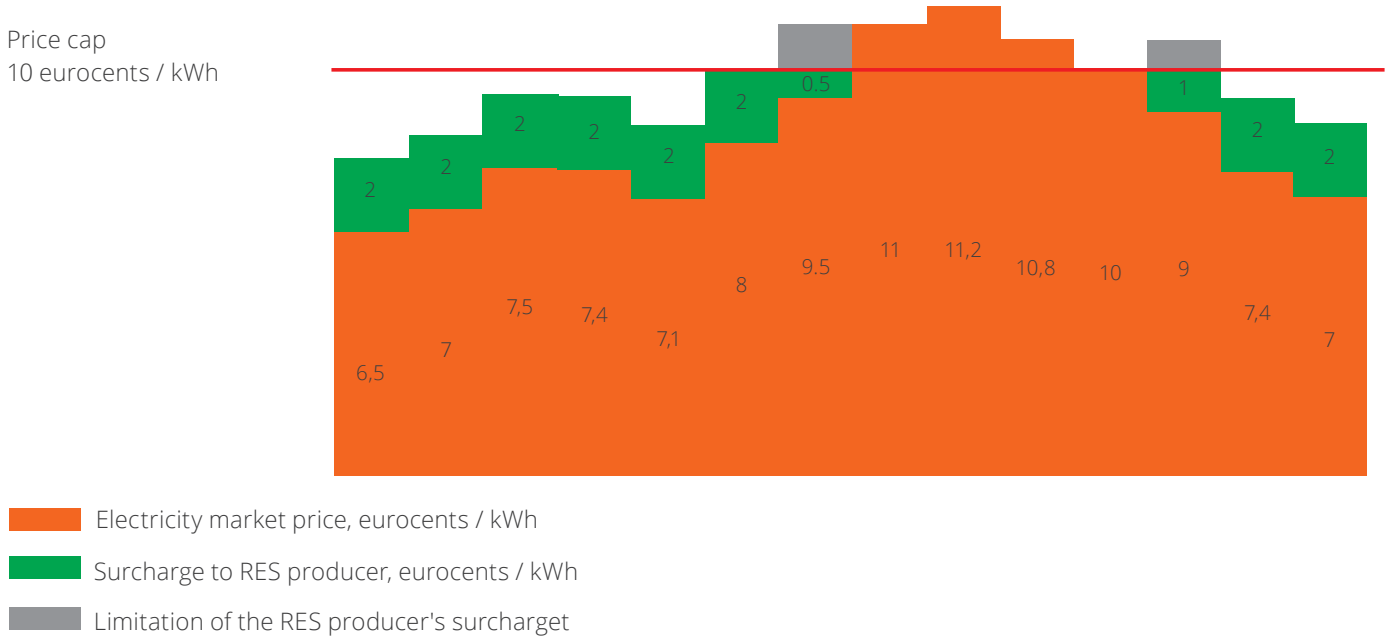
They are a fairly flexible mechanism. Similarly to the feed-in tariff, it can be adjusted according to a power generation technology. Extra premiums can be set for certain technologies to promote their development. In addition, premiums can be gradually reduced after the lapse of a certain period.

Fixed feed-in premiums are a simpler mechanism and can therefore be implemented easier. But there is a risk of 'overcompensation' in the case of high prices in the energy market or a risk of 'undercompensation' if market prices, on the contrary, are lower than expected. That is why fixed premiums are often supplemented by a predetermined maximum and/or minimum rate of the premium itself or a general resulting pricefor the producer.

Example

A wind power producer becomes entitled to a feed-in premium on a market price for electricity sold.
Premium rate: 2 Eurocents/kWh
Market price + premiums limit – 10 Eurocents/kWh.

Figure 15.
Adjusted fixed premium mechanism



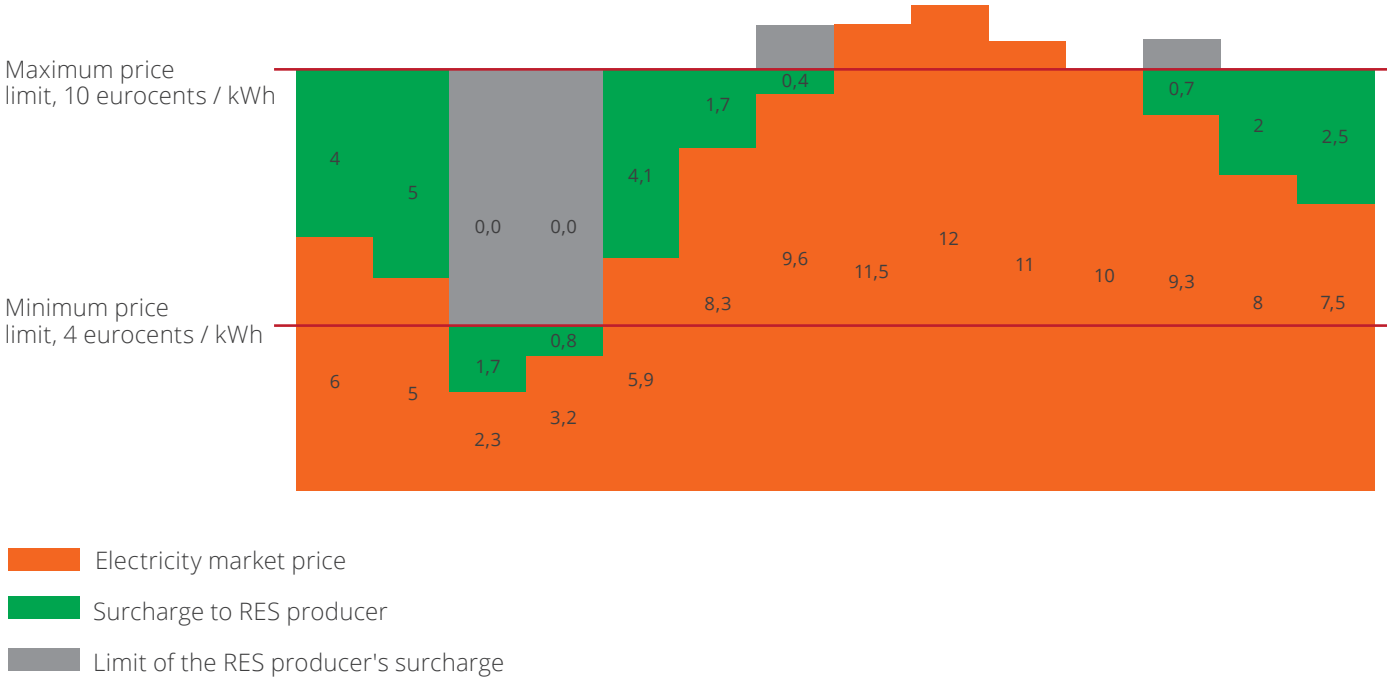
Sliding feed-in premiums are always calculated using an algorithm that factors a difference between market prices (sometimes with a breakdown by technologies) over a certain period of time and a predetermined tariff. The level of such predetermined tariff is often based on the effective feed-in tariff.

If an electricity market price becomes higher than a price limit set, it may occur that a RES producer will not be entitled to any premium. In some cases, minimum price limits are introduced to avoid the payment of too high compensation to producers while guaranteeing them a certain minimum level of income. If the market price falls below a certain level, the RES producer receives a refund to the extent of such decrease.

Thus, a 'price corridor' is shaped, within which fluctuations of 'green' electricity prices are possible.

Example

Figure 16.
Sliding premiums



NB

In contrast to the feed-in tariff, this mechanism allows RES producers to sell power at prices than can be even higher than a fixed maximum price set for their projects. This can happen if the market price becomes higher than this limit.

In the world

Italy[33]

In Italy, RES facilities with a generating capacity over 1 MW are required to sell the entire power produced in the energy market. In addition to the income so derived, they are also entitled to a feed-in premium that equals to a difference between a basic feed-in tariff (which applies to projects with a generating capacity of up to 1 MW) and a market price. It is determined through the calculation of special 'zonal' electricity prices, subject to the regional aspects of supply of, and demand for, electricity. Monthly average zonal prices apply to RES facilities having stable power generation patterns (for example, biogas installations). Hourly prices apply to RES facilities with unstable generation patterns (for example, solar or wind). Feed-in premiums for large projects are determined through auctions conducted by the government.

Spain[34]

This country was a pioneer in the introduction of feed-in premiums in Europe and put them in place in 1998. Producers could choose between the feed-in tariff and fixed premiums payable in addition to a market sale price (except for solar power plants, for which only the feed-in tariff was available). Maximum and minimum compensation levels were introduced a couple of years later to provide a guaranteed income for RES producers. FIPs could be calculated on a monthly or hourly basis. In February 2013, all the premiums were reduced to zero and the mechanism was, in fact, cancelled.

In Ukraine

For the time being, Ukrainian law does not provide for any specific regulation of feed-in premiums for RES projects. Their implementation requires certain regulatory amendments that are described in more detail in the Recommendations section.

What projects are eligible for the use of the mechanism?

— commercial SPPs
— commercial WPPs
— biogas installations
— biomass installations
— geothermal power

[33] RES LEGAL Europe. URL:
http://www.res-legal.eu/search-by-country/italy/single/s/res-e/t/promotion/aid/feed-in-tariff-ii-ritiro-dedicato/lastp/151/

[34] Energypedia. Feed-in Premiums (FIP). URL: https://energypedia.info/wiki/Feed-in_Premiums_(FIP)

Contracts for difference

Under contracts for difference (CFD), 'green' power producers sell electricity at market prices and enter into additional agreements with the government or other market players (consumers, traders or suppliers). According to this mechanism, they will either receive compensation for a difference between a fixed tariff and a real sale price in a market or pay for this difference to the other party.

In the case of contracts between power producers and consumers, a sale price is fixed at a certain level. On the other hand, the producer of green electricity and its buyer each individually sell / purchase power in the market but only compensate each other for a difference between an actual price and the fixed price.

Figure 17.
Contracts for difference between power consumers and producers

The government can be a party to such contracts, too. In this case, contracts for difference take a form of government support for RES producers. In fact, this mechanism is similar to sliding feed-in premiums.

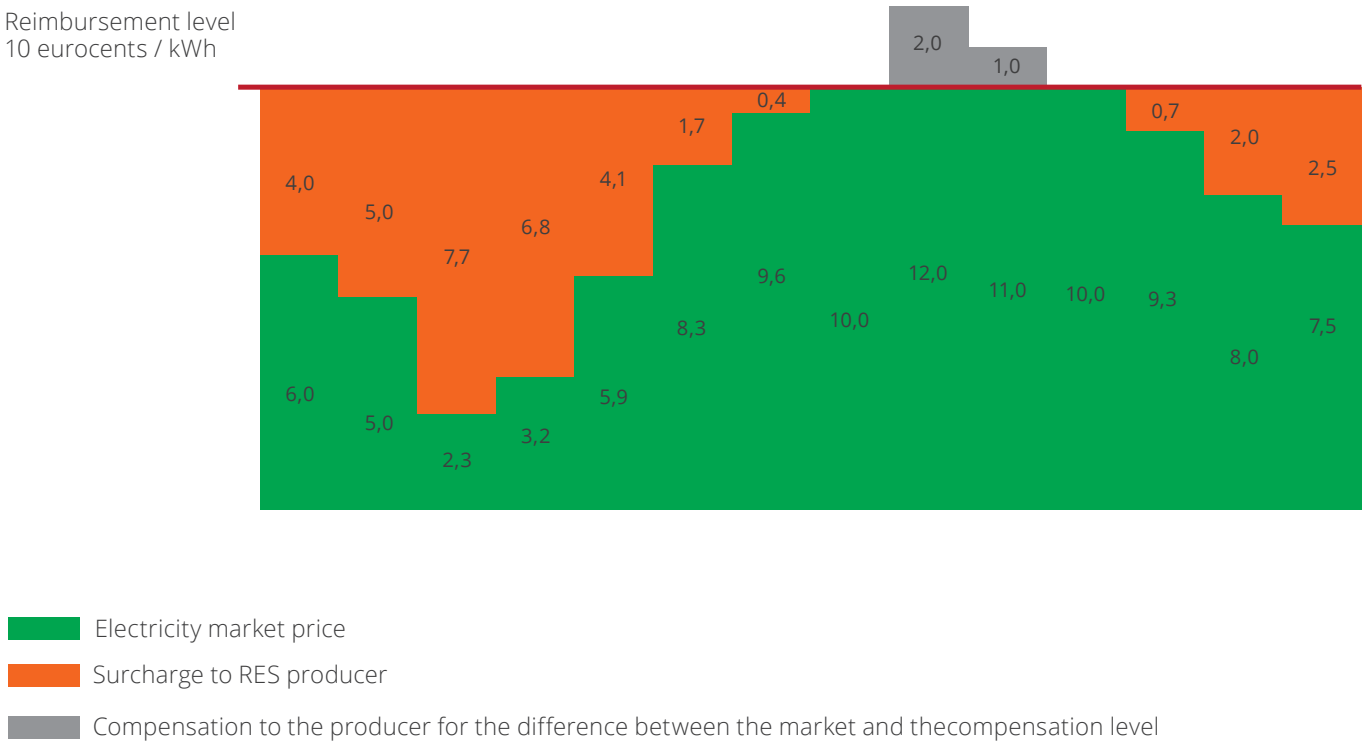
There are three possible scenarios:

1. The market tariff is lower than a compensation level (the producer is paid compensation in the amount of a difference between them);
2. The market tariff equals the compensation level (the producer does not receive compensation);
3. The market tariff exceeds the compensation level (the producer compensates the government for the difference).

Advantages of the mechanism

1. It reduces dependence of RES power producers on government support – only a price premium is guaranteed by the state instead of a full sale price.
2. Increases competition in the electricity market and involves RES producers in all the segments of the electricity market.
3. Promotes development of direct contractual sales of power to consumers. Encourages the businesses community to consume clean energy.

Figure 18.
Contracts for difference between power producers and the government



In the world

The United Kingdom[35]

Contracts for difference have been used in the United Kingdom since 2015. Under this mechanism, RES power producers sign long-term contracts with the state-owned company (Low Carbon Contracts Company). The producers will sell power in the market at common prices for 15 years and will additionally receive compensation for a difference between a fixed price (strike price) and a market price (reference price).

Contracts for difference can equally be combined with auctions. Companies, which compete for government support within quotas set by the government, become entitled to sign contracts for difference. The bidder submitting the lowest fixed power sale price (strike price) signs the contract for difference. The optimal level of costs for support for clean power is therefore maintained.

Albania[36]

The country generates almost all its electricity (95%) from hydro power. To diversify its generation sources and as part of its European integration efforts, in 2017 Albania passed an act introducing contracts for difference, which is similar to the British one (auctions + feed-in premiums). However, another support system, which provides for the use of feed-in tariffs, is available for solar and wind power plants with a generating capacity of up to 2 MW and 3 MW, respectively.

Ukraine

For the time being, Ukrainian law does not provide for any specific regulation of contracts for difference in respect of RES projects. Their implementation requires certain regulatory amendments that are described in more detail in the Recommendations section.

[35] Contracts for Difference. Police Paper. URL: https://www.gov.uk/government/publications/contracts-for-difference/contract-for-difference

[36] National Agency of Natural Resources of Albania. Brochure 2019: Renewable Energy. URL: http://www.akbn.gov.al/wp-content/uploads/2019/06/Renewable-Energy1.pdf

Recommendations

The recommendations provided in this paper relate to legislative and regulatory amendments that are expected to create conditions for the introduction of direct power purchase agreements, feed-in premiums, contracts for difference, net power metering and other support mechanisms for renewable energy projects in Ukraine.

1.To develop and approve a mechanism for RES producers to exit the balancing group of SE 'Guaranteed Buyer'.

Today, RES power producers are part of the balancing group of SE 'Guaranteed Buyer', which is responsible for the imbalances of such producers. However, to ensure an unimpaired operation in different market segments, Ukrainian law provides for a full responsibility for imbalances of electricity market participants.

According to the Ministry of Energy, the government is working to develop legislative amendments to enable renewable power producers to sell electricity in all market segments, including the possible payment to such producers of compensation for a difference in a price of electricity sold in the future. It is expected that the bill will be developed and introduced to the Ukrainian Parliament (the Verkhovna Rada) in 2021.

2. To issue the guarantees of origin of electricity for producers.

These guarantees are widely used in foreign countries to certify that electricity has been generated from RES in the case of its sale under bilateral agreements or in other market segments. The relevant regulation, under which the State Agency for Energy Efficiency is required to issue such guarantees, was passed as early as in 2013. However, this has proved to be impossible in practice, as there is no technical possibility to issue the guarantees (the necessary registry does not work).

3. To provide the regulation of the virtual PPAs market.

The peculiarity of virtual PPAs (and their derivatives – contracts for difference) is that there is, virtually, no physical exchange of the commodity – electricity. They are financial instruments – derivatives. Today, there is no established market for financial derivative products in Ukraine. Recently passed Ukrainian Act No. 738-IX, amending certain legislative acts of Ukraine to facilitate the attraction of investments and the introduction of new financial instruments, is expected to provide the regulation of this market over the next few years. Whether it succeeds, will depend on the proper implementation and enforcement of secondary legislation by the National Securities and Stock Market Commission.

4. To develop and to pass legislative and regulatory acts that will allow for introduction of the net metering mechanism

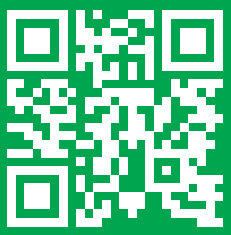
(net power consumption metering). Meanwhile, activists, experts, and representatives of the business community should inform the government about the importance of this mechanism for the further development of the renewable power sector in Ukraine.

5. The Cabinet of Ministers of Ukraine should determine support quotas for RES projects at auctionst pursuant to Act No. 2712-VIII 'On amending certain legislative acts of Ukraine to provide competitive conditions for the production of power from alternative energy sources' dated 25 April 2019. This Act provides, among other things, that auctions will be introduced with effect from 1 July 2019 and will be conducted until 31 December 2029.

On the other hand, Act No. 810-IX, amending certain legislative instruments of Ukraine to improve the conditions of support for the production of power from alternative energy sources and dated 21 June 2020, does not fix any specific date for the conduct of the first auction.

On 3 December 2020, the Ministry of Energy presented proposed quotas to support the production of electricity from renewable sources, the auction schedule for 2021 and indicative forecasts for annual support quotas in the period from 2022 to 2025.

Consultations on the proposed auction quotas should be held as soon as practicable with the inclusive participation of the public and the business and expert communities. The Cabinet of Ministers of Ukraine should issue relevant resolution subject to comments raised by all stakeholders. This would enable to kickstart the preparations of the governmental agencies and RES investors and successfully conduct the first auctions.



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