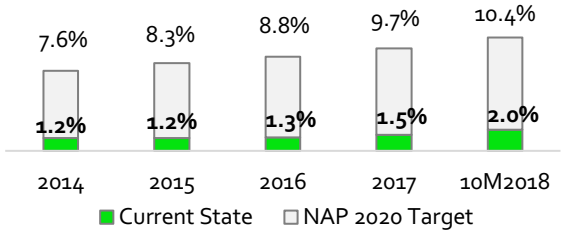
Policy Note 2019.1 – The Draft Law on Renewable Energy Sources

IN December 2018 the draft law on renewable energy sources (RES) passed the first reading in the Parliament of Ukraine. The proposed law would be an important step to make renewables support more economically viable. Even though the deployment of renewables accelerated in 2018, the current "Green Tariff" feed-in tariff (FIT) system has failed to achieve deployment targets. It also proves to be quite expensive: In 2018, renewables accounted for 8.6% of total power cost.

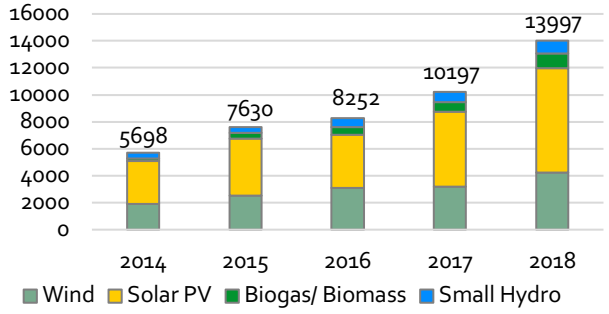
Falling short of target: RES (excl. big hydro) share in electricity generation and National Action Plan (NAP) 2020 goals



Source: SE Energorynok, NAP 2020, DiXi Group

Ukraine is at a crossroads: If the country wants to achieve the renewable energy generation goals enshrined in the Energy Strategy 2035, the current system of state support for renewables must be significantly overhauled.

Spiralling costs despite low effectiveness: Annual costs of Green Tariff in million UAH



Source: SE Energorynok, NBU, DiXi Group

The general intention of the law is to reduce the costly Green Tariff during a transition phase and then to replace it with an auctioning system, while smaller installations should still be subject to a reduced FIT in the future. This would be a step towards a more competitive, market-based renewable energy support scheme, in line with the global trend from fixed tariffs to auctioning. Yet, there is still room for improvement in some areas of the law.

Heading towards a market-based development of renewables

By aiming to replace the Green Tariff with an auctioning system, Ukraine is generally on the right track. The competitive tendering of licenses for RES projects has a number of potential advantages: By allowing competition among renewables developers, costs for the support scheme could be greatly reduced. Moreover, deployment targets – and thus also costs – could be more easily controlled. Yet, these positive outcomes cannot be taken for granted. International experiences show that certain institutional, technological and market-related preconditions, such as a sufficient number of bidders with enough liquidity, have to be met for an auctioning scheme to achieve the desired results.

A number of positive aspects of the draft law should be emphasised. Because building a market system from scratch is always difficult, the draft law correctly proposes so-called pilot auctions to be able to refine the design after first experiences are made under the new system. In line with the recommendations of the Energy Community, the draft also proposes to start with an auctioning design that is rather simple and can evolve towards a more complex system if necessary, which makes it possible to incorporate experiences from the pilot phase. Moreover, a transition phase from the old Green Tariff system to the new auctioning system allows market participants to prepare in time.

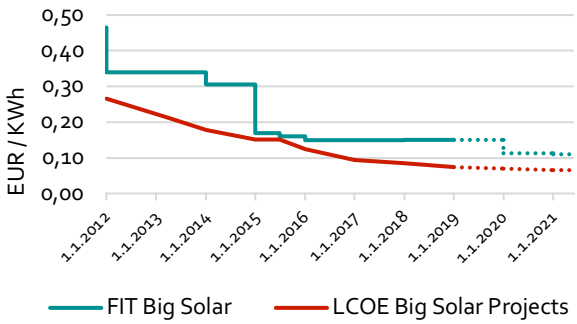
There are a couple of aspects of the law, however, that might entail difficulties and need to be addressed. The fact that RES facilities will only be responsible for grid imbalances from 2024 onwards could threaten grid stability. Also, wind farms of up to 3 MW and other RES facilities of up to 1 MW are required to participate in auctions only from 2023 onwards, which in our view is too late. The most important potential drawbacks are, in our opinion, the cost risks of wind and (mainly) solar until 2020, optimal location selection for new installations and the support for small projects. We will go into more detail regarding these three aspects.

The cost risks of high wind and solar deployment until 2020

The draft law proposes to phase out the Green Tariff from the beginning of 2020 on. At the same time, the deployment of utility-scale solar has risen rapidly in 2018: In the first ten months of 2018, 540 MW of solar plants were installed – the largest absolute increase ever for solar in Ukraine. This surge in deployment also explains the rising share of RES electricity generation (2%, 10M2018) and leads to rising costs for the Green Tariff in 2018 of almost 14 billion UAH. 2019 is the last year in which new RES projects can benefit from the current high FIT rates by signing a pre-Power Purchasing Agreement (pre-PPA). Thus, a further increase in deployment and generation is likely. 2019 could therefore see an additional – and unsustainable – increase in FIT costs.

In order to ease the cost burden that the Green Tariff poses, we recommend to lower the tariff rate already within 2019. An earlier reduction of tariffs could be justified by another argument: As shown in the figure on p.6, the FIT for big solar projects exceeds their Levelised Cost of Electricity (LCOE) – i.e. the cost of producing one kWh of electricity. Given that our LCOE trajectory correctly covers all relevant costs, renewables producers operate profitably under the current scheme as the guaranteed revenue through the FIT exceeds cost. Most importantly, the figure shows that the margin between LCOE and FIT is projected to increase.

LCOE and FIT for big solar projects in Ukraine



Source: DiXi Group

This shows that policy makers could immediately reduce the FIT rates to the 2020 level and thus cut costs without deterring investment into renewables – building and operating solar plants would be possible as long as the guaranteed FIT exceeds LCOE.

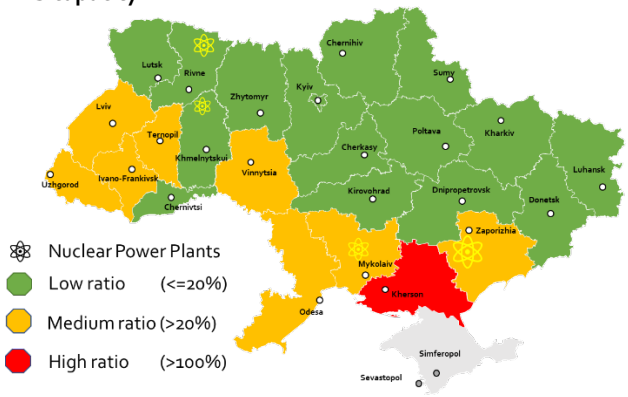
Choosing optimal locations for renewables

Overhauling the state support system for renewables could give policy makers the opportunity to influence not only *how many* new solar parks or wind farms should be built but also *where* they should be built. As of now, the initial idea of regional quotas was abandoned during the legislative process. However, optimal location selection allows to reduce balancing needs and thus costs for the Ukrainian electricity system and should hence not be overlooked.

The geographical concentration of renewables can have two mains effects – grid bottlenecks and higher balancing needs. The situation for Ukraine is shown in the figure below: Renewables are distributed unevenly across the country. Moreover, higher demand/renewables ratios indicate higher chances of grid bottlenecks. In order to balance the fluctuations in power generation that higher renewables shares cause, the energy system needs to provide additional flexibility, either by conventional plants or energy storage to stand in when there is neither much sun nor wind. Unfortunately, these two balancing options are quite costly.

A complementary technology solution that reduces the need for balancing – and the occurrence of grid bottlenecks – is the smart selection of locations for wind and solar installations.

Ratio of hourly average electricity demand covered by peak RES capacity



Source: Own calculations

Wind and solar electricity yields depend on the weather conditions at the respective location. The larger a country, the larger the variation of weather conditions – and thus yields. Taking advantage of this effect would reduce the balancing needs of the Ukrainian electricity system.

We incorporate smart location selection into our energy model of Ukraine to assess the size of the effect. Using hourly data on wind speed, solar radiation and temperature for up to 25 different locations in Ukraine, we show that especially wind plants can balance each other's fluctuations in electricity generation.

Wind speeds are quite different across Ukraine, so investors who get the same price per kWh at each location would have an incentive to install all their wind turbines at the windiest location of Ukraine. This would result in total wind production being very high when the wind is blowing at this location and very low when there is a still at exactly this location. At the same time, we also observe that wind speeds in Zakarpattia and Volyn oblast are almost independent (in mathematical terms, they show a correlation of 0.1 only). Figuratively speaking, this means that building five windmills in both oblasts instead of building ten windmills at one location reduces the frequency with very low and very high power production.

For solar, the picture is somewhat different. Since the sun rises and sets almost at the same time everywhere in Ukraine, the correlations are much higher than for wind. When solar electricity output in Lviv is high, it is high in Poltava too.

We employed our Optimal Dispatch Model V2.2 to estimate curtailment losses – and greenhouse gas (GHG) emissions of the entire electricity system – for two scenarios. Curtailment losses are the quantities of electricity generated by renewables that have to be "thrown away" because total generation exceeds electricity demand. This happens when there is both much sun and wind at the same time. In the first scenario, 15 GW of wind plants were installed at only one location in Ukraine. The second scenario assumed that 15 GW of wind plants were distributed evenly across the country.

Reducing curtailment losses and emissions: Two scenarios of wind power distribution

Indicator	One location	Even distribution	Difference
Feasible production	52 TWh	55 TWh	+ 3 TWh
Systemwide GHG emissions	37 Mt	33 Mt	- 4 Mt
Curtailment losses	21 %	8.5%	- 13 pp

Source: Own calculations

These findings show that distributing new RES installations – primarily wind – across the country could reduce curtailment losses and the need to balance the fluctuations of renewable power generation through conventional plants to a notable extent.

The benefits of small renewables

A second aspect of the draft law that we want to address is the missing support for small projects. An auctioning scheme, if well designed, allows that renewable targets can be achieved at relatively low costs through a transparent process. However, participating in an auction is still rather complex and expensive, which especially deters developers of small projects who lack the necessary organisational and financial resources. Moreover, the end of the Green Tariff by 2030 proposed by the draft law means that these small projects will soon find it difficult to secure loans.

It must be stressed, however, that certain small installations of renewables deserve to be particularly supported as they offer a number of benefits. They can reduce network losses, e.g. through self-consumption. Moreover, if they are well located, small renewable installations can enhance grid stability. This is especially true for small and local solar installations which also help to increase the wider public acceptance of renewables. Small and local biogas plants furthermore offer a number of particular advantages: They contribute to the reduction of emissions as they especially utilise agricultural residuals such as manure. Biomass feedstocks are abundant in Ukraine. Biogas plants also help to save fuel by co-generating heat and power and increase the flexibility of the overall energy system as a highly manoeuvrable balancing and storage option. Moreover, these plants could provide additional sources of income for small and medium agricultural companies.

If small installations of renewables are worth supporting, how should an appropriate support scheme – outside the auctioning system – look like?

How to support small renewables

A reformed Green Tariff for small installations would allow to exploit the benefits of small PV and biomass installations at reasonable cost. It could have the following components:

1) *Guaranteeing* **project-based feed-in tariffs for 10 to 20 years** (i.e. beyond 2030) would give small projects the necessary security without being too expensive.
2) *Setting* a higher feed-in tariff for **small biomass** plants that use a high share of manure.
3) *Introducing* rules for **"grid-friendly" solar development** helps to drive down costs of expensive congestion management.
4) *Introducing* a **dynamically adjusting feed-in tariff** for small installations.

The fourth point deserves special attention: Such a dynamic mechanism could in fact lead to higher deployment at lower cost compared to a fixed feed-in tariff for small installations. Germany has implemented a feed-in tariff for small installations that dynamically responds to the actual level of deployment – it could be a role model for Ukraine.

If the quarterly RES development targets are met, the responsive German feed-in tariff decreases by 0.5 % per month. If actual deployment is higher than target value, the feed-in tariff decreases faster – if less capacity than expected is built, it decreases slower.

Such a responsive system has a number of advantages. First, it is easier to let renewable development follow a predefined track, whereas no such track is defined under the current Green Tariff. The ability to set suitable targets would therefore allow policy makers to take control over the development of small renewables. Second, if development exceeds expectations, overall costs could be managed more easily: Tariffs will automatically fall. Third, the built-in adjustment mechanism renders tedious amendments to primary legislation to adjust the feed-in tariff level unnecessary. Lastly, it ensures investor confidence: In an automatically adjusting tariff system, revenues are much more predictable than under the current system, which could collapse when costs skyrocket.

Comparison of German and Ukrainian feed-in tariffs for renewables

Technology	Germany `18	Ukraine (Green Tariff `18)	Difference (Ger : Ukr)
Wind	6 €ct/ kWh (auctions; onshore)	10 €ct/ kWh (> 2 MW)	1 : 1.6
Solar (House-holds)	11 €ct/ kWh (< 40 kWp; EEG 2017)	18 €ct/ kWh (< 30 kW)	1 : 1.6
Biogas	14 €ct/ kWh (< 150 kW; EEG 2017)	12 €ct/ kWh	1 : 0.8

Source: Bundesnetzagentur, DiXi Group

What remains to be done?

In sum, the overall direction of the draft law proves that Ukraine is on the right track towards a better system of state support for renewables. Especially because of the recent delays, highest priority should be given to putting the bill through as soon as possible – a legislative deadlock would imply unsustainable costs.

As to the content of the draft law, we emphasise four points: First, it is vital that further amendments do not weaken the proposed auctioning scheme. Second, further adjustments to the draft law – or secondary legislation – should focus on exploiting the benefits of renewables below the auctioning threshold by introducing a dynamically adjusting feed-in tariff based on the project duration. Third, incentives for a smart and grid-friendly location selection of renewables should be set. Finally, the FIT should be reduced already in 2019 in order to contain costs.