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Limiting the cost of feed-in-tariff subsidies

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About Low Carbon Ukraine

Low Carbon Ukraine is a project that continuously supports the Ukrainian government with demand-driven analyses and policy proposals to promote the transition towards a low-carbon economy. In particular, the project has the mandate to support the implementation of the Energy Strategy 2035.

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Executive summary

Ukraine has guaranteed to pay eligible renewable energy producers a fixed feed-in tariff, which is set above wholesale market tariffs. Although, the current feed-in-tariff regime will be replaced by an auction scheme by 2020, for existing installation the feed-in-tariff is guaranteed until 2030 This is meant to provide a stable environment to RES producers and thus incentivise them to invest.

And indeed, this policy had been successful in the sense that it led to a significant increase of RES capacity. We estimate that RES capacity eligible for feed-in-tariffs is likely to increase to 5.6 GW by the end of 2019 when no more new applications will be accepted – up from 3.2 GW as of June 2019. Annual expenditures of subsidising feed-in-tariffs above market prices are expected to rise to UAH 28 bn in 2020 (ca. 0.85 bn EUR) and to remain at similar levels until 2030[1]. Amidst, this increase, it legitimate to ask how to limit the cost of RES support and how to avoid the increase to translate into higher electricity prices.

While FIT expenditures are significant – equal to 0.6% of GDP or 1.5% of public expenditures – this increase will only partially translate into higher electricity costs. This is due to the fact that feed-in-tariff subsidies are financed both, through a TSO tariff surcharge – which indeed has a direct impact on prices – but also through proceeds from electricity sales from state-owned generating companies – which effectively resembles budget financing and does not affect electricity prices.

Amidst the increase of FIT subsidy cost, there have been calls to reduce the FIT levels for existing renewable energy installations. Such a proposal is understandable from policy-makers' perspective but problematic as this means reneging on the FIT tariffs guaranteed to investors until 2030. Breaking these guarantees would inevitably damage the investment climate and undermine trust in any future government contract. International experience suggest that such a move may also increase borrowing cost and also carries the risk of legal action especially from foreign investors seeking arbitration.

Amidst the risks of an outright reduction of FIT levels, it is sometimes proposed to stretch support. That is, paying RES investors the same amount of revenue but stretched over a longer period of time. It needs to be understood that this is effectively the same as cutting the FIT levels. Any revenue postponed into the future has to provide sufficient interest in order for investors not to be worse off.

Policy makers may therefore decide to compensate investors for having to wait longer for their revenues – for example by guaranteeing them the present value of revenues as before the FIT adjustment. While this may mute protests from the investors, it also implies additional cost of financing the prolongation of subsidies.

Amidst the cost and risk of changing existing FIT contracts, we advise against it. Instead, we recommend to focus on more effective and less risky measures. First of all, the government may consider a moratorium stopping any new applications for FIT tariffs for all projects which have not yet started. Additionally, it should be analysed if the financing of RES support could be changed so as to de-couple it from electricity prices and to allow Energoatom and Ukrhydroenergo to sell their full capacity on the wholesale markets. This would increase liquidity thus diminishing market power of dominant players and thus reducing prices for the population and industry.

[1] In 2020 prices

1 Background and objectives

In 2009 the government of Ukraine first implemented a so-called feed-in tariff (FIT) regime for certain types of renewable energy installations. Under a feed-in-tariff regime, the government legally guarantees investors to pay them a specified tariff for the electricity produced by them over a certain period of time.

The FIT regime currently in place pays eligible producers feed-in tariffs ranging from 3.0 – 4.6 UAH/kWh[2]. Since the introduction of the scheme, RES electricity capacity has risen rapidly to 3.2 GW in June 2019 given rise to concerns that subsidies for renewables provided through the feed-in-tariff regime may become too costly. Furthermore, there are concerns that the high expenditures for renewables FIT could lead to an increase of electricity tariffs.

The government has reacted to these concerns by introducing an auction regime for renewables support which will be used to provide support to any new installations commissioned after January 2020. Nevertheless, existing installations, which have been granted feed-in-tariffs before the end of 2019, will continue to receive FIT for the guaranteed period until 2030. As such, expenditures for feed-in-tariff subsidies are likely to represent a considerable financial burden until 2030.

Against this backdrop, this paper aims to:

- Estimate expected expenditures of RES subsidies provided through feed-in-tariffs
- Assess if this could cause upward pressure on electricity tariffs
- Assess policy options to avoid that FIT expenditures could lead to an increase of electricity tariffs

2 Forecast of RES capacity eligible for FIT and resulting FIT expenditures

2.1 Expected RES capacity by 2020

The main question is, how much renewable capacity is already eligible for feed-in-tariffs and how much more capacity is likely to be added until the new auction regime starts in Jan 2020. Our analysis focuses on historical capacity and the estimated pipeline of projects until the end of 2019. These installations are eligible for FIT until 2030.[3]

By end of June 2019 a total of 3.44[4] GW of RES capacity existed which is eligible for FIT tariffs (excluding households PV). Based on current announcements and recent trends we estimate a further increase of RES capacity to 5.6 GW by the end of 2019. It is noticeable that in 2019 alone another 3.5 GW of RES

[2] Older RES installations may benefit from higher tariffs.

[3] Please note, this policy paper does not analyse the effect of RES installations potentially eligible for FIT after 2019. The reasons for this are 1) FIT for plants commissioned after 2020 will be lower, according to the latest changes in the law in April 2019 and 2) it is not yet clear whether developers will be able to secure the needed pre-PPAs before end of 2019, since there is still no model document approved.

[4] Includes only installations which are connected to Ukrainian grid, without accounting for plants in Crimea and non-controlled territories of Donetsk and Luhansk

capacity has already become or will go online. This reflects the willingness of producers to still benefit from the current FIT regime before the auction introduction and FIT decrease in 2020.

Amidst concerns about rising FIT expenditures, policy makers should investigate if some projects which have not yet been started, may be prevented from applying for the current FIT regime and shifted to the new auctioning regime. That way, the additional capacity added between now and the start of the auction system in January 2020 may be limited to some extent. Clearly, this option, if at all, does only apply for those RES projects which are still in the application phase and for which construction has not yet started.

2.2 Current and expected expenditures

FIT levels were first introduced in 2009 and are established in the law. However, since the inception of the FIT scheme in 2009 feed-in-tariff levels for new contracts were adjusted several times. At the same time, the length of the support period for all of the contacts remained the same with FIT guaranteed until the end of 2029. Thus, the level of feed-in-tariffs differs depending on when a respective installation became operational with older installations receiving revenues under higher feed-in-tariffs than more recent ones.

When calculating the cost of feed-in-tariff support, it is important to distinguish between gross and net expenditures for feed-in-tariffs. Gross expenditure is the total revenue for RES installations resulting from the applicable feed-in-tariff level and the amount of electricity produced by eligible installations.

The actual subsidy for the RES producer, however, is the difference between the feed-in-tariff and the wholesale market price – the tariff RES producers would obtain if they had to sell their electricity on the open market similar to other producers not eligible for feed-in-tariffs. The larger the difference between the feed-in-tariff level and the wholesale market price, the larger the cost of subsidizing RES producers.

The wholesale market price currently stands at around UAH 1,700 per MWh[5] of electricity produced. This price forms the basis for our estimate of subsidy costs for the existing stock of RES eligible for feed-in-tariffs as well as the additional capacity expected to fall under the feed-in-tariff regime by 2020.

In comparison, the weighted average of feed-in-tariffs granted to RES producers in 2020 is estimated to be about UAH 4,650 (EUR 140) per MWh produced. Thus, by 2020 each MWh of electricity produced by RES eligible for feed-in-tariffs receives an average subsidy of UAH 2,950 (EUR 88) per MWh above the wholesale market price.

Based on the forecasted total RES capacity, we expect the total annual expenditure for RES subsidies through feed-in-tariffs to amount to UAH 28.4 bn (or about EUR 0.8 bn[6]) in order to cover the difference between feed-in-tariffs and wholesale market prices. To put this into relation, RES subsidies through feed-in-tariffs will be equivalent to 0.6% of GDP or about 1.5%[7] of total public expenditures in 2020.

Table 1: Current and expected RES capacities and FIT expenditures

[5] For the purposes of this policy paper, we do not model potential changes to the wholesale market prices and assume it to remain unchanged.

[6] Assuming an exchange rate of 33 UAH/EUR in 2020.

[7] Based on IMF forecasts for GDP and public expenditures for 2020.

	Capacity (GW)	Electricity produced in 2020 (GWh)	Gross FIT expenditures in 2020 (EUR mln)	Net FIT expenditures in 2020 (EUR mln)
Already installed and receiving FIT (as of 30/06/2019)	3.4	5,400	807	530
Expected additional capacities until end of 2019	2.2	4,250	541	323
Total capacity eligible for FIT after 2020	5.6	9,650	1,347	853

Source: LCU calculations.

How annual expenditures for subsidies through feed-in-tariffs will develop until 2030, when the period guaranteed to investors ends, depends on a number of factors. An important factor here is the development of the UAH-EUR exchange rate as feed-in-tariffs are paid in UAH but guaranteed in EUR terms. As such, expenditures on feed-in-tariffs is subject to a currency risk. Should the UAH depreciate towards the EUR, the cost of subsidies in UAH terms will increase. On the other hand, an ongoing appreciation of the UAH would lead to a reduction of subsidy costs.

Conclusion: expenditures for subsidising RES via feed-in-tariffs have increased substantially reflecting a large increase of installed capacity eligible for subsidies. This means, expenditures for these subsidies do now constitute a significant share when compared to the size of the economy and public expenditures. As such, it is relevant to ask whether expenditures for feed-in-tariff subsidies are likely to affect electricity costs for population or industry.

3 Are feed-in-tariffs linked to electricity tariffs for the population

Whether or not the high expenditures of feed-in-tariffs are likely to affect electricity cost for the population and industry depends on who actually pays for the feed-in-tariff subsidy (the difference between feed-in-tariffs producers receive and the wholesale market price). While in many countries, feed-in-tariffs are directly financed through a surcharge on electricity tariffs, in Ukraine the question of financing of feed-in-tariffs is less straight forward as the system is rather complex.

Currently, electricity produced by RES producers eligible for feed-in-tariffs is procured centrally through the state enterprise Guaranteed Buyer. The Guaranteed Buyer has two functions on the electricity market: 1) it covers the difference between market prices and preferential prices for households (PSO) and 2) it sells the renewable electricity on the day-ahead and intraday markets and partially covers the FIT payments.

The Guaranteed Buyer finances itself through two sources. One source is the state-owned generating companies Energoatom (nuclear power plants) and Ukrhydroenergo (hydro power plants) which are obliged to supply electricity at tariffs significantly below market level to the Guaranteed Buyer. The Guaranteed Buyer in turn sells this electricity on the wholesale market at much higher market prices. The profit generated this way is used to subsidise low household tariffs (so-called PSO operations) and recently the government allowed the Guaranteed Buyer also to use these profits to finance RES FIT expenditures.

Since Energoatom and Ukrhydroenergo are state-owned companies, the resulting lost profits of these companies due to selling electricity below market prices to the Guaranteed Buyer is directly affecting government revenues as this means lower incomes to the state budget. Thus, the source of financing of this part of FIT tariff expenditures comes indirectly from the public budget and it will not affect electricity tariffs.

However, these profits are not sufficient to compensate the cost of RES support through FIT in full. The remaining amount is covered by payments of the TSO Ukrenergo to the Guaranteed Buyers. The TSO payment in is included into TSO tariffs and thus represents a surcharge on electricity tariffs.

Consequently, at the moment feed-in-tariff subsidies are financed jointly a) by electricity consumers via a TSO surcharge included in the tariff b) indirectly via public finances, in form of lost revenues from dividends of state-owned companies.

Due to the complex scheme of financing FIT expenditures it is difficult to say which funding source is more important.

Conclusion: As the FIT surcharge is financed both through a TSO fee on electricity tariffs as well as through dividends of state-owned companies, the expected increase of FIT expenditures will only partially affect electricity tariffs. In this context it is positive that the Guaranteed Buyer was recently allowed to increase financing of FIT support from electricity sales as this helps to reduce the effect on electricity prices. Analysing to what extend financing of FIT subsidies through the TSO surcharge can be reduced further would be a worthwhile exercise in order to limit the impact on electricity prices.

4 Impact assessment of policy options to limit subsidy expenditures for RES

Amidst the significant cost of subsidising RES through the feed-in-tariff regime, there have been voices arguing that the current subsidies offered to RES producers are too generous and even calls to retroactively adjust the feed-in-tariff regime.

Low Carbon Ukraine raised concerns about high cost of the current feed-in-tariffs system in previous publications[8]. Nevertheless, any adjustment of the feed-in-tariff level which was guaranteed to investors would damage the trust in any government-secured contract and cause significant damage to the country's investment climate. It also carries substantial legal risk as international experience suggests (see chapter 5)

Nevertheless, it is entirely legitimate to assess all policy options. Therefore, in order to provide a basis for an informed discussion, below we estimate the impact of a hypothetical scenarios for adjustment of the feed-in-tariff regime on investors profitability and also estimate the amount of expenditure savings these could generate. However, this analysis by itself is not sufficient for a comprehensive policy decision.

[8] Policy Briefing 04/2019 "RES development in Ukraine – Stabilizing the support for renewables", https://lowcarbonukraine.com/publications/policy-briefings/

The main question assessed by the analysis: Is it possible to adjust FIT and reduce the financial burden of the RES support scheme, while also accounting for investors profitability and value of money in time?

4.1 Approach used for the assessment

In order to reduce subsidy expenditures while at the same time wishing to shield investors from losses, it may be considered to prolong the period during which feed-in-tariffs are paid while reducing the overall level of feed-in-tariffs. In short, paying lower feed-in-tariffs for longer. The basic idea behind this proposal is to provide the investor with the same nominal revenue although stretched over a longer period of time.

When considering such an idea, it is important to understand that any cash flow postponed into the future is worth less than the same amount of cash today. In order to convince an investor to wait for an additional year for one and the same cash flow, he will expect the same revenue plus an interest similar to the rate of return of his original investment. Otherwise, he will be worse off compared to the status quo and similarly dissatisfied as with an outright tariff reduction.

To take this into account in our analysis we ask: **by how much could feed-in-tariff levels be reduced when extending the period during which feed in tariffs are paid by 5 years until end of 2034 while at the same time compensating investors for the fact that they have to wait longer for their money.**

Specifically, in our analysis we have the conditions that any FIT tariff adjustment has to ensure that discounted revenues before and after the adjustment stay the same. A crucial variable for this analysis is the discount factor – roughly speaking the interest rate the investor receives for having to wait longer for his money. For our calculations we use three different levels of the discount rate, 8%, 10% and 12%. This range is roughly comparable the rate of return for other investments in Ukraine denominated in EUR. For example, recently issued USD and EUR-denominated sovereign Eurobonds pay interest rates ranging from 6.75% to 9.75%[9].

We also calculate how the potential feed-in-tariff adjustments affect total expenditures on RES support in EUR – both annually and over the entire period during which FIT are guaranteed.

For the purpose of this policy paper, we focus only on commercial ground PV and onshore wind projects as these types of projects correspond to 90% of estimated payments in 2020, and PV and wind projects are more or less standardised, so a generalised financial model can be designed for their assessment. FIT values and support duration for other projects remain as it is. For PV projects degradation rate of PV cells is accounted for.

[9] https://dragon-capital.com/what-we-do/research/fixed_income/ukraine/

4.2 Stretching of FIT which ensures the same discounted revenue

In this scenario we calculate which FIT level reduction is possible under the following conditions:

- The present value of future revenues is equal to current support level (i.e. discounted revenues stay the same before and after the adjustment)
- FIT support is prolonged until 31/12/2034, i.e. 5 year more of FIT compared to existing scheme
- FIT adjustment is applied starting from 1/1/2020
- Future revenues are discounted with 8%, 10% or 12% discount rate

The table below shows by how much FIT levels can be reduced under these conditions while ensuring that the discounted revenues stay the same when compared to before the FIT adjustment.

Table 2: Impact on support scheme cost for revenue-neutral scenario

	FIT reduction from 2020	Net FIT cost until end of support, EUR bln	Average annual net FIT costs, EUR mln
Status quo (baseline)		7.9	794
8% discount factor	-20%	7.3	484
10% discount factor	-17%	7.8	520
12% discount factor	-14%	8.3	556

Source: LCU

Our analysis suggests that an extension of the FIT period allows to reduce FIT levels by 14% - 20% depending on the level of compensation (discount factor) for investors. Thus, such a measure would result in a significant reduction of annual FIT subsidy expenditures compared to the current annual expenditure. However, overall FIT expenditures for the guaranteed period will most likely increase unless a low discount factor of 8% is chosen which is unlikely to be accepted by investors.

Note: in this analysis we apply the same FIT level reduction for all investors regardless of the vintage year of the installation, technologies and other factors affecting their profitability. Neither does the above approach account for investors ability to service loans which may be at risk from a blanked reduction of FIT tariffs. Thus, if a stretching is considered at all, a more detailed approached based on a net present value (NPV) analysis disaggregated by technology and vintage year should be used. We carried out such an analysis which is presented in the appendix of this paper.

What is more, guaranteeing the same discounted revenues to investors is not the same as ensuring the same profitability. Especially, investors with installations which had a higher rate of return than the discount rate offered, will not be satisfied and may appeal such a decision.

Conclusion: By stretching the FIT period while (at least partially) compensating investors for their waiting time, annual FIT subsidy costs can be reduced significantly. However, overall the government may end up with higher expenditures than before. Effectively the government borrows money from investors which it could do better and at lower cost through different channels for example by issuing debt.

5 International experience with feed-in-tariff adjustments

5.1 Overview

A review of international experience suggests that adjustments of policy support and feed-tariffs in particular is not uncommon. Almost all countries with incentive schemes adjust their support periodically in order to account for falling investment costs and thus lower need of support.

However, these adjustments predominantly only affect new installations and leave existing investors unchanged. Nevertheless, while retroactive changes are less common, they are not unheard of. Since 2000 at least six European Union countries have, at some level, enacted changes to their RES policy support which can be described as retroactive. That is, while taking effect only from the date of publication, the changes affected existing rights and obligations of renewable energy producers and investors. The list below provides examples of the most recent cases[10]:

- **Bulgaria:** 2012 introduction of a grid access payment and a 40% reduction of feed-in-tariffs
- **Belgium:** 2012 introduced a retroactive fee and reduced the guaranteed certificate prices
- **Czech Republic:** 2010 introduced a retroactive tax of ca. 26% for large systems
- **Greece:** 2012 also introduced a 25% tax for larger installations
- **Spain:** 2010 reduction of feed-in-tariff levels by up to 45% and introduction of a 7% tax in 2012
- **Italy:** 2014 changed the terms for feed-in-tariffs for existing investors asking them to chose from three options all of them effectively reducing the support level

Below we look more closely at the example of Spain in order to assess the impact of the retroactive changes.

5.2 Case of Spain

Spain retroactively reduced support for renewables several times starting in 2008. This policy U-turn followed a large increase of RES capacity on the back of high feed-in-tariffs, favourable climatic conditions and (until that point) a stable regulatory regime.

Over the period between the mid-90s until 2008 overall installed wind capacity increased to about 22 GW and solar PV 6.3 GW (including concentrated solar power).[11] This rapid increase was fuelled by high feed-in-tariffs of around 0.50 EUR / kWh. Some studies even estimated the cost of policy support even at around 65 EUR / MWh in Spain in comparison to around 25 EUR / MWh in Europe 2010.[12]

Both the rapid growth of capacity and the high level of policy support led to a strong increase of expenditures for RES subsidies. Among other things the rising financial burden resulting from RES subsidies became visible in EUR 25 bn of debt which had accumulated in the electricity system as electricity companies were not allowed to pass on the full feed-in-tariff paid to RES producers. This high financial burden convinced with an economic crisis and resulting fiscal crisis, which required the state to

[10] https://www.cameronhepburn.com/app/uploads/2013/08/Thomas-Haelsig-MSc.pdf
[11] https://www.renewableenergyworld.com/articles/2013/04/pain-in-spain-new-retroactive-changes-hinders-renewable-energy.html#gref
[12] https://www.eurelectric.org/media/1868/prices_study_final-2014-2500-0001-01-e.pdf

carry out severe austerity measures in order to avoid a default. Against the backdrop of the fiscal crisis the government of Spain enacted a number of retroactive changes to the RES subsidy regime, including:

- **2008:** a retro-active reduction of PV feed-in-tariffs tariffs from 0.46 EUR/ kWh to 0.32 EUR/kwh – a substantial 30% reduction.
- **2010:** reduction of the tariff premium for Wind electricity by 35%
- **2010:** extension of the reduction of feed-in-tariffs for PV to 46% and introduction of an additional grid access feel
- **2013:** introduction of 7% tax on all energy producers (conventional and renewable)

As intended, the measures led to a significant reduction of the expenditures for RES subsidies. However, due to their retroactive nature, the measures caused a strong loss of confidence in the Spanish RES subsidy system grinding to a hold almost all investment activities for years to come. In addition, it is estimated that the sudden change in the policy framework resulted in considerable job losses of RES companies and related industries. Furthermore, the policy change is attributed with a worsening of financing terms both for the government as well as RES companies.

Due to their retroactive nature, the measures were challenged in national and international courts. However, neither Spain's supreme court nor its constitutional court awarded compensation for renewable energy producers after the cuts were introduced. In contrast, international investors have been awarded high compensation in rulings regarding the cuts through international arbitration courts. For example, in 2017, Spain lost a case in international arbitration (International Centre for Settlement of Investment Disputes, ICSID) and was ordered to pay EUR 128 m to compensate an affected concentrated solar producer.[13] In addition, in 2019, the ICSID awarded US company NextEra Energy its entire claim of €290.4 m which it was seeking as reparation for the subsidy U-turn. Specifically, the tribunal found that Spain breached the Energy Charter Treaty as it did not extend NextEra "fair and equitable treatment" and it failed to protect its legitimate expectations of the investor.[14] With tens of cases still in the courts this presents a considerable legal and financial risk for the Spanish government.

Conclusion: Several countries have changed RES support and in particular feed-in-tariff conditions retroactively. The example of Spain shows that such move may result in considerable cost in terms of investor confidence, credit rating and financial costs from international investors seeking arbitrage. Similar as a default, such a policy measure should only be considered as a measure of last resort.

6 Conclusions and recommendations

The starting point to of this paper was to assess if an increase of expenditures for RES support through feed-in-tariffs could lead to an increase of electricity tariffs. Additionally, we assessed possible options for limiting the increase of RES subsidies on electricity tariffs.

We find that the current support scheme has been rather successful in promoting investments in renewables energy capacity. By end of the year we expect a total of 5.6 GW to be installed. While this has many benefits, it is connected with considerable expenditures to subsidizing the difference between the guaranteed feed-in-tariff and the market price of electricity. This is likely to amount to EUR 854 mln in 2020. This is a considerable amount and justifies that the government looks for ways of limiting the cost

[13] https://www.pv-magazine.com/2017/05/05/spain-loses-its-first-renewable-energy-case-in-international-courts/

[14] https://www.pv-tech.org/news/spain-ordered-to-pay-290m-plus-over-subsidy-u-turn

of providing subsidies through feed-in-tariffs and ensures that the rising cost of subsidies do not translate into electricity tariffs for the population and industry.

In fact, we find that the government has already enacted a number of measures which are likely to limit the impact of feed-in-tariffs on electricity tariffs, specifically:

- Replacement of the feed-in-tariff regime by a more cost-efficient auction-based support system.
- Reducing the part of FIT expenditures which is financed through a TSO surcharge and replacing it by other sources, which limits the direct impact of further increase of subsidies on electricity prices.

In addition to these measures the government should consider the following additional measures:

- An immediate moratorium on granting any further feed-in-tariff agreement for new installations unless construction has started already in order to limit the increase of capacity until the new auction scheme is place.
- Allow large RES operators to participate directly in the wholesale electricity market in order to increase liquidity in the wholesale market and reduce market power of the existing players
- Explore how financing of FIT expenditures through TSO surcharges can be reduced further in order to de-couple FIT expenditure increases from electricity prices
- Changing the financing sources of FIT expenditures may allow to sell electricity which is currently provided by state-owned generating companies below market prices to the guaranteed buyer on the wholesale market. Such a move would significantly increase liquidity in the wholesale market leading to lower prices for the population and industry.

We do not recommend changing level of feed-in-tariffs or length of guaranteed period of existing contract. While a reduction of FIT tariff levels this will lead to reduced annual FIT subsidy costs, this would come at considerable cost in terms of worsening of the investment climate, credit rating, future legal risks and so on. Despite these considerable risks, reducing of FIT tariffs will only partially affect electricity prices due to the way RES support is financed. As such, we strongly advise against any retroactive change of FIT tariff levels and recommend on more effective ways to reduce electricity costs.

Annex: Stretching of FIT which leaves the net present value of investments unchanged

A blanked stretching of FIT with a uniform reduction of the FIT level, neglects different levels of profitability across technologies and vintages years. To address the shortcoming a more disaggregated approach is presented below which calculates the possible FIT reduction according to the year when operation of the RES installation started and by technology. In addition, as opposed to only considering revenues the analysis takes into account the net present value of all cash flows such as CAPEX, OPEX, output levels and degradation rates of PV cells and other project-specific parameters. To account for the range of capacity factors between geographical areas, we run simulations for both lower boundary (smaller projects with lower capacity factors) and median ones.

Another factor considered in the analysis is the project's ability to repay existing loans in order to limit "spill over" effect of FIT reductions into financial sector. The table below shows results of this scenario, at a discount rate of 10%.

Based on the above we have analysed which FIT level reduction are possible under the following conditions:

- The net present value (NPV) of the projects are equal to current support level (i.e. discounted cash flow stays the same
- FIT support is prolonged until 31/12/2034, i.e. 5 year more of FIT compared to existing scheme
- FIT adjustment is applied starting from 1/1/2020
- Future revenues are discounted with 10% discount rate
- For each year net revenues need to be larger than loan servicing cost (interest plus repayment)

Table 3: FIT reductions factors based on financial modelling approach

Commissioning year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020*
PV ground	-16%	-16%	-16%	-16%	-9%	-9%	-10%	-12%	-17%	-15%
Wind	-14%	-14%	-15%	-5%	-10%	-10%	-14%	-12%	-14%	-16%

**Note: for power plants, commissioned close to year end 2019, eligible for 2019 FIT*
Source: LCU

Our analysis suggests that FIT levels could be reduced in some cases by 16% - depending on the year of commissioning of the installation while simultaneously extending until 2035, while keeping NPV of projects equal to initial ones. For some commissioning years debt was a main limiting factor, resulting even in slightly higher NPV than under status quo parameters, thus leaving investors slightly better off after adjustment.