Managing the RES Account

A report to the Regulatory Authority for Energy

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1 Executive summary

The Greek electricity market is undergoing a significant transformation. The new market design that requires more active market participation is now in place. The Greek National Energy and Climate Plan (NECP) includes an ambitious decarbonisation agenda – lignite units are expected to gradually retire in the short term and significant volumes of RES capacity are envisaged. Infrastructure projects will allow for most of the islands to be connected to the mainland system, unlocking further RES potential and delivering significant benefits for consumers.

After a period of relatively limited RES growth (in particular solar PV), the FiP support scheme and the RES auctions have so far managed to procure substantial new capacity. Going forward, unsupported RES can very soon become a reality in line with the NECP vision.

However, the RES Account balance is once again in the spotlight as a deficit has re-appeared. Different stakeholders and commentators have provided a wide range of views with respect to the drivers of the deficit and the potential solutions.

In this report we also want to draw the discussion away from simply 'who should be paying for the deficit' and focus more on ensuring efficiency of the system and a stable and predictable environment. This means that there is a need:

- to deliver a solution that ensures a balanced RES Account in the long run; and
- to aim for an efficient outcome for the electricity system as whole and consider the wider consequences when choosing the design of the compensation mechanism.

The first step for finding a solution is to clearly define the issue. The RES Account problem can be framed as follows:

- the outflows (ie. the support payments to RES producers) from the RES Account are 'fixed' and can be relatively predictable going forward assuming a well-managed procurement process of RES volumes;
    - any variations in the payments to RES producers will primarily be a result of resource availability (wind speeds and solar irradiation);

— on the other hand, some of the inflows are 'floating', far less predictable, and depend on wider market conditions beyond the control of policy makers.

This mismatch between relatively 'fixed' outflows and 'floating' inflows means that a balanced RES Account would be purely circumstantial, unless there is a clear **dynamic** underlying mechanism that allows for compensating fluctuations in 'floating' market dependant inflow streams. It is only a commitment to a dynamic solution that will ensure a balanced RES Account on a sustainable basis.

What is the level of the deficit?

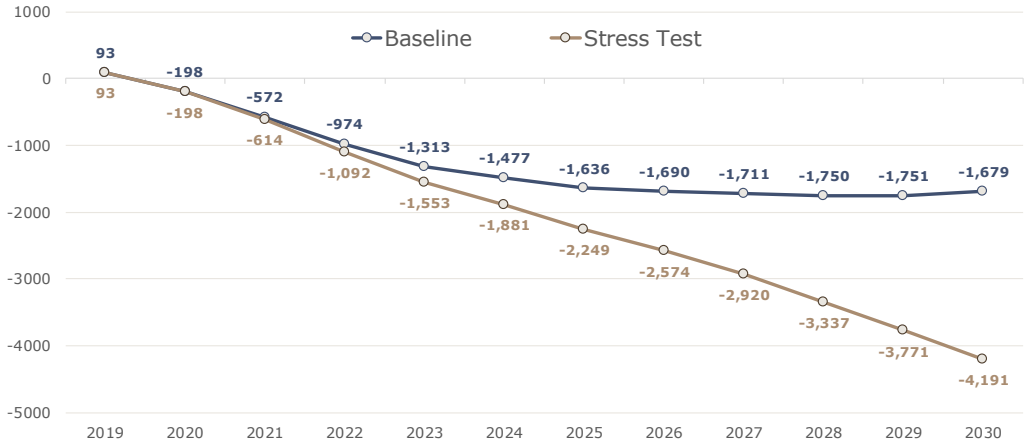
We have analysed the potential evolution of the RES Account balance for the period 2020-30 under different scenarios. It is hard to see a set of underlying market conditions that would result in a balanced RES Account in the very short term, and even in the longer term, in the absence of some form of policy intervention.

Our view is that the cumulative RES Account deficit will be just below €1bn at the end of 2022, assuming current policies persist, and based on current market expectations. Going forward, in the medium to long term, commodity prices, including carbon prices are likely to increase. Carbon prices, in particular, will need to allow for wider decarbonisation. Any electricity prices increase as a result of higher commodity will however be somewhat offset by the greater deployment of zero variable cost RES, and the cumulative deficit may continue to grow out to 2030, though at a slower pace.

We do however recognise that the underlying scenarios, which have been agreed with RAE and **do not necessarily reflect our own independent views of electricity price projections for Greece**, can be seen as conservative when it comes to commodity prices evolution in the long term, and to some extent inconsistent with the degree of additional RES capacity added to the system. The choice of a more conservative outlook was however intentional to allow us to better capture the potential risks with the RES Account. Exhibit 1.1 shows the projected cumulative surplus/deficit of the RES Account over the period 2020-30 in the two scenarios (Baseline and 'Stress Test') ignoring the €70m buffer and the policy measures announced in November 2020 by the Ministry of Energy & Environment.

In our Baseline scenario, the annual (current) balance of the RES Account is expected to improve from 2024 onwards where an annual deficit of €164m is expected in 2024 compared to the €339m deficit expected in the previous year. Even though the annual deficit of the RES Account drops in the longer term with a surplus envisaged in 2030, the RES Account would have already accumulated a circa €1.7bn cumulative deficit in 2030. In our Stress Test scenario the deficit accumulated in 2030 is €4.2bn. Depressed commodity prices result in equally low inflow streams and FiP payments increase as a higher top-up is needed for RES projects with a FiP contract

Exhibit 1.1 – Projected cumulative balance of RES Account (m€, nominal)



Notes: 2020 figures take account of the historical data published by DAPEEP up to July and assume that the effective RES levy for 2020 accounts for a shift away from a discounted levy for a significant portion of customers

Why is there a need for additional support beyond market prices?

The additional compensation is needed because RES generated electricity was more expensive than conventional thermal production. This is no longer necessarily the case though. There have been significant cost reductions in solar PV and wind, and these are competitive with thermal generation, if not cheaper. However, the 'learning curve' and the deployment that was delivered as a result of the support schemes on a global scale allowed for this cost reduction.

At this point, it is also worthwhile to clarify one point. There is a widely used argument that RES reduces wholesale prices and consumers benefit from that reduction. This is true, but this reduction may not always be sufficient to compensate for the additional cost of some of the older RES installations. Further to this, this 'merit order' effect is sometimes overestimated. For example, the previous ΠΧΕΦΕΛ methodology was attempting to estimate the hypothetical wholesale price assuming all RES away, but without replacing this with some other form of efficient generation (which may have happened if RES capacity was not deployed).

Is the level of additional support provided to RES in Greece reasonable?

This fundamental need for support beyond market pricing, however, does not necessarily mean that past procurement of RES in Greece has been efficient and cost effective. Analysis that was done by the Ministry of Energy when it introduced the 'New Deal' legislation suggested that the implied project returns based on the original FiTs were well above the norm, and were subsequently re-adjusted. Even after this re-adjustment, the 'target' IRRs put forward by the Ministry of energy were still above what could now be considered a reasonable return for energy projects with a long-term PPA and a fixed price.

It is hard to say whether the FiT levels implied returns for RES producers beyond what would be considered reasonable (or not) on a project by project

basis, especially given that the country risk at the time was high. We also do not have access to the actual costs faced or the cost of debt for different RES projects to perform a project by project analysis to determine the expected returns on investment, and such an analysis is beyond the scope this report.

Who should bear the additional cost for RES electricity?

There are different 'sources of income' for funding RES support payments with the most typical ones including:

- state funds;
- a transparent charge can be levied directly on consumers;
- the burden can be borne by suppliers who can then include this additional cost in the retail tariffs.

In Greece, a combination of various revenue streams has been used, ranging from the RES levy that is a regulated charge imposed directly on consumers to a surcharge included in the TV license fee. Charges have been added, removed and amended. This volatility is, on its own right, a reason for concern.

Greece is however not the only country where the funding for RES generated electricity has been a concern. In Germany, the EEG surcharge has seen a substantial increase over the years and there was recently a decision to cap the surcharge and explore other revenues that can be used for supporting RES. In France, they are now considering to impose retroactive FiT cuts on 'older' solar PV projects.

Given the current position of the Greek RES Account, the commonly discussed options with respect to who should bear the additional cost are:

- electricity consumers through an increase in the RES levy;
  - this may appear as an obvious solution but there are also some disadvantages with this option at this point in time:
    - in the relatively adverse economic circumstances with COVID-19, even small increases in electricity bills may have an impact on affordability for electricity consumers, resulting in knock-on implications across the entire supply chain;
    - any increase on industrial load may impact on competitiveness, and if lower charges for industrial loads are retained, then domestic consumers will be disproportionately burdened;
    - this may not be a politically acceptable solution at a time when the Greek state is attempting to find ways to support a weakened economy as a result of the various restrictions due to COVID-19;
- suppliers should pay in the form of a Supplier levy;
  - assuming suppliers can immediately adjust their retail tariffs and in the presence of a competitive market, then one would expect that such a levy would be passed through to the consumers in the competitive part of the retail tariff;

- there are voices that support that suppliers would be absorbing such a levy, but this appears to be an irrational behaviour, and would only happen if:
  - there is some form of de facto retail price regulation on the competitive tariffs; or
  - some suppliers would be offering tariffs at below cost in an attempt to gain retail market shares, which would be happening irrespective of the presence of said levy – in any case, it is rather extreme to support that such a levy would be fully absorbed; or
  - suppliers currently have retail margins well beyond what would be expected in a competitive market – this should be a completely separate topic and a potential indication that competition is not working in the Greek retail market;
- in the case that suppliers have locked in fixed retail tariffs and given the, in some cases, relatively thin margin involved in electricity supply, any sudden Supplier levy introduction may mean that some suppliers can go 'bust';

- RES producers could accept a FiT cut;
  - similar concerns as those raised above for suppliers would apply when it comes to impact on profitability and even viability assuming efficient pricing and procurement in the first place; and
  - such reductions tend to undermine investor confidence and may impact on cost of future RES costs.

How can the RES Account balance be managed?

There is a wide range of potential measures that can be adopted to help manage the RES Account balance and continue with uninterrupted support payments to FiT and FiP contract holders:

- limiting outflows (ie reducing payments to RES generated volumes);
- increasing inflows; or
- allowing a deficit to persist and deferring payments (through raising debt).

There are pros and cons with the different options, and given the potential magnitude of the RES Account deficit, a combination of measures may be more appropriate. Some are also better suited in the short term, whereas others may require additional time to be implemented.

In Section 7, we assess in more detail some of the options for managing the RES Account balance. Given the various constraints and the current backdrop, we have put forward some ideas for further consideration.

Unfortunately, in the short term the solutions that can realistically be implemented appear to be more 'traditional', and include:

- an increase of the RES levy;
- the introduction of a Supplier levy;

- an extraordinary charge to RES producers;
- an increase in the allocation of EUAs; and
- a more permanent FiT cut.

It is far from ideal to use measures that have been used in the past, but in the very short term these appear to be options that can be more easily adopted. The only other alternative would be to fund the deficit through debt to allow time for a more enduring solution to be put in place.

Directing more of the proceedings from the auctioning of EUAs does mean less money for other schemes and incentives. However, given the circumstances, it may be more appropriate to proceed with this to limit the scale of any further measures.

Given the wider economic considerations and in the current COVID-19 dominated environment, any increase in the RES levy could be something that is more difficult to adopt. Under different circumstances, we would be more supportive of an increase, and once the economy is in a more stable state, the RES levy should be used to manage the RES Account.

We are not in general supportive of a Supplier levy, on the basis that this may be passed through to consumers and end up being equivalent to an increase in the RES levy. Alternatively, if any such charge is 'absorbed' by suppliers this may result in a squeeze in their retail margins.

In the absence of other alternatives, some form of reduction for FiT projects may end up being inevitable. If this goes ahead, it should be done on the following basis:

- only if there is room for any reduction or charge when looking at the implied returns;
- with a view of returning any extraordinary charge once a RES Account surplus arises; and
- potentially in exchange for a grid connection extension assuming a more permanent reduction or on a voluntary basis.

We therefore see the following as a realistic plan for the **short term** given the various constraints:

- increase the EUA allocation to allow for additional proceedings into the RES Account per annum;
- offer the option to RES producers with a FiT contract to opt for a FiT cut in exchange for a grid connection extension;
    - grid connections in the future will be highly valuable and there should be strong uptake of this option, but we do accept that some RES producers may not find this attractive;
- allow for part of the existing deficit to be serviced through debt to the extent possible with the debt then repaid from the RES Account once the long term solution is put in place;
- if the above does not allow for fully alleviating the deficit and, if possible, increase the RES levy; and

- impose an extraordinary charge to RES producers for the remaining of the deficit (if any) up to a level that does not imply a drop below a reasonable IRR and if and only if all other measures are not sufficient to manage the deficit and with a view of repaying this once the RES Account has a surplus.

A more sustainable solution could be centred around more innovative ideas that provide for incentives for wider decarbonisation and allow for consumers to recognise the benefits of RES. In the medium to long term, we believe that the RES Account could be:

- funded from a broader base (rather than simply electricity consumers) through the introduction of a carbon tax on heat and transport;
  - such a measure is now also being introduced in Germany;
  - unlike electricity consumption that is relatively inelastic (and considerably less carbon intensive than oil products used in heat and transport), higher cost of fuels for heat and transport can result in lower consumption and switching to renewable energy sources; and
  - the cost of supporting RES will be more targeted to those with a higher carbon footprint;
- further support by large consumers (and even domestic consumers) and suppliers on a voluntary basis;
  - several companies are now attempting to enhance their sustainability agenda and may be willing to contribute to the RES Account on a voluntary basis in exchange for 'green' credentials.

The **long-term model** for the RES Account could then be based on:

- continuation of the existing inflows;
- allowing the RES levy to adjust depending on projected balance but with a cap;
- introduce a carbon tax on carbon emitting fuels in the heat and transport sectors with some of the proceedings going into the RES Account – if there is excess these funds can be used for incentivising other initiatives that promote decarbonisation (EVs, energy efficiency etc.);
- set up a scheme that promotes 'green credentials' with voluntary contributions; and
- continue with offering the option to accept a FiT cut in exchange for a grid connection extension.

The measures proposed by the Ministry of Energy & Environment appear to deliver a balanced RES Account, but as market conditions change policy makers should be committed to further action when and if necessary

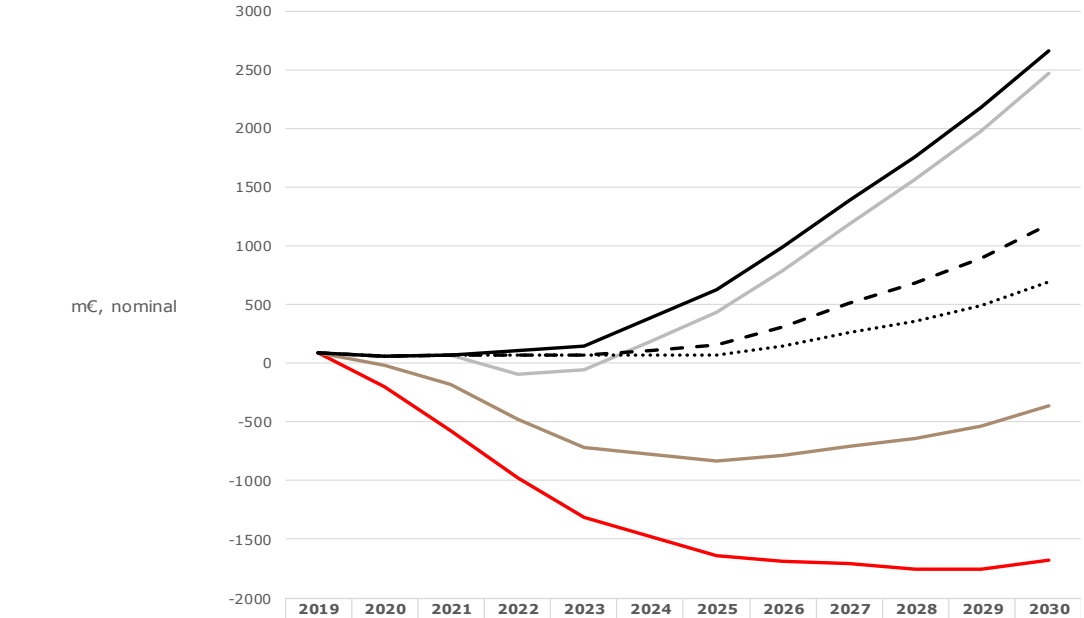
The Ministry of Energy & Environment has now proposed a set of measures to alleviate the RES Account deficit. This bundle of measures includes some actions, which we were also proposing, and some additional measures that we had not considered.

These measures include:

- RES levy reconciliation;
  - the settlement of RES levy payments from some consumers (connected on the MV and HV network) that had been paying a discounted unit payment had already been considered in a previous ministerial decision, and will be effective retrospectively from start of 2019;
- Recovery and Resilience Fund (RRF) income;
  - Greece has secured funds from the RRF stimulus package aimed at helping repair the economic and social damage caused by the coronavirus – there is an expectation that part of this will be used for the RES Account, which has also been impacted by the coronavirus;
- introduction of a temporary Supplier levy;
  - suppliers will also face a supplier levy in 2021 – unlike the ΠΧΕΦΕΛ charge, this new Supplier levy is a uniform levy for each MWh supplied;
- EUAs allocation;
  - increase the allocation of proceedings from the auctioning of EUAs from 65% to 78%;
- one-off extraordinary levy on RES producers revenues;
  - RES installations electrified before 31 December 2015 will have to return 6% of the revenues captured in 2020;
- RES producer verification fee;
- diesel tax;
  - introduction of a 0.03€/litre special green tax on diesel (for transport);
- PSO levy – RES levy compensation;
  - any future reduction in the PSO levy as a result of interconnection of islands to be used dynamically to offset any potential increase in the RES levy.

Exhibit 1.2 shows the impact of the announced measures on the cumulative balance of the RES Account out to 2030 as per our Baseline scenario with Exhibit 1.3 providing for further commentary with respect to the different cumulative balance trajectories presented.

Exhibit 1.2 – RES Account cumulative balance with and w/o measures, Baseline



	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
No Measures	93.2	-198	-572	-974	-1313	-1477	-1636	-1690	-1711	-1750	-1751	-1679
High degree of certainty	93.2	-13	-179	-480	-717	-778	-834	-785	-704	-639	-537	-361
Some degree of uncertainty	93.2	60	65	-92	-51	188	431	793	1187	1564	1979	2466
All measures	93.2	60	65	108	149	388	631	993	1387	1764	2179	2666
PSO reduction	93.2	60	65	70	70	108	152	314	508	684	899	1187
PSO & Diesel tax reduction	93.2	60	65	70	70	70	70	150	262	357	490	695

Source: AFRY Management Consulting

Exhibit 1.3 – Supporting commentary for Exhibit 1.2

'Cluster' of measures	Measures included	Commentary
High degree of certainty	*-Extraordinary RES tax (producers)* *-Supplier Levy* *-RES Levy reconciliation* *-Diesel tax*	There is a high degree of confidence both in terms of 'ability to implement' and the expected value of the additional inflows to the RES Account.
Some degree of uncertainty	*-PSO Levy compensation* *-RES producer verification fee* *-EUA Allocation* *(the trajectory in the Exhibit includes the above measures in addition to the ones classed as 'high degree of certainty')*	There is a high degree of confidence in terms of 'ability to implement' but the resulting level may be subject to market conditions. For example, based on the recent EU-wide emissions targets, EU allowances available to Greece might be lower than expected.
All measures	All	It is yet to be confirmed whether Greece will secure the additional RRF funds.
PSO reduction	All	This 'trajectory' allows for the 'PSO Levy compensation' to be reduced (and the benefit from the lower PSO levy to be transferred to consumers) as long as the cumulative balance of the Account remains above €70m.
PSO & Diesel tax reduction	All	This 'trajectory' allows for both the 'PSO Levy compensation' and 'Diesel tax' to be reduced as long as the cumulative balance of the RES Account remains above €70m.

Source: AFRY Management Consulting

Our analysis suggests that the announced measures appear to deliver a balanced RES Account across all modelled years (and in our Baseline scenario). However, all measures would be needed (if they are not substituted by other measures), and the accumulated funds will have to be in line with expectations given that in the short term the RES Account is projected to have a marginal surplus with the measures in place.

We have identified the following risks (amongst others) that could again bring the RES Account into negative territory:

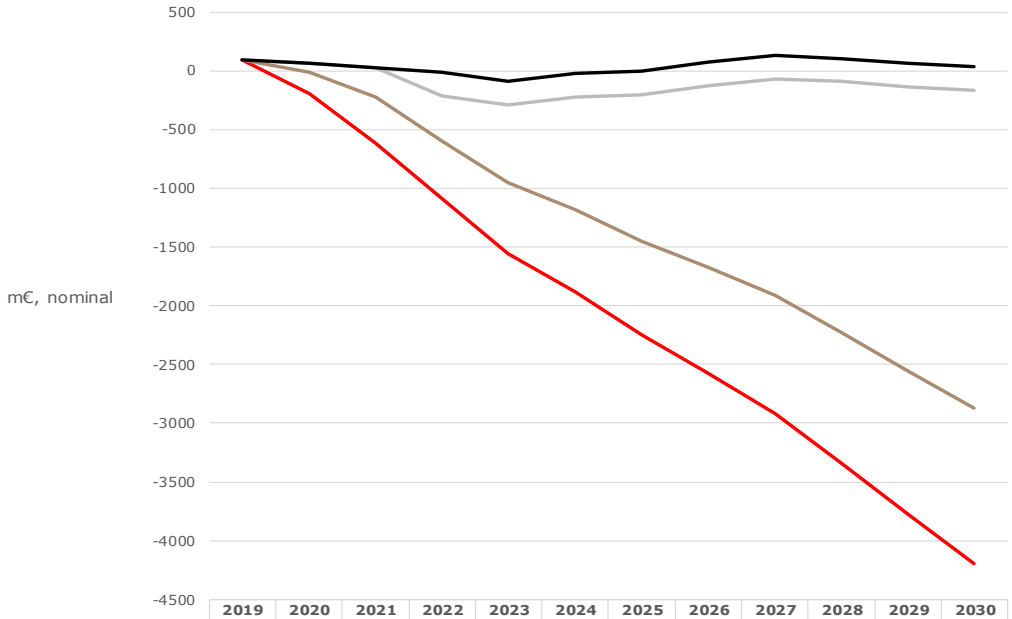
- **The RES Account is marginally balanced up to 2023**: Until 2023 the (cumulative) surplus of the RES Account ranges between €60m and €150m. As such, any implementation delays or a 'market shock' (significant delay to COVID-19 vaccine for example) could result in a deficit;
- **The additional income from the Resilience & Recovery Fund is yet to be confirmed**: If this income is not delivered in its entirety the RES Account may again not be balanced over the period 2022-23;
- **Income from the increased EUA allocation could be lower in the short-term:** Due to the recent announcement regarding the tightening of the EU-wide CO2 emissions targets, Greece may end up receiving a lower number of allowances than what is assumed in our analysis. Any such limitations of supply of allowances will most likely however come alongside an increase in the carbon price. If the carbon price does not rise to a level where it offsets this reduced number of allowances, this would again reduce the inflows to the RES Account; and
- **The timing of the interconnection with Crete is important:** Should the 'major' interconnection of Crete be delayed the expected €200m due to the "PSO Levy compensation" would be lost.

Post 2024, the outlook, however, is more positive. If all measures are implemented (even excluding the RRF income), the RES Account is projected to accumulate a surplus ranging between €2.5bn and €2.7bn by 2030.

We have therefore also explored how the "PSO Levy compensation" and "Diesel tax" incomes could be reduced in the future. Our analysis suggests that the 'PSO Levy compensation' and 'Diesel tax' could be abandoned from 2024 and 2026 respectively whilst ensuring that the RES Account has a cumulative surplus of €70m at all times (assuming that all other measures are implemented and deliver the expected outcomes).

Given that the future is uncertain, and the RES Account is impacted by global market forces, such as the price of gas and carbon, we have also explored a scenario where commodity prices remain depressed and demand grows at a slower pace. In the Stress Test scenario, the measures marginally suffice to deliver a balanced RES Account in the short term. A small deficit resurfaces in the very short term and disappears in 2026, but this is more 'manageable' when compared to the case without any measures in place. The effect of the measures on the RES Account balance in the Stress Test case are presented in Exhibit 1.4.

Exhibit 1.4 – RES Account cumulative balance with and w/o measures, Stress Test



	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
No Measures	93.2	-198	-614	-1092	-1553	-1881	-2249	-2574	-2920	-3337	-3771	-4191
High degree of certainty	93.2	-13	-221	-599	-958	-1183	-1448	-1670	-1913	-2227	-2557	-2873
Some degree of uncertainty	93.2	60	23	-211	-295	-226	-202	-125	-73	-94	-135	-164
All measures	93.2	60	23	-11	-95	-26	-2	75	127	106	65	36

Source: AFRY Management Consulting

In the Stress Test scenario, it is not only inflows (market income, EUA income etc.) that remain depressed going forward. As wholesale electricity prices remain at low levels, top-up payments under the FiP scheme also increase, further impacting the RES Account balance.

This then raises considerations also with respect to future RES procurement, and whether there is scope for gradually limiting the role of government support for RES development.

It is not within the scope of this report to look at and consider the future RES procurement in Greece. We have however noticed a relevant subtlety in the respective announcement of the broader structural measures. There is a mention of 'architectural' changes in the new RES auctions, which seems to hint towards greater market exposure.

The existing FiP contract already mean a certain degree of integration of RES in the markets (as RES with a FiP need to participate in the markets and have balance responsibility in the enduring model), and the announcement seems to imply the intention to take one step further towards a future move to unsupported RES.

One interpretation of these 'architectural' changes to the new RES contracts could be that the intention is to limit the volume of each project that is underwritten by a government-backed support contract through the new RES auctions. This could then mean that the support contract would cover part of the project (and help support project financing) and a greater share of the market risk could be borne by the RES project (and potentially be shared with an offtaker depending on the circumstances). This is obviously one of

the different ways that a smooth transition towards 'merchant' RES can be facilitated, and there would need to be further consideration on whether this will deliver more efficient outcomes for the Greek electricity market and the details of such a scheme.

In any case, before any such move towards more balanced risk allocation, there is a need to first encourage the full balance responsibility provisions for all FiP projects in line with European guidance and as is done in other European countries. The regulated provisions that shelter RES with a FiP contract from facing market imbalance exposure should be removed, but whilst ensuring that there are appropriate tools in place (for example intraday trading) to manage this responsibility.

2 Introduction

This report has been prepared by AFRY Management Consulting for the Regulatory Authority for Energy ("RAE"). All analysis included in this report has been based on assumptions agreed with RAE, and the scenarios included do not necessarily reflect our own independent views with respect to the evolution of electricity price projections (which may be different to those presented in this report). The main objective of our analysis is to provide for projections for balance of the RES Account, and high-level recommendations for potential measures that could be adopted to ensure the RES Account sustainability.

2.1 Structure of this report

The report is structured as follows:

- Section 3 provides for some background to the RES Account and describes how different circumstances, including the COVID-19 pandemic, have affected the sustainability of the RES Account;
- Section 4 presents our approach for quantifying and projecting the various inflows and outflows streams of the RES Account over the period 2020-22;
- Section 5 describes the underlying input assumptions used for modelling the Greek wholesale market and projecting the inflows and outflows of the RES Account over the period 2020-2030;
- Section 6 summarises the results of our analysis;
- Section 7 explores different policy measures that could be used to manage the balance of the RES Account, and puts forward a sustainable model for managing the RES Account; and
- Section 8 describes the measures as proposed by the Ministry of Energy and what those could mean for the balance of the RES Account.

2.2 Conventions

All monetary values quoted in this report are in Euros in nominal money terms, unless otherwise stated.

Annual data relates to calendar years running from 1 January to 31 December, unless otherwise identified.

2.2.1 Sources

Unless otherwise stated, the source for all tables, figures and charts is AFRY Management Consulting.

3 Background

The economic sustainability of the RES Account was a major concern in the past. The RES Account was in deficit until 2016 as the various income streams were not sufficient to cover the needs for supporting RES generated electricity. Outflows increased substantially as an unexpected amount of solar capacity was deployed over the period 2012-2013.

Policymakers attempted and managed to reduce this deficit through a number of measures targeted at suppliers (Supplier levy or ΠΧΕΦΕΛ), RES producers (FiT cuts) and consumers (increase of the RES levy). From late 2017 and until end of 2019 the RES Account was in 'surplus'. Since early 2019, however, the lignite levy and the Supplier levy have been removed, and the RES levy was reduced.

The administrator of the RES Account, DAPEEP, publishes on a monthly basis the inflows/outflows of the RES Account and also provides a forecast regarding the evolution of the RES Account balance for the remainder of the year. The latest DAPEEP forecast foresees a cumulative deficit of around €218 by the end of 2020[1].

The RES Account balance depends on a range of different income streams, and is heavily impacted by underlying market conditions (commodity and wholesale electricity price levels). Given this backdrop, RAE has identified the need for an independent analysis of the monthly evolution of the RES Account inflows and outflows for 2020-2022. This could act as a comparison to the DAPEEP forecasts and also help identify any further actions needed to ensure the sustainability of the RES Account.

3.1 Overview of the RES Account

Payments to RES generators are financed through the RES Account[2], with funds gathered through a number of revenue streams. **For simplicity, we**

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1 https://www.dapeep.gr/wp-content/uploads/ELAPE/05_JUNE_JULY_2020_DELTIO_ELAPE_v1.0_08.10.2020.pdf

2. The Renewable Energy Sources Special Account ('RES Account') managed by the RES & GO Operator (DAPEEP), is used to compensate renewable and combined heat and power producers for the energy that they produce. All the resources for the payments of FiTs and FiPs to the are gathered in the RES Account.

first present a simplified version of the inflows and outflows into the RES Account, prior to the recent changes introduced to better accommodate the FiP scheme.

The key revenues streams into the RES Account can be broadly grouped into the following:

- market revenues (i.e. the revenues generators would have earned had they solely been paid based on market prices), and include:
  - Day Ahead market income;
    - this is equal to the revenue that the entire Greek RES FiT portfolio captures for volumes sold (by the renewable energy market operator, 'DAPEEP') to the Day Ahead market at the System Marginal Price ('SMP');
  - imbalance settlement income;
    - this is equal to the charges (can be either positive or negative) that the deviations of the entire Greek RES FiT portfolio (represented by DAPEEP) face as part of the Imbalance Settlement;
  - average thermal variable cost 'uplift';
    - given the nature of the current Greek Pool and the SMP determination there are circumstances when the average cost of thermal generation 'running' is higher than the resulting SMP, and this component is aimed at reflecting this 'uplift';
  - 'avoided cost' (displacement cost) revenue for RES generation on the non-interconnected islands;
    - this stream is calculated as the product of RES generation on the non-interconnected islands and a regulatory set price equal to the weighted average cost of electricity for the non-interconnected islands and is paid by the Distribution Network Operator, DEDDIE, into the RES Account;
- auctioned European Union Allowances ('EUAs');
  - this represents the income from revenues accrued from auctioning of carbon allowances that goes towards supporting the RES Account; and
- the RES levy, levied directly on electricity consumers and aimed at compensating the variations between the total amount due to renewables and the other revenue streams;
  - this relates to the payments made by consumers in the form of a 'green' levy included in electricity bills and depends on the consumer type and the consumption level. This levy is the main 'tool' for ensuring a balanced RES Account as other revenue streams, and in particular market revenues, are floating and depend on market and weather conditions. The Regulatory Authority for Energy (RAE), revisits the level of the RES levy on a semi-annual basis.

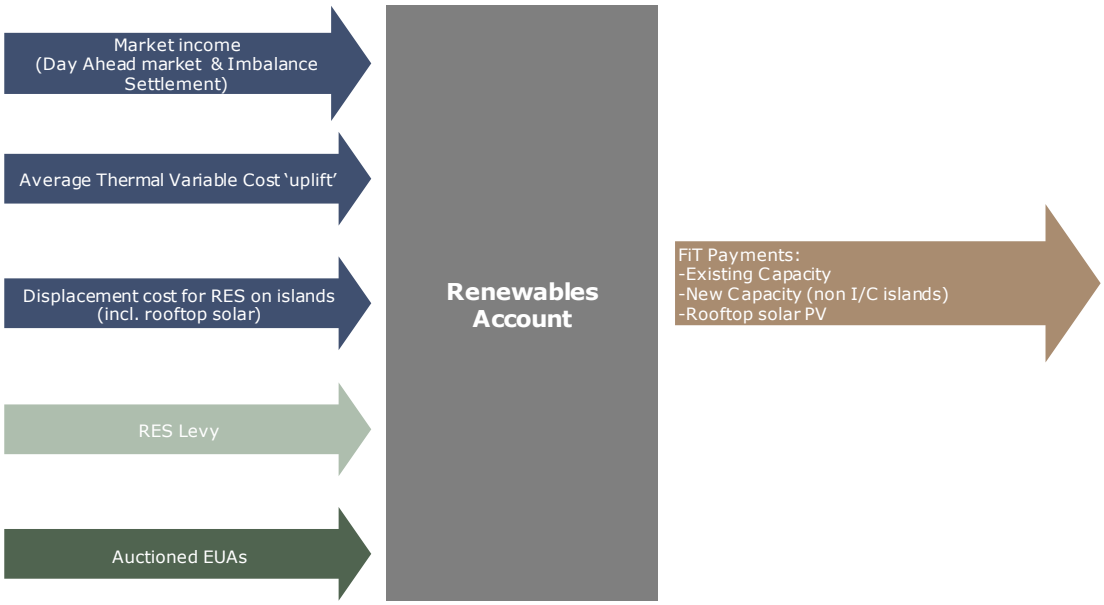
Other revenue streams for the RES Account that were used in the past include:

- the Supplier Levy;

- the Supplier Levy has now been abandoned, and was a charge on suppliers aimed at capturing the 'merit order effect';

- other revenue streams;
  - lignite levy;
    - this charge on lignite production has now been abandoned;
  - TV license levy;
    - this charge has also been abandoned.

Exhibit 3.1 – Simplified schematic representation of RES Account inflows and outflows



Source: DAPEEP, AFRY Management Consulting

The actual inflows and outflows of the RES Account is currently more complex than the simplified version presented above. It has been modified to account for additional outflow (and inflow) streams in the presence of projects under the new FiP support scheme. As shown in Exhibit 3.2, the RES Account has been split into four 'sub-accounts' and additional inflows relate to:

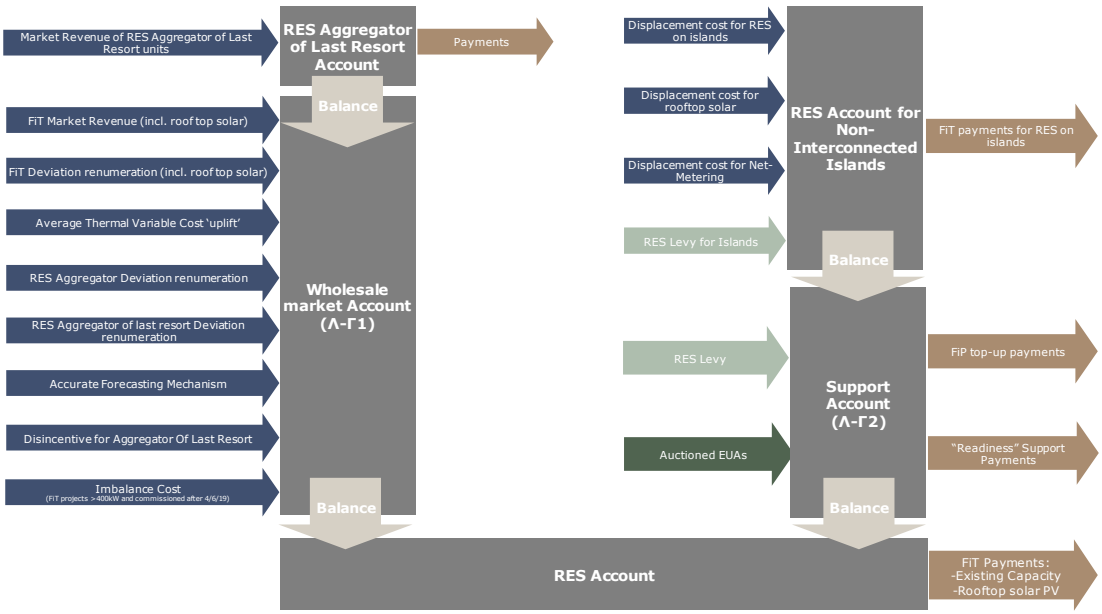
- market revenues and deviation renumeration for projects managed by DAPEEP in its role as a RES Aggregator and/or RES Aggregator of Last Resort; and
- revenues from the accurate forecasting mechanism.

Additional outflows correspond to:

- FiP top-up payments (which could also be an inflow); and
- 'Readiness' Support payments ('ΠΑΕΣΑ').

Most of these inflows/outflows are relatively small, and are expected to be removed once the new Target Model market is in full swing and the intraday market is operational and liquid.

Exhibit 3.2 – Schematic representation of the 'sub-accounts' of the Greek RES Account



Source: DAPEEP, AFRY Management Consulting

3.2 Historical performance of the RES Account

The Greek RES Account has in the past experienced a substantial deficit. Significant volumes of solar PV (around 2GW) were commissioned over the period 2012-13, having locked in relatively high FiT prices. As shown in Exhibit 3.3, the total FiT payments to renewables increased from around €1.2bn in 2012 to €2bn in 2013. Policy makers did not react quickly at the time to either better manage the volumes of FiT contracts that were made available or to increase the RES levy to be in a position to fund this new solar PV capacity added to the system.

The RES Account already had a deficit of around €200m at the beginning of 2012, and by the end of 2012 the RES Account stood at -€340m. The deficit continued to increase over the course of 2013 with a cumulative position of around -€580m by the end of 2013.

In April 2014, a bundle of measures was approved by the Greek Parliament (Law 4254/2014), more commonly referred to as the 'New Deal', aimed at resolving this RES Account deficit. The measures included:

- FiT cuts for both existing and new RES projects;
- 'back payments' for the 2013 income of existing RES projects (ie. the FiT cuts were effective from 2013 onwards); and
- an increase of the RES levy paid by electricity consumers.

Under the 'New Deal', solar PV faced the sharpest reduction with a FiT cut in the order of 33%. This also applied to rooftop installations (PV on residential rooftops faced a 20% cut). FiT level adjustments for operational PV took account of a number of factors, such as type of technology, time of project development, presence of other forms of subsidy (or tax exemptions), cost

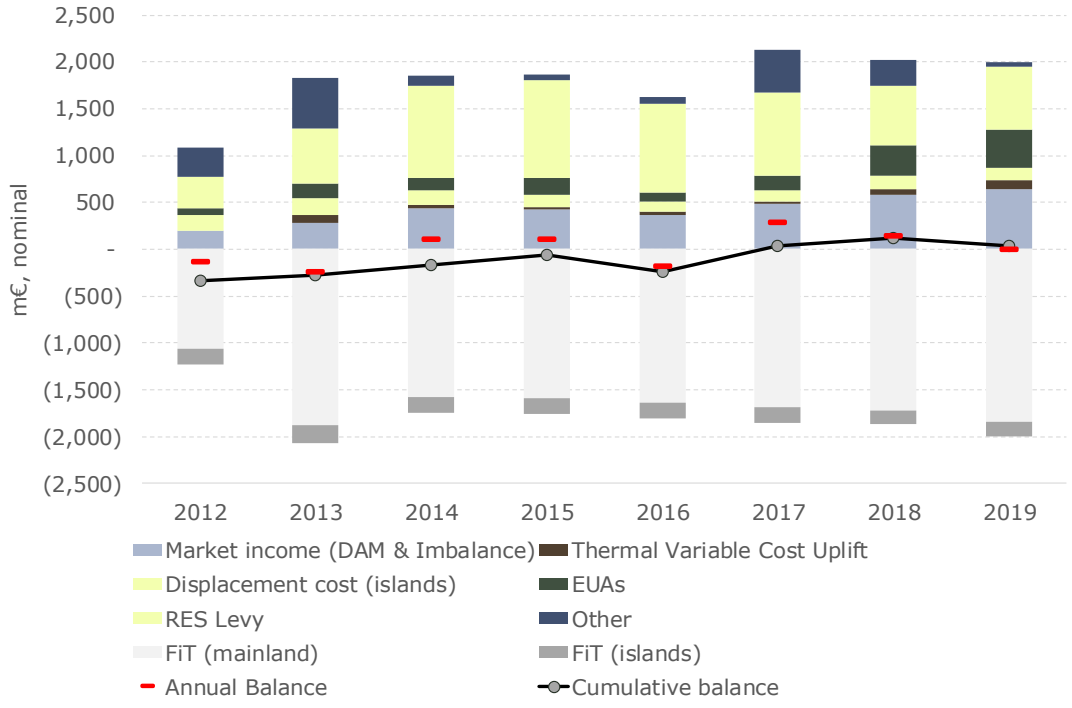
of the installation and even project location (specifically differentiating between projects in mainland Greece and the islands). Other existing RES such as wind and small hydro experienced a much smaller FiT reduction.

These retrospective changes were aimed at readjusting the existing applicable RES FiTs so that IRRs across all types of RES technologies were in line with an assumed European norm (around 12-15%) at the time.

The combination of these measures reduced the RES Account deficit, and the RES Account was almost balanced at the end of 2015. Underlying electricity prices can, however, have a strong impact on the RES Account inflows. Low gas prices in 2016 had a knock impact on Greek electricity prices. As a result, the corresponding market income of the RES Account was reduced and a deficit re-appeared.

In late 2016, a further RES Account revenue stream was introduced – the Supplier levy. This combined with higher electricity prices in 2017 helped eliminate the cumulative deficit of the RES Account by the end of 2017. In 2018 and 2019 the RES Account remained in surplus as electricity (and the corresponding market income) and carbon prices remained high.

Exhibit 3.3 – Historical evolution of RES Account balance



Source: DAPEEP

With the RES Account in surplus in 2019, the Ministry of Energy and Environment, decided, in late 2019, to:

- reduce the applicable RES levy; and
- remove the Supplier levy.

Electricity suppliers had been opposed to the Supplier levy since its original introduction. The surplus accumulated in 2019 appeared to allow for

removing this charge on suppliers and also reducing the RES levy imposed on end users. We can only assume that these steps were taken in late 2019 under the expectation that commodity prices and Greek electricity prices would, in 2020, remain at the levels seen in 2019 (or be even higher).

However, 2020 has so far been an extraordinary year. The COVID-19 crisis has had a strong impact on both global commodities markets and the Greek electricity market:

- oil and gas prices have dropped significantly, and with gas being the predominant price-setting fuel in the Greek electricity market, Greek electricity prices have followed a similar trend in 2020;
- with lockdown measures imposed from March to May 2020 in Greece, electricity demand has also seen a sharp year-on-year decline;
  - the demand drop has a 'double' effect on the RES Account;
    - on the one hand, lower demand means a lower RES levy revenue as this is a per MWh consumed charge; and
    - at the same time, lower demand means lower electricity prices, and, as a result, a lower 'market income' for the RES Account for the RES generated volumes.

Even before the full effect of COVID-19, and until the end of March 2020, the RES Account surplus had dropped to €65.6m as of end of March 2020 from €93.2m at the beginning of 2020. When accounting for the €70m buffer that has been introduced, the RES Account was standing at -€4.4m at the end of March 2020.

Based on the most recently available data from DAPEEP, the RES Account had a deficit of around €194m at the end of July 2020 as outflows were significantly greater than inflows over April to July. This comes as no surprise:

- electricity prices over the period April-July 2020 have remained depressed;
- demand was much lower than the levels seen over the same period in 2019; and
- the spring months are those that typically have relatively high outflows (high load factors for solar PV in particular), and relatively lower inflows (lower demand and electricity prices).

DAPEEP now projects an annual deficit of €311 for 2020. As the RES Account had a surplus of €93m at the beginning of the year, the cumulative position of the RES Account is expected to be -€218. This is based on the following assumptions:

- an average electricity price of €46.5/MWh for the last three months of 2020 (the average SMP for 2020 until end of June has been €41/MWh);
- an average EUA price of €27/tonne for carbon allowances;
- a total electricity consumption of 51TWh in 2020; and
- no change to the current RES levy.

4 Approach

Our approach for assessing the sustainability of the RES Account for the years 2020-30 is as follows:

- define the projected **outflows**;
  - the energy volumes are based on:
    - the existing renewables capacity and the expected future deployment on both the interconnected and non-interconnected system; and
    - AFRY's own data on load factors for different technologies that relies on historical irradiation and wind speed data, and also informed by historically observed generation (as reported by DAPEEP);
  - the effective Feed-in Tariff for different technologies (for projects with a FiT contract) are approximated by the weighted average effective FiT captured by different technologies in the past;
- project the various **inflows**;
  - the approach for defining the various inflows is detailed in the following sections with the key advantage in our approach being the accurate representation of the wholesale electricity price captured by renewables; and
- finally, define the monthly **balance** on the assumption that the RES levy is maintained at its current level.

4.1 Estimating RES Account outflows

The RES Account outflows consist of two key streams:

- Feed-in-Tariff payments, which include:
  - payments to existing RES projects on the interconnected system;
  - payments to existing/new RES projects on the non-interconnected islands (excl. rooftop solar); and
  - payments to existing/new rooftop solar (<10kW) projects on either mainland Greece or the non-interconnected islands.
- Feed-in premium (FiP) payments to RES projects with a FiP contract.

Further to these, there is also the "readiness" support payments that are used as a transitional measure to incentivise improving forecasting capabilities.

4.1.1 FiT payments for existing capacity

The FiT price level faced by different RES projects depends on a range of factors:

- technology type;
- year of commissioning;
- project size;
- location (mainland or non-interconnected islands); and
- the presence (or absence) of an upfront capital grant.

Calculating FiT payments on a project by project basis can prove challenging. There is a wide range of different projects with a different FiT and a lack of transparency when it comes to site-specific generation data. We have not used a bottom-up approach for defining the total FiT outflow. Instead we use a more simplified approach that can provide for sufficiently accurate estimates.

For the purposes of this analysis we have used the generation-weighted average captured FiT published by DAPEEP for 2019 as an indicator of the expected effective average FiT payment for the different technologies. This then assumes that the balance of generation across the projects remains fairly similar to that seen in 2019.

The projected generation is based on the installed capacity of RES projects under the FiT scheme as reported by DAPEEP[3], and our own assumptions on expected load factors for the different renewable technologies, and informed by historical load factors as inferred by data published by DAPEEP.

4.1.2 FiT payments for new capacity on the islands and roof-top solar

All new RES capacity on the non-interconnected islands will have a fixed price contract (until connected to mainland Greece) with applicable price levels defined in Table 1/Article 4 of Law 4414/2016, and any subsequent amendments. A similar approach is followed for rooftop solar projects below 10kW which are remunerated based on a different set of prices.

4.1.3 FiP payments for new capacity

Support payments to RES capacity on mainland Greece under the new support scheme take the form of a two-way Contract for Differences ('CFD'). This means a RES project receives (or pays back) the difference between an agreed strike price and the reference price.

[3] Monthly Bulletin of RES Account – April & May 2020

When it comes to the level of new capacity expected to be commissioned in the short-term we have used the latest DAPEEP projections as the starting point for 2020. We then include the capacity that has been awarded a contract from the FiP auctions and account for some capacity (solar PV) that is added to the system with a FiP contract but without going via the competitive auction route.

The Strike Prices for all new solar PV and wind generators have been estimated as follows:

- we compute the capacity weighted average Strike Price (faced by all projects commissioned in 20203) based on:
  - the actual FiP Strike Prices of RES projects commissioned until July 2020[4], and
  - for the remaining capacity between August and December 2020, the awarded FiP Strike Prices achieved in the auctions in chronological order (excluding projects that have already been commissioned);
- similarly, for subsequent years (2021-23), we use the auction results, again in chronological order, to derive a capacity weighted average Strike Price for each of the three commissioning years;
- for RES capacity that comes online from 2023 onwards and assumed to be procured from further rounds of FiP auctions we take a conservative approach and assume that the Strike Prices for the different technologies (solar PV and wind) are equal to the lowest successful bid prices from the last auction(s) should support be needed beyond market pricing.

The applicable reference price is then calculated as the monthly 'market-wide' generation-weighted average captured price for each technology using our modelled projections for RES generation and hourly price formation, and, as a result, the respective captured prices for each month in the modelled period.

Unlike the FiT scheme, only the premium (i.e. Strike Price – Reference price) is paid out of the RES Account in the case of the FiP scheme. We estimate this based on the respective Strike Prices for the different new projects and the modelled reference price. This then also means that wholesale market income captured by FiP projects is not included as an inflow to the RES Account.

4.2 Estimating RES Account inflows

The key inflows into the RES Account include:

- wholesale market income for FiT projects (represented in the wholesale market by DAPEEP) including any imbalance settlement charges;
- back-payments from FiP projects;
- average Thermal Variable Cost 'uplift';

[4] Data provided by the Client

- displacement cost for RES on islands;
- RES Levy; and
- auctioned EUAs.

4.2.1 FiT revenue from mainland generators (wholesale market)

Generation from FiT projects is included in the markets (via priority orders) by DAPEEP. DAPEEP then receives the corresponding payments for volumes sold in line with the resulting market price in any given period.

The monthly projected wholesale market revenue in our analysis reflects the annual captured price (by different renewable technologies on the mainland system), rather than the annual baseload price. The projected captured prices for solar and wind projects under the FiT scheme in mainland Greece is based on modelled results.

The modelling of the Greek electricity system is done with the use of our proprietary electricity dispatch model, BID3. We use BID3 for producing our own electricity price projection for Greece (and all other European markets). For this project we have modelled the Greek electricity system from August 2020 until end of 2030 under two scenarios. The scenarios and underlying input assumptions are described in Section 5.

We assume that all 'FiT' and 'FiP' volumes are traded in the Day Ahead market, and this means there is no need for defining the intraday prices.

We have also assumed that the imbalance settlement results in net zero effect for the RES portfolio represented by DAPEEP across a given year. This will obviously not be the case, and there may be some imbalance cost faced by RES generation. However, given the project timescales and scope of the project we have not performed such an imbalance costs analysis.

4.2.2 Back-payments from FiP projects

On the basis of the Strike Prices for FiP projects as detailed above and the market captured income as determined in our modelling, we also estimate the resulting back-payments from FiP projects into the RES Account, when the captured price exceeds the Strike Price (on a monthly basis).

4.2.3 Average Thermal Variable Cost 'uplift'

To ensure that the 'floor' level of the wholesale market inflow is maintained at any given hour, if the algebraic sum of the 'market' income is below the average variable cost of the operating thermal units, an uplift payment is currently charged to suppliers to ensure that the sum of these three variables is equal to the average variable cost of thermal units.

This uplift payment was relatively high in 2019 and is expected, by DAPEEP, to remain a significant inflow stream in 2020. This however, has been primarily a result of lignite units, with high variable costs, being required to generate out of merit, at certain hours, for system/technical reasons. Given that the modelling of such constraints is outside the scope of this project we

have used DAPEEP's projections so that this inflow stream is included in 2020.

From 2021 onwards and with the introduction of the new EU Target model compliant market the existence of such a mechanism is under question given the operation of the new market. As such, we assume that this mechanism is no longer in place from 2021 onwards.

4.2.4 FiT revenue from island generators (displacement cost)

Electricity generation on the non-interconnected islands is predominantly based on oil and diesel-fired generators, and the cost of generation is substantially higher when compared to mainland Greece. The 'market' revenue captured by the renewable generators on the islands (and by extension by the RES Account) is set to be equal to the avoided cost (i.e. what is the counterfactual cost of generation). We assume that this 'displacement cost' approach is retained in the future.

4.2.5 RES Levy

The RES levy is charged directly on the electricity consumption of end consumers, and is used to compensate for a shortfall in the RES account's other revenue streams. For 2019, the base RES levy was set at €17/MWh with applicable discounts for certain types of customers (and a different level applied to some types of consumers). The unit RES levy to be used for this analysis is assumed to remain the same as today (accouting for the move of some of the consumers to the base RES levy), and the total RES levy inflow is defined as the product of the applicable RES levy and the projected consumption.

4.2.6 Revenue from EUAs

Greece auctions EUAs and part of the proceedings is used to support the RES Account. The number of EUAs for 2021-2030 are calculated based on the total EU-wide allowances issued, including any reductions due to the Market Stability Reserve mechanism, as well as the proportion of EUAs that Greece has been receiving historically. The percentage of the revenues that are allocated to the RES Account is 72% for 2020, and assumed to revert back to 65% in 2021.

4.2.7 Other inflows

There are additional inflows that are much smaller in magnitude (such as the ΜΜΒΑΠ, ΠΑΕΣΑ etc.). These tend to be negligible and we have therefore used DAPEEP's projections for 2020 and have excluded those from our analysis for the years 2021/22.

5 Assumptions

5.1 Commodity prices

Exhibit 5.1 presents the annual time-weighted average gas and carbon prices used for the years 2020-2022.

Greek gas prices have been estimated based on the following methodology:

- for the months of August to October 2020 we use the historical average TTF spot prices;
- for future months and years we use as a starting point the average TTF forward prices as published by EEX over the period 1st of October-12th November 2020;
  - for November 2020 we have used the EEX month ahead index as of October 2020;
  - for December 2020 we have used the average of the month ahead products traded over the periods 1st of October-31st of October (month+2) and 1st of November to 12th of November (month+1);
  - for the first three months of 2021 we have used the average of the month ahead products (month+2, month+3, month+4) over the period 1st of November to 12th of November 2020;
  - for the remaining months of 2021 we have used the three quarterly products (2Q21, 3Q21, 4Q21) and for 2022 the relevant seasonal products (summer, winter);
  - for the years 2023, 2024 we have used the relevant annual products (calendar+3, calendar+4);
  - for the years 2025-2030, we trend between the 2024 gas price, as derived by the above methodology, and the post-COVID 2030 gas price projection used in the Impact Assessment done by the European

Commission 'Investing in a climate neutral future for the benefit of our people'[5];

- we then apply a premium based on the delta between Greek import gas prices and TTF in line with historical evidence for 2020 with this premium assumed to decrease and gradually disappear from 2025 onwards;
  - we do appreciate, however, that the historically observed premium when compared to the TTF index may not persist going forward, and if that is the case, Greek gas prices would be even lower with corresponding impact on electricity prices; and
- add the relevant gas entry and variable transportation charges as published by DESFA;
  - in the case of gas-fired generation we distinguish between mid-merit/baseload and more peaking units;
    - the former, are assumed to buy annual gas capacity products and it is only the variable exit charge (as published by DESFA) that is included in the generator bid; and
    - the latter are assumed to buy daily gas capacity products, and the exit charge is 'variabilised' and included in their respective bid.

The lignite prices used in our analysis are in the range 1.94 – 3.74 EUR/GJ[6].

When it comes to carbon prices, we have used the average traded price of the *December-20/21/22* forward products as published by EEX over the period 5-24 November 2020.

The displacement cost for RES on islands has been estimated as follows:

- based on short-term projections for HSFO and LSFO for the period 2020-2021;
- for 2030 we use the post-COVID 2030 oil price projection used in the Impact Assessment done by the European Commission 'Investing in a climate neutral future for the benefit of our people' to derive HSFO and LSFO estimates (the oil price has then been converted to HSFO and LSFO estimates in line with historical regression analysis);
- all estimates for the years between 2021 and 2030 are based on linear trending; and
- historical analysis undertaken, based on displacement cost data published by DEDDIE, to derive the power plant average efficiency on an island by island basis.

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5 https://www.galileogreenenergy.com/wp-content/uploads/2020/09/European_Commission_Impact_Assessment_2030Climateambition_Annexes.pdf

6 https://www.dei.gr/documents2/investors/meleth%20booz/understanding%20lignite%20generation%20costs%20in%20europe.pdf

We have also developed an additional scenario ('Stress-Test'), where we keep gas prices constant from 2024 onwards and carbon prices and displacement cost from 2023 onwards (in real 2019 money terms). The Greek gas premium is also assumed to disappear at a faster pace in the 'Stress-Test' scenario.

Exhibit 5.1 – Commodity prices (€/MWh, nominal), Baseline

	Gas	Carbon	Displacement cost (islands)
2020	11.59	24.37	127.0
2021	17.63	26.69	140.7
2022	18.07	26.96	155.1
2023	18.56	28.42	170.4
2024	18.43	30.00	186.5
2025	19.31	31.62	203.2
2026	20.22	33.30	220.5
2027	21.16	35.04	238.4
2028	22.13	36.83	257.0
2029	23.13	38.67	276.2
2030	24.16	40.58	296.0

Exhibit 5.2 – Commodity prices (€/MWh, nominal), Stress Test

	Gas	Carbon	Displacement cost (islands)
2020	11.60	24.37	127.0
2021	16.22	26.69	140.7
2022	16.48	26.96	155.1
2023	16.56	27.44	170.4
2024	16.43	27.99	173.8
2025	16.76	28.55	177.2
2026	17.09	29.12	180.8
2027	17.43	29.70	184.4
2028	17.78	30.30	188.1
2029	18.14	30.90	191.8
2030	18.50	31.52	195.7

Note 1: The gas price relates to undelivered gas (excluding transportation and exit gas capacity charges); 2020 prices are the historical average up to October and based on forwards thereafter
Source: EEX, EC

5.2 EUA allocation to the RES Account

Our assumptions for the EUAs available to Greece and the share allocated to the RES Account are shown in Exhibit 5.3 below. We have to note, however, that there is some uncertainty around the available EUAs to be auctioned in the very short term, and these may end up being slightly lower than those assumed below.

Exhibit 5.3 – EUAs available and allocation to RES Account

	Total EUAs	Allocation to RES Account
2020	20,629,500	72%
2021	20,570,394	65%
2022	19,682,687	65%
2023	21,001,649	65%
2024	25,669,781	65%
2025	24,133,322	65%
2026	26,062,483	65%
2027	24,695,081	65%
2028	23,486,116	65%
2029	22,334,047	65%
2030	21,189,227	65%

Source: RAE, AFRY Management Consulting

5.3 Demand

As already discussed, one of the key inflow streams of the RES Account is the RES levy. As such, the assumed Greek electricity demand is a key parameter. Electricity demand impacts directly in terms of total RES levy collection and indirectly in terms of the resulting electricity price formation (and the market income captured by RES).

We have developed two demand tracks to capture a wider range of how electricity demand might evolve in the next decade.

Exhibit 5.4 shows our demand assumptions for the interconnected system in our Baseline scenario. In this scenario we expect a total demand that is approximately 6% in 2020, when compared to the NECP estimate. This demand reduction is informed by the so far observed impact of COVID-19 on demand. We then assume that demand reverts back to the NECP level in 2025.

Exhibit 5.4 – Interconnected system demand projections (GWh)

	Baseline	'Stress test'
2020	49,844	49,844
2021	50,197	50,021
2022	51,383	50,189
2023	55,592	54,292
2024	56,341	55,125
2025	57,095	55,960
2026	57,274	55,901
2027	57,453	55,842
2028	58,190	56,304
2029	58,927	56,760
2030	59,664	57,213

Notes: Crete & Cyclades are assumed to be part of the interconnected system in 2023
Source: NECP, ADMIE, AFRY Management Consulting analysis

5.4 RES levy

Exhibit 5.5 presents the RES levy used for the interconnected and non-interconnected electricity system. As different customers are subject to a different RES levy, a demand weighted-average RES levy is used for the interconnected system based on the charges set out in ΥΠΕΝ/ΓΔΕ/76979/4917 and additional data provided by DAPEEP with regards to the number of customer eligible for a RES Levy discount. For defining end-user demand and the associated RES Levy inflow we assume 2.4% losses on the transmission side and also take into account the 'losses scaling factors', as set out in 778/2020 for losses on the distribution network.

Exhibit 5.5 – RES levy (€/MWh, nominal)

	Interconnected	Islands
2020	14.37	17
2021	14.37	17
2022	14.37	17
2023	14.37	17
2024	14.37	17
2025	14.37	17
2026	14.37	17
2027	14.37	17
2028	14.37	17
2029	14.37	17
2030	14.37	17

Notes: It is not yet clear yet which types of and how many consumers face a discounted levy, and the demand-weighted RES levy on the interconnected system may be different than the one presented here
Source: RAE, AFRY Management Consulting

5.5 RES installed capacity

Exhibit 5.6 presents the assumptions for FiT projects on the interconnected system. The capacity figures are taken from the latest DAPEEP publication and are assumed to remain constant for the next two years. The annual load factor is based on the average observed in the period 2017-2019. The assumed FiT that these projects receive is based on the generation weighted average Strike Price of each technology using data published by DAPEEP over the course of 2019.

As FiT projects exit their 20-year contracts and enter the 7-year extension period, the effective FiT will gradually start to drop. However, this drop and the corresponding drop in the overall FiT expenditure will start becoming more noticeable post 2030. Similarly, Exhibit 5.7 presents the assumptions used for FiT projects on the non-interconnected islands.

Exhibit 5.6 – FiT RES project assumptions (interconnected system)

	Capacity (MW)	Load factor (%)	FiT (€/MWh)
Wind	2632	26.88	93.4
Solar*	2233	17.12	277.1
Rooftop Solar	353	15.02	420.0
Small Hydro	225	32.32	87.4
Biomass	70	51.10	148.5
CHP (small)	105	20.1	148.3
CHP (dispatchable)	134.6	74.3	17.08

Note 1: For the years 2021 and 2022, 45MW of FiT Solar PV projects are added (<100kW) per year
Note 2: Once FiT projects (solar and wind) enter their extension period, they are subject to a Eu90/MWh tariff and as a result the effective FiT presented above drops.
Source: RAE, DAPEEP, AFRY Management Consulting

Exhibit 5.7 – FiT RES project assumptions (islands)

	Capacity (MW)	Load factor (%)	FiT (€/MWh)
Wind	306.8	26.13	94.61
Solar	129.8	19.35	364.28
Rooftop Solar	22.1	18.38	419.4
Small Hydro	0.3	32.72	91.67
Biomass	1	50.11	224.51
CHP	0	n/a	n/a

Notes: FiT presented reflects projects commissioned before 2020. RES on the NII commissioned from 2020 onwards are subject to a Eu98/MWh tariff for wind and a Eu65/MWh tariff for solar PV.
Source: RAE, DAPEEP, AFRY Management Consulting

Exhibit 5.8 presents the assumed RES capacity for the years 2020-2030 for projects under a Feed-in-Premium (FiP) contract. The 2020 numbers are based on the March/April 2020 monthly bulletin DAPEEP projections.

Exhibit 5.8 – FIP RES capacity (MW)

	Wind	Solar	Small hydro	Biomass	CHP
2020	1109	405	25	27	10
2021	1864	1187	25	37	10
2022	2200	1725	25	47	10
2023	2300	2011	25	54	10
2024	2550	2298	25	60	10
2025	2800	2584	25	67	10
2026	2800	2584	25	77	10
2027	2800	2584	25	87	10
2028	2800	2584	25	137	10
2029	2800	2584	25	187	10
2030	2800	2584	25	237	10

Note 1: Corresponds to the December capacity of the given year
Note 2: Years 2021,2022 include ~400MW of FiP projects that have secured a contract outside the auctions (communities' projects and projects of capacity between 100kW and 500kW)
Source: RAE, DAPEEP, AFRY Management Consulting

Exhibit 5.9 presents the assumed Strike Prices RES projects commissioned from 2020 onwards based on the auction results from 2018 out to April 2020. The Strike Price changes year-on-year to take account of the lag between securing a FiP contract and electrification.

Exhibit 5.9 – Assumed FiP Strike Price for FiP projects (€/MWh, nominal)

Commissioning Year	Wind	Solar	Small hydro	Biomass	CHP
2020	93.34	66.50	100	184	99.9
2021	59.63	58.53	100	184	99.9
2022	55.78	51.51	100	184	99.9
2023	55.87	45.84	100	184	99.9
2024	54.64	45.84	100	184	99.9
2025	53.86	45.84	100	184	99.9
2026	53.86	45.84	100	184	99.9
2027	53.86	45.84	100	184	99.9
2028	53.86	45.84	100	184	99.9
2029	53.86	45.84	100	184	99.9
2030	53.86	45.84	100	184	99.9

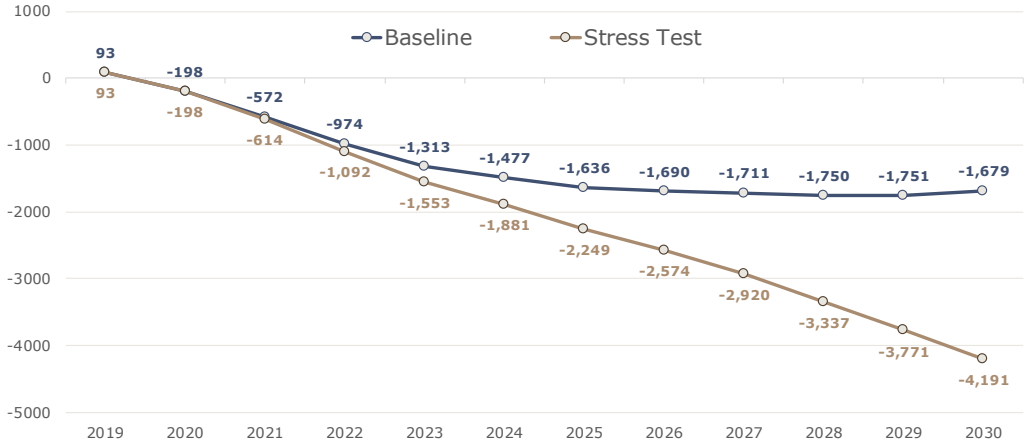
Source: RAE, DAPEEP, AFRY Management Consulting

6 Projections of the RES Account balance

Our analysis suggests it is hard to see a set of underlying market conditions that would result in a balanced RES Account in the next decade. Some form of policy intervention would be needed to ensure that DAPEEP's obligations under its support contracts with RES producers can be met.

Exhibit 6.2 presents the projected cumulative surplus/deficit of the RES Account over the period 2020-30 in the two scenarios (Baseline and 'Stress Test') ignoring the €70m buffer and the policy measures announced on November 2020 by the Ministry of Energy & Environment.

Exhibit 6.1 – Projected cumulative balance of RES Account (m€, nominal)



Notes: 2020 figures take account of the historical data published by DAPEEP up to July and assume that the effective RES levy for 2020 accounts for a shift away from a discounted levy for a significant portion of customers

Exhibit 6.2 shows the breakdown of the different key inflow and outflow components for the baseline scenario and similarly Exhibit 6.3 the resulting breakdown under our Stress Test scenario. All inflow streams are expected to be lower in 2020 when compared to 2019, and lower than previous expectations in the short term (an in-depth explanation of the key drivers is presented in Exhibit 6.4):

- **RES levy**: the RES levy income stream is a function of the per unit RES levy and the underlying end user demand. The 2019 mainland electricity demand (on the HV side) was 52.2TWh and we expect the 2020 mainland electricity demand to be lower than that (49.8TWh) with electricity demand assumed to bounce back to the 2019 level in 2023. This demand reduction has a direct impact on the volumes that pay the per unit RES levy and indirectly impacting on wholesale electricity price levels.
- **Market income**: lower than expected gas, and as a result, electricity prices have a knock-on impact on the 'market income' captured by FiT RES volumes – the demand reduction puts further downward pressure on electricity prices and the corresponding market income.
- **EUA auctions**: the announcement from EEX with respect to the carbon allowances to be made available to Greece means that Greece will now have 15% less allowances to auction in 2020 than envisaged. Most of the proceedings from the auctioning of the EUAs (72%) is used to support the RES Account, and this income stream is now expected to be lower. The Market Stability Reserve is expected to 'remove' further allowances out to 2023.
- **Displacement cost (islands)**: the corresponding displacement cost for the islands is also going to be significantly lower in the short term given the current oil price levels.

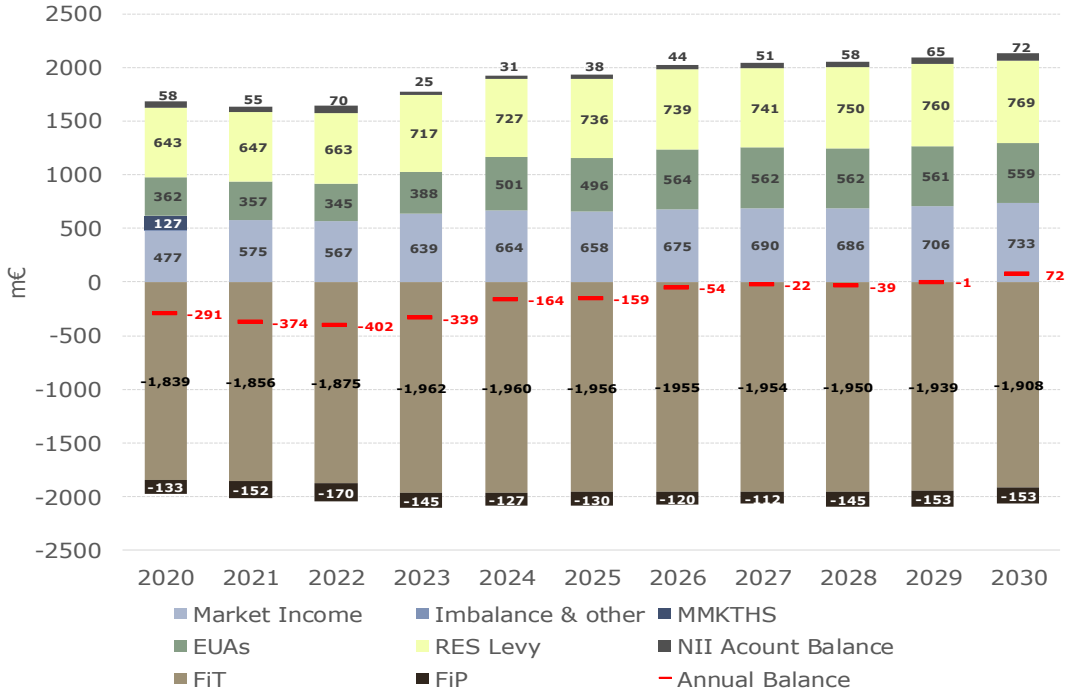
The average thermal variable cost uplift is calculated by the Greek TSO, ADMIE, based on the actual dispatch, which may include 'out of merit' generation. For 2020 we have used DAPEEP's projection of €127m. With the new Greek market design now in place, this 'uplift' will be abandoned, and we have therefore excluded it from our projections.

On the other hand, outflows in the short-term are expected to increase (though this increase will be rather limited):

- **Feed-in-Tariff**: the FiT payments are expected to increase in 2021/22 due to some limited additional solar PV projects (<100kW) that are expected to be commissioned with a FiT contract (40MW per year);
  - 2020 was a year with a lower than average RES output, and once we move to more 'typical' RES output levels in our modelling in 2021, the overall FiT expenditure will be slightly higher; and
- **Feed-in-Premium**: with additional FiP RES projects commissioned in the next years, FiP payments are also expected to rise.

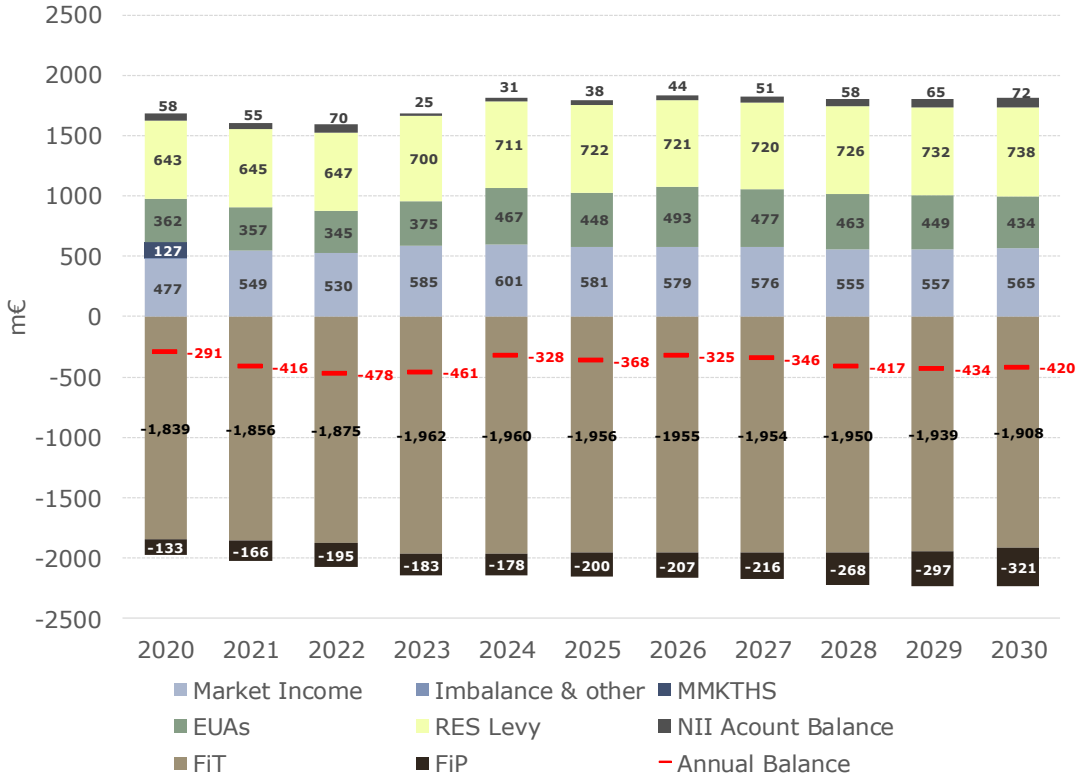
In our Baseline scenario, the annual (current) balance of the RES Account is expected to improve from 2024 onwards where an annual deficit of €164m is expected in 2024 compared to the €339m deficit expected in the previous year. Even though, the annual deficit of the RES Account drops in the longer-term with a surplus envisaged in 2030, the RES Account would have already accumulated a circa €1.7bn cumulative deficit in 2030. In our Stress Test scenario the deficit accumulated in 2030 is €4.2bn. Depressed commodity prices result in equally low inflow streams and FiP payments increase as a higher top-up is needed for RES projects with a FiP contract.

Exhibit 6.2 – Projected evolution of RES Account inflows/outflows, Baseline scenario (m€, nominal)



Notes: 2020 figures include the historical data published by DAPEEP up to July.

Exhibit 6.3 – Projected evolution of RES Account inflows/outflows, Stress Test scenario (m€, nominal)



Notes: 2020 figures include the historical data published by DAPEEP up to July.

Exhibit 6.4 –Key drivers impacting on the RES Account balance (Baseline scenario)

Inflow/Outflow Streams	Drivers
Market Income	***Short Term*** **–**Expected to rise in line with the underlying wholesale price movements (driven by gas and carbon prices). ***Medium Term*** **–**Post-2025, however, even though gas and carbon prices continue to rise, the market income into the RES Account remains fairly stable as additional low variable cost renewable generation on the system offsets the commodity-driven increase of the electricity price, especially at times of high renewables generation.
EUAs	***Short Term*** **–** The EUA income drops in the first years of the modelling period as a result of a somewhat stable carbon price, an assumed reduction of the EUA allocation to the RES Account compared to 2020 (from 72% to 65%) and an expected reduction of EUAs allocated to Greece given the Market Stability Reserve (MSR) mechanism. ***Medium Term*** **–** The EUAs income then rises until 2026 as a result of an increasing carbon price as well as a slight increase in EUAs made available to Greece. During the last 4 years of the modelling period, the EUA income remains stable as any carbon price increase is offset by the reduction in expected allowances to be made available to Greece.
RES Levy	The RES Levy income is the product of the unit RES Levy and the electricity consumption on the interconnected system. As the unit RES Levy is assumed to remain constant throughout the entire modelling period, the RES Levy income moves in line with the underlying electricity consumption. With the 'full' interconnection of Crete assumed to take place in 2023, the RES levy income increases (though this is a simple transfer from the NII Account Balance).
NII Account Balance	***Short Term*** **–** The displacement cost is expected to increase in line with rising carbon prices and a bounce-back of the oil price. With the interconnection of Crete in 2023 however, a significant portion of NII demand is transferred to the interconnected system and as a result, the income from the NII RES Levy drops, with the corresponding impact on the balance of the NII Account. ***Medium Term*** **–** With electricity consumption on the NII system increasing and no assumed increase of the FiT RES portfolio on the islands, the NII Account balance rises.
Feed-in-Tariff payments	***Short Term*** **–** Feed-in-Tariff payments rise out to 2023 with additional small (<100kW) projects added to the system (2021/22) and once the Crete FiT payments are transferred to the interconnected RES Account in 2023. ***Medium Term*** **–** As FiT projects enter their "extension" period, and remunerated based on a reduced tariff, FiT payments start dropping.
Feed-in-premium payments	***Short Term*** **–** FiP payments rise out to 2023 as additional RES capacity is added to the system (awarded through the FiP tendering scheme). Even though auctions are expected to continue and additional FiP projects are installed until 2025, FiP payments drop because of an increase in wholesale prices (with an associated drop in the required premium) as well as expected reduced Strike Prices from the second set of auctions which results in generators having to pay to the Account. ***Medium Term*** **–** With additional RES capacity on the system post 2025, the captured price of RES assets drops (cannibalisation effect) and as a result FiP payments are expected to rise again for the rest of the modelling period..

Source: AFRY Management Consulting

7 Options for managing the RES Account

7.1 Potential measures

There is a wide range of potential measures that can be adopted to help manage the RES Account balance and continue with uninterrupted support payments to FiT and FiP contract holders:

- limiting outflows (ie reducing payments to RES generated volumes);
- increasing inflows; or
- allowing a deficit to persist and deferring payments (through raising debt).

There are pros and cons with the different options, and given the potential magnitude of the RES Account deficit, a combination of measures may be more appropriate. Some are also better suited in the short term, whereas others may require additional time to be implemented.

The intention is to put forward and assess different measures that can be used as interim solutions and more long-term solutions that can be used on a sustainable basis.

7.1.1 Retroactive changes to support payments

FiT tariffs for some projects have already been reduced in the past under the 'New Deal' legislation. These FiT 'haircuts' came at a time when Greece was facing an economic crisis and the RES Account deficit was at an unsustainable level. Tariffs may have been reduced, but, at the same time, RES producers with a FiT contract were also given an extension to the existing contract tenure.

Regulatory and revenue certainty are very important for investors. Any retroactive changes to support payments may undermine investor confidence and even result in additional costs in the longer term (as cost of capital tends to rise if there is policy instability and uncertainty). That said, the presence of a deficit in the RES Account is, in its own right, a source of uncertainty that does impact on investor confidence.

Currently, there are projects that are being connected to the system with their remuneration being a result of participating in a competitive auction process. In the case that cuts to support payments end up being used to manage the RES Account deficit, projects that have participated in an auction should be excluded:

- their Strike Prices and respective support cost is very small when compared to the FiT projects, and, if anything, these may end up actually paying into the RES Account rather than receiving payments once electricity prices rise;
- there may be legal complications with changes to remuneration that has been determined from participation in a public tender.

A FiT cut for some classes of existing RES projects is a possibility, but is far from ideal. It is not only Greece where such cuts are being considered. As a benchmark, in France they are now imposing a FiT cut on solar PV built before 2011. There may be however unintended consequences from a mandated FiT cut:

- the impact on RES producers and utilities may have knock on effects to the wider electricity sector and even adversely affect lenders;
- foreign and domestic investor confidence may be undermined, and this can increase cost of future RES projects; and
- there may then be wider implications on the Greek energy strategy, which is now based on the wider deployment of RES.

That said, it is in everyone's interest for the RES Account to be balanced. A FiT cut would permanently reduce the outflows of the RES Account, and will therefore reduce the likelihood of a deficit re-appearing in the future. This also translates into timely payments to RES producers. At the same time, it also improves electricity affordability, assuming that the change does not result in higher required returns for new RES projects.

A centrally imposed FiT reduction could be:

- complemented with a 'counterweight', such as a reduction in exchange for an extension to the grid connection agreement; and/or
- done on a voluntary basis, again in exchange for an extension to the grid connection agreement.
    - it is unclear however what the uptake of a voluntary scheme would be, but this could be combined with a mechanism that gives priority to support payments to those that have accepted a FiT cut (with those that did not opt for one being the ones that get paid last in the case a RES Account deficit re-surfaces).

RES producers with existing FiT contracts may also be offered a choice:

- either accept a small FiT cut; or
- a higher FiT cut in exchange for an extension of the grid connection.

In any case, the issue around investor confidence and perceived risks remains. Policy makers should be mindful of the perception that retroactive FiT cuts create, and the potential for risking future RES deployment

(indirectly) and/or increasing the cost of future installations. We are not supportive of such retroactive measures given the potential impact on investor confidence and long-term efficiency.

7.1.2 Extraordinary charge to RES producers

An extraordinary charge to RES producers has also been used in the past, and it is easier to implement. It is, however, an interim solution and most definitely not in line with the philosophy of a sustainable and robust model. The same considerations as those with a FiT cut apply.

7.1.3 RES levy increase

The RES levy was designed to be the main 'lever' for ensuring that consumers face the real cost of RES generated electricity. Similar regulated levies are used in other European countries (such as the EEG surcharge in Germany). The RES levy could be adjusted to compensate for the difference between underlying electricity market prices and the cost of RES generated electricity procured under support schemes:

the RES levy should increase as underlying electricity prices drop; and

the RES levy should decrease when underlying electricity prices rise.

There are some obvious attractions with increasing the RES levy, in particular in terms of simplicity, but will also mean an increase in the cost to consumers in the short term (even though the overall cost to consumers may be lower as a result of lower wholesale prices, given that the cost of RES is in any case fixed).

7.1.4 Introduction of a Supplier levy

In other European countries (for example the UK), there is no explicit payment from consumers, and the funds needed for the support payments are collected from electricity suppliers. This can be done in different ways, but typically the relevant payments for supporting RES from suppliers are proportional to the underlying retail market share.

In the past, an interim Supplier levy had been put in place. Its estimation was somewhat complicated with an uplift calculated from an additional ex-post run to reflect the 'merit order effect'. A new supplier charge could be introduced, which could take the form of a uniform charge per MWh supplied.

Any form of charge on suppliers should be done in a way that:

- it does not distort retail competition; and
- allows for the efficient functioning of the market and use of resources (and does not create perverse incentives for suppliers).

There is however no clear benefit from including the cost of supporting RES in the competitive part of the retail tariff. This would effectively be a pass-through charge, and there is no room for suppliers to compete as is the case with wholesale sourcing.

Retail competition should be encouraged and facilitated. Any form of price regulation may distort competition, and risk the long term efficiency of the system. If an obligation (and a charge) is imposed on suppliers, then they should be in a position to recover this additional cost from consumers. Any form of explicit or indirect retail price cap can negatively impact retail gross margins and the sustainability of the supply business.

There is no clear benefit from moving away from the RES levy to a Supplier levy. In both cases, its calculation would need to be done in a dynamic way and allow for re-adjustment.

7.1.5 Increase the amount of EUAs allocated to the RES Account

There is always the option to increase the amount of revenues from auctioning EUAs by increasing the share of EUAs allocated to the RES Account. An additional 10% of EUAs allocated to the RES Account equate to around €50m based on the assumed carbon prices. This measure on its own appears to be insufficient to fully cover for the expected RES Account deficit, and would have to be combined other measures. At the same time, this would mean that the relevant funding for other purposes would be lower.

7.1.6 More innovative solutions

RES could be supported through a broader base through the introduction of a carbon tax. Carbon tax schemes in addition to the EU ETS have been introduced in some European markets (GB is an example). In the case of Greece, this could cover the wider energy sector, rather than being limited to power generation. Any carbon emitting activity (transport, heating, power generation) could face an additional carbon tax with the proceedings being used to support the RES Account.

The design of such a scheme would require further consideration to understand the impacts on the wider economy. Exceptions may also have to be made, in particular for some industrial activities where energy costs are a key input and additional costs may impact on competitiveness.

Broadening the base that pays for the RES Account has however some attractions. It would limit the additional burden on domestic electricity consumers, and could even provide for incentives to reduce carbon emissions from other activities. We do recognise, however, that a carbon tax scheme goes beyond the scope of the power generation sector and lies within the remit of the wider energy and environmental strategy of Greece.

In the short run this is a measure that may be more difficult to implement. In the medium to long term, however, this appears to be a solution that has the potential to completely eliminate any future deficit in an equitable way, whilst providing incentives for wider energy decarbonisation.

We recently see a growing demand in specific European countries for Guarantees of Origin (GO), and a lot of large companies are trying to enhance their sustainability profile. Greece could also consider a voluntary scheme for contributing to the RES Account with supporters receiving some

form of 'green' accreditation showing the extent to which they help support RES generation in Greece.

7.2 What are the most appropriate solutions in the short term?

Unfortunately, in the short term the solutions that can realistically be implemented are more 'traditional', and include:

- an increase of the RES levy;
- the introduction of a Supplier levy;
- an extraordinary charge to RES producers;
- an increase in the allocation of EUAs; and
- a more permanent FiT cut.

It is far from ideal to use measures that have been used in the past, but in the very short term these appear to be the only options that can be adopted. The only other alternative would be to fund the deficit through debt to allow time for a more enduring solution to be put in place.

Directing more of the proceedings from the auctioning of EUAs does mean less money for other schemes and incentives. However, given the circumstances, it may be more appropriate to proceed with this to limit the scale of any further measures.

Given the wider economic considerations and in the current COVID-19 dominated environment, any increase in the RES levy could be something that is more difficult to adopt. Under different circumstances, we would be more supportive of an increase, and once the economy is in a more stable state, the RES levy should be used to manage the RES Account.

We are not in general supportive of a Supplier levy, on the basis that this may be passed through to consumers and end up being equivalent to an increase in the RES levy. Alternatively, if any such charge is 'absorbed' by suppliers this may result in a squeeze in their retail margins.

In the absence of other alternatives, some form of reduction for FiT projects may end up being inevitable. If this goes ahead, it should be done on the following basis:

- only if there is room for any reduction or charge when looking at the implied returns;
- with a view of returning any extraordinary charge once a RES Account surplus arises; and
- potentially in exchange for a grid connection extension assuming a more permanent reduction or on a voluntary basis.

We therefore see the following as a realistic plan given the various constraints:

- increase the EUA allocation to allow for additional proceedings into the RES Account per annum;

- offer the option to RES producers with a FiT contract to opt for a FiT cut in exchange for a grid connection extension;
  - grid connections in the future will be highly valuable and there should be strong uptake of this option, but we do accept that some RES producers may not find this attractive;
- allow for part of the existing deficit to be serviced through debt to the extent possible with the debt then repaid from the RES Account once the long term solution is put in place;
- if the above does not allow for fully alleviating the deficit and if possible increase the RES levy; and
- impose an extraordinary charge to RES producers for the remaining of the deficit (if any) up to a level that does not imply a drop below an IRR of 10% and if and only if all other measures are not sufficient to manage the deficit and with a view of repaying this once the RES Account has a surplus;

7.3 What are the most appropriate solutions in the medium to long term?

A more sustainable solution could be centred around more innovative ideas that provide for incentives for wider decarbonisation and allow for consumers to recognise the benefits of RES. In the medium to long term, we believe that the RES Account could be:

- funded from a broader base (rather than simply electricity consumers) through the introduction of a carbon tax on heat and transport;
  - such a measure is now also being introduced in Germany;
  - unlike electricity consumption that is relatively inelastic (and considerably less carbon intensive than oil products used in heat and transport), higher cost of fuels for heat and transport can result in lower consumption and switching to renewable energy sources; and
  - the cost of supporting RES will be more targeted to those with a higher carbon footprint;
- further support by large consumers (and even domestic consumers) and suppliers on a voluntary basis;
  - several companies are now attempting to enhance their sustainability agenda and may be willing to contribute to the RES Account on a voluntary basis in exchange for 'green' credentials.

The long-term model for the RES Account should then be based on:

- continuation of the existing inflows;
- allowing the RES levy to adjust depending on projected balance but with a cap;
- introduce a carbon tax on carbon emitting fuels in the heat and transport sectors with some of the proceedings going into the RES Account – if there is excess these funds can be used for incentivising other initiatives that promote decarbonisation (EVs, energy efficiency etc.);

— set up a scheme that promotes 'green credentials' with voluntary contributions;

— continue with offering the option to accept a FiT cut in exchange for a grid connection extension.

7.4 Summary of options

The table below summarises the various options we have identified.

Option	Potential	Timing	Comment	Recommendation
Increase RES levy		ST/LT	- Straightforward to implement - In line with approach used in other countries	✓Allow RES levy to fluctuate to compensate for differences but with a cap in the **LT model**
Introduction of Supplier levy		ST/LT	- Straightforward to implement - Depending on level may squeeze retail margins unsustainably in the ST - May result in an equivalent increase in cost to consumers if fully passed through	✗
Carbon tax on wider emissions (heating and transport)		LT	- Enhanced incentives for decarbonisation - More complex to implement - Requires buy-in from a wider group of stakeholders	✓Structure the **LT RES Account model** around this carbon tax with a view to reduce contribution if other streams provide for sufficient income
'Green credential' contributions	Limited	LT	- Market is still immature - Limited uptake - Potentially limited income	✓Set up a scheme that allows 'green credentials' in the **LT model**
Voluntary FiT reductions	Limited?	ST/LT	- Potentially limited uptake	✓Give RES producers the option to opt for a voluntary RES cut in exchange for a grid connection extension
Mandated FiT cuts	ca €200m (assuming 10% cut)	ST/LT	- Risks investor confidence and this, in turn, may mean higher system costs and consumer costs in the long run (as investors require higher returns)	✗ Avoid mandated FiT cuts even if it deemed that returns are beyond the norm (✓) Introduce an extraordinary charge if and only if no other option available
EUAs allocation	ca €75m (assuming 80%)	ST	- Diverting resources from other activities - Proceedings are unlikely to be sufficient on their own to eliminate the deficit	✓Increase EUA allocation in the short term
Retention of Average Variable Thermal Cost 'uplift'	Limited	ST	- With the new Target Model market there should be no need for the ΜΜΚΘΣ - With lignite units running less frequently this cost item will in any case be significantly lower	✗

8 Impact of proposed Ministry measures

8.1 Ministry of Energy & Environment measures

The Ministry of Energy & Environment has now proposed a set of measures to alleviate the RES Account deficit. This bundle of measures includes some actions, which we were also proposing, and some additional measures that we had not considered.

These measures include:

- RES levy reconciliation;
  - the settlement of RES levy payments from some consumers (connected on the MV and HV network) that had been paying a discounted unit payment had already been considered in a previous ministerial decision, and will be effective retrospectively from start of 2019;
- Recovery and Resilience Fund (RRF) income;
  - Greece has secured funds from the RRF stimulus package aimed at helping repair the economic and social damage caused by the coronavirus – there is an expectation that part of this will be used for the RES Account, which has also been impacted by the coronavirus;
- introduction of a temporary Supplier levy;
  - suppliers will also face a supplier levy in 2021 – unlike the ΠΧΕΦΕΛ charge, this new Supplier levy is a uniform levy for each MWh supplied;
- EUAs allocation;
  - increase the allocation of proceedings from the auctioning of EUAs from 65% to 78%;
- one-off extraordinary levy on RES producers revenues;
  - RES installations electrified before 31 December 2015 will have to return 6% of the revenues captured in 2020;
- RES producer verification fee;

- diesel tax;
  - introduction of a 0.03€/litre special green tax on diesel (for transport);
- PSO levy – RES levy compensation;
  - any future reduction in the PSO levy as a result of interconnection of islands to be used dynamically to offset any potential increase in the RES levy.

We have performed an independent high level quantification of the potential income that these can yield, based on our understanding of how the measures will be implemented. These are then compared with the Ministry's estimates.

Exhibit 8.1 – Estimated RES Account income from measures proposed by the Ministry of Energy & Environment

m€	Ministry estimate	AFRY estimate
2020 one-off		
RES levy reconciliation	180	ca 90*
Extraordinary RES tax	110	90-100
2021 one-off		
Supplier levy	110	108 (98)**
RRF	200	200
Annual		
EUAs	75 per annum	70-110 per annum***
Verification fee	25	25 per annum
Diesel tax	100	82 per annum
PSO levy compensation	50/200	75/200

* In our projections from 2020 onwards we have already assumed that some of the electricity consumers will no longer be eligible for the discounted RES levy. This means what would be termed as 'RES levy reconciliation' for 2020 is already included in our modelling. This has been based on data provided by DAPEEP with respect to the share of different consumer types that will be eligible for a discounted RES levy. There may however be some potential for some additional consumers to no longer be eligible for a discounted RES levy, and this could add additional income to the RES Account (beyond what we have modelled). This could be up to ca €20m per annum from 2021 onwards (and this is captured in analysis of the measures), but there is a high degree of uncertainty around this.
** The estimate in the parenthesis reflects the income accrued assuming that the levy is imposed on the volumes sold to final consumers (ie excluding distribution system losses)
*** The additional income from increasing the allocation of auctioned EUAs to the RES Account will change year-on-year depending on underlying EUA prices
Source: AFRY Management Consulting

Alongside the announcement for the measures to manage the RES Account deficit, the Ministry of Energy & Environment put forward some further structural actions for the participation of RES in the electricity market. These go beyond the scope of our analysis and we have not assessed how these impact the future of RES in Greece.

These 'structural measures' can be summarised as follows:

- the continuation of RES auctions out to 2024 with around 2.1GW expected to be procured in six joint auctions;
  - there is also a mention of including changes to the architecture of the auctions;
- extending the auctions to small solar PV (<500kW), which have not reached a certain level of 'maturity' by 1 January 2021 with a view to have dedicated auctions for this group of projects;
  - there will be a 'grace period' for some small solar PV projects that are awaiting final grid connection terms from HEDNO until 31 December 2021 to capture an administratively set Strike Price;
- changes to the provisions for 'Energy Communities' and strategic projects; and
- the initiation of a 'zoning' framework for RES.

As already mentioned, we have not considered these structural changes in this report. We do recognise however the subtlety in the announcement of a new round of RES auctions. The existing FiP contract already mean a certain degree of integration of RES in the markets (as RES with a FiP need to participate in the markets and have balance responsibility in the enduring model), and the announcement seems to imply the intention to take one step further towards a future move to unsupported RES.

One interpretation of these 'architectural' changes to the new RES contracts could be that the intention is to limit the volume of each project that is underwritten by a government-backed support contract through the new RES auctions. This could then mean that the support contract would cover part of the project (and help support project financing) and a greater share of the market risk could be borne by the RES project (and potentially be shared with an offtaker depending on the circumstances). This is obviously one of the different ways that a smooth transition towards 'merchant' RES can be facilitated, and there would need to be further consideration on whether this will deliver more efficient outcomes for the Greek electricity market and the details of such a scheme.

In any case, before any such move towards more balanced risk allocation, there is a need to first encourage the full balance responsibility provisions for all FiP projects in line with European guidance and as is done in other European countries. The regulated provisions that shelter RES with a FiP contract from facing market imbalance exposure should be removed, but whilst ensuring that there are appropriate tools in place (for example intraday trading) to manage this responsibility.

8.1.1 RES levy reconciliation

The DAPEEP expectation is that around €90m will be paid in 2020 in the RES Account from consumers that in 2019 were facing a 'discounted' RES levy. This estimate looks broadly reasonable.

In our 2020-30 analysis we have already assumed that a significant share of the consumers with a 'discounted' RES levy revert to the default €17/MWh charge (given that there already was a relevant ministerial decision). This

means that we are already including part of what is termed as a '2020 RES levy reconciliation' in our 2020 projections for the RES levy collection.

8.1.2 Extraordinary RES tax on RES producers

We have interpreted this extraordinary tax as a 6% payment from RES producers with projects electrified before 31 December 2015 on the total revenues captured in 2020.

RES output in 2020 has so far been below average, and this also impacts RES revenues. We estimate this measure to result in payments of around €90-100m.

8.1.3 Supplier levy

It is unclear to us on which volumes the Supplier levy will be applied to. This can be done on the basis of the volumes bought by suppliers in the wholesale markets or the metered volumes. The key difference is effectively whether distribution losses are included or not. Depending on the detailed implementation, the Supplier levy is expected to result in €108 or €98m based on our demand projections for 2021.

8.1.4 RRF income

We cannot comment on the funds from the Recovery and Resilience Fund, and simply assume that these funds are realised in their entirety in 2022.

8.1.5 EUA allocation

In our 2020 modelling, our starting point is that 72% of the auctioned EUAs are directed to the RES Account. This means that the increase from 65% to 78% translates into an additional 6% when compared to our modelled results. From 2021 onwards, and depending on the level of the assumed carbon price the additional EUA income to the RES Account is estimated between €70-110m.

8.1.6 RES producer verification fee

We cannot comment on the funds from the RES producer verification fee, and simply assume that €25m make their way into the RES Account in 2021 and 2022.

8.1.7 Diesel tax

The Hellenic Statistics service (ELSTAT) suggests that 2.7bn litres of diesel were sold in 2019. We have not performed an analysis or projections of the diesel market in Greece. Assuming that this annual diesel consumption persists throughout the entire period, we expect the diesel tax to deliver €82m per annum.

8.1.8 PSO levy compensation

The measure linked to the PSO levy is subject to interpretation. In Greece, to allow for uniform electricity retail pricing, there is a form of cross-

subsidisation between electricity consumers on the interconnected system and the islands. This then is managed via a Public Service Obligation levy. There are now a range of infrastructure projects underway to allow for the interconnection of the islands to the mainland system. This will have significant benefits in terms of overall system costs and should result in a gradual reduction of the PSO levy.

The PSO levy compensation measure can be interpreted either as:

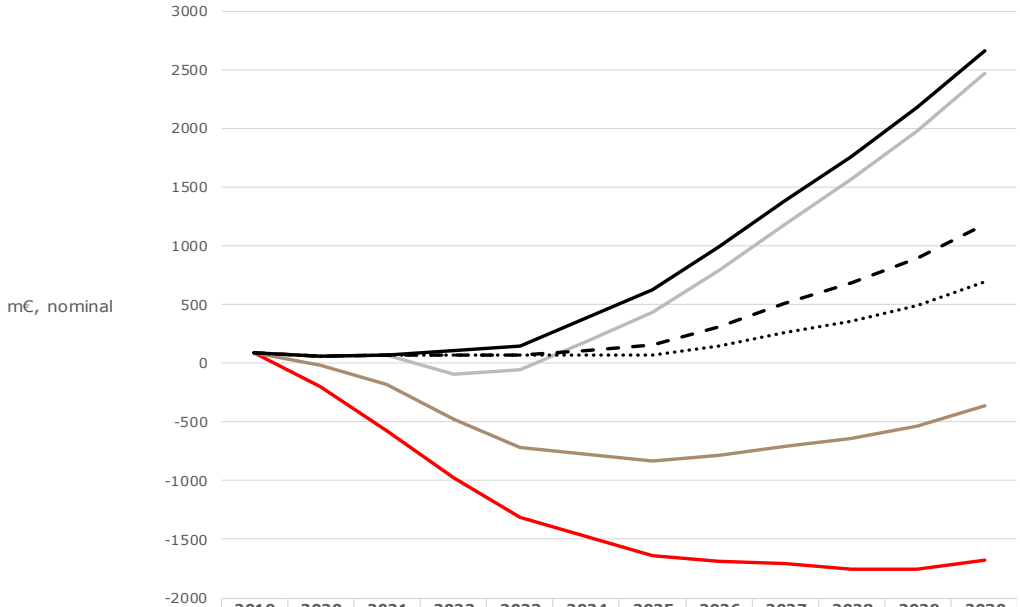
- the PSO remaining at its current level and any potential reduction as a result of further interconnection being used for the purposes of the RES Account, irrespective of the increase of the TUoS charges; or
- the sum of the PSO levy and the TUoS remaining at its current level with any upside being used for the RES Account – this them means that consumers face no increase in electricity bills in that respect, and it is only the net benefit of further interconnection that is used for the RES Account.

The amount available from this measure depends on interpretation. If it is only the net benefit used, then the RES Account can benefit from up to 200m once the 'major' Crete interconnector has been completed. Otherwise, the PSO levy compensation can deliver more than 400m once the Attica-Crete interconnection is in place.

8.2 Projected impact of measures on RES Account balance

Exhibit 8.2 shows the impact of the announced measures on the cumulative balance of the RES Account out to 2030 with Exhibit 8.3 providing for further commentary with respect to the different cumulative balance trajectories presented.

Exhibit 8.2 – RES Account cumulative balance with and w/o measures, Baseline



	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
No Measures	93.2	-198	-572	-974	-1313	-1477	-1636	-1690	-1711	-1750	-1751	-1679
High degree of certainty	93.2	-13	-179	-480	-717	-778	-834	-785	-704	-639	-537	-361
Some degree of uncertainty	93.2	60	65	-92	-51	188	431	793	1187	1564	1979	2466
All measures	93.2	60	65	108	149	388	631	993	1387	1764	2179	2666
PSO reduction	93.2	60	65	70	70	108	152	314	508	684	899	1187
PSO & Diesel tax reduction	93.2	60	65	70	70	70	70	150	262	357	490	695

Source: AFRY Management Consulting

Exhibit 8.3 – Supporting commentary for Exhibit 8.2

'Cluster' of measures	Measures included	Commentary
High degree of certainty	*-Extraordinary RES tax (producers)* *-Supplier Levy* *-RES Levy reconciliation* *-Diesel tax*	There is a high degree of confidence both in terms of 'ability to implement' and the expected value of the additional inflows to the RES Account.
Some degree of uncertainty	*-PSO Levy compensation* *-RES producer verification fee* *-EUA Allocation* *(the trajectory in the Exhibit includes the above measures in addition to the ones classed as 'high degree of certainty')*	There is a high degree of confidence in terms of 'ability to implement' but the resulting level may be subject to market conditions. For example, based on the recent EU-wide emissions targets, EU allowances available to Greece might be lower than expected.
All measures	All	It is yet to be confirmed whether Greece will secure the additional RRF funds.
PSO reduction	All	This 'trajectory' allows for the 'PSO Levy compensation' to be reduced (and the benefit from the lower PSO levy to be transferred to consumers) as long as the cumulative balance of the Account remains above €70m.
PSO & Diesel tax reduction	All	This 'trajectory' allows for both the 'PSO Levy compensation' and 'Diesel tax' to be reduced as long as the cumulative balance of the RES Account remains above €70m.

Source: AFRY Management Consulting

Our analysis suggest that the announced measures appear to deliver a balanced RES Account across all modelled years (and in our Baseline scenario). However, all measures would be needed, and the accumulated funds will have to be in line with expectations given that in the short term the RES Account is projected to have a marginal surplus with the measures in place.

We have identified the following risks that could again bring the RES Account into negative territory:

- **The RES Account is marginally balanced up to 2023**: Until 2023 the surplus of the RES Account (cumulative) ranges between €60m – €150m. As such any implementation delays or a 'market shock' (significant delay to COVID-19 vaccine for example) could result in a deficit;
- **The additional income from the Resilience & Recovery Fund is yet to be confirmed**: If this income is not delivered in its entirety the RES Account may again not be balanced over the period 2022-23;
- **Income from the increased EUA allocation could be lower in the short-term:** Due to the recent announcement regarding the tightening of the EU-wide CO2 emissions targets, Greece may end up receiving a lower number of allowances than what is assumed in our analysis. Any such limitations of supply of allowances will most likely however comes

alongside an increase in the carbon price. If the carbon price does not rise to a level where it offsets this reduced number of allowance ,this would again reduce the inflows to the RES Account;

— **The timing of the interconnection with Crete is important:** Should the 'major' interconnection of Crete be delayed the expected €200m due to the "PSO Levy compensation" would be lost.

Post 2024, the outlook, however, is more positive. If all measures are implemented (even excluding the RRF income), the RES Account is projected to accumulate a surplus ranging between €2.5bn and €2.7bn by 2030.

We have therefore also explored how the "PSO Levy compensation" and "Diesel tax" incomes could be reduced in the future. This is shown in Exhibit 8.4. Our analysis suggests that the 'PSO Levy compensation' and 'Diesel tax' could be abandoned from 2024 and 2026 respectively whilst ensuring that the RES Account has a cumulative surplus of €70m at all times.

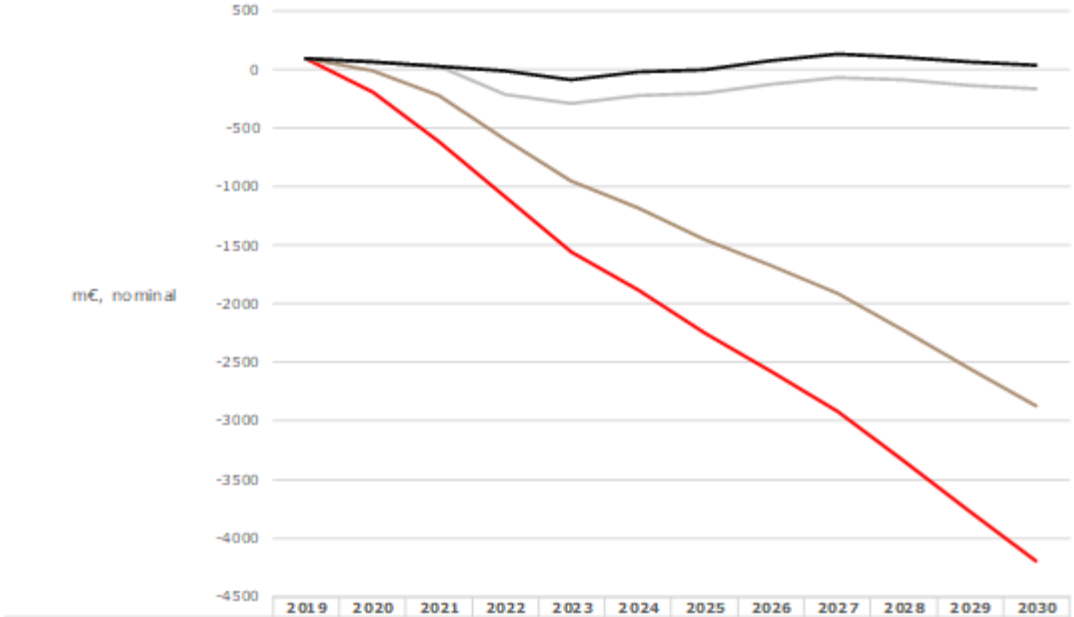
Exhibit 8.4 – Income required from 'PSO levy compensation' and 'Diesel tax' for a balanced RES Account - Baseline

Year	PSO Levy compensation (m€, nominal)	Diesel tax (m€, nominal)
2020	0.0	0.0
2021	75.0	82.0
2022	37.1	82.0
2023	158.7	82.0
2024	0.0	43.7
2025	0.0	38.5
2026	0.0	0.0
2027	0.0	0.0
2028	0.0	0.0
2029	0.0	0.0
2030	0.0	0.0

Source: AFRY Management Consulting

The future is uncertain, and the RES Account is impacted by global market forces, such as the price of gas and carbon. This is why we have also explored a scenario where commodity prices remain depressed and demand grows at slower place. In the Stress Test scenario, the measures marginally suffice to deliver a balanced RES Account in the short term. A small deficit resurfaces in the very short term and disappears in 2026, but this is more 'manageable' when compared to the case without any measures in place. The effect of the measures on the RES Account balance in the Stress Test case are presented in Exhibit 8.5.

Exhibit 8.5 – RES Account cumulative balance with and w/o measures, Stress Test



	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
No Measures	93.2	-198	-614	-1092	-1553	-1881	-2249	-2574	-2920	-3337	-3771	-4191
High degree of certainty	93.2	-13	-221	-599	-958	-1183	-1448	-1670	-1913	-2227	-2557	-2873
Some degree of uncertainty	93.2	60	23	-211	-295	-226	-202	-125	-73	-94	-135	-164
All measures	93.2	60	23	-11	-95	-26	-2	75	127	106	65	36

Source: AFRY Management Consulting

TABLE OF EXHIBITS

Document control

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Version	Date	Comments
v100	20 January 2021	Final report

ÅF and Pöyry have come together as AFRY. We don’t care much about making history.

We care about making future.

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