



**INDEPENDENT POWER TRANSMISSION SYSTEM OPERATOR  
(IPTO – ADMIE)**

**Department of System Operation and Control**

**Technical Requirements**

**FOR THE PROJECT**

**«Wind & Solar power production forecast service»**

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## 1. Introduction and Project Scope

### 1.1 The role of IPTO (ADMIE)

IPTO is the Greek Transmission System Operator (TSO) and member of ENTSO-e following its rules and guidelines. Among the responsibilities of IPTO is the preparation and publication of optimal generation schedules on a daily basis (Day Ahead and Intraday Dispatching Schedule – DS & IDS) in the context of the Greek energy market. Those schedules are produced by an optimization engine that takes into account information which typically includes load demand forecasts, Renewable Energy Sources (RES) forecasts, reserve requirements, bid quantities and prices submitted by the market participants, interconnection schedules, technical information of generation units, various grid constraints etc. In this context IPTO is obliged to produce and publish the necessary RES forecasts for the DS optimization and in addition to provide LAGIE (Greek NEMO) the necessary RES forecasts for the Day Ahead Scheduling (DAS) optimization.

### 1.2 The requirement for wind and solar power production forecast

Operation Planning Section (OPS) of the Department of System Operation and Control is responsible for providing all necessary forecasting information (DAS Requirements) for the execution of the DAS and DS optimization schedules through the Market Management System (MMS).

Among the forecast data provided by OPS is the RES power production forecast. OPS produces and makes public these forecasts utilizing proprietary software tools owned by IPTO or using forecasting reports provided by external contractors.

Due to the large penetration of RES during the last decade, their accurate forecasting is of high importance for the energy market. Inaccurate forecasts may lead to sub-optimal schedules and thus cause a significant impact on the economic cost of the operation schedules. Under-forecasts may lead to purchase of expensive services in order to deal with peaks and over-forecasts may lead to unnecessary capacity being committed.

Weather conditions are among the predominant factors that affect not only the production of RES, but also electrical power consumption in context. However among the various types of RES, wind and solar are the ones that have direct dependence on the weather conditions. Due to the stochastic nature of the energy sources (wind power, light intensity and cloudiness), forecasting of wind and solar production requires the development of special and complicated forecasting models.

### 1.3 Current forecasts

Currently IPTO is obliged to deliver forecasts for wind and solar production for the total Greek interconnected territory and alternatively for the North and South parts of the country. In addition, in order to deal with potential power flow conjunctions in the weaker parts of the Transmission System, regional (localized) forecasts (e.g. forecasts for Evvoia, Peloponnese etc) are also required. Forecast confidence intervals are also necessary (e.g. P10-P90 percentiles) and are delivered. The aforementioned forecasts are produced either by utilizing proprietary company owned software tools or using forecasting reports provided by external contractors or a combination of both available sources.

In context the variables used for the short-term wind and solar forecasts are:

1. The daily weather conditions forecast (Cloudiness, light intensity, wind power and direction, dust dispersion, etc).
2. Historical weather conditions observations (for the previous day)
3. Historical average hourly power production (for the previous day)
4. Data regarding individual wind and solar farms (installed capacity, location, etc)



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#### 1.4 Law 4414/2016 Requirements

Law 4414/2016 is in compliance with EU's directives and enforces the participation of all RES entities in the wholesale day-ahead electricity market.

Until now all RES entities were represented financially in the electricity market by LAGIE while IPTO was obliged to produce the necessary power forecasts which were taken under consideration in the DAS optimization algorithm as non priced energy offers in priority.

Under the new legislation RES entities are discriminated (categorized) in the following groups:

1. RES entities which have old feed in tariff contracts signed until 31<sup>st</sup> of December of 2015 (and have met the required commissioning dates)
2. RES entities which have old feed in tariff contracts signed until 31<sup>st</sup> of December of 2015 (and have met the required commissioning dates) , have installed capacity over a predefined limit (5MW) and therefore have the privilege (and incentives to terminate their contracts) of choosing to voluntarily sign sliding feed in premium contracts with the obligation to participate in the day-ahead electricity market
3. RES entities which have contracts under the new feed in tariff scheme (according to the Law 4414/2016) signed after 1<sup>st</sup> of January of 2016 (in practice after December of 2016) but have installed capacity under a predefined limit depending on the technology (3MW for wind technology and 500kW for the rest technologies) and therefore cannot participate in the day-ahead electricity market
4. RES entities which have sliding feed in premium contracts signed after 1<sup>st</sup> of January of 2016 (in practice after December of 2016) and are obliged to participate in the day-ahead electricity market

In this context the following structural changes regarding the participation of the RES entities in the wholesale day-ahead electricity market will be introduced:

1. RES Feed in tariff representative entity - RFTR (currently is LAGIE) will be the representative of all RES entities (RES entities with old feed in tariff contracts signed until 31<sup>st</sup> of December of 2015 or RES entities with new feed in tariff contracts signed after 1<sup>st</sup> of January of 2016, in practice after December 2016) with installed capacity under a predefined limit depending on the technology (3MW for wind technology and 500kW for the rest technologies) which have not the right to participate individually in the day-ahead electricity market.
2. Individual Entities RES entities with signed sliding feed in premium contracts signed after 1<sup>st</sup> of January of 2016 (in practice after December of 2016) or RES entities which have old feed in tariff contracts signed until 31<sup>st</sup> of December of 2015, have installed capacity over a predefined limit (5MW). Both entities have the privilege to choose if they want to participate individually in the day-ahead electricity market or to be represented by an Aggregator.
3. Aggregators: will be nominated companies that will represent portfolios of RES entities in the day-ahead electricity market. The RES portfolios will be comprised by those RES entities of point 2 above which are obliged or have the privilege to choose if they want to participate in the day-ahead electricity market but do not want to participate individually.
4. Last Resort Aggregator (LRA): will be the entity that will represent a portfolio of RES entities of point 2 (RES entities which are obliged or have the privilege to choose if they want to participate in the day-ahead electricity market but do not want to participate individually or through an Aggregator) in the day-ahead electricity market in case of bankruptcy of an Aggregator or in case the RES producers choose so. This representation will apply for limited time and/or incentives against this representation will be given.

## 1.5 Scope of Supply

The current tools need upgrading and reengineering mainly due to the adaptation of the new Law 4414/2016 and the consequential structural changes as described in the previous paragraph, but also for other reasons:

1. The large penetration of wind and solar production units both at the system and the distribution network causes power flow conjunctions in the Transmission and Distribution Systems.
2. The current segregation of areas along the countryside is not sufficient to capture the dispersed nature of solar production, especially of those connected in low voltage network. Higher resolution is needed in order to achieve more accurate forecasts.
3. The need for a realistic, accurate and integrated consideration in the forecast of all renewable sources, so that, together with the production of the conventional units and the net interconnection flows, the actual load demand can be calculated and forecasted.
4. IPTO has recently implemented the new EMS which requires detailed and accurate forecasts for its functionality.

The aforementioned factors impose IPTO on proceeding with a tender in order to obtain a detailed forecast service that will provide a reliable and accurate wind and solar production report and web-service in order to cope with the new requirements. Therefore the Scope of Supply of this project is the appointment of a contractor who will provide IPTO detailed forecasts services regarding wind and solar power production and will be flexible enough so as to adjust these forecasts to possible changes of RES entities' groups.

The objective of this document is to describe the requirements for the aforementioned forecasts in terms of:

1. Description of the requested service (resolution, various subtotals etc).
2. Accessibility to the service (FTP server, Web App, format of the data, etc).
3. Delivering of the forecasts (delivering timeframe, forecasting timeframe).
4. Data to be provided by IPTO.

## 2. Requested service

### 2.1 IPTO & Dispatching Schedule

As mentioned above, among others, IPTO's role as a TSO is to ensure the delivery of high quality electrical power safely and uninterruptedly to all parts of the interconnected Greek Territory. In order to achieve the aforementioned task in compliance with the rules of the wholesale electricity market, IPTO is obliged to calculate and publish the optimal generation schedule on a daily basis for the day ahead (Dispatching Schedule - DS).

This procedure takes into account all possible energy inflows in the Transmission System (priced or non-priced). RES production in the Transmission System is one of these inflows thus their forecasted energy production for both the whole Greek Territory and the North – South Bidding Zones discrimination (due to internal congestion management, the Transmission System is divided to North and South Bidding Zones and the power flow between them is subject to an inter-zonal constraint) is required.

In addition for the purposes of calculating and forecasting of total load demand the sum of RES production for both Transmission System and Distribution Network for both the whole Greek Territory and the North and South Bidding Zones discrimination is required.

Finally, due to the need for power flow congestion management, discrimination in specific special regions (see below) for both Transmission System and Distribution Network is required.

Consequently, for the needs of DS and power flow congestion management IPTO requires the following power production forecasts for wind and solar farms:

1. Hourly production forecast of the sum of wind farms of Greek Territory
  - ✓ Intraday and 10 days ahead
  - ✓ Divided in North and South Bidding Zones Segregation
  - ✓ Discriminated in three (3) regional forecasts due to congestion management difficulties, indicatively:
    - i. Peloponnese
    - ii. Thrace
    - iii. Evvoia
  - ✓ P5, P10, P90 & P95 percentiles
  
2. Hourly production forecast of the sum of wind farms of Greek Territory which inject in the Transmission System (connected to high voltage grid)
  - ✓ Intraday and 10 days ahead
  - ✓ Divided in North and South Bidding Zones Segregation
  - ✓ Discriminated in three (3) regional forecasts due to congestion management difficulties, indicatively:
    - i. Peloponnese
    - ii. Thrace
    - iii. Evvoia
  - ✓ P5, P10, P90 & P95 percentiles
  
3. Hourly production forecast of the sum of solar farms (High, Medium, Low Voltage and rooftops) of Greek Territory
  - ✓ Intraday and 10 days ahead
  - ✓ Divided in North and South Bidding Zones Segregation
  - ✓ Discriminated in three (3) regional forecasts due to congestion management difficulties, indicatively:
    - i. Peloponnese
    - ii. Thrace
    - iii. Evvoia
  - ✓ P5, P10, P90 & P95 percentiles



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4. Hourly production forecast of the sum of solar farms of Greek Territory which inject in the Transmission System (connected to High Voltage grid)
  - ✓ Intraday and 10 days ahead
  - ✓ Divided in North and South Bidding Zones Segregation
  - ✓ Discriminated in three (3) regional forecasts due to congestion management difficulties, indicatively:
    - i. Peloponnese
    - ii. Thrace
    - iii. Evvoia
  - ✓ P5, P10, P90 & P95 percentiles

## **2.2 Last Resort Aggregator (LRA) & RES Feed in Tariff Representative Entity (RFTR)**

Law 4414/2016 foresees that the RES power production forecasts regarding the participation of RES entities in the wholesale day ahead electricity market should have the following discrimination:

1. Type or Technology (e.g. solar, wind etc)
2. Loss Factor Zone (LFZ)
3. North & South Bidding Zones

IPTO will be nominated to provide the above mentioned detailed forecasts to both Last Resort Aggregator & RES Feed in Tariff Representative Entity.

### **2.2.1 Type of RES Technology**

There are 5 different RES technology types available in Greek Territory:

1. Wind Farms
2. Solar Farms and Rooftops
3. Small Hydro Plants
4. Combined Heat and Power (CHP) generation Co-Generation
5. Biomass

IPTOs' scope of supply requirement of the present inquiry is to provide power production forecasts for Wind and Solar farms.

### **2.2.2 Loss Factor Zones (LFZ)**

LFZs are sectors of the Transmission System Network (TSN) where the transmission losses of any kind of production (e.g. thermo or hydro or RES production) connected to a specific sector are considered to have equal loss factor.

There are 5 LFZs which are depicted in map 11.1 (TSN on Greek Territory) with blue curved draft lines (Appendix). All kind of production units (or RES farms), which are connected to High Voltage Grid (i.e. 66kV, 150kV or 400kV) are corresponded to the 5 LFZs.

The rest of the production units (or RES farms) are corresponded to a virtual 6<sup>th</sup> LFZ which is considered to cover the Medium and Low Voltage Network (covers the whole Greek Territory).

LFZs No3 & 4 along with LFZ No6 are separated in Northern and Southern part from the virtual line (black line map 11.1 Appendix) that separates TSN in North and South Bidding Zones as described in the following paragraph.

### 2.2.3 North & South Bidding Zones of Greek Market Balance Area

As mentioned before due to internal congestion management the Transmission System currently is divided to North and South Bidding Zones and the power flow between them is subject to an inter-zonal constraint (see black line map 11.1 Appendix).

In any case of structural changes in TSN (e.g. connection of Crete Island in the TSN or starting of commercial operation of Megalopoli\_V thermal production unit) Bidding Zones shall be adjusted according to the Regulation Authority's future guidelines regarding updated TSN's requirements.

Consequently taking into consideration all the aforementioned definitions, regulations and discrimination, IPTOs scope of supply requirement of the present inquiry is to provide the power production detailed forecasts for wind and solar farms segregated as shown in table 11.2 (Appendix) for both Last Resort Aggregator & RES Feed in Tariff Representative Entity.

## 3. Accessibility to the service

Access to the forecast data shall be provided by the following means which are all required:

1. Remote FTP repository
2. E-mailing of file reports
3. Web application

In the case of FTP service in a remote repository the names of the files should be consistent with a specified pattern (e.g. <wind forecast><interval><local area><forecast execution timestamp>.csv) in order to enable retrieval of the power production forecasts programmatically. The data should be in a structured format or tabular format to facilitate parsing (Appendix, table 11.2). The files should be posted in the agreed timeframe. Details will be agreed with the contractor at the beginning of the service provision and can be changed from time to time upon agreement and subject to technical feasibility.

In the case of e-mailing service the names of the files should also be consistent with a specified pattern (e.g. <wind forecast><interval><local area><forecast execution timestamp>.xls). The data should be in a structured format or tabular format to facilitate parsing (Appendix, table 11.2). The files will be sent to various recipients in the agreed timeframe. The recipient distribution list will be agreed with the contractor at the beginning of the service provision and can be changed from time to time upon agreement and subject to technical feasibility.

In the case of Web-Application the contractor will create a web tool where IPTO's staff (using credentials) will be able to create and retrieve (download) the necessary local or total wind or solar power forecasts on its own at any time during the day. IPTO's staff will have access via credentials. The downloading files should be consistent with a specified pattern (e.g. <wind forecast><interval><local area><forecast execution timestamp>.csv). The data should be in a structured format or tabular format to facilitate parsing (Appendix, table 11.2).

Access to the data is crucial as it will be used by the OPS in its daily operations. Also the necessity for credibility of the delivering process of the forecasts and its uninterrupted 365/24/7 operation is of utmost importance.

In the extreme case of loss of service, the service provider shall have the obligation to deliver the weather forecast by using alternative means, that will be specified (for instance by alternative e-mail). Therefore the use of a hot line for 365/24/7 communication in case of emergency IT communication issues is necessary.

## 4. Delivering of the forecasts

### 4.1 Delivering timeframe

The power production forecasting files (via FTP or e-mailing) according to the current OPS' daily procedure should be available every day and be updated by the following hours (Athens time zone - EEST):

- ✓ Before 07:30
- ✓ Before 10:30
- ✓ Before 13:30
- ✓ Before 16:30
- ✓ Before 19:30
- ✓ Before 22:30

Delivering details will be agreed with the contractor at the beginning of the service provision and can be changed from time to time upon agreement and subject to technical feasibility.

In any case of legislative structural changes (e.g. target model implementation) the delivering timeframe shall be adjusted according to the provisions in force.

Regarding Web-Application, it shall be accessible 24/7 providing the latest updates for both wind and solar power production forecasts in separate views. The forecasts shall be updated every hour.

### 4.2 Forecasting period timeframe

All forecasts (file reports delivered via FTP or e-mailing or Web-Application) should initially contain one (1) hour interval values for both wind and solar power production in any of the areas needed.

In any case of legislative structural changes (e.g. intraday market and balancing market) the forecasting interval values shall be adjusted according to the provisions in force (half hour and/or 15 minutes forecasting intervals).

The forecasting horizon for the said forecasts shall include the intraday and 10 days ahead forecast starting from the day ahead.

## 5. Non valid days & errors

### 5.1 Non valid days

Contractor shall develop proprietary automated warning system (flag) to inform IPTO in case of emergency (loss of meteorological data, forecasting system failure etc). The aforementioned flag shall be included in every corrupted report file and shall indicate uniquely the type of failure (e.g. color flag).

In case the following circumstances occur during a dispatch day, the last shall be characterized as non valid forecasting day:

1. Two of the three report files to be delivered on FTP server or sent at 07:30, 10:30 or 13:30 are corrupted (zero values, null file, repeated values, missing or null regions - LFZs, not updated compared to the previous one, file not being available).
2. Two of the three report files to be delivered on FTP server or sent at 07:30, 10:30 or 13:30 where the forecast is not valid due to contractor warning (flag) in case of contractor's fault.
3. The report file to be delivered on FTP server at 10:30 contain forecast which deviates significantly from the real production, i.e. the mean absolute hourly difference between forecast and real production for all 24 hours of the day ahead shall not exceed 25% of total (or regional in case of LFZs) installed capacity. This term shall be applied to the report file to be available at 10:30 while in case the last shall not be available or is null or contains zero or repeated values or is flagged fault by the contractor this term shall be applied to the report file to be available at 07:30
4. The report file to be delivered on FTP server at 20:30 contain forecast for the first eight hours of day ahead (01:00 to 08:00) which deviates significantly from the real production, i.e. the mean absolute hourly difference between forecast and real production for the first eight hours of the day ahead exceeds 300 MW. This term shall be applied to the report file to be available at 20:30, while in case the last shall not be available or is null or contains zero or repeated values or is flagged fault by the contractor this term shall be applied to the previous available valid report file.

A maximum of one day per month can be accepted without penalty being a non valid forecasting day.

In case that the contractor has on time (flag) warned IPTO about the corrupted report files, three days per month can be accepted without penalty being non valid forecasting days.

In case that the characterized as non valid forecasting day is one of the 12 official holidays in Greece and the contractor has on time (flag) warned IPTO about the corrupted report files, two days per month can be accepted without penalty being non valid forecasting days.

The contractor is obliged to inform IPTO on time (scheduled to be agreed at the beginning of the service provision and can be changed from time to time upon agreement and subject to technical feasibility) in case that IPTO fails to deliver (on scheduled periodic update) the necessary data for the training of the forecasting models.

## 5.2 Errors

Error procedure shall be based on the report file to be available at 10:30 with regard to the forecasting values of the 24 hours of the day ahead.

The daily forecasting error either of the total country forecast or for the regional forecasts according to segregation of paragraph 2.2 is:

1. The Normalized Mean Absolute Error – NMAE

$$NMAE = \frac{1}{n} \sum_{i=1}^n \frac{|x_i - y_i|}{P_{inst}}$$

where:

$x_i$ : Forecasting value of wind or solar hourly energy

$y_i$ : Measured value of wind or solar hourly energy

$P_{inst}$ : Installed capacity of wind or solar farms

$n$ : Forecasting horizon (24 hours of the day ahead of the report file to be available at 10:30)

2. Normalized Root Mean Square Error – NRMSE

$$NRMSE = \sqrt{\frac{1}{n} \sum_{i=1}^n \left( \frac{x_i - y_i}{P_{inst}} \right)^2}$$

where:

$x_i$ : Forecasting value of wind or solar hourly energy

$y_i$ : Measured value of wind or solar hourly energy

$P_{inst}$ : Installed capacity of wind or solar farms

$n$ : Forecasting horizon (24 hours of the day ahead of the report file to be available at 10:30)

IPTO shall calculate the aforementioned errors from the starting day of delivered forecasts (trial period not included) till the last day's deliver according to the contract. The calculation will be performed at least two months after the end of each dispatch day and shall be based on the forecasted values of the report file available at 10:30. The actual production energy values are collected by the official Metering Data Acquisition System of IPTO through telemetering of the 15 min energy values registered in the metering devices installed at the RES production units in the HV and MV network. The hourly actual production energy values are calculated as an integration of the 15 min meter data. Regarding the LV RES production units (mainly solar parks), the corresponding errors will be calculated based on the available telemetered energy data and on estimated hourly energy values for the non-telemetered LV RES production units. Solar rooftops installations will be exempted from the error-calculation procedure.

The mean forecasting error either of the total country forecast or for the local regional forecasts according to segregation of paragraph 2.2 for each month is:

3. Monthly Average of Normalised Mean Absolute Error –  $NMAE_{month}$

$$NMAE_{month} = \frac{1}{m} \sum_{j=1}^m NMAE$$

where:

$NMAE$ : Value of the Normalized Mean Absolute Error for every day of the month

$m$ : number of month days including non valid forecasting days

4. Monthly Average of Normalised Root Mean Square Error –  $NRMSE_{month}$

$$NRMSE_{month} = \frac{1}{m} \sum_{j=1}^m NRMSE$$

where:

$NMAE$ : Value of the Normalized Mean Absolute Error for every day of the month

$m$ : number of month days including non valid forecasting days

**The maximum permissible forecasting error regarding wind forecasting production shall be 8% regarding  $NMAE_{month}$ .and 11% for  $NRMSE_{month}$ .**

**The maximum permissible forecasting error regarding solar forecasting production shall be 6% regarding  $NMAE_{month}$ .and 8% for  $NRMSE_{month}$ .**



## 6. Data to be provided by IPTO

### 6.1 Individual wind and solar farms data

The following is a list of attributes that define the identity and the characteristics of individual wind and solar farms which will be included in the register data file that IPTO will provide to the contractor:

- Name of wind or solar farm
- Unique code for each farm
- Installed capacity of the farm
- Voltage level (High, Medium, Low Voltage)
- Loss Factor Zone (LFZ)
- North or South Bidding Zones
- Location of the farm (municipality and / or geographical coordinates)
- Geographical coordinates (only for High and Medium Voltage farms)
- Hourly production historical data (only for High and Medium Voltage farms)
- Hourly production historical data and/or monthly energy production data (only for Low voltage farms and rooftops)
- Name and code of the representative aggregator

Data file formatting shall be agreed at the beginning of the service provision and can be changed from time to time upon agreement and subject to technical feasibility. Delivery of the data files shall be done via FTP remote server.

### 6.2 Geographical locations & grouping

Geographical coordinates are available for all wind farms as the metacenter of the polygon of each farm. Geographical coordinates are also available for all solar farms (as the metacenter of the polygon of each farm) which are connected to the Transmission System (High Voltage).

Geographical coordinate's data are also available for the majority of the solar farms which are connected to the Medium & Low Voltage Network but non-available for rooftop solar units. However municipality of installation is available for all solar parks and rooftops. Therefore all solar parks can be grouped in geographical areas which are specified as municipality borders in order to provide the ability of correlation between parks with and without available geographical coordinates (indicatively see map 11.3 in Appendix).

### 6.3 Long term historical data

IPTO shall provide detailed historical data in order to facilitate the contractor to build and train the forecasting models. The Hourly production historical data, referenced in paragraph 6.1, will be provided for a time period of 3 years.

Hourly production data for Low Voltage connected solar farms is likely to be available in 2018, provided by HEDNO (DEDDIE, the Distribution System Operator).

Data file formatting shall be agreed at the beginning of the service provision and can be changed from time to time upon agreement and subject to technical feasibility. Delivery of the data files shall be realized using a Secure FTP communication channel. The selected contractor will sign a non-disclosure agreement for all data and for all information in general provided in the framework of the forecasting services project.

## 6.4 Wind and solar farms register

According to Law's 4414/2016 provisions, any solar or wind farm entity will have the right to change its' representation mode (either individually or through Aggregator or through Last Resort Aggregator) once in every month. Therefore the representation register (will contain all the data described in paragraph 6.1) of solar and wind farms which will be used in the forecasting tools will be flexible and will be modified once every month.

According to the Regulation Authority's guidelines these entities will have the right to change their representation mode in the market by submitting a declaration till the 10<sup>th</sup> day of the current month with application from the 1<sup>st</sup> day of the next month. IPTO shall be obliged to send the updated register's data file via FTP remote server till the 15<sup>th</sup> day of the current month.

## 7. Demonstration of credentials

Bidders shall be required to provide proof of previous Wind and Solar Power Production forecast enterprise services.

More specifically, bidders shall be required to provide a minimum of 5 recommendation letters from enterprise clients (at least 3 of the clients shall be TSOs) in the last five years to whom they have provided continuous equivalent services for at least one year.

The recommendation letters should be sent from the clients directly to IPTO.

## 8. Bidders selection

IPTO's scope of the present inquiry is to appoint two contractors which shall be the first two bidders of the bidders list.

The condition of appointing the second bidder is to match the lower bidder's offer. In case that the second bidder does not wish to match the lower bidder's offer then the next in the bidders list merit order shall be asked to match the offer etc.

In case that there will be no second bidder to match the lower bidders offer then only one bidder shall be selected.

## 9. Duration of service

The service will be provided for three operational years in which the following periods are not included:

- 1 month data exchange and model calibrating period
- 3 months testing period

The operational period (i.e. payment period) of three years will start after the end of the successful three months period.

IPTO will have the option to reject the selected contractor during the testing period if the computed errors of the 3<sup>rd</sup> month forecasts are exceeding the acceptable limits of paragraph 5.2. In this case IPTO will have the option of selecting the next contractor of the bidders list.

Contract extension for one (1) year will be optional after a written approval by IPTO.



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## 10.Compliance table

The services offered shall be in accordance with the compliance table below. This table should be completed by all bidders. Each entry in the compliance list corresponds to a section in the document.

Item Number	Description	Section	Requirement	Notes by Bidder	Compliance (Yes/No)
1	The wind power production forecasts shall be provided in detail and in the structured format according to the requested discrimination	2.1 & 3	Required		
2	The solar power production forecasts shall be provided in detail and in the structured format according to the requested discrimination	2.1 & 3	Required		
3	The wind & solar power production forecasts shall be provided in the structured detailed format (table 11.2, Appendix) for the RES Feed-in Tariff Representative entity (RFTR)	2.2 & 11.2	Required		
4	The wind & solar power production forecasts shall be provided in the structured detailed format (table 11.2, Appendix) for the Last Resort Aggregator (LRA)	2.2 & 11.2	Required		
5	Access to forecast files will be provided via FTP access	3	Required		
6	Forecast files will be provided via e-mail	3	Required		
7	Access to forecast service will be provided via Web App	3	Required		
8	In case of loss of service the provider shall be responsible for delivering the weather forecast to ADMIE by alternative means (e.g. by email)	3	Required		
9	The forecasts should be updated every hour (Web App)	4.1	Required		
10	The forecasts via forecast files shall be updated at the requested timeframe	4.1	Required		
11	The forecast horizon shall be 10 days	4.2	Required		
12	The forecast time interval shall be one (1) hour and could be adjusted after IPTO's request down to 30 or 15 minutes in case of legislative structural changes	4.2	Required		
13	Automated warning system (flag)	5.1	Required		



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14	Proof of enterprise services shall be provided by means of recommendation letters send directly from the clients of the service provider to ADMIE (at least 5 recommendation letters shall be required, 3 from TSOs).	7	Required		
15	Contractor shall have access to the data files provided by IPTO via FTP remote server	6.1, 6.2, 6.3 & 6.4	Required		
16	Wind & Solar farms data register shall be flexible and updated every month	6.4	Required		
17	3 months testing period with IPTO's right to reject the bidder prior to operational period	9	Required		
18	Duration of the service 3 years (operational period)	9	Required		



# 11. Appendix

## 11.1 North – South & LFZ Map







### 11.3 Solar Grouping Map

