CENACE
CENTRO NACIONAL DE CONTROL DE ENERGÍA

Technical Annex

Numerical Weather Forecast Service for the Renewable Energy Forecast (Wind and Photovoltaic)

Definitions, Acronyms and Abbreviations	
CENACE	Centro Nacional de Control de Energía
DOF	Diario Oficial de la Federación (Official Journal of the Federation)
NA	Not Available
SIN	Sistema Interconectado Nacional (National Interconnected System)
GCR	Gerencia de Control Regional (Regional Control Management)
CEL	Central (Central)
ORI	Oriental (Oriental)
OCC	Occidental (Western)
NOR	Noroeste (Northwest)
NTE	Norte (North)
NES	Noreste (Northeast)
PEN	Peninsular (Peninsular)
N	Norte (North)
O	Occidente (West)
W	West
Web Service	Technology that uses a set of protocols (XML, SOAP and WSDL) and standards that are used to exchange data between applications.
SOAP	Simple Object Access Protocol: protocol on which the exchange of information is established.
REST	Representational State Transfer: architecture that, using the HTTP protocol, provides an API that uses each of its methods (GET, POST, PUT, DELETE, etc.) to perform different operations between the application offered by the web service and the client.
RESTful	Type of Web Services that are implemented using the REST architecture
WSDL	Web Services Description Language: is the language of the public interface for Web services. It is an XML-based description of the functional requirements for communication with web services.
SSL	Secure Sockets Layer: Cryptographic protocol that allows to establish secure communications through a network.

Solicited Service
Numerical Weather Forecast Service of wind speed forecast and global radiation forecast for modeling Renewable Energy (Wind and Photovoltaic). Hereinafter they will be referred to as "THE SERVICES", which must comply with the terms and conditions indicated in this "TECHNICAL ANNEX".

	Technical Description of the Service
1	As part of the tasks assigned to CENACE in the Forecasting Manual published in the DOF on November 23, 2017, wind power modeling should be performed for the short term. Derived from the above, it is required: D.T.1.1-The numerical weather forecast of the hourly form wind speed (m / s), in the geographic coordinates of Mexico where wind farms are installed. Such prediction is required from the day the forecast is received and up to 8 days in advance, and must be received daily (twice a day). The forecasts must come in hourly basis. That is, for each coordinate the wind speed forecast is required for each hour contained from the day they are received and up to 8 days ahead. Thus, 9 days of wind speed are forecast daily on an hourly basis

for each coordinate and the forecasts are updated twice a day.

D.T.1.2- The wind speed forecast must be modeled for each of the following geographic coordinates of the Electrical System (SIN):

Coordinate	Electric System	GCR	Latitude	Longitude	Altitude (metres above sea level)	turbine tower height (m)
1001	SIN	ORI	16° 24' 43.22" N	94° 58' 1.87" W	7	80
1002	SIN	ORI	16° 33' 45.22" N	94° 58' 39.87" W	30	64
1003	SIN	ORI	16° 28' 33.12" N	94° 45' 27.65" W	15	78
1004	SIN	ORI	16° 11' 24.05" N	93° 56' 46.66" W	28	80
1005	SIN	ORI	16° 33' 44.89" N	94° 50' 16.57" W	21	80
1006	SIN	ORI	16° 34' 02.1" N	94° 43' 32.2" W	40	78
1007	SIN	ORI	18° 44' 16.49" N	97° 22' 13.89" W	2614	80
1008	SIN	ORI	16° 32' 21.609" N	94° 49' 2.28" W	23	80
1009	SIN	ORI	16° 27' 21.7" N	95° 6' 59.7" W	38	80
1010	SIN	OCC	21° 52' 55.43" N	101° 51´ 4.31" W	2426	80
1011	SIN	NES	29° 35' 58.17" N	101° 37' 32.36" W	505	101.5
1012	SIN	OCC	22° 43' 7.74" N	102° 34' 35.66" W	2485	93
1013	SIN	NES	26° 15' 33.28" N	100° 35' 6.34" W	805	94
1014	SIN	NES	25° 45' 57.15" N	98° 44´ 58.56" W	209	118
1015	SIN	NES	25° 55' 9.21" N	98° 11´ 51.45" W	40	95
1016	SIN	NES	23° 26' 16.01" N	98° 50' 18.29" W	196	95
1017	SIN	NES	23° 47' 13.24" N	98° 52' 9.60" W	345	95
1018	SIN	NES	23° 25' 52.96" N	98° 52' 42.36" W	444	95
1019	SIN	NES	23° 48' 7.29" N	98° 51' 12.86" W	345	95
1020	SIN	NES	25° 40' 54" N	100° 38' 38" W	1257	98
1021	SIN	NES	25° 44' 17.4" N	98° 19' 58.02" W	90	93
1022	SIN	PEN	21°21'25.25" N	88°55'58.70" W	10	120
1023	SIN	NES	25° 45' 27.49" N	98° 11' 48.93" W	49	120
1024	SIN	NES	23° 20' 26.62" N	98° 52' 4.21" W	431	120
1025	SIN	NES	23° 25' 55.005" N	98° 54' 45.429" W	462	132
1026	SIN	NES	23° 44' 8.87" N	98° 49' 28.97" W	159	132
1027	SIN	OCC	23° 5' 54.46" N	101° 6´ 14.07" W	1984	78
1028	SIN	OCC	23° 52' 41.82" N	101° 32´ 43.74" W	2290	80
1029	SIN	OCC	21° 48' 15.34" N	101° 40´ 58.21" W	2181	80
1030	SIN	NES	25° 38' 59" N	101° 26' 2.8" W	1157	125

Table 1.1. Geographic Coordinates for Wind Speed

D.T.1.3.- For each coordinate, the wind speed forecast must be modeled at the height of the turbine tower in that coordinate, indicated in the column “Turbine tower height (m)” in table 1.1

For example, for the coordinate number 1001 of the SIN, the wind speed forecast should be forecast at 80 m height from the ground. And for another example, for the 1016th coordinate of the SIN, the wind speed forecast must be forecast at 95 m height from the ground.

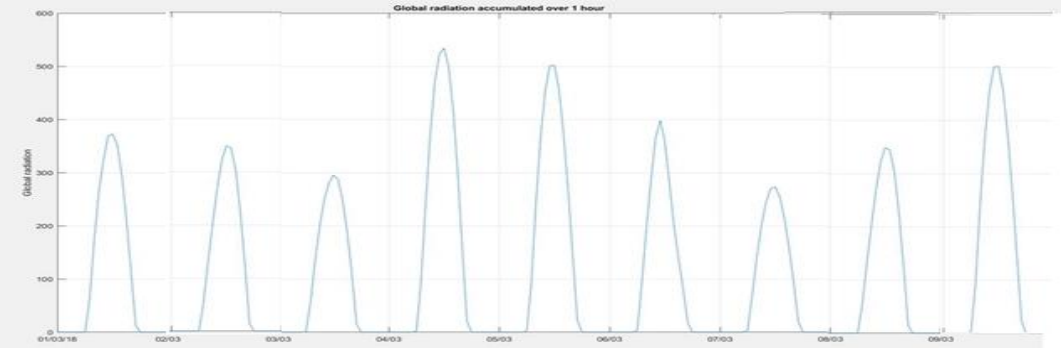
As part of the tasks assigned to CENACE in the Forecasting Manual published in the DOF on November 23, 2017, solar photovoltaic power modeling should be performed for the short term.
Derived from the above, it is required:

2

D.T.2.2 The numerical weather forecast of the hourly basis accumulated solar global radiation (W/m2), in the geographic coordinates of Mexico where solar pv farms are installed. Such prediction is required from the day the forecast is received and up to 8 days in advance, and must be received daily (twice a day). The forecasts must come in hourly basis. That is, for each coordinate the hourly basis accumulated solar global radiation forecast is required for each hour contained from the day they are received and up to 8 days ahead. Thus, 9 days of solar global radiation accumulated are forecast daily on an hourly basis for each coordinate and the forecasts are updated twice a day..

In this case the accumulated solar global radiation that is requested is as described below:

1) Per hour, that is, only the accumulation over the period of one hour for each of the hours of the days required to forecast (see Graph 2.1)



Graph 2.1

D.T.2.2.- The solar global radiation forecast must be modeled for each of the following geographic coordinates of the Electrical System (SIN):

Coordinate	Electric System	GCR	Latitude	Longitude	Altitude (metres above sea level)
1001	SIN	CEL	19°37'17.41" N	99°47'1.28" W	2532
1002	SIN	OCC	21°53'44.47"N	101° 14'30.09"W	2176
1003	SIN	OCC	21°54'49" N	102° 03'54" W	2042
1004	SIN	OCC	21°50'31.87" N	101° 43'7.77" W	2195
1005	SIN	OCC	21°45'34.36" N	102°12'21.02" W	1943
1006	SIN	OCC	21°03'46.32"N	100° 32'38.78"W	2050
1007	SIN	OCC	21°20'52" N	100°35'48" W	2612
1008	SIN	NOR	29°3'39.24" N	110°46'10.92" W	50
1009	SIN	NOR	30°47'17.88" N	112°43'27.48" W	290
1010	SIN	NOR	29°10'59.88" N	111°43'16.68" W	48
1011	SIN	NTE	24°09'04.36" N	104°27'36.94" W	1880
1012	SIN	NTE	27°39'19.76" N	105°04'13.67" W	1225
1013	SIN	NTE	25°23'29.84" N	103°18'59.98" W	1170

1014	SIN	NTE	30°11'27.61" N	106°26'56.83" W	1270
1015	SIN	NTE	27°19'26.24" N	104°50'21.02" W	1329
1016	SIN	NTE	28°38'24.46" N	104°27'37.26" W	1333
1017	SIN	NTE	25°38'5.44" N	103°01'55.52" W	1333
1018	SIN	NTE	25°33'07" N	103°02'55" W	1333
1019	SIN	NTE	30°11' 29.6406" N	107° 37' 40.7784" W	1408
1020	SIN	ORI	19°33'2" N	98°21'16" W	2534
1021	SIN	OCC	20°15'47.94" N	99°45'47.30" W	2265
1022	SIN	OCC	23°53'41.64 N	101°45'43.20" W	1972
1023	SIN	OCC	23°14'01.00" N	101°58'27.13" W	1984
1024	SIN	OCC	22°13'28.00" N	102°09'39.00" W	2116
1025	SIN	NOR	29°57'23.184" N	112°39'16.811" W	79
1026	SIN	NOR	27°59'40.312" N	110°42'45.748" W	18
1027	SIN	NOR	26°52'1.16" N	109°23'16.648" W	50
1028	SIN	NTE	25° 33' 22.24" N	103° 10' 59.23" W	1114
1029	SIN	NTE	25°57'72.71" N	103°22'28.64" W	1095
1030	SIN	NTE	31° 36' 17.93" N	106°49' 53.64" W	1300
1031	SIN	PEN	19°54'14.94" N	88°50'10.03" W	40

Table 2.1. Geographic Coordinates for Solar Global Radiation

Place and Delivery Conditions	
Place	Numerical weather forecasts of wind speed and global radiation must be delivered daily through a web service provided by CENACE (the provider must make the necessary configurations or adjustments in their systems to consume the web service). See Appendix A for more detail
Conditions for numerical weather forecast of wind speed	The requirements of the wind speed forecast are listed below: I.1.- For each geographic coordinate mentioned in Table 1.1, the wind speed forecasts with zero, one, two, three, four, five, six, seven and up to 8 days in advance are required daily. With zero days in advance we mean that the forecast of the current day on which the forecasts are received is required. In hourly basis (ie the forecast for each of the 24 hours of that day in advance, where the day in advance is from 0, 1, 2, 3, 4, ..., 8), see I.2.1 and I. 2.2 for starting and ending days of daylight saving time, which have a forecast of 23 and 25 hours respectively. The forecast is expected based on the local time of Mexico City. For example, suppose that today is June 9, 2020, then for each coordinate of Table 1.1 today it is received:

1. The wind speed forecast for each of the 24 hours on June 9 and the forecast must be referenced to the local time of Mexico City of that day (June 9).
2. The wind speed forecast for each of the 24 hours on June 10 and the forecast must be referenced to the local time of Mexico City of that day (June 10).
3. The wind speed forecast for each of the 24 hours on June 11 and the forecast must be referenced to the local time of Mexico City of that day (June 11).
4. The wind speed forecast for each of the 24 hours on June 12 and the forecast must be referenced to the local time of Mexico City of that day (June 12).
5. The wind speed forecast for each of the 24 hours on June 13 and the forecast must be referenced to the local time of Mexico City of that day (June 13).
6. The wind speed forecast for each of the 24 hours on June 14 and the forecast must be referenced to the local time of Mexico City of that day (June 14).
7. The wind speed forecast for each of the 24 hours on June 15 and the forecast must be referenced to the local time of Mexico City of that day (June 15).
8. The wind speed forecast for each of the 24 hours on June 16 and the forecast must be referenced to the local time of Mexico City of that day (June 16).
9. The wind speed forecast for each of the 24 hours on June 17 and the forecast must be referenced to the local time of Mexico City of that day (June 17).

I.2.1- In Mexico City, the first Sunday of April begins summer time. The clock is advanced one hour from 2 o'clock in the morning, that is, 2 o'clock disappears, so it is only received the first 23 hours of forecast for that day. The forecast of the hour 24 must come with NA. The forecast is expected referenced to the local time of Mexico City. This case applies only when the forecast is made for the day daylight savings time begins.

To cite an example, suppose today is April 1, 2020, so for each coordinate of Table 1.1 today it is received:

1. The wind speed forecast for each of the 24 hours on April 1 and the forecast must be referenced to the local time of Mexico City of that day (April 1).
2. The wind speed forecast for each of the 24 hours on April 2 and the forecast must be referenced to the local time of Mexico City of that day (April 2).
3. The wind speed forecast for each of the 24 hours on April 3 and the forecast must be referenced to the local time of Mexico City of that day (April 3).
4. The wind speed forecast for each of the 24 hours on April 4 and the forecast must be referenced to the local time of Mexico City of that day (April 4).
5. The wind speed forecast for each of the 23 hours on April 5 and the forecast must be referenced to the local time of Mexico City of that day (April 5). This day is the beginning of summer time. In this case the forecast of the hour 24 must be NA
6. The wind speed forecast for each of the 24 hours on April 6 and the forecast must be referenced to the local time of Mexico City of that day (April 6).
7. The wind speed forecast for each of the 24 hours on April 7 and the forecast must be referenced to the local time of Mexico City of that day (April 7).
8. The wind speed forecast for each of the 24 hours on April 8 and the forecast must be referenced to the local time of Mexico City of that day (April 8).
9. The wind speed forecast for each of the 24 hours on April 9 and the forecast must be referenced to the local time of Mexico City of that day (April 9).

I.2.2- In Mexico City on the last Sunday of October, summer time ends. The clock is delayed one hour from 2 o'clock in the morning, so that day has 25 hours and the forecast of those 25 hours should be received. The forecast must be referenced to the local time of Mexico City. This case applies to the coordinates of Table 1.1, when the forecast is made for the day that daylight saving time ends.

To cite an example, suppose today is October 20, 2020, so for each coordinate of Table 1.1 today it is received:

1. The wind speed forecast for each of the 24 hours on October 20 and the forecast must be referenced to the local time of Mexico City of that day (October 20).
2. The wind speed forecast for each of the 24 hours on October 21 and the forecast must be referenced to the local time of Mexico City of that day (October 21).
3. The wind speed forecast for each of the 24 hours on October 22 and the forecast must be referenced to the local time of Mexico City of that day (October 22).
4. The wind speed forecast for each of the 24 hours on October 23 and the forecast must be referenced to the local time of Mexico City of that day (October 23).
5. The wind speed forecast for each of the 24 hours on October 24 and the forecast must be referenced to the local time of Mexico City of that day (October 24).
6. The wind speed forecast for each of the 25 hours on October 25 and the forecast must be referenced to the local time of Mexico City of that day (October 25).This day is the end of daylight saving time).
7. The wind speed forecast for each of the 24 hours on October 26 and the forecast must be referenced to the local time of Mexico City of that day (October 26).
8. The wind speed forecast for each of the 24 hours on October 27 and the forecast must be referenced to the local time of Mexico City of that day (October 27).
9. The wind speed forecast for each of the 24 hours on October 28 and the forecast must be referenced to the local time of Mexico City of that day (October 28).

I.3.- For each geographic coordinate in Table 1.1, wind speed forecasts must be delivered daily, updated twice a day. The first update must be delivered at 8:00 a.m. and the second update must be delivered at 3:00 p.m. (in the afternoon). Deliveries must be made at the local time of Mexico City. The first delivery will be referred to as the forecast received in the morning. We will refer to the second update as the forecast received in the afternoon.

I.4.- The wind speed forecasts for every geographical coordinates mentioned in Table 1.1, must be provided electronically, through a web service, which will receive an array or list of objects with the corresponding forecast information. The structure of the objects, parameters, type of return and technical requirements of the web service are specified in Appendix A of this Technical Annex. The delivery of the forecasts by the supplier is expected as follows:

- First update of the forecasts (see section I.3): From 08:00 hours with a tolerance of 60 minutes.
- Second update of the forecasts (see section I.3): From 15:00 hours with a tolerance of 60 minutes.

	I.5.- For every geographic coordinate mentioned in Table 1.1 the forecast units must be given in m/s. I.6.- Confidentiality between both parties the provider and CENACE is requeried, about the information delivered by CENACE and the information the provider gives to CENACE, by signing a confidentiality agreement, which will be signed by both parties prior to the delivery of the service.
Conditions for numerical weather forecast of accumulated solar global radiation	The requirements of the accumulated solar global radiation forecast are listed below: II.1.- For each geographic coordinate mentioned in Table 2.1, the accumulated solar global radiation forecasts with zero, one, two, three, four, five, six, seven and up to 8 days in advance are required daily. With zero days in advance we mean that the forecast of the current day on which the forecasts are received is required. In hourly basis (ie the forecast for each of the 24 hours of that day in advance, where the day in advance is from 0, 1, 2, 3, 4, ..., 8), see II.2.1 and II. 2.2 for starting and ending days of daylight saving time, which have a forecast of 23 and 25 hours respectively. The forecast is expected based on the local time of Mexico City. For example, suppose that today is June 9, 2020, then for each coordinate of Table 2.1 today it is received: 10. The accumulated solar global radiation forecast for each of the 24 hours on June 9 and the forecast must be referenced to the local time of Mexico City of that day (June 9). 11. The accumulated solar global radiation forecast for each of the 24 hours on June 10 and the forecast must be referenced to the local time of Mexico City of that day (June 10). 12. The accumulated solar global radiation forecast for each of the 24 hours on June 11 and the forecast must be referenced to the local time of Mexico City of that day (June 11). 13. The accumulated solar global radiation forecast for each of the 24 hours on June 12 and the forecast must be referenced to the local time of Mexico City of that day (June 12). 14. The accumulated solar global radiation forecast for each of the 24 hours on June 13 and the forecast must be referenced to the local time of Mexico City of that day (June 13). 15. The accumulated solar global radiation forecast for each of the 24 hours on June 14 and the forecast must be referenced to the local time of Mexico City of that day (June 14). 16. The accumulated solar global radiation forecast for each of the 24 hours on June 15 and the forecast must be referenced to the local time of Mexico City of that day (June 15). 17. The accumulated solar global radiation forecast for each of the 24 hours on June 16 and the forecast must be referenced to the local time of Mexico City of that day (June 16). 18. The accumulated solar global radiation forecast for each of the 24 hours on June 17 and the forecast must be referenced to the local time of Mexico City of that day (June 17). II.2.1- In Mexico City, the first Sunday of April begins summer time. The clock is advanced one hour from 2 o'clock in the morning, that is, 2 o'clock disappears, so it is only received the first 23 hours of forecast for that day. The forecast of the hour 24 must come with NA. The forecast is expected referenced to the local time of Mexico City. This case applies only when the forecast is made for the day daylight savings time begins. To cite an example, suppose today is April 1, 2020, so for each coordinate of Table 2.1 today it is

received:

10. The accumulated solar global radiation forecast for each of the 24 hours on April 1 and the forecast must be referenced to the local time of Mexico City of that day (April 1).
11. The accumulated solar global radiation forecast for each of the 24 hours on April 2 and the forecast must be referenced to the local time of Mexico City of that day (April 2).
12. The accumulated solar global radiation forecast for each of the 24 hours on April 3 and the forecast must be referenced to the local time of Mexico City of that day (April 3).
13. The accumulated solar global radiation forecast for each of the 24 hours on April 4 and the forecast must be referenced to the local time of Mexico City of that day (April 4).
14. The accumulated solar global radiation forecast for each of the 23 hours on April 5 and the forecast must be referenced to the local time of Mexico City of that day (April 5). This day is the beginning of summer time. In this case the forecast of the hour 24 must be NA
15. The accumulated solar global radiation forecast for each of the 24 hours on April 6 and the forecast must be referenced to the local time of Mexico City of that day (April 6).
16. The accumulated solar global radiation forecast for each of the 24 hours on April 7 and the forecast must be referenced to the local time of Mexico City of that day (April 7).
17. The accumulated solar global radiation forecast for each of the 24 hours on April 8 and the forecast must be referenced to the local time of Mexico City of that day (April 8).
18. The accumulated solar global radiation forecast for each of the 24 hours on April 9 and the forecast must be referenced to the local time of Mexico City of that day (April 9).

II.2.2- In Mexico City on the last Sunday of October, summer time ends. The clock is delayed one hour from 2 o'clock in the morning, so that day has 25 hours and the forecast of those 25 hours should be received. The forecast must be referenced to the local time of Mexico City. This case applies to the coordinates of Table 2.1, when the forecast is made for the day that daylight saving time ends.

To cite an example, suppose today is October 20, 2020, so for each coordinate of Table 2.1 today it is received:

10. The accumulated solar global radiation forecast for each of the 24 hours on October 20 and the forecast must be referenced to the local time of Mexico City of that day (October 20).
11. The accumulated solar global radiation forecast for each of the 24 hours on October 21 and the forecast must be referenced to the local time of Mexico City of that day (October 21).
12. The accumulated solar global radiation forecast for each of the 24 hours on October 22 and the forecast must be referenced to the local time of Mexico City of that day (October 22).
13. The accumulated solar global radiation forecast for each of the 24 hours on October 23 and the forecast must be referenced to the local time of Mexico City of that day (October 23).
14. The accumulated solar global radiation forecast for each of the 24 hours on October 24 and the forecast must be referenced to the local time of Mexico City of that day (October 24).

	15. The accumulated solar global radiation forecast for each of the 25 hours on October 25 and the forecast must be referenced to the local time of Mexico City of that day (October 25). This day is the end of daylight saving time). 16. The accumulated solar global radiation forecast for each of the 24 hours on October 26 and the forecast must be referenced to the local time of Mexico City of that day (October 26). 17. The accumulated solar global radiation forecast for each of the 24 hours on October 27 and the forecast must be referenced to the local time of Mexico City of that day (October 27). 18. The accumulated solar global radiation forecast for each of the 24 hours on October 28 and the forecast must be referenced to the local time of Mexico City of that day (October 28). II.3.- For each geographic coordinate in Table 2.1, solar global radiation forecasts must be delivered daily, updated twice a day. The first update must be delivered at 8:00 a.m. and the second update must be delivered at 3:00 p.m. (in the afternoon). Deliveries must be made at the local time of Mexico City. The first delivery will be referred to as the forecast received in the morning. We will refer to the second update as the forecast received in the afternoon. II.4.- The accumulated solar global radiation forecasts for every geographical coordinates mentioned in Table 2.1, must be provided electronically, through a web service, which will receive an array or list of objects with the corresponding forecast information. The structure of the objects, parameters, type of return and technical requirements of the web service are specified in Appendix A of this Technical Annex. The delivery of the forecasts by the supplier is expected as follows: • First update of the forecasts (see section II.3): From 08:00 hours with a tolerance of 60 minutes. • Second update of the forecasts (see section II.3): From 15:00 hours with a tolerance of 60 minutes. I.5.- For every geographic coordinate mentioned in Table 2.1 the forecast units must be given in W/m^2. I.6.- Confidentiality between both parties the provider and CENACE is requeried, about the information delivered by CENACE and the information the provider gives to CENACE, by signing a confidentiality agreement, which will be signed by both parties prior to the delivery of the service.

Appendix A
Wind Speed Forecast Web Services

The provider must send the Wind Speed forecast information consuming a web service developed by CENACE, the web service will use the standard SOAP protocol for the reception of the data and the communication must be done safely via the Internet throught SSL.

- Methods
  - EnviarPronosticoVelocidadViento
    - Input parameters
      - SistemaElectrico: Text string, indicates the system to which the forecast belongs {SIN} (see Electric System column in Table 1.1).
      - NumeroActualizacion: Data of integer type, indicates the forecast update number for the date sent {1,2} (1 for the morning update, 2 for the afternoon update).
      - Fecha: Data of date type, which indicates the date of the day on which the forecast is received.
      - Pronósticos: Array/List of Pronostico type containing the forecasts of every coordinate.
    - Return: Text string with the receipt ticket or the corresponding error message.
- Class
  - Pronostico: Class that represents the one-day forecast for a specific coordinate, contains the following properties:
    - NumeroCoordenada: Integer data representing the coordinate number to which the forecast corresponds (see Table 1.1 the Coordinate column).
    - GerenciaControl: Text string with the acronym of the Control Management to which the coordinate belongs (see Table 1.1 the GCR column).
    - DiasEnAdelanto: Integer type data, which represents the number of days ahead of the forecast with respect to the date of receipt of the forecast {0,1,2,3,4,5,6,7,8}.
    - Fecha: Date type data, which indicates the date of the day to which the forecast corresponds
    - H1, H2… H25: Numerical properties (one per hour) of real number type that represent the forecast of each of the hours of the day. The class has properties for the 25 hours, this is to cover the 25th hour when summer time ends. Hour 25 is only occupied when daylight saving time ends. When it is the beginning of daylight saving time, only the first 23 hours of the class are occupied (H1 to H23), in this case put NA at the 24th hour and also at the 25th hour. For the rest of the days only the first 24 hours are forecast (H1 to H24), and on those days put NA for the 25th hour.

The WSDL file with the description of the service, as well as the URL of the service will be provided to the Supplier, who must make the necessary configurations in their systems to consume the web service.

Appendix A
Solar Global Radiation Forecast Web Services

The provider must send the solar global radiation forecast information consuming a web service developed by the CENACE, the web service will use the standard SOAP protocol for the reception of the data and the communication must be done safely via the Internet throught SSL.

- Methods
  - EnviarPronosticoRadiacionGlobal
    - Input parameters
      - SistemaElectrico: Text string, indicates the system to which the forecast belongs {SIN} (see Electric System column in Table 2.1)
      - NumeroActualizacion: Data of integer type, indicates the forecast update number for the date sent {1,2} (1 for the morning update, 2 for the afternoon update).
      - Fecha: Data of date type, which indicates the date of the day on which the forecast is received.
      - Pronósticos: Array/List of Pronostico type containing the forecasts of every coordinate.
    - Return: Text string with the receipt ticket or the corresponding error message.
- Class
  - Pronostico: Class that represents the one-day forecast for a specific coordinate, contains the following properties:
    - NumeroCoordenada: Integer data representing the coordinate number to which the forecast corresponds (see Table 2.1 the Coordinate column.
    - GerenciaControl: Text string with the acronym of the Control Management to which the coordinate belongs (see Table 2.1 the GCR column).
    - DiasEnAdelanto: Integer type data, which represents the number of days ahead of the forecast with respect to the date of receipt of the forecast {0,1,2,3,4,5,6,7,8}.
    - Fecha: Data of date type, which indicates the date of the day on which the forecast is received.
    - H1, H2… H25: Numerical properties (one per hour) of real number type that represent the forecast of each of the hours of the day. The class has properties for the 25 hours, this is to cover the 25th hour when summer time ends. Hour 25 is only occupied when daylight saving time ends. When it is the beginning of daylight saving time, only the first 23 hours of the class are occupied (H1 to H23), in this case put NA at the 24th hour and also at the 25th hour. For the rest of the days only the first 24 hours are forecast (H1 to H24), and on those days put NA for the 25th hour.

The WSDL file with the description of the service, as well as the URL of the service will be provided to the Supplier, who must make the necessary configurations in their systems to consume the web service.