# ELECTRICITY MARKET IN SPAIN. MAIN REGULATORY ASPECTS.

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## ELECTRICITY MARKET. REGULATORY FRAMEWORK.

Directive 2009/72/EC, on an internal market for electricity

Directive 2009/28/EC, on promotion of energy from RES

Law 24/2013, of the Electricity Sector

Royal Decree 2019/1997 on the electricity market functioning.

Market rules (www.omie.es)

System operation procedures (www.ree.es)

CNMC instruction on electricity exchanges in the interconnections

#### **OTHERS**

Royal Decree 1955/2000, on permitting procedures.

Royal Decree 413/2014 and Ministerial Order IET/1045/2014 Specific remmuneration regime

Royal Decree 738/2015 Non peninsular systems

#### ACTIVITIES OF THE ELECTRICITY SUPPLY CHAIN

- **√** Generation
- **✓** Transmission
- ✓ Distribution
- √ Supply / Trading
- ✓ Energy charging services
- √ Cross-border electricity exchanges
- √ System Operation/ Market Operation

#### **ELECTRICITY GENERATION ACTIVITY**

- ✓ Liberalized activity. Free entry.
- ✓ Permitting procedure according to Royal Decree 1955/2000.
- ✓ Once the facility is built, the next steps in order to participate in the market are:
  - a) Certification of the compliance with the legal, technical and economic requirements.
  - b) Become a market agent.
  - c) Be registered as a production unit.

#### **ELECTRICITY MARKET. RES TECHONOLOGIES**

- A. PARTICIPATE IN THE MARKET WITHOUT ANY SUPPORT SCHEME.
- B. PARTICIPATE IN THE MARKET WITHIN THE 'SPECIFIC REMUNERATION' REGIME: PROCEDURE for ACCESS TO THE REMUNERATION ACCORDING TO ROYAL DECREE 413/2014.

IN BOTH CASES: PARTICIPATION IN THE SPOT MARKET AND ANCILLARY SERVICES ON AN EQUAL FOOTING WITH OTHER TECHNOLOGIES.

#### **ELECTRICITY GENERATION ACTIVITY**

Remuneration components (art.14 Electricity Sector Law):

- 1. Electricity Price:
  - 1. Day ahead and intraday spot market Price.
  - 2. Bilateral contracts or forward markets.
  - 3. Ancillary and balancing services.
- + In certain cases, capacity mechanisms.
- 2. Renewables, cogeneration and wastes: specific remuneration (support scheme).
- 3. Electricity generation in non peninsular electricity systems: aditional remuneration.

## ELECTRICITY MARKET. BROAD DEFINITION DIFFERENT CONTRACTING OPTIONS AND HORIZONS:

- ✓ Day-ahead and intraday spot market: managed by OMIE as spot market operator.
- ✓ Bilateral contracts (between different stakeholders).
- ✓ Forward markets: Futures markets managed by OMIP-OMICLEAR (MIBEL).
- ✓ System adjustment (ancillary and balancing) services:
  - Technical constraints resolution.
  - Upward Power reserve
  - Secondary and tertiary reserves
  - Deviation management

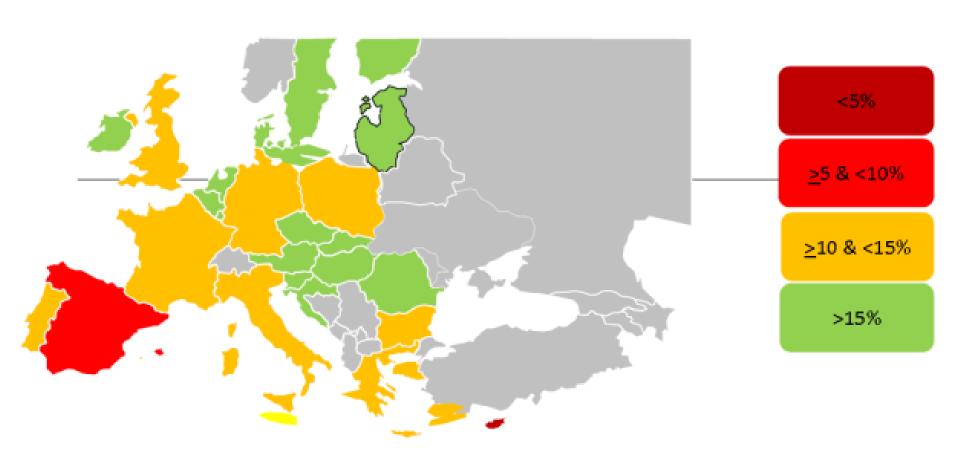
MANAGED BY THE SYSTEM OPERATOR (REE)

#### CROSS BORDER EXCHANGES OF ELECTRICITY

- ✓ Market agents can participate in cross-boder exchanges of electricity according to the rules approved for each border.
- ✓ Only denied in case of risk for the electricity supply.
- ✓ Third countries: specific authorisation by the Ministry.
- ✓ Cross border exchanges for system security: managed by the system operator.
- ✓ CNMC: Regulation of capacity allocation and congestion management rules. (CIRCULAR 2/2014)

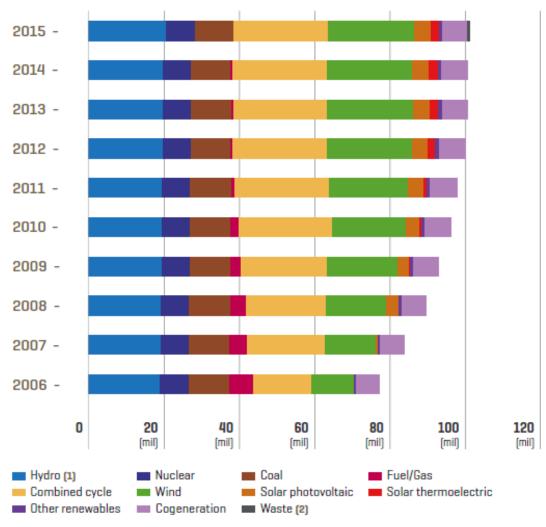
#### SPANISH ELECTRICITY MARKET

Map of interconnection levels in 2020 after implementation of current PCIs



### EVOLUTION OF INSTALLED POWER CAPACITY ON THE SPANISH PENINSULA





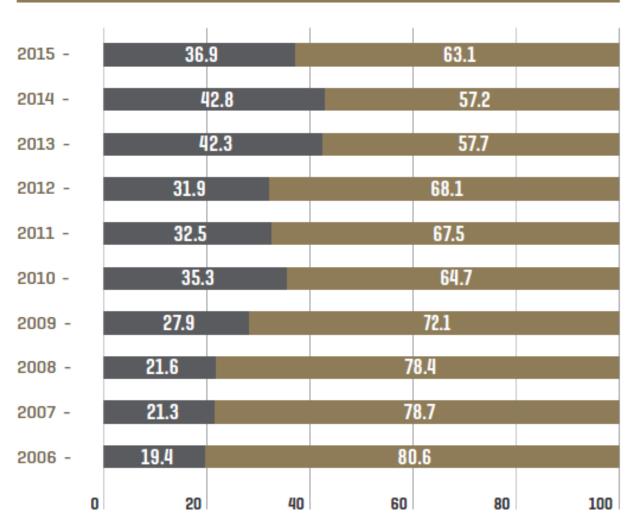
ELECTRICITY
GENERATION
MIX.
EVOLUTION
OF INSTALLED
CAPACITY.

(1) Includes power from pure pumped storage. (2) Power included in Other renewables and Cogeneration until 31 Dec, 2014. // Source: National Commission for Markets and Competition (CNMC) on data regarding power from: non-Hydro Management Unit (UGH), wind, solar photovoltaic, solar thermoelectric, other renewables, cogeneration and waste.

Source: REE

#### EVOLUTION OF RENEWABLE AND NON-RENEWABLE GENERATION ON THE SPANISH PENINSULA





ELECTRICITY
GENERATION
MIX.
SHARE OF RES
AND
NON-RES
GENERATION.

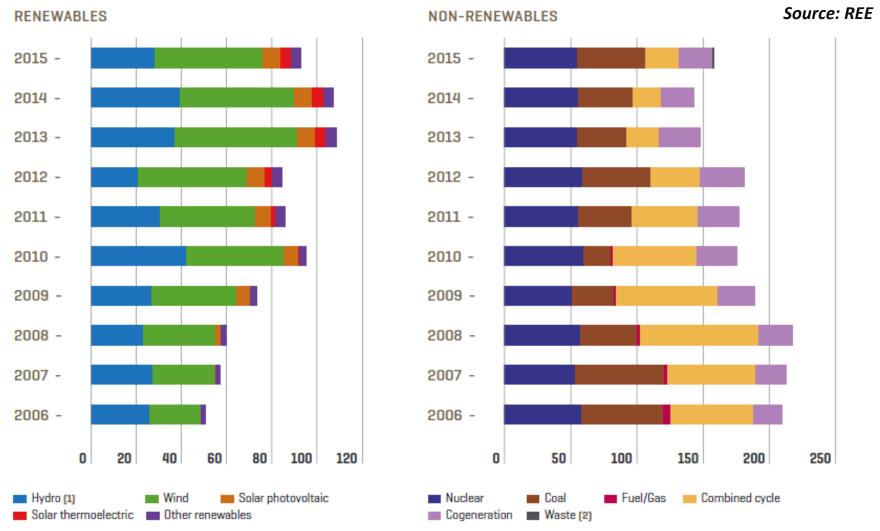
Renewable: hydro, wind, solar photovoltaic, solar thermal and other renewables.
Does not include pumped storage generation.

Non-renewable: nuclear, coal, fuel/gas, combined cycle and cogeneration and waste.

#### BREAKDOWN OF THE GENERATION MIX

### EVOLUTION OF RENEWABLE AND NON-RENEWABLE ELECTRICITY GENERATION ON THE SPANISH PENINSULA



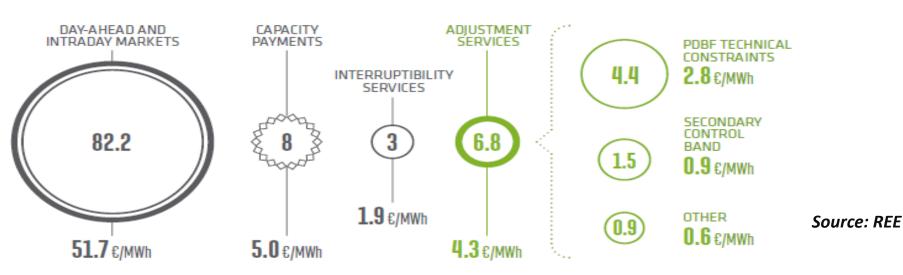


#### **ELECTRICITY MARKET IN 2015.**

- ✓ ENERGY ON DAY-AHEAD MARKET: 247 TWh (+ 0,2%): 73% SPOT MARKET 27% BILATERAL CONTRACTS
- ✓ ENERGY ON INTRADAY MARKET: 27,8 TWh (-10,5%)
- ✓ ENERGY ON ADJUSTMENT SERVICES: 18,2 TWh (-26,5%)

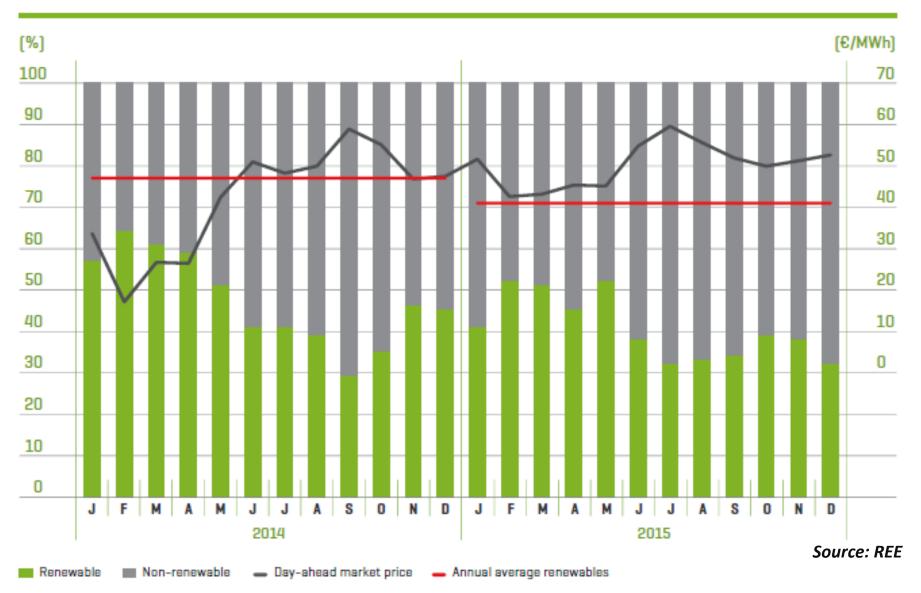
#### COMPONENTS OF THE FINAL PRICE 2015

%



#### **ELECTRICITY PRICES AND GENERATION IN 2015**

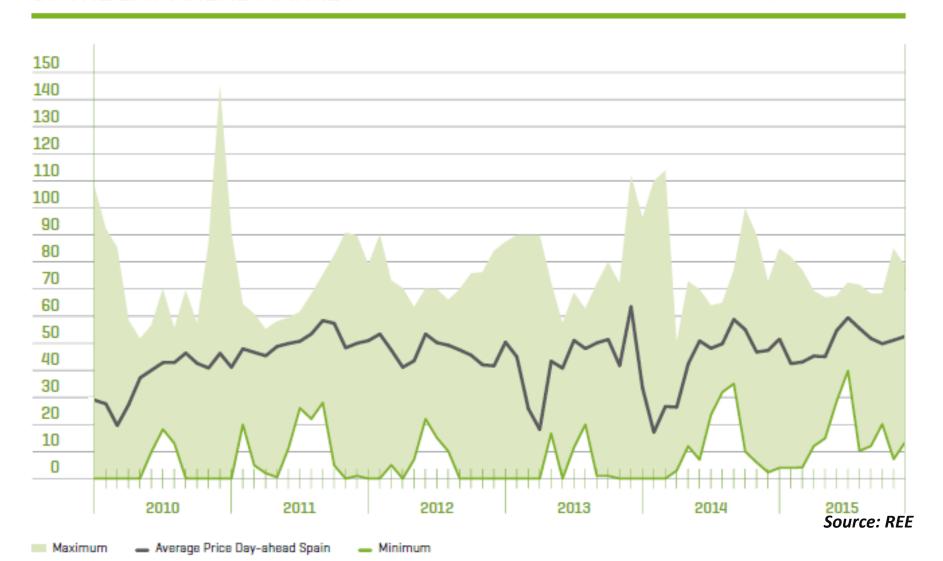
#### **GENERATION AND PRICES**



#### **EVOLUTION OF ELECTRICITY PRICES**

## MAXIMUM, MINIMUM AND AVERAGE PRICE OF THE DAY-AHEAD MARKET

€/MWh





#### **INDEX**

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2.4 Asset Management

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#### **WHO WE ARE**

Suddeutsche Invest (SDI) was established in 2008 generating value added services for the photovoltaic project sector. Over the last years we have successfully introduced and established our clients in new markets, mainly in Europe but also in Japan, Chile, Philippines and the US.

Currently, we have expertise advising, managing and solving a wide range of issues for our customers, either developers, EPCist or private institutional investors.



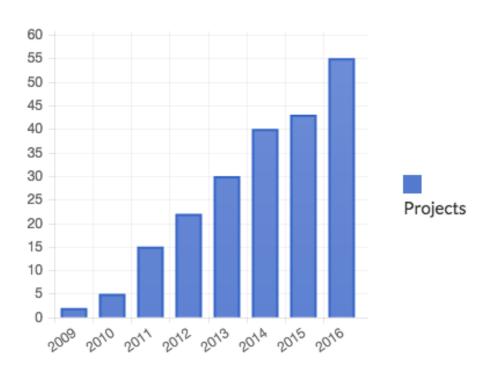
#### WHO WE ARE

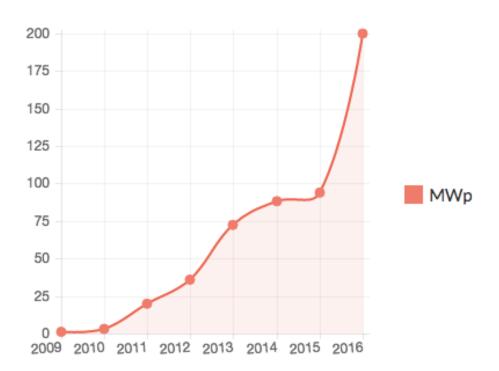
Our services range from the conception of a project to the operation and management of the PV asset once it's producing. SDI keeps its clients permanently up to date in the new requirements and standards, as well as aware of the PV market opportunities all around the world.

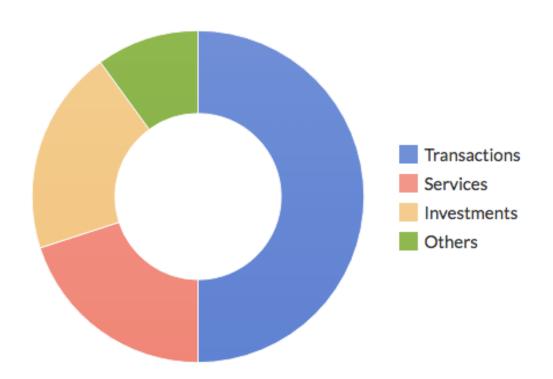
We have been involved in more than 50 PV transactions, amounting to more than 500 M€ and an installed capacity above 200 MWp.



## Increasing Experience







## 2 Services

#### **2.1 COUNTRY PROSPECTION**

#### **Legal Framework**

We know the regulatory and legal issues of each market

#### **Energy Market Monitoring**

Constantly listening to the energy markets highlights

#### **Economical Models**

We provide feasibility studies looking for the best profitability

#### **Projects Portfolio Selection**

If you are an investor we have the best project for you

#### **Local Partners Selection**

If you are a developer or promotor we connect you with the appropriate local partner.

#### **Investor Research Selection**

If you are a developer or EPCist we have your investor



#### **2.2 TRANSACTION ADVISORY**

#### Internal Due Diligence

We draft the technical, financial and tax-legal Due Diligence to select the best projects.

#### **Transaction Scheme**

We manage every step of the sale and purchase agreement

#### **Commercial Negociation**

We negociate to achive the best deal

#### **Due Diligence Coordination**

Is the time for truth. We schedule legal-tax and technical Due Diligence.

#### **Contracts Advice**

Due to our experience, we optimize the contracts: SPA or APA, EPC, O&M.

#### Tax and Legal Optimization

Looking for the best options to get the highest return



#### Services

#### 2.3 CONSTRUCTION MONITORING

#### **Construction Control on the ground**

Checking the critical processes of the construction progress.

#### **Quality Controls on site**

Quality control of the PV equipments.

#### **Cost Control**

Improving the projects profit



#### **2.4 ASSET MANAGEMENT**

## Premium

## Basic

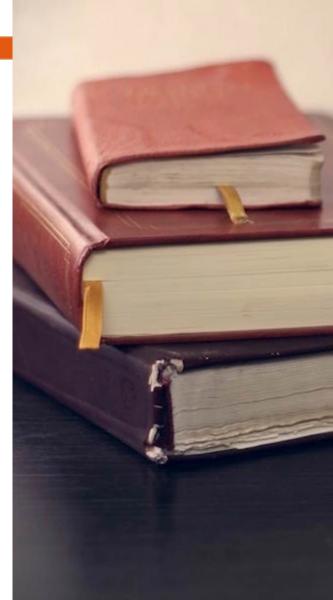
- Regulatory Monitoring
- Relations with Public Administration Bodies/Entities/ Institutions
- Suppliers Management, Security Company, Insurance, etc
- Lease Contract Management
- Asset Performance
- Performance reports
- Bookkeping
- Treasury Management
- Banking Relations
- Accounting Reports

#### Tailor Made Asset Management

We can customize your Asset Management as you need

#### Assets legal framework monitoring

We are permanent aware about the legal changes



#### **2.5 TAKEOVER ASSISTANCE**

## **Post Acquisition Services**Internal Due Diligence to refinance and takeover activities.



#### **2.6 PV ASSESSMENTS**

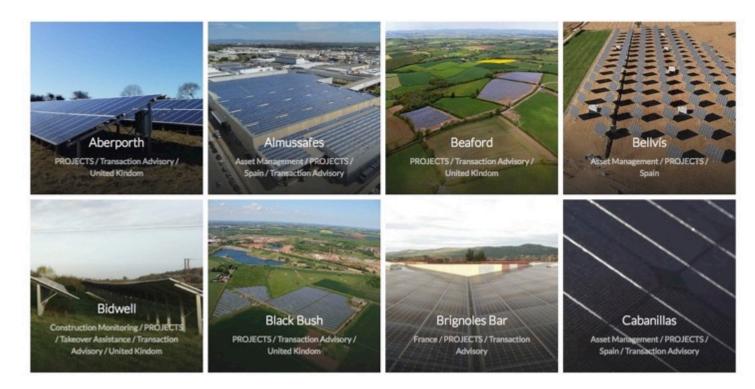
### Appraisal studies Accurate evaluation to the market value

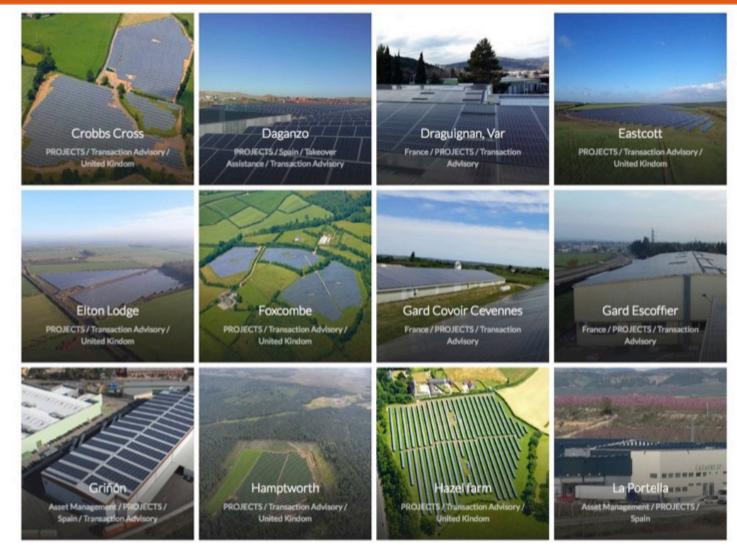


#### 3 Track Record

Here are the projects we have supported in the whole cycle advisory. These are the basis of our experience that we can offer to you.

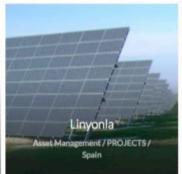
France, Italy, Philippines, Portugal, Spain, United Kindom



















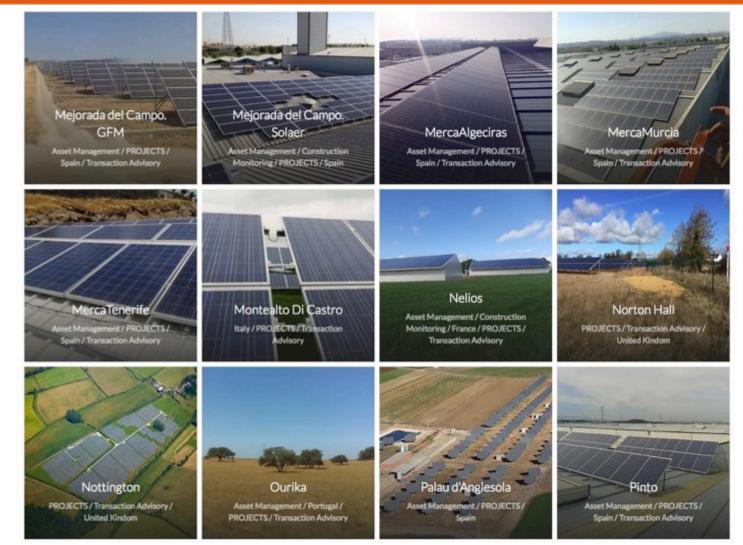


















Hérault

Advisory

The Team



Carles Sancho

Partner



Juan Francisco García

Partner



Pau Sancho

CFO



decisive

making things happen



commitment

we are in the shoes of our clients



specialisation

focused in solar photovoltaic



integrity

responsibility and professionalism







#### MODELLING ELECTRICITY MARKETS

Antonio de Juan Director, Head of Spain & Portugal

October 20, 2016



#### PÖYRY'S MODELS FOR LONG-TERM PRICE PROJECTIONS

Our fundamental models generate consistent energy scenarios underpinned by fundamentals



 BID3 projects the future development of electricity markets via modelling of the physical operation (generator output, electricity flows, emissions) and economic behaviour (electricity prices, revenues)



Pegasus projects the future development of the European gas markets and prices taking also into consideration developments in North America, Asia and the global LNG market



 The Carbon Model models the EU-ETS calculated price for emissions certificates based on CO<sub>2</sub> avoidance costs and the CO<sub>2</sub> European trading regime



 Cronos projects the future development of global oil prices based on worldwide supply and demand

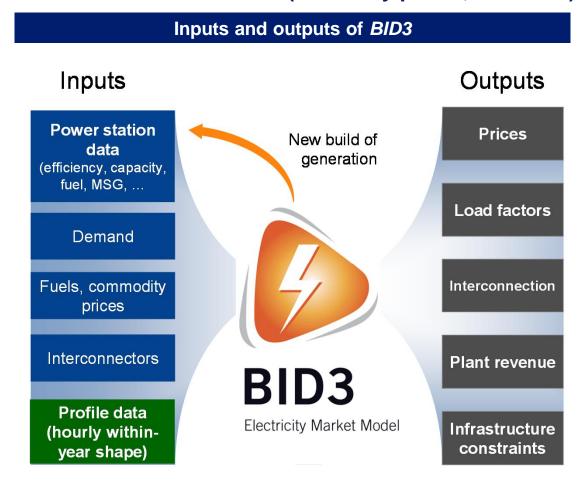


 Olympus projects the future development of globally traded coal prices based on worldwide supply and demand



#### BID3 – PÖYRY'S ELECTRICITY MARKET MODEL

BID3 projects physical operation (generator output, electricity flows, emissions) and economic behaviour (electricity prices, revenues)



#### **Basics of BID3**

- BID3 is an optimisation which minimises the system cost in a year subject to constraints
- Pöyry has included in BID3 the following thermal plant dynamics
  - Start-up,
- Part-loading (no-load),
   Minimum Stable Generation
- Minimum off times, minimum on time
- Start-up cost and variable maintenance costs dependent on start temperature
- Ramping
- Reserve/response



#### UNDERLYING SCENARIO PRINCIPLES

A number of core modelling principles underlie our standard HCL scenarios

Based on market fundamentals

We model physical assets and their commercial operation.
 Prices and revenues are the result of the interaction of supply and demand

Internally consistent

 Gas, coal, carbon and electricity prices are iterated to ensure consistency

Rational investor behaviour

 Investors will only build where they see prospects for sufficient returns

Assumption of competitive free markets

• In the short-term, deviation from this is possible, but we always assume a reversion to competitive markets

No prediction of investment cycles

 Long-term assumption of rational investors with foresight means no investment cycles occur



#### **ELECTRICITY MARKET MODELLING PRINCIPLES**

In addition, the electricity modelling overlays the following principles

#### Competitive SRMC bidding

 Perfect competition means that plant runs on basis of position in merit order based on SRMC, not whenever the market price is above its marginal cost of generation

#### Lights do not 'go out'

 Wholesale markets lead to recovery of fixed and variable costs of generation. Scarcity Rent and/or Capacity Payments may be required

#### Perfect foresight of investment

 Perfect foresight of investment means that there is no under-or overinvestment

#### Internally consistent

• All of Europe is run simultaneously, ensuring consistent projections for any European country

#### Projections for dayahead electricity prices

- Projections are closest to day-ahead electricity prices
- Projections are not forward curves

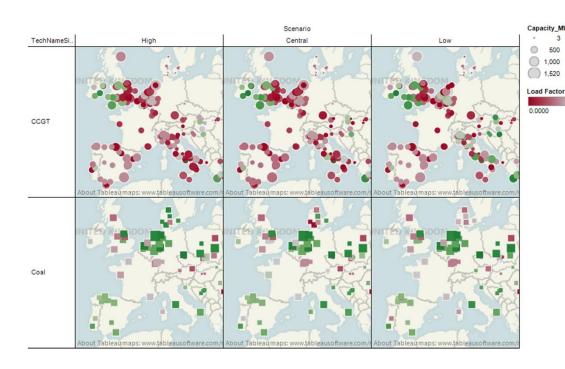
#### Range of weather patterns

 We capture internally consistent weather patterns: we do not know what future weather will be, but it will respect historical patterns



#### **BID3 – PÖYRY'S ELECTRICITY MARKET MODEL**

We model all facilities across Europe, which provides detailed outputs and all markets interactions



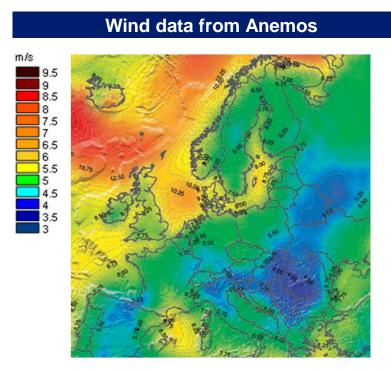
#### Coverage of BID3

- BID3 simulates all countries in Northern and Western Europe and Turkey
- BID3 produces hourly price projections for 8,760 hours per year up to 2040
- BID3 determines optimal exports and imports between regions, based on regional market economics and interconnection constraints
- Each country has its individual database of generation (every medium-large power plant in Europe & Turkey) and demand which are standardized for *BID3*
- BID3 enables assessing the commercial performance of individual companies or power stations



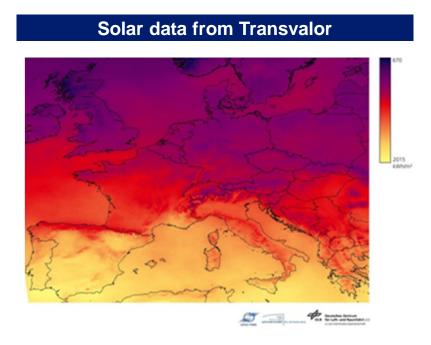
#### **WEATHER IS AND WILL BE A KEY FACTOR**

Detailed historical data is a key input to BID3, keeping time and spatial correlation of RES production across Europe



#### Data inputs:

- Hourly data from 2003 to 2010
- Data resolution of 20 km
- 20 million data points for Europe & Turkey



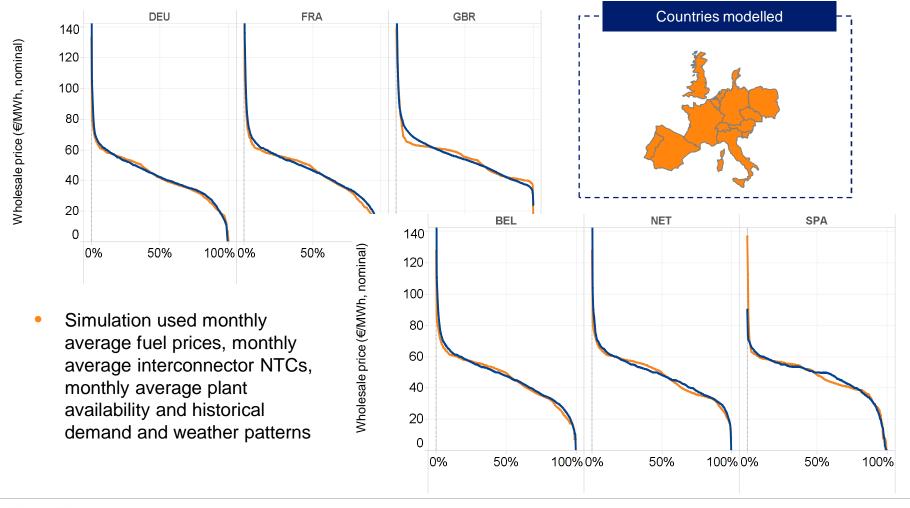
#### Data inputs:

- Hourly data from 2003 to 2010
- Data resolution of 2 km
- 60 million data points for Europe & Turkey



#### **MODEL ACCURACY**

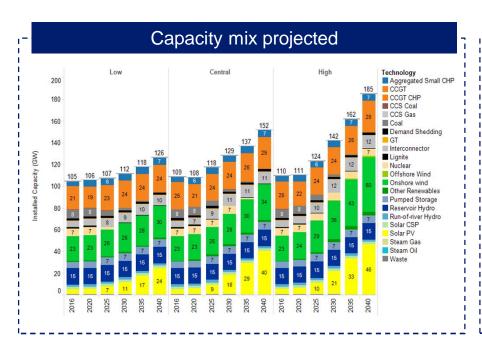
Comparing historical prices against a 'backcast' of BID3 shows that it produces accurate prices and a convincing price shape.

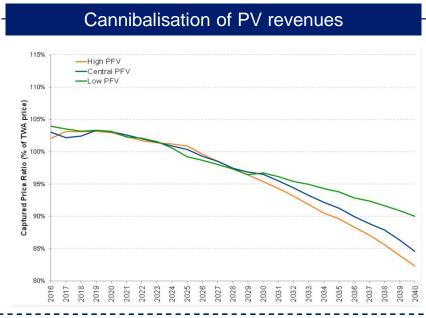




#### SOME SAMPLE RESULTS FOR SPANISH PV

#### **Spanish solar results**





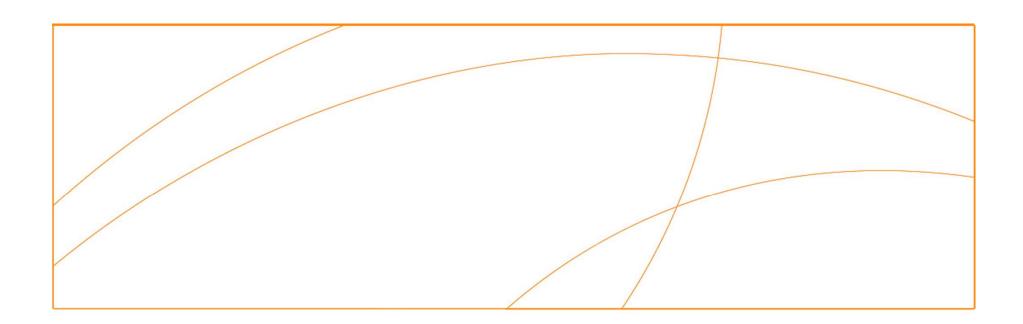


#### **KEY TAKEAWAYS**

### The merchant business mode we are heading needs a number of analytical skills to be used

- BID3 simulates all countries in Europe and Turkey. BID3 is also modelling some markets in LatAm (Mexico, Chile...) and some markets in Middle East as well as specific ISOs in USA.
- *BID3* produces **hourly price projections** for 8,760 hours per year up to 2040, which allows for tailor made assessment to investors.
- BID3 enables assessing the commercial performance of individual companies or power stations.
- BID3 allows for ad-hoc assessments in the long term addressing the sensitivities required.
- Scenarios can be modified to explore the risks associated to the projection allowing for an understanding of the risk exposure over the long run – during PPA and post PPA.



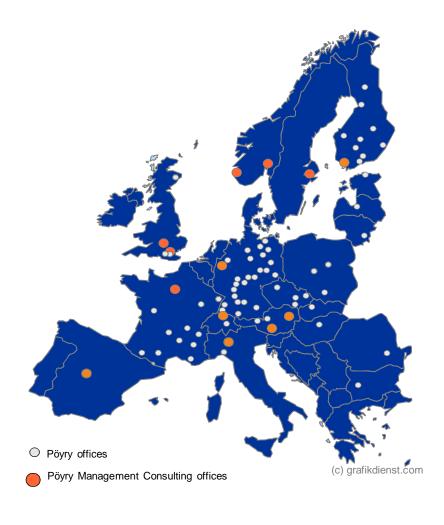




# ANNEX Pöyry Management Consulting overview

#### **PÖYRY MANAGEMENT CONSULTING**

#### Europe's leading specialist in energy management consultancy



- Pöyry Management Consulting is the consulting subsidiary of the Pöyry group
- Offering expert advice from strategy to implementation on policy, regulation, business operations, financing and valuation and sustainability
- Providing in-depth market intelligence across Europe
- Over 200 energy market experts in 13 offices across Europe:
  - DüsseldorfOxford
  - HelsinkiStockholm
  - London Paris
  - Madrid Vienna
  - Milan Villach
  - Moscow Zürich
  - Oslo



#### **PÖYRY CLIENTS**

We have a proven track record of delivering expertise in large market modelling, market design and regulatory projects for a variety of different clients

#### Policy makers

Regulators, Governments, European bodies

#### Investors

Banks, funds, shareholders

#### Utilities

Generators, TSOs, DNOs, retailers

#### Power exchanges and traders

#### Consumers

Large consumers, aggregators, associations



We are the leading advisor in gas and electricity sectors in Europe







Antonio de Juan Director, Head of Spain & Portugal +34 615 457 290 antonio.dejuanfernandez@poyry.com

Consulting. Engineering. Projects. Operations.





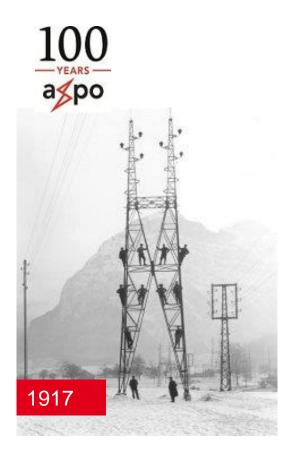
## PPA pieza clave en la financiación de nueva capacidad



Antonio Canseco

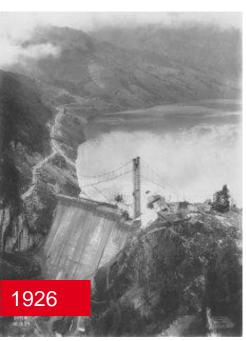
#### El Grupo Axpo





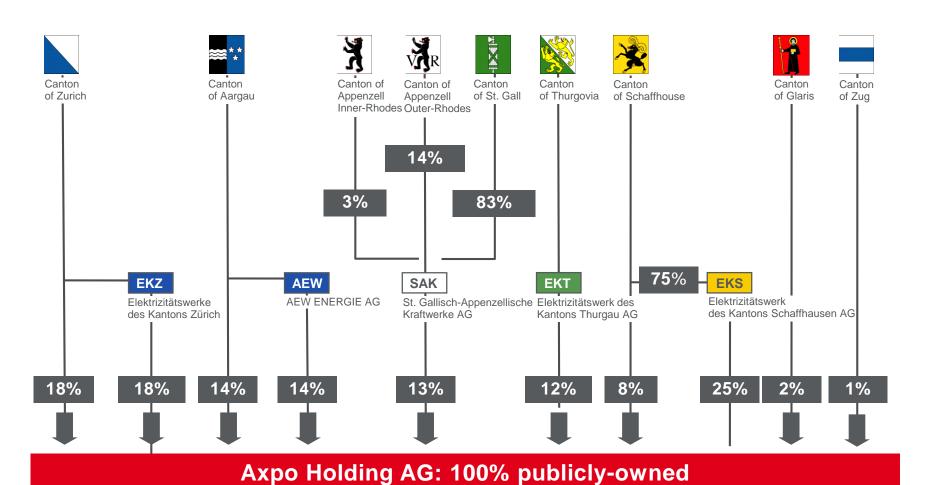






#### El Grupo Axpo





#### El Grupo Axpo



#### Compañía

- Suministr
- Más de 4
- 116 plant
- Compañí
- Presentes

## a po SUPER LEAGUE CHALLENGE LEAGUE

#### Country

Switzerland

Germany

France

Italy

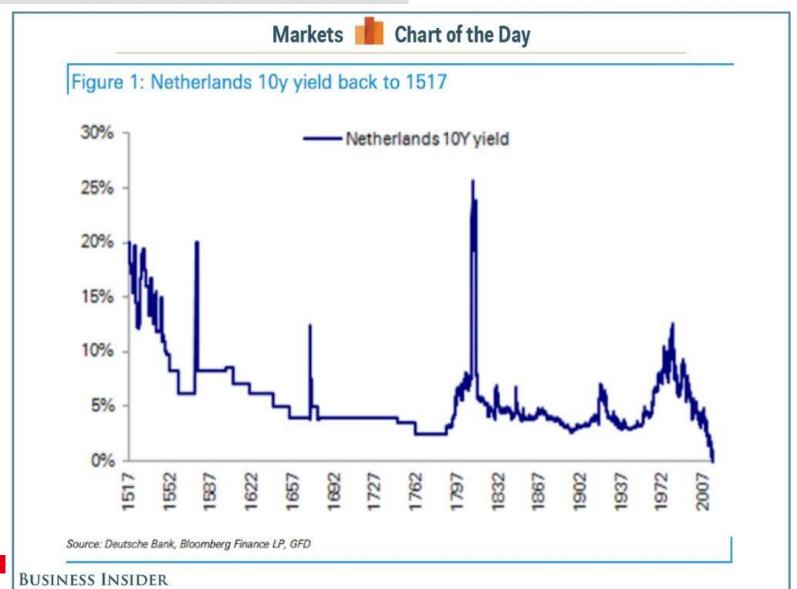
Spain





## ¿Qué rentabilidad debemos exigir a una inversion de poco riesgo?





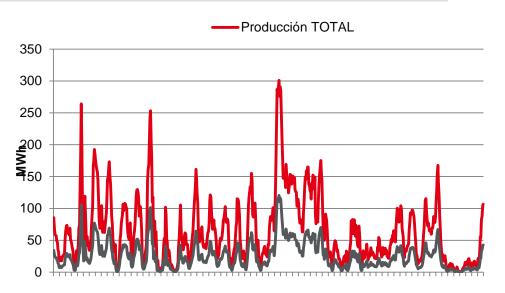
#### **Curvas Forward**

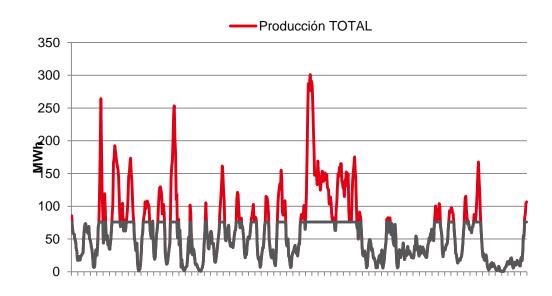




#### **PPAs.** Diferentes esquemas

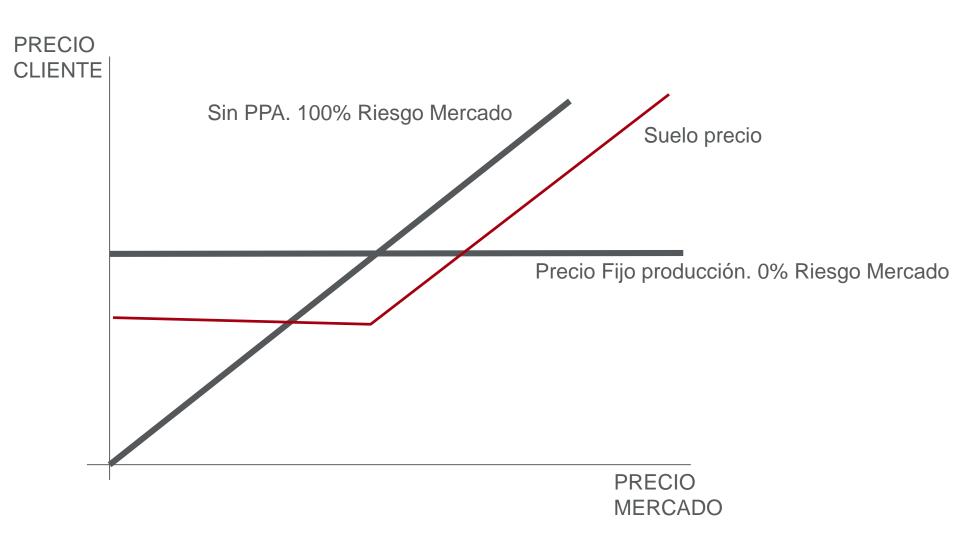






#### **PPAs.** Diferentes esquemas







# **Electricity Price Protection Portugal & Spain**

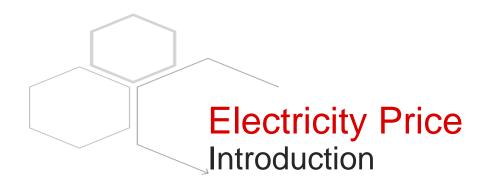




#### Index

- ▶ Importance of Electricity Price
- The Solution
  - Definition
  - Contracting Cycle
  - Operative Cycle
  - Alternatives
- Aon
- Contact People







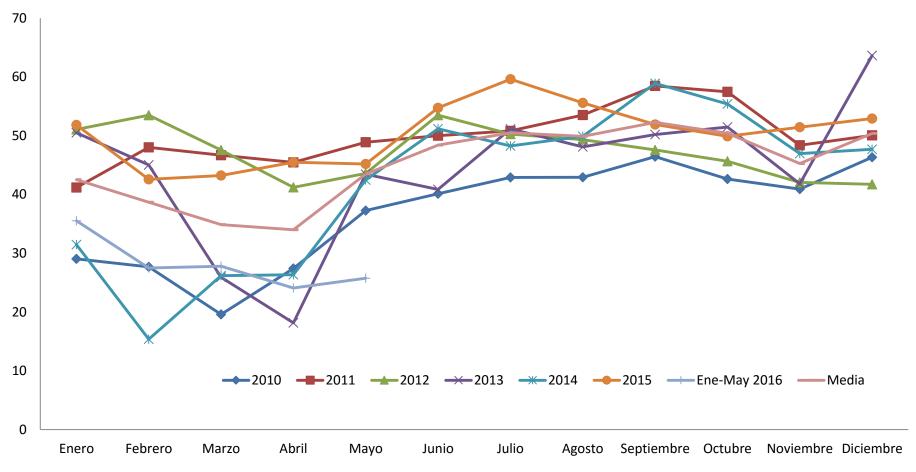
▶ Estimation of the evolution of the electricity daily market is critical when doing projections of future income for a Power Plant and a fundamental parameter when deciding new investments.

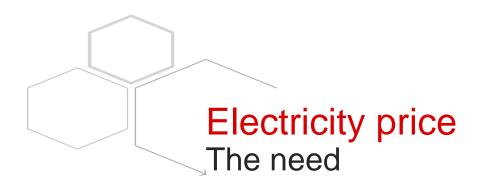
Recent market volatility and law modification affecting structure of the income makes it necessary to look for stability in electricity price without subsidies through tailor made structured solutions adapted to client needs and accepted by their financing banks.





## Electricity Price Pool historic evolution







A solution to transfer the risks associated to the oscillations of pool price in the electricity market.

→ With the objective of obtaining a known and stable minimum price at medium –long term (not a better price but a stable price)



▶ Reduce impact on company Balance Sheet and allow better acces to financing



Definition

**The Solution** 





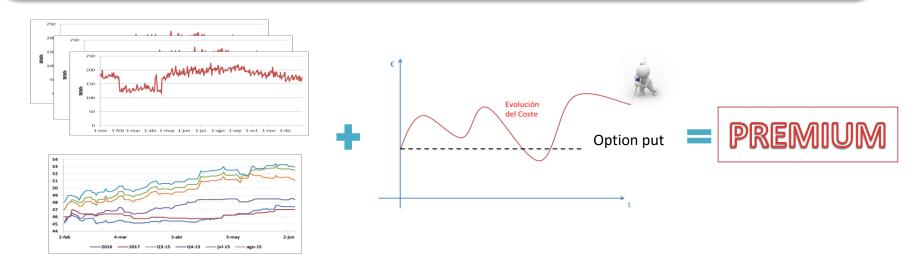
- Coverage of a **Ground Price** through a Derivative (**option put**) or an **Insurance**
- Contract signed directly among Client and Seller of the Cover with the intermediation of Aon.
- Seller of the Cover is a **first class Power Trading Company**, solvent and with proven experience in structured solutions.
- The Product is a tailor made solution adapted to client needs.





#### Client to define:

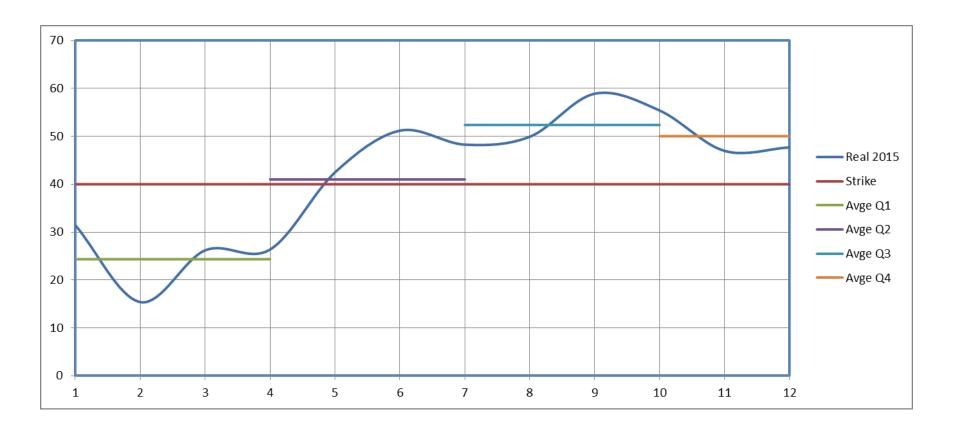
- -Target price or ground (Strike) that will trigger the cover
- -Coverage Period (between one month and multi year periods)
- -Energy Volume to be insured (MWh) during the period....



....and Seller (Power Trader) in base of actuarial analysis and future projections to comunicate Premium

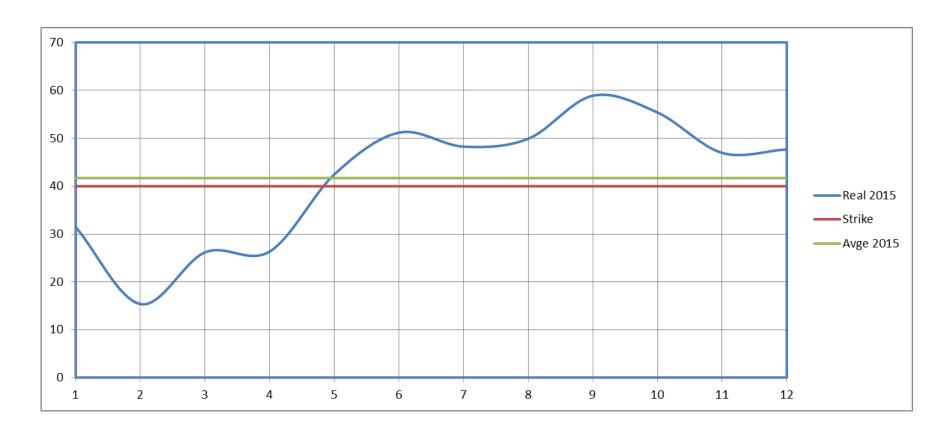
















## The product Definition

**Name** 

Option Put (ground)

Seller

**Power Trading Company** 

Subyacent Price

Hourly market price given by OMIE

**Hour Volume** 

Base Load (same volume per hour)

**Premium** 

€/MWh, to be paid 5 days from closing of the operation

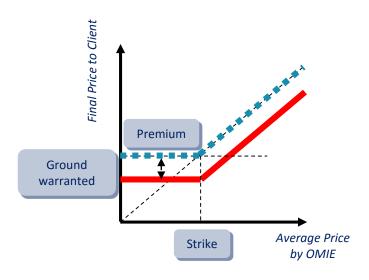
**Payout Period** 

Tba. Each month/quarter/year

**Payout calculation** 

#### For each Payout Period:

- If average of subyacent price is under Strike, then Seller will pay to Client: Strike minus Subyacent Price times Volume
- No payment in any other case

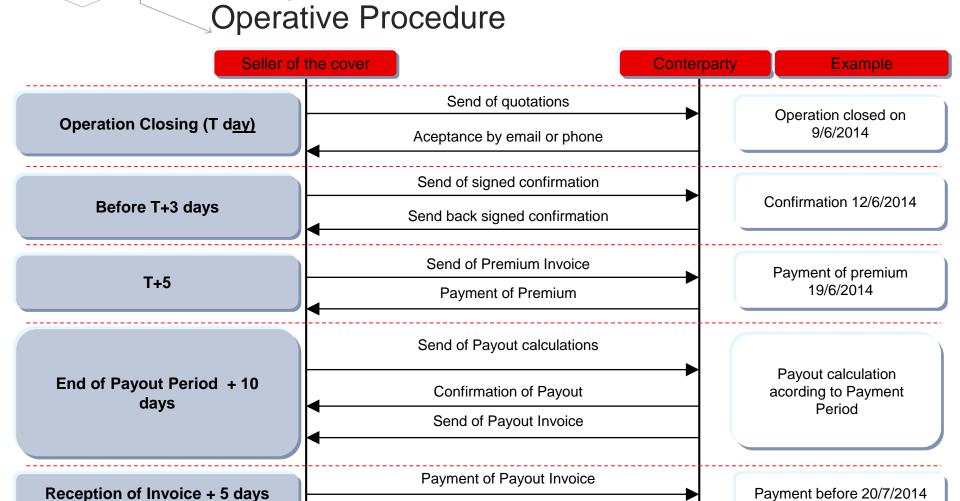


Seller warranties a minimum price of electricity (ground or strike).

Prices over the strike will be fully in favour of the client





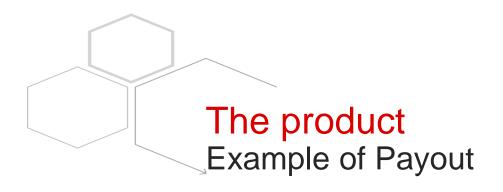


Note: for calculations only working days will be considered





- Temporary cover from a month to 5 years.
- Payout period to be agreed: monthly, quarterly, yearly...
- Subvacent agreed with client according to his profile (f.e. only during day hours, etc).
- ▶ Energy Volume variable during the year (f.e. 60% of volume during summer months, 40% during spring and autum, nil on winter).
- Posibility to structure as a Derivative or as an Insurance



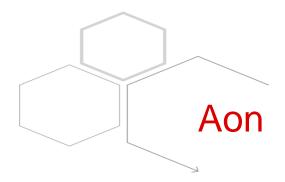


Example for 1 MWh base load.

Put with Strike 44 €/MWh

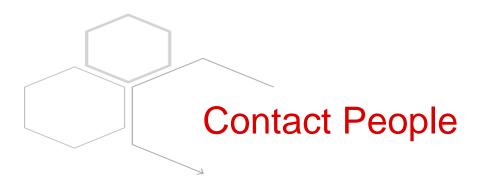
| Pool Price (1)          | 35 | 40 | 42,3 | 45 | 50 |
|-------------------------|----|----|------|----|----|
| Ground Price/Strike (2) | 44 | 44 | 44   | 44 | 44 |
| Payout (2-1)            | 9  | 4  | 1,7  | 0  | 0  |







- Lead energy Insurance Broker
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Aon Gil y Carvajal, S.A. Insurance Brokerage, Single Shareholder Company.

Entered in the Madrid Mercantile Register, Sheet M-19857, Volume 15321, Page 133, Fiscal Identity Number A-28109247.

Entered in the Special Register of Insurance Broker Companies with code J-107. Financial capacity and Public Liability Insurance taken out in accordance with that which is provisioned for in Law 26/2006, dated 17<sup>th</sup> July.

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