

Challenge of selling wind energy on the market : obstacles and opportunities

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French onshore wind at a turning point

- Current FiT validated by EU Commission Competition Directorate on **March 23, 2014** for up to 10 years unless changes were made to existing scheme.
- FiT confirmed by French government Order of **June 17, 2014**.
- **December 2015** Amending Financing Law changed the funding mechanism of the RE support scheme and in particular taxed imports of RE.
- EU Commission considers that support scheme was changed and seems to require that French government notify a new support scheme complying with July 2014 Guidelines. This interpretation of the EU Commission still needs to be validated and FEE has somewhat of a different view
- At the very least, the guidelines include transitory dispositions with a grandfathering clause (Chapter 5 – Paragraph 250).
- French gouvernement under strong pressure to notify a new support scheme for onshore wind.

From FiT to CfD

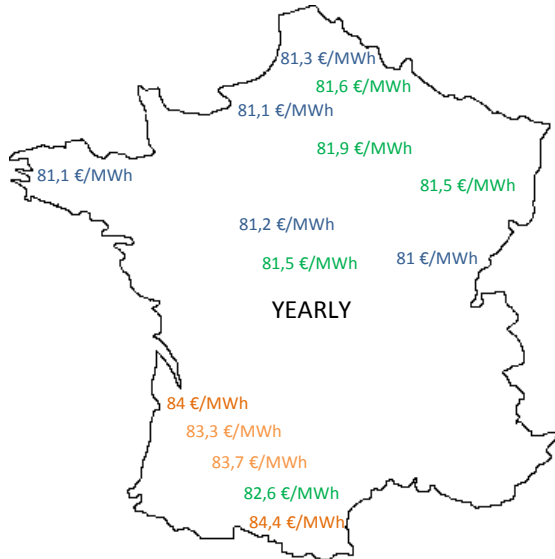
- FiT unchanged from prior scheme : approximately 82€/MWh declining 2% a year and indexed to CPI with two periods (10 years and 5 years) with downward adjustment for second period above 2,400 Heq average.
- Energetic Transition Law dated Aug. 18th, 2015 introduced main aspects of EU Commission guidelines into French regulation
- 2015 : year-long discussion with french government over the CfD formula (common to all RE technologies)
- D 2016-682 of May 27, 2016 lays the details of CfD formula applicable to all RE sectors and explicitly maintains FiT for onshore wind.
- Formula :

$$CR = \sum_{i=1}^n E_i \cdot (\alpha T e - M 0 i) - (N b \text{ capa} \cdot P \text{ ref capa}) + \sum_{i=1}^n E_i \cdot P \text{ gestion}$$

From FiT to CfD

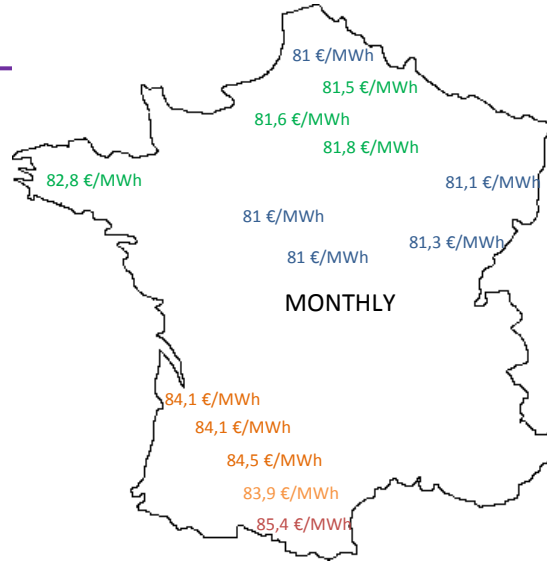
- Formula is complex :
 - Total remuneration = electricity market remuneration + capacity market remuneration + energy premium + management premium,
 - Stacks up electricity market risk and capacity market risk.
 - Initially it also included GO market risk → No guarantee of origin,
- Negative prices not remunerated : number of hours unknown and whether a minimum number of consecutive hours is applied,
- Timeframe for reference price calculation can go from 1 month to one year,
- Coefficient alpha may be declining over time to mentally prepare producers to pure market conditions,
- Onshore wind theoretically continues under FiT,
- No indication about auction mechanism in May 2016 Decree. Top up mechanism described in details but may be superseded by auction

Timeframe for reference price calculation in formula creates distortions

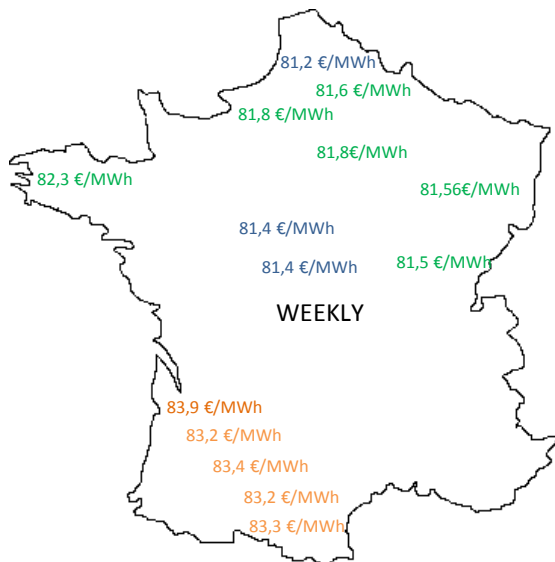


Average revenue = 82,2 €/MWh

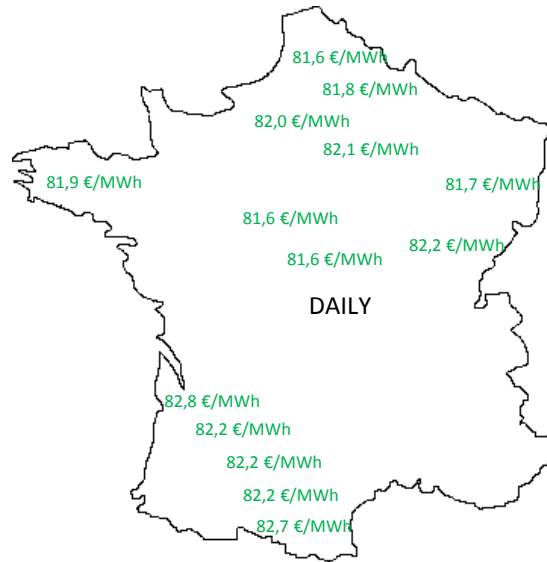
2013



Average revenue = 82,5 €/MWh



Average revenue = 82,2 €/MWh

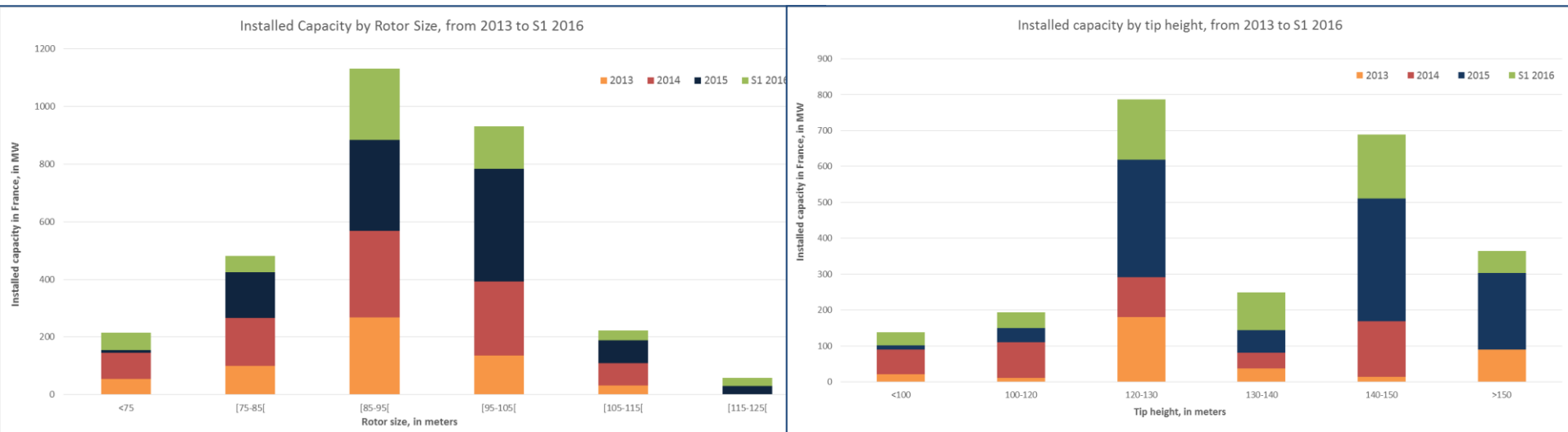


Average revenue = 82,0 €/MWh

- Simulations of CfD realized by FEE using existing wind parks over 2012, 2013 and 2014 (EPEX SPOT prices weighted average with with national wind production (RTE data))
- Three major wind regimes in France
- A yearly timeframe generates deviations of up to 8€/MWh (2012) and a monthly timeframe reduces them to 4€/MWh
- The shorter the timeframe the smaller the deviation from the reference price.

Rigid permitting prevents from reaching economic optimum

- France lags behind in introducing new technology due to its regulations :
 - tip height limitation (150m not in any regulation but practice),
 - difficulties to change machines once permits are obtained (development time is long – 8 years on average and more due to procedure and third party challenges) even if machines are outdated,
 - Vast majority of machines installed with 85m-105m rotors and 120m-150m tip height
 - German averages for S1 2016 : 109m rotor and around 185m tip height



Crash adjustment for the French wind onshore industry

- Jump from regulated to semi merchant system: unlike Germany, France did not experiment any direct sale before until now,
- Need to improve selection of machines to deliver best production for the location in relation with the reference price (rigidity of regulation must be loosened to bring prices down),
- Need to improve wind data collection (height, duration) to reduce uncertainty,
- RE production so far sold on market concerns hydro facilities that are not under financing,
- French lenders only have experience with foreign markets as far as market risk for RE project finance,
- New environment will drive investors and lenders to require additional comfort (lower gearing) in the absence of mitigation measures,
- New environment may render existing projects developed with older machines not financable or unattractive for investors due to older technology

French electricity market highly concentrated despite entry of new players

- French day ahead EPEX SPOT market is lagging at 100 TWh/year (about 550 TWh/year of production) -vs- 300 TWh in Germany, despite surge in volume since market prices are below regulated prices (ARENH),
- French Intraday liquidity is much too low to properly integrate RE production (9.000 MWh on 30.08.2016 and Germany 97.000 MWh on the same day),
- The remaining 450 TWh stay more or less in the balancing perimeter of the historical producer
- Keeping RE in the historical operator's balancing perimeter does not help to decrease its dominant position and to develop the market
- EDF benefits from full knowledge of privileged information from existing portfolio of RE portfolio – Acces to this information must be shared,
- Agregators entered the French market, with various backgrounds such as Trianel, subsidiaries of utilities (BKW, Axpo, Alpic, CNR, Statkraft) or newcomers such as Danske Commodities, Centrales Next, E6 or Hydronext

How to sell wind production and use project finance?

- French wind industry did not experiment direct sale of its production up until now.,
- Transition period will be required to allow existing projects to switch to new support mechanism with enticing support (management premium). Allowed by Decree 2016-682 with a right to return to FiT (only once in the project lifetime),
- Management premium will need to be higher than that in Germany today or at least start higher and decline over time,
- What kind of contracts with agregators :
 - Long or short term
 - Market price but how to cover deviation (management premium?)
 - Guaranteed price but what discount?
- How to rate agregators in case of long term PPA's. Last resort buyer possible but with a maximum of 80% of target price and for a limited period of time,

How to sell wind production and use project finance?

- Standard PPA General Conditions agreeable to lenders and agregators will facilitate transition,
- The inherent deviation from the reference price may vary over time due to more RE on the market, technological changes (more efficient machines, storage), political decisions (nuclear power), increased domestic market inter dependence,
- Such evolution over time may lead to more conservative production values or higher DSCR, therefore higher gearings; or more aggressive cash sweeping,
- New project finance tools may be necessary such as periodical refinancing (mini perms for exemple) in order to reduce gearing decline,
- Physical access to grid essential for direct sale on market : grid operator (Enedis) is not under control of regulator and unavailability time/durations without compensation increased dramatically over the last few years

Integration to the market is key to best valuation of energy produced

- Timing and duration of maintenance is essential (reduction of down time, scheduling during low price as well as low wind periods, one preventive maintenance a year during summer..),
- Wind parks design must take into consideration down time reduction in the design phase (for exemple cluster of machines, redundancies where appropriate),
- Automation and remote control of sub stations with data acquisition and universal communication with agregators,
- Integrate forecast into normal operation mode
- Ideally, in the future, access to end users for better valuation of energy produced

Conclusion

- Some regulatory change will facilitate full valuation of production (contract with grid operator, intra day liquidity, less concentrated market structure),
- Project finance structure to be adjusted to reflect new paradigm (how to reduce/mitigate risks),
- Agregators will contribute to de-risk partly uncertainty on price,
- IPP's will contribute to de-risk partly uncertainty on quantities (planning and operation phases)