POSITION

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1. Draft legal framework

In a CRM with reliability options, capacity providers receive a fixed capacity payment (at a price set through a competitive auction). In exchange for this payment they are to pay back part of the market revenues when the market price goes above a certain threshold, i.e. they are obliged to reimburse the positive difference between the reference price and the strike price.[1] This mechanism therefore limits the revenues earned on the energy markets by assets contracted in the capacity market.

This pay-back obligation will be imposed in the contract with the capacity provider.[2]

2. Pay-back obligation should be applicable to all capacity providers

In order to have **a level playing field amongst all capacity providers it is key that they are all equally subject to the pay-back obligation**, irrespective whether they are holder of generation, storage or demand response capacity.

In Ireland[3] capacity providers of demand response are excluded from the pay-back obligation because it is not possible for demand response to receive an energy payment for the demand reduction. This situation is very different from the one in Belgium: Belgium did considerable efforts to better integrate demand response in the market so that it can participate (e.g. transfer of energy in the balancing market) in return for an energy payment.

3. Reference price

3.1. Short description

The reference price is defined as the price that reflects the price that is supposed to be realized by the capacity provider on the electricity markets[4].

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1 See definition 69° in article 2 of the draft law related to the capacity remuneration mechanism (version 13.11.2018).

2 Article 7 decies, §6 of the draft law with proposals to modify the Electricity Law of the 29th of April, 1999 introducing a capacity remuneration mechanism (version 13.11.2018).

3 § 126 of '*Decision State Aid SA.44464 – Ireland – Irish Capacity Mechanism*', European Commission, DG COMP, 24th of November, 2017.

4 See definition 78° in article 2 of the draft law related to the capacity remuneration mechanism (version 13.11.2018).

The reference price should approximate the revenues that an asset has captured on the electricity markets. A correct methodology is an important precondition for a fair calculation of the amount that has to be paid back.

If the reference price methodology fails to reflect the revenues earned on the electricity markets, the resulting deviations between the real revenue and estimated revenue will create **an additional risk for the capacity provider**. One should be aware that such a situation would have several serious downsides:

- A generator that has a forward deal with a consumer will be exposed to the so called market-to-market risk of having to pay back the peak price in day-ahead while he has not been benefitting from that price level. Therefore, capacity holders will be forced to apply an additional risk premium on the capacity bids which leads to a **structural increase of the global system costs and, hence, of the electricity invoice for the Belgian end consumers**.

  This additional risk could discourage both existing capacity holders and potential investors to invest in Belgium and to participate to the Belgian CRM. Investors might choose not to bid in at all when the long-term risk they would be exposed to could not adequately be estimated or hedged. Such an approach would **run counter to the original objective of a CRM**, which is to provide a better investment climate for producers through risk reduction at the lowest cost for society.

- **A decrease of the liquidity on the forward market**s would be another consequence. This would make the Belgian forward market less attractive with a negative impact on the competition and the possibilities for supplies to secure their electricity supply at an attractive cost. This would certainly impact industrial consumers who buy electricity years ahead and on the other consumers who would like their electricity supply ensured at the lowest cost.

- If Belgian capacity holders would be put in the situation where they will need to pay back revenues they have never received in the spot market, this would be a major **market distortion as such risk doesn't exist in other countries**.

To avoid such detrimental impacts, the reference price methodology should properly handle the volumes hedged on the forward markets versus the volumes exposed to the short-term markets. For this reason, FEBEG urges for a **realistic and pragmatic approach that as much as possible correctly reflects the revenues of the capacity provider**.

Other countries with reliability option have also developed a methodology to determine a reference price. However, it is important to highlight that those countries have different electricity systems compared to the Belgian one, which is portfolio-based. Their solutions are not transposable as such to the Belgian market.

Ireland	§ 59	Price actually obtained by an individual capacity provider selling its electricity on the electricity market (spot). If a seller fails to sell, balancing prices will apply No reference price for foreign capacity providers.
Italy	§ 88-91	Reference price is function of the price of MGP (Mercato del Giorno Prima) and the MSD (Mercato per il Servizio di Dispacciamento). All forward volumes are excluded from pay-back obligatoin Reference price for foreign capacity providers is the MGP price, as market coupling is not applied to balancing up till now.
Poland	-	Not applicable

Great-Britain	-	Not applicable
Belgium	-	**Reference price based on day-ahead market and only applicable on volumes exposed to the spot market.**

3.2. Explanation FEBEG proposal

Hedging as a valuable risk management tool for both generators as consumers

Prices on the electricity markets are reflecting at all times the supply-demand balance and are therefore fluctuating from one day to another, and even from one hour to another. The price levels are reflecting the marginal generation or opportunity costs, not only from conventional units (e.g. commodity costs) but also more and more from other providers (e.g. renewables, storage, demand response).

Changes in price are a source of uncertainty and risk for both producers and consumers. To mitigate such risks, producers and consumers can agree beforehand to sell/buy the electricity for a certain period at an agreed price. Such trades are hedging operations that are being executed mainly on forward markets. On these markets, electricity can be bought and sold from roughly 3 to 2 years in advance so market participants can limit their exposure to price risks on the short-term markets. These forward markets thus provide value for both producers and consumers, as it provides immunization against price fluctuations. A standard measure of this price risk is the 'Value at risk' (VaR). A simple example of the VaR calculation of a producer is shown in Exhibit 1.

Exhibit 1 - Value at Risk: simplified calculation

- *Current electricity prices on forward markets are 45 €/MWh*
- *Maximum price drop in x% confidence interval is 30 €/MWh (price dropping to 15 €/MWh)*
- *For a 400 MW power plant, the Value at Risk for one day is:*
  *400 * (45-15) * 24 (hours) = 288.000 €*
- *If half of the energy of the power plant is sold on the forward market today, the Value at Risk will be halved:*
  *200 * (45-15) * 24 = 144.000 €*

On the one hand, hedging provides the capacity providers (generation, storage, demand response, …) the opportunity to choose for the optimal way to position their assets on the different markets depending on their risk appetite. On the other hand, the use of forward markets benefits both small and large consumers through such risk-mitigation. **Large consumers often hedge part of their consumption on the forward markets in line with their expected consumption, price levels and risk strategy. Especially energy-intensive, industrial consumers usually have active hedging strategies to manage their energy costs. Small consumers benefit implicitly from the hedging strategies of their supplier, who hedges their portfolio in order to have competitive offerings towards consumers.**

Whether and which proportion of the generation capacity or expected load is hedged depends on numerous elements, such as the prices in the forward markets, the expectation of the price evolution and the hedging strategy of the market participant. Such activities are performed by traders active on the different markets and mostly acting on behalf of producers or consumers via trading departments of larger companies. Independent trading companies can provide additional liquidity to markets but have no use for a physical delivery of electricity for themselves. As electricity cannot be stored in a warehouse to await moments of higher prices, independent traders have therefore to close any open positions before the actual physical delivery of the energy.

Finally, it is important to make the distinction between risk transfer and risk elimination. A producer that hedges the output of a power plant transfers the price risk to another party by selling the corresponding energy through a forward contract. If the buyer of this energy has no use himself for the energy - i.e. he is not an end consumer or a supplier - the underlying price risk is merely being transferred from the producer to this buyer of the contract. This reasoning also applies to the generation department of a utility that transfers the energy to its own trading department. As the trading department has no use for the energy itself, the price risk has been transferred, but from the overall perspective of the utility, the price risk remains. **The only way to completely eliminate the price risk corresponds to a situation where the buyer of this energy is actually expecting to consume this energy for his own activities (industrial or commercial). In this way, both the buyer and the seller of the energy are immunized against further price fluctuations and the price risk has been eliminated.** In other words, traders can never by themselves remove the price risk associated to the ownership of some energy. They can merely facilitate hedging activities by providing liquidity and act as counterparties for producers and consumers. As a result, the actual volume of energy held by traders will always be limited, as it poses a direct and sizeable price risk to them, and has a value of zero or even negative when delivery will occur. A simple example (see Exhibit 2) illustrates the risk posed by large positions and the strict need for risk elimination instead of merely risk transfer.

Exhibit 2 – Risk of a forward CAL contract

- *A generator wants to sell the full baseload output of a 400 MW power plant for 1 year ahead on forward markets*
- *Current baseload price is 45€/MWh, so the contract is sold for: 45 * 8760 (hours / year) * 400 = 158M €*
- *If a trader buys this contract, he is exposed to a large risk: a 15€/MWh drop in the price will cost him 52M €*
- *The Belgian electricity market is between 6.000 and 10.000 MW (so equivalent of between 15 and 25 of such power plants), which clearly exceeds the ability of any player to be exposed to such risks. Hence, the need for risk elimination instead of risk transfer.*

For a producer, it can generally be considered that the more likely a unit is expected to deliver energy at a certain time, the earlier it is hedged. The actual level of hedging of market players integrates numerous components to fully reflect opportunities and risks that market participants are exposed to.

Hedging and the pay-back obligation

The introduction of reliability options will be an additional component to be integrated in the hedging strategy of market participants.

A central question is to define the part (volume) of the contracted capacity that is actually exposed to the high electricity prices and that could earn actual revenues above the strike price. These high electricity prices are reflecting tight conditions of supply-demand balance and manifest exclusively on the short-term markets. But as explained in the previous paragraph, producers are selling part of the expected energy generated in advance on the forward markets. Energy which is already sold on forward markets, is no longer able to capture any revenue from the short-term markets. Indeed the producer has already agreed to deliver this energy at a pre-determined price through the forward contract. **The necessity of accounting for hedged capacity when defining the pay-back obligation is in line with the underlying economics and risk management practices and is therefore generally accepted**.

Misunderstandings on hedging and the pay-back obligation

FEBEG considers it very important to have an **informed and factual debate on the relation between the reference price and hedging.** In this perspective, FEBEG would like to address and clarify a few concerns.

Effective, risk reducing hedging includes risk reduction at the consumer-side

A first concern for taking into account hedged capacity when calculating the pay-back obligation is a perceived risk that consumers would pay twice. On the one hand, the consumer would pay for the capacity remuneration to ensure a sufficient level of adequacy and on the other hand he would nevertheless remain exposed to high prices for the (hedged) capacity that is excluded from the pay-back obligation. However, it is not correct to assume that a trader could be the final party in a hedging strategy, leaving the consumer exposed to spot-prices with any associated price spikes, in addition to the cost of the reliability options. This incorrect view ignores several fundamental elements of the forward markets:

- **Final consumers also want to reduce their price risk.** Large consumers, like industrials, can do this outright by buying their energy through forward contracts. Suppliers on their side have to be competitive on the retail market and should therefore make their customers benefit from their (active) risk management. For instance, a final consumer concluding a contract with fixed electricity prices would expose the supplier to a price risk unless this supplier is buying at the same time the energy for these contracts through trades on forward markets. The idea of passive consumers exposed to the short-term markets is therefore incorrect.

- As explained previously, **any party that does not consume the energy itself, remains exposed to the price risk of the energy in its portfolio**. The assumption underlying this concern is therefore unrealistic: traders are not willing to remain exposed to large price risks even for the small hypothetical chance of capturing a limited number of price spikes over a year. Additionally, traders should not remain with open positions close to delivery because there is no physical delivery on their side.

Traders are thus not willing to remain exposed to price risks for large volumes and consumers want to reduce their price risk (through their suppliers). **Hedged capacity that is accounted for in the calculation of the pay-back obligation is therefore not an additional cost to consumers but actually reflects a reduction in exposure to high prices by both consumers and producers.**

Hedging cannot be an effective risk-reduction tool through in-company trading

Another concern regards the ability of producers to 'simulate' hedges that would allow them to evade the pay-back obligation and to earn revenues above the price threshold on the short-term markets. A producer would be able to perform such simulation of a forward hedge through the intervention of a trader that belongs to the same company as the producer. Such an in-house trader could thus act as an intermediary to artificially increase the hedging ratio of the producer. In this way, the producer can evade partly the pay-back obligation as more of its capacity 'appears' to be sold on the forward markets while still earning the high short-term prices through its trading department.

This concern overlooks the actual objective of forward markets, hedging strategies and risk policies to reduce the risk exposure of the company as a whole. By transferring the price risk towards an in-house trading department, the company does not actually reduce its exposure to the price risk, i.e. the Value at Risk. As a result, the company that would be able to capture high prices on the short-term market also remains fully exposed to the short-term market price risks. In other words, such a situation does not reflect an effective strategy of hedging at company level and there would be no impact on the hedging ratio of this company. Therefore, the ratio of capacity that is sold on the forward market should make the distinction between internal risk transfers and external risk elimination from the perspective of the overall company. **Hedging where there is effective risk elimination – where the producer is no longer exposed to short-term price fluctuations and thus no longer able to capture high prices on the short-term market – should be excluded from the calculation of the pay-back obligation.**

Generators capture short-term price spikes for all capacity, even for hedged capacity

Questions are also raised about whether hedged capacity is actually precluded from capturing high prices on the short term markets. The reasoning behind this is that high prices on the short-term markets are propagated back to the prices in the forward markets. Thus hedged capacity would still be able to capture the high prices on short-term markets through the price increases on the forward markets. As a result, there would be no reason to take account of hedged capacity when calculating the payback obligation as all capacity captures high prices on the short-term markets.

This reasoning is based on two key assumptions. One is that high prices on the short-term markets (with an hourly granularity, reflecting supply and demand (im)balance) are fully propagated back to the forward markets (being standardized, with a granularity based on year, quarter, month, … reflecting an average supply and demand situation). The other is that hedged capacity is perfectly able to capture any price increases on the forward markets whenever they occur. However, there are fundamental issues with both assumptions.

The first assumption regarding the perfect back-propagation of high prices on the short-term markets at first sight seems to be correct. For example, concerns regarding security of supply issues in Belgium and the reduced nuclear availability during winter 2018-2019 contributed, together with other factors, to a temporary increase of forward prices. However, it is incorrect to assume that such a situation is exemplary for actual moments of scarcity. The nuclear outages were announced well in advance and with a high degree of certainty. More commonly, high prices on the short-term markets are more driven by load fluctuations, (lack of) renewable generation and unexpected – or even forced – outages of thermal power plants. **Such risks are impossible to forecast precisely in the timeframe of forward markets and as a result are heavily discounted in the forward prices. The perfect back-propagation of high prices on the short-term markets is therefore lacking**.

The second assumption is that any risk-premium that occurs on the forward markets can be perfectly captured by producers. This implies that producers delay their hedging activity until the appearance of scarcity prices on short-term markets lead to increases in prices on the forward markets. However, as explained previously, hedging is a risk-reduction activity aimed at exchanging a risky, fluctuating short-term price for a fixed price at an acceptable level. **The hedging activity is more driven by a risk-policy with a time-path instead of a speculative or opportunistic trades. A producer may thus have already sold significant part of his capacity when scarcity concerns lead to price increases.**

The ability of capacity to capture high prices appearing on the short-term markets through its hedging activity is thus very limited. Not only do forward markets reflect risks in both directions – under- as well as overestimating the potential of high prices on the short-term markets at different times – but also with the inherent uncertainty around it. Furthermore, the actual objective of hedging – risk reduction – in the forward markets precludes opportunistic behaviour of waiting for high-prices on the short-term markets to appear in forward markets.

<u>Ways to reflect hedging in the payback obligation</u>

There is thus a genuine need to reflect the risk-management activities of producers on the forward markets in the calculation of the pay-back obligation. This can be achieved in several ways, with different degrees of associated drawbacks.

Expose all contracted capacity to a reference price linked to short-term markets

This option assumes that contracted capacity can capture high prices on the short-term market, irrespective of whether it has already been sold on the forward markets as part of a hedging strategy. As explained previously, such ability to capture such high prices on the forward markets is based on questionable assumptions. Moreover, even if there is a perfect back-propagation of high prices on the short-term market and producers are able to perfectly capture this, there would still remain a fundamental financial risk for the producer. With for example a 1 in 20 year risk of scarcity appearing, the producer would need 20 years of revenue on forward markets to capture an equivalent amount of the scarcity revenue on the short term markets. If a scarcity moment would occur during the first years of the capacity market, the producer would be exposed to the full pay-back obligation while having not yet captured the equivalent amount from the forward markets. A producer – especially smaller ones

– would not be able to bear such a financial setback. This is then further exacerbated when the underlying assumptions of perfect back-propagation and perfect revenue capturing fall apart.

The result would be that producers only sell capacity on the forward markets with an additional risk premium or include it directly in the capacity price in the CRM tender. Both options would be detrimental to Belgian consumers due to additional risk premiums that a capacity market should actually reduce.

Include forward markets in the reference price

An option is to include all capacity in the calculation of the pay-back obligation and to include the forward markets in a generic way in the calculation of the reference price. This would account for the imperfect ability for producers to capture any scarcity premiums. However, there are numerous forward products with evolving prices through time. The inclusion of forward markets in a generic way in the calculation of the reference price will thus entail arbitrary choices on which products/prices at which maturity/times to include. Hedging on the other hand is a continuous and continuously evolving activity for which a pre-determined path of 4 years (for one-year contracts) to up to 19 years (for 15-year contracts) is too rigid. It could force producers to sell on the forward markets at moments where it is not economically sensible to do so. It could also fundamentally disturb the forward markets by forcing producers to sell at fixed moments, pushing prices artificially down at these moments while reducing liquidity and increasing prices outside of the time-windows determined by the reference price calculation.

The inclusion of forward prices in the reference price would be an improvement over total exclusion in case all contracted capacity is exposed to the pay-back obligation. However, it would still significantly and detrimentally disturb the forward markets as well as reduce the ability of producers to perform an effective hedging strategy. Furthermore it would very complex to implement.

Base the pay-back obligation on the realized hedging per power-plant

An option that would allow producers full freedom to perform hedging strategies is to exclude hedged capacity based on the realised hedging activity per power-plant. This would fully reflect what part of the contracted capacity was able to capture high prices on the short-term markets and should thus be subject to the pay-back obligation.

The challenge of this approach is to achieve a process that would allow the correct registration of all such trades for each individual power plant. Currently, hedging is being performed on a portfolio basis. This allows a producer to optimize not only the risks of different power plants within one portfolio, but also manage risks associated with a load portfolio and intermittent renewables. Disentangling all elements in separate hedging actions will be a costly process with a reduction in overall efficiency of risk management.

While the first two options to reflect hedging in the pay-back obligation would increase the risk to the producer, this approach would reduce such risks but at significant costs. **It would make hedging more complex and expensive while at the same time less efficient as portfolio benefits would be lost.**

Exclusion of volume based on ex-ante defined hedging ratio

A final option is that the reference price includes only short-term market prices and it is only applied to the associated short-term volumes (which would capture such prices). In this way, the reference price fully reflects scarcity prices when they appear. At the same time, capacities that were sold in forward markets that did not profit from scarcity pricing are immunized from pay-backs for revenues they did not earn. The ratio of volumes exposed to short-term markets and volumes sold on forward markets would be defined up-front as part of the auction specifications. **This provides transparency to**

the producer as to what volumes will be exposed to the pay-back obligation and they can integrate this in their risk management. On the other hand, there is ability by capacity holders to evade or change the volumes exposed to the pay-back obligation by changes in their hedging strategy, as the ratio is defined in advance.

The ratio of volumes exposed to the short-term market can be delineated in several ways, for example per technology. **The easiest option would be to use a general reference level of the volume exposed to short-term markets that is then applied to the contracted capacity for the calculation of the pay-back.**

The ratio of volumes exposed to the short-term market – thus not hedged – will vary from one company to another, depending on the risk appetite. However, one can observe common practices in terms of hedging throughout the sector. Information is often publicly available in the annual reports of energy companies because the hedging ratio is relevant for the shareholders that want to have a view on the risk policies of companies. **Globally, the annual reports of energy companies show that a very large majority (more than 85%) of the expected production is sold before the start of the delivery year, and thus no longer exposed to price fluctuations on the short-term markets**. This finding reinforces the idea that a global and pragmatic approach – one general reference in line with common sector practices – should be favored in order to limit the administrative workload for all involved stakeholders.

<u>How to correctly reflect the short-term markets in the reference price</u>

The short-term market price component of the reference price should be based solely or mainly on the day-ahead market. **The day-ahead market is the last effective, liquid and transparent market in which capacity holders can sell and buy energy. In other words: it is the most liquid market in which the large majority of capacity that is still exposed to short-term market is active**. As its price is based on pay-as-cleared, it also provides a clear price signal that all market participants pay or receive and clearly signals moments of scarcity. Insofar as the intraday market should be included in the reference price, care should be taken with the formulation of a reliable price indicator that market participants can realistically capture. Its overall weight in the reference price should also reflect the volumes that are active on the intraday market compared to the day-ahead market. The balancing market should not be included in the reference price as it is not a reliable indicator of scarcity, only covers the marginal volumes and reflects for exposed producers a cost rather than a revenue.

Additional information: overview short-term markets

Irrespective of the inclusion of forward markets, it is clear that the reference price has to include short-term markets as these markets will most clearly signal moments of scarcity. Three market timeframes are generally considered as being part of the short-term markets: day-ahead market, intraday market and balancing market. Not all these markets may be suitable for inclusion into the reference price. For the reference price to be a reliable indicator of earned revenues by capacity, they need to be liquid markets with a clear market price reference and have a reliable signaling function of scarcity moments.

Day-ahead market

The day-ahead market is currently the reference short-term market timeframe with the largest pool of liquidity. It is used by market participants to close their positions and schedule generation capacity. Through the use-it-or-sell-it mechanism, all available cross-border transmission capacity is available for the day-ahead market to exchange energy flows between countries. As the day-ahead market clears according to the pay-as-cleared principle, each market participant receives or pays the single clearing price. The market also provides a reliable indicator of potential scarcity moments, as most supply and load are being traded on this market. In the past, prices above 250€/MWh have occurred, and price caps allow it to go to 3.000€/MWh.
The day-ahead market is therefore ideally suited for inclusion in the reference price.

Intraday market

The intraday market is currently used mainly by market participants to rebalance any deviations from the schedules of the day-ahead market based on new elements. Such elements can be unexpected outages, changes in demand or reforecasts of (intermittent) renewable energy sources. As these elements can also result in scarcity, the intraday market can at moments signal a scarcity that was not present in the day-ahead market. The intraday market is a continuous trading market, where prices are based on the outcome of bilateral trades. There is therefore no single reference price captured by all market participants.
The intraday market could be relevant to include in the reference price as it can signal a scarcity moment that was not yet present in the day-ahead market. However, two elements should be considered when doing so. First, the actual volumes that are traded are still limited and thus also the capacity that actually earns any scarcity prices. Any inclusion of intraday prices in the reference price should therefore reflect the respective volumes on both the day-ahead and intraday markets. Second, as the intraday market is a continuous market, no single reference price exists that all market participants receive or pay. Even if a 'synthetic' reference price is formulated, individual market participants will earn a different income than the one calculated based on the synthetic price.

Balancing market
The balancing market is not a full market where market participants can exchange energy freely. It is instead an 'obligatory' market where markets participants with residual imbalances in their portfolio are forced to buy or sell energy at the imbalance price. The imbalance price is a reflection of the cost for the TSO to resolve such imbalances. The imbalance price is thus mainly driven by short-term imbalances between supply and demand. As an indicator of scarcity moments, it is therefore not reliable as high imbalance prices may occur due to unexpected outages while there is no actual scarcity situation. At the same time, the capacity exposed to imbalance prices is extremely limited and in cases of high imbalance price - indicating mostly an unexpected outage - mostly creating a cost instead of a revenue for exposed producers.
The balancing market is therefore not suitable for inclusion in the reference price. It is not a reliable indicator of scarcity situations, covers a marginal amount of volumes and mostly exposes a generator to an additional cost instead of a revenue.

Conclusion

Scarcity prices are most likely to appear in short-term markets. However, producers do not capture the prices in short-term markets for all the energy they sell. Consumers are likewise not necessarily exposed to them, because of their respective hedging activities on the forward markets. **The methodology to compute the pay-back has to correctly reflect both the revenues that assets actually earn on the short-term markets - compared to forward markets - and the associated volumes.** If this distinction on prices and volumes is not properly made or skewed, it will create a risk for producers that are securing their earnings partly or wholly on the forward markets. This may be detrimental to the cost-efficient functioning of the forward markets and the capacity market. The objective of the capacity market is to reduce risks for market participants to encourage investment to ensure adequacy. The payback obligation should not undermine this objective by introducing a new risk for capacity holders.

In practice, forward markets will never exceed the strike price (representing short-term generation or opportunity costs of the peak units, storage or demand response) and are not effective at allowing the producer to capture price spikes on the short-term markets. The volumes sold on these forward markets should therefore be excluded fromthe calculation of the pay-back obligation, i.e. the pay-back obligation should not be applied on the volumes sold on the forward markets. Most of the options to achieve this, have drawbacks to such a degree that their implementation would have serious, detrimental impacts on the forward markets. Forward markets are important tools for risk management for both producer and consumer and have in their turn impacts on the international competitiveness of all market participants. These drawbacks should thus be taken onboard when deciding on the calculation methodology for the reference price and the volumes exposed to the pay-back obligation.

The preferred solution to take account for hedged volumes would be to use a general reference level of the volume exposed short-term markets that is then applied to the contracted capacity for the calculation of the pay-back. This provides visibility to the capacity holder on the risk exposure, excludes any possibility to manipulate the payback obligation through hedging strategies and is sufficiently simple to avoid costly implementation requirements.

In addition to the consideration of forward markets in the calculation of the pay-back amount, **it should also reflect whether an asset is delivering ancillary services** for the TSO. The delivery of such services should be considered as being available for supporting security of supply, even when the asset is not delivering its full, contracted capacity at the moment of scarcity[5]. Without such consideration, the delivery of ancillary services generates additional risks that will be reflected in the price of delivering such services.

4. Strike price

4.1. Short description

The strike price is an upfront determined price that indicated the threshold above which the capacity provider needs to reimburse the difference with the reference price[6].

The strike price is in fact the threshold triggering the pay-back obligation.. The objective of the strike price is to avoid excessive revenues for some assets.

Ireland	§ 58	Strike price should reflect the short run marginal costs of a peaking unit. Formula taking into account fuel costs, carbon cost and cost of reference of a demand response unit of 500 EUR/MWh.
Italy	§ 90-92	Strike is set at level of the standard hourly variable cost of the technology with the highest variable costs, i.e. peak technology. 125 EUR/MWh for existing contract throughout contract duration and 167 EUR/MWh for new contracts (reviewed after comment EC) Demand response does not participate in the CRM: it is opted out and exempted from financing the CRM
Poland	-	Not applicable
Great-Britain	-	Not applicable
Belgium	-	**Strike price should be applicable to all capacity holders and should be set at highest of 2 options: 1) fuel plus CO_2 cost of the marginal plant or 2) demand response costs.**

4.2. Explanation FEBEG proposal

The economic viability of a power plant is dependent on several factors: revenues from electricity markets and other additional revenues, fuel and CO_2 costs, fixed costs, investment costs, etc. It is also important to point out that high electricity prices does not necessarily lead to high profits. The earning potential is mainly dependent on the spread between the electricity price received and the fuel plus

[5] To ensure that Elia can maintain system balance at all time, it is necessary that some assets have the capability to increase their output. This means that at all times – including during scarcity events – some assets need to be running below their maximum capacity to ensure the ability to increase their output.

[6] See definition 77° in article 2 of the draft law related to the capacity remuneration mechanism (version 20.07.2018).

CO_2 price paid. **To ensure the intended healthy investment climate for power plants and to minimize interference with the energy market, the strike price needs to properly reflect the underlying costs of the marginal capacity provider** (generation, storage or demand response) during stress events.

It is important to emphasize that the existence of infra-marginal rents is economically justified to cover (part of) the fixed and investment costs, but a CRM based on reliability options limits somehow this infra-marginal rent in exchange for a capacity remuneration. Indeed, there's a strong link between the strike price, the reference price and the bidding strategy of capacity holders in the capacity auction: the bidding strategy for a certain asset will include the potential cost of a pay-back obligation given the reference price, the strike price and the cost structure of the asset. **In other words: the higher the strike price, the lower the bids in the capacity auction**.

FEBEG considers the definition of the strike price in the Irish system as good approach: the Irish strike price is formula with a multiplier based on the highest of 2 options: 1) fuel plus CO_2 cost of the marginal plant, or 2) demand response costs.

According to FEBEG the strike price should therefore be one single price applicable to all capacity providers set at the highest of two options: 1) fuel plus CO_2 cost of the marginal plant or 2) demand response costs.

Defining the strike price this way has several advantages:

- applying the same strike price to all capacity holders will avoid any incentives for gaming and other unintended side effects on the energy markets;
- a strike price based on the highest of the costs of the marginal plant or demand response costs ensures a level playing field between generation, storage and demand response;
- one avoids to create market distortions because with the coexistence of different strike prices for different capacity holders participating in the auction would induce different risks and market behaviors.

The strike price should also over time be adapted to incorporate market evolutions as long as the strike price is known before the auction and fixed for the obligation period.

5. Assessment of the impact of the pay-back obligation

5.1. Introduction

The definition of the pay-back obligation – i.e. the definition of the reference price and the strike price – together with other relevant parameters, e.g. price caps, will be one of the key factors determining the attractiveness – and hence the success – of the CRM.

In order to have a better view on and a deeper understanding of the impact of the pay-back obligation, some hypothetical business cases are developed for illustration purposes.

5.2. Description of business cases

FEBEG proposes to illustrate the impact of the pay-back obligation with two business cases[7], i.e. an OCGT and a CCGT. These business cases are inspired by the distribution curve for demand in the CREG study (CDC-929) of the 4th of February, 2010. These figures have involved and will certainly further

involve in function of market circumstances and are therefore to be considered as an illustration to clarify the concerns of FEBEG.
The following assumptions are made for the two business cases:

	OCGT	CCGT
Capacity (A)	50 MW	400 MW
Use	Peak	Semi base load
Forward % (B)	Not or limited hedged in forward markets, e.g. 10 %	Largely hedged in forward markets, e.g. 90 %
Forward price (C)	95€/MWh	50€/MWh
CAPEX needs	Low: 60€/kW/y	High: 100€/kW/y
Strike price (D)	Two scenario's: 95€/MWh and 300€/MWh	
Reference price (E)	Two scenario's: 95€/MWh and 500€/MWh	

It is also important to note the following:

- to reduce the complexity of the examples the day-ahead market price is applied to the full volume while variations in efficiency, gas costs and CO_2 price are not considered;
- 'EOM': these are the revenues from the energy only market, i.e. sum of forward market revenues (A*B*C) and spot market revenues ((1-B)*A*E) within the given hour;
- 'pay back': this is the absolute pay back obligation in the given hour, i.e. (if E > D): (E-D)*A*(1-B))
- total position, i.e. EOM - pay back: this figure indicates the extent to which the generator is able to pay the pay-back obligation using the revenues from the EOM.

5.3. Total volume contracted in CRM is exposed to the pay-back obligation

		strike (D)	reference (E)	OCGT exposure EOM	OCGT exposure Pay back	OCGT exposure Total position	CCGT exposure EOM	CCGT exposure Pay back	CCGT exposure Total position
Case 1	Run	95	95	4,750	0	4,750	21,800	0	21,800
	Unplanned outage			0	0	0	-16,200	0	-16,200
Case 2	Run	95	500	22,975	-20,250	2,725	38,000	-162,000	-124,000
	Unplanned outage			-2,025	-20,250	-22,275	-162,000	-162,000	-324,000
Case 3	Run	300	95	4,750	0	4,750	21,800	0	21,800
	Unplanned outage			0	0		-16,200	0	-16,200
Case 4	Run	300	500	22,975	-10,000	12,975	38,000	-80,000	-42,000
	Unplanned outage			-2,025	-10,000	-12,025	-162,000	-80,000	-242,000

This example demonstrates three crucial points:

- Especially CCGTs, already without the pay-back obligation, have a strong incentive to be available at all times due to the forward hedging positions in the EOM. Unplanned unavailability is already very costly and will be avoided where possible. Therefore, the pay-back obligation in this form, would have little effect on the availability of the plant itself.
- Even when available according to agreement, the CCGT can run with a negative result. The objective of the reliability options is to pay-back part of the 'high revenues', not to have to pay-back something with was never received. Such an exposure to the pay-back obligation could discourage CCGTs to participate in a capacity auction.
- The very large pay-back obligation would in any case need to be priced into the capacity bid. This would lead to an overall higher system costs for something which clearly would have little effect on the availability of the plants.

5.4. Volume exposed to pay-back obligation is limited to the volume traded on the spot market

		strike	reference	OCGT exposure EOM	OCGT exposure Pay back	OCGT exposure Total position	CCGT exposure EOM	CCGT exposure Pay back	CCGT exposure Total position
Case 1	Run	95	95	4,750	0	4,750	21,800	0	21,800
	Unplanned outage			0	0	0	-16,200	0	-16,200
Case 2	Run	95	500	22,975	-18,225	4,750	38,000	-16,200	21,800
	Unplanned outage			-2,025	-18,225	-20,250	-162,000	-16,200	-178,200
Case 3	Run	300	95	4,750	0	4,750	21,800	0	21,800
	Unplanned outage			0	0		-16,200	0	-16,200
Case 4	Run	300	500	22,975	-9,000	13,975	38,000	-8,000	30,000
	Unplanned outage			-2,025	-9,000	-11,025	-162,000	-8,000	-170,000

In this example, the absolute pay-back obligation of OCGT and CCGT is comparable. The difference in positions is mainly caused by the EOM. The OCGT has a higher incentive to be available when it matters most and the CCGT has manageable risks.

5.5. Conclusions

Risk of pay-back obligation not taking into account hedging and outages

The examples clearly show that hedging and outages should be taken into account in the calibration of the pay-back obligation.

- *Hedging (see title 3.2. for full FEBEG position)*
  Hedging secures the revenues from the EOM over a longer period as soon as the sales prices are higher than the costs. Hence, hedging reduces the investment risks and lowers the capacity bidding price. If the pay-back obligation would not take into account hedging, than the resulting additional financial risk (= probability x price spread (reference price - strike price) x offered volume (%hedged)) which will be priced in.

- *Outages (see title 3.4.3.2 for full FEBEG position)*
  Exposing the outage risk to the pay-back obligation will worsen the financial risk related to the pay-back obligation (= probability outage x reference price x offered volume (% hedged)) which will be priced in the capacity bidding.

So, taking into account hedging and outages in the pay-back obligation will reduce risks and the prices of the capacity bids.

Risk of too low strike price

A pay-back obligation based on a too low strike price, e.g. strike price set at the marginal cost of an OCGT, would undermine the attractiveness of investing in OCGT's.

OCGT's will bid in the capacity auction at the level of CAPEX needs, FOM needs and financial risk of outages. A pay-back obligation with a too low strike price will thus:

- limit the revenues of OCGT's in the EOM;
- increase the missing money of new OCGT's to the level of their CAPEX and FOM needs.

Risk of too low price caps

Price caps should leave room to include the financial risk of pay-back obligations and outages.
