Ministère
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Liberté Égalité Fraternité

Direction générale de l'énergie et du climat

Consultation with Market Participants – English version

Reflections on the Introduction of Virtual Hydro Capacities to Wholesale Markets

Consultation Document – May 22, 2025

Hydroelectricity represents the second largest source of electricity production after nuclear and the largest source of renewable electricity in France. This sector is important for the electrical system in several respects, particularly due to the flexibilities it provides to the electrical system.

France has historically been well-equipped with significant development of hydroelectric facilities from the beginning and throughout the twentieth century. The current challenge for the French Government is to ensure the modernization and compatibility of the plant with increased security and environmental requirements on one hand, and to enable the exploitation of the residual potential on the other hand, in accordance with the objectives set in the multi-year energy program.

Hydroelectric facilities with a power exceeding 4.5 MW are operated in France under a hydraulic energy concession system: the facilities belong to the State, which entrusts their operation, including electricity production, to a concessionaire for the duration of a concession contract.

Hydraulic energy concessions in France are currently in a legal impasse due to disagreements with the European Commission, particularly regarding their granting procedures. This situation delays and hinders investments, especially projects for Pumped Storage Hydropower Stations (PSH), whose development is necessary for energy transition. This situation also slows investments related to the modernization of hydroelectric facilities and the update of water resource management conditions.

In this context, in connection with the European Commission, the French Government is studying various exploitation solutions for hydraulic facilities that would resolve the disagreements with a view to resuming investments. To date, discussions with the European Commission are ongoing and no decision has been made. The National Assembly has also conducted an information mission dedicated to the management and exploitation modes of hydroelectric installations, led by MPs Marie-Noëlle Battistel and Philippe Bolo.

Among the various solutions being considered, some suggest maintaining historical operators on their facilities alongside the marketing of electricity with representative products of the production from different hydroelectric assets, for a share of production to be determined for each of the assets concerned. This is what the aforementioned information mission believes: transitioning to an authorization regime must be considered, accompanied by a very strict regulatory framework, which may require the implementation of additional measures, also strictly tailored to the intended objective.

Whatever the case, operational management of hydraulic facilities would be completely independent of the delivery of market-offered products, so that the operator remains the sole decision-maker concerning the facilities, considering the challenges of energy production and water management, including stress situations due to drought or flooding.

If such products are proposed in electricity markets, the current consultation aims to gather feedback from market participants on five specific types of products that could be proposed to represent hydroelectric assets (lakes, pumped-storage plants, run-of-river, etc.). This initiative seeks to understand the views and expectations of various stakeholders in the sector, with a view to a potential commercialization of these products by major historical hydroelectric concessionaires with expired concessions.

Interested parties are invited to respond to this consultation **before June 15, 2025** at the email address ***concertation-hydro@developpement-durable.gouv.fr***

In the interest of transparency, the French Government reserves the right to publish elements that could be essential for the information of all stakeholders, provided they do not involve secrets protected by law. If your contribution contains elements you wish to keep confidential, a version without these elements must also be sent. In this case, only this version will be published. In the absence of a redacted version, the full version may be published, subject to information that falls under secrets protected by law.

The French version of this document shall prevail.

1. Purpose of the Consultation

The French Government wishes to gauge the interest of market participants for different products representative of hydroelectric production in order to adapt their format and content if necessary, with a view to potential commercialization through competitive auction.

Concretely, the proposed products aim to grant buyers access to a share of the operation of a hydroelectric production profile through the availability of virtual, controllable, and partially callable production volumes with characteristics similar to those of hydraulic dams (run-of-river, water storage dams, PPSs, lakes). Five types of products could be considered for this purpose.

In all cases, these products would involve the delivery of a hydroelectric production profile but would not grant any rights over the operational management of hydraulic facilities. The operator of the facilities who would market the products subject to consultation would operate the entire power plant and also deliver the electricity to its co-contractors and receive the associated remuneration. The historical operator would remain responsible for the physical operation of the dam and the associated legal, technical, and financial obligations. They would also ensure the missions related to multi-use of water and minimum discharge management at the local level.

Definitions:

Contract Duration*: duration of the contract between the operator and the buyer allocated following an auction. At the end of the contract duration, if the buyer wishes to continue benefiting from market products, they must participate in a new preceding auction.*

***Reference Period**: within a contract, the period during which the mobilized energy production volume can be spread within power rules limits (annual, quarterly, weekly, daily, or for the duration of the contract). The contract duration can be divided into several reference periods, ahead of each of which the buyer defines the production profile they desire for the forthcoming reference period.*

***Profile Granularity**: optionality within the reference period (annual, monthly, daily, hourly). When requesting the profile for the following reference period, the buyer can define a power value for each granularity.*

1. Description of the framework

The current framework involves the availability of virtual hydro capacities and the possibility for the buyer to benefit from physical electricity delivery based on market products. The proposed products are representative of production profiles and the flexibility of the hydroelectric park following arrangements corresponding to all types of hydroelectric installations, dispatchable (stored water, lake, or PSH) or not (run-of-river). Virtual capacities would be allocated via a competitive auction, with a maximum production, possibly callable, as well as a maximum power and sometimes minimally defined, according to the form requested.

The products sold would correspond to a delivery of electricity in France, that is, within the zone of the electricity market auction where the injection point of the hydroelectric installations is located.

For callable products, the auction winners could exercise their delivery option respecting power and production limits as described below.

For all products, it could be considered to allow the buyer to have the associated Guarantees of Origin (GOs).

2. Description of different types of products

2.1 Several types of market products

- **Commercialization of a Type 1 product**: the product buyer would be able to request, over a reference period annual/quarterly or monthly, fixed power products as "baseload").

This product could be offered for a duration of 1 year.

- **Commercialization of a Type 2 product**: the product buyer would be able to request, over a reference period quarterly, within the limit of the total energy volume purchased per quarter, the delivery of a power profile "baseload" or "peakload/offpeak", whose powers could be defined with a monthly granularity (to be positioned at will according to the months within the limit of the total negotiated production volume and a maximal or minimal volume to place each month). The buyer's nomination decision between different months must take place a few days before the start of each quarter. Within the monthly granularity, the production profile is thus that of a standard market product "baseload" or "peakload/offpeak".

For example, if the product is a duration of 6 months, the auction calendar for the quarterly reference period could be:

- in January: sale of quarters Q2 and Q3;
- in April: sale of quarters Q3 and Q4;
- in July: sale of quarters Q4 and Q1;
- in October: sale of quarters Q1 and Q2.

Similarly, a calendar for nomination of options could be:

- first Monday of December for the distribution between months of Q1;
- first Monday of March for the distribution between months of Q2;
- first Monday of June for the distribution between months of Q3;
- first Monday of September for the distribution between months of Q4.

Example of a Type 2 product: purchase in October of year N of a production for a total volume of 300 MWh for Q1 N+1, at a price of y € determined during the auction. On the first Monday of December, the buyer has the flexibility to virtually place their energy purchased monthly, with power profiles "baseload" or "peakload/offpeak". They can choose to place 150 MWh in January (peakload), 30 MWh in February (peakload), and 120 MWh in March (baseload).

- **Commercialization of a Type 3 product**: the buyer would be able to request, over a reference period weekly, the delivery of a power profile "baseload" or "peakload/offpeak", whose powers could be defined with daily granularity, within the limit of the total production volume purchased per week and maximum daily volume. The nomination period for the buyer is several days before the start of each week. Within the daily granularity, the production profile is thus that of a standard market product "baseload" or "peakload/offpeak".

For example, if the product is a duration of 1 month, the auction calendar for the weekly reference period could be:

- each first business day of the month, sale of weeks W+5 to W+8 (or 9, depending on the months).

Similarly, a nomination calendar for options could be:

- every Wednesday, distribution between days of the following week.

Example of a Type 3 product: purchase on the first business day of January of a production for a total volume of 300 MWh for week W+5, at a price of y € determined during the auction. On Wednesday of week W+4, the buyer can choose to place 50 MWh on Monday, Tuesday, and Wednesday in "peakload", 70 MWh in "baseload" on Thursday and Friday, and 5 MWh in "baseload" on Saturday and 5 MWh in" baseload" on Sunday.

- **Commercialization of a Type 4 product**: the buyer would be able to request, over a daily reference period, the delivery of a power profile whose power they could define with hourly granularity, the buyer's nomination period being made before D-1 (or at the latest at 9 a.m. on D-1) within the limit of the total purchased production for the day and the power limits defined during the auction. This product therefore proposes the delivery of energy in the form of an hourly profile. The distribution of energy among the hours of the day is at the hand of the option buyer.

For example, if the product is a duration of 1 month, the auction calendar for the daily reference period could be:

- each first business day of the month, sale of days for the following month.

The nomination calendar for options could be:

- each day before 9 a.m., distribution among the hours of the following day.

Example of a Type 4 product: purchase on the first business day of January of a production for a total volume of 12 MWh for 1 month, at a price of y € determined during the auction. For example, on January 14, the buyer can choose their hourly profile for January 15: 2 MW for 4 hours between 8 a.m. and 12 p.m., and 4 MW for 1 hour between 6 p.m. and 7 p.m.

Beyond these four standardized product types, depending on the actors' appetite, a longer-duration hourly product with risk-sharing could be considered:

- **Commercialization of a Type 5 product**: unlike Type 1-4 products, this Type 5 product would include hydraulic risk-sharing between the operator and the buyer through the "virtualization" of hydraulic assets and associated with a longer duration (annual or multi-year), with a longer reference period for energy distribution.

The buyer would purchase from the operator a product including a reference power and a stock of energy maximum (virtual reservoir), representative of an aggregated virtualized set of actual hydroelectric impoundments. Each day, the day before, the buyer could request the delivery of a power profile per hour, within the limit of their theoretical power. Beyond their initial stock, the virtual reservoir would vary periodically, decreasing in accordance with the buyer's requested delivery of energy or increasing according to inflows estimated at the aggregation level of hydroelectric reservoir parks on which the virtual reservoir sits. This virtual energy stock would have a maximum volume representing its "spillover" in case of significant inflows or low electricity delivery demand (in which case the energy is permanently lost for the buyer). This product could also integrate capacity guarantees up to a proportion of the theoretical power purchased.

For example, if the product is a duration of 5 years, the auction calendar could be 6 months before the product start.

The nomination calendar for daily delivery could be:

- each day before a defined time, distribution among the hours of the following day.

Example of a Type 5 product: purchase in October N-1 for a contract start on April 1 of year N, including a virtual power station with a maximum power of 50 MW and a virtual reservoir maximum of 2,000 MWh, representative of an aggregated set of existing hydroelectric impoundments, half-filled at the beginning of the product. Every day, the buyer could request the delivery of an hourly production curve for the next day, within the limits of their maximum power and virtual reservoir. The volume of this reservoir would be reduced by the requested energy delivery and periodically increased by estimated natural inflows from the set of existing hydroelectric impoundments supporting the virtual reservoir. Additionally, the buyer would have capacity guarantees up to a proportion of the 50 MW.

2. 2. Price and commercial mode

Products would be sold within the framework of competitive auctions based on the price excluding tax of the mobilizable energy covered by the option (theoretical volume of purchased energy at a price in €/MWh). Auctions would be periodically organized for each of

these products according to the duration, reference periods, and granularity of each contract, in order to sell them progressively in a rhythm coherent with that of wholesale markets.

The duration of Type 1 to 4 products will be set in coherence with market horizons, typically from 1 month to 3 years, and the duration of Type 5 products would be set in alignment with industrial risk-sharing horizons (several years, for example).

Competitive auctions, open and non-discriminatory, could be organized by operators offering the products. The proper execution of these auctions, including price formation, will be guaranteed by the monitoring of the French Energy Regulatory Commission ("CRE") under the provisions of Article L. 131-2 of the energy code which states that "*the CRE monitors transactions performed between suppliers, traders, and producers, as well as transactions performed on organized markets*."

Auctions would define, for each product, the callable production volumes per reference period as well as the maximum and sometimes minimum power limits, and potentially other parameters associated with the product.

Periodically and at the expiration of product durations, their terms might be adjusted to consider market developments.

I. General questions on the framework presented

1. To what extent could the five types of presented products address a need for diversification in your energy portfolio? What advantages do you recognize in these new products compared to the transfer of the same production volumes in existing wholesale market products?
2. Would you prefer the underlying Guarantees of Origin in the offered products to be integrated into the sales contracts for the different products?
3. What relevant data should the French Energy Regulatory Commission (« CRE ») potentially monitor to ensure proper auctions occur depending on the type of product? Generally, what do you think about the role of the CRE in ensuring the auctions are properly carried out?
4. What impacts (price, liquidity) do you anticipate on the functioning of organized electricity markets (spot, intraday, term) in the event of such competitive auctions for each of the four presented types of products?
5. Regarding the sales mode, what do you think of auctions by operators based on the energy price covered or estimated by the option in €/MWh? Otherwise, what alternative selection methods would you recommend?
6. At what frequency do you think it necessary to review the adequacy of these products with market developments? What main parameters would be important to monitor to ensure the adequacy between proposed products and market evolution?
7. **Free remarks**

II. Questions on product types

1. What do you think of the types of products in the framework? Would you be interested in acquiring each type of product?
2. What could be the optimal duration for these types of contracts? Would multi-year contracts be preferable over monthly/yearly contracts, or rather a mix of contracts with different maturities (if so, what maturities)?
3. What auction format seems the most suitable to you for providing these options? Does the auction calendar for each product seem appropriate to you?
4. What is your opinion on the reference period (annual for Type 1, quarterly for Type 2, weekly for Type 3, daily for Type 4 or dependent on the product duration for Type 5) and granularity (annual for Type 1, monthly for Type 2, daily for Type 3 and hourly for Types 4 and 5)? What do you think about the nomination periods before each quarter/week/day (especially the hourly limit the day before for hourly products)?
5. Generally, how do you assess the novelty of the flexibility offered by this framework and the contributions of these types of products to the electricity market?
6. Does the management of nominations and different products require specific skills in your view? If yes, which ones?
7. What evolutions of proposed parameters would strengthen your interest in each type of product?
8. For the Type 5 product, what do you think about integrating capacity guarantees up to a certain proportion of the maximum power?
9. For the Type 5 product, beyond the delivery of an hourly production curve, what do you think about integrating the pumping component of Pumped Storage Hydropower Stations, including the possibility of delivering an electric consumption curve, allowing, on a given day, a production or consumption profile to be requested within the proposed granularity, within a maximum power and energy limit?
10. For the Type 5 product, concerning hydraulic risk-sharing at the level of aggregated hydroelectric installations independently of volumes offered within this type of product, what aggregation perimeter seems most relevant to you?
11. **Free remarks**