

12 November 2015

# The Future of Hydroelectricity in France: What does the New Energy Transition Law Mean for the Long-Delayed Renewal of Concessions?

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## Executive Summary

Hydroelectricity plants account for 19.7% of installed capacity in France, a percentage that is second only to nuclear power. But the share of hydroelectricity doesn't fully capture its importance in the French electricity mix—as a flexible and cheap energy storage mechanism, hydroelectricity is critical in balancing a grid that incorporates more and more intermittent renewable energies.

Despite hydro's growing importance and government objectives to increase peak hydro capacity by at least 3 GW by 2020, installed capacity has levelled off due to a conjunction of economic factors, mostly as a result of the uncertainty regarding the renewal of hydroelectricity concessions.

Of the 400 hydroelectricity installations under the concession regime, which account for 95% of installed capacity, many should already have been renewed or will see their concession expire in the coming years. The renewal of these concessions through a competitive bidding process was first begun in 2010, but was never completed.

The 2015 energy transition law creates a new regulatory framework, which clarifies the rules of the game, but should also translate into fewer hydropower concessions being renewed in the short term as a result of concession extensions. These extensions are justified either by improvement works or by the grouping of assets into coherent hydraulic systems, with a new common concession expiry date.

For those assets which will nonetheless be awarded to new bidders, the government has created a new semi-public corporate entity, which will allow it to remain in control of these infrastructures if it chooses to, either as a minority or majority shareholder.

## Hydroelectricity, a Critical Part of the French Electricity Mix

France is well known for its reliance on nuclear power, which constitutes most of the nation's base load supply of electricity. But the national electricity mix is also highly reliant on hydroelectricity, which is used both for base load and peak production.

Overall, hydroelectricity accounts for 19.7% of installed capacity (25.4 GW as of January 2015) and 12.6% of electricity consumption (68.2 TWh in 2014). It is France's main source of renewable electricity and the second most important energy source in the electricity mix.

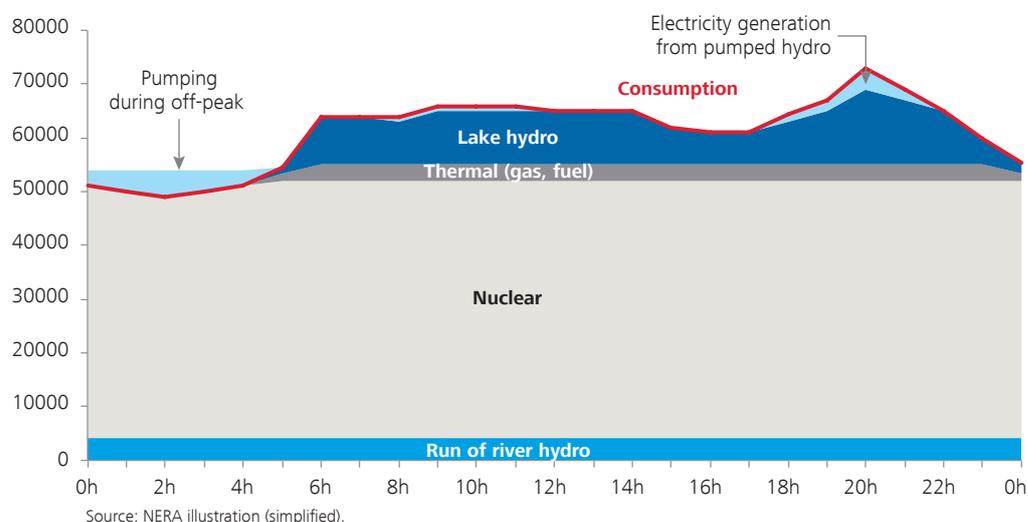
There are three types of large hydro plants used in France:

- The run-of-river type, which has little to no storage capacity and provides a continuous supply of electricity. Filling time is typically less than two hours, which allows a small degree of flexibility during the day.
- The lake/reservoir type, which can be used either for seasonal storage (when filling time exceeds 400 hours) or for weekly or daily storage (when filling time is between 200 and 400 hours).
- The pumped-storage type, which uses energy at times of low demand to pump water to the upper reservoir in order to provide peak-load. These stations de transfert d'énergie par pompage (STEP) plants, which are pumped storage power stations, account for 16% of installed capacity.

It should be noted that the three above categories are not entirely mutually exclusive—some pumped-storage hydropower plants are also lake/reservoir-type plants.

More than half of the French hydropower supply is flexible, allowing adjustment of production according to consumption. This production is lower in the summer and on nights or weekends, and ensures very high production capacity that is easily adaptable during peak consumption or in case of cold weather.

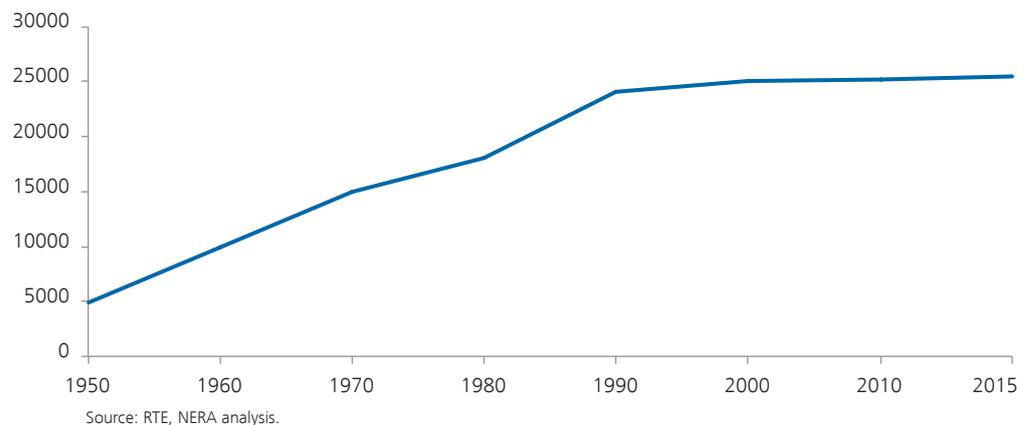
Figure 1. **Use of hydro during a typical winter day in France – illustrative in MW**



Hydroelectric capacity is thus a major asset for balancing the electricity network, as up to 15,000 MW can be mobilized in minutes. This is compared with seven to 11 hours for thermal power plants and about 40 hours for nuclear reactors to go from standstill to full power. As more and more intermittent renewable energy sources are connected to the grid, hydroelectricity's ability to balance the grid grows ever more critical.

Despite this growing importance, little new capacity has been added since the early 1990s (Figure 2). This is even though the unused hydroelectric potential for France is estimated at 22.5 GW,<sup>1</sup> of which 60% would be from new reservoir and run-of-river plants, 25% from new pumped-storage plants, and 15% from improving existing plants.

Figure 2. **Evolution of installed hydro-electric capacity in France in MW**



The fact that capacity has levelled off can be explained by several factors:

- New hydropower plants face political and environmental hurdles, as well as land use conflicts, which makes it difficult to build new capacity.
- The 75-year concessions for many existing hydroelectric plants have expired or are due to expire over the coming years. This limits the incentive for getting the approval for and investing in improving assets, which should revert to the conceding authority or be awarded to new concessionaires.
- Large hydropower plants are very capital intensive, but the liberalization of the French electricity market has increased the level of uncertainty regarding future revenue streams. This uncertainty is compounded by the increasing share of intermittent renewable energy in the mix and overall decreasing electricity prices since 2011.
- Pumped-storage hydropower profitability has been impacted by the TURPE tariffs<sup>2</sup> since 2002, as they need to pay electricity network tariffs both as producers and consumers of electricity.

- Pumped-storage hydropower capacity is currently a small market with little depth. Added capacity could depress peak-period price and affect the profitability of new plants, thereby reducing the incentive to invest in such projects.
- Flexible hydropower profitability depends to a large extent on the cost of competing peak production thermal plants. However, since the ETS Directive did not translate into high carbon prices, thermal peak production facilities have remained competitive, thus decreasing the incentive to investment in new hydropower plants.

## The Long-Delayed Renewal of Hydroelectricity Concessions

Since 1919, all French hydroelectricity installations with a capacity of 4.5 MW or more have been regulated by a concession regime.<sup>3</sup> There are currently more than 400 hydroelectric concessions, which represent more than 95% of installed hydroelectric capacity (i.e., 24.3 GW). EDF operates 80% of installed capacity, while Engie—through the Compagnie Nationale du Rhône (CNR) and the Société Hydroélectrique du Midi (SHEM)—operates 12% of hydropower capacity. One hundred percent of pumped-storage plants are operated by EDF.

Since the Sapin law, which was passed in 1993,<sup>4</sup> all public service delegations are theoretically subject to a competitive bidding procedure. However, this law was not applied to hydropower concessions, as EDF was a public entity until 2004, and until 2008, EDF benefitted from a “preferential right” for the renewal of hydropower concessions. Now that both of these legal hurdles have been removed (under pressure from the European Commission), the renewal of hydropower concessions is to be awarded through a competitive bidding process.

Nonetheless, as of October 2015, 14 concessions (accounting for 2.6 GW) have expired and have not yet been renewed. Under the energy code,<sup>5</sup> concessions that are not yet renewed continue to be operated by the historical concessionaire, which doesn’t have to pay concession fees. A further 11 concessions are set to expire between 2015 and 2020 (accounting for 0.7 GW). The State Auditor (“Cour des Comptes”) pointed out in 2013 and 2015 that this results in both a shortfall in revenues for the state and an impediment to the further liberalization of the French electricity market.

Though the French government moved towards launching a tendering procedure in 2010 for 10 concessions (for a total of 47 plants accounting for 20% of hydropower capacity, or 5.2GW<sup>6</sup>), the process was never completed.

This interruption of the renewal procedure occurred despite strong interest by investors as recognized by the government: on top of the incumbents (EDF and GDF-Suez), Vattenfall, ENEL, E.ON, Statkraft, Fortum, BKW International, Direct Energie and Axpo, among others, expressed interest.<sup>7</sup> Investor appetite for French hydro assets was driven to a large extent by the appeal of investing in a renewable energy, which doesn’t suffer from intermittency and is not exposed to the same type of risks as other renewables, and thus ideally complements a portfolio of other green assets while bearing none of the regulatory risks of thermal energies.

The interruption of the tendering process was all the more surprising given that the renewal of concessions was a key part of France’s objective to meet its 2020 renewable energy targets by adding a planned capacity of 3 GW of hydropower peak capacity.<sup>8</sup>

Indeed, the government planned to use the renewal of concessions to grant authorizations for new equipment, and the modernization of the plants to increase their capacity as a way to meet its objective (as restated in a 2012 government directive:<sup>9</sup> “to meet the objectives of hydroelectricity development, the State must give a new impetus, which can be declined in three components: over-equipping and modernizing existing plants for which concessions are set to be renewed, launching tenders for new capacity and continued support to small hydroelectricity”).

## The August 2015 Energy Transition Law Creates a New Regulatory Environment for the Renewal of Concessions

In August 2015, the French parliament approved a sweeping law on energy transition,<sup>10</sup> which includes a chapter on hydroelectricity concessions. This new law significantly alters the regulatory landscape of hydropower concessions.

First of all, some assets which form a coherent hydraulic system will be grouped by valley, to offer coherent concessions. This means renewing some concessions before they expire, while renewing some after their planned expiry. The law thus allows an exception to article L-521 of the energy code, which stipulates that concessions cannot exceed 75 years.

The new common expiration of the concession is calculated so as to maintain the economic equilibrium of the concessionaire, and can be set by decree as either the latest expiry date of the concessions, or 75 years on top of the average of the dates of the decrees authorizing the construction of the plants. For example, if two hydropower plants were authorized to be built in 1950 and 1960, with a planned expiry of each’s concession in 2025 and 2035, the new end of the concession period would be between 2035 and 2030  $[(2035-1960)+(2025-1950)]/2 + 75=2030$ . It should be noted that concessionaires whose concessions end early will be indemnified by concessionaires whose concessions have been prolonged, the amount of which will be fixed by decree.

Until the decree setting the new concession groups and the new concession expiry dates is published, the actual impact of this measure is difficult to assess. **In effect, the decree means that in the short term, the government doesn’t have to put as many concessions on the market as should have been the case under the previous regulatory framework.**

Second, the law allows a second exception to the 75-year concession period, in case of heavy investment in improvements approved by the government (the government must first ask for a list of proposed improvement works), which helps further French energy goals and policy as defined in articles L 100-1, L-1002 and L-100-4 of the energy code. **This should also translate into fewer concessions being put up for renewal in the short term, while still helping the government achieve its 2020 target of increased hydropower peak capacity.**

For all concessions, whether prolonged or newly awarded, a concession fee proportional to the revenues will be set by the conceding authority for each concession. The fee's maximum level will be calculated in order to preserve the economic equilibrium of the concessionaire, and the volume and price at which the concessionaire will sell electricity. This new concession fee will be taken into account when determining the new expiry date for when the latter is modified under the conditions mentioned above.

Third, the law gives the State the option of creating a new form of semi-public corporation—the Société d'Économie Mixte Hydroélectrique (SEMH), which would exist for the duration of each concession. The private operator of each SEMH would have at least 34% of the capital, and the State and public partners (local government entities mostly) would own between 34% and 66% and have the corresponding voting rights. This new form of corporation allows the State to maintain a strong degree of control if it so chooses, even when it puts up concessions for renewal. The private operator would still be chosen through a competitive public bid, but **the State would be able to retain either minority or majority control over any assets it chooses to, thus considerably limiting the extent of the now long-planned market liberalization.**

## **The Calendar for the Renewal of Hydropower Concessions is Likely to Accelerate Soon**

Now that the energy transition law provides a framework for the renewal of hydropower concessions, the calendar is likely to accelerate, especially with the added pressure of the formal letter of notice issued by the European Commission to France in October 2015 for failing to liberalize its hydropower market as planned. According to public statements, the government is now targeting 2016 for the first competitive bidding process for hydroelectric concessions. The upcoming changes in the hydro sector landscape could redraw the cards of the French electricity market, at a time where hydropower is growing ever more critical in sustaining a successful energy transition.

## Notes

- <sup>1</sup> Rapport sur les perspectives de développement de la production hydroélectrique en France, 2006, Ministère de l'économie, des finances et de l'industrie.
- <sup>2</sup> Tarifs d'Utilisation des Réseaux Publics d'Electricité, the tariffs to use the French TSO's grid.
- <sup>3</sup> Loi du 16 octobre 1919 relative à l'utilisation de l'énergie hydraulique.
- <sup>4</sup> Loi n°93-122 du 29 janvier 1993.
- <sup>5</sup> Code de l'énergie, alinéa 3 de l'article 521-16.
- <sup>6</sup> The government chose to group existing plants in 10 coherent concessions, which explains why the planned capacity to be awarded was superior to the capacity of hydropower plants whose concessions have expired.
- <sup>7</sup> La lettre d'information du renouvellement des concessions hydroélectriques n°2, January 2012, Ministère de l'Ecologie, du Développement Durable, des Transports et du Logement.
- <sup>8</sup> Programmation pluriannuelle des investissements de production d'électricité, période 2009-2020, Ministère de l'écologie, de l'énergie et du développement durable.
- <sup>9</sup> Circulaire du 29 octobre 2012.
- <sup>10</sup> Loi n°2015-992 du 17 août 2015 relative à la transition énergétique pour la croissance verte.

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