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For a harmonisation of hydropower regimes in European Single Market¹

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Highlights

- Our study of hydropower regimes in European countries reveals the considerably variable terms of hydropower usage rights, in both their joint obligations and the degree of openness of the competition processes through which these rights are granted.
- The environmental and economic stakes and liabilities associated with the use of hydropower account for the in-depth public controls in granting these rights. Nevertheless, the strong differences among hydropower regimes in Europe cannot be explained by rational environmental or economic criteria while they bring competition distortion to the common European electricity market.
- Over the last decade, the European Commission has opened several infringement procedures to prompt the implementation of competitive processes. However, unfortunately, this has not been undertaken with a common 'European' approach, which would ensure similar efforts throughout Member States to open the competition process to access hydropower. The current discrepancies among Member States create obstacles for countries engaged in a competitive renewal process, as there is not a level playing field or a coherent European reference framework.
- Thus, the heterogeneous state of European hydropower regimes requires significant efforts from the European Commission, and the institutional stakeholders, to stimulate harmonisation. It would help if the Commission Directorates-General started debating the topic and coordinating their action. New, clear steps must be taken to prepare national and regional authorities to harmonise their rules of attribution and to mitigate competition distortions.

1. This policy brief summarises the reasoning and the results of the FSR research report: "Regimes for granting right to use hydropower in Europe" (2015).



Background

The characteristics of hydropower make it a prominent energy source in liberalised electricity systems. Hydropower provides widespread benefits to the entire power supply chain. It can be a substitute for any other generation technology (either baseload, mid-merit or peak power plants). Furthermore, hydro storage (with or without pumping) plays a major role in balancing the system, because of the flexibility it provides, which is all the more useful to the system if intermittent generation is to be integrated. Hydropower also has the advantage of being emission-free while generating electricity. Moreover, considering its concentrated location in Europe - in the Alps, the Pyrenees, in Scandinavia, etc. - it also significantly impacts on the network interconnection exchanges between the European countries.

However, hydropower, in particular, is a generation technology which has a considerable effect on its local environment. It can impact other water or land uses (tourism, agriculture, aquaculture, etc.), or even remote aquatic life. It can also produce greenhouse gases from the decomposition of specific flooded land (up to 0.25 tCO₂e/MWh in the lifespan of the power plant, compared to 1 tCO₂e/MWh for a gas turbine). The liabilities of hydropower usage may be far-reaching. Therefore, the benefits of hydropower for the entire power system should be weighed against its potentially negative environmental impact.

This arbitrage accounts for the in-depth public controls observed in granting the rights to use hydropower, install a power turbine, and possibly build a water reservoir for the purpose of energy storage.

Public controls of the use of hydropower are usually realised at the national, regional or local level, through regulators or local authorities. This multiplicity of stakeholders is even greater at a European level, which exposes the huge disparity in the type of rights, the way they are attributed and maintained, and the joint (environmental or investment) obligations that these rights encompass. This diversity may, in turn, create variable incentives to use and develop hydropower facilities across European countries and regions. Accordingly, this may lead to serious distortions of the national energy markets, as well as the European electricity market, as a whole.

Therefore, understanding and grasping the main differences between the national or regional hydropower regimes throughout Europe is of particular interest. As it stands, the economic literature and general knowledge on hydropower remains national in scope. As of yet, no benchmarking of the different European hydropower regimes has been carried out, which complicates the study of potential market distortions. Consequently, we address this deficiency by comparing the hydropower regimes of European countries with large hydropower capacity, or potential capacity, focusing mainly

on Western countries, namely Austria, Bulgaria, Finland, France, Germany, Great Britain, Greece, Italy, Norway, Poland, Portugal, Spain, Sweden and Switzerland. Except for Switzerland, Greece, Bulgaria and Poland, the energy systems in these countries are already connected through a common regional market, which accounts for 85% of the EU electricity generation. This common market is expected to expand and include all the European countries in the near future.

In this document, we analyse and compare the characteristics of these 14 hydropower regulatory regimes, to identify their key economic properties. We then study the action of European institutions, with regard to hydropower regimes and possible distortions, and we open a discussion toward the need for more harmonisation at a Europe-wide scale.

A three-faceted framework to study hydropower regimes

A unified analytical framework is needed to describe, scrutinise and compare national hydropower regimes, on an equal basis. Robust recommendations could not otherwise be formulated at a Europe-wide scale.

The characteristics of hydropower regimes can be described through three main facets: (i) the institutional enforcement of hydropower regimes, (ii) the process of granting rights to use hydropower and the enforcement of these rights, (iii) the joint obligations that hydropower operators must respect.

Facet #1 Institutional enforcement

The institutional enforcement of hydropower regimes details the regulation and application of hydropower regimes by regulators and other authorities. In particular, it considers the repartition of various stakeholders in designing hydropower regimes and granting rights for its usage. These stakeholders can be varied, from municipalities or regulatory authorities, through to environmental authorities and national or regional governments. Studying the differences between each regime, at that level, gives clear indications of the degree of heterogeneity between regimes.

The institutional framework also describes the type of rights, authorisations, licences, permits or concessions, which determine the applicable set of laws and regulations of hydropower usage. The definition of these rights might have an economic impact through the relevant legal limitations.

Facet #2 Process of granting rights to use hydropower and enforcement of these rights

Another facet of the hydropower regime regards the characteristics related to the granting and enforcement of the rights to



use hydropower. It first regards the duration of the right. The different local or national public authorities can grant it for variable durations, for one or several decades, with more or less time for hydropower operators to pay back their investment.

These rights can be granted or renewed through negotiation between the applicant and the public authority, or through a competitive process. In this regard, it will be necessary to distinguish, among the European countries, those which have been under the scrutiny of an infringement procedure from the European Commission (or the EFTA² Surveillance Authority with respect to the EFTA States).

Facet #3 Obligations of hydropower operators

The last main facet of hydropower regimes regards the joint obligations that hydropower right holders must respect. Besides technological specification, hydropower usage rights generally include strict environmental, financial or contractual conditions, which are associated with both the environmental impact of hydropower plants, as well as the strategic economic and financial benefits associated with the technology.

The right to use hydropower generally specifies one, or several, authorised types of power plant: run-of-the-river (letting the water flow without a dam), or a reservoir dam. It can also include criteria on size, waterfall characteristics or the installation of a pump (to pump water downstream from the watercourse when the electricity price is low, store it in a reservoir and use it when the energy will be more valuable).

Some restrictions of use (minimum or maximum water flow use) may also be attached to the usage right. These restrictions can concern the share of water utilisation with other activities, such as with tourism installations, fisheries, or they can be based on ecological (fishway, sediment flow) or security reasons (to avoid spilled water that may create flooding downstream).

The right of use can also encompass investment obligations for environmental protection (e.g., fish ladders - to help fish go upstream, aerating turbines or multi-layer intakes to avoid a decrease in the temperature and oxygen concentration in the reservoir, etc.).

Most often, it also includes the payment of royalties or specific taxes (based on its electrical power, ground coverage, water use or the amount of electricity produced or stored, the generated revenues, etc.). These conditions are based on the objective of national and local authorities to share the (often significant) rent of hydropower use with the rest of the region or country.

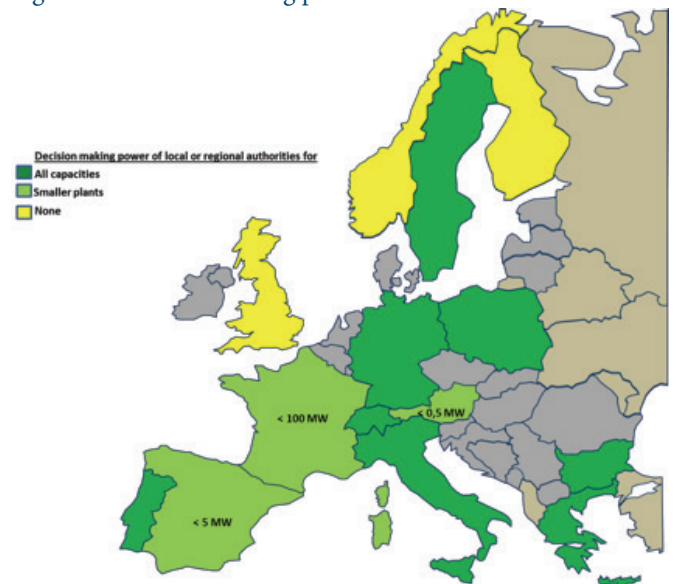
2. The European Free Trade Association is a free trade organization between Iceland, Liechtenstein, Norway and Switzerland that operates in parallel with, and is linked to, the European Union.

Diversity of national hydropower regimes

In this section, without being exhaustive, we present, in 5 figures, some characteristics that make the hydropower regimes of the 14 studied European countries (namely Austria, Bulgaria, Finland, France, Germany, Great Britain, Greece, Italy, Norway, Poland, Portugal, Spain, Sweden and Switzerland) very singular.

Figure 1 presents the degree to which hydropower rights are granted by local or regional authorities, depending on the size of the power plant.

Figure 1. Decision-making power of local authorities



One can observe the wide range of decision-making power for local authorities. In some countries, like Great Britain, Finland or Norway, all rights are granted by a single national authority, whatever the location or size of the hydropower plant. In other countries, such as Portugal, Italy, Switzerland, Germany, Sweden, Poland, Bulgaria or Greece, the rights to use hydropower are granted by regional or even local authorities. This may add local diversity to national differences on the method of granting the right to use hydropower, and their associated obligations.

Figures 2 and 3 focus on the specification of the rights to use hydropower. Figure 2 presents the various types of usage rights (authorisation, concession, licence, and permit) and their duration, which goes from 12 years in Great Britain (with, nevertheless, the possibility of infinite renewal), to up to 80 years in Switzerland, with the most extreme case being Sweden and Finland, with no time limit.

If the economic impact of observing different types of rights to use hydropower is unclear, the variability of its duration has



two main implications. First of all, the incentive for investment is all the more powerful if the duration of the right is long, as hydropower operators are then able to cover their investment costs over a longer period. A compensation scheme could otherwise be planned, and correctly valued, at the termination of the right, to achieve the same incentive effect. Meanwhile, a longer right duration reduces competition for hydropower access, which means the opportunity for potential new entrants arises less frequently. Different duration times thus imply different investment incentives and opportunities for new entrants to challenge incumbents.

Figure 2. The forms of rights to use hydropower

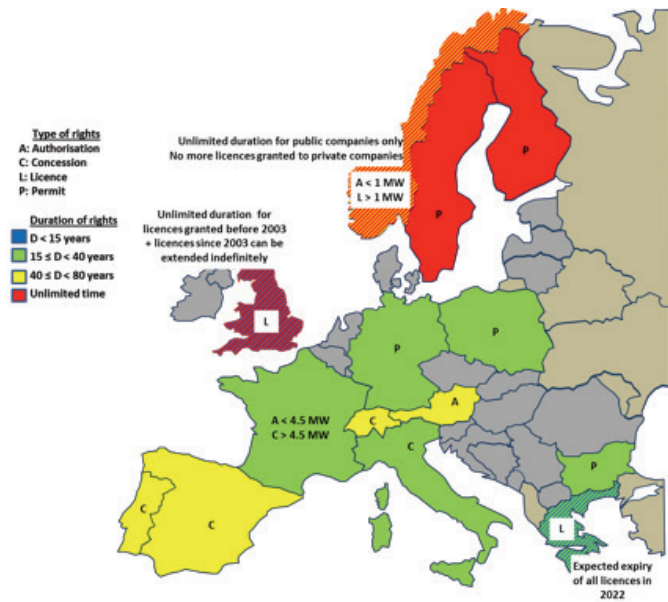
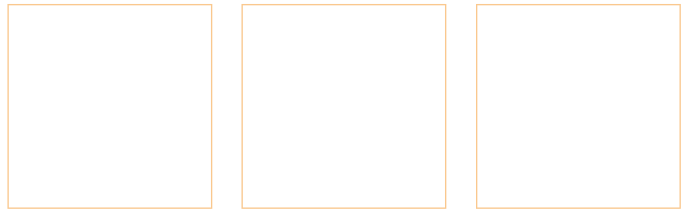


Figure 3 represents an overview of the environmental obligations, provided by the different hydropower regimes, with details on the various thresholds and areas where an environmental impact assessment is required, and the necessary minimum residual flow. An environmental impact assessment can be mandatory for all power plants (as in Bulgaria, Poland or Sweden) or for the biggest ones (as in Norway, Austria, Italy and Portugal). It can also only be applied in environmentally sensitive areas, and when the effects on health and the environment are most likely (in Great Britain, Greece, Finland, France and Italy). Minimum residual flows are also very variable from one country to another, from non-zero in Germany, or 5% in Great Britain, to more than 12% in France.

From an economic point of view, such differences in the environmental impact assessment and residual flow requirements can lead to differences in investment costs for hydropower facilities, other things being equal. Indeed, the environmental obligations imply either an increase in investment costs for a maximal exploitation of hydropower potential, or a reduction



of the plant capacity. Given the economies of scale of hydropower facilities, such a solution would lead to lower profitability of the plant.

Figure 3. Environmental impact assessment and residual flow obligations

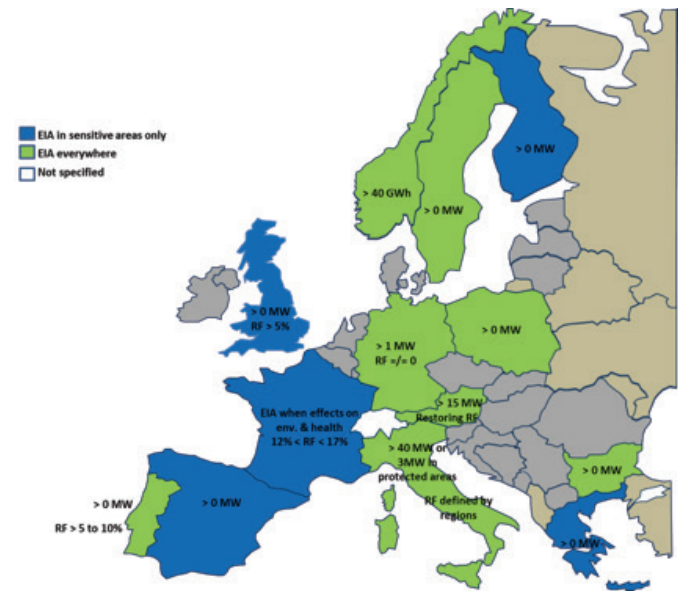
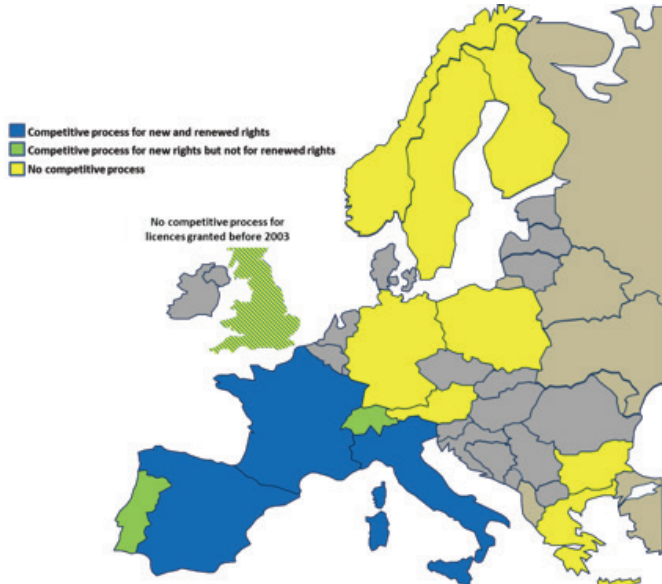


Figure 4 illustrates whether the rights to use hydropower are attributed or renewed through a competitive process.

France, Spain and Italy currently grant or renew the right to use hydropower through a competitive process. Great Britain does the same for licences granted after 2003, the licences granted before 2003 having no time limit. A competition process for new power plants is only implemented in Portugal and Switzerland. The other studied countries, Norway, Sweden, Finland, Germany, Austria, Poland, Bulgaria and Greece had not implemented any competitive process to grant the right to use hydropower, until recently. Obviously, the implementation of a competitive process to grant or renew the right to use hydropower provides opportunities for new entrants to access this resource and these national markets.



Figure 4. Process of competition to grant the right to use hydropower



It must be noted that the way these rights are attributed evolved some years ago in France, Italy and Spain, after they were targeted by infringement procedures from the DG internal market and services, as recently seen with Austria (see figure 5). Five other infringement procedures have also been initiated by different Directorates-General. The DG Competition has opened a State aid procedure in Portugal, questioning the price paid by the incumbent to extend the duration of its concession rights. And, the DG Environment opened an infringement procedure in Austria, Germany, Poland and Spain for not respecting the water directive in planning a new hydropower plant.

An infringement procedure was also opened against Norway by the EFTA Surveillance Authority (ESA), in 2002³. This was due to discrimination between public and private companies, as the latter were not compensated at the termination of their right to use hydropower, while retroceding their asset to the public authority. The ESA decision of 2007 allowed Norway the right to legitimately pursue the objective of establishing a system of public ownership of all expiring rights. There has not been any major change in the other countries.

3. EFTA Court (2007), Case E-2/06, EFTA Surveillance Authority v. The Kingdom of Norway, Judgment of the Court: Conditions for concession acquisition of hydropower resources, http://www.eftacourt.int/uploads/tx_nvcases/2_06_Judgment_EN.pdf.

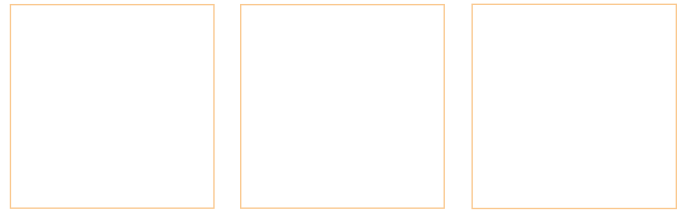
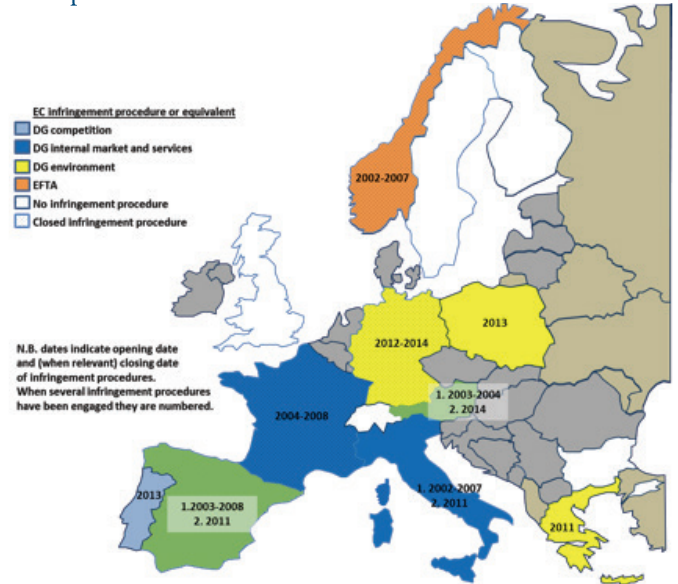


Figure 5. Several countries have been subject to an infringement procedure



Possible distortion of the European electricity market

The differences in hydropower rights regimes, observed in Western European countries, are currently not established on a commonly defined basis. Rather, they are decided by the different national or local authorities. The specification of each national or local regime, the obligations faced by hydropower operators, and the characteristics of the granting process (competitive or not) present no uniformity in any scope greater than the national level. Some of these differences could be justified from an economic point of view, e.g. those based on environmental specification. However, it is not possible to decisively conclude whether these differences are justified from an economic point of view, and thus whether they introduce competition distortion.

Such distortions can influence both investment conditions and the use of power plants. Other things being equal, if one country provides better or worse conditions for investment and use of hydropower (through more or less obligations, taxation or competition), it will distort the national power equilibrium, the electricity price in each country, and the electricity flow pattern through the power grid, compared to a situation in which the national hydropower regimes would be built according to a common methodology.⁴

4. Even if it is not illustrated here, diversity of taxation is also important, which introduces additional distortion to the European electricity market.



Lack of clarity from the different European Commission DGs, and the need for greater harmonisation of hydropower regimes

Not referring to a well-defined analysis of the right to use hydropower, the European Commission follows a case-by-case approach in each of its several DGs. The infringement procedures it opened follow this path. Each DG acts independently on its own infringement cases, with its own objectives, using different, uncoordinated tools. As of today, fortunately, no country has yet been simultaneously targeted for its hydropower regime by several DGs. Several strong contradictions in DGs' approaches are nevertheless observed. DG Competition has targeted Portugal for State aid, but DG Internal Market and Services has raised no question about the absence of a competitive process for the renewal of rights to use hydropower. Similarly, DG Environment has opened an infringement procedure against Austria for non-compliance with the water directive while DG Internal Market and Services has opened none, whereas no competitive process has been implemented. Furthermore, decisions made by DG Internal Market and Services seem to lack uniformity. While the EC reopened an infringement procedure against Italy, due to a newly added delay to the Italian law on opening the hydropower market, other countries like Austria, Germany or Sweden have not been questioned, despite rights to hydropower being granted without any competitive procedures, sometimes for very long periods (see box

1). These examples show a regrettable lack of coordination and consistency of the European Commission DGs. It might lead to additional and contradictory distortions of competition, and make it more difficult to open competition for hydropower in other countries.

The time has come for the European Commission to stop the case-by-case and DG-by-DG approach. The Commission has to start a complete and thorough analysis, and should work on coherent economic recommendations for designing and granting the rights to use hydropower. The action and policy of the various DGs acting on the EU hydropower regime should be coordinated and their tools and approaches harmonised.

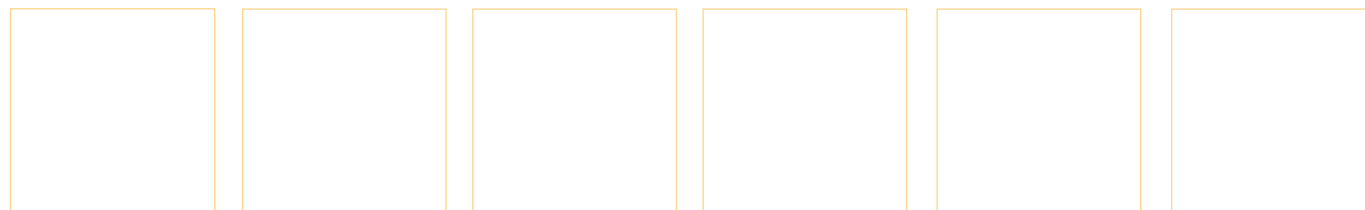
At a global level, the goals of the Commission DGs should be to deliver a harmonised regulatory regime for hydropower. Our study of the European national regimes has exposed serious issues that go beyond the legitimate variability of competition procedures. The many differences observed from one national or regional regime to another exacerbate the distortions of competition between Member States, and jeopardise the achievements of the common energy market. New and harmonised rules regarding the implementation of rights and joint obligations are an urgent matter that the EC should treat alongside its efforts to develop and regularise the competitive processes for hydropower rights.

It is time for the EU to start implementing its new "Energy Union" policy strategy approach: to stop "silo" thinking and fragmented action; to move forward with one mind and a single voice across all Commission DGs.



Box 1 National situations versus currently engaged procedures for competitive infringement

Countries	Type of right to use hydropower	Evaluation of granting procedure		Currently engaged in procedure for competition infringement?
		Duration	Competitive process?	
Austria	Authorisation	●	●	No
Bulgaria	Permit	●	●	No
Finland	Permit	●	●	No
France	Concession > 4.5 MW	●	●	No
Germany	Permit	●	●	No
Great Britain	Licence	● (before 2003) ● (after 2003)	● (before 2003) ● (after 2003)	No
Greece	Licence	●	●	No
Italy	Concession	●	●	Yes
Norway	Licence > 1 MW	●	●	No
Poland	Permit	●	●	No
Portugal	Concession	●	●	Yes
Spain	Concession	●	●	No
Sweden	Permit for water operation	●	●	No
Switzerland	Concession	●	●	No



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