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The water–energy nexus in Chile: a description of the regulatory framework for hydroelectricity

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This article offers a general description of hydropower regulations in Chile wherein two sectors that are regulated separately come to meet each other: water (as a natural resource) and electric industry (as an activity). First, the characteristics for pursuing the activity are described together with the manner in which the hydropower plants perform their function as an energy source both in terms of implementation (setting up the plants) as well as in terms of operations (functioning as an energy source). Second, the legal schemes that serve as the institutional foundation and regulatory system for water and energy are laid out. Lastly, specific regulation applicable to developing hydropower is reviewed in terms of both hydroelectric power plant projects (their construction) as well as operations.

Keywords: water; electricity; hydropower; institutional foundation; practical and juridical connection

Introduction

The water–energy nexus is an important one. Expanding on this further, the connections to be studied could include water, energy and global changes or water, energy and environment. Other combinations are water, energy and indigenous regulations or water, energy and food, given the evident and marked interrelation and interdependence that exists among the components of these equations and among the relevant activities that depend upon them. In this text we have focused on the most limited nexus possible (water–energy) and an even more specific topic contained therein: hydroelectric power, the legal framework that regulates it, and the primary conflicts uncovered in this area within Chile.¹

¹ For a variety of perspectives on the case of Chile, refer to the following: Carl Bauer, ‘Dams and Markets: Rivers and Electric Power in Chile’ (2009) 49 *Natural Resources Journal* 583 (trans ‘Represas y mercados: ríos y energía eléctrica en Chile’ (2015) 5 *Revista de Derecho Ambiental* 9); Manuel Prieto and Carl Bauer ‘Hydroelectric Power Generation in Chile: An Institutional Critique of the Neutrality of Market Mechanisms’ (2012) 37 *Water International* 131.

See also Alejandro Vergara, Daniela Rivera, Valeria Moyano, Elisa Blanco, ‘Aguas y energía: propuestas para su autogobierno y resolución especializada de conflictos’ in *Propuestas para Chile, Concurso Políticas Públicas 2013* (Ediciones Centro de Políticas Públicas UC 2014) 241–70.

One practical perspective of this nexus that is distinct from the traditional and incorporates the element of global change and the influence this has on the remainder of the elements contained in this equation, as well as the links that arise among them, can be seen in Francisco Meza and others, ‘Water–Food–Energy Nexus in Chile: The Challenges due to Global Change in Different Regional Contexts’ (2015) 40 *Water International* 839.

Therefore, it is essential to provide a general description of the regulations and conflicts in the area of hydroelectricity in Chile wherein two sectors that are regulated separately come to meet each other: water (as a natural resource) and electricity (as an activity). Perhaps this work will serve to contrast with other descriptions that are typically given as the basis of a critical analysis of the Chilean model. We will focus on this description.

First, it is important to show the characteristics of the country for carrying out this activity and the manner in which the hydropower plants perform their function as an energy source both in terms of implementation (establishing the plants) as well as in terms of operations (functioning as an energy source).

We can only review specific current regulations for developing hydroelectricity for both hydropower plant project implementation (construction) and operation after we explain the legislative schemes that comprise the institutional foundation and water and energy regulation.

I. Water, energy and hydroelectricity as juridical facts

1. *Water and energy as essential elements for the existence, subsistence and development of society*

Having sufficient water and electricity is essential for the development of any society. The two elements enable the basic needs of the population to be satisfied. Furthermore, they utilise essential inputs of productive activities.

(A) WATER: SUBSISTENCE FACTOR, ENVIRONMENTAL PRESERVATION AND PRODUCTIVITY

Given that water is an element that is inseparable from the very existence and subsistence of humanity, its use has played a key role throughout the history of civilisations. The river basins and subterranean water sources have become the backbone of urban development. They are used for supplying storage systems for the populace, for irrigation, industrial activities and power generation. In addition to humanity's vital need for water, it is important to specify that the availability of this resource is conditioned to a great degree by the specific geographic characteristics of each country, which definitively shape the respective water rights.

(B) ELECTRICITY AS A FUNDAMENTAL SERVICE

Energy utilisation has always been intimately tied to the needs of man, and has been one of the key pillars of economic and technical development in the modern age. The strategic role of energy usage for the maintenance and development of modern life is evident. This includes its use on the part of individuals, as well as in the production of the majority of goods and services needed for subsistence and progress of society.

Growing global urbanisation and the escalation of more countries as large energy consumers will probably mean a scenario of more complicated scarcity and extreme competition for using certain fuels, increased volatility and higher energy prices. The emissions of local and global hydrocarbon contaminants are another reason to decrease dependency on fossil fuels and to seek new, independent sources of energy such as hydropower that are cleaner and more accessible in terms of price.

2. Geographic and hydrologic characteristics of Chile: a long, narrow strip of land

Water is unevenly distributed over the planet and on each continent. Chile is not immune from this general rule, and its unequal division is particularly noteworthy. Very few countries present such large contrasts as does this one. There are areas with abundant quantities of water in circulation and others where it is nearly non-existent. The rivers are powerful and voluminous in certain areas, whereas in others they are calm or have miniscule flows. There are some areas with great energy potential and others that have nearly none due to low flow rates.²

Taking the continental area into consideration, Chile is the longest and narrowest country in the world. Its extreme north and south are set at a distance of about 4,300 km, while its east–west dimension measures an average of 177 km. The maximum width is 360 km (at the latitude of Mejillones), and the minimum is at 90 km (at the latitude of Illapel). The fact that this territory is so large longitudinally and that the Andes Mountain Range reaches heights exceeding 6,000 metres in the northern area and averages 2,000 metres in the southern region means that there is a great deal of climate variety as well. This affects the superficial run-off which, together with the unique topography of the country, results in the high degree of hydrographic variety noted above. Additionally, one must recall that the elevations of the highest Andean peaks increase the velocity of water flow or run-off down their slopes. This speed does not considerably decrease until the river becomes an estuary at sea, thus the length the river must run to do so is shorter in relation to other countries.³

3. Key point of the water–energy nexus: hydroelectricity

(A) HYDROELECTRIC POTENTIAL

Hydroelectricity arises from the kinetic energy created by a waterfall or run-off and is utilised to create electricity with a turbine whose rotational movement is then transferred to an electric power generator. Currently, it is the renewable energy source most widely used throughout the world, generating 16 per cent of the electricity needed in 2010.⁴ The region of Latin America and the Caribbean has the second-largest hydropower potential at the global level, providing nearly 65 per cent of the electricity generated therein.⁵ Under this scenario, Chile clearly has the appropriate conditions for adopting an energy matrix based for the most part on hydroelectricity.

(B) HYDROELECTRIC POWER PLANT FUNCTIONING

Electricity generation based on the kinetic energy of water is produced in large hydro-power plants and is renewable (given that the water is utilised and then, generally,

² Ana María Errázuriz and others, *Manual de Geografía de Chile* (2nd edn, Editorial Andrés Bello 1992) 119–25.

³ *Ibid.*

⁴ United Nations World Water Assessment Programme (UN Water), *Water and Energy: The United Nations World Water Development Report 2014* (UNESCO and UN Water 2014) 38.

⁵ *Ibid.*, 38–95. For similar information, see Antonio Embid and Liber Martín, *El nexo entre el agua, la energía y la alimentación en América Latina y el Caribe. Planificación, marco normativo e identificación de interconexiones prioritarias* (Ediciones Comisión Económica para América Latina y el Caribe, CEPAL 2017) 33.

returned to the basin it was drawn from for its use). There are two types of plants referenced in the Chilean legal regulations, with respect to which two stages can be distinguished: construction of the plant's equipment, and the operations phase of electricity generation using the motive power of water.

(C) HYDROELECTRIC POWER PLANTS FOR RUN-OFF (STREAMING) AND RESERVOIR MODELS

Streaming plants use the flow force of a waterway (whether or not this force is 'provoked' by water redirection thus creating a slope, or instead the natural motive power of the current is directly utilised as occurs in 'run-of-the-river' type plants), and it is directed to pass through the turbines and return to the watercourse afterwards. The dam or reservoir plants are those that store water for hydroelectric purposes, which brings with it the advantage of being able to select the precise moment to use the resource in electricity production.

The essential difference between the two types of plants, in addition to the scope of the works and installations (the reservoir plants are usually the most invasive ones upon the environment, given that they must create a sort of artificial lake that inundates the land) is that, with reservoir plants, one can 'choose' the right moment to produce electricity without depending upon the run-off or current that the water storage source may have at a specified moment, given that they utilise water that has already been stored in artificial lakes. The streaming plants are permanently dependent upon the climatological and fluvial conditions of the particular source, and remain subject to the run-off or volume that said source might have in each period or season of the year.⁶

4. *Developing hydroelectricity activities: implementation and operations*

It is important to explain the project and operations stages for the entire hydropower plant. Two fundamental stages can be distinguished, whether or not they are dam or reservoir plants, or streaming: implementation and operation.⁷

(A) IMPLEMENTATION OF A HYDROELECTRICITY PLANT

The implementation of these kinds of projects (usually of large scope and scale) is marked by four essential factors that are necessary to consider:

- (1) *Planning and construction of hydraulic works.* The hydropower plants are expressions of the progress made in modern hydraulic engineering. They consist of a set of parts comprising hydraulic works that, taken together, can be classified as a 'hydroelectric plant'.
 - (i) *Reservoir plants.* The following items constitute the principal works: the dam tasked with restraining the water from a given waterway and

⁶ Concerning the greater (reservoir plants) or lesser (streaming plants) control of hydro variability, see Bauer 2015 (n 1) 31.

⁷ The closing phase or abandonment of the facilities or activity is not included here despite the fact that it is recognised in the Chilean environmental legislation given that the topic exceeds the intentions of this work.

storing it in a reservoir; the machine room that holds the turbines, alternators and regulation and control elements; the turbines that transform the water's kinetic energy into mechanical energy; the alternators that are the actual electricity producers that will turn the mechanical energy of the turbines into electricity; and lastly, the ducts designed to feed the turbines with injected, pressurised water to increase the motive power through a system of conduits.

- (ii) *Streaming plants.* These have the same principal installations as the reservoir, except that they do not have a dam since they do not store water. Furthermore, they have two essential works: the water intake or water conveyance canal through which the water is captured from the natural water flow and transported toward the location in which the turbines are situated (usually through a sloped path that gives additional force to the transported water), and the discharge point where the water is returned to the natural waterway from which it was extracted.

These works, especially those of greater size, require administrative authorisations for this sector such as those granted by the General Water Directorate.

- (2) *Modification of natural watercourses.* Whether it concerns the construction of reservoir or streaming plants, both of these necessarily imply the intervention upon a natural watercourse. A reservoir plant significantly alters the river's flow, producing a reservoir or artificial lake due to retaining the water, therefore influencing the run-off downstream from the dam. The works included in a streaming plant may be considered less invasive, but also result in a modification of the flow since water must be extracted and then returned through hydraulic uptake and discharge areas.

Again, in this sector it is normal to require administrative authorisations, specifically those conferred by the General Water Directorate.

- (3) *Land use (land owned by a third party in the majority of cases).* It may seem obvious, but the project works that form a hydropower plant must be situated in a selected location to occupy land surface that has flowing lakes or rivers present. The required land could be: (i) the property of the same owner who wishes to implement and build the hydroelectricity project, or (ii) the property of a third party that is completely unconnected to the project and the activity intended to be carried out. There are no difficulties on this point under the first scenario, since the works to be built will be situated on the same land. In the second case, there is a difference of interests between the landowner of the site where the project will be installed and the project owner who wishes to pursue the economic activity of electricity production by building upon said land. In this context, legal or administrative authorities will intervene as necessary for the bestowal of easements that will facilitate access to third-party facilities after having paid the corresponding compensation.
- (4) *Environmental impacts.* Hydroelectricity plants usually produce impacts upon the environmental components surrounding them as a result of modifying the natural flow of a waterway. This means the natural flow of a river, the level of subterranean water in the area near the reservoir, the local flora, the land to be used for the reservoir or its hydraulic works, or the ecosystems that depend upon the relevant waterway are all components that are normally affected by such projects. Therefore, the project must be submitted to an

environmental impact assessment procedure that is supported by special governmental institutions.

(B) HYDROELECTRIC POWER PLANT OPERATIONS

Once they are constructed and connected to the electrical system, hydropower plants are ready to perform the function they were designed for: taking advantage of the motive power of water to transform it into electricity and inject it into the transportation system that distributes it to places of consumption. This is the phase in which the effects and problems of the previously stated four factors manifest themselves and become real. Additionally, there are other situations that must be recognised such as relations and conflicts between hydropower companies and other owners of water rights to the same basin (such as farmers, for example, an area that often gives rise to feuds due to the means and manner of using this resource).

5. *Socio-environmental aspect of hydroelectricity: conflict in the industry*

There are characteristics listed above that are shared by all hydropower projects with their own specifics according to each case. It is easy to say that in the implementation, construction and operations phases of plant installations there is a high potential for impacts on and modifications to the environment, local customs, quality of life and territory of the neighbouring populations, in the contiguous economic activities or industries and more. This is why it is very common for hydropower activity to be accompanied by social or environmental problems, and the resistance or opposition by groups or associations who envision threats to their wellbeing and development.⁸

In this context, it is important to bear in mind that, in accordance with the Environmental Justice Atlas, Chile occupies the 12th position globally for those countries with the most environmental conflicts with 46 controversies in total. Of these, nine are related to the element of water, all of which are connected to hydroelectricity projects.⁹ A recent study done by the National Council on Innovation for Development shows that for the 1998–2015 period, of the 49 large-scale projects centred on energy and water that presented socio-environmental conflicts, 28 pertain to energy and 10 are connected to hydropower plants. Said plants are located primarily in the central and southern regions of the country. The main reasons given for conflict are the effects upon tourism, the native flora and fauna, the ancestral ways of life of indigenous communities and the availability of water.¹⁰

Having said that, such a degree of conflict is a general tendency at the global level, wherein hydroelectric plants have been the centre of criticism for various reasons. Some of these are attributed to damage to the environment and biodiversity, loss of cultural

⁸ Problems and impacts that make up part of the environmental regulation, in connection with the industrial regulation of water and energy, are issues that we will not address here. Embid and Martín (n 5) 32 critique the classification of hydroelectricity as a renewable energy source that has a non-consumptive water use and low impact on the environment and other users.

⁹ Information taken from the website: Environmental Justice Atlas <https://ejatlas.org> accessed 12 June 2017.

¹⁰ Eduardo Astorga and others, *Evaluación de los conflictos socio-ambientales de proyectos de gran tamaño con foco en agua y energía para el periodo 1998 al 2015. Informe final* (Consejo Nacional de Innovación para el Desarrollo 2017).

and historic sites and societal alterations. Nevertheless, the reservoirs of some of these plants also enable water storage for periods of drought, assist in flood management, and enable boating and other recreation.¹¹

II. Institutional bases and regulation of water and energy

II.A. Legal regime of water: regulatory framework, administrative intervention and regulation of its use

1. *Regulating the use of water*

The regulatory sources that comprise the current regulations on water rights in Chile are primarily the following: Decree Law (DL) No 2.603 of 1979; Art 19 No 23 and No 24 of the Political Constitution of the Republic (PCR) of 1980; and the Water Code (WC) of 1981 with its subsequent modifications.

(A) DL No 2.603 OF 1979

This regulatory text marks the start of the very recently revised water rights in Chile with a clear tendency toward liberalising the management and use of water. The next regulatory steps arising from this text are the PCR of 1980 and then the WC of 1981.

The DL No 2.603 sets out standards on the rights to use water and ‘authorises the President of the Republic to establish a general legal framework for water’. However, the contributions made by this piece of legislation are much more extensive:

- (1) It reinforced the guarantee of the water rights giving the title-holders ‘ownership over them’ as stated in Art 1 of DL No 2.603.
- (2) It recognised the customary rights to water as use rights. It is presumed that customary use of water that complies with the corresponding requirements constitute use rights and therefore are ‘recognised’, as given in the PCR of 1980.¹²

(B) PCR OF 1980

It is essential to include the PCR of 1980 as a source of water rights. The following provisions of this regulatory source must be particularly highlighted:

- (1) *Article 19 No 23*. Given that the right to use water is an intangible good recognised by Art 19 No 24 PCR, and there is freedom to acquire all manner of goods, any limitation or requirement applicable to its acquisition must be brought into effect through a law made by a qualified majority and must always invoke the national interest.
- (2) *Article 19 No 24 final clause*. In accordance with this provision: ‘The rights of individuals over water, recognised or constituted in compliance with the law,

¹¹ UN Water (n 4) 38.

¹² Similarly, Art 7 of DL No 2.603 states that: ‘The owner of the use rights shall be presumed to be whoever has the property that is currently using said rights. In the event the aforementioned standard were not applicable, the owner of the usage rights shall be whoever is currently making effective use of the water.’

shall grant the title-holders ownership over them.’ This article sets out and guarantees the ‘ownership’ over the ‘rights’ to use water. Furthermore, it specifies that said rights can be ‘recognised or constituted in compliance with the law’, which means ratifying, now by a constitutional court, that from the perspective of their origin, such rights may be ‘constituted’ (ie, stemming from an administrative procedure of concession) or ‘recognised’ based upon customary use practices or other special situations (conferred by Art 7 DL No 2.603 of 1979).

(C) WC OF 1981

This regulatory source heads the current regulatory framework on water in Chile. The following aspects stand out:

- (1) Considering the available water as a natural source to be a national good for public use and, therefore, exempt from the private legal system.
- (2) Existence of a *concession procedure* through which water use rights are granted or constituted for individuals, and a *legalisation procedure* for the recognised rights, particularly based upon customary uses of water that were initiated prior to the entry into force of the WC of 1981.
- (3) The existence of *real administrative rights* (water use rights) that enable the owners to use a set amount of the water privately and exclusively as a result of the concession or recognition bestowed by a relevant authority.
- (4) The *joint administration and management* of water. The General Water Directorate (DGA) is a centralised administrative authority tasked with ensuring the protection and administration of water as a national good for public use. Having said that, once the rights are constituted or recognised, the water becomes subject to management for each hydrographic basin by the respective organisations of users, particularly those called ‘supervision committees’. These are private bodies comprised of the very owners of usage rights, although they exercise public powers. Such is the force of this latter organisational structure that this can certainly be characterised as a dual administration of the hydro resource shared by the authorities with this private entity (each one in distinct contexts and with very distinct powers).¹³

2. *Organisation and powers in water administration and management*

In this arena, two distinct moments must be reviewed. One is the ‘granting’ of the right to use water, where registration and control of the hydro resource in which the DGA plays a key role. The other is the effective ‘distribution’ of water to the owners of such rights. The supervision committees and remaining user organisations intervene in this aspect.

¹³ Similarly, a complete analysis can be found in Christian Rojas Calderón, *La distribución de las aguas. Ordenación y servicio público en la administración hídrica y en las juntas de vigilancia de ríos* (Thomson Reuters 2016) 144–93 and 219–306, who classifies the work done by the supervision committees as a ‘private service in the public interest’ (SPIP).

(A) GENERAL WATER DIRECTORATE

The DGA is a technical entity of the Government Agencies that is very important in the subject of water. As it is a public authority, it falls directly under the Ministry of Public Works. The DGA has the following functions:

- (1) to establish or assign original water rights;
- (2) to exercise policy for and supervision of the resource and the context in which it authorises the construction of hydro projects. Additionally, it can authorise modifications to said works or change the place in which they are to be situated;
- (3) to conduct oversight of the user organisations;
- (4) to plan the general development of the resource, formulate recommendations for its use; and
- (5) to maintain a public record of the water use rights.

(B) SUPERVISION COMMITTEES

These organisations are made up of individuals including all of the use rights holders that in any way take advantage of superficial or subterranean waters of the same hydro-graphic basin or catchment.

The water management role of the supervision committees is strengthened by the scant specific directives or functions required of them by the DGA. Only in cases of extreme drought, or in the event of serious mistakes or misuse in water distribution or the financial management of the organisation, is the said administrative body authorised to provisionally shut down its functioning and intervene in the supervision committees. Notwithstanding the foregoing, and regardless of its character as a private or individual organisation, there is little latitude for members to agree to regulations they may deem relevant, since the contents of the Water Code were designed with a high degree of specificity.

(C) THE REMAINING USER ORGANISATIONS

This legal category is very distinct from the supervision committees and includes the water communities and constituent associations despite the fact that all of them are broadly referred to as ‘user organisations’. The primary difference is that the duty to manage all of the water of a basin only arises in the case of the supervision committees. In the remaining situations, the concept is limited to protecting the interests of the members who comprise said organisations, which come to be based upon the presence of an artificial hydraulic work and shared resource exploitation.

The water user organisations can be defined as those non-profit entities with a legal status whose fundamental aim is to administer the water sources or basins over which they have authority and/or the works through which the water is captured, stored and/or piped; distribute and, exceptionally, redistribute the water among their members; and to settle certain conflicts among the latter parties or between them and their own organisation.

3. *Exploitation of water and the utilisation of another party’s land*

The basic premise in this regard is set out in the very same Water Code. It states that the owner of water use rights also possesses the means necessary to exercise them. It carries

with it by the simple application of the law, the ability to impose any of the easements that may be required after having paid the corresponding compensation (Arts 8, 25, 26 and 28 WC of 1981).

Therefore, since they are surface waters that are primarily used for hydropower activities (although Supreme Decree No 203 of 2014, which contains the subterranean waters regulation, included a norm that recognises the possibility of constituting non-consumptive rights over this type of resource), access to a third-party plot of land is legally guaranteed. This requires, however, the processing of easement requests at a judicial venue (although there is a variant that enables the establishment of these encumbrances at an administrative office as will be reviewed in the next section concerning energy).

The easements that are most typically requested in this case are those for pass-through or transit (in order to access and move around the third-party property); of aqueduct (that authorises moving water through a third-party property at the expense of the interested party, comprising the right to build works and drains so that the water discharges into natural basins); and of flooding (to construct reservoirs or collection sites on third-party property for the purpose of storing water).

4. *Conflict resolution system*

In order to wrap up this overview of the institutional aspect of water in Chile, we must briefly review the conflict resolution system set up for this industry. It is important to state that there is a very disjointed regime for disputes, with a number of venues, petitions, procedures and resources involved. Some of them are described below.¹⁴

(A) CONFLICT RESOLUTION BODIES

Of the various entities involved in this area, the following make up the primary participants:

- (1) *Ordinary courts of justice.* Given the non-existence of contentious-administrative courts in the country, disputes over water are resolved by commonly authorised courts. The authorised jurisdictional body is defined by the kind of issue to attend to, but the majority of water conflicts are concentrated in the Appeals Court (one in every regional capital) and the Supreme Court, notwithstanding the intervention of Civil Courts that are found in each community or group of communities.
- (2) *General Comptroller of the Republic.* While the essential function of the Comptroller is to review and control the legality of the administrative acts, it is not unusual for the verdicts issued by this body to resolve certain controversies or issues raised by individuals or stemming from its own administrative rulings designed for managing water issues.
- (3) *General Water Directorate.* Although the DGA does not have jurisdictional powers either, when it is aware of and resolves disputes that are set out in

¹⁴ A diagnosis and proposal concerning conflicts in the field of water can be reviewed in Vergara and others (n 1) 243–45 and 261–64.

specific procedures (be they on establishing or exercising water exploitation rights), it can be understood to perform the role of a judge. It must consider various contradictory perspectives and allegations, and determine the legally sound option to move forward with the particular request filed.

- (4) *User organisations.* These organisations possess jurisdictional powers with an express base and a legal foundation. The board of directors is tasked with exercising this role and is mandated to function as an arbitration court to solve issues that arise between its members concerning sharing water or exercising rights, or those problems that arise between said members and the very same member organisation (Arts 244 to 247, 258 and 267 WC of 1981).
- (5) *Environmental Courts.* A new institutional system was created in 2010. This includes a specialised dispute resolution system: the Environmental Courts (three at the national level). A large percentage of the issues these entities settle relate to the subject of water and are focused on the qualitative aspect of the resource.

(B) MEANS OF OBJECTING TO ADMINISTRATIVE RESOLUTIONS

Notwithstanding the possibility of using the recursive tools in this field set out in Act No 19.880 of 2003, for all administrative procedures, it is pertinent to highlight the existence of two ways of objecting to the DGA resolutions regulated in the water legislation: the reconsideration option, which is lodged before the same administrative authority (Art 136 WC of 1981) and the claim option before the appropriate Appeals Court (Art 137 of 1981).

(C) SPECIAL MEASURES CONCERNING THE PROTECTION OF WATER EXPLOITATION RIGHTS

Lastly, it is important to mention the existence of at least two special mechanisms for protecting the private ownership of water: the legal protection resource, which can be called upon by anyone who believes they are being harmed by the exploitation of the resource by recent projects or events (Art 181 WC of 1981); and the protection measure, which applies to acts or omissions that are arbitrary or illegal that result in eliminating, disturbing or threatening the legitimate exercise of the referenced use rights (Arts 19 No 24 final section and 20 PCR).

II.B. Legal regime for electricity: statutory framework, administrative intervention and regulating use

1. Statutory framework of the electricity industry

There are two types of provisions, both legal as well as regulatory, but the key piece of legislation is the General Electricity Act (FDL No 1 of 1982), wherein the foundation of the institutional aspects of electricity is laid out. It gives private parties open access to the electricity business, particularly the generation and transport of energy.¹⁵

¹⁵ Prieto and Bauer affirm that one of the key elements of the new legal framework for electricity in Chile is the introduction of free competition in the production sector. This would imply that there

There is a clear demarcation between the distinct activities that comprise the segments of the electricity market that have different characteristics:

- (1) The *production* area is comprised of a set of electricity companies that own electricity generation plants. This has given rise to a market that does present competition, but has no economies of scale. The prices tend to reflect the marginal production costs. There are no barriers to entry for new actors and no natural monopolies have been identified.
- (2) The *transmission* segment involves the activity of sending energy from the generation points to either the mass consumption points or transformer substations in which economies of scale are present as well as indivisibility of demand and the tendency to function as a natural monopoly.
- (3) *Distribution* is the activity of taking energy to end-users located in an explicitly defined geographic zone in which the companies that provide this service operate as a natural monopoly due to its regulation. It is important to specify that the concession is only essential for the service of public distribution.¹⁶
- (4) The *commercialisation* of electricity is not expressly mentioned in the activities listed in Art 1 of the General Law on Electricity Services described in the Decree with the Force of Law No 4 of the Ministry of Economy, Growth and Reconstruction of 2007 (hereinafter, LGSE). Regulations in this sector are not fully developed, but are essential for pursuing this activity since a key aspect of this industry is the purchase and sale of energy.

2. *Role of electricity concessions*

Electricity concessions have a legal scope that is perfectly delimited and limitable as an act of the Administration that has the role of a creator of rights.

(A) THE ELECTRICITY CONCESSION IS AN ACT OF THE ADMINISTRATION

The Superintendent of Electricity and Fuels (SEC) issues this act of concession through a resolution (Art 11 Para 2 LGSE) in the case of provisional concessions. Definitive concessions are issued by the Ministry of Energy by order of the President of the Republic through a supreme decree (Art 11 Para 1 LGSE).

Therefore, an electricity concession is an act of the Electricity Administration that arises as a result of the administrative procedures that are regulated in each case by the LGSE (Arts 11 to 34) and in the Regulations of said Act (RLGSE, Arts 18 to 51), and whose filing consists of a series of procedural steps that conclude in a final act that denies or grants the relevant concession.

should not be any institutional preferences for specific energy sources. However, in the opinion of the authors, this would not happen since the legislation for both water and electricity contains a series of preferences that make hydroelectricity cheaper than other sources of energy. See Prieto and Bauer (n 1) 139–40.

¹⁶ Eugenio Evans and María Carolina Seeger, *Derecho Eléctrico* (LexisNexis 2007) 2–3.

(B) THE ELECTRICITY CONCESSION IS A TITLE THAT RESULTS IN AN *EX NOVO* RIGHT

An *ex novo* right is discernible in terms of its scope and how it addresses production, distribution or transmission of electricity. In every case, its scope is to grant rights to effectively conduct studies (provisional) and the projects or installations (definitive) concerning the hydraulic plants, distribution lines or electricity transport and the use of public and private land to do so.

- (1) In the case of *distribution*, in addition to the rights to occupy public and private land, the definitive electricity concession shall be for the purpose of setting up the appropriate economic agent for conducting the public service of distribution defined in Art 7 LGSE.
- (2) In the case of *hydraulic generation* and transfer, the set-up for conducting said economic activities has already been stipulated by legal ordinance (Art 4 Para 3 LGSE). The only function this has for the financial agent of this concession is the one given: a title that is legally authorised for assessing encumbrance charges for using private and public land.

In these two latter cases, the final administrative act of the process, while it does recognise the respective rights, has a unique substantive efficacy: it grants the right to effect, through the above-indicated encumbrance charges, the respective generation and transport installations. These latter concessions (that are such only formally) do not create the right to produce or transport electricity, since they are not made public and can be freely undertaken.

3. Organisation and administrative authority of the electricity sector

The operations of electricity activities are done on the basis of steps taken on the part of the companies working in each area of the distinct segments as well as the government bodies tasked with auditing, regulating and inspecting them.

(A) NATURAL OR LEGAL PERSONS, PUBLIC AND PRIVATE

Given the validity of the principle of economic subsidiarity, only the private entities (companies) operate in the sector generating, transporting or distributing electricity, except in extremely exceptional cases that are regulated by the PCR (Art 19 Nos 21 and 22); said companies are connected with the users. Furthermore, there is a type of legal entity of public rights designated to coordinate the activity (the Independent Coordinator of the National Electricity System).

- (1) *Electricity, generation, transport or distribution companies*. Usually identified by the same law as ‘electrical companies’ or as ‘concessionaires’. These companies may or may not be concessionaires in the case of generation and transmission. Said concession title is only required in the case of distribution. The operating companies for the national, regional and development areas transmission systems, despite being a ‘public service’, are not required to hold a concession title.
- (2) *End-user or consumer*. Defined by the same law as that which utilises the electricity supply for consumption.

- (3) *Independent Coordinator of the National Electricity System (Coordinator)*. This is defined in the law as a technical and independent body tasked with coordinating the operations of the set of installations of the national electricity system that operates interconnectedly. This definition simultaneously regulates their behaviour and the other industry actors.

This involves an autonomous, non-profit, public legal body directly created by the law with its own funding that is separate from the Government Agencies.

(B) INSTITUTIONS OF THE GOVERNMENT AGENCIES: SPECIFIC PUBLIC SERVICES

The following authorised entities in this area are included:

- (1) *Ministry of Energy*. It has various relevant functions, such as setting rates and promoting the development of production, transport and distribution of electricity.
- (2) *National Energy Commission (NEC)*. It was created in 1978 with the aim of guiding the government on all energy-related matters. To do this, the regulation contained in Decree Law No. 2.224, imbues it with a series of functions for creating plans and policies, for coordination, proposing economic and technical norms and calculating rates and prices for energy.
- (3) *Superintendent of Electricity and Fuels (SEC)*. This oversight and supervisory body was created by Law No 18.410 of 1982. As regards electricity, it must ensure compliance with the laws, regulations and technical norms on electricity generation, transport and distribution in order to verify that the quality of the services rendered to users is what is demanded, and that said operation do not represent a danger to people or things.

It plays a key role in the processing of electricity concessions and in establishing the respective easements among other functions of the industry, meaning it is an important regulatory body. Furthermore, it has penalising powers.

4. *Use of public and private land for developing electricity production*

The concession licensing creates and establishes through the mere operation of the law, a specific encumbrance that applies to third-party, individually owned land, or lands owned by the state, region or municipality. It is called an 'easement', which is an encumbrance that constitutes a real right for the concessionaire, permitting the use of such land.

(A) ESTABLISHMENT OF ELECTRICITY EASEMENTS THROUGH THE ADMINISTRATIVE ROUTE

The electricity easements are established upon the concession decree that creates them after having been settled, published and entered into the public record. Technically, these easements are established through the approval of the easement plans, which gives them a stamp of legality. In effect, the establishment of the encumbrance cannot be the focus of a new debate, rather only its use.

(B) STRUCTURE OF THE EASEMENTS GRANTED THROUGH A DEFINITIVE CONCESSION DECREE

Generally, easements established by a concession decree are governed by the provisions found in the LGSE. Therefore: (i) in terms of its establishment, the real right to the easement is understood as founded by the decree that simultaneously establishes the electricity concession. Juridically, this establishment works by mere operation of the law once the respective records processing has been completed; and (ii) in terms of its exercise, if the easement has been created by a concession decree, the provisions of the LGSE apply, especially concerning land use, compensation payments and any problems this produces.

Thus, the establishment of administrative easements (through the mere ruling and refinement of a concession decree by the Ministry of Energy) is separated from their exercise (land use and compensation payments), which can likewise be voluntarily refined within the same administrative procedures that grant the definitive electricity concession or through subsequent legal measures and/or processing.

(C) EXERCISE AND EFFECTIVENESS OF THE ELECTRICITY EASEMENT ESTABLISHED BY CONCESSION DECREE

Once the concession that administratively created the easement is granted, the electricity concessionaire that wishes to fully exercise said rights must first compensate the owner of the land where it has been established (be it in the conventional manner or within a conflict situation underway). In keeping with the above, after this occurs, the land use rights can be exercised.

(D) SOME RESULTS OF EASEMENTS ESTABLISHED ADMINISTRATIVELY

The owner of the land in question has the duty of allowing entrance by the concessionaire to conduct repair and maintenance work of the installations set up pursuant to the compulsory easement (Art 56 LGSE). The Competent Judge sets out the mechanism for doing so. In addition to what is set out in Art 67 Para 2 LGSE, and for the purpose of the order to take material possession of the land on the part of the relevant judge (when no agreement with the land owner has been reached), at the request of the concessionaire the same judge can call upon law enforcement to assist in compliance with the concession decree.

5. Conflict resolution system

(A) INTERVENING BODIES

Two bodies can resolve conflicts in the electricity arena: the Expert Panel or the ordinary courts depending upon which matters are to be addressed.

- (1) *Expert Panel*. This is a truly special court that does not form part of the judiciary, and it can resolve specific controversies that may arise between electricity companies and the Administration (contentious-administrative jurisdiction), or between the same electricity companies (in the manner of an arbitration court). Their resolutions become binding rulings that cannot be appealed in another petition.

- (2) *Ordinary courts.* The general authority of these courts is maintained in order to resolve the causes not dealt with by the Expert Panel, as the authority of the latter is limited to those cases strictly listed in the law.

(B) CHALLENGE PROCEEDINGS AND THE DEFENCE OF PRIVATE INDIVIDUALS' RIGHTS

There are special mechanisms for these purposes, including:

- (1) *Claims.* Private individuals can bring claims to the SEC for conflicts between or against other private individuals, consumers and owners of the electricity, gas or liquid fuel installations.
- (2) *Appeal for reconsideration.* An appeal for reconsideration can be lodged against SEC resolutions to apply penalties.
- (3) *Claims appeal.* A claim can be filed against any SEC resolution viewed to be illegal at the Appeals Court that corresponds to the claimant's address.

III. Juridical statutes of hydroelectricity

After having delved into the institutional basis that makes up the juridical scheme for the water and energy sectors, we move on to developing the intimate connection between the regulations on both activities as pertains to hydropower. The two above-named stages are distinguished herein: on implementation (for its construction and establishment) and operations (for its exercise).

1. *Implementation of a hydroelectricity plant*

The juridical scheme for implementing a hydroelectricity plant is conditioned by the fact that it can effectively be carried out. This is influenced by various factors.

(A) THE NEED FOR WATER USE RIGHTS

In order to employ the motive power of water, hydropower companies must have the exploitation rights that would permit such an activity. In general terms, the exploitation rights may be of two types: (i) those that permit the owner to fully consume the water known as 'consumptive rights' (Art 12 Water Code); or (ii) those that could use the water without consuming it, with the duty to replace the water from the basin it was extracted from falling to the rights holder. These are known as 'non-consumptive rights'.

Both the streaming plants as well as the reservoir plants need non-consumptive use rights. However, for technical operational reasons, the latter category does additionally require a certain amount of consumptive rights. This is because there must always be a volume of water in the reservoir for these plants to have a minimum operational level, and this water is not returned to a natural watercourse.

(B) PLANNING AND CONSTRUCTION OF HYDRAULIC WORKS

As has already been set out, a hydropower plant means a complex grouping of hydraulic works. The main parts are: a dam in the case of reservoir plants and conveyance, and

discharge canals in the case of streaming plants. Whether or not the project must have permission for its construction from the relevant authority on hydraulic matters is determined in accordance with the projected size of the plant, which is associated with the energy potential it is designed to produce.

The primary permission that large-scale hydraulic works must obtain is what is set out in Arts 294 through 297 of the Water Code, known as the large hydraulic works permit. Effectively, the works that must follow the authorisation procedure of the DGA in accordance with Art 294 of the Water Code are, among others:

- (1) reservoirs with capacity greater than 50,000 cubic metres or whose wall is greater than five metres in height; and
- (2) aqueducts that conduct more than two cubic metres per second.

Thus, a hydropower plant that has hydraulic works that present one of the given scenarios due to its characteristics shall require approval by the DGA in order to be built and functioning. The DGA will conduct a technical hydraulic test prior to deciding whether or not to issue the permit. Therefore, Art 295 of the Water Code states that the ‘General Water Directorate shall grant authorisation once the definitive project has been approved and only when it has been proven that the work will not affect the safety of third parties nor contaminate the water.’

(C) MODIFICATION OF NATURAL WATERCOURSES

Large hydraulic engineering works that encompass the hydropower plants are placed in or near natural watercourses, the motive power or flow of which is used to create electricity. Impacts on these watercourses must also be authorised separately by the relevant authority in compliance with what is set out in Arts 41 and 171 of the Water Code. Article 41 of the Water Code is the part of these provisions that describes the requirements and need for permission.¹⁷

The cited norm states that: (i) the legal rights that must be protected by the DGA when analysing and determining whether or not to permit the modification of a natural waterway are quite similar to those set out in Art 294 of the Water Code for large hydraulic works, but don’t mention the requirement to not alter the water run-off pattern. The latter aspect is generally associated with environmental matters and is recited below; and (ii) the definition of what is to be understood by an installation that modifies a watercourse is quite broad. This means that practically any work situated in said places must have the stated permit.

Given the similarities of the requirements that must be met so that the DGA grants this authorisation in comparison with what is contained in Art 294 of the Water Code, and in order to ease the processing of the large-scale hydraulic

¹⁷ ‘The project and construction of any modifications that were necessary over the natural or artificial waterways for the purposes of building works... that may harm the life, health or wellbeing of the population or in any way alter the run-off pattern of the water shall be the responsibility of the interested party and must be previously approved by the General Water Directorate ... The meaning of the word modification not only concerns changes to the watercourse path, but also... the construction of new works, arches, throughways above or below level, or any other substitutions or additions.’

projects, Decree No 50 of the Ministry of Public Works dated 2015 declared that the owner of a project can simultaneously submit a request for both permits, which can be processed jointly.

(D) LAND USE

The project owner who needs to occupy another party's land for hydroelectricity installations has two options depending upon whether or not the electricity concession for hydroelectricity production was sought because, as stated above, it is not compulsory for these types of projects:

- (1) *Easements that stem from water use rights.* The water use rights give to the owner all means necessary for exercising them, especially in accordance with Art 96 of the Water Code. This is the right 'to build upon the servient estate any works necessary for exercising said right, such as dams, intakes, discharges, abutments, hydropower plants, machine housing and more'.

Easements may be granted voluntarily (an agreement between the project owner and the corresponding landowner, which is formalised in a contract), or can be obtained through summary proceedings in which the compensation amount for the owner of the land being occupied by the project is discussed.

- (2) *Easements that arise from the electricity concession.* If the project owner opts to seek the electricity concession in compliance with the norms of the LGSE, and considering reservoir hydropower plants that have a rated capacity equal to or greater than 20 MW are the only electricity generation plants that can request electricity concessions, the supreme decree issued by the Ministry of Energy that grants the definitive electricity concession to the project owner gives rise to, by the sole ministry of the law, the real right to impose easements on the land necessary to utilise its works (Arts 124 and 49 LGSE).

(E) ENVIRONMENTAL ASSESSMENTS AND PERMITTING

Act No 19.300 of the General Environmental Framework states that, for those projects that produce environmental impacts to be implemented and operational, the Environmental Impact Assessment System must have previously reviewed them. This is to ensure that the project impacts shall not be significant, and in the case that they are, to include the necessary environmental mitigation, compensation and reparation measures that are deemed adequate.

Under this assessment procedure, the environmental aspects of the permits for large hydraulic works (no water contamination) and modification of natural waterways (altering the superficial flow of rivers) are primarily analysed not only by the DGA, but also by the relevant environmental authority tasked with conducting the assessment procedure (Environmental Assessment Service).

After the assessment is complete and when it has been determined that the project shall not have any significant impacts on the environment or, if applicable, that the mitigation, compensation or reparation measures offered by the project owner are adequate, it shall be authorised by an Environmental Assessment Decision.

2. *Operations of a hydropower project*

Once a hydropower project is implemented, the respective plant begins to function in order to inject energy into the interconnected system. An essential aspect of this operation is the work of the supervision committees (in terms of the use management and handling of the water), of the Coordinator (insofar as the notices it may issue), and the exercise of supervisory powers (both the SEC for electricity matters as well as the DGA for water issues).

(A) ROLE OF THE SUPERVISION COMMITTEES

Once the hydropower plants are operational, they shall be submitted to the distribution agreements and functions relating to water sharing of the supervision committees. In practice, these organisations decide the ‘measure’ of the use rights of their members (including the hydropower companies), and the time frame and manner in which they may be exercised.

(B) ROLE OF THE ELECTRICITY COORDINATOR

Given that this concerns an energy network that injects power into the system, the hydroelectricity plants must also be adjusted to the dispatch notices that the Coordinator issues, as a technical and independent body tasked with coordinating the operations of the set of installations of the national electricity system that operates interconnectedly.

(C) ROLE OF THE OTHER BODIES THAT MAKE UP THE GOVERNMENT AGENCIES

It is also important to bear in mind that, concerning the functioning of a hydropower plant, the respective public bodies have oversight capacity for matters related to water, electricity and the environment.

IV. *Hydroelectricity regulation subject to critique and analysis*

The regulation of hydroelectricity in Chile has been subject to critical review in the literature, which we discuss. The goal of this work, given its origin and intention, is to provide a description of the Chilean regulatory model for hydroelectricity. That which we have not undertaken on this occasion is an analysis of said literature, for example, a description of the conflicts that have occurred in the sector.

A notable foreign observer of the Chilean water situation (Carl Bauer) has also been conducting analyses of the matter. He has reached diverse conclusions on the regulatory model framework in effect during the time of his work. Notwithstanding, the matters that he references should be discussed upon reviewing the results of the new regulatory framework for energy (which was recently modified in 2016). Additionally, there is currently a wish to modify the water regulations, which remain uncertain after lengthy legislative proceedings.¹⁸

¹⁸ Act No 20.936 of 2016 set out a new electricity transmission system and created an independent coordinating body for the national electricity system. This greatly alters the administrative organisation, the results of which will be seen over the course of its application that recently came into effect.

The aspects that stand out and underscore the criticism of the Chilean model (Bauer especially) are fundamentally the following:

- (1) *Supposed regulatory preference for non-consumptive rights and for hydropower.* The creation of non-consumptive rights (Water Code of 1981) would mark the first institutional preference for hydroelectricity. This would also be demonstrated by the fact that other non-extractive water cases (such as the cultural uses, those connected to conservation or recreation) are not explicitly recognised in the legislation as an object of property rights and, therefore, remain outside the market model.¹⁹
- (2) *A special focus on property rights of the hydropower companies over their water use rights.* Chilean legislation (for both water and electricity) has come up with its own concept of property rights, especially as concerns use rights allocated to hydroelectricity activities. Thus, the original assignment of use rights would be focused on productive uses, within which there are various rules that reveal a preference for hydroelectricity.²⁰
- (3) *Alleged concentration and monopoly of non-consumptive use rights.* The rules of the Chilean model have enabled a high concentration of non-consumptive water rights, which has created monopolies, the failure to exercise a high percentage of rights and barriers to new competitors. This also implies the possibility that certain electricity companies can control the installation of new projects and, therefore, the storage and price of electricity.²¹
- (4) *Control of water flow by hydroelectric companies.* Concerning hydropower companies' behaviour, it is maintained that they have exercised the non-consumptive water rights controlling the water downstream from their installations in accordance with the electricity generation demand. This would cause externalities and conflicts with the users, especially irrigators.²²
- (5) *Problems in the management of natural sources.* The rivers are managed by supervisory committees that must include all water rights holders for the basin, be they consumptive or non-consumptive. Notwithstanding, the rules for decision-making by these bodies would give preference to the non-consumptive rights holders, as the voting rights are assigned as a function of the number of rights held along with the amount of flow. This means the consumptive rights holders frequently do not include the hydroelectricity companies in their meetings and decision-making.²³
- (6) *Supposed preference given by the jurisdictional system for non-consumptive rights and for hydropower.* The judicial resolutions (regular courts) on conflicts concerning water have become another example of institutional preference for hydroelectricity. The market as the principal venue for solving these conflicts has failed and the administrative authority lacks the powers to intervene. This has given the courts a special role within the hydroelectricity institutions.

¹⁹ Bauer 2015 (n 1) 25–27 and 63; Prieto and Bauer (n 1) 135.

²⁰ Prieto and Bauer (n 1) 143.

²¹ *Ibid* 136–37.

²² *Ibid* 136. For similar information, see UN Water (n 4) 96.

²³ Prieto and Bauer (n 1) 141–42.

They have been protectors of private property and are predisposed to favour hydropower interests, particularly when dealing with other water uses.²⁴

Conclusions

First, water and energy are essential elements for the growth of the Chilean economy, and its nearest nexus is reflected in hydroelectricity, whose juridical scheme is strongly connected to planning or assessment and to the implementation and operation of hydropower projects. These imply, in the majority of cases, modifying or altering natural waterways, the construction of large-scale hydraulic works, utilisation of the water resource (either by storing it behind dams or by directly taking advantage of the motive force of the waterway), the use of land that does not belong to the project owner and environmental impacts that surround these projects.

Second, the Chilean legal system plans regulation by sector for each one of the aspects, requirements and impacts associated with a hydropower project. Such regulations arise from the very same norms that comprise the institutional side of water rights, energy rights and environmental rights.

Third, the assessment and implementation stages for hydropower projects are marked by an 'authorisational' relationship between the project owner and the empowered bodies of Government Agencies. The first seeks from the second the respective permissions for implementing a hydropower project. Meanwhile, prior to issuing said permissions, the authorities must verify whether they do or do not follow the requirements that the law sets out (primarily, the lack of harmful or damaging impacts to third parties or the environment).

Lastly, once the authorisations are granted, during the operations stage of the hydropower project in question, a true coordination scheme is put forth both for the water sector (through the supervision committees) as well as for the energy sector (through the Independent Coordinator of the National Electricity System). At the same time, verification of the elements needed to operate the hydropower project is done from a position of supervision and oversight in permissions granted by the authorities, and if need be, any behaviour that is not in compliance can be penalised.

²⁴ *Ibid* 142–43.