Journal of Alpine Research | Revue de géographie alpine

96-1 | 2008

Les barrages : vers de nouveaux enjeux pour la montagne

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Electronic version

URL: <https://journals.openedition.org/rga/416>

DOI: 10.4000/rga.416

ISSN: 1760-7426

Translation(s):

Politique régionale et ressources hydroélectriques - URL : <https://journals.openedition.org/rga/409> [fr]

Publisher:

Association pour la diffusion de la recherche alpine, UGA Éditions/Université Grenoble Alpes

Printed version

Date of publication: 15 March 2008

Number of pages: 79-90

ISBN: 978-2-200-92500-0

ISSN: 0035-1121

Electronic reference

Franco Romero, "Regional policy and hydroelectric resources", *Journal of Alpine Research | Revue de géographie alpine* [Online], 96-1 | 2008, Online since 24 June 2009, connection on 08 December 2022.

URL: <http://journals.openedition.org/rga/416> ; DOI: <https://doi.org/10.4000/rga.416>

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Regional policy and hydroelectric resources

The case of a Swiss Mountain Canton

Franco Romerio

EDITOR'S NOTE

Translation: Luc Gueriane, Durham, UK

- 1 Ticino is an Italian speaking Swiss canton situated in the South of the Alps. An idea marked its history from the end of the 19th century: valorising hydroelectric potential in the canton's interest. The stakes, that presented themselves differently in time, include economic development, fiscal perception, electricity supply and environmental protection.
- 2 In order to valorise hydroelectric potential, the canton firstly backed water concessions to private, public and mixed electricity companies rooted in Ticino and in German speaking cantons. Later, it opted for water cantonalisation, through the creation of its own company, Azienda Elettrica Ticinese (AET). Cantonalisation was justified on the basis that water represents a public property and electricity supply, a public service. A more recent argument raises the usefulness of maintaining decision centres under the canton's control, on the basis that electricity companies can play a crucial part in regional economic development.
- 3 Ticino's economic policy was greatly influenced by the organisation of electricity markets and the configuration of networks. Until recently, markets were structured according to a monopolistic model. Access to networks was subject to owners consent. For the canton, there was notably the problem of managing the electricity surpluses and deficits. The passage from a monopolistic system to a competitive one, as well as the adoption of the principle of third party access to networks, open interesting perspectives but introduce new risk.

- 4 Electricity caused significant political conflicts in Ticino, between supporters and opponents of cantonalisation, and more recently of the opening of markets to competition. Intense controversies characterised discussions on the choice of goals, when seeking to prioritise economic, fiscal, energy and environmental objectives. Relations between the canton and extra-cantonal electricity companies also experienced frictions. The same applied between the canton and towns and villages involved in hydroelectric exploitation, to the extent that some united with extra-cantonal companies in an attempt to block the canton's plans.
- 5 This article analyses the technico-economic factors that influenced electricity policy in Ticino and highlights the room for manoeuvre that cantonal political authorities were able to use. Political choices were evaluated on the basis of the following criteria: electricity supply security, environmental protection and socio-economic development of the canton. The objective is to identify the critical factors that should be taken into consideration when defining regional policy on hydroelectric matters.
- 6 The problem is extremely important to mountain regions of developed and developing countries looking to valorise their hydroelectric potential in a context often characterised by the opening of markets to competition and privatisations. The interest of our study resides in the fact that it provides a long term perspective. Furthermore, the geographic, economic and political particularities of Ticino allow us to clearly define the area studied and highlight external relations.
- 7 The sources used to carry out this study are represented by the reports of the federal and cantonal government, the reports and minutes of the cantonal parliament, the studies published by the public administration and the electricity sector from the end of the 19th century to date. Our publications provide details on sources and references used (Romerio, 1985, 1994a). Bibliography on electricity in Switzerland is extremely vast. The books cited as references represent an introduction to the subject (Beltz, 1996; Gugerli, 1996; Paquier, 1998; Romerio, 1994b, 2007).
- 8 The article is organised in the following manner: first, we outline the institutional and economic frame for hydroelectric exploitation. Then, we evoke socio-economic and environmental impacts. The main part of the paper is devoted to a historical analysis, from the end of the 19th century to 2007. The analysis of the recent situation allows us to consider future perspectives, before concluding with the critical factors of regional policy in the hydroelectric domain.

The institutional and economic framework facing the end of monopolies

Federalism and water concessions

- 9 The federal hydropower act of the 22nd December 1916 is a framework law that preserves the sovereignty of cantons and defines the water concession system. The cantonal act on the use of water of the 17th May 1894, replaced by that of the 7th October 2002, rests on the same concepts. Federalism and the concessions system characterise hydro-electric exploitation in Switzerland. The concession determines the rights and obligations of the electric company. In principle, it lasts for 80 years. Article 43 of the federal act states that "once granted, the right of use cannot be rescinded or

restricted except for reasons of public utility and upon indemnification". The concession thus creates vested rights.

- 10 Concessions cannot be called into question by the opening of markets to competition. This represents an obstacle for the dynamics in progress; at the same time it is a guarantee for the canton, notably in the case where the concessionary company would have to change ownership. However, with developments in laws of competition, it is not granted that in the future, public authorities attribute concessions as they did before.

Monopoly and competition

- 11 Until recently, the electricity market structure had a monopolistic character. Local distribution companies and a private company controlled the market in their respective areas of influence. They managed low and medium tension networks. The cantonal market and its high tension networks were controlled by ATEL (a private company based in the German part of Switzerland), before passing over to AET. The very high tension interconnection between the canton and national and international markets depended on ATEL, which assured network regulation for the entire canton.
- 12 This system is undergoing profound restructuring with the opening of markets to competition and the adoption of third party access to the network. As it is not possible to describe these reforms in this paper, it is useful to recall an element that allowed AET to expand its sphere of activity: the handing over by EGL, which had a profile of a competitor to ATEL on the Swiss market, of a certain transport capacity on its national and international interconnection. Access to the network and to extra-cantonal markets is fundamental in the valorisation of the hydroelectric energy produced in the Alps.

The impacts of hydroelectric exploitation

On the regional economy

- 13 The electricity sector represents an important economic activity for Ticino. Qualified jobs have been created in both technical and commercial domains. The availability of electricity at reasonable prices contributed to making local industry a little more competitive. Collaborations with innovative industries were experimented with, in the field of hydrogen for example. One should also consider that this sector allowed the realisation of road infrastructures in mountain valleys.
- 14 For public authorities, the electricity sector represents an important source of revenue. The water tax that the concessionary has to pay the canton in return for exploiting a water course can reach 50 euros (80 CHF) per KW installed. It is defined by the Federal parliament on the basis of a compromise between mountain cantons, lowland cantons and electricity companies.

On the environment

- 15 The impacts on landscapes and watercourses of hydroelectric exploitation, that are often overlooked, have given rise to numerous protests. The historian R. Ceschi recalls

for example the reflections of A. Gnesa, an inhabitant of Val Verzasca, who compared "the material benefit measured in kilowatts to the spiritual well being dispensed by the natural untouched beauty of the valley" (cf. Giannoni et Jakob, p. 31). She opposed a damn that was activated in 1967. Paradoxically, Anna Gnesa suggested resorting to nuclear energy in order to protect the mountain's valleys.

- 16 Significant damage was provoked on the Brenno River during the drainage of Luzzone in 1985: 250 000 m³ of mud was dumped and the river's turbidity reached very high levels. However, it is the question of residual water flows that caused the strongest controversies. For a long time, the law did not foresee specific norms in this respect. The federal act on the water protection of the 24th January 1991 filled a gap without however, changing the situation; it can not be applied retrospectively due to vested rights. If it were applied, electricity production for the canton could reduce by approximately 10%.
- 17 The cantonal act on water use was completed by an article concerning residual flows in 1976. The problem of vested rights posed itself again here. As for water concessions, the act has no precise rules in this respect. Negotiations with electricity companies lead to numerous improvements as of the 1960s.
- 18 The history of hydroelectricity is marked by a number of very serious accidents. For example, the 9th October 1963, a landslide in the Vajont dam in the North of Italy caused a huge wave that destroyed several villages, causing 2'000 deaths. The echo of this tragedy in a canton that had just constructed huge damns, where a considerable number of immigrants from that very same region of Italy worked, was enormous. The local papers from the 11th and 12th October 1963 described "the thousands that disappeared under a sea of mud and gravel" and stating that "grave responsibilities were emerging". However, this type of risk, supervised by the federal services through an ordinance adopted in 1957, never really concerned the population.

The succession of concession modes from 1905: between cantonal, national and international strategies

Early 20th century: the concession of Biaschina

- 19 The first significant concession dates back to 1905 and concerns the waters of Biaschina (30 MW). It was granted to Motor of Baden, a private company, represented by A. Nizzola, who played a fundamental role in the development of the Swiss electricity industry. A few years later, Motor became Motor Columbus and created OFELTI to manage its interests in Ticino; they later gave rise to ATEL in 1933. Other smaller concessions were granted to towns and villages and to private companies.
- 20 The idea of water cantonalisation incited great hope. Cantonal MP G. Cattori stated that "the public ownership would allow the enriching of balance sheets, economic development and stimulate industrialisation" (Ticino Parliament minutes (PM), Spring 1904,
- 21 p. 354). It did not materialise as towns, villages and privately owned companies were already organising the electricity distribution service, and Motor offered an industrial project combining the exploitation of Biaschina's waters with the creation of a small

industrial centre in Bodio. Furthermore, during the war, the industries of this village of Levantine worked for the Germans, to the extent that London's secret services were monitoring their activities.

- 22 The concession of Biaschina prohibited the exportation of electric current outside the canton. In the case of the concessions granted to the Swiss Railways, it was even requested that the electricity production be used solely on the Ticino section of the Gothard line, "including the Airolo-Göschenen tunnel", that links Ticino to the German part Switzerland (PM, Spring 1906, p. 713).
- 23 It can be said that at the beginning of the 20th century, concessions were granted taking into consideration the perspective of the canton's economic development. Regarding the environment, in the case of the debate on demand for the Biaschina concession, it was noted that "electrochemical industries could produce negative exhalations and waste" (PM, July 1905, p. 636). Furthermore, a terrible explosion provoked the destruction of the Nitrum factory in Bodio on the 21st July 1921; 16 workers lost their lives.

Between the two wars: the Piottino concession

- 24 The second big concession concerns the waters of Piottino (45 MW), that were granted to OFELTI in 1928 for a 40 year period. In 1933, when the installation was brought into service, the concessionary was on the brink of bankruptcy. After the First World War, the crisis had in effect hit the canton's economy. Exportations to Italy were unable to develop, due to the creation of new production facilities in this country and restrictions imposed by Rome. Exportations in the North of the Alps were made possible by the realisation of the Gothard high tension line in 1933, without however experiencing a significant expansion, due to the market's saturation. Political authorities no longer objected to exportations, such that a message from cantonal government on the 20th February 1933 states that "energy exchanges over large distances have become a fundamental condition for prosperity" (PM, Autumn 1933, p. 391).
- 25 Economic perspectives did not make partisans of cantonalisation convincing during the granting of the concession. Furthermore, "hidden powers" must have presented an obstacle to the public ownership option, in fact cantonal government stated that "when things were well on their way [with Italian investors], contracts were ruptured because of influences that cannot be detailed" (PM, Spring 1927, p. 43).
- 26 Piottino did not lead to the creation of new industries. This represented a failure, evermore so given that the market did not offer new prospects for production. Motor Columbus, in allowing OFELTI to realise the Piottino development, in building the Gothard line and creating ATEL, was able to see beyond the period's economic difficulties.
- 27 At the time, environmental problems were not given much consideration. The first Piottino concession project had a number of unique elements to it. It was anticipated that "concessionaries must respect a residual water flow of 200 liters/second even during dry times". If, however, new industries were created, measures should have been adopted "in order to avoid the pollution of agriculture and of landscapes" (PM, Spring 1927, p. 10).

The war years: the Lucendro concession

- 28 In 1942, a third large concession was granted to ATEL: concerning the waters of Lucendro and Sella, allowing the creation of a power plant of 45 MW, equipped with two artificial lakes. The economic revival, provoked by the start of the Second World War, had stimulated electricity demand. During the cold and dry winters, national supply was no longer guaranteed. The concession was granted with very little discussion, due to the war economy and the projects characteristics, that experts had qualified as "inspired yet costly".

Immediately after the war: the Maggia and Blenio concessions

- 29 In March 1949, Parliament approved the Maggia concession (570 MW), and in November 1953, that of Blenio (396 MW), to two companies, OFIMA and OFIBLE, that brought together Ticino canton, ATEL and electricity companies belonging to cantons and towns of the German part of Switzerland. In 1949, MPs from all parties, including the communist opposition, congratulated themselves along with the cantonal government, notably N. Celio, who became president of the Confederation, on the skill with which they negotiated the Maggia concession. Cantonal MP E. Zeli, stated that "Today's vote represents an exceptional part of our canton's history and most importantly after the opening of the Gothard railway" (PM, Autumn 1948, p. 408). In 1953, the Blenio concession was approved with a little less enthusiasm, yet without real opposition.
- 30 Criticism did not however delay to appear, with the publication in 1956 of a pamphlet by F. Pedrini, ex cantonal MP and federal judge. It was characteristic of the political debate that followed for the next thirty years, and rested on the following points:
- The duration of the concession, 80 years, without a repurchase option: which would have allowed the renegotiation of concessions after 40 years, but the necessity to amortise several millions of francs did not facilitate the acceptance of such causes by partners.
 - The canton's participation limited to 20% of the share capital: however, it must be recognised that it was difficult for the canton to find outlets even for this quota; furthermore, this solution allowed to share out the risk of the investment, whilst profiling the canton as an electricity producer.
 - The system of taxation of OFIMA and OFIBLE: in principle, these companies did not make any profits, given that production is obtained at cost price. In order to avoid total escape from the canton's tax department, they are made to declare an artificial profit, determined by the market's interest rate applied to the share capital. This offers the advantage of guaranteeing the canton tax revenue, but the disadvantage of not reflecting the true market value of the energy produced, hence objections.
 - The absence of rules forcing the companies to create industries in the region: on this point it should be noted that the production of Maggia and Blenio is predominantly peak energy, and does not lend itself to metallurgic or electrochemical supply, that requires base-load energy.
 - The absence of standards on residual water flows, of which the effects were described most powerfully by the writer P. Martini, an inhabitant of the Maggia Valley: "When a

little water runs beneath the bridge of Visletto – he wrote in 1957 – it sounds like a cow urinating right along a course" (Giannoni et Jakob, p. 41).

- 31 In order to understand the period's hydroelectric policy, it is useful to recall that in the immediacy after the war, the national market was faced with a shortage of electricity, but it was difficult to know how things were to evolve through time. The Italian market could not represent an outlet to installations created in Switzerland, as this country found itself in a precarious situation. In Ticino, existing installations were meeting cantonal demand. Furthermore, the Swiss electricity sector had consolidated itself and was not open to new entries, such as the Ticino canton.
- 32 We can say that in this context, the canton attempted to take advantage of the necessity to create large power stations in Switzerland in order to valorise Ticino's hydroelectricity potential. The Maggia and Blenio investments were conceived in view of exportation to the German part of Switzerland. The resentment of the valleys' inhabitants that followed, can be understood notably in the fact that on the contrary to the cases of Biaschina and Piottino, where populations had already been opened up by the creation of the Gotthard railway line in the 19th century, the populations of Maggia and Blenio had never been faced with infrastructures of national scope (fig. 1).

Figure 1. Main hydroelectric power plants and medium and high tension lines, Ticino, 2000.

The 1950's: the creation of a cantonal company

- 33 The Biaschina concession incorporated a repurchase option after 40 years. It reached its term in 1951. The canton was in a position to lay the foundations to water cantonalisation. In this perspective, a cantonal electricity company had to be created. The question gave rise to the century's most heated political debates. Supporters were

inspired by political movement in several European countries, which lead to the nationalisation of the electricity sector in the immediate after war period (Bolchini et Castronovo, 1989), demanding the pure and simple cantonalisation of the Biaschina waters. The cantonal government on the other hand defended a less radical approach and sought a partnership with the ex concessionary (ATEL). The canton's Parliamentary special commission stigmatised the fact that "the message [from the government] was characterized by a pessimistic vision of the situation", and "is reticent with regards to the advantages of the public ownership of the waters" (PM, Autumn 1958, p. 223). Airolo and Lugano's councils attempted to block the cantonalisation project because they favored relations with ATEL. Parliament approved the repurchase of Biaschina on the 23rd December 1958; the law establishing the canton's company (AET) was approved in June that same year.

- 34 The repurchase of Biaschina brought to light an underlying political divide between those who thought that the only way the canton could prosper was through water cantonalisation, and those who, on the other hand thought that a partnership with ATEL would have given them greater hope. The future brought to light the opportunities presented to the canton by AET, and at the same time the difficulties of operating in a market dominated by the incumbents.

From the beginning of the 1960's to the end of the 1990's: the development of the Cantonal Company

- 35 With the economy as it was in the 1960's, the canton found itself confronted by a strong increase in electricity demand (fig. 2). The AET's availability, having the responsibility of the canton's supply, can be resumed as follows:
- The Biaschina and Piottino facilities, cantonalised respectively in 1958 and 1972 (with a total of 195 MW including the modernisation of Biaschina);
 - the Verzasca facility, realised by AET and Lugano through to a concession granted 1959 (105 MW);
 - other minor hydroelectric facilities (23 MW);
 - the canton's share of Maggia and Blenio production, from the 1980's onwards, when cession contracts between the canton and it's partners expired (193 MW);
 - the nuclear power stations of Bugey, Cattenom and Leibstadt's participation, acquired between 1972 and 1985 despite antinuclear opposition (in total 45 MW);
 - a contract with ATEL as from 1988 (60 MW).

Figure 2. Electricity generation and consumption, Ticino, 1910-2006.

- 36 It should be noted that in 1988 the cantonal parliament chose not to act upon the repurchase option for Lucendro, because of the legal difficulties caused by the fact that part of the waters depended upon the canton of Uri.
- 37 AET experienced serious difficulties during this period, particularly between the 1960's and 1970's, which lead to very poor financial results. In effect, it was obliged to dispose of its surpluses and cover deficits on markets controlled by ATEL and EGL. F. Zorzi, member of the cantonal government, resumed the problem as follows: "he who owns the network is practically the master of he who doesn't find himself in this situation and is obliged to accept the conditions that are imposed on him" (PM, Spring 1960, p. 415).
- 38 The cantonal company's mediocre results were also due to relatively low tariffs, conceived to favor the local economy. The consequences were deceiving however, to the extent that the large metallurgic factory Monteforno, situated near Bodio, which had benefited from AET's assistance, closed its doors in 1994.
- 39 These problems caused turbulent political debates, which were not only looking to determine responsibility, but were also used as ammunition for both right and left wing factions.

The cantonal company facing the opening of markets to competition and its future

From 1998: the opening of markets

- 40 Over the years, AET became a very important company for the canton. As the opening of markets to competition took shape, a new generation of manager rose to the challenge by attempting to take advantage of the opportunities that it brought, notably in playing a much more active role on Swiss and European markets. Profits rose in an impressive manner. The company's strategy became the maintenance of a decision

making body of great importance in the canton, the creation of a competence magnet in commercial matters, the assurance of supply security, the valorisation of hydroelectric resources and the search for synergies with innovative industries.

- 41 A certain opposition to the new AET's management organised itself however. Many are wary of privatisation, even though no plans were made on this subject. Confrontations between different political factions had repercussions on the cantonal company. Management resisted, whilst following political debates closely. Conflicts between the canton and towns and villages reemerged. Airolo attempted to create alliances with other villages in order to prevent the canton from repurchasing the Calccaccia waters (3,7 MW), for which the concession was reaching expiration. Lugano's electricity company, on the other hand, bought shares in Motor Columbus, which controlled ATEL, and joined a group comprising notably Electricité de France. This decision contrasted AET's strategy that focused on independence.
- 42 The needs to dispose of a more abundant production lead AET to engage in the following operations:
- Expansion of the Biaschina facility (50 MW);
 - purchase of shares in the hydroelectric facility of Mattmark in Valais (20 MW);
 - participation in different types of installations (small hydroelectric and other renewable energies, gas turbines, coal stations, possible nuclear power stations) in the European Union.
- 43 In order to take advantage of the development of green energy markets, AET joined the "Naturmade" association and the European organisation "RECS" (Renouvelable Energy Certificates). With Rätia Energie (Val Poschiavo), it created Swisshydro for the marketing of hydroelectric production on ecological grounds.

The medium and long term future

- 44 The reorganisation of electricity markets, which has just been ratified by the federal act on electricity supply of the 23rd March 2007, is in the process of radically modifying the problem of valorising hydroelectric resources. The prospect of accessing networks and wholesale markets offers new perspectives to small and medium producers. AET seized the opportunity and is evolving in this environment without underestimating the risks, notably those related to the uncompetitive behaviors of big Swiss and European electricity companies. In the perspective of increasing tensions on energy markets, AET must furthermore optimise its purchases and sales of electricity.
- 45 The canton must prepare for the end of large hydroelectric concessions. One must not lose sight of the amplitude of the phenomenon: between 2030 and 2060, it could repurchase approximately 1 100 MW. Between all the mountainous cantons, approximately 6 500 MW will reach expiration. In this perspective, these cantons should examine any opportunities for convergences allowing the creation of a large alpine hydroelectricity company in the 2050 horizon.

Conclusion

- 46 The study of the experience of Ticino allows us to identify the critical factors that should be taken into consideration when defining regional policies on hydroelectricity

in mountain regions. In order to valorise hydroelectric potential, there must first be great political will. Internecine quarrels between political factions are counterproductive, as are rivalries between cantons, towns and villages and between mountain cantons.

- 47 There must equally be great will and competence on behalf of the electricity sector's management, which must know to strike national and international relations and correctly manage risks related to investments and trade.
- 48 The opening of electricity markets to competition can represent an interesting opportunity to valorise regional hydroelectric resources, through the possibility of accessing networks and wholesale markets. The monopolistic system did not offer this opportunity. The creation of green products represents an asset, in the measure that environmental management rules are developed.
- 49 Electricity companies should belong to a region's local authority, in order to avoid the relocation of decision centers. This does not prevent minority private share holdings or collaborations with external electricity groups that are respectful of their partner's independence.
- 50 Mountain regions must not lose sight of the importance of hydraulic production in electricity supply security. The power provided by power plants with reservoirs is particularly precious in this respect. The perspectives for hydroelectricity are excellent and producing regions must take advantage.

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APPENDIXES

Abréviations

AET : Azienda Elettrica Ticinese

ATEL: Aare-Tessin AG für Elektrizität

EGL : Elektrizitätsgesellschaft Laufenburg

OFELTI : Officine Elettriche Ticinesi

OFIBLE : Officine Idroelettriche della Blenio

OFIMA : Officine Idroelettriche della Maggia

PMTicino canton parliamentary minutes

ABSTRACTS

This article brings to light the different models applied in the management of hydroelectric resources in the Swiss canton Ticino during the 20th century. Future prospects are broached in view of the opening of the electricity markets to competition. We equally analyse political projects, notably regarding matters of water cantonalisation, as well as the technico-economic factors which influence them. Conflicts, that have been particularly acute, are evoked, and socio-economic, energy and environmental issues detailed. The national and international context is pointed out. The study allows the identification of critical factors that must be considered in the definition of regional policies in relation to hydroelectric matters.

Cet article met en lumière les différents modèles de gestion des ressources hydroélectriques adoptés dans le canton du Tessin au XX^e siècle. Les perspectives d'avenir sont esquissées en vue des processus d'ouverture des marchés à la concurrence. On analyse aussi bien les projets politiques, notamment en matière de cantonalisation des eaux, que les problèmes technico-économiques qui les ont influencés. Les conflits, qui ont été particulièrement aigus, sont évoqués, et les enjeux socio-économiques, énergétiques et environnementaux précisés. Le contexte national et international est rappelé tout au long de l'analyse. Cette étude permet d'identifier les facteurs critiques qu'il faut prendre en considération dans la définition des politiques régionales en matière hydroélectrique.

INDEX

Mots-clés: hydroélectricité, concession d'eau, ouverture à la concurrence, politique régionale

Keywords: hydroelectricity, water concessions, opening to competition, regional policy

Geographical index: Ticino

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