

Rationalising Territorially Dispersed Consumption: The Projects of Fernand Courtoy for the Electricity Production and Distribution of Belgium

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keywords: Fernand Courtoy, utility systems, electricity production and distribution, Belgian planning history, dispersed urbanisation, industrialisation

1. Introduction

In the history of the Belgian electricity production and distribution, Fernand Courtoy takes an important, but somewhat peculiar position. In his quest to find an efficient organisation of the Belgian electricity supply, his starting point is that of an engineer in an industrial company that is at the same time bulk consumer and self-producer. This is a completely different point of departure than that of companies that only produce electricity to sell it to others and differs as well from the politico-economic, ideological motives of politicians. Both of these other motivations had, however, dominated the debates on the organisation of the Belgian electricity supply around the turn of the 20th century. Courtoy's insights as an engineer and his ability to repeatedly manoeuvre himself central in the decision-making process speak of his tactical skill as well as of his knowledge of a wide range of aspects concerning the production of electricity. Particularly remarkable is his adherence to a vision he set out early in his career and which he coherently elaborated across different contexts and scales during the following decades. Studying the endeavours of Fernand Courtoy therefore provides a unique insight in the inner workings of the changing electricity sector of the interbellum and in the territorialisation of the Belgian electricity production and distribution.

Specific to the Belgian context is the territorial condition in which the electrical infrastructure was implemented. Already before the effective appliance of electricity, a spatial policy was pursued that favoured the strong dispersion of activities, people and functions. Embedding the electricity supply in this context of dispersal at first led to a lot of small-scale electricity production facilities being installed. With the increase of the energy demand and the technical possibilities of large-scale electricity production, new ways of dealing with this condition had to be sought that could organise the production and distribution of electricity on a bigger scale. Courtoy's plans are characterised by a careful balance between the accumulation of electricity production, the distributed production capacity and the dispersed energy consumption. The different conceptions of the role of electricity within the economic logic of other types of producers and consumers, however, resulted in other territorial strategies. Between the two world wars, several projects were undertaken to search for an efficient national organisation of the electricity sector that had to cope with these divergent approaches. In these projects, Courtoy would be actively involved.

In 1907, Fernand Courtoy graduated from the *Institut électrotechnique Montefiore* in Liege.¹ This prestigious institute was established in 1883 as one of the world's earliest academic institutions that offered advanced courses in electrical engineering.² Before this specialisation, he had studied mining engineering at the *University of Liège* where he was also briefly employed as an assistant. After his studies he started working at the *Société Anonyme d'Ougrée-*

¹ Bertrams, K., Un partenariat à double facette? Milieux académiques et industriels dans le secteur électrique belge (1880-1940). *Annales historiques de l'électricité* 5, no. 1 (2007): 41.

² *ibid.*, 39-42.

Marihaye, one of the numerous coal mining companies in the Liege basin that was as well a major iron and steel producer.³ In this company Courtoy became the chief responsible for the electrical equipment. It was within this context that he would become interested in the efficient – in his words ‘economical’ or ‘rational’ –, industrial production of electricity.

In 1927, this interest would lead to his proposal for the organisation of electricity production on the national level. A proposal that was elaborated within the framework of a commission initiated by the national government. Before being appointed reporter of this commission, however, Courtoy had already seen the chance to develop his vision on several other occasions. Moreover, the 1927 report would not turn out to be the endpoint for Courtoy. His proposal would cause vivid debates within the electricity sector which, together with political turmoil during the 1930’s, made that the actual tackling of the issues addressed by the commission would be severely delayed. In the meantime, several of the report’s guidelines had been overtaken by events or were renegotiated.

2. Clustering the Production Facilities in the Liege Basin

Many of the ideas in Courtoy’s national plan can be traced back to his realisations in the Liege basin. Also Courtoy himself would refer to these accomplishments throughout the whole of his career. Arriving at *S.A. d’Ougrée-Marihaye*, the engineer found electrical equipment, used as well for the production of electricity as for its appliance in manufacturing process, dotted all over the several plants within the extensive and non-contiguous area that was conceded to the company. The 1906 map compiled by the *Administration des mines* shows six locations with ongoing mining activities,⁴ while in 1905 a fifth blast-furnace was constructed and there would be eight of them operational at the dawn of the First World War. This situation was the legacy of the company’s long history filled with takeovers and merges and gave rise to a distributed deployment of means and resources.⁵

For the production and use of electricity this was an ineffective organisation, in technical and economic terms. At several location dispersed over the company’s ground, different small-capacity production units had to be installed together with standby units to replace them in case of breakdown. Connecting the different production units in parallel in an electricity grid, while changing some of them for more efficient units with a higher production capacity would be more advantageous. Furthermore, such a set-up would also considerably diminish the needed number of backup units and would allow for a more concerted operation of the combined production equipment.⁶ Technically, such an organisation was not easy to realise, however, as the electricity production equipment of the company existed out of different types of machinery (with their own characteristics concerning frequency, cyclical regularity, adaptability, ...) which had to be adjusted to each other. In addition, a system for the management of the grid had to be devised. Nonetheless, Courtoy set out to fulfil this task of coordination and succeeded to establish the small-scale grid of *Ougrée-Marihaye* by 1911. This grid had an unprecedented

³ Courtoy, F., *Production économique de l’électricité dans les régions industrielles*. Liege: Ch. Béranger, 1919: title page.

⁴ Administration des mines, *Carte des concessions houillères* [map]. Bruxelles: Administration des mines, 1906 : sheet 4. [accessible online: <http://tinyurl.com/jj8hcyv>, last accessed 11 August 2016]

⁵ Bussière, E., La sidérurgie belge durant l’entre-deux-guerres: Le cas d’Ougrée-Marihaye (1919-1939). *Belgisch tijdschrift voor nieuwste geschiedenis* 15, no. 3-4 (1984): 304-306.

⁶ Courtoy, F., *Production économique de l’électricité dans les régions industrielles*: 6-8.

technical complexity as it was globally the first operational parallel connection of such diverse types of production equipment.⁷

Although the main challenge in this endeavour had been technological, the engineer realised that even more benefits could be achieved for the electricity production of the company with the construction of a similar set-up on a bigger scale that included more diverse ways for the production of electricity and its appliance. Because of Courtoy's experience at *Ougrée-Marihaye* and the already developed technological solutions, the challenge now became to convince potential partners and to find a form of organisation for the implementation of such a grid.

Besides the arguments of being able to more efficiently use production units with a higher production capacity and the possibility to reduce the needed amount of backup units (or their employment for the raising of the combined production capacity), two more advantages came forward in Courtoy's plea for the connection of production units on the regional scale. First, the mixed activities and working schedules of the different partners could help to ameliorate the load profile of the grid.⁸ The sum of the necessary individual production capacities would lower with a parallel connection because peaks in electricity demand at one location are compensated by lows in demands elsewhere. Coordination of the working schedules could even augment this effect. Second, a more considered consumption of the resources used for electricity production could be thought out. Large, more efficient units powered on coal of low quality or residual gases could provide the bulk of energy production, while diesel units, more expensive per kWh produced, could be started up quickly during peak demand (figure 1).⁹ At the scale of a single factory this was often not feasible as production technologies (and their combustibles) were often adapted to more specific energy cycles which resulted in more expensive electricity.

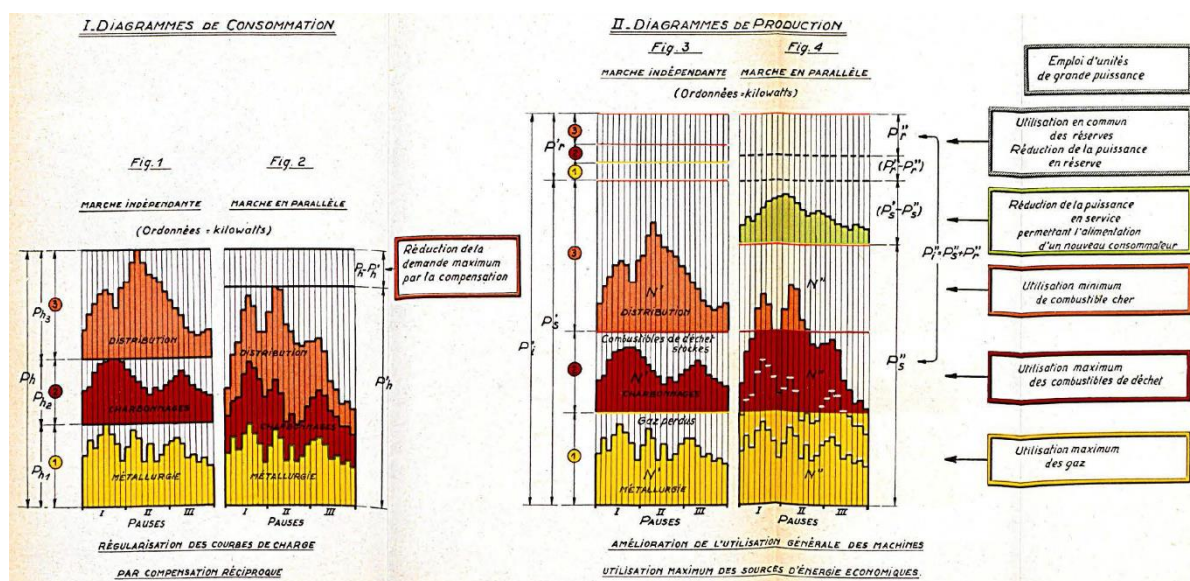


fig. 1 – independent and combined load diagrams; the benefits in regard of the total load and the amount of production units.

(source: Courtoy, F., *Les groupements de centrales électriques en Belgique: Philosophie des groupements, Materialité et économie des opérations réalisées*. Brussels: Union des Centrales Électriques du Bassin de Liège, 1940: sheet 9.)

⁷ Kurgan - van Hentenryk, G., The Economic Organization of the Belgian Electrical Industry since the End of the 19th Century. In *The Economic Development of Belgium since 1870*, eds. Herman Van der Wee and Jan Blomme, 238-54. Cheltenham: Edward Elgar, 1997. 243.

⁸ Courtoy, F., *Production économique de l'électricité dans les régions industrielles*: 168-190.

⁹ *ibid.*, 73-98.

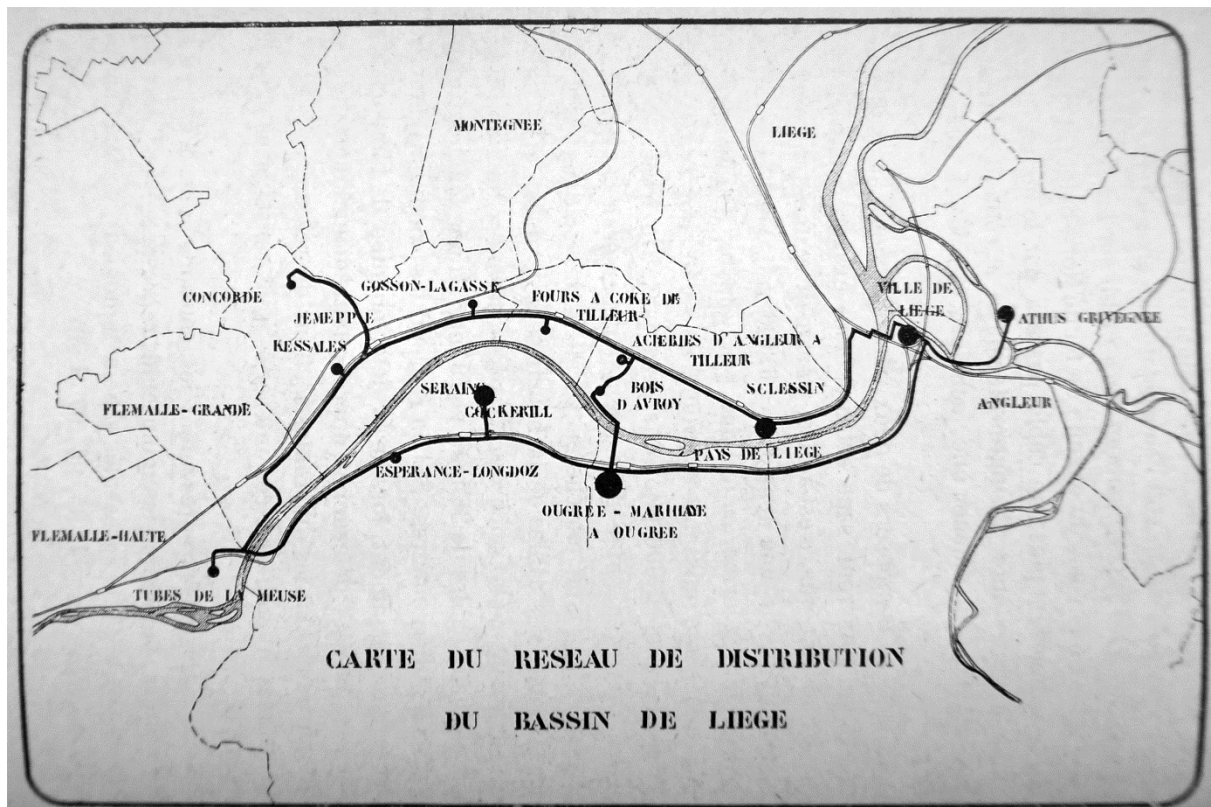


fig. 2 – map of the grid of the UCE.

(source: Courtoy, F., *Production économique de l'électricité dans les régions industrielles*. Liege: Ch. Béranger, 1919: 204.)

The Liege basin was very suitable for such a clustering ('*groupement*') of electricity generation plants. Around the city and along the borders of the river Meuse, a lot of heavy industry was concentrated, mainly in the metallurgic and coal mining sectors. For these companies, the self-production of electricity seemed obvious since many of them traded in coal or fabricated residual products that could be used for energy production such as low quality coal, heat or residual gases.¹⁰ A strong demand for energy in their actual production processes and this wealth of resources made that the different companies all had their own electricity production facilities. Moreover, the rhythm of the coal mining industry differed from that of the production of steel.¹¹ Together with the specific load profile of the public electricity companies (mainly destined for lighting, agriculture and private use) this resulted in a sufficient variability enabling the obtaining of considerable benefits by the balancing of the load in a shared grid.

Almost directly after the completion of the *Ougrée-Marihaye* network Courtoy secured the support and cooperation of several partners in the Liege basin (figure 2) and started studying the issue more concretely.¹² A first article containing related set-ups abroad and the guiding principles of his proposal was presented and published in 1914.¹³ While the book manuscript of his final result was also ready the same year the First World War halted its publication.¹⁴

¹⁰ *ibid.*, 156.

¹¹ *ibid.*, 182.

¹² *ibid.*, preface.

¹³ Courtoy, F., *Production économique de l'électricité dans les régions industrielles*. *Revue Universelle des Mines de la Métallurgie, des Travaux Publics, des Sciences et des Arts appliquée à l'Industrie* 5th series, vol. II (1914): 1-45.

¹⁴ Courtoy, F., *Production économique de l'électricité dans les régions industrielles*.

Eventually, the outcome of his study would only be published in 1919 and the first parts of the grid only be operating from 1920.¹⁵

Most of the technical obstacles to connect the electric equipment of the various companies could be solved analogously to the *Ougrée-Marihaye* network. New technical challenges were the connection of different types of company grids. Some of these still used a direct current 500 V grid, while the others used three-phase alternating current, all at a frequency of 50 Hz, but with different voltages ranging from 2100 V to 6300 V. To combine these characteristics into a single, ‘universal grid’¹⁶ Courtoy designed three types of substations in which the electricity current would be transformed from the characteristics of the individual companies to those of the three-phase transportation grid running at 50 Hz and 6300 V (and vice versa).¹⁷ Furthermore, the substations and the transportation lines were equipped with the necessary safety mechanisms in order to contain and diminish the damage in case of accident or failure.¹⁸

The production of electricity and the coordination of the grid was dealt with centrally. To do so Courtoy made use of a system he had encountered during his study of the electricity grid of Durham and Northumberland.¹⁹ A central office was connected by telephone to all of the different electricity production facilities and also received information from signals and sensors all over the network. By studying the load diagrams and the state of the network, technicians were able to manage the many electricity production units almost in real-time. From this coordinating office, orders to put into action, halt or regulate the charge of the individual units were sent around the grid, guaranteeing the system’s proper functioning.

The main difference between Courtoy’s proposal and the NESCO-grid in Durham and Northumberland was that the latter’s production stations belonged to a single firm.²⁰ For the Liege endeavour it would be crucial that every of the associated companies could pursue its own corporate policy except for their electricity production. This had to be managed as if it belonged to a single firm. Therefore, some very clear rules did apply in this sector: First, the associated companies could not sell or buy electricity outside the organisation. Second, immediate and ‘absolute obedience’ to the directives of the coordinating technicians was imperative. The association would be formed as a cooperative society with the full use of the member’s production facilities and an equal share of the costs needed for the construction of the network as requirements for accession. The cooperative was directed by delegates of the different factories and was called *Union des Centrales Électriques du Bassin de Liège*, often abbreviated as UCE.²¹

The main task of UCE was to provide electricity to its stakeholders at the lowest price possible. For the exchange of electricity between associated companies Courtoy devised a complex method to determine the price based on a mediation of the apparent and the real benefits of both the producer and consumer in accordance with the specific situation in which the electricity was exchanged.²² Later on, he would develop a simpler method he called ‘EREFKA’. This method took into account the aspects of depreciation and interests of the equipment (r), the fixed

¹⁵ Courtoy, F., *Les groupements de centrales électriques en Belgique: Philosophie des groupements, Materialité et économie des opérations réalisées*. Brussels: Union des Centrales Électriques du Bassin de Liège, 1940: 24.

¹⁶ see Hughes, T.P., *Networks of Power: Electrification in Western Society, 1880-1930*. Baltimore: John Hopkins University Press, 1983: 122-125.

¹⁷ Courtoy, F., *Production économique de l’électricité dans les régions industrielles*: 198-205.

¹⁸ *ibid.*, 212-214.

¹⁹ Courtoy, F., *Production économique de l’électricité dans les régions industrielles*: 6-9.

Courtoy, F., *Production économique de l’électricité dans les régions industrielles*: 141-145 & 214-215.

²⁰ see Hughes, T.P., *op. cit.*: 443-460.

²¹ Courtoy, F., *Production économique de l’électricité dans les régions industrielles*: 277-284.

²² *Ibid.*, 250-276.

production costs (f) and the price for the combustibles that varied with the load on the production unit (k).²³ In order to fulfil its principal task UCE could as well sell electricity to third parties and enrol activities related to the production of electricity. Financial profit made from these activities could be invested in the union or be paid out to the associated companies.²⁴

3. Engineering the Electricity Legislation

The establishment of the UCE was the first of such cooperative associations in Europe²⁵ and proved to be highly successful. For a large part this was because of its location that was very favourable with its concentration of industrial activity. None of this could have been realised, however, without the consent of the municipality of Liege. The city, just as any other Belgian municipality, had to grant access to its municipal roads for the construction of the transportation and distribution lines of electricity. Without municipal permission only private property and the sides of provincial or national roads and railroads could have been used. Municipal refusal would have made it almost impossible to construct the network Courtoy foresaw.

Most of the time, municipalities did not bother much about the usage of their roads. Yet, the road permissions formed the backbone of a concessionary system that reserved the use of the municipal infrastructure to specific actors for specific purposes.²⁶ Many cities and villages had already granted a concession for the distribution of electricity to a private firm, or sometimes the exclusive right to distribute electricity was automatically included in a gas or (public) lighting concession. Once such a concession was granted, these concessionaires could contest the construction of other electricity networks (that crossed municipal ground), or could demand a compensatory fee.²⁷ Industrial self-producers with establishments across the same road could legally be denied the crossing of that road for their electricity distribution.²⁸ In the case of Liege, an additional advantage for Courtoy's plan was that since 1913 the city's electricity distribution was provided by a public company.

Because of this concessionary system a type of electricity producers different than that of the industrial self-producers had emerged. Since they combined the activities of electricity production and distribution, they were referred to as 'producer-distributors'. After establishing a production unit, these companies attempted to obtain a sufficient amount of concessions in order to assemble an area in which they would have the exclusive right for electricity distribution. The territorial strategy of the producer-distributors was in line with Belgian spatial policy. This policy was aimed at the dispersal of industrial activities and people all over the national territory instead of its concentration in urban cores. By the demarcation of regional monopolies producer-distributors were able to accumulate the necessary volume of consumption. Because of the national policy of dispersal such a volume was, except at some historical urban cores, unavailable at a single location.

²³ Courtoy, F., La tarification "EREFKA": Son application au règlement des échanges dans les groupements de centrales électriques. *Revue universelle des mines etc* 7th series, vol. XI, no. 2 (1926): 58-68.

Courtoy, F., *Les groupements de centrales électriques en Belgique*: 47-54.

²⁴ Courtoy, F., *Production économique de l'électricité dans les régions industrielles*: 277-284.

²⁵ Kurgan - van Hentenryk, G., *op. cit.*, 243.

Brion, R., and Moreau J.L., *Tractebel 1895-1995: Les métamorphoses d'un groupe industriel*. Antwerp: Mercatorfonds, 1995: 156.

²⁶ Maes, R., *De overheidsbemoeiing op het gebied van de elektriciteitsvoorziening in België*. Brugge: Die Keure, 1967: 23-26.

²⁷ *ibid.* 3.

²⁸ De Jonge, S., De elektriciteitssector in België: Van gemeentelijk tot partikulier monopolie? De totstandkoming van de wet op de elektriciteitsvoorziening van 10 Maart 1925. *Belgisch tijdschrift voor nieuwste geschiedenis* 16, no. 3-4 (1985): 372-374.

Both the industrial consumers, a part of which produced its own electricity, and the municipalities looked warily upon the producer-distributors. The regional scale on which these companies operated sidelined the latter, because collaboration between municipalities was prohibited. Later on, this was remedied by provincial initiatives and the 1922 law on intermunicipal cooperation.²⁹ By then, the producer-distributors had, however, already established themselves quite firmly. The industrial consumers from their part believed that the lack of competition caused by the monopolies caused prices to be artificially high. Also the restrictions on the use of their self-produced energy remained to be a thorn to their side. Certainly the heavy industry was concerned about its dependence to the producer-distributors for a resource this vital for the continuation of their production processes.

From the turn of the twentieth century onwards, several of the engineering societies, strongholds of industrial interests, therefore plead for a reform of the concessionary system for the distribution of electricity. In 1906, a parliamentary committee is established that has to research the possibility of a specific legislation for this utility system.³⁰ To defend their position, the producer-contributors found the *Union des Exploitations Électriques en Belgique* (UEEB) in 1911, which develops a counterproposal for the work of this committee.³¹ The First World War then interrupts the work on a legal framework for the electricity sector in Belgium, but when hostilities ceased, the debate continues. New rounds of consultation and new proposals, ranging from a status quo over the total liberalisation to the nationalisation of the electricity production and distribution sectors, succeed one another. In 1922, the law on intermunicipal cooperation is voted, setting aside some of the objections of the local authorities. The same year, the *Associations des Centrales Électriques Industrielles en Belgique* (ACEIB) is established to represent the interests of the industrial producers of electricity.³² Courtoy, by now highly respected for his work on the UCE, was one of the driving forces behind this organisation and would use it as a platform to communicate his views on the legal statute of electricity distribution.³³

On 10 March 1925, the Belgian national parliament finally adopted a law on the distribution of electricity.³⁴ This law could be seen as a compromise between the standpoints of the UEEB and the ACEIB.³⁵ On the one hand, bulk consumers needing a supply above 1000 kW (during a period of a quarter of an hour) were from now on excluded from the concessionary system. The electricity market for these consumers was liberalised and the permissions for the construction of high-voltage power lines were dealt with by the provinces and the state. On the other hand, the producer-distributors maintained their monopoly for all other customers. Municipalities still had to grant road permits for the construction of distribution grids, which from now on also included the use of the national and provincial roads on the municipal territory. For the producer-distributors, the exclusivity of such a distribution network remained an important advantage in the supply of the dispersed industrial activities. Lastly, the parliament recognised the electricity production and distribution as a public utility. As a result, it became easier for the government to actively intervene in the sector and to expropriate land for the construction of electricity grids.

²⁹ Maes, R., *op. cit.*: 16-23.

³⁰ De Jonge, S., *op. cit.*: 374-380.

³¹ *ibid.* 380-384.

³² Brion, R., and Moreau J.L., *op.cit.*: 160.

³³ see for example Courtoy, F., Bases rationnelles d'un statut juridique concernant la production et la répartition de l'énergie électrique. *Revue universelle des mines etc* 6th series, vol. XVII (1923): 173-81.

a list of such articles can be found in Courtoy, F., *Les groupements de centrales électriques en Belgique*: 7-8.

³⁴ Maes, R., *op. cit.*: 69-150.

³⁵ De Jonge, S., *op. cit.*: 384-391.

4. Organising the National Electricity Production

In the closing paragraphs of his study on the electricity grid for the Liege basin, Courtoy argues that the parallel connection of electricity production units can also be achieved elsewhere in the country and that ‘in this way, Belgium would realise an almost ideal mode of electricity production and distribution’.³⁶ He therefore sets the industry a task: ‘Today, let us apply the device of our country: “Union makes strength” [*l’union fait la force*]; Let us cluster our centrals, and we will be able to state that the present work will have as its emblem: “Profit, security and progress in the Union”’.³⁷ Already during the war, Courtoy himself commences to work on this task and, in 1919 – simultaneously with the delayed publication of his study on the Liege basin from which the above phrases are quoted – he presents the outlines for what he sees as the most efficient organisation for Belgium’s (industrial) electricity production.³⁸

Around the same time, Courtoy quits his job at *Ougrée-Marihaye* and establishes the *Bureau d’Études Industrielles Fernand Courtoy* in Brussels. This engineering office offered consultancy to the industrial companies on a wide aspect of issues, among which of course electricity, but was also hired by public instances. For the latter it was involved in the design of local and regional distribution plans as well as strategies for the electrification of whole provinces.³⁹ In 1928, the office also started to publish a monthly (and from 1935 onwards bimonthly) bulletin in which technological advances, legal or economic topical matters were discussed that concerned the industrial sector.⁴⁰ Courtoy himself stayed involved in the installation of the UCE and continued to promote the virtues of this model of organisation. Furthermore, he kept actively lobbying for the interests of the industry in the electricity sector as one of the principal spokespersons of the ACEIB.

When the Belgian government announced the creation of the *Commission Nationale des Grandes Travaux* in order to stimulate the dwindling economy by large infrastructural projects, Courtoy seized the opportunity to once again push for his vision for the national electricity production and distribution. One of the several subcommissions had to research the ‘construction, organisation and exploitation of hydroelectric power plants’ in the hilly south of Belgium. Courtoy was appointed a member of the commission as a representative of the industrial producers, while its other members, Henri Marchal, Maurice Passelecq and Alexandre Wust, all came from producer-distributors.⁴¹ Despite this numerical preponderance, the final report of the commission, written by Courtoy, strongly bears his mark and mainly develops further his 1919 article.

Already in the report’s introduction it is made clear by the commission that the discussion of the application of hydroelectric power has to take into account all other resources for electricity generation. Indeed, the always readily available potential energy stored in the reservoirs could be saved up for moments when the use of more fugitive (residual) resources and their heavy, but inexpensive production units would not suffice. In other words, the planning of the construction of dams requires a vision on the general organisation of the Belgian electricity production.⁴² As a result, hydroelectric power generation was relegated to the margins of the

³⁶ Courtoy, F., *Production économique de l’électricité dans les régions industrielles*: 296.

³⁷ *ibid.*, 295.

³⁸ Courtoy, F., *Avant-projet de réorganisation de la production de l’électricité industrielle en Belgique*. *Revue universelle des mines etc* 6th series, vol. II, no. 1 (1919): 1-45.

³⁹ See for example Maes, R., *op. cit.*: 51-59.

⁴⁰ This publication was called the *Bulletin de documentation du Bureau d’Études Industrielles Fernand Courtoy*.

⁴¹ Brion, R., and Moreau J.L., *op. cit.*: 162-163.

⁴² Commission Nationale des Grands Travaux: Sous-Commission des Barrages-Réservoirs en Ardennes: Question 8° (c-d), *Organisation générale de la production de l’électricité en Belgique*. Brussels: Weissenbruch (1927): 3-4.

research and the main part of the work is concerned with outlining a plan to make the existing electricity production more rational.

A first study of the existing situation revealed that electricity was produced in more than 250 facilities all over the country. These facilities had widely divergent load factors and capacities, worked with varying types of machinery and made use of a range of resources. Most of the production plants were not structurally connected to one another. More or less half of the energy was generated by self-producing industrials and the other half by producer-distributors (figure 3).⁴³

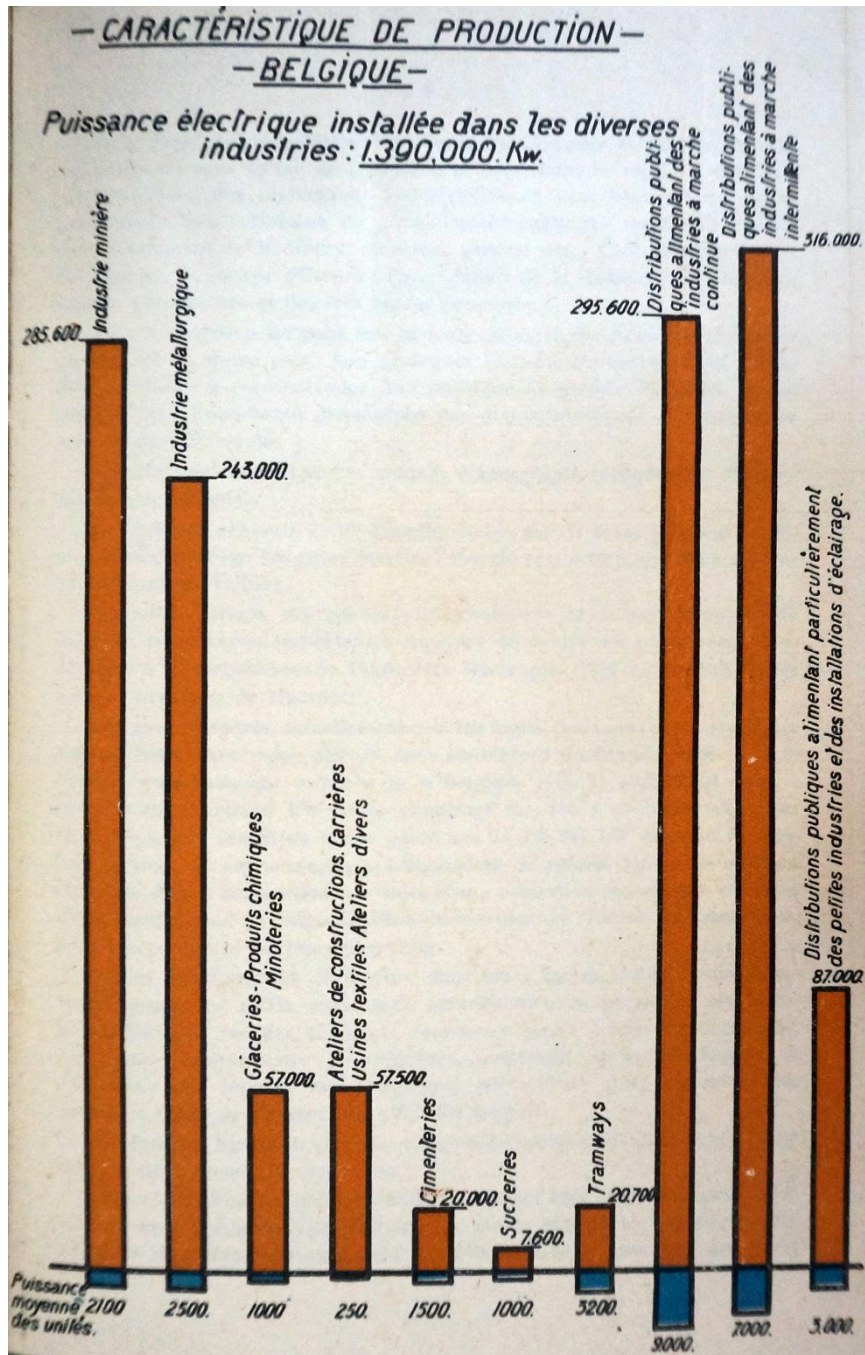


fig. 3 – characteristics of the Belgian electricity production according to the CNGT. (source CNGT, *Organisation générale de la production de l'électricité en Belgique*. Brussels: Weissenbruch (1927): figure 2.)

⁴³ *ibid.*, 8-10.

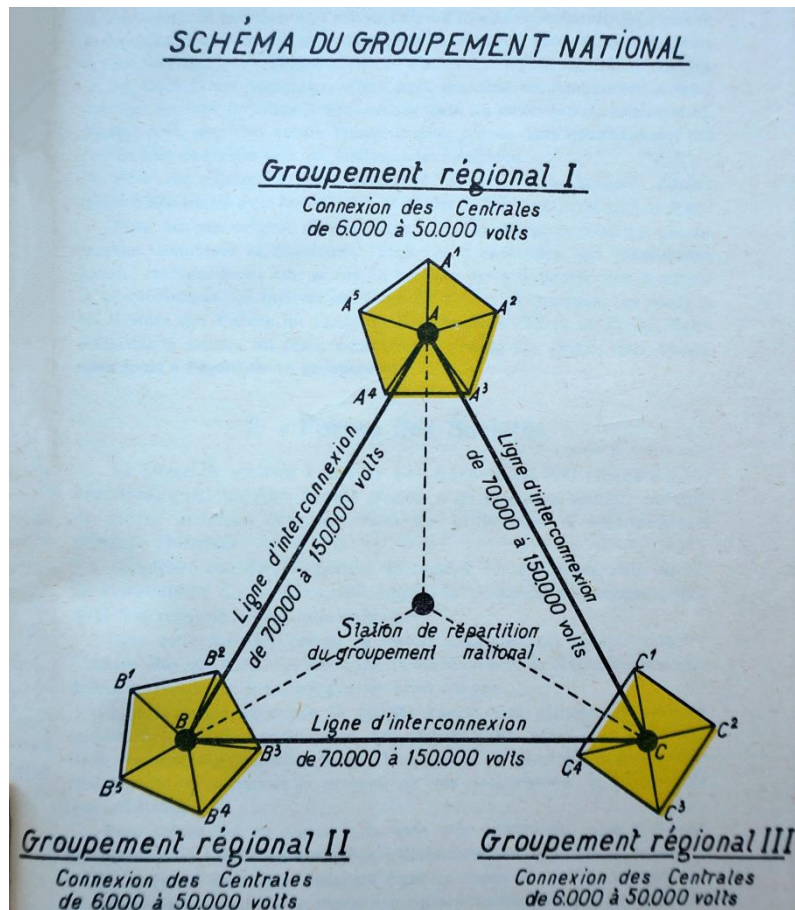


fig. 4 – schematic representation of the technical concept of the CNGT.

(source CNGT, *Organisation générale de la production de l'électricité en Belgique*. Brussels: Weissenbruch (1927): figure 15.)

In the same vein as Courtoy's clustering of the territorially dispersed production units of a single company and the subsequent parallel connection of the energy generation of different companies on a regional scale, the commission proposes to add another layer to the organisation of the electricity production. All over Belgium, regional electricity unions modelled after the UCE should be established and, in their turn, be coordinated by a national union.⁴⁴ This union would have to regulate the electricity exchange between the different regional unions, much in the same way as these entities operated in relation to their associated companies. To make this exchange possible, a national high voltage grid had to be constructed that was to link the different unions (figure 4).

According to the commission, the clustering of thirteen existing centres of production could generate the electricity needed for Belgium in 1927. By the selective reinforcement of some of these centres and the construction of two hydroelectric power plants, they should also be capable of meeting the nation's estimated electricity demand for 1935. The thirteen centres could be grouped in nine different unions – one for each province – and every union would have a major connection point to the high voltage grid (figure 5). Furthermore, the commission also envisaged three international connections for the grid to the Grand Duchy of Luxembourg and France.⁴⁵

⁴⁴ *ibid.*, 20-21.

⁴⁵ *ibid.*, 11-15.

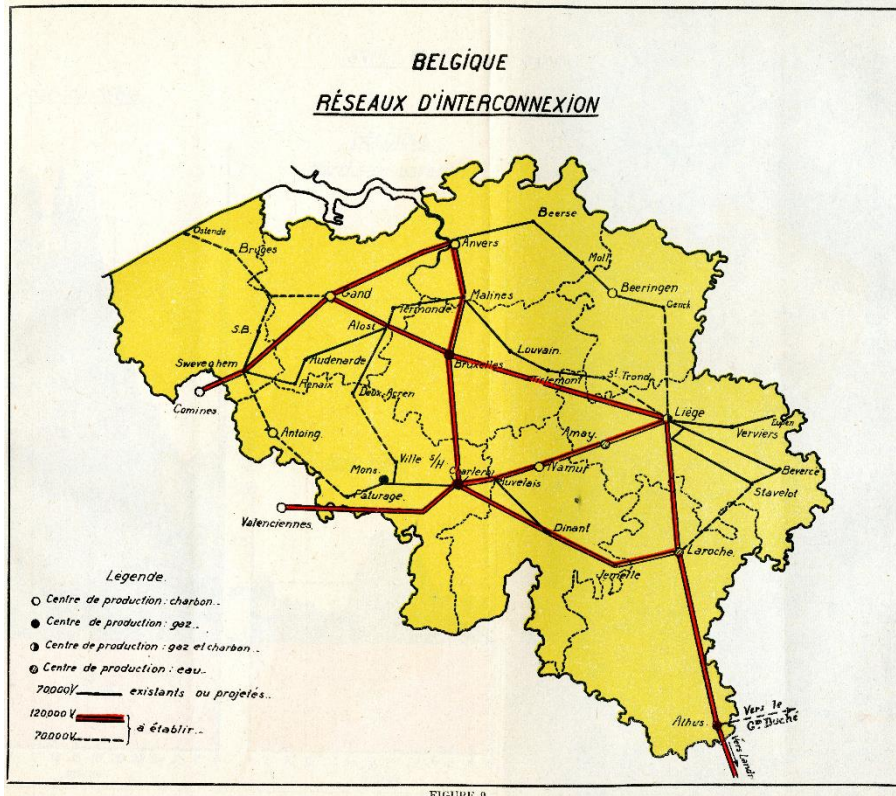


FIGURE 9.

fig. 5 – project for an high voltage grid by the CNGT.
(source CNGT, *Organisation générale de la production de l'électricité en Belgique*. Brussels: Weissenbruch (1927): figure 9.)

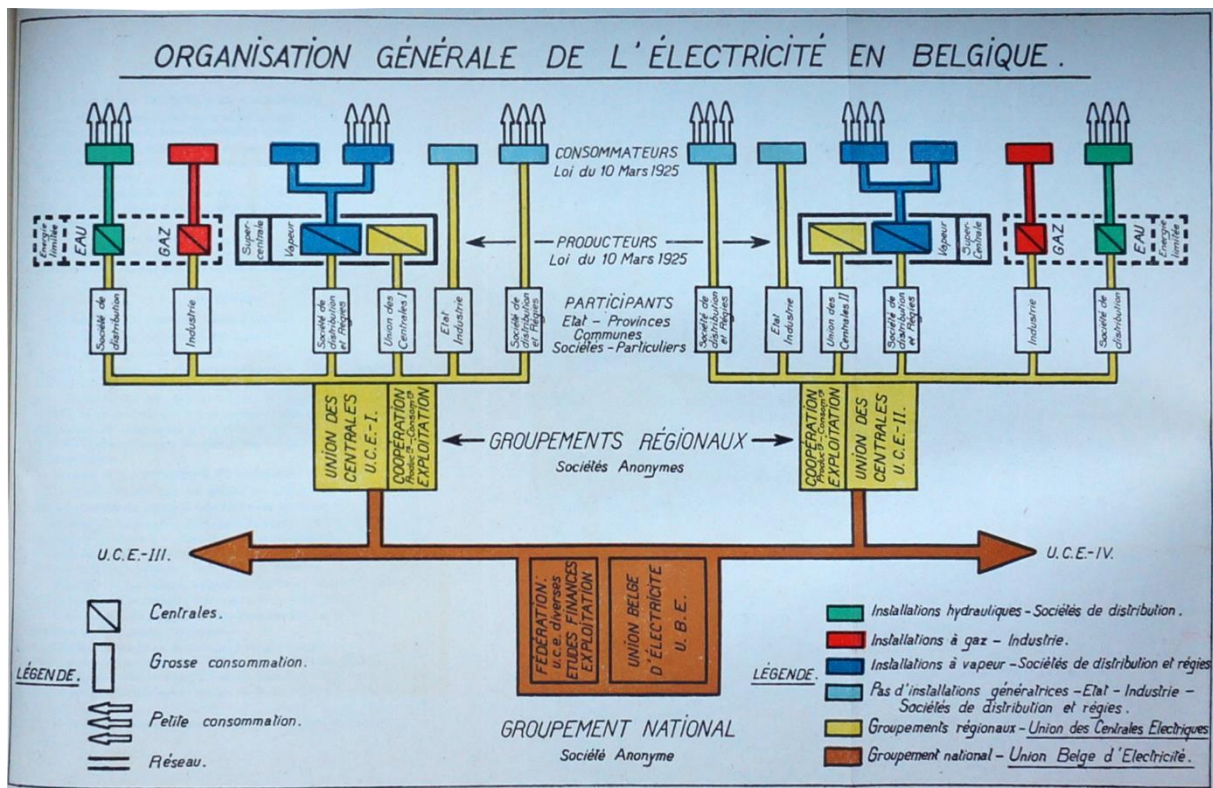


fig. 6 – scheme of the organisation of the CNGT.
(source CNGT, *Organisation générale de la production de l'électricité en Belgique*. Brussels: Weissenbruch (1927): figure 14.)

The arguments in favour for this organisation did not differ much from those brought forward in the 1919 study on the regional clustering of electricity production. The national scale and the context of the commission's report, however, gave them another dimension. Instead of being simply a rational, efficient and economical organisation advantageous for the participating companies, the proposals now seemed to be developed for the common good.⁴⁶ The plan was said to advance the national economy and hence contributed to the wellbeing of the country and its people.

This idea was also reflected in the composition that was proposed for the different unions. '[A] policy of broad entry [*large accueil*]' should be followed.⁴⁷ All types of producers (public companies, industrial (self-)producers and producer-distributors) should be represented, together with delegates of the government and of those consumers for whom the electricity supply did not fall under any monopoly of distribution. The consumption and the consumers, and with it the distributors of electricity, thus became more prominent in the organisation of the unions (figure 6). While the cooperative spirit of the UCE should remain, the unions' different types of activities and the diverging contributions of its associates reformed them into '*sociétés anonymes*'.⁴⁸ Association to the unions would not be made compulsory for any of the electricity producing companies, however, it would bring certain benefits. The exploitation of the hydroelectric power plants and the electricity provision of major public enterprises, such as the (to be) electrified national railroads, would 'preferably' be granted to the electricity unions.⁴⁹

5. Charges and Tensions

In July 1927, the conclusions of the commission were approved by the national government.⁵⁰ Moreover, Courtoy was asked by the minister of industry and labour to prepare a bill that would provide the legal framework for the proposed organisation of the national electricity production and distribution.⁵¹ The engineer lost no time and tried to quickly push his vision through. Not only did he deliver the bill asked for, he and the ACEIB also established the *Union Générale Belge d'Électricité* (UGBE) in 1928, which had to serve as the national coordinating union.⁵² Already in the commission's report it had indeed been remarked that setting up the coordinating union before the regional unions could help in establishing (the compatibility between) the latter.⁵³

The same year, Courtoy and the UGBE would set up another union. This *Union des Centrales Électriques du Hainaut* (UCEH) would be subdivided in three smaller centres, corresponding to the three mining basins in its territory, those of the Borinage, Centre and Sambre. The UCE, finally, was renamed to *Union des Centrales Électriques de Liège, Namur et Luxembourg* (UCE Linalux) after it had expanded the area it serviced to the province of Luxembourg and partially

⁴⁶ see, for example, *ibid.*, 40.

⁴⁷ *ibid.*, 21-22.

⁴⁸ *ibid.*, 27-28.

⁴⁹ *ibid.*, 37.

⁵⁰ Courtoy, F., *Une campagne tendancieuse contre les conclusions de la Commission Nationale des Grands Travaux concernant l'organisation générale de la production de l'électricité en Belgique*. Brussels: Association des centrales électriques industrielles de Belgique, 1927: 4.

⁵¹ Vanthemsche, G., Een onvervulde socialistische droom: De nationalisering van de Belgische elektriciteitssector voor de Tweede Wereldoorlog. In *Overheid & economie: Geschiedenissen van een spanningsveld*, eds Blondé, B., Greefs, H., Van Damme I. and Van der Wee, H., 153-180. Brussels: University Press Antwerp, 2014: 165.

⁵² Courtoy, F., *L'organisation de la production de l'électricité en Belgique en 1938*. Brussels: s.n., 1938: 4-5 & 9-10.

⁵³ CNGT, *Organisation générale de la production de l'électricité en Belgique*: 27.

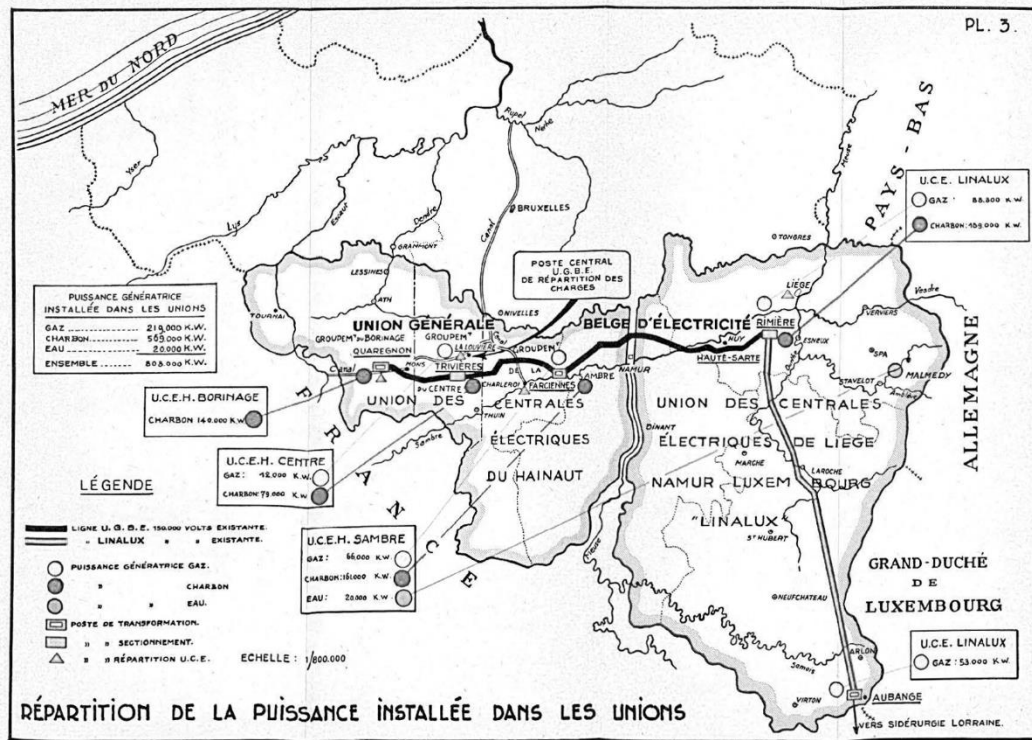


fig. 7 – organisation of the UGBE in 1940.

(source: Courtoy, F., *Les groupements de centrales électriques en Belgique: Philosophie des groupements, Materialité et économie des opérations réalisées*. Brussels: Union des Centrales Électriques du Bassin de Liège, 1940: sheet 3.)

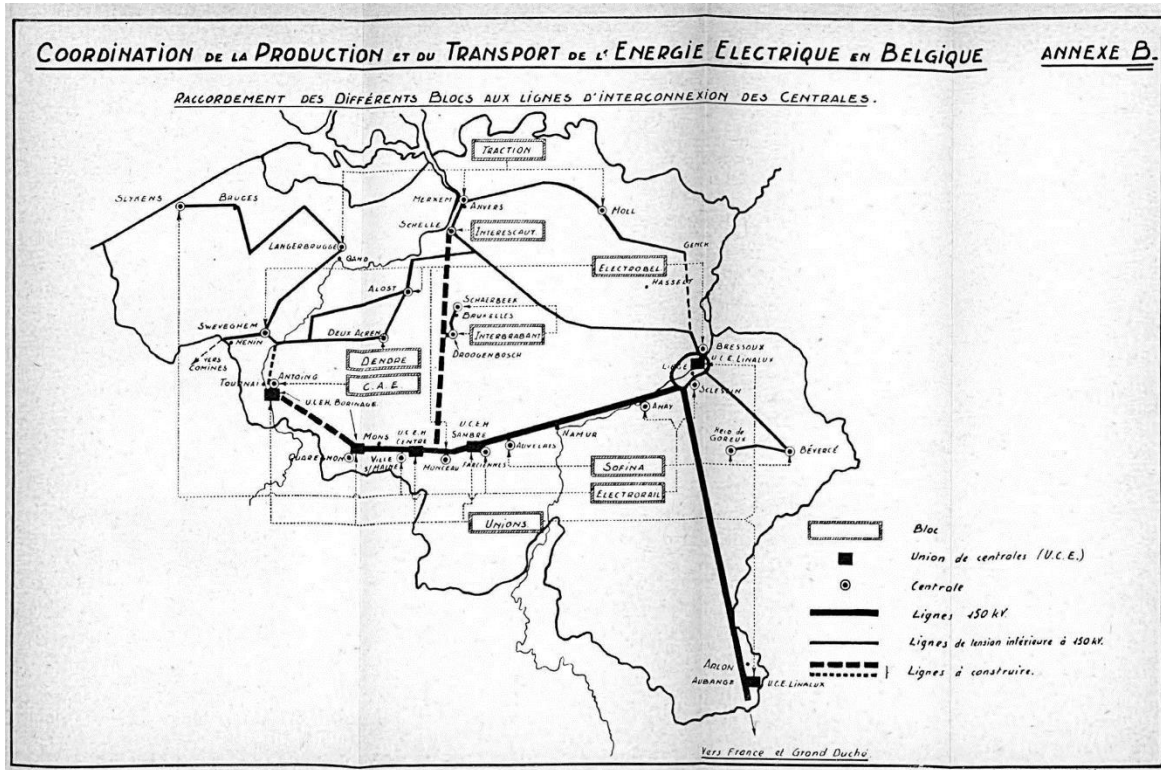


fig. 8 – grid managed by the CPTÉ with indication of the different blocks.

(source: Courtoy, F., *Les groupements de centrales électriques en Belgique: Philosophie des groupements, Materialité et économie des opérations réalisées*. Brussels: Union des Centrales Électriques du Bassin de Liège, 1940: annex B.)

that of Namur.⁵⁴ The infrastructure supporting these regional unions was finished in the beginning of the thirties. An interconnection between both grids would be established in 1932 and marked the start of a fully operational UGBE (figure 7).⁵⁵

From the beginning, however, this seemingly flying start of the execution of the national plan for the production and distribution of electricity, was surrounded by protests. Certainly the producer-distributors regarded Courtoy's initiatives as direct charges on the economic conditions on which their industry was based. Although they had been part of the commission that had elaborated the plan, they seemed to have underestimated the implications of its work and the indisputability of its guiding lines. There seemed to be less space for negotiations than anticipated.⁵⁶

As an attempt to mitigate Courtoy's proposals several major objections were raised in a series of letters, press releases and leaflets.⁵⁷ The producer-distributors accused those in favour of the plan of underappreciating their efforts to supply electricity all over Belgium. Now this work was nearly completed, the UGBE would reap the profit of this endeavour without the producers-distributors having had the time to make profit or receiving sufficient compensation. Even though association to the UGBE and its regional unions was not compulsory, the benefits related to association and the unbalancing effects of such an organisation would, according to the producer-distributors, force solitary companies into bankruptcy. The UEEB regarded the commission's plan as the start of some kind of (disguised) *etatism* and the handing over of the management of their production units as expropriation. By refusing their cooperation and with the help of their political allies the producer-distributors were able to stall the implementation of the plan.⁵⁸

The deadlock thus created was even further complicated by the political context of the 1930's. The global economic depression also hit Belgium and caused a succession of falling governments, each failing in its search for a way out of the economic malaise. From 1935 until the dawn of the Second World War, the socialist party BWP was part of the different governments. Its economic policy was based on a 1933 plan that foresaw the nationalisation and coordinated organisation of certain key economic sectors, among which the electricity sector and the financial sector (which was deeply entangled with the former). When the author of the plan, Paul De Man – the plan was generally known as the Plan De Man –, and his successor Jules Merlot failed to implement this plan, arrangements were made to have the electricity sector deduct a contribution from its profit. This because, in the eyes of these politicians, the sector parasitised on its crucial, but unassailable position in the nation's economy. Also this arrangement was never imposed, however. Nonetheless, the ever imminent threat forced the ACEIB and the UEEB to continue negotiations on the organisation of the electricity production and distribution sector.⁵⁹

In the end, it were the financial interests in the sector that would push for a solution between both type of companies. Since the construction of large production plants, the financial

⁵⁴ Courtoy, F., *L'organisation de la production de l'électricité en Belgique en 1938*: 4-5 & 9-10.

Vandewalle, G., De rol van de openbare en privé-sector in de produktie van elektriciteit in België sedert het begin van de 20ste eeuw tot heden. *Driemaandelijks tijdschrift van het gemeentekrediet van België* 35, no. 139 (1982): 56.

⁵⁵ Courtoy, F., *Les groupements de centrales électriques en Belgique*: 24.

⁵⁶ See, for example, the remark of Émile Uytbork (UEEB) to Alexandre Galopin (Société Générale) quoted in Vanthemsche, G., op. cit.: 165.

⁵⁷ Courtoy, F., *Une campagne tendancieuse*.

Courtoy, F., *Portée des attaques dirigées contre les représentants de l'industrie au sein de la Commission Nationale des Grands Travaux*. Brussels: ACEIB, 1927.

⁵⁸ Brion, R., and Moreau J.L., op. cit.: 164-165.

⁵⁹ Vanthemsche, G., op. cit.: 165.

resources needed for electricity companies combined with the perspective of an attractive return had made the electricity sector an interesting investment and this across the industrial / producer-distributor divide. Certainly the *Société Générale de Belgique*, then Belgium's most important investment bank, had important interests on both sides of the sector.⁶⁰ Feeling these interests threatened, they tried to avoid the nationalisation or any other state intervention by developing the rational, efficient working of an autonomous, dominantly private electricity sector. In this way, they hoped to deprive the supporters of public ownership of their main arguments about the excessive charging and squandering within the electricity sector.⁶¹ In the view of the financial sector, the national plan brought forward by the commission envisioned such a rational and efficient working. It, however, had to be adapted to some of the producer-distributors demands. After ten years of delicate negotiations this finally resulted in the 1936 'trusts-unions agreement'.⁶²

Some of the main lines from the report of the national commission are present in this secret agreement between the industrial (self-)producers and the producer-distributors. Still, a coordinating organisation manages parts of the electricity production and transportation on the national level. This entity, the *Société pour la Coordination de la production et du Transport de l'Énergie Électrique* (CPTE) remains however subordinate to its affiliates since it would not own or maintain the infrastructure it coordinates. While the CPTE appears to be similar to the concept of the UGBE this characteristic makes it less powerful. Another major difference lies in the nature of its members. The associates of the CPTE are large economic blocks that represent the financial interests behind the different companies (figure 8). Hence the composition of the CPTE, and therefore also the organisation of the electricity production and distribution sector in Belgium, is not based on geographical demarcations represented by the regional unions, but by the financial structures of the Belgian economy (compare figure 5 with figure 8).⁶³

6. Dispersed Consumption

Many of the ideas of Courtoy can be brought back to his first job as electrical engineer at *Ougrée-Marihaye*. Two features of this job – the context of a large industrial company and the dense stretch of industrial activities along the Meuse in the Liege basin – can be said to have deeply influenced the position taken by the engineer in a succession of electricity production and distribution questions over the years. Working at an industrial company determined his view on the role of electricity in the production process. Except for those companies that produce electricity only to sell it (to a distributor or to an end user), electricity is mainly regarded by the industry as a resource instead of a product. To secure their access to this resource or because they are able to produce electricity at an economical cost, some companies decided to start their own electricity production. In almost none of these cases electricity becomes more than a by-product and the emphasis lies on the continuous reproduction of the conditions in which its core production can thrive. In other words, the production of electricity is aimed at its consumption for the production of other (superior) items.

The geographical context of the Liege basin provides a second clue to understand many of Courtoy's standpoints. While the coal mines and the metallurgic companies have played a

⁶⁰ Brion, R., and Moreau J.L., *op. cit.*: 176.

⁶¹ Such a strategy can also be found in some of Courtoy's texts of that time. See, for example, Courtoy, F., *Position de l'industrie à l'égard des projets de loi de 1937 concernant la production, le transport et la distribution de l'énergie électrique en Belgique*. Brussels: ACEIB, 1938.

⁶² Courtoy, F., *Les groupements de centrales électriques en Belgique*: 12.

⁶³ *ibid.*, 12-20.

decisive role in the early establishment of the industrial economy in Belgium, they later became an exception in the dispersed national industrial territory. This dispersed organisation of the territory was deliberately created by the national elites to achieve advantages such as an easy access to cheap land and labour.⁶⁴ To accommodate industrial activity in this condition of dispersal a broad set of infrastructures was implemented.⁶⁵ Belgian policy makers were convinced that such an effort would cost less than the expenses associated with an economic model based on industrial concentration (the construction of housing and other facilities for labourers, the establishing of safety and hygienic measures and institutions, etc.).⁶⁶

Courtoy's clustering of the different production units in the Liege basin, however, are an example of the benefits that could be gained from accumulation, very tellingly illustrated in his placing of the load diagrams of different types of companies on top of each other (figure 1). Constrained by technological, legal or financial limits such forms of accumulation had for a long time only been attainable by physical concentration. As an electrical engineer, Courtoy understood that the relatively light and inexpensive infrastructure that could be used to construct connections between the different production units made possible the production of such beneficial effects of accumulation in electricity production and distribution. His endeavours can be seen as the gradually expanding of the scale in which these effects were achieved with at different scales new (types of) problems surfacing and having to be tackled. Each time a balance had to be found between the advantages of dispersal and those of accumulation. This is certainly apparent in his vision on the national organisation of the electricity sector in which a careful integration between the different levels of the company / production unit, the region and the nation is of primordial importance.

In the search for this balance, Courtoy's perception of electricity as primarily being a resource rather than a product would bring him at odds with the producer-distributors. Instead of linking a range of production units, the fairly homogenous condition of a diversity of small-scale, loosely-connected fragments juxtaposed offered these companies the opportunity to gather a critical mass of consumers all over the territory. If Courtoy refers to the motto 'union makes strength' that of the producer-distributors could have been 'divide and rule'. For the latter the dispersed territory had become a condition in which their production of electricity was embedded; for the industrial self-producers it was an obstacle in the (more advantageous) reproduction of the context in which they operated. Still, both types of companies could avail with a more efficient production of electricity. Time and again, this shared objective would bring them together during times of crisis.

⁶⁴ Grosjean, B., *Urbanisation sans urbanisme. - Une histoire de la "ville diffuse"*. Wavre: Mardaga, 2010.
De Meulder, B., Schreurs J., Cock, A., and Notteboom, B., Patching up the Belgian Urban Landscape. *OASE* 19, no. 52 (1999): 78-113.

⁶⁵ De Block, G., *Engineering the Territory: Technology, Space and Society in 19th and 20th Century Belgium* [PhD thesis], Leuven University, 2011.
Van Acker, M., *From Flux to Frame: Designing Infrastructure and Shaping Urbanization in Belgium*. Leuven: Leuven University Press, 2014.
Peleman, D., *Les hommes de la route: Engineering the Urban Society of the Modern Road in Belgium, 1899-1962* [PhD thesis], Ghent University, 2013.

⁶⁶ This is more explicitly addressed in Bruggeman, D., Dehaene, M., Urban questions in the countryside: The history of electricity networks as collective consumption in early 20th-century Belgium. *RGS-IBG Annual International Conference 2015 Geographies of the Anthropocene*. 2015. A shorter version with more illustrations was also published in eds., Barcellona, M., Cavalieri, C. *VIII International PhD Seminar Urbanism & Urbanization*. 2015: 166-76.

See also Castells, M., *La question urbaine*. Paris: François Maspero, 1972.

Brenner, N., *New State Spaces. - Urban Governance and the Rescaling of Statehood*. New York: Oxford University Press, 2004.

The division within the electricity production sector is as well clearly visible in the maps. During the 1930's, the area of activity of the electricity unions covers almost half of the national territory (figure 7). This territory is characterised by the strong presence of industry in a long stretch of relatively well-demarcated coal basins, which are all heavily associated with mining and metallurgy. These industries require large facilities and are bound by some geographical conditions, making the establishment of electricity unions (and the distribution of surplus energy to the industrial basin's hinterland) more plausible. In contrast, the territory of the producer-distributors which covered the other half of the country was more marked by a historical network of merchant towns. Industrial activities, population and the traffic flows of persons and materials were more spread out and more diverse.⁶⁷ This situation was to the advantage of the producer-distributors.

Courtoy's industrial perspective becomes again apparent in how he deals with the more secluded parts of Belgium, in the southern, western and eastern corners of the territory (figure 5). While smaller interior regions with less electricity production could often be serviced by the national network that connected the more productive regions of the country, these parts required specific solutions. The less industrialised and hilly most southern part of Belgium is simply annexed by the UCE and the electricity production of the steel industry of the Grand Duchy of Luxembourg. The potential construction of hydroelectric plants in this area will, however, also have contributed to this decision. In the most western province, Courtoy chose to establish the main point of connection in the south-eastern part of the province where there was more industrial activity. This made that urban, at times historical, cores with less industry were not directly connected to the high voltage grid. In the north-eastern part of Belgium Courtoy counted on the emerging mining industry. Remarkable here is that these companies worked in close and good cooperation with producer-distributors, probably because they still had to focus on the organisation of their core business.⁶⁸

The two perceptions of the role of electricity production – one as the result of a production process and another as a resource to be constantly reproduced to enable other production processes – ensued different approaches to the dispersed condition of the Belgian territory. This made the organisation of the national electricity production and consumption based on only one of these perceptions impossible. A solution, necessitated by the imminent danger of state intervention, was found in the assembling of both organisatory logics by making use of a common denominator: the financial interests behind the different companies which bridged the sector's divide. In this solution, however, the territorial dimension of the plan proposed by Courtoy is lost. Furthermore, the question remains if this is indeed the most efficient, rational or economical organisation practicable, which was, after all, the aim Courtoy pursued.

7. Aftermath and Conclusion

With the secret agreement between the industrial self-producers and the producer-distributors in 1936 not all tensions were relieved. Political pressure persisted until the beginning of the Second World War and afterwards new attacks on the privileged position of the electricity companies were launched by civil society organisations, the labour unions in particular.⁶⁹ In the first years of the postwar period, the organisation of the electricity sector was therefore modified into a more corporatist structure.⁷⁰ This was mainly done by involving other parties than the

⁶⁷ Vanderमotten, C., *Dynamiques spatiales de l'industrialisation et devenir de la Belgique. Le Mouvement Social*, no. 185 (1998): 75-100.

⁶⁸ See Bruggeman, D., Dehaene, M., *op. cit.*

⁶⁹ Brion, R., and Moreau J.L., *op. cit.*: 187-190 & 201-211.

⁷⁰ Maes, R., *op. cit.*: 403-486.

founding private companies in the structure established in accordance to the 1936 agreement and by the integration of new coordinating and regulating institutions this structure. Hence it can be argued that the organisation of the sector was based on the foundations laid by the agreement between both types of private electricity producers and this almost until the end of the 20th century (when a de facto national monopoly was created because of merges in the sector and when preparations for the liberalisation of the energy market are made).

The electricity blocks that organised the sector by their financial interests would gain importance as well. Two processes of rationalisation have contributed to this. First, the technological advances that enabled the realisation of very large and efficient electricity production plants that culminated with the eventual use of nuclear power. Quickly, the production capacities of these plants would exceed the needs of a single regional company. Second, the possibilities offered by technological, legal, economic and societal developments to reduce the fragmentation of the financial interests in the electricity sector. To an increasing extent, each financial block would group their activities in the sector around a single company and, over time, also the number of blocks would diminish. Both of these rationalisation processes were already initiated during the time of the national commission's study in 1927.⁷¹ Nonetheless, the commission and the negotiators of the 1936 agreement deserve merit by the way in which they enabled the consolidation of these processes in an organisation that through numerous evolutions would prove capable of efficiently providing this public utility to its users.

Fernand Courtoy has played a major role in this consolidation. The main principles of the 1927 report were based on a vision he had developed through his work in the Liege basin. This work was motivated by the benefits that could be achieved by the rationalisation of the electricity production. This rationalisation took the form of the clustering of diverging production facilities; the benefits can be understood as the amelioration of the conditions of production or, at least, as the making easier of the reproduction of these conditions of production. This aim was not only attainable for a single company, but was taken by Courtoy across different scales up to the national level. Besides the more technical aspects of his plan, an important challenge was to find an organisation that could be embedded within the dispersed Belgian territory. The coordination of regional production unions turned out to be incompatible with the spatial strategy of the producer-distributors. In the agreement of 1936 the weakened coordination between financial blocks would emerge as a feasible compromise. Although this can be seen as a concession to the essence of his vision, Fernand Courtoy's ideas and initiatives have firmly put his mark on the organisation of the Belgian electricity production and distribution sector.

⁷¹ In 1928, for example, two important regional producer-distributors merged into the *Société des Centrales Électriques des Flandres et du Brabant*. Around the same time two other companies had found a new enterprise to operate a shared production plant at Schelle. When this became operational in 1930 it was the largest power station of Europe.