

CHINA-EUROPE ELECTRIC CORRIDOR: AN ISSUE OF ENERGY SECURITY AND GLOBAL GEOPOLITICS

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Overview

Energy policy is a historical pillar of European construction. Since the creation of the Economic Community of Coal and Steel (ECSC) in 1951 up to the policy to implement within the European Union (EU) - but also with the adjacent countries - a Union of Energy, energy issues have been central to the common policy. Becoming aware of the reality of climate change in the 1990s, leading to the definition and implementation of the various Energy-Climate packages, the European Union has embarked on the path of an in-depth change in energy issues. One of the priority areas of efforts, given the structure of Europe's energy demand, concerns the continent's electricity networks. Developed on a strictly national basis, electricity transmission and distribution networks are now increasingly interconnected to form a true continental system.

The European Union (EU) energy policy revolves for more than thirty years around the liberalization of gas and electricity infrastructure assets and the end of national monopolies in transmission and distribution (T&D). This purely economic orientation of the UE regarding gas and electricity – alongside with a strong free competition policy under the supervision of DG COMP – had contrasted results depending on the country, the companies considered and the national economic well-being. This policy, intending to allow the consumer to benefit from the best service possible, had unexpected results giving the most powerful European companies the upper hand over gas and electricity distribution all over Europe. However, among the real effects of this liberalization, there is an increasing involvement of non-EU actors, sometimes supported by States.

Yet the actual situation of T&D in Europe is showing a different picture as a new actor entered the European market at the eve of the 2010s: China. State-owned energy companies of China are buying important stakes in gas and electricity Transmission System Operators (TSO) and Distribution System Operators (DSO) all over Europe. Alongside this acquisition policy, China is also promoting the idea of creating an “electric corridor” between China and Europe – first step towards a global grid integration - to merge the electric production and transmission from Asia to Europe through Central Asia and Russia. This electric corridor, promoted as a strategic energy security backbone by Chinese actors, could also be considered as a new dependence from the European point of view. Such a situation could lead Chinese state actors to have a form of economic and technological preponderance over a sector that represents both the future of the fight against climate change, as a pole of technical excellence, but also a central link in the continent's energy security value chain. Through this Chinese policy, which can be seen as a continuation of a global policy to create an interlinked “Eurasia”, questions arise as to the consideration of the strategic nature of electricity networks by the States, the European Union and the various collective security organizations such as NATO.

Methods

This paper considers both the economic issue of electric integration inside and outside the European Union and the geopolitical implication of a transcontinental network with China. It relies on the methods and tools of Economic geography to provide a multi-layer and multi-stakeholders analysis, underlying the contradictions in policy and practices within the EU and between European countries.

Alongside this analysis based on the assessment of the benefits of trans-continental electric integration, the paper also analyses the geopolitical implications of this potential integration from a global security point of view. As energy critical infrastructures could be considered, in a broader view, as major security infrastructure for European nations and the whole Europe as a continent, the cross analysis between security needs and liberalization of energy transmission and distribution is the structuring point of the paper.

The paper relies on the study of national energy strategies, European energy strategy, corporate orientations of European DSO and TSO and also Chinese state-owned energy companies (e.g. State Grid of China, China Southern

Grid, Three Gorges Corp, etc.). It also analyses the funding from Chinese state-owned banks and funds, the merger and acquisition policy from Chinese companies.

The paper also considers the national legislation of European countries and European Union regarding the monitoring of foreign investments (e.g. in France the Villepin Decree) and the use of this legislation in the energy sector. Alongside this analysis, the paper balances this “protectionist vision” with the analysis of the EU legislation towards competition – under DG COMP – and the different results in terms of energy security (e.g. the decision to not authorize the EDP-GDP merger in Portugal). The articulation between these two orientations and the whole competition within the European Union on protection vs. liberalization – between DG COMP and DG ENER notably – is also an important point to consider.

The whole methodology revolves around both a vertical multiple layer analysis articulating national, European and trans-continental levels. This analysis is complemented by a horizontal one articulating the influence strategies between companies, administrations and international organizations (especially the Chinese-sponsored GEIDCO).

Results

China may possibly use its position in the electric transmission and distribution sectors in Europe to promote the view of a transcontinental electric network, considered an “electric silk road”. This project relying on Chinese-based technologies in both electric transmission (UHV system) and data management (5G) could create dependencies in both technologies and supply of electricity, creating a super “pipeline effect” in terms of energy security.

The Chinese strategy, using State Grid as a spearhead, seems to create a consensus in Europe over the electric corridor in acquiring important stakes in TSO and DSO all over the continent (Italy, Greece, Portugal, UK, etc.). This merger and acquisition policy, combined with the promotion of technological norms through research centres (GEIRI Europe notably) and international organizations (GEIDCO) aims to develop the idea that relocating power plants out of Europe would help European countries to meet their climate goals and strengthen the fight against climate change.

The EU seems unable to define a global policy towards this Chinese strategy as the issue of a monitoring system of foreign investments is not desired by some countries that want to retain the upper-hand over their economic security and also by the EU Commission that considers such a system to be in contradiction with the EU free-market orientation.

The consequence of networks liberalization in Europe

In Europe, electricity grids went through different stages following changes in community regulations. At first, based on a vertical concentration of activities from production to distribution through transport, they have most often been state monopolies such as in France (EDF) or Italy (Enel). At the end of the 1990s, progress in European policy on liberalizing the whole economy led to the gradual opening of downstream activities to free competition. The European Union is pushing for the deconcentrating of network activities and their separation from production activities. The first important step in this direction was Directive 96/92/EC, which forces Member States to separate the activities of transmission system operator from those of electricity production and distribution. In Italy, in 1999, Enel's transmission and distribution activities were separated and the company Terna was constituted, in Portugal REN, which manages the networks, was separated from the EDP production entity, in France ERDF (nowadays Enedis) was created in 2008 when the directive on the liberalization of distribution operators entered in force; RTE (managing the transmission network) was separated from EDF in 2000.

In 2003, the two Directives 2003/54/EC and 2003/55/EC liberalized the electricity and gas distribution markets throughout the Union, allowing free competition for distributors. The 2003/54/EC Directive on electricity markets requires, on the one hand, a legal separation of distribution activities (Article 15) and the third parties' access to the distribution network (Art. 20) leading to a *de facto* liberalization, applicable in 2007. The declared aim of the European Commission was thus to promote free competition allowing the final consumer to have the best possible prices, the Commission considering that monopolistic system, state-controlled or not, prevented this objective to be achieved. In 2004 the Commission refused the merger between EDP and GDP in Portugal that could have created a super energy monopoly under state supervision. However, this situation had unanticipated effects such as concentrations to face the increased competition, like the GDF-Suez merger as a response of the Enel bid over Suez. Some large energy companies also took advantage of this opportunity to expand beyond their borders and thus complete important positions at the continental level, such as Sweden's Vattenfall in Sweden, Germany and the United Kingdom or Spanish Iberdrola present in Spain and Scotland. The supposed movement of liberalization was thus not complete since it mainly consisted in maintaining the competence on a national basis (France, Italy, Portugal, Spain, Belgium,

etc.), but with an economic weakening of transmission and distribution companies. They were deprived of the support of their parent company or their state and were thus often bought back in the middle of the 2000s by the biggest European operators who had been able to anticipate the changes in the regulation.

Nevertheless, transmission system operators as well as distribution system operators - sometimes confused in the same entity or separate - are key players in the electricity value chain. With the evolution of national electricity systems - which itself is causing a crisis in the traditional utilities model - towards an increasingly decentralized production, the managers of both types of networks (transport and distribution) are gaining power. The European Union integrated the issue of the harmonization of the European electricity networks - including the large-scale development of smart grids - within the "A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy" in 2015¹. In 2017, the third report on the Energy Union highlights the renewed desire to complete a single energy market in Europe - in particular in electricity - by developing transnational interconnections (France-Italy, for example) in order to achieve both a redundancy in networks and a guarantee of better prices for the final consumer. However, it was without counting on the significant interference of extracontinental state actors from China.

Chinese state-owned enterprises taking stakes in European networks

Since the mid-2000s, China, using its state organizations (public companies and national funds), has embarked on a massive policy of purchasing strategic economic assets all over the world. The *Chinese Investment Tracker* of the Heritage Foundation/America Enterprise Institute reveals the focus of Chinese actors towards the energy sector. Of the 2034.22 billion USD invested globally between 2005 and 2019, 727.5 billion were spent in the energy sector, accounting for 36% of the total². This sector, which has been favored for a long time, in view of China's critical fossil fuel supply needs, has seen since the beginning of 2010 a diversification of investments towards the production and transmission & distribution systems of electricity, following the priorities set by Beijing.

The main structure active in asset purchases in the field of transmission and power distribution in Europe is the state-owned State Grid Corp. of China (SGCC). It is considered one of the richest and most powerful companies in the world, ranking second across all countries and sectors in the *Fortune Global 500*. China's leading electricity grid operator, covering 80 percent of the country³, is a state-owned enterprise that had a 363 billion USD revenue in 2016, giving it unparalleled economic investment capabilities in the sector of electrical operators. In addition, the company owns the majority of Yingda International Trust's investment fund, providing it with a much greater capacity for action on the markets than other major players in transmission and distribution. In 2011 State Grid created a subsidiary in London, State Grid Europe Limited (SGEL) which is the main actor in buying stakes in European networks.

Beyond SGCC, other energy players are active in takeovers in Europe and around the world. Other main Chinese energy companies have also concentrated their asset purchases in Europe in the fields of transport and distribution of energy, according to their specialties. The Spanish group ACS for energy and waste services has thus been the target of several Chinese buyouts, first for its recycling subsidiary Urbaser, then for the energy services assets in Brazil, bought by SGCC. Another major Chinese player involved is the state-owned company, Three Gorges Corp., established for the management of the eponymous dam, which has rapidly diversified into asset management abroad - partly through its subsidiary China International Water and Electric Corp. - which led to the purchase of a substantial part of the Portuguese energy company EDP. It is also involved in development prospects in the Balkans, interconnected to the European Union system, notably in Serbia.

The Chinese system, centralized at the level of the central committee of the Chinese Communist Party, has also for many years been based on a large number of sovereign wealth funds and investment structures (Kong & Gallagher; 2016). Among the most active, the State Administration of Foreign Exchange Investment Fund (SAFE) is the investment arm of the international exchange control agency. SAFE was the first of the Chinese sovereign wealth funds to take part in the purchase of electric assets in Europe with the purchase of 3% of the Italian national electricity company Enel in 2014. However, it is with China Investment Corp., China's largest sovereign fund in terms of capitalization, that the largest investments occurred, including the purchase of 11% of the UK's electricity transmission network⁴.

The mapping of Chinese actors' investments reveals a concentration, at first, in Southern Europe countries. Taking advantage of the deep economic crisis in Greece, Portugal and Italy since the early 2010s, Chinese companies and funds benefited from the needs in cash of those states to buy large shares in the national transmission and

¹ https://ec.europa.eu/commission/energy-union-and-climate/state-energy-union_fr

² <https://www.aei.org/china-global-investment-tracker/>

³ The rest being held by China Southern Power Grid.

⁴ China Investment Corp. also participated in the takeover of British gas T&D network in 2018 alongside with investors from Australia and Qatar.

distribution sectors. The first targeted country was Portugal, which for many years has struggled with the organization of its energy sector. State Grid's acquisition of 25% in REN (2012), the national electricity transmission company, preceded that a 23% share in EDP, the national electricity producer⁵, which was later bought by China Three Gorges Corp. Thanks to REN, State Grid became *de facto* able to influence the European Transport Network organization (ENTSO-E). Three Gorges Corp. also initiated a bid to buy the remaining shares of EDP, in order to have full control over the national electricity producer.

In 2014, the next SGCC move was in Italy, where it partnered with the Italian state in buying 35% of the CDP Reti fund from the Italian Cassa dei Depositi through SGEL. Thanks to this important participation, SGCC obtained a leverage over the activities of SNAM (gas network operator) and Terna (electricity transmission network operator). From this moment on, SGEL is able to directly nominate a board member in both SNAM and Terna⁶. Terna is also present in other countries like Montenegro where it owns 100% of Terna Crna Gora. SGCC also continued its development in the Greek networks in acquiring 24% of Independent Power Transmission Operator (IPTO) to the Greek state in 2016 and the purchase of 75% of the private group Copelouzos, becoming *de facto* the key player in transport and distribution in Greece.

Targeting Portugal, Italy and Greece - buyouts were made in Spain but in other energy subsectors - Chinese companies and funds have positioned themselves in the struggling economies of the European Union. By offering large amounts of money for assets most often under public control (REN, CPD Reti, IPTO), Chinese players gained significant influence at the level of each state. In addition, it gave China several canals of information dissemination and influence over the electricity policy at European level, in particular with the ENTSO-E, of which REN, Terna, National Grid and Public Power are members. At the level of electricity distributors, the Chinese players, led by SGCC, by taking shares in several important players in the field, could want to propose a convergence of standards and practices - at the multi-national level - on those from China⁷.

We must add to this chronology investments attempted by Beijing that did not materialized, like the attempt to buy 14% of the Belgian electricity distributor Eandis in 2016, which the city of Antwerp finally blocked the transaction. Similarly, other attempts are underway as the purchase offer of State Grid Corp. for the German 50 Hz company which is one of the four main electricity transmission companies in Germany. In this sense, there is a clear global strategy for taking major shareholdings in the management structures of European electricity grids⁸.

The China-Europe electric corridor

Beyond the issue of the presence of one or more organizations directly linked to the Chinese state within the electricity transmission and distribution sector in various European countries, a global geopolitical vision underpins Beijing strategy. Various publications and presentations, notably from State Grid, show the will to create a global interconnection of electric transport networks from China to Europe. The deployment of ultra-high voltage (UHV) lines in China, which is compulsory to cover such a large territory, could also be applied for the constitution of a terrestrial "electric corridor" between Europe and Asia. This is in any case the dream of State Grid, put forward especially at the August 2012 conference of the International Council of Large Electric Grids (CIGRE): connecting the power generation zones of Western China and Central Asia to the European electricity consumption market by an ultra-high voltage system (1,100 kV) of several thousand kilometers⁹.

It could be seen as a continuation of the terrestrial part of the project BRI (*Belt and Road Initiative*) of "new silk roads", by a connection of large scale, lashing a little more Europe to China. With the will to relocate, at least partially, electricity production from the European continent to Western China, Beijing intends to create an electrical dependence that no longer relies on supplies of raw materials, but on electricity itself, conceived in this way as some kind of non-substitutable commodity. Moreover, there is an important economic issue associated with this potential electric corridor. A 2017 JRC Study (Ardelean and Minnebo; 2017) estimated the global cost of such a corridor between 15 and 26 billion EUR. Due to this very important cost, there is a need for China to secure positions in

⁵ Also present in Belgium, France, Romania, Spain, Brazil and Mexico.

⁶ https://www.cdp.it/sitointernet/page/en/cdp_409_stake_in_cdp_reti_transferred_to_state_grid_and_italian_institutional_investors?contentId=CS_A11238

⁷ Beyond State actors, Chinese private investment companies, such as CK Infrastructure Holding, are also present in the European electricity sector, possessing distribution networks in the UK (UK Power Networks Holding Ltd, Seabank Power Ltd) or smart meter companies in Germany (Ista).

⁸ SGCC and other Chinese actors are also present out-of-Europe in Australia, Brazil, Israel and the Philippines but with a less coordinated strategy (except, maybe, in Brazil).

⁹ Presentation made by Liu Z., State Grid Corp of China CEO, on 26th August 2012 at the CIGRE, *Intercontinental Transmission Highway for Optimization of Global Energy Resources*. The same vision could be found in SGCC official documents such as the *Corporate Sustainability Report 2016*.

European TSO and DSO to ensure the commitment of European countries – and the EU – regarding this expensive project.

China has long since looked to the European Union for technological co-operation in the field of energy, including so-called "green" technologies to which energy efficiency is linked. The different EU-China partnerships that have succeeded each other since the end of the 2000s, notably the Europe-China Clean Energy Center, active from 2010 to 2015, worked for a technological convergence. The *EU-China 2020 Strategic Agenda for Cooperation*, led by the European External Action Service¹⁰, also focuses on technologies related to energy efficiency, but also on information and communication technologies (ICT), another fundamental brick for smart grids. In 2016, the signature of an *EU-China Energy Roadmap* reinforces this orientation, with cooperation on energy efficiency devices and electrical networks at the center of the framework¹¹. Moreover, China also has an important participation in multilateral forums such as the 21st Century Power Partnership (21CPP) in which the country is focused on grid integration issue, SGCC leading the works, alongside with Danish and German public institutions¹².

At the research centers level, Chinese players have also been able to penetrate the European system with the creation in 2014 of the Global Energy Interconnection Research Institute Europe (GEIRI Europe)¹³ belonging to SGCC. This institute, located in Berlin, acts as a development agency for academic and technological cooperation on the continent for the Chinese state actor. Three of GEIRI Europe's four research groups are demonstrating SGCC's priorities in Europe (cyber-physical systems security, energy storage, ultra-high voltage power lines). By acting at the scientific level, through involvement in European research networks (e.g. *European Technology and Innovation Platform on Renewable Heating and Cooling*), GEIRI Europe acts on the upstream part for the future European standards. In China, the C-EPRI (China Electric Power Research Institute), belonging to SGCC and having an office in Germany (Frankfurt), has created a research center for High Voltage DC in 2013, in order to proposer dedicated technologies for this China-EU electric corridor.

The 13th plan for Science and Technology presented by the Chinese administration in 2015 makes no secret of the critical place given to energy technologies. The sector is considered, inside the Plan, as one of the 7 key sectors of technological development for the country. Since this plan, it is important to note the efforts that have been made by Chinese companies and state organizations to implement the deployment of new technological solutions, particularly in view of a national energy transition. China is one of the first countries to adopt a generalized system of smart meters in 2017, again the first stage in the development of a national smart grid.

It is also important to note that China is attempting to achieve a dominant position in the electricity storage market, first at the vehicle level, and then in high capacity storage on and off the grid (Mazzucchi; 2018-2). The economic alliances within the energy sector in China on this particular issue, show on the one hand the willingness of the electricity players, starting with State Grid, to position themselves in this sector and, on the other hand, the gradual shift of battery producers towards a greater level of production and technology¹⁴. The proliferation of patent filings in this field is also a sign of China's global orientation towards the domination of the market for electric storage technologies - in particular lithium batteries - to solve, at least partially, the energy equation of the country.

In addition to storage-related technologies, Chinese energy companies have also been extremely active on the issue of smart grids through the know-how of telecommunication companies and those related to power grid management. The presence of Chinese state organizations in the telecommunications sector in Europe, as well as China's willingness to become a normative player in this field, are not new, and it is highly likely that the convergence between the electricity grids and the information and communication technologies needed for smart grids is facilitated. Huawei appears as the spearhead of China in the digitalization of energy sector in Europe. The Chinese telecommunications company emphasizes on its website its partnerships with European utilities for the development of new data transmission and proceeding systems¹⁵. Huawei ICT products in grid management that are already used by SGCC would help the Chinese electric utilities to develop bonds with European. The use of Huawei technologies in Italy, Germany, Switzerland and other countries – inverters for solar power plants in Spain for example - already facilitates a potential interconnexion with the "electric silk road", especially with 5G in industrial Internet of Things¹⁶. Chinese state capitalism, while allowing firms some leeway, is nevertheless highly prescriptive on technologies considered as key, under which smart power grids appear clearly in strategic Chinese documents. Thus, there is no surprise when looking at the Global Energy Interconnection Development and Cooperation Organisation (GEIDCO)¹⁷,

¹⁰ http://eeas.europa.eu/archives/docs/china/docs/eu-china_2020_strategic_agenda_en.pdf

¹¹ https://ec.europa.eu/energy/sites/ener/files/documents/FINAL_EU_CHINA_ENERGY_ROADMAP_EN.pdf

¹² <https://www.nrel.gov/docs/gen/fv18/71449.pdf>

¹³ <http://www.geiri-eu.com/>

¹⁴ The national batteries producer CALB, itself subsidiary of the aviation company AVIC, has partnerships with electricity sector companies such as State Grid and China Southern Grid.

¹⁵ Ex in Italy with Enel: <https://e.huawei.com/fr/case-studies/global/2017/201711080907>

¹⁶ <https://telecoms.com/intelligence/the-power-grid-industry-is-diving-deep-into-5g-commercialization/>

¹⁷ <https://en.geidco.org/>

a China-led international organization intending to promote the benefits of global electric interconnexion in Eurasia, to find Huawei as one of the major council members of this organization, alongside SGCC and China Southern Grid. GEIDCO officially promotes the SGCC ultra-high voltage technology as the backbone for the global interconnexion, starting with the China-Europe electric corridor¹⁸.

The global energy security issue

Finally, electricity transmission and distribution networks are key elements of a state's security and defense. They constitute a vital infrastructure for the economy well as for the communications of a country. Several documented cases show that power grids tend to become primary targets for cyber-attacks – especially with the massive integration of renewable energy sources (RES) -, which tend to increase with an increasing connectivity. The current trend of using multiple electricity producing energy sources, such as wind turbines or solar panels, creates the need to put in place a complex command and control system. This kind of decentralized system changes the paradigm of the whole national electric power system from a production-oriented approach to a demand-oriented approach. Having a real-time management of electric power production to fulfil the demand, there is a necessity to enhance the industrial control system with an important data management part. The command and control systems, especially the SCADA (Supervisory Control and Data Acquisition), rely on a large stream of data used to pilot these decentralized wind farms or solar power plants. This stream is made by the gathering of each turbine data and has a more important role in plants that utilize RES than in the traditional thermal ones.

The increasing reliance on *smart* systems means larger implementation of remote-based control of the facilities, especially with decentralized producing infrastructures such as small hydro, or mid-sized wind farms.¹⁹ This reliance on supposedly smart systems also means an increase in the number of sensors to allow for a more precise management of the facility. On the other side, it also means an increase in the number of remote access points to the system, which opens a window of opportunity for distant cyberattacks. In addition, different communication protocols, especially wireless ones (such as Wi-Fi, 3G, 4G, and ZigBee) give cyber-aggressors an easier access to the system than with wired connections. The distributed nature of next-generation electric networks tends to increase the use of wireless protocols to facilitate their management through remote controls. Their connected essence – further developed with the use of cloud computing for SCADA data processing - enhances the possibility of sabotage oriented cyber-attacks (Sun, Liu and Xie; 2016).

These systems could also be targeted by ransomware or by hostile takeover of the system as their cybersecurity level could, most of the time, be considered as quite low. An aggressor could infiltrate the system using physical vulnerabilities or remote-control access to introduce a malware (e.g. Petya, WannaCry, etc.). The loss of revenues of a paralyzed wind farm could be estimated to be between USD 252 000 and USD 750 000 per day (Staggs; 2017). Even with the existence of global standards for industrial control systems – ISA 99 for example - the lack of precise cyber security regulations and protocols for renewable energy sources could be a major threat to national grids with the projected increasing role of renewables in countries' energy mixes. In this view, RES power plants and substations could constitute the ideal gateway for cyber-aggressors to enter the whole national – or multinational, as the EU is pushing for ever more interconnected system – power grid.

Using these vulnerabilities, middle or high skilled determined hackers could breach into the whole electric system of a country and create regional or national black outs. In terms of global security there is a risk of economic disruption far more severe than the result of the 2007 cyber-attack against the Estonian government and its banking system. Cyber security policies that specifically address the risk related to renewable energy producing facilities should be implemented in Western countries according to the national level of cyber awareness and the level of consciousness regarding specific RES plants risks. At the EU level, the 2016 Clean Energy for All Europeans proposal made by the Commission specifically mentioned the need to address the specific issue of cybersecurity. In the most advanced NATO cyber countries such as the US, or France, the awareness of cyber security risks to RES plants and how to deter these risks are slowly being included in their strategic white papers and documents²⁰. There is still a gap to fill before they are properly included in national policies.

Yet at the European level, regulations regarding cyber security are at crossroads. The EU Commission has tried for years now to promote its Digital Single Market Strategy through legislations such as the Network and Information Systems (NIS) Directive²¹. However, the enormous differences between the member-states, in terms of both capabilities and awareness, limit the harmonization of regulations by leaving it to the goodwill of each member state.

¹⁸ <https://en.geidco.org/aboutgei/uhv/>

¹⁹ <https://www.forbes.com/sites/thomasbrewster/2015/06/12/hacking-wind-solar-systems-is-easy/#360564064d5c>

²⁰ In France the 4th recommendation of the General Council for Economy report (2017) regarding *the opportunities of the energy transition* specifically addresses the challenge of strengthening the cybersecurity level of infrastructures.

²¹ <https://ec.europa.eu/digital-single-market/en/cyber-security>

The EU has taken steps to impose an important change in this cyber-security policy, switching from a national-based policy to an EU-based policy. Trying to transform the European Union Agency for Network and Information Security (ENISA) into a cyber-security agency responsible for the certification of cyber devices for the whole Europe, the EU Commission intends to gain an upper-hand over cyber security issues. The unresolved issue is on the level of cyber security ENISA would base its certification on. The most advanced countries in terms of cyber security, especially France and Germany, were afraid that the chosen level is inadequate and would not ensure a proper level of protection against determined aggressors. In May 2018, the proposal for the EU Cybersecurity Act finally limited the transformation of the ENISA into a European Cybersecurity agency in charge of the harmonization of national regulations.

Considering these issues in terms of cybersecurity, the will of China to create an integrated “electric corridor” relying on remote ICT management – using mostly 5G – appears as an important security issue. There is of course the fear of zero-day vulnerabilities – and potential backdoors – but in a broader sense this policy would multiply exponentially the number of distant access points to the electric system. If global integration is a benefit for electric security, having a better redundancy in production and transmission, it could also, in case of major breakdown, lead to a cascading effect. Using one kind of technology, especially in terms of ICT protocol to manage the plants and substations, is thus a paradoxical security issue. Of course, for China it is the opportunity to promote its own technologies and norms, in the context of global technology competition with the United States, but for Europe it is more a delegation of security in the hands of an external state. This situation would therefore create a dependence not only in terms of energy security but of global security as the electric and cyber networks would be totally intertwined and dominated by Chinese state-controlled actors.

Conclusions

The project of China-Europe electric corridor appears to be a challenge for the EU energy policy as well as for the idea of a European policy to regulate foreign investments in strategic sectors. Regulation of competition has been the very deep core of EU policy for more than forty years, especially since 1996 in the energy sector. The results of this policy, emphasizing the liberalisation of electricity and gas market as beneficial for the European consumer, appears contrasted. On the one hand, the liberalization of national energy markets may have removed the burden of state-monopolies, sometimes considered a cumbersome bureaucracy. Nevertheless, on the other hand, this policy, going without any control of foreign investments, gave the opportunity to non-EU state-controlled companies to enter the European electric T&D markets, allowing non-EU states to influence national and European policies. To this extend the strategy of Chinese companies to buy stakes in multiple TSO and DSO all over Europe to achieve predominance over the continent could be considered a way to influence the European energy policy from the technical and infrastructural level.

Firstly, there is a major geopolitical issue. The buyouts of multiple transport and distributions operators, on a large scale, constitute a continental energy security issue, especially with the growing interconnection at a transboundary level. Several major transporters and distributors are now partly or wholly dependent of an extra-European state through various economic or financial mechanisms. This situation naturally rises concerns about China's actual or supposed intentions vis-à-vis the European electricity sector, which, split between various companies, represents an easy economic prey. Beijing's willingness to move towards electrical integration at the Eurasian level lead to the risks of both a sharing of energy security issues between Europa and China and an *a priori* orientation of EU member-states energy policies to China. By positioning themselves at the end of the energy value chain, Chinese state-owned enterprises thus have an important leverage, particularly in view of the entire European energy sector evolution.

The second observation is techno-regulatory. The acquiring of the technological know-how of European companies on the issue of smart grids is coupled with the possibility of regulatory pressure from State Grid towards standardization according to its own standards. By completing a form of continental dominance over next-generation power grids, SGCC, alongside with other companies such as Huawei, could launch a normative offensive at the community level relying on its European subsidiaries.

Emerging from these observations, there is the need to reconsider the policy of liberalization of the networks carried out through 2003/54/EC Directive in terms of energy security. In view of the potential implications, the challenge of Europe's technological and geopolitical independence should be a priority. In a sense the policy pursued for many years is a response to the very essence of the economic opening up of the European market, but it ends up weakening both the cohesion and the security of the Union.

Secondly, this situation of a deep fragmentation of the transport and distribution sectors, if it is consubstantial with a desired and decisive liberalization policy in Brussels, does not exclude concertation at Community level.

ENTSO-E, which brings together transmission system operators at the European level, does not have the same regulatory and standardization capacity as the North American FERC-NERC pair. On the contrary, ENTSO-E - just like ENTSO-G in gas - appears rather as a facilitator of interconnection and a forum of discussion between the different actors. The transformation of this organization - which could also include distributors - into a true European regulator at the same level of the FERC, especially in the role of the latter in controlling the acquisitions of assets in electric field, could compensate for the preponderance of an economic actor. The liberal logic implemented so far, if it is not to be called into question, must be accompanied by a real control of the operators at Community level to ensure that they work above all in the direction of European interests, including in terms of energy security.

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