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POLICY BRIEF

EUROPEAN TRANSPORT REGULATION OBSERVER

Electricity and Infrastructure Managers: Is there a need for regulation?

Highlights

Electricity is used for railway traction. With the 4th Railway Package, traction current became excluded from the Minimum Access Package to be provided by the Infrastructure Managers (IMs) and was declared an additional service that could be acquired from third parties or even directly generated by the Railway Undertakings (RUs) themselves. It is, however, still common in many Member States to have the IMs as the only providers (the so-called “intermediaries”) of electricity for traction, be it for legal or for technical reasons. The question of traction current has recently gained attention because of the decarbonisation imperative on the one hand and the rise in electricity prices on the other. Overall, there seems to be a need for clearer regulation.

In the context of their corporatisation, railway operators were unbundled and their electricity generation, if they had any, was often sold to electricity generating companies. Most IMs now buy electricity on the market, even though some of the IMs still generate their own electricity or a portion thereof. With increasing electricity prices IMs are forced to manage their electricity portfolio more proactively (futures, hedging, etc.). Some of the IMs are even considering going back into the generation business be it in order to reduce price risks or in order to take advantage of renewables generation along their infrastructures. There might even be opportunities for IMs to sell electricity, for example for charging electric vehicles at railway stations.

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This raises the question as to how far IMs can go in terms of energy management and generation, thus the need for regulatory certainty. In particular, there is a need to clarify the interface between railway and energy regulation.

Against this backdrop and drawing on the discussions of the 22nd Florence Rail Forum, this policy brief examines the current and foreseen practices in the different Member States in matters of electricity for traction, the technical and legal issues that complexify the matter, as well as the question of whether there is a need for regulatory clarification.

Is there a need for regulation in rail traction current?

A comment by Matthias Finger and Juan Montero, Florence School of Regulation – Transport Area

Our Rail Forum on traction current asked the question whether there was a need for regulation; the clear and simple answer is YES! And probably there would have been a need for action since long; yet, it is the exploding electricity prices as a result of the Ukrainian war, coupled with the pressures to and opportunities for greening rail, that really put traction current on top of the agenda of Railway Undertakings (RUs), Infrastructure Managers (IMs) and railway regulators… whereas the issue still remains absent from DG MOVE's current work programme.

To recall, the EU pursues the objective of building a single European market, both for electricity and rail. Not only the goals are identical in both sectors, but also the means to reach that goal, namely by unbundling formerly vertically integrated operators, while regulating non-discriminatory access of both electricity suppliers and RUs to the monopolistic infrastructure that are the electricity grid on the one hand and the rail network on the other. So far so good. However, both processes are pursued independently from one another and not astonishingly have ignored one another and have followed different rhythms. On the one hand, electricity market liberalisation has simply left aside rail traction current, even though railways are typically the biggest consumer of electricity in almost every EU Member State. On the other hand, railway liberalisation, even in the 4th Railway Package, has assumed that RUs would eventually have access to various suppliers of electricity, as traction current is defined as an additional service in the Recast Directive, and if not, it would be charged at cost plus a reasonable profit.

The reality today is that the single European electricity market is much more mature than the single European railway market. There is competition in the supply of electricity, but RUs in most Member States cannot choose their electricity supplier and they rely on the monopolistic provision by the IM in each territory. As electricity prices have risen, this has become the largest cost in some routes, even higher than track access charges, becoming a barrier to entry for newcomers and an impediment to realising the single European railway area.

Traction current is becoming even more relevant (and complex) because the EU's ambitious decarbonisation objectives put unprecedented pressure on railways which are called upon to play a central role to reach these goals, not the least thanks to attracting massive investments on the deployment of new electricity sources such as solar panels. IMs are concentrating four different roles: generating part of the electricity, acquiring another part in the market, transmitting it all to RUs through their infrastructure, and selling it to them. Too much integration of activities for a natural monopoly.

Now, the most logical way out would be to apply the more mature electricity regulatory framework also to traction current, and this is most likely where we will end up at the very end, at the example of Germany where the Federal Court of Justice has mandated precisely that already back in 2010; unbundling of the corporation in charge of energy, and detailed regulation on access to the infrastructure, including the deployment of meters in rolling stock.

But in order to get there, we nevertheless will have to deal with specificities of electricity in railways (identification of consumers when locomotives are leased and subleased, consumers moving across the country, deployment of meters, etc.). Indeed, one has to acknowledge that railways are not simply a large customer that has been forgotten in the electricity regulatory framework. It cannot be treated as a closed distribution network either, which is the closest concept the electricity regulatory framework has for integrated railways. Rather, typically the IM operates a parallel electricity network, often also covering an entire country, a network that has no

status within the electricity regulatory framework. And even in the railway regulatory framework this railway electricity grid is simply treated as an appendice to the tracks. It is moreover a network that is not just distributing electricity to a few end customers aka RUs. Rather, that parallel network has multiple interconnections with the national electricity grid, and in some countries these interconnections involve the transformation of the current from 50Hz to 16.7Hz, an additional cost factor.

In some countries, integrated railway companies produce electricity for their own consumption and with the new decarbonisation objectives (and sometimes corresponding subsidies) IMs aspire to venture into electricity generation. This is further complexified by the fact that in most EU Member States the end using customers, i.e., the RUs (in most Member States) are still unable to precisely measure the consumption of a particular train thanks to onboard devices.

To that one has to add legal and institutional specificities of railway electricity, both generation and grid operations, different in each Member State. In some Member States railway electricity is under the electricity law, in others precisely exempt from that electricity law. In some Member States, traction current must be provided by the national IMs, in others this is simply a historical practice. In some Member States, the IM actively manages traction current (hedge contracting etc.), in others it is forbidden to do so. It is fair to say that in most Member States incentives for managing traction current are not aligned with the requirements of long-term planning and investing of RUs.

Now, all these legal, institutional and technical specificities do indeed complexify the application of a regulatory framework to traction current that is not only harmonised across Member States so as to facilitate cross-border railway operations, but moreover is stable and predictable so as to favor long-term investments while at the same time capable of handling various types of public support for strengthening railways vis-à-vis less decarbonised modes of transport. Not to mention the fact that this framework should be in line with the basic principles of both a single European electricity and railway markets. But none of these specificities are insurmountable.

The question therefore is more one of how to get there and who should be the driver. One could start from the more mature electricity regulatory framework and gradually adjust traction current to it. One might also start from the current railway regulatory framework and gradually remove the specificities that impede the creation of a single European traction current market. The ultimate outcome of these two processes will probably be very similar, but the chances of going astray will probably be bigger along the second way, not to mention the fact that it will certainly take longer. And who should take the lead? Before COVID-19 the European Commission's DG MOVE and DG ENER had started discussions to address the issue. We think that it is time to resume these discussions in the interest of advancing a more integrated single European electricity and railway market.

Main Takeaways from the Discussions

By Teodora Serafimova, Florence School of Regulation – Transport Area

The current context of unprecedented energy price increases and volatility, coupled with the European Union's ongoing energy transition and efforts to pursue a modal shift to rail, renders the topic of traction current particularly relevant for railway undertakings (RUs) as well as for the entire railway ecosystem. To recall, traction current is an essential rail-related service for providing rail transportation using electric trains and locomotives. The public electricity grid network is composed of energy companies producing electricity, which in turn, is transmitted and distributed to households and companies. This electricity is also fed into the railway network through dedicated infrastructure elements such as electric substations. Despite its evidently close link to the use of the electrical supply equipment, traction current is excluded from the Minimum Access Package (MAP). Instead, traction current is classified by Annex II No. 3 (a) of Directive 2012/34/EU as an "additional service" and thus follows a separate price regulation.

Though the Directive does not define traction current, the concept can be easily understood as "the continuous flow of electricity with a view to enabling electric trains to feed their engines and provide transport services". Despite what is a seemingly straightforward definition, a closer look at its implementation in the various Member States reveals a high degree of divergence in approaches. To gain a deeper understanding of these national practices and approaches, the 22nd Florence Rail Forum was kicked off with a presentation of the recently published Overview Paper on Charges for Traction Current, produced by the Independent Regulators' Group – Rail (IRG-Rail). The findings of this overview document are based on questionnaire responses by 23 member countries of IRG-Rail.

Various stakeholders need to be taken into account when examining the topic of traction current. These include railway undertakings (RUs), as the end users of the electricity; infrastructure managers (IMs) as the party in charge of operating the rail network; and the energy undertaking, which is the company that supplies the electricity. The IRG-Rail overview paper analyses the different relationships that exist between these three sets of actors, namely the user of traction current, the (rail-related) service provider, and the energy supplier.

The so-called "intermediary" approach is most prevalent in the EU. In the countries where such an approach is observed, there is a direct relationship between the end user of the electricity (i.e., the RU) and the service provider, which in a majority of cases, is the IM. These two parties enter into a contract for the provision of the traction current service. In parallel, there is another relationship between the service provider and the energy supplier, which in turn, provides the electricity to the rail network. It is referred to as an "intermediary" relationship because the IM, as the service provider, is in the middle of the two other parties, whereby two separate relationships exist. An alternative approach is that of "separation", in which even though there is still a relationship between the end user of traction current and the service provider, the electricity itself is not directly contracted from that party. Instead, in these cases, the RU directly sources its electricity from the energy supplier. Things can get further complicated when we observe a mix of different approaches, i.e., having the possibility of obtaining the electricity from the service provider either as a fallback option or as an alternative to going directly to the market. Similarly, complexity increases in instances where the service providers are allowed to produce the electricity themselves.

The overview paper shows that in 17 out of the 23 countries surveyed, there is only one provider of the service. In a majority of cases (in 15 out of the 17 countries), this party tends to be the IM or a subsidiary company of the IM. There are some exceptions though, such as Poland, where an independent company (not the IM) is in charge of providing traction current, and the Netherlands, where RUs set up a group-purchasing organisa-

tion that buys the electricity from the market and then resells it to the individual RUs.

Conversely, it is only in a few countries that we observe more than one provider of traction current. These include Austria, Bulgaria, Finland, France, Germany and Portugal. However, the fact that there are multiple providers of electricity in these countries does not preempt the possibility for RUs to choose an energy provider. To illustrate this, in Portugal, there are two energy providers, but these were selected by the IM and the incumbent RU in a tendering procedure. In other words, this does not guarantee an individual RU the right to choose an alternative energy supplier. On the other hand, whereas there is only one energy provider in both the United Kingdom and Belgium, in theory, it is still possible for an RU to sign a contract directly with another energy supplier. In other words, the number of providers does not determine the possibility of choosing a provider.

The report goes on to reflect on the reasons behind there being a sole provider (the IM) in the majority of cases. The fact that the IM tends to be the only provider illustrates how tied the provision of the service is to the rail infrastructure. Most of all, the report underlines the existence of legal and practical reasons for sticking to a sole provider. In the case of Croatia, for instance, there is a legal constraint deriving from the National Railway Act, which stipulates that IMs shall be the sole buyer of electricity through a public procurement procedure. A similar situation can be observed in Spain, where the legal constraint originates from the National Energy Sector Act. In this case, it stipulates that the IM should be the only owner of the electric supply points and, as such, can be the only party that can access the energy market. Moreover, there are also practical constraints behind cases with a sole provider. In Italy and Sweden, for instance, it is claimed that there is an economic advantage to the IMs being the sole provider of the service. In Slovakia, on the other hand, technical constraints linked to the limited implementation of on-board metering were argued to hinder the adoption of an alternative approach in the country.

Charging systems are another topic that the report explores in depth. Additional services have a particular price regulation, and in cases, where there is a sole provider of the service, the regulatory framework stipulates that charges cannot exceed the cost of providing the service plus a reasonable profit. The IRG-Rail report finds that in 15 of the respondent countries, service providers do not charge a reasonable profit, meaning that in these cases, the service provider acts as a mere intermediary between the parties, buying electricity from the market and then reselling it to the operators in the rail network, without including any or a reasonable profit. What is more, in a third of respondent countries, it is specifically mentioned that their system follows a profit neutrality principle.

A few exceptions exist, however. One of these is Austria, where dedicated infrastructure is in place and used for the provision of the service. The presence of such an infrastructure element and its associated risk is the justification for charging a reasonable profit. In Romania, on the other hand, a fixed amount is charged per MWh, though no information has been gathered as to the reasoning for it.

In this context, it should be noted that reasonable profit, when applicable, refers to the charge for the rail-related service, not to the price or fee that is charged by the energy company since the latter is not regulated by railway regulation. Therefore, it cannot be excluded that some energy companies do charge reasonable profit for the provision of electricity. In countries where it is possible to directly contract with an energy supplier, the prices for energy are determined by the free market.

Another topic tackled by the study relating to the charging systems is that of energy measurement systems (EMS), also referred to as on-board power meters. These are devices that are installed on trains and that provide an actual measure of consumption as opposed to an estimated consumption during a given journey. Traditionally, all charging systems have relied on conversion ratios or alternative metrics that provide an estimation of a train's consumption

throughout a given journey. However, there are many different variables that may affect the real consumption of a given train, including the technical specifications of the train, the characteristics of the terrain or even the driving behaviour of the train driver. As a result, similar trips may end up consuming significantly different amounts of electricity despite being charged in the same way. Conversion ratios and other metrics, therefore, do not fully capture all the potential variables affecting final consumption.

The implementation of EMS, however, remains limited and continues to face important economic and technical barriers. At present, only 11 countries' charging systems allow for the usage of EMS. Notwithstanding, there is broad agreement among regulators on the advantages linked to their wide-scale deployment in railways. First, charging according to actual consumption matches real demand for electricity, which may lead to fewer inefficiencies in the system and less supply imbalances altogether. Second, allowing for charging according to actual consumption would provide a clearer signal of the cost borne in the provision of the transport service. RUs may translate this into the final prices, ensuring better price signals for the end users of transportation. Third, if RUs can pay on the basis of what they consume, this could foster energy savings by incentivising better performance by train drivers or investment in more energy-efficient rolling stock.

According to a number of stakeholders, the fact that some charging systems do not allow for the use of EMS constitutes a practical obstacle for choosing an energy provider, given that it is more difficult to link energy consumption with output production by RUs. Incentivising the roll-out of EMS was, therefore, welcomed as a means to enable a shift away from the reliance on a sole provider.

The Forum also provided an opportunity to examine the topic of traction current from an energy regulation perspective. To recall, electricity supply has been liberalised in the EU since 2007. According to Article 4 of the Electricity Directive (EU/2019/944), all electricity consumers shall have the right to choose their electricity supplier, in addition to which, they can have more than one electricity supply contract in parallel, provided that the required connection and metering points are established. In view of this, from an electricity standpoint, it was noted that there is no legal provision or legitimate reason which would hinder RUs from enjoying the same freedom to choose their supplier.

The Forum, furthermore, explored the status of IMs' electricity network within the electricity regulatory framework and, more precisely, whether it can be considered a so-called "closed distribution system". According to Art. 38(1)(b) of the EU Electricity Directive, this specific type of system shall distribute electricity primarily to the owner or operator of the system or their related undertakings, which in the case of railways would be the IMs. Drawing on this definition, it is doubtful that this would be the case in most Member States, as it is RUs – as opposed to the IMs, which tend to be the primary consumer of electricity. Having said that, even if it were to be classified as a closed distribution system, railway IMs would still have to comply with the obligation to provide third-party access under the EU Electricity Directive, thus leaving little room or justification for not allowing competition in the market.

Moreover, reacting to the findings of the IRG-Rail study, some stakeholders argued that the limited metering on the individual train level does not constitute a legitimate excuse for sticking to a sole provider. In particular, it was noted that since there are multiple trains and train companies operating on the same rail network today, specifically in the liberalised rail freight segment, there must already be ways of defining and measuring their individual consumption. This, in turn, it was argued, could be an indicator of their respective energy consumption in a transitory period up until smart meters are installed at a large scale. Here once again, an analogy was drawn to the electricity sector, where despite liberalisation having been in place for 25 years already, smart meter implementation is still not uniform across the Union.

Another interesting observation from the energy sector has been that even if consumers are

entitled to switch energy suppliers, they do not tend to make use of this right on a regular basis. In fact, for a long time, the switching rate in the EU has remained at around 5 – 6%. This means that a typical consumer would switch energy suppliers every 16 to 20 years. The fact that consumers do not switch, however, is not a conclusive indicator of whether competition has been effective or not. To illustrate, there could be a scenario where effective competition in a given market exists, but all competing suppliers are offering the same prices and terms, which in turn, leaves consumers with little incentive to switch away from the incumbent provider in order to take advantage of competitive prices. In other words, contestability and the mere threat of competitors may well be sufficient to avoid overcharging by the incumbent supplier.

Subsequently, discussions dove deeper into the role of the IMs with respect to the traction current consumed by RUs. Stakeholders were in agreement that If IMs were to simultaneously compete with other energy suppliers in selling electric current to RUs, their role as electricity network operators would have to be separated from their supply business in order not to distort competition (e.g., IMs using access charges to their electricity networks in order to disadvantage competitors in respect to their own business of supplying electricity). When it comes to separation, there is a long history of unbundling between competitive and monopoly activities in the European energy sector, where it has been pursued on three main grounds: to avoid cross-subsidisation in tariff-setting, possible discrimination in access conditions and distortions in network development.

Drawing on this, different forms of unbundling were identified for railway IMs based on the regulatory framework for the energy sector. To begin with, “accounting unbundling” would require the railway IMs to keep separate internal accounts for each of their activities, in particular, separate accounts for their electricity network-related activities and for other activities. Subsequently, “functional (management and decision-making) unbundling”, would require the railway IMs to separate the management, including decision-making, of their different activities, in particular separate management and decision-making of their electricity network-related activities and of their other activities. “Legal unbundling”, on the other hand, would require the IMs to operate their regulated and competitive activities, in particular, their electricity network-related activities and their other activities, through separate legal entities. Finally, “ownership unbundling” would require the electricity network-related activities and the other activities of the railway IMs to be operated by undertakings with separate ownership.

In the German case, for instance, the Federal Court of Justice has ruled that energy regulation shall be applicable in the context of traction current. Though unbundling is underway, there is no specific unbundling rule in the railway market, which stipulates that IMs cannot be service facility operators in parallel. As a result, DB Energie runs the distribution network while at the same time producing and selling energy without the obligation to unbundle. This, in turn, has been possible thanks to provisions stemming from EU legislation, which foresee that very small operators with less than 100 000 customers shall be exempted from adhering to unbundling rules. This illustrates that the legislator, at the time of designing the law, had not considered that an energy supplier as big as a railway energy supplier, could have less than 100 000 customers yet such high consumption. In view of this, discussants agreed that IMs do not entirely fit into the electricity framework and reiterated the importance of regulatory clarification.

In conclusion, this initial session showed that the railways- and energy-related regulatory frameworks have evidently been approached and developed in a separate manner. This points to a lack of knowledge and awareness at the time of the boundaries between the two laws and sectors, which are being brought to light ever more prominently by the current realities. As a result, there is little alignment and even contradictions between some of the provisions in the

respective pieces of law. Stakeholders were in agreement on the need to clarify the law and the borders between the different legal provisions. As a starting point, a careful analysis of the legal interfaces would have to be conducted. Only afterwards would it be possible to devise a regulatory framework that is conducive to a more efficient railway system and a competitive energy system. Whereas Forum participants agreed on the central role that the European Commission would have to play in such a clarificatory exercise, it was also noted that another, perhaps more pragmatic, debate could take place directly between railway and energy operators.

What are the current and foreseen practices in the different Member States in matters of electricity for traction? What are the technical and legal issues complexifying the matter?

Austria

In Austria, the infrastructure manager (IM) ÖBB-Infrastruktur AG has its own traction transmission and distribution system covering roughly 2 000 km of the electricity network in the country. About one-third of the energy needs are met by the IM's own production, whereas another one-third is contracted by partner power plants. In other words, roughly two-thirds of the Austrian energy demand from the railway sector is covered within the traction current network and power plants within it, which has a frequency of 16,7 Hz (in contrast to the general public network's frequency of 50 Hz).

Prior to 2015, the Austrian IM delivered the energy to the railway undertakings (RUs) while also being the owner of the distribution network. The traction current and the use of the traction current network were provided as one product. In 2015, the first proceedings were initiated by the Austrian regulator, Schienen Control Kommission, with the goal of enabling liberalisation and ensuring that all RUs could source their energy either from the 50 Hz network or from the 16,7 Hz network. The ultimate objective was to enable the delivery of energy by a (third) energy provider. In 2016, the deregulation of the traction current market was completed.

Railway law has been applied in the regulation of the traction current network in Austria. The EU Railway Directive defines traction current as an "additional service", and in Austria, this term has been broadly interpreted to constitute an "entire network". Though the Electricity Directive gives clear indications as to what a system operator is (i.e., either it is a distribution system operator or a transmission system operator), in its transposition into the National Electricity Act, the Austrian legislator ruled that a distribution system operator or a transmission system operator can only be one that runs on the frequency of the 50 Hz network. As a result, the 16,7 Hz network was intentionally left out. Following a lengthy investigation process launched by the regulator, the Federal Court referred the Decision back, stating that the additional service comprises both the traction current and the traction current network, whereby the traction current network is only to be regulated where the traction current itself is in competition. As underlined by the IRG-Rail paper, whereas Austria allows RUs to source their energy from the 50 Hz public network, in practice, this has been discouraged by the IM's double tariff system (i.e., one tariff for the distribution of energy and one tariff for the conversion of energy). In sum, the Austrian approach underscored a preference to prioritise the proper transposition of existing regulation as opposed to resorting to new regulation.

Germany

A similar railway network structure to Austria characterises Germany. However, as already elaborated in the previous section, already back in 2010, the German Federal Court of Justice ruled that the traction current network is an electricity supply network and is to be subjected to regulation under the Energy Industry Act, given that no specific rules on access and charges for the traction network exist in railway law.

On the basis of the Federal Court decision of 2010, it has been possible to establish that energy suppliers have a right to supply customers in the traction network, RUs can choose their own energy supplier (third-party access), and costs of the traction network are to be paid via energy bills (i.e., not part of the MAP). A total of

about 12 railway electricity suppliers are active in the German market today. There are no price differences for conversion and distribution, and a price list is reworked in line with the rules of the electricity regulation and published on an annual basis.

Notwithstanding, the Federal Court has also acknowledged the need for specific regulation in order to cater to the technical needs of the railway network. These relate, in particular, to the mobile and transboundary nature of railways, whereby there is not one but numerous RUs and locomotives per customer. One given technical point of use does not necessarily remain with the same user, and changes can take place at frequent intervals. Moreover, the fact that braking energy can be fed back into the catenaries and remunerated provides an economic incentive to RUs to improve the efficiency of their operations and reduce their electricity bills. In contrast, energy regulation tends to deal with more stationary businesses, such as buildings.

Subsequently, different market approaches have evolved over the years. In July 2022, the German regulator Bundesnetzagentur (BNetzA) published a regulation of traction current access rules with a view to simplify the operational procedures, ensure more efficient process design, designate clear responsibilities, and accelerate digitalisation. The obligations laid down in the regulation are to be implemented by July 2026. In sum, the need for additional regulation was approached sceptically by stakeholders in Germany, where it has been clearly established that electricity regulation applies to the distribution grid. Notwithstanding, it was recognised that the political response to the current energy crisis is going in the direction of more regulation rather than less.

Spain

The cost of electricity has typically represented between 12% and 19% of the average cost per ticket of an average high-speed operator in Spain under normal circumstances, according to figures from May 2021. This oscillation can be attributed to the differences in the charges for the use of the lines, which for some routes such as Madrid-Barcelona are greater, diluting the weight of the cost of energy in relative terms. The current price increases triggered by the energy crisis have resulted in traction current now accounting for 27-40% of operators' cost structure. For the average operator, this price increase means an increase in the average cost per ticket of between 22% and 35%, which in turn, is equivalent to around €8 more per ticket on the Madrid-Barcelona route.

Against the backdrop of the current realities, national regulations governing traction current in Spain assign the IM, Adif, exclusivity in the acquisition of traction current, which it then resells to railway operators as a service. As a public entity subject to Spanish public procurement law, Adif has to adhere to rigid regulations in terms of contracting deadlines, negotiations and the involvement of interested parties in the management of electricity supply contracts. Contracts of more than five years are not to be exceeded.

One of the advantages of such a centralised purchasing model has been that it allows for better prices to be obtained due to economies of scale while simplifying the administrative management of the supply of traction current for new entrants. Centralised purchasing, however, was only welcomed as long as it adequately takes into account the interests of all railway operators, regardless of whether incumbents or newcomers. A negative effect of such a centralised purchasing approach, on the other hand, is that it can restrict the possibility for operators to take their own decisions in the complex times of the current energy crisis whilst limiting certainty on electricity supply prices. The latter is a crucial precondition to enabling the proper pricing of tickets. What is more, the above-mentioned limitation of contracts to a maximum of five years conflicts with the long-term needs of railway operators. To illustrate, it was pointed out that while the newcomer OUIGO has a 10-year framework allocation capacity contract, its rolling stock needs to be modified to enter the Spanish market, and the related investments have to be amortised for a period of time exceeding ten years.

In view of this, Forum participants stressed the need for enhanced transparency in the selection process of the energy supplier, in particular when it comes to prices, contract modalities and any measure that may have anti-competitive effects. Some participants put forward the idea of establishing a so-called contract co-management body involving the participation of all interested rail companies. In addition, support was expressed for the prolongation of supply contracts, regardless of whether these are centralised or not, to a duration of up to 10 or 15 years.

Italy

Traction current in Italy is regulated by a set of consecutive Decisions by the Italian Transport Regulation Authority (ART-IT). First, through its Decision no. 127/2017, the ART-IT launched a public consultation on the further development of principles and criteria for regulating access to the national railway system. Notably its Annex A, point 8 of the Decision ("Pricing of the traction current supply") underlines the need to ensure a better correlation between the tarification determined by the national IM, RFI, for the provision of traction current and the actual energy consumption of each single train. Since at the time of the Decision's adoption, only a few trains were equipped with on-board meters, energy consumption was based on an estimation by the IM.

The subsequent Decision No. 152/2017 concluded the consultation process and adopted some additional principles and criteria for regulating access to the national railway system (Annex A to the Decision). The Decision imposed the establishment of different energy consumption classes, depending on rolling stock types, and the adoption of specific coefficients for each class (to estimate the energy consumption from the amount of electrical train*km operated) with the aim of differentiating the unit cost of energy depending on each energy consumption class.

Decision No. 33/2018, on the other hand, requested the national IM to ensure that the accounting and billing of the traction current supply are done by means of EMS from 2019 onwards. A communication from the IM dating from March 2022, however, demonstrates that only two RUs in Italy declared themselves in a position to use EMS for energy billing.

Last year's ART-IT Decision No. 227/2022 requested the IM to launch, by 1st February 2023, a public consultation of stakeholders on the terms of reference, through which applicants for rail infrastructure capacity may request the provision of traction current to the different providers operating in the liberalised energy market (and therefore not only through the IM). In the context of this consultation, the ART-IT also requested the IM to publish any existing impediments and incentivising provisions for applicants to install on-board energy metering systems on their respective rolling stock and buy traction current from third parties.

When it comes to the technical issues, RUs quoted difficulties in getting EMS to comply with the latest standard of EN 50463:2017 due to a lack of data transducers installed on-board as well as a lack of their electronic components on the market. On the regulatory front, the main obstacles pertained to the management of "mobile" points of delivery. Stakeholders reaffirmed that the existing energy regulatory framework does not adequately consider the case of final consumers equipped with "mobile" supply points, such as RUs operating trains on a network, and instead, it largely focuses on fixed points of delivery spread over pre-defined territorial zones of the energy transmission grid.

In sum, the Italian experience suggests that in order for RUs to buy energy on the free market, they would need to meet a number of pre-conditions. Namely, they would need to be equipped with fiscally certified EMS, acknowledged and accepted by the energy market, and be connected to fixed territorial points of delivery managed by the IM, which allows metering, accounting and billing of the energy transmitted by different energy providers and consumed by trains circulating along the different stretches of the rail network.

The need for a European response to address both ad-hoc and structural issues

Subsequently, discussions also zoomed out onto the European context. To recall, the European Green Deal and the Sustainable and Smart Mobility Strategy set ambitious objectives for modal shift both for passenger rail and rail freight. Progress towards these objectives, however, stands to be de-railed in the short term, with energy prices for traction having, on average, tripled in 2022 compared to 2021. What is more, the increase in electricity prices has been more significant than the increases in diesel prices, thus disproportionately affecting railways. If left unaddressed, this risks incentivising operators to switch back to diesel to power their trains.

Besides the economic elements, stakeholders highlighted the operational and technical challenges posed by the energy crisis. In particular, since higher speed comes with higher energy consumption, some participants cautioned against the forced reduction in rail speed, given that rail speed is a decisive element in rendering railways competitive vis-à-vis other modes and to growing their modal share. To counteract these effects, stakeholders stressed the need for railways to be granted priority access (also compared to other transport modes) to affordable and sufficient electricity in view of the necessity to sustain and grow their share. Besides being a core pillar of the EU's decarbonisation strategy, discussions recalled the strategic role played by rail freight during the crisis in sustaining supply chains and safeguarding the transportation of various types of energy in countries like Germany and Czechia.

In response to the crisis, the European Commission has adopted Regulation 18/54, which sets a number of emergency interventions with a view to tackling electricity prices in the short term. One of these is a target for reducing power consumption (a 5% reduction on 10% of the peak hours from 1st December to 30th March 2023). A revenue cap has also been introduced for the infra-marginal producers (i.e., nuclear and renewables). Some end users (RUs) might be able to benefit from such revenue caps, in particular, by reducing the unit costs of electricity traction for railways. Forum stakeholders stressed the importance of ensuring that part of the revenues from the cap is channelled towards traction current as a means to deal with the high energy prices. The application of these rules at the EU level was welcomed as particularly important to protect public service contracts.

While participants agreed that the long-term effect of such emergency rules should not be underestimated given their possibly distortive effect on competition, they also acknowledged that competition has been useful in managing the crisis. To illustrate, had there been no competition in the market, the pressure would have fallen entirely on the sole (monopoly) supplier. Conversely, there is also a need for strong customers in the market who have the purchasing power and resources to invest in large renewables projects and who are able to engage in long-term contracts (e.g., 20-30 years). In addition to the above-mentioned short-term measures, the Commission also put forward some longer-term measures as part of its REPowerEU Plan, comprised of a series of legislative proposals dealing with energy efficiency and savings, renewables deployment, and the addition of a new chapter to the national recovery plans on resilience.

In contrast to the emergency measures aimed at alleviating the effects of the energy crisis, the regulation of traction current calls for a long-term solution. In sum, discussions reaffirmed the interlinkages between European railways and energy laws. The EU Railways Directive hints at this interdependence by making a clear reference to the Electricity Directive in its Annex II where traction current is identified as an "additional service", i.e., "it should be done without prejudice to the Electricity Directive". Going forward, participants were aligned over the need for clarification on the interpretation of existing railways law. Since bringing the issue to the European Court of Justice would entail a lengthy and cumbersome process, stakeholders largely agreed that intervention at the institutional level would be more productive. Here a good starting point would be the clarification of concepts, including rail infra-

structure, the level of unbundling and charging systems in order to create a shared understanding of the rules and ensure their uniform application across the EU.

Conclusions

The discussions of the 22nd Florence Rail Forum identified a vast divergence across EU Member States when it comes to traction current and the overall organisation and management of electricity in railways. This divergence in itself constitutes an obstacle to advancing the Single European Railway Area, to promoting cross-border services and to growing the modal share of rail. The underlying factors behind this divergence are engrained in regulation and, specifically, the lack of clarity in regards to which regulatory framework shall apply to traction current. IMs, as natural monopolies, necessitate regulation, and this becomes particularly evident when it concerns their role as electricity suppliers.

A vast majority of stakeholders, therefore, agreed that the central question to be posed is not so much "whether" but rather "what type" of regulation would be needed going forward. An initial clarification to be made pertains to the "reference point" for the future regulation of traction current, notably, whether it should be the electricity- or railways-regulatory framework that serves as the basis for future regulation. The electricity regulatory framework enjoys a higher degree of maturity and can, thus, be applied immediately, as we have seen in the German case. The railways regulatory framework, on the other hand, may require some time for its further refinement or clarification. On a positive side note, devising a tailor-made regulatory framework would offer the advantage of better catering to the needs and specificities of the railway industry (e.g., mobile and cross-border nature, difficulty measuring its energy consumption, etc.).

Regardless of which avenue policymakers opt for, Forum stakeholders were aligned over the fact that the basic principles guiding the introduction of liberalisation (i.e., unbundling, access regulation) in network industries across Europe would remain largely the same for the railway sector. Therefore, the main principles around contestability, ensuring the possibility to directly contract a supplier, and the supervision of the conditions on which IMs pass the cost will have to be guaranteed.

Stakeholders also agreed on the need to make a distinction between structural issues (concerning regulation as such) and ad-hoc issues (concerning temporary aid measures due to high energy prices). While short-term problems surrounding high energy prices and regulatory uncertainty tend to take centre stage today, in the long-term, the focus would need to be placed on structural issues.

Against the backdrop of the European Green Deal and the need to decarbonise transport, IMs as major landowners, are well positioned to invest in solar panels and renewable energy along their infrastructure. Given railways' significant electricity generation capabilities, they have also become paramount in the ongoing debate concerning energy blackouts and resilience. By taking up a more proactive role in electricity generation, railways can boost the resilience of the entire electricity system.

As the discussions have shown, many IMs and RUs are indeed unveiling plans to invest in electricity generation with a view to becoming more self-sufficient and supporting the energy transition. In Italy, for instance, even before the energy crisis, Ferrovie dello Stato Italiane (FS) launched a new investment plan, which foresees the production of sufficient renewable energy to meet 40% of their electricity needs in the next five years. To this end, FS intends to invest €1.8 billion in the installation of solar power plants over the course of the next five years while making use of underutilised assets and space. Securing a conducive EU regulatory and industrial policy framework will be paramount to accelerate the deployment of such projects by incentivising efficient investments in the system, securing functional supply chains and access to necessary materials.

Third-party-access in railway electricity markets is possible

A comment by Florian Baentsch, DB Energie GmbH

Third-party-access (TPA) in the railway electricity market is possible – this was the main conclusion drawn from the German experience presented at the 22nd Florence Rail Forum in December 2022. On the basis of the European Electricity Directive (2019/944/EC) as well as the national Energy Economics Law (Energiewirtschaftsgesetz) and various domestic regulations, the electricity distribution network to supply traction power to railways in Germany is regulated to promote competition. This nation-wide distribution network on the technical basis of 110 kV and 16,7 Hz is owned and operated by DB Energie GmbH, which is a subsidiary of Deutsche Bahn AG. DB Energie guarantees open access to this network and offers the contractual and technical means for all relevant parties.

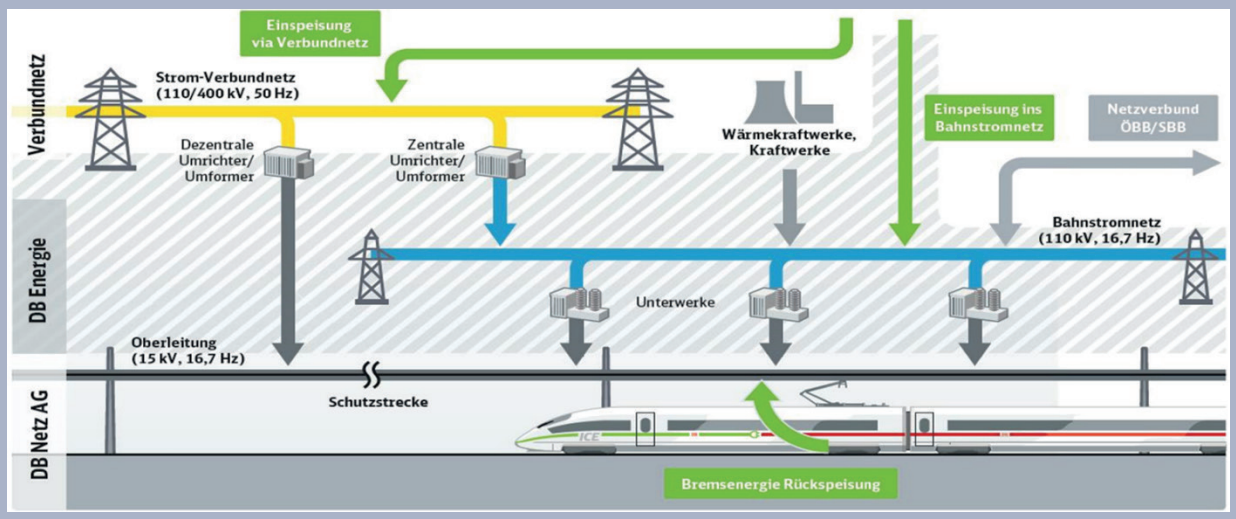
Within the competitive railway electricity market, all railway companies are free to contract an electricity supplier of their choice. Accordingly, about ten to twelve electricity suppliers have decided to enter this market to serve railway companies. The legal contracts, economic processes and data exchange formats are similar but not completely identical to those applicable to the regular 50 Hz electricity market. This is due to certain specific qualities of the railway market. For instance, railway customers are travelling around the country and also cross national borders, which is rather unusual in the normal electricity sector. Moreover, railways use different trains and locomotives to serve their transport obligations and may also exchange locomotives with other operators from time to time. Therefore, the point of supply had to be defined in order to aggregate electricity consumption to the correct railway operator. Each railway operator needs to be responsible for the electricity he or she has actually consumed. Market rules are therefore based on the definition that all trains and locomotives operated by each railway unit at each point in time constitute the “virtual point of supply”.

The electricity consumption of each virtual point of supply is calculated as the sum of all measured volumes of electricity consumption. Therefore, the measurement of the electricity consumption of each train and locomotive is a key feature of the competitive railway electricity market. Electricity consumption data is provided by on-board-meters and exchanged with the electricity grid operator. DB Energie, therefore, processes and delivers such consumption data to all eligible parties, such as the train operators and their electricity suppliers, as well as to other railway infrastructure managers in neighbouring countries. This data is also used to charge for the use of the electricity network. Those network access charges are calculated by DB Energie and regulated by the national electricity regulator. All customers find these network charges publicly available on the internet.

Under normal economic circumstances, competition in a market is there to stay. It is hardly possible to put a broken egg back into its shell. But what are normal circumstances, nowadays? Currently, we see regulation entering the wholesale electricity market as so-called “excessive” revenues of different electricity generators are curtailed. Additionally, strict regulation is also entering the end-user market. “Electricity price brakes” have been introduced by the German government to come into effect starting in March 2023.

Is there any room left for competition? Hopefully, curtailed revenues in the wholesale market as well as legally binding caps in the end-customer market of electricity, will remain temporary instruments to cope with the energy crisis. As we all hope that this crisis may not last forever, we are also hopeful that competitive electricity markets will prevail.

Traction Power is distributed via the Railway electricity network of DB Energie GmbH



Finding the right balance between competition and industrial policies at the intersection between railways and electricity regulations

A comment by Andrea Minuto Rizzo,
Ferrovie dello Stato Italiane

The intersection between electricity and railways regulation has several dimensions that can be assessed both from a European policy perspective and with a temporal approach, distinguishing between short-term and long-term. This discussion is very timely, as the current energy prices crisis still exerts a considerable impact on the cost structure of rail traction.

From a short-term perspective, when facing great uncertainty, public policy decisions can, indeed, influence the future direction in a decisive way, especially in the current phase where industrial policy is back into the political agenda. However, while – on the one hand – increasing the competitiveness of Europe, also in the light of decisions taken in other jurisdictions, like the Inflation Reduction Act in the United States of America, is key, on the other hand, protecting the level playing field among countries with different fiscal space would avoid fragmenting the internal market.[1]

Against this background, promoting modal shift towards rail as the most sustainable transport mode, is among the top priorities of the Commission's objectives within the Green Deal. In its Communication on a "*Sustainable and Smart Mobility Strategy*"[2], the Commission noted the need to shift towards more sustainable transport modes for both passenger and freight services, indicating very ambitious targets. Rail freight traffic must increase by 50% by 2030 and double by 2050, while highspeed traffic must double by 2030 and triple by 2050.

But in the meantime, energy prices have soared, sometimes to an unbearable level, and emergency regulations have been put in place both at European and national levels. In this challenging situation, the goal of a decarbonised European transport and mobility sector should not only remain achievable but also ensure an equal basis, without differentiations based on the country where an undertaking is located. Otherwise, the risk of a reverse modal shift becomes more concrete, with fossil-fuel-reliant transport modes gaining a competitive advantage over more sustainable, electricity-based transport modes such as railways, as well the one of a fragmented and uneven playing field.

At the initiative of the Commission, Council Regulation n. 1854/22[3], adopted on 6 October 2022, consists in an emergency intervention to address high energy prices, while preserving the functioning of the EU's electricity market and security of supply. The Council Regulation includes an integrated and interdependent package of four emergency interventions, including - among others - a wholesale cap on the market revenues of inframarginal technologies (e.g., nuclear, renewables). Interventions do not include an electricity retail price cap, which could have been considered at European level for services of general interest, such as rail, to stabilise it against inflation while – in certain cases - it has been taken into account at national level by countries with sufficient fiscal space. In that regard, policymakers should beware of possible unintended long-term effects of these discrepancies in short-term emergency rules. State aid cannot be the only European solution and should be accompanied by fair support mechanisms that maintain the integrity and unity of the internal market.

1 Special meeting of the European Council (9 February 2023) – Conclusions (https://www.consilium.europa.eu/media/61997/2023-02-09-euco-conclusions-en.pdf).
2 European Commission's Communication « Sustainable and Smart Mobility Strategy – putting European transport on track for the future », https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12438-Sustainable-and-Smart-Mobility-Strategy_en.
3 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022R1854&qid=1676213980555&from=en.

Moving to the medium and longer term, Repower EU is one of the solutions envisaged by the European Commission to tackle these issues. On 18 May 2022[4], in response to the hardships and global energy market disruption caused by Russia's invasion of Ukraine, the European Commission presented the REPowerEU Plan with the aim of accelerating clean energy deployment and promoting energy efficiency and the use of renewable sources. It could offer the possibility to support the rail sector both - on the one hand - supporting zero emission transport and its infrastructure and - on the other hand - when it might contribute to increasing the share and accelerating the deployment of renewable energy, such as on transport infrastructure. According to the EU Solar Energy Strategy[5], highways or railway tracks present, indeed, an unexploited potential for solar energy deployment.

In that wider context, FS has set a goal to become self-producer of energy, enabling it to become one of the largest producers of renewable energy, thus playing an active role in the green transition. As early as 2027, according to its 10-year Industrial Plan, FS aims at covering 40% of its energy needs, producing up to 2.6 TWh, with an investment of more than 1.6 billion euros. As FS is the first consumer of energy in Italy, with 2 percent of national consumption, it will weigh less on the Italian electricity system. At the beginning of 2023, it has already launched a 130 million tender for twenty photovoltaic plants to be installed in those areas adjacent to railway electrical substations and from 2024, it will start generating energy, while additional tenders are expected later this year.[6] This will offer a concrete contribution to the country's green transition, hoping it will generate a possible multiplier effect also at European level, with Italy and Europe being less dependent on imported fossil energy sources.

European public policy decisions will continue to be key to help private investments such as the one described above become a reality. The Green Deal Industrial Plan, presented by the European Commission on February 1st with the aim of putting Europe's net-zero industry in the lead, goes in the right direction, especially in two respects, both related to the definition of a predictable and simplified regulatory environment but not only. First of all, by ensuring a simplified and fast-track permit-granting process, as well as access to critical raw materials.[7] Secondly, by proposing, on top of existing European financial tools, the introduction of a possible European Sovereignty Fund to give a structure and an answer to the investment needs in strategic sectors.

In such difficult times, Europe should find an appropriate balance between competition and industrial policies in order to provide a much-needed framework for all European undertakings to compete on a level playing field, thus bringing to light much-awaited ambitious green transition investments.

4 Communication from the Europen Commission REPowerEU Plan https://energy.ec.europa.eu/system/files/2022-05/COM_2022_230_1_EN_ACT_part1_v5.pdf
5 Communication from the Europen Commission ' EU Solar Energy Strategy' https://eur-lex.europa.eu/resource.html?uri=cellar:516a902d-d7a0-11ec-a95f-01aa75ed71a1.0001.02/DOC_1&format=PDF
6 https://www.fsnews.it/it/focus-on/corporate/2023/1/19/energia-gruppo-fs-gara-130-milioni-20-impianti-fotovoltaici.html
7 https://commission.europa.eu/document/41514677-9598-4d89-a572-abe21cb037f4_en

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