

## EUROPEAN TRANSPORT REGULATION OBSERVER

### *ATM: How to Make Progress Towards an Economic Regulator?*

*by Matthias Finger and Teodora Serafimova, EUI*

#### Highlights

Improving Air Traffic Management (ATM) performance is the main goal of the Single European Sky (SES) initiative. The EU's SES legislation has introduced a performance scheme, which defines performance targets in the key performance areas of safety, environment, airspace capacity and cost-efficiency through the adoption of Union-wide performance targets and approval of binding National or Functional Airspace Blocks (FAB)-level performance targets. It is through this scheme that monopoly Air Navigation Service Providers (ANSPs) are currently 'regulated' in Europe.

To assist the Commission and the national supervisory authorities in the implementation of the performance scheme for air navigation services, the Commission first designated in 2010 the Performance Review Commission of EUROCONTROL (PRC) as the Performance Review Body (PRB) of the Single European Sky. Since 2017 the PRB acts as an independent group of experts.

The task of the PRB is to monitor the performance of ANSPs and to provide recommendations to the Commission on target setting and monitoring. In February 2019 the PRB [published its final recommendations](#) for the Union-wide performance targets in air navigation services for the third reference period (RP3) (2020-2024). These targets relate to the improvement of flight punctuality, encouragement of more efficient flight paths so as to reduce the environmental impact of air traffic, and the cost reduction of service provision to the benefit of airlines and passengers, while ensuring the highest safety standards. Following this recommendation, the Commission's Implementing Decision (EU) 2019/903 setting the Union-wide performance targets for the ATM network for RP3 was adopted in May 2019.

POLICY  
BRIEF



During the consultations and preparations organised ahead of RP3, it became apparent that the revision of the rules for RP3 could be only limited in scope, focusing in particular on simplifying and clarifying the legal provisions. What is more, the recent [Report of the Wise Persons Group on the Future of the Single European Sky](#) recommends the establishment of a “strong, independent and technically competent economic regulator at the European level”, stressing that a strengthening of economic regulation at European level can help ensure better consistency in approach, also at national levels.

This calls for a wider reflection on the future of economic regulation in ATM in order to tackle key issues faced by the sector. While RP3 preparations are underway and performance targets have already been defined for that period, the [12th Florence Air Forum](#), which took place in Budapest, aimed at planning the time after RP3, by exploring the possibility to improve the economic regulation and to move towards an economic regulator of ATM.

More specifically, the forum sought to answer the following three critical questions:

- Balance sheet of performance and charging scheme so far: What are the main weaknesses and why do we need to move to an economic regulator for ATM?
- Economic regulation of monopolies: What can we learn from other infrastructure sectors?
- How to set up an economic regulator organisationally?



## What Can Air Traffic Management Learn From Electricity?<sup>1</sup>

*A comment by Matthias Finger (Florence School of Regulation – Transport Area) and Ivan Arnold (HungaroControl)*

The 12th Florence Air Forum was based on the idea that the regulation of Air Traffic Management (ATM)<sup>2</sup> can learn from the regulatory experiences of some other infrastructure sectors. In this opinion piece, we would like to make the case that the challenges of regulating electricity flows at European level come closest to the challenges of regulating European air traffic flows. This is not to say that one could not also learn from other infrastructure sectors such as rail or telecom, but we argue that electricity comes closest to air in both technical and institutional design and therefore should serve as an analogy, if not as a framework structuring future regulation of ATM. We will proceed in three steps: we will first compare electricity and air at an infrastructural and technological level; indeed, if there are such similarities between electricity and air, the case can be made that there should also be institutional similarities. In a second step, we will therefore compare the institutional setup between the two sectors. In a third section, we will identify the respective challenges in the two sectors and discuss what is done about them institutionally, especially in regulatory terms. Finally, we will draw some lessons as to what ATM regulation could learn from the electricity sector and especially from the way it is regulated.

Before entering into technology, let us state that that the political objectives at EU level, as well as the ways to reach these objectives, are almost identical in air and electricity. They would also be identical when it comes to rail, road and inland water transport, but their implementation is comparably much further advanced in electricity. In all the infrastructures the goal of the EU is to create a Single European Market, be it for electricity, air transport, rail services, etc. The reasoning is that a Single European Market would be economically more efficient than the current fragmented and nation-based system. This is to

1. The authors would like to thank Marc Baumgartner for his valuable comments of an earlier draft of this document.
2. ATM, includes all the services related to air navigation, i.e., Air Space Management (ASM), Air Traffic Services (ATS) and Air Traffic Flow Management (ATFM). ATS, in turn, includes the various flight information services, alerting services, air traffic advisory services and ATC services (area, approach and aerodrome control services).

be achieved by way of unbundling of vertically integrated national public monopolies, thus distinguishing between the monopolistic infrastructure on the one hand and the competitive services on the other. Subsequently, the different national infrastructures need to be interconnected, harmonized and otherwise transformed into a seamless EU-wide infrastructure. In electricity this political project is called 'Copper-plate Europe', whereas in air it is called, since 1999, 'Single European Sky' (SES).

## The Technological Level

There is a technological but not a conceptual difference between electricity and air: in electricity, the infrastructure is composed of electricity cables (and transformers), namely high-voltage and distribution cables, whereas in air no such physical transport infrastructures exist. But one could argue that airspace structures complemented with Communication, Navigation and Surveillance (CNS) technologies, which include, among others, radars, towers and other ATC technologies, could be considered to be the infrastructure that 'transports' airplanes, just like cables (and transformers) 'transport' electrons. As we are mostly concerned with the European-wide infrastructure, let us focus on the high-voltage grid crossing the different EU countries, whose equivalent would be ATM, and leave aside the electricity distribution grid.

High-voltage cables determine where electricity flows. They have been built in Europe over the past 80 years or so, mainly from a national perspective and as such are not necessarily best placed and even less so best dimensioned for accommodating a fully integrated and coherent EU-wide grid. In order to achieve this copper-plate Europe, and even though cable technologies are pretty much standardized across Europe, they have to be upgraded, developed and interconnected, especially when it comes to crossing national borders. This is costly and often meets popular resistance. Electricity flows and corresponding capacity are thus not so much a technological but rather a grid design and of course an investment issue. Things are different in air: although airspace structures and ATM infrastructures historically were developed along isolated national blocks within the ground and aerial borders of sovereign states, ATM cannot itself determine where airplanes 'flow'.<sup>3</sup>

3. This is decided by the airlines on the basis of several considerations, such as firm strategy, overflight costs, security considerations and others more.



But because ATM operates national legacy systems with little interoperability and develops capacity in isolation from one country to another, this overall restricts available airspace capacity internationally. Notwithstanding the fact that the airspace is a scarce resource and airspace capacity cannot be infinitely increased, capacity shortages caused by fragmentation have an adverse effect over the whole network. The lack of standards also leads to the fact that all investment, up to today, are made into improving relatively isolated national legacy systems, a trend that is further exacerbated by vendors' lock-in strategies.

Just like with air, where airplanes are 'produced' by airports scattered around Europe (and beyond), electricity is produced by power plants that are equally scattered around Europe. Power plants produce according to demand, whereby supply and demand are matched either by bilateral contracts (sometimes generators even sell their own electricity to consumers) and, increasingly, by trading platforms. Matching takes into account the available transport, i.e., (high-voltage) grid capacity, in particular the capacity across national borders, where most of the congestions occur. Today, day-ahead and intra-day electricity markets (but not long term markets, which could be seen as the equivalent of the timetable in the case of airlines) are 'coupled', meaning that electricity and capacity are sold together. The price of transport thus also includes congestion, i.e., the right to transport (in addition to transporting the electricity). In air transport, the decision to let the aircraft 'flow' (fly) is taken as a result of a complex process between the Network Manager (NM) at EU level and the National Air Navigation Services Providers (ANSPs). In some cases even the airspace users (e.g., airlines) along with other service providers participate in such a complex collaborative decision making process. The ultimate decision where an aircraft flies is based on the availability of airspace, available capacity in the network, weather conditions, unplanned events, etc. However, unlike in electricity where producers are restricted by the available grid capacity, airspace users may have the choice to take longer or more expensive flight routes or fly at a lower altitude if they are willing to pay the price for higher fuel, operating and ATM costs.

In other words, while airplanes are 'guided' to their destination along their flight trajectories by ANSPs, electricity is flowing according to the laws of physics and will always flow to the closest consumption point. One

of the defining features of electricity is that it cannot be stored and thus, once produced, must be consumed. This leads to the fact that the load in the grid constantly needs to be balanced at 50 Hertz, as the system can tolerate very little deviation without leading to a blackout. This is not totally identical, yet still similar in air: airplanes, once airborne, must land at some point, even though there are some reserves in the system. Balancing the electricity would be analogous to Air Traffic Flow Management (ATFM) in ATM, whose function it is contribute to a safe, orderly and expeditious flow of air traffic by ensuring that air traffic control capacity is utilized to the maximum extent possible and that the traffic volume is compatible with the capacities declared by the respective ANSP.

Overall, it can be said that the technological features in electricity and air are quite similar, notably (1) the fact that we are dealing with a European grid and with European airspace structures, flight routes and traffic flows, even though national technological legacy systems still exist in electricity and such systems and national airspace structures still prevail in ATM; (2) the fact that these systems and structures determine the capacity of the network; and (3) the fact that both electricity and airplanes cannot really be "stored" and must be guided to their destination so as to avoid blackouts and crashes. The (only) major difference, however, is that airlines, unlike electricity generators, do have some choice when it comes to selecting the routes they want to fly. It is thus justified to compare how the two sectors are governed from an institutional point of view, given that, at least according to theory, governance somewhat needs to follow the infrastructural and technological setup.

## The Institutional Level

While there are many similarities in the technical structure, electricity and air differ very much when it comes to their institutional history: the electricity sector was characterised by vertically integrated national public monopolies, with the exception of federalist countries, where we had regional vertically integrated monopolies. A significant portion of EU electricity regulatory efforts thus pertains to unbundling and non-discrimination of new entrants. This was and is not the case in air, where the sector has always been mostly unbundled:<sup>4</sup> ATM

4. In some countries, ATM and airports have been part, in the past, of the same public entity.



service providers were national public monopolies, while airports were local or state monopolies and airlines national public flag-carriers. As we will see below, this means that there must be less to no concern about regulating discrimination when airlines want to access the airspace. However, history also means that airlines have never been linked with the infrastructure (i.e., ATM) and therefore usually they have no understanding of the nature, the functioning and the limitations of infrastructures. And this is somewhat reflected in their behavior (past and present), notably in the principle “first-come-first serve”, meaning that airlines basically do what they want and expect the infrastructure (ATM) to accommodate.

Furthermore, electricity historically had a much more national focus than air, which, at least in Europe, always had an international dimension. But even in electricity there were European flows very early on and collaboration and coordination among European countries in matters of electricity took place since the 2<sup>nd</sup> WW. On the other hand, ATM also has always been very national, owing to national sovereignty and the important role of the military in matters of airspace structure and airspace use. While the declared intent is to manage military and civil airspace jointly, this has mainly remained an intent in most of the countries. In other words, electricity and air infrastructures, like most other infrastructures, have, because of their history, originally been very national. However, much progress has been made in matters of harmonizing the high-voltage grid across Europe, in part because of EU regulatory pressure and action, but also because the transport of electricity has already been quite standardized from the very beginning. This is different in ATM, where ATM technologies differed significantly from country to country and where little progress had and is being made towards their standardization. While the SES initiative, and especially its technology component SESAR (Single European Sky ATM Research), were to remedy this situation, the results are disappointing. In its special report on the SES, the European Court of Auditors observed that the policy objectives of the SES initiative have not been achieved, and that the benefits of the SESAR project were overestimated.<sup>5</sup>

But let us start with the basic building blocks, i.e., TSOs and ANSPs: in electricity, the so-called Transmission Systems Operators (TSOs) had to be created at the national level – by way of EU regulations and pressure – by unbundling, i.e., by separating them out of the national vertically integrated electricity companies. In some federalist countries, the TSO even had to be created from scratch by assembling bits and pieces from the different regional electricity companies. This was a painful process, which is however now more or less complete. In ATM, Air Navigation Services Providers (ANSPs) evolved in an analogous manner. They were gaining independence from state administrations through corporatization and subsequently had to be functionally separated from policy and regulatory functions. One of the fundamental principles of the SES initiative is the separation of service provision from regulation, at least at the functional level.<sup>6</sup> All the EU member states have implemented such functional separation as a result of the SES regulation. At the same time, in some cases, ownership rights over ANSPs are exercised by the authority also responsible to some extent for ATM policy making and regulation and there are some cases where the ANSP itself is embedded in a civil aviation authority. Proper design would also require an institutional separation between policy functions on the one hand (which remain with the government) and regulatory functions on the other (which should evolve into an independent regulatory authority at the national level). While this important institutional change has taken place in electricity as a result of EU pressure, the full separation of the policy from the regulatory function has not been properly achieved in most EU member states, because there has been no EU legislation and pressure in this matter so far. Furthermore, several national supervisory authorities struggle with the lack of financial resources and proper expertise and therefore have difficulties in fulfilling their roles properly. As we will show below, this will remain a problem, when moving towards or trying to establish an EU ATM regulator.

The main functions of the TSOs are to provide an efficient and safe high-voltage grid, which includes planning, developing (investing in) and operating the grid, as well

5. European Court of Auditors – Special Report: Single European Sky: a changed culture but not a single sky VI, 21, 51, 78, [https://www.eca.europa.eu/Lists/ECADocuments/SR17\\_18/SR\\_SES\\_EN.pdf](https://www.eca.europa.eu/Lists/ECADocuments/SR17_18/SR_SES_EN.pdf) - December 2017.

6. Article 4.2 of REGULATION (EC) No 549/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 10 March 2004 laying down the framework for the creation of the single European sky (the Framework Regulation).



as to ensure the grid's stability, notably by providing so-called balancing services. All this at a national level. The three main functions of the ANSP are (1) to manage the national airspace (which is the equivalent, in electricity, of defining available grid capacity, planning to increase that capacity), (2) to manage air traffic flows at the national level (which could be seen as the equivalent of real-time balancing in electricity) in collaboration with the Network Manager who does the same at European level and (3) to provide air traffic services, among which air traffic control (i.e., separating aircraft in real-time) is perhaps the most important. The equivalent of this function, in electricity, is the operation of the grid.

As for international coordination, this is typically a gradual process by which the national TSOs and the national ANSPs collaborate more and more closely with one another. In electricity the European Commission has stepped in in 2009 so as to speed up and to organize this coordination by way of regulation. In the beginning there was first a collaboration among the different national vertically integrated monopolies, called UCPTÉ (European Network of Transmission Systems Operators), which evolved into UCTE (Union for the Coordination of the Transmission of Electricity) once they got unbundled. From there things evolved further, because of EU regulatory pressure, into the pan-European ENTSO-E (European Network of Transmission Systems Operators for Electricity) in 2009 and has stayed so until today. ENTSO-E is the body that coordinates – under EU mandate and under EU regulatory supervision (see below ACER) – the electricity flows across the continent, develops and maintains the European operational framework through operations network codes/guidelines, agreements and standards and coordinates measures for the protection of critical infrastructures. In broad terms, this would be the equivalent, in air, of Air Traffic Flow Management (ATFM) at EU level, currently one of the functions of the Network Manager, complemented by the coordination of airspace management,<sup>7</sup> which is today still a national function. Balancing however – which is similar to capacity management by the ANSPs --, as well as operations – the equivalent of Air Traffic Services – remain with the national TSOs.

7. 'Airspace management' is a planning function, whose primary objective is the maximization of the utilization of available airspace by dynamic time-sharing and, at times, the segregation of airspace among various categories of airspace users on the basis of their short-term needs.

The process of international coordination in air is less straightforward. While, international co-operation has always been an operational requirement for ANSPs operating neighboring airspaces, several layers of complexity are added as a result of the following factors. First, EUROCONTROL, an international organisation and its legal framework, operates in parallel with the EU institutions and their legal framework. Second, there is a proliferation of institutions and decision-making bodies with sometimes overlapping decision-making powers. Third, as if the system was not already complex enough, some decision-making powers were furthermore delegated to industry stakeholders. Finally, much of what is happening at the operational level is based on the process of "collaborative decision-making", in which all operational stakeholders are involved in various decision-making and advisory processes and bodies, for example in the case of deciding about airspace structures. This level of complexity makes it difficult to understand the system, to drive into a desired policy direction or simply to change it. There is a good deal of uncertainty involved and there is definitely a lack of transparency in current European ATM.

Besides the cooperation between neighboring ANSPs, so-called "free-route" airspaces overarching several states are increasingly set up at a regional level. At the European level, the creation of an overarching pan-European air traffic flow management function was achieved when the Central Flow Management Unit (CFMU) of EUROCONTROL was established in 1995. EUROCONTROL can thus be viewed as a facilitating platform, whose role it is to reduce complexity by mitigating the negative effects of airspace fragmentation. Still, and unlike UCPTÉ or ENTSO-E for electricity, EUROCONTROL is an international organization, established by treaty among participating States (the so-called Eurocontrol Convention), and not an association of ANSPs. Also, EUROCONTROL encompasses several non-EU member States and has today 42 member States. However, as part of the SES process, the Commission has created in 2011 the equivalent of the mandate it gave to ENTSO-E for air in the form of the so-called Network Manager. This is an EU function first assigned to EUROCONTROL in 2011, then again in 2019 for a 10-year term. EUROCONTROL as the Network Manager essentially does what EUROCONTROL as an international organization had been doing from the



creation of the CFMU, namely coordinating European air traffic flows as well as a few other functions called the network functions, but now by mandate of the European Commission.

But the most important and the defining institutional difference between the electricity and the air transport sector is as follows: in parallel to giving ENTSO-E a clear mandate regarding the coordination of the EU electricity grid, the Commission has also created ACER in 2009, the European Community of Energy Regulators (see Pototschnig's paper in this issue). ACER is a strong European regulator which instructs and supervises the different national electricity market regulators, as well as ENTSO-E. ACER is a clear example of the Europeanization of regulation and as such only comparable to BEREC, the Body of European Regulators for Electronic Communications, also created on 2009. ACER has several functions: most importantly, it must ensure harmonization of both grid operations and electricity markets, including unbundling in each of the member states. Its main function would be the equivalent of the supervision at European level of air traffic flow management, which, in ATM, is carried out by the Network Manager. When it comes to grid operations (i.e., what ANSPs do), it works closely with ENTSO-E, but ultimately has decision-making power. Also, the ATM equivalent of ACER should have decision-making powers, whereas the Network Manager currently only has a coordinating role. Such decision-making power does not exist in ATM today. ACER also supervises and ensures the independence of the national electricity regulators. In ATM, the National Supervisory Authorities (NSAs) are responsible for certifying and overseeing ANSPs and for the preparation of national performance plans. But ANSPs do not have the equivalent of a European coordinating body similar to ENTSO-E. Indeed, EUROCONTROL is not an ANSP collaboration, but an intergovernmental organization established to carry out some functions on behalf of its Member States, and there is no operational and institutional oversight over ANSPs nor is there a final decision-making authority at the European level. Finally, ACER sets the rules for the economic regulation of the grid, of course based on EU regulations. But the equivalent of ACER does not exist in ATM, and the question whether it should exist was precisely the topic of the 12<sup>th</sup> Florence Air Forum.

## What Are the Real Challenges?

But in order to answer the question whether the equivalent of ACER should exist in ATM, we still have to examine what challenges ATM faces, and whether these challenges are indeed comparable with the challenges of the European high-voltage transmission grid. To recall, the infrastructural and technological setups in electricity and ATM are somewhat similar and so are the institutional setups with the exception of ACER and EUROCONTROL. The differences are, on the one hand, that the equivalent of air traffic flow management is done at EU level in electricity (by ENTSO-E under the supervision of ACER), whereas this is done at the European level by EUROCONTROL and at national level by the ANSPs. At the same time, airspace management (the equivalent of which is done by the ENTSO-E at the European level in electricity), remains at the national level today, under the responsibility of each Member State. While ENTSO-E has a role in shaping the grid, there is no equivalent function in ATM for shaping European ATM infrastructure.

As we will argue in this section, air traffic flow management and to some extent airspace, infrastructure and capacity management should be done at the EU level within a much simplified regulatory framework, inspired by the electricity sector. Air traffic flow management could continue to be done by the Network Manager as part of EUROCONTROL. Airspace, infrastructure and capacity management should also be done by a (new) body at European level in a collaborative arrangement with the Member States and the ANSPs similar to ENTSO-E, again within a regulatory framework that is much simpler and has more transparent processes than the current one. This new body would then be overseen by an EU regulator similar to ACER, capable of supervising the operations of the network, driving its evolution and making decisions in individual cases when collaborative arrangements are insufficient.

So what are the challenges? They are actually quite different when it comes to electricity and ATM:

- In Electricity, today's main challenge is to keep the high-voltage grid stable in Europe, i.e., to avoid blackouts: with the phasing out of fossil fuel and nuclear based power plants, Europe is turning more and more to renewable energies, which are volatile,



i.e., dependent upon sunshine and wind. This requires ever bigger efforts by the TSOs to keep the grid stable, thus increasing the needs of balancing electricity, including the needs for redispatch of electricity across national borders. Furthermore, electricity is no longer produced by big power plants and dispatched to the end users in a capillary system. Rather, it is increasingly also produced in a decentralized manner and consumed much more closely to the producers, thus increasing the challenges for the high-voltage transportation grid. Finally, and because of the above-mentioned developments, member States are increasingly concerned by security of supply issues and set up all kind of mechanisms to prioritize their national supply over pan-European exchanges, thus threatening the European electricity market over the “copper-plate Europe”. The EU Commission responds to these challenges by numerous regulatory measures. These are mainly measures to ensure that electricity can flow freely across Europe, notably by means of rules regarding the coordination between the different TSOs, as well as between suppliers and TSOs (embodied in so-called “network codes”). Such norms are set among the TSOs via ENTSO-E and then approved and enforced by ACER at the European level. These rules are both about technological harmonization and standardization, but even more so about institutional harmonization across TSOs. This is mainly an internal market issue, and regulation by ACER is mainly geared at a better functioning of the internal (Single European) electricity market.

- The challenges are very different when it comes to ATM: here, the challenge is not necessarily one of a dysfunctional internal market (the demand for air transport is constantly growing), but more obviously the challenge of a lack of ATM capacity, caused by fragmented and non-standardized infrastructure, as well as by suboptimal airspace structures following national borders instead of operational needs. The Airspace Architecture Study published by the SESAR Joint Undertaking in March 2019,<sup>8</sup> in its assessment of the situation, has clearly spelled out the reasons why ATM lacks capacity and is congested, namely

8. A proposal for the future architecture of the European airspace; SESAR Joint Undertaking, 5 March 2019, related to the Delegation Agreement between the European Commission and the SJU with reference MOVE/E3/DA/2017-477/SI2.766828 for developing a proposal for the future architecture of the European Airspace.

the fact that actual demand far exceeds expected demand. In our view, this is (1) because airspace is a finite resource just like water and soil, (2) because capacity is managed at the national level, (3) because airspace structures follow national borders rather than operational needs, thus limiting interoperability and adding to airspace complexity, (4) because the technological infrastructures are partly outdated and are capable only of limited interoperability, and (5) because the current lack of capacity is at least partially also the result of a prior policy focus on cost efficiency, as opposed to capacity development (when traffic was low). As a result, for example, there is now a chronic lack of controllers in some key areas.

## What Does That All Mean for ATM Regulation and an ATM Regulator?

Indeed, it is not at all clear whether this challenge of ATM capacity can be addressed by ATM regulation and an ATM regulator. Still, we might be inspired by the regulation of the European electricity sector. Let us discuss the most relevant aspects of the ATM sector one by one and examine what can be learned from electricity for each of them:

- The most straight forward function is certainly Air Traffic Flow Management (ATFM): this function is already Europeanized and taken care of by the Network Manager as part of EUROCONTROL. This function is clearly needed, and needed at a European level, and EUROCONTROL is probably the only organization capable of providing it, at least today. Here, actually, electricity could learn from ATM, as this function of balancing electricity flows is still done at a national level by the TSOs. But ATM can certainly also learn from electricity as to how this function is regulated, namely at a European level for non-discrimination and cost efficiency. The corresponding rules are set by ACER and the implementation of these rules is delegated to the national independent regulatory authorities. Once properly regulated, it could even be imaginable the Network Manager to also evolve into a platform for allocating the available capacity (slots), as determined by an EU Air Space Manager (see next point).





- A little less straightforward is how the European airspace is structured and how network capacity and network infrastructures are developed. In the case of electricity, a similar function has been delegated to ENTSO-E, while being supervised and regulated by ACER by way of so-called “network codes” and other rules pertaining to interconnection, interoperability and congestion management. In ATM, although there are some common EU rules and principles, airspace design and airspace management is carried out at the national level by the ANSP. The development of network infrastructures and network capacity also involves various forms of coordination, but, at the end and most of the time the development of the network infrastructure and capacity remain fragmented. This could be changed, if an ENTSO-E-like technocratic and cooperative platform of States and ANSPs is established with the objective of defining cooperatively how European airspace should be structured and the network infrastructures and capacity should be developed. This entity could be called a European Network of Airspace and Infrastructure Managers (ENAIM). As a second step, it will then be necessary to invest into the harmonization of the upgrading of the national ATM legacy technologies along principles of technological standardization and harmonization as mandated by this new EU Airspace and Infrastructure Manager. This could even include the development of an EU ATM infrastructure, such as for example an EU-wide digital ATM platform.
- This very process, along with activities of this new EU AIM body, should in turn be supervised and regulated by an EU ATM Regulator along the model set by ACER. This task should not be delegated to the national regulatory authorities, but should be handled exclusively by the EU ATM regulator. Once the structuring of the European airspace has taken place, as well as network infrastructures and network capacity have been harmonized, a corresponding European Network of Airspace and Infrastructure Managers created and its regulation enshrined and embodied in a new EU ATM regulator, one can then (and only then) envision to set EU rules about airspace usage, such as for example congestion pricing or slot allocation rules according to political priorities. But such rules would have to be politically defined at EU level.
- Some activities carried out by ANSPs today, may in turn, be decoupled; especially those related to the collection, transfer, analysis and storage of data. Some of these activities will have to be regulated, while others may become market-based activities. Air Traffic Control (ATC), i.e., basically separating aircraft, will remain a monopolistic activity performed by the national ANSPs and thus will have to be regulated. However, the technology used to perform this activity will have to evolve towards harmonized and interoperable standards set by the above-mentioned new European Network of Airspace and Infrastructure Manager and supervised in turn by the new EU ATM Regulator. As a monopolistic activity, ATC will have to be regulated for efficiency but also for security of supply, just as in the case of TSOs. Such regulation will not change, even if ATC may be performed through virtual centers and digital ATC platforms, rather than by ANSPs themselves. This regulatory task can be delegated to the national regulatory authorities, which, in turn, apply regulations set by the new EU ATM Regulator. But it could also be imaginable – especially if virtual non-nation-based centers and other digital ATC platforms emerge – that this new EU ATM Regulator will regulate the ANSPs’ the virtual centers’ or the digital ATC platforms’ activities directly, without passing via national regulatory authorities, which will then become redundant. Actually, many of them have never been properly enabled to carry out their tasks in an efficient and independent manner.

## Conclusion

The European ATM infrastructure is reaching its limits in capacity and cannot guarantee sustainable operations (longer routes than necessary, lower flight altitudes, more emissions). It is quite clear that the European ATM system (which includes airspace structures as well as physical infrastructure) needs an extensive overhaul to increase its resilience and efficiency in the face of the challenges of growing but potentially volatile traffic, cyber threats and a deteriorating environmental performance. We suggest that this is best done by reducing the complexity and increasing the transparency of the current legislative framework. Like this has happened in EU railways and in EU electricity, we would like call for an “Recast” of EU ATM legislation and regulations. We have argued that



the regulation of electricity can be a source of inspiration for a new, leaner regulatory framework facilitating more efficient co-operation and at the same time providing tools for efficient decision-making and achieving policy objectives. Improving airspace structures for the benefit of the whole network, developing infrastructure and modernizing technology on a European scale, all call for regulation at the EU level. This, in our view, could be achieved by creating two new entities. First, a collaborative platform of States and ANSPs – we have argued for a European Network of Airspace and Infrastructure Managers – as inspired by ENTSO-E, so as to drive the reorganization of European airspace and the development of the European ATM infrastructure. Secondly, we argue for a new EU ATM Regulator as inspired by ACER, overseeing the processes driven by the EU Airspace and Infrastructure Manager and exercising decision-making powers where necessary. Like ACER, this regulator would have several regulatory functions, many of them technical (harmonizing legacy systems), some of them economic (regulating the monopolistic activities of the ANSPs), and some of them processual (supervising national authorities and the gradual transfer of some functions to the EU level).

Of course this is just one proposal about how to organize European ATM as inspired by the organization of the electricity sector. Other approaches, inspired and enabled by other, perhaps more novel technological innovations may of course also be possible.



## Main Takeaways From the Discussion

*By Teodora Serafimova, Florence School of Regulation – Transport Area*

Under the current SES legal framework, decisions regarding the performance targets are adopted through comitology rules. This, in turn, can lead to political bargaining with Member States, both for the setting of targets and for the assessment of individual performance plans. This is to the detriment of a neutral and apolitical assessment and may have a direct impact on the level of ambition, for the setting of incentives and for the imposition of sanctions. Coupled with this, there has been an observed lack of industry-specific knowledge and instability of competent supporting experts.

The creation of an independent economic regulator for ATM could help to address these shortcomings. In fact, recommendation number eight of the recent [Report of the Wise Persons Group on the Future of the Single European Sky](#) calls for the establishment of a “strong, independent and technically competent economic regulator at the European level”. The report stresses that a strengthening of economic regulation at the European level can also help ensure better consistency in approach, including at national levels. Drawing on experiences from the first and second reference periods, a number of significant shortcomings could be identified relating to the design of the existing regulatory framework, the expertise of the stakeholders involved and the interaction between them, as well as the implementation of the performance and charging scheme.

### ***Balance sheet of performance and charging scheme so far: what are the main weaknesses and why do we need to move to an economic regulator for ATM?***

The progress observed to date across the four key performance areas of safety, environment, airspace capacity and cost-efficiency has varied significantly. Safety, which ranks as a top priority under the ATM system, is the only parameter where an excellent record was maintained over the past years. Environmental performance, on the other hand, has not enjoyed the same advances as safety, as airlines are still not flying the shortest routes. This in turn results in higher CO<sub>2</sub> emissions and higher fuel costs incurred by airlines.

Stakeholders acknowledged the CO<sub>2</sub> footprint of aviation as an issue of growing concern, and airlines are now facing pressure not only from policy makers, but also from consumers and investors to reduce emissions. With the growth of CO<sub>2</sub> emissions outpacing traffic growth, it was stressed that there is a huge untapped potential for CO<sub>2</sub> reduction and economic savings in the aviation sector. CO<sub>2</sub> emissions due to ATM inefficiencies should be the first to be eliminated.

Flight punctuality has similarly followed a downward trajectory, as evidenced by the explosion of delays in recent years. Participants reported that airspace congestion and system inefficiencies have caused a major drop in on-time performance, which in turn leads to rising disruption costs. There have been no consequences for ATM underperformance, as airlines have absorbed the costs associated with delays. This has consumed scarce financial resources, which could be better invested in other causes, namely improving efficiency and performance. What is more, the empowering effect of social media makes customers more demanding and outspoken. Consequently, we are seeing today a growing number of fines being imposed on airlines as a result of passenger rights laws.

More generally, stakeholders pointed out at the existence of possible trade-offs between the four objectives of cost-efficiency, environment, safety and delays, which need to be taken into consideration in the discussions around the future economic regulation. To give an example, in a congested airspace, avoiding delays has sometimes come at the expense of taking longer and more polluting flights.

The instability of the existing framework, as well as the absence of guarantees about the return on investment, have caused a drop in investments aimed at technological modernisation in ATM. In reference to the drop in capital expenditure since the beginning of SESAR, stakeholders argued that the current economic regulation had not encouraged the uptake of new technologies in ATM. What is more, the system’s complexity has translated into additional costs, which in turn have been passed on to passengers. The widespread inefficiency was, among other things, linked to weak targets for both *en-route* and terminal services. Some of these weak targets can, at least in part, be explained by the absence of an independent economic regulator and the resulting political bargaining among Member States. What is more, the current regime



has been sub-optimal when it comes to risk-sharing. The provision of cross-border services has not improved and fragmentation persists. Overcoming all this, calls for coordination at the European level.

According to the latest Court of Auditors report, collaboration between Member States within the Functional Airspace Blocks (FABs) has improved, whereas the environmental performance of aviation is now monitored and reported upon. Some stakeholders, however, expressed skepticism, referring to the FABs as a mere ‘window dressing’ exercise, which, in reality, has not enhanced collaboration.

Justifications for the need for transiting towards an EU economic regulator for ATM was provided on numerous grounds. Firstly, an economic regulator is indispensable for regulating statutory or natural monopolies. Technology, however, is slowly disrupting these very ATM monopolies by introducing the possibility of choosing ATM providers, at least for some of the services. Whereas in the future there will be strong incentives for good cost-effective provision, in the meantime, a regulator will be needed to set the right incentives with a view to unleashing the potential of technological innovation. Secondly, given that competition is only gradually emerging, an economic regulator could set incentives to reward early movers, while responding to consumer needs.

Indeed, up to now, performance has been measured on the basis of ‘money spent’, which stakeholders agreed is an inadequate indicator of effectiveness. Instead, the focus should be on incentivising ANSPs and Member States to invest in new technologies and to deliver good quality services. The creation of an impartial European regulator for ATM, with permanent experts, is key to simplifying today’s overly complex framework and for driving down the costs associated with it. By establishing a professional regulator one can also increase the predictability of the system.

### ***Economic regulation of monopolies: what can we learn from other infrastructure sectors?***

As a “late comer”, the aviation sector has the advantage of being able to draw lessons and to build upon the experiences of other sectors, such as energy, telecommunications and rail. A general trend observed

across all these network industries has indeed been the emergence of independent sector-specific regulators. In none of these industries, however, has the established central economic regulator taken on roles of national regulators. Rather, both are complementary and have continued to work in parallel.

Drawing on the principle of subsidiarity, issues best tackled at the local level, should remain the competence of local and national authorities, thereby stressing that the objective at hand is not to establish a ‘superpower that regulates everything’, but rather to help optimise efficiency at the EU level. The aim is to relieve national regulators from certain pan-European network-related issues, so as to enable them to focus their efforts on national and local problems. When it comes to consumer protection, for instance, there has been a clear tendency for consumers to revert to their respective national regulators. National regulators will moreover, continue to play an instrumental role in securing enforcement and compliance with the rules, also the ones set at the EU level. In other words, the European regulator would be in charge of network- and cross-border issues.

When it comes to the institutional structure, a number of commonalities were identified between the electricity and aviation sectors. At the national level, we have National Regulatory Authorities and the Transmission System Operators (the equivalent of ANSPs in aviation). At the regional level, Regional Coordination Centres could be seen as the equivalent of the FABs. At the European level, there is the European Network of Transmission System Operators (ENTSOs), which can somewhat be compared to EUROCONTROL, along with the EU Regulatory Agency for the Cooperation of Energy Regulators (ACER), whose equivalent does precisely not exist in the aviation sector and which could thus serve as a model for a European ATM regulator.

In the electricity sector two different regulatory practices co-exist, namely traditional cost-of-service and rate-of-return regulation on the one hand and incentive regulation on the other (i.e., the use of rewards and penalties to induce utilities to achieve set goals whereby the utility is given some discretion in achieving the goal at hand). While incentive-based regulation has typically been applied in the case of operational expenditures (opex), cost-of-service regulation has been more relevant for capital expenditures (capex). However, a growing



number of regulators are now shifting towards ‘totex’ regulation, whereby the same regulatory treatment is being applied to both opex and capex. This approach can help to reduce the risk of distorted incentives.

In light of the experience of the telecommunications sector, the possibility for selective regulatory measures was highlighted. For example, telecommunications operators sometimes have the possibility to apply for “self-regulation”, meaning that they can propose the regulation to be imposed on them, which is then approved by the regulator. In this way, some operators may be able to avoid excessive regulatory burdens in exchange of investing into their networks.

Drawing on the experience of the rail industry, it appeared that a “silo approach” to transport regulation (i.e., regulating each transport sector separately) is no longer appropriate and an inter- or multi-modal approach to regulation will become necessary. Also, in the rail sector interoperability issues and the lack of technical harmonisation across Member States clearly stand in the way of a Single European Railway Area, something that seems to be quite comparable with ATM.

**EU Directive 2012/34** (for railways) was pointed out as being particularly relevant here: as per this Directive, each Member State needs to designate a national regulatory authority for the railway sector. The authority shall be legally distinct and independent from any other public or private entity, but also from the infrastructure manager, as well as of the competent authority in charge of awarding public service contracts. Guaranteeing this regulatory authority’s competence and independence was stressed as being crucial so as to avoid regulatory capture.

The provisions of the above-mentioned Directive, moreover, stipulate that in the event of failure by a Member State to ensure the competent authority’s independence, the European Commission is entitled to initiate an infringement procedure. In terms of functions and responsibilities, this regulatory authority ensures fair and non-discriminatory access to the rail infrastructure, monitors the state of competition in the rail services markets, handles complaints and takes remedial actions when appropriate.

When it comes to purely economic regulation, the so-called “infrastructure charging scheme” (which would

be somewhat the equivalent of the operating costs of an ANSP) is aimed at incentivising railway undertakings and infrastructure managers to minimise disruption and to improve the performance of the rail system more generally. This scheme includes penalties for network disruptions, compensations for undertakings which suffer from disruption and bonuses that reward better-than-planned performance.

Be it in electricity, telecommunications or railways, powers to collect data, access to data and data analytics expertise were all stressed as being key elements for regulators to do their job and in particular to address information asymmetries.

### *How to set up an economic regulator organisationally?*

The third thematic session of the Forum sought to answer organisational questions relating to the establishment of a European economic ATM regulator.

While it was pointed out that the creation of an economic regulator will not be a ‘silver bullet’ for addressing delays and other issues facing the aviation sector, it was agreed that such a measure would constitute a significant key step towards setting the right incentives for modernising the ATM system. Despite acknowledging the benefits of establishing an economic ATM regulator, some participants, however, expressed concern about the fact that European ATM is highly heterogeneous, for example when it comes to salary levels, taxes and pension schemes, something that would certainly have to be taken into account in a pan-European regulatory scheme.

A clear consensus emerged over some of the characteristics that an economic regulator must possess. In particular, such a regulator would need to be legally and organisationally independent from the entities it regulates, as it would also need to be equipped with appropriate technical and intellectual capacities to operate in a competent and professional manner. It should furthermore be backed by a sustainable source of funding.



## An EU Regulatory Agency for the Air Traffic Control Sector?

*A comment by Alberto Pototschnig, ACER*

There are many similarities between the air transport and the energy sectors when it comes to the economics of their shared essential facilities. In the energy sector, these are typically the networks, while in the air transport sector they include airports and air traffic control services. These similarities suggest that the experience with regulating the energy networks could be of relevance for shaping the regulation of some of the activities in the air transport sector.

In particular, some of the approaches typically used to regulate energy networks – such as price and revenue caps, profit sharing, yardstick competition – could be used (and in many cases have been used) to regulate air transport sector activities.

More interesting is, however, the regulatory governance of the energy sector and to assess which of its aspects could be usefully mimicked in the air transport sector, and for air traffic control services in particular.

One of the main aspects of the reform of the regulatory governance of the energy sector introduced by the Third Energy legislative Package ten years ago was the establishment of the EU Agency for the Cooperation of Energy Regulators (ACER). ACER's purpose was defined as to assist national regulatory authorities for energy ('NRAs') in performing their regulatory tasks at EU level and to coordinate their action where necessary. In this way, the Agency was meant to fill the regulatory gap on cross-border issues that was emerging while creating an Internal Energy Market, in the face of NRAs mainly having national powers and competences.

The need for a new framework for regulatory cooperation was – and still is – most obvious with respect to wholesale markets and the so-called horizontal networks. In fact, wholesale markets are being integrated beyond national borders and it is undisputable that such a development can hardly be supported and overseen, in an efficient and effective way, by NRAs cooperating on a purely voluntary basis. The same considerations apply to the development of the trans-European energy networks.

However, over time, ACER's role has evolved, as recognised in the 2019 recast of ACER's founding Regulation, where it is specified that it shall also contribute to the establishment of high-quality common regulatory and supervisory practices, thus contributing to the consistent, efficient and effective application of Union legal acts in order to achieve the Union's climate and energy goals.

In many respects, ACER is quite unique among the many decentralised EU agencies. First of all, it is one of the few regulatory agencies (as opposed to operational or licencing agencies). The European Banking Authority (EBA), the European Insurance and Occupational Pensions Authority (EIOPA), the European Securities and Markets Authority (ESMA) and the Body of European Regulators for Electronic Communications (BEREC) are probably the most similar agencies, also with regulatory responsibilities. Moreover, while in all these agencies, regulatory decision-making is mostly in the hands of national regulators, in ACER it is mostly vested in the Director, with national regulators providing guidance and exercising scrutiny. This is most evident in the process for the adoption of many of the decisions, recommendations and opinions of the Agency, which requires the favourable opinion of the Board of Regulators, composed of representatives from NRAs, on the Director's proposal. However, in formulating its opinion, the Board of Regulators is unable to change the proposal by the Director: it can either endorse it (i.e. provide the favourable opinion) or reject it in its entirety. Recently, with the recast of the ACER's founding Regulation, the Board of Regulators has been given the possibility of proposing amendments of the text to the Director, but the final decision on which text to propose for the final favourable opinion is still left with the Director. This approach has worked very effectively: in its more than eight years of operation, and more than 150 acts adopted through this procedure, there has been only four occasions in which the Board of Regulators refused to provide the favourable opinion to the Director. In all but one case, a new proposal by the Director subsequently obtained the required favourable opinion.

Another peculiarity of ACER is the voting structure in the Board of Regulators, where each NRA has one vote, irrespective of the size of the Member State it represents. This might appear at odds with the typical EU voting



structure, but it reflects the technical, rather than political role of the Board of Regulators. This Board and the NRAs represented in it are called to provide guidance and exercise control over the regulatory action of the Director. In this technical role, it is easier to understand the rationale of equal voting weights: there is no reason why the expertise of the NRA representative from a large Member State should be more valuable, or should be considered more relevant, than the expertise contributed by the NRA representative from a smaller Member State.

This governance of the decision-making process provides an additional dimension to ACER's regulatory activity: it is not just the coordination of national regulatory practices and action, but there is also an important added dimension of promoting the European market integration process, even when this means abandoning some well-established national practices. In sectors which have to undergo a profound transformation to support an integrated EU-wide market, this institutional framework and governance provides, in my view, clear advantages. It might not be the approach necessarily preferred by national authorities, and this clearly emerged in the institutional negotiations for the recast of the ACER's founding Regulation. In that context, a number of Member States expressed their strong preference for aligning the decision-making process at ACER to the more typical model of EU regulatory agencies. In the end, thanks to the opposition of smaller Member States and the European Parliament, the unique model of ACER was maintained and therefore it can be used as a valuable reference for those other sectors where a strong European dimension in its regulatory approach is warranted.



## Economic Regulation of Transport Infrastructures in France: Toward a Multimodal and Data-Driven Regulation

*A comment by Anne Yvrande-Billon, Autorité de Régulation du Transport (ART)*

Like all economic regulators of infrastructure monopolies, the French transport regulatory authority (ART) is in charge of preventing the exercise of market power by transport infrastructure managers – initially the rail infrastructure and service facilities managers – and to ensure a transparent and non-discriminatory access to these infrastructures. To promote competition among transport service providers, on the downstream market, for the benefit of customers, it is indeed crucial to regulate the access conditions to these essential facilities and work to remove the various barriers impeding the establishment of a single European area.

More originally in the European landscape, the French transport regulatory authority has shifted from a rail regulator to a multimodal regulator, and is now in charge of the economic regulation not only of rail infrastructure managers but also of intercity coach stations managers as well as of airport charges. In addition, ART monitors the economic performance of motorways concessionaires and control their procurement procedures. At last, by 2020, ART is also expected to be responsible for controlling the compliance of transport service operators to their obligations to open their transport data and for monitoring the neutrality of the algorithms used to provide multimodal information.

The extension of responsibilities allows to mutualize and refine the technical competencies required to implement economic regulation (e.g. WACC analyses and tariff regulation) and monitor the performance of monopolies. More interestingly, multimodal transport regulation enables to take into consideration the developments of the transport market and the evolution of its operators. As competition in the transport sector is not only intramodal but often intermodal, and because transport service providers tend to become largely diversified so as to provide door-to-door transport services and/or alternative transport solutions for a given route, the development of a multimodal approach to the regulation

of transport infrastructures and services appears to be inevitable.

However, if a multimodal approach to transport regulation is beneficial, the necessary condition for a regulatory body to be effective and credible, especially in highly subsidized sectors where political interference is likely, is to have enough human and material resources to be independent. As stated in the Directive 2012/34 establishing a single European railway area, which resulted in the creation of “ART’s ancestor” in 2009, the regulatory body shall be a stand-alone authority which is, in organisational, functional, hierarchical and decision-making terms, legally distinct and independent from any other public or private entity. This implies, as stipulated in the directive, that Member States ensure that the regulatory body is staffed and managed in a way that guarantees its independence. Indeed, the governance and organisation rules ensuring the independence of board members (e.g. non-renewable mandates, cooling-off periods, collegial decision-making) and the investigation, enforcement and sanctioning powers granted to regulatory bodies are likely to be of little significance if the regulatory body does not have enough competences and expertise to develop a critical mind and avoid being “captured by ignorance”.

As a consequence, to effectively play their role, regulators must be able to become “data crunchers”. They shall not only have the power to request relevant information from the regulated stakeholders but also be able to enforce such requests with appropriate penalties, including fines. This implies increased capacity in the fields of data collection, storage and analysis to implement a data-driven regulation.





Florence School of Regulation, Transport Area  
Robert Schuman Centre  
for Advanced Studies

European University Institute  
Via Boccaccio, 121  
50133 Florence  
Italy

Contact:  
FSR-Transport:  
[fsr.transport@eui.eu](mailto:fsr.transport@eui.eu)

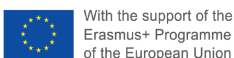
## Robert Schuman Centre for Advanced Studies

*The Robert Schuman Centre for Advanced Studies, created in 1992 and directed by Professor Brigid Laffan, aims to develop inter-disciplinary and comparative research on the major issues facing the process of European integration, European societies and Europe's place in 21<sup>st</sup> century global politics. The Centre is home to a large post-doctoral programme and hosts major research programmes, projects and data sets, in addition to a range of working groups and ad hoc initiatives. The research agenda is organised around a set of core themes and is continuously evolving, reflecting the changing agenda of European integration, the expanding membership of the European Union, developments in Europe's neighbourhood and the wider world.*

## FSR Transport

*The Florence School of Regulation (FSR) is a project within the European University Institute (EUI) focusing on regulatory topics. It works closely with the European Commission, and is a growing point of reference for regulatory theory and practice. It covers four areas: Communications and Media, Energy (Electricity and Gas), Transport, and Water.*

*The FSR-Transport Area's main activities are the European Transport Regulation Forums, which address policy and regulatory topics in different transport sectors. They bring relevant stakeholders together to analyse and reflect upon the latest developments and important regulatory issues in the European transport sector. These Forums inspire the comments gathered in this European Transport Regulation Observer. Complete information on our activities can be found online at: [fsr.eui.eu](http://fsr.eui.eu)*



Views expressed in this publication reflect the opinion of individual authors and not those of the European University Institute.

© European University Institute, 2020

Content © Matthias Finger and Teodora Serafimova, 2020

doi:10.2870/808098  
ISSN:2467-4540  
ISBN:978-92-9084-825-7