All aboard - travelling Europe by night

Towards cheaper night train tickets for people

June 2023

Summary

European night trains are slowly making their comeback in Europe. They are one of the solutions to shift passengers from air to rail. Nevertheless, the night train business model suffers from structural and regulatory disadvantages compared to planes. As a result, it is often more expensive for passengers to travel by rail for the same distance, despite the low-carbon impact of this transport mode. Night train travel has an on average a 28 times lower climate impact than air travel[1].

In this briefing, Back-on-Track Europe and Transport & Environment are showing how the EU and Member States can easily reduce the price of a cross-border night train ticket and push for the creation of new lines.

We find that setting a 0% rate of value-added tax (VAT) on cross-border routes and reducing the track access charges (TAC)[2] can lower the ticket price by between 3% and 48% depending on the passenger profile scenario taken. On average, the ticket price reduction for all types of users on European lines studied is 15%.

European countries should also temporarily or permanently exempt night trains operators from TAC to incentivise railway operators to create new lines. This exemption would be particularly welcome to allow rail operators to acquire or refurbish night train rolling stocks.

Back-on-Track Europe and Transport & Environment are calling on Member States and the EU to set up the relevant binding measures to achieve this price reduction and kick-off the market of European cross-border night trains.

[1] Back-on-track Europe (2022). *The Global Warming Reduction Potential of Night-Trains*.
[2] Track Access Charges (TAC) are tolls paid by rail operators to use the rail infrastructure. See for detailed definition of TAC

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Introduction - First of its-kind analysis shows that the EU and Member States can easily reduce the ticket price of European night trains

1. Context - The come back of night trains to shift air to rail

1.1. The slow renaissance of night trains in Europe

The network of night trains[3] in Europe since the year 2000 has declined considerably. The offer at national and European levels for night trains have been considerably reduced all over Europe, reaching the state of extinction in some countries, like in Spain. Years of underinvestment has decreased reliability and comfort, making it an unpopular choice for travellers. This, combined with the rise of low-cost airlines made sleeper trains uncompetitive and their profitability was further reduced.

However, from 2020, a few new night train connections have been launched, partly to respond to the growing urgency to shift to low-carbon transport modes. For example, Brussels and Berlin are now finally connected again with a night train operated by the new rail company European Sleeper.

1.2. The contribution of night trains to fight climate change

Night trains emit little CO2 (on EU average 14gCO2/km) and have on EU average a 28 times lower climate impact than air travel[4]. This is one of the most climate friendly modes of transport and it allows to cover long distances at night. A night train between Brussels and Malmö in Sweden would emit only 15 kg CO2e per person against 305 kg of CO2e for the plane[5]. From Berlin to Naples or Brussels to Vienna, the emissions savings of taking a night train over a plane for a family of four would be 2.8 tonnes and 3.6 tonnes[6].

The contribution of night trains to reducing GHG emissions and climate-related impacts is higher on longer distances (beyond 1,500 km) than on shorter distances, reinforcing the case for developing long-distance European night trains. Various reasons can explain this:

- Longer flights have greater emissions. Planes heat up the climate the higher they fly (non-CO2 effect) and they fly higher on longer distances;

[3] A night train can be defined as a train running for at least 7 hours including the 02:00 to 05:00 segment and conveying berths and/or couchettes.
[4] Back-on-track Europe (2022). *The Global Warming Reduction Potential of Night-Trains*. Retrieved from: https://back-on-track.eu/the-global-warming-reduction-potential-of-night-trains/
[5] Back-on-track Europe (2022). *Waking up in Malmö is still an utopia.* Retrieved from: https://back-on-track.eu/waking-up-in-malmo-is-still-a-utopia/
[6] According to http://www.ecopassenger.org using a non-CO2 multiplier (RFI Factor) of 3 for the current climate impact of aviation.

- On longer distances, night trains will compete essentially with aviation. On shorter distances night trains do also compete with cars and coaches. However, aviation has far higher emissions than coaches and most cars;

- While high-speed daytrains could cover distances up to 1,000 km with acceptable journey times, night trains can cover the same distance or longer at lower speeds with less time "lost" as the passenger can sleep;

- If high-speed-compatible night trains could use existing high-speed lines particularly in the evenings and in the mornings they could serve more metropolitan areas than with lower speeds. A single night train could serve both Madrid and Barcelona on one end and Amsterdam, Brussels and Paris on the other within an attractive timeframe when using the existing high-speed tracks on both ends, whereas a slower night train, confined to slower tracks, could only connect Amsterdam/Brussels with Barcelona skipping Paris. Serving more metropolitan areas means attracting a higher passenger volume. This will help to make use of the full capacity of a single night train of up to 700 passengers per train thus using energy and existing infrastructure even more effectively.

Nevertheless, we have to bear in mind that two-third of aviation emissions in Europe are from extra-EU flights, which cannot, for most of them, be replaced by trains (e.g. Paris to New York). If you add flights to all the islands in Europe (Ireland, Cyprus, Malta, Balearic Islands, Canaries, Sardeigna, Greek Islands), rail can only shift passengers from air to rail to a reduced share of the travels[7]. But, developing night trains is also about convincing citizens to choose a holiday vacation that is accessible by rail (e.g Berlin to Naples, and then to Capri) rather than taking a flight to Cancun. Night trains participate in changing the perception of rail travel, pushing citizens to consider rail instead of aviation for distances beyond 500km. To do so, night trains must be comfortable, plentiful and most essentially affordable to a wide range of passengers.

In a poll conducted by Yougov for Europe on Rail[8], it is found that a large majority in Germany, Poland, France, Spain and the Netherlands would be willing to use night trains (69%) and that nearly three out of four respondents (73%) think that rail travel on the same route should generally be cheaper than air travel. It has also been recently observed that the German and Spanish cheap rail tickets offers have increased the number of passengers travelling by rail.[9]

[7]Transport & Environment (2022). *Maximising air to rail journey*. Retrieved from: https://www.transportenvironment.org/discover/maximising-air-rail-journeys/
[8]New European public opinion poll shows support for shifting to rail. (2020, March 21). https://europeonrail.eu/. Retrieved June 6, 2023, from https://europeonrail.eu/portfolio/european-public-opinion-poll-shows-support-for-shifting-flights-to-rail/
[9]Matalucci, S. (2023, March 26). Subsidised train tickets: Germany and Spain set an exemple. *Voxeurop.* Retrieved June 8, 2023, from https://voxeurop.eu/en/subsidised-train-tickets-germany-and-spain-set-an-example/

1.3. Night train cost structure: a difficult business to operate

This section looks at the night train business model. One of the major barriers identified regarding the shift from plane to night train is the disadvantage of cost structure in competition with (budget) airlines. This cost structure disadvantage is explained by:

- The utilisation rate (the number of people that can travel in a single train in 24h) of night trains is lower compared to daytime trains, as reclining seats require an additional space of 10-30%, couchettes[10] need 30-100%, and sleeper cabins 100-300% more space. While the newly introduced capsules will decrease the need for booking couchette or sleeper compartments exclusively for privacy reasons they also need 30-100% more space than a daytime train. Night train rolling stock is also used less than high-speed trains or planes that can make multiple journeys within a day. A long-distance night train can make no more than one journey every 24h.
- The cost structure of plane trips is less distance-related compared to night trains. As a large share of the cost structure in aviation comes with the time and fees involved with take-off and landing, trains have a cost advantage only on shorter distances. The track access charges (TAC)[11] paid by the rail operators are essentially proportional to the distance travelled by train. The longer your line (km) is, the greater the share of TAC on the total cost of operating a night train will be. This is particularly significant beyond 1800 km.

[10] A couchette is a single bed in a shared compartment (usually between 3 to 6 persons). A sleeper cabin is a private compartment with usually 1 to 3 beds. A capsule is a newly developed sleeping arrangement from Austrian railway operator OBB consisting of a couchette that you can close for privacy.

[11] Track access charges (TAC) are tolls paid by rail operators to use the rail infrastructure. See annexes for detailed definition of TAC

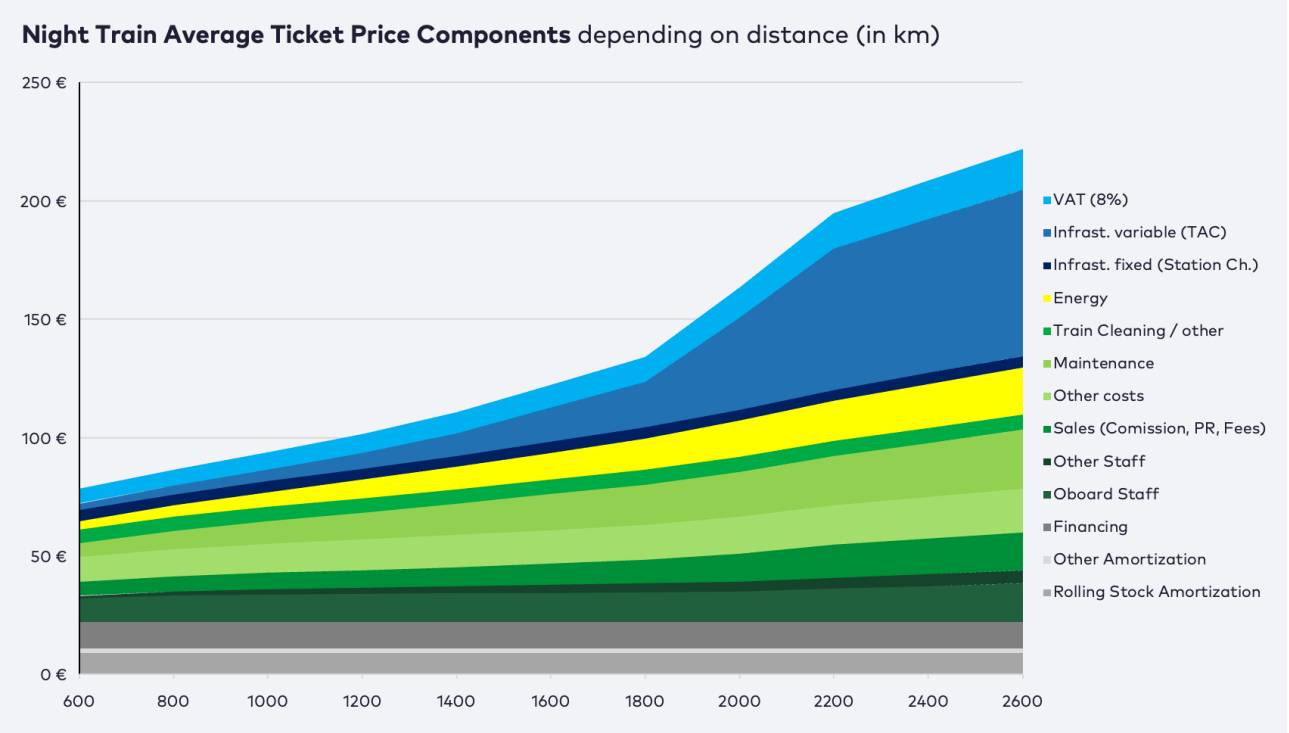


Figure 1. Night trains average ticket price components dependending on the distance travelled (in km)

- Unlike planes and coaches, train sets have to comply with different technical requirements (signalisation, power supply, track gauge and size of the train for tunnels, languages) in Europe, which depend on the chosen route. This can be partly avoided by using interoperable train coaches (TSI-compatible[12]), but as a result concessions on speed would be necessary. Using other more specific trains involves a risk that they can not be used elsewhere which makes financing new rolling stock difficult, particularly for new rail entrants.
- The leasing and second-hand markets for night trains are not mature unlike in the aviation and coach sectors. This is because many modern night train cars were scrapped or left to decay after the massive rise of budget airlines alongside with the extension of high speed trains in the beginning of the 2000's. If there is rolling stock available for leasing at all, it is coaches from the 50's, 60's and 70's which did not have a proper update in terms of comfort.
- Some costs are specific to night trains and make them more expensive in comparison with planes like higher staff costs due to night shifts on journeys lasting more than 8 hours or higher cleaning costs due to using beds with linen[13].

[12]Technical Specifications for Interoperability. https://www.era.europa.eu. Retrieved June 6, 2023, from https://www.era.europa.eu/domains/technical-specifications-interoperability_en

[13] Curtale, R., Larsson. J., & Nässén. (2023). Understanding preferences for night trains and their potential to replace flights in Europe. The case of Sweden. *ScienceDirect.* https://www.sciencedirect.com/science/article/pii/S2211973623000430

- Generally, cross-border trains in Europe "suffer from weak international cooperation, administrative hurdles, the lack of trains which are technologically possible to use in different countries, the absence of easy international booking and the lack of a legal framework that guarantees passengers' arrival times."[14]

1.4. Governments are slowly acting to make night trains cheaper

At the EU level, The Commission published in December 2021 an Action Plan to boost long-distance and cross-border passenger transport[15]. Unfortunately, the EC has not tabled binding legislation to reduce the cost of trains. It has put forward several initiatives including:

- Publication of “guidelines in 2023 for setting track access charges which support and encourage the development of long-distance and cross-border passenger services”
- Assessment of “the need for an EU-wide exemption of international rail tickets from VAT to significantly reduce the cost to rail passengers”.
- The administrative support to 10 cross-border rail pilot projects including two new night train services between Paris and Venice and Amsterdam and Barcelona.

At the Member States levels, several countries have set up or are in the process of setting up national policies that would reduce the cost of international night trains.

- France has reduced track access charges for non-high-speed night trains to direct cost.
- In Austria, VAT has been removed on international train tickets since 2023.
- In Germany, from 2024, the night tariff will generally apply for genuine night trains.
- In Belgium, night trains will be exempted from paying TAC and traction energy for 2 years in order to kick off the market of European night trains. The federal government has earmarked a budget of 2 millions euros for this support to European cross-border night trains.

Therefore taking into account the agenda at the EU level and Member States level, we decided to focus on two components of the cost structure of night trains: track access charges (TAC) and value-added tax (VAT).

The VAT is charged on ticket price sold by the rail operator while TAC are part of the overall cost structure of the night train. TAC are tolls paid by rail operators to use the rail infrastructure.

[14] ibid
[15] European Commission (2021). *Action plan to boost long-distance and cross-border passenger rail.* Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0810&from=EN

2. Analysis: significant price reduction is feasible on cross-border European night trains

Our analysis found that setting a 0% rate of value-added tax (VAT) on international tickets and a reduction of track access charges (TAC) for European night trains could significantly reduce the cost of the train ticket on five of the lines studied. Across the seven lines studied the average price reduction is 15.34%.

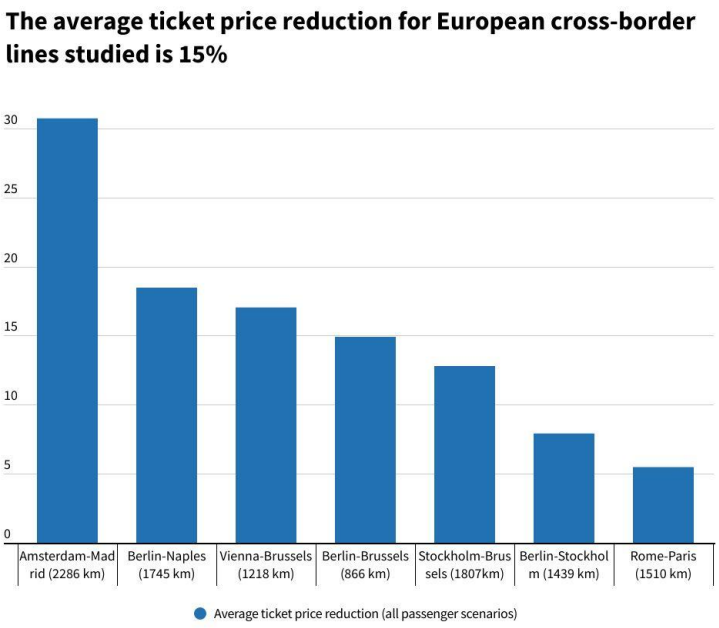
The methodology of our analysis is explained in the annexes and our calculations sheet can be downloaded on both Back-on-Track Europe and Transport & Environment websites. This briefing focuses on looking at the price reduction on open access lines (instead of public services obligations).

2.1. Ticket price reduction across all passenger profiles for European night trains

There is a significant ticket price reduction on five of the lines studied (Amsterdam-Madrid, Berlin-Naples, Vienna-Brussels, Berlin-Brussels and Stockholm-Brussels). The price reduction is on average between 12.80% and 30.73%. The ticket price reduction for two of the lines studied (Berlin-Stockholm, Rome-Paris) is less significant. It is respectively 7.91% and 5.48%.

The analysis was performed with three scenarios corresponding to three different passenger profiles (a family of four, a business traveller and a solo low-cost traveller). The detailed results per scenario can be found in the annexes. We have also calculated the ticket price reduction for two national lines (Paris-Briançon and Milano-Lecce) that can be found in the annexes.

Figure 2. Average ticket price reduction for the seven European night trains lines studied



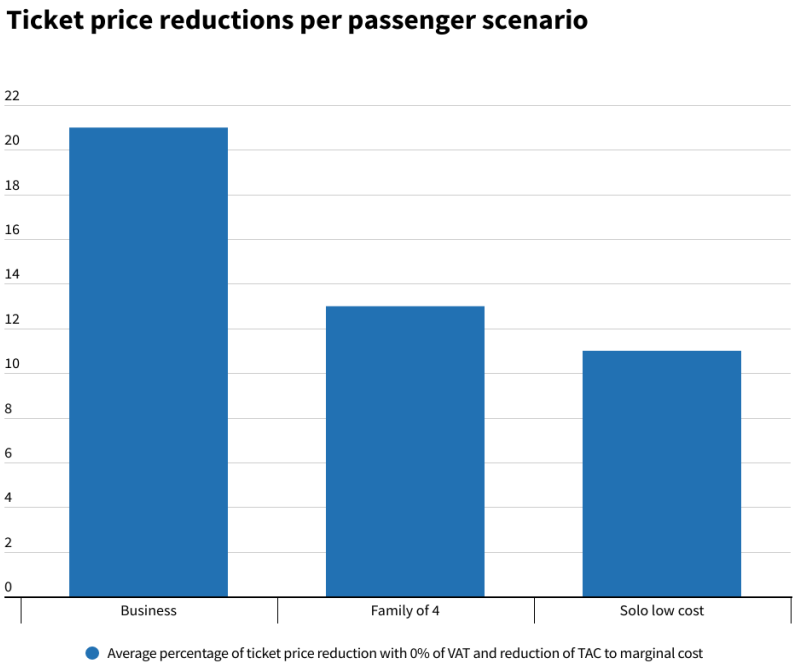


Figure 3. Average ticket price reduction per passenger scenario

Example: A family of four on a return trip from Amsterdam to Madrid could save up to €365 on their night train tickets, from a departing price of €1,482

2.2. Multiple factors behind the difference in ticket price reduction for the lines studied

There is a significant ticket price reduction possible on five of the lines studied. On the two other lines, the reduction is less significant. The difference in the fare reduction between routes is based mainly on the following factors:

- **The distance of the night train**. The TAC are km-related. Longer is the distance travelled by the night train, bigger is the weight of the TAC on the ticket price. This explains partly why the two lines with the highest ticket price reduction are Amsterdam-Madrid (2286 km) and Berlin-Naples (1745 km). Nevertheless, it cannot be the only explaining factor because the Rome-Paris line (1510 km) has only a ticket price reduction of 5.48%.

- **A 0% rate of VAT**. If the line has a significant part of its journey in a country where a VAT rate of 0% is already applied to cross-border night train tickets, the ticket price reduction will be smaller. This explains partly the low ticket price reduction for Paris-Rome as both Italy and France already

apply a VAT rate of 0% for cross-border trains. Nevertheless, it cannot be the only explaining factor as Amsterdam-Madrid and Berlin-Naples also have a significant part of their journey in France and Italy while having an important ticket price reduction.

- **A TAC system is already in favour of night trains**. This explains the low ticket price reduction for the Paris-Rome line as night trains in France already benefit from a specific market segment with reduced TAC.

Several other factors can explain the price reduction differences between the lines**.** One of those is the optimisation of the TAC by the rail operator, for example by combining two night train lines to one train on parts of the journey. This allows sharing the burden of TAC among a bigger number of passengers.

2.3. Exemption of TAC to facilitate the launch of new night trains by rail operators

In Belgium, the federal government exempted night trains from paying TAC and traction energy for two years to kick off the market of cross-border night trains. In our calculations sheet, we show how a full exemption of TAC would impact the ticket price. The night train operator could either:

- Apply this exemption of TAC to further reduce the ticket price
- Use this exemption of TAC to invest in night train rolling stock.

TAC exemption reduces the risk of operators making losses with new lines. Establishing new lines is risky and costly and this risk would be minimised with TAC reduction and 0% rate of VAT. A railway undertaking could opt for not investing and just harvesting the temporary suspension. But then it is risking losing passengers in competition with another rail operator which invested in new modernised rolling stock, offering higher comfort and reliability.

2.4. Financially affordable measures for governments

We believe reduction or a (temporary) exemption of TAC, as well as setting a 0% rate of VAT for European train tickets will bring additional benefits to the EU and the Member States because:

- It would only be indirect subsidies, completely in line with the EU directives and not requiring direct subsidy (public service obligations) to long-distance passenger transport (which some member states would be reluctant to use);
- It will not significantly reduce the amount of revenues for the States and the infrastructure managers as the reduction will apply to services that hardly exist today;

- Some rail infrastructure, sometimes funded with EU money such as the high-speed link between Perpignan in France and Figueras in Spain, have spare capacity. Night trains could improve their utilisation.

Moreover, reducing TAC and VAT for European cross-border night trains would create a more level playing field in competition with air travel which enjoys a 0% rate of VAT for international journeys due to international agreements and takes advantage of a cost structure which does not cover the full environmental cost of its emissions. As long as the 0% rate of VAT for international air travel is not lifted, rail travel should benefit from the same advantage. Night trains are a new market with a low profitability. They need help in order to kickstart the market.

3. Policy recommendations and Conclusions

3.1. Policy recommendations

Due to the market and regulatory difficulties faced by European night trains, they need to be supported by governents. Both Member States and the EU can act at their level, with the EU having the possibility to harmonise the rules at the European level to kick off a proper rail market.

Therefore:

Back-on-Track Europe and Transport & Environment are specifically calling on the Commission of the European Union to:

1. Define **night trains as a market segment** (in addition to freight services, passenger services within the framework of a public service contract and other passenger services) for which infrastructure managers must evaluate their relevance for mark-ups.

2. Make a **TAC reduction on direct costs** mandatory for the night train segment until its relevance for mark-ups is proven.

3. Recommend an **EU-wide VAT rate of 0%** for European night trains.

While the EU has the power to harmonise TAC and VAT rules[16] Member States can also directly act at their national level to reduce the price of European night trains. Back-on-Track Europe and Transport & Environment are specifically calling on Member States to:

1. **Reduce TAC on night trains** to the direct cost.

2. Set at their national level a **0% rate of VAT for all European night trains[17].**

3. **Explore a (temporary) exemption from TAC** for European night trains to kick-off the market. We recommend at the minimum a temporary suspension and gradual reintroduction of TAC on a standardised direct cost level during a 7 year period 2026-2032 which would be sufficient for existing and new operators to order new or refurbished rolling stock in order to take advantage of the introduction period.

4. Not exclude the night train segment from using existing high-speed lines (like in France) to anticipate further developments in night train technology.

[16] Unanimity at the Council is required to update VAT rules
[17] Policy recommendation specifically addressed to Germany, Spain, Belgium, Netherlands, Croatia and Greece as the other EU countries already applied a 0% rate of VAT

Back-on-Track Europe and Transport & Environment are calling on both Member States and the European Union to reduce the financial burden on European night trains to stimulate the offer and make them more price competitive.

3.2. Conclusions

Across the seven lines modelled in the briefing, reducing TAC and setting a 0% rate of VAT for European night trains would allow travellers to save on average 15% on their night train ticket. Nevertheless, even with this reduction, the ticket price on some of those routes can remain high and constitute a barrier for travellers to shift from air to rail.

Governments must further explore policy solutions to put rail and air on a level playing field, further reducing the price of rail and increasing aviation costs. We would recommend Member States and the EU to explore the following options:

- Reduce energy taxes on train that represent an increasing share of the operating cost of the rail operators;

- Increase the price of aviation with for example a tax of kerozen which is today untaxed and removing the 0% rate of VAT for international connections. Aviation must pay for its high climate impact;

- Reduce the station charges that can represent a significant cost for operating a night train (e.g. the expensive station charges in Paris Austerlitz);

- Improve the interoperability of the European network to reduce the cost of operating night trains. This would require the EU and Member States to step up the investments in the modernisation and standardisation of the network as well as remove administrative bottlenecks.

The goal of this briefing was to explore how we can reduce the price of European night trains tickets running on the Open Access model. Nevertheless, to further reduce the price of the tickets, Member States and the EU could explore the possibility to create European public service obligations (PSOs) - particularly in areas with lower population density - to subsidise a significant share of the operating cost of running night trains. But, this option would require a stronger financial engagement of Member States and the EU.

Annexes - Methodology and detailed results

Annexe 1. Train routes

The following criteria were used to select the train routes studies:

- Routes with high-volumes of air passengers
- Combination of existing and potential routes
- Geographical balance (Eastern Europe is not represented due to a lack of data)
- Essentially European lines but also two national lines for comparaison
- European lines that are (mostly) operated on Open Access and not on Public Service Obligation to reflect the ticket market price.

The selected routes are the following:

European lines	Vienna-Brussels Stockholm-Berlin Stockholm-Brussels Amsterdam-Madrid Berlin-Naples Paris-Rome Brussels-Berlin
National lines	Milano-Lecce Paris-Briançon

Annexe 2. Ticket price reductions

a) Ticket price estimation

There were two methods for estimating the ticket price for the routes selected:

- If this is an existing line we looked on the booking website of the rail operator
- If this is not an existing line we made an estimation based on several characteristics of existing lines with a similar profile

Three passenger scenarios were selected to estimate the price of the ticket:

- **Business traveller scenario.** We looked for a 1 day return for one person exactly on Wednesday next week. We chose a bed in a private compartment or a capsule (if Wednesday is unavailable we were looking for the next available working day).

- **Family of 4 scenario:** We looked for a 6-8 day return trip for two adults and two children (6 and 12 years old) in a specific week, exactly 10 weeks ahead choosing the cheapest option with 1 day flexibility. We chose a private compartment with 4 couchettes.

- **Solo low-cost traveller scenario.** We looked for a 4-8 day return trip 9-11 weeks ahead for one person choosing the cheapest option. We chose a shared couchette.

b) Calculation of track access charges (TAC)

For TAC, we use the information provided in the network statements of the various infrastructure managers. Following our calculations, we contacted the infrastructure managers for a peer-review of the calculations.

Track access charges (TAC) are composed of two parts:

- a direct cost;
- mark-up costs.

What is the direct cost?	What is the mark-up cost?
The direct cost is the fee that the rail operators pay to compensate the infrastructure manager for the cost caused by the rail operator (mainly maintenance and operation of the infrastructure). They may include surcharges for environmental damage (noise) or use of congested lines.[18]	Mark-ups come on top of the direct cost. They shall help the infrastructure manager refinancing the original construction cost of the existing infrastructure. However these market markups must be charged impartially and anticipate the market segment's ability to pay these markups

3 variables were selected:

- Current TAC situation (CTAC)
- Reduction to the direct cost in the EU (mark-ups removed) (MCEU)
- Temporary exemption of TAC in the EU (following the Belgian model) (TSEU)

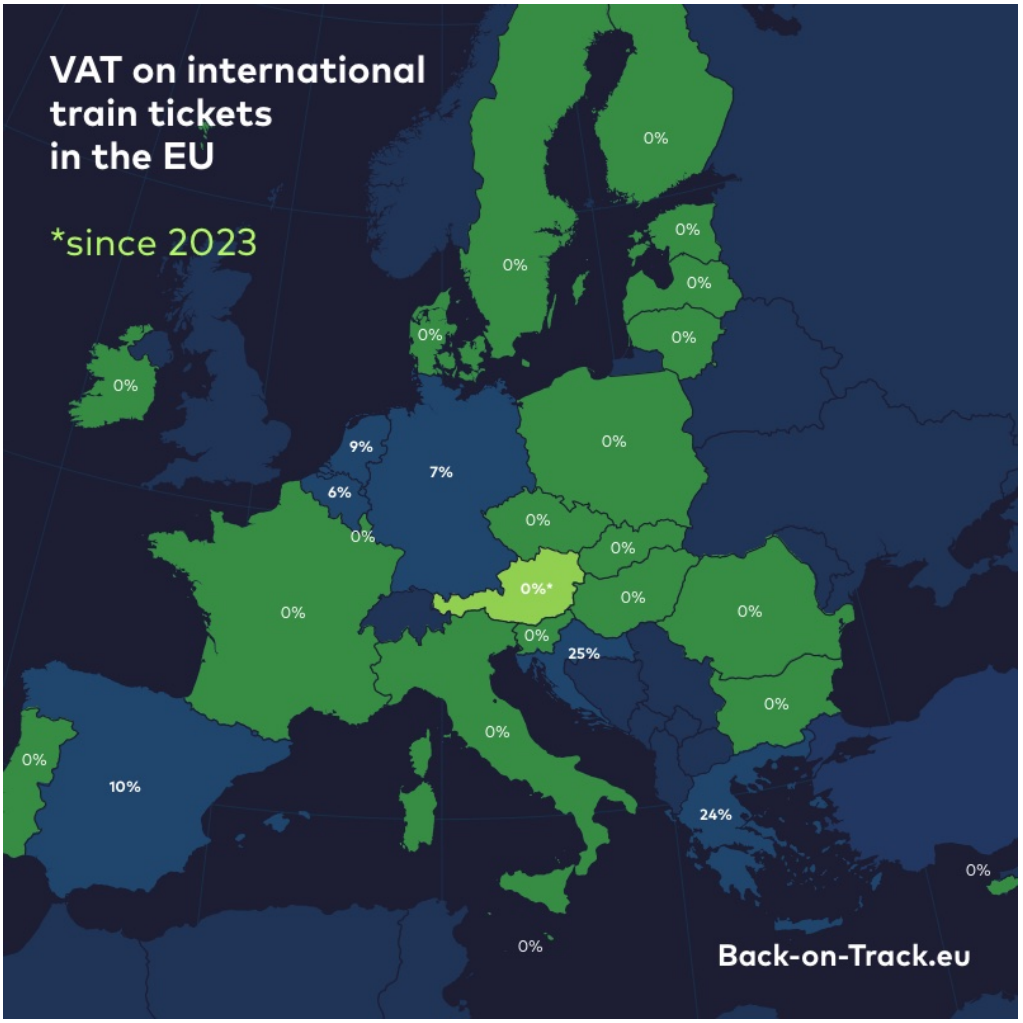
[18] There is a big difference in the direct cost defined so we assume that some infrastructure managers only charge marginal cos.)

c) Calculation of VAT per train routes

For VAT, we took the available information on official government websites in each European country studied.

2 variables were selected:

- Current VAT perceived on cross-border night trains
- A 0% rate of VAT for European night trains tickets



Annexe 3. Overview table of the ticket price reduction across all scenarii

Lines	Scenarios	Initial return ticket price (in €)	New ticket price after 0% VAT rate and TAC reduction (in €)	Price reduction
Amsterdam-Madrid	Business scenario	883.84	460.06	-47.95%
	Solo low Cost scenario	330.01	265.47	-19.56%
	Family scenario	1,482.02	1,116.14	-24.69%
Berlin-Naples	Business scenario	672.33	508.58	-24.36%
	Solo low Cost scenario	251.04	210.23	-16.26%
	Family scenario	1,127.36	960.60	-14.79%
Vienna-Brussels	Business scenario	490.60	398.74	-18.72%
	Solo low Cost scenario	175.60	152.02	-13.43%
	Family scenario	731.60	592.52	-19.01%
Berlin-Brussels	Business scenario	458.00	392.53	-14.30%
	Solo low Cost scenario	178.00	159.83	-10.21%
	Family scenario	1,152.00	1,036.55	-10.02%
Stockholm-Brussels	Business scenario	861.34	701.40	-18.57%
	Solo low Cost scenario	321.61	288.54	-10.29%

	Family scenario	1,444.30	1,306.29	-9.56%
Berlin-Stockholm	Business scenario	700.32	600.37	-14.27%
	Solo low Cost scenario	262.52	251.20	-4.31%
	Family scenario	744.01	705.70	-5.15%
Rome-Paris	Business scenario	918.18	840.10	-8.50%
	Solo low Cost scenario	342.84	331.19	-3.40%
	Family scenario	1,539.59	1,469.73	-4.54%
Milano-Lecce	Business scenario	219.80	193.29	-12.06%
	Solo low Cost scenario	83.80	77.61	-7.38%
	Family scenario	203.00	165.87	-18.29%
Paris-Briançon	Business scenario	404.00	404.00	0.00%
	Solo low Cost scenario	74.00	74.00	0.00%
	Family scenario	377.00	377.00	0.00%

Further information

Victor Thévenet
Rail Coordinator
Transport & Environment
victor.thevenet@transportenvironment.org

Juri Maier
Back-on-Track Europe
press@back-on-track.eu