Response to the Balanced Approach procedure Schiphol

DEFINITIEF
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Welcome to Amsterdam Airport

Schiphol Group

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Executive summary

Effective, enforceable measures with structural benefits

1. Schiphol has been connecting the Netherlands with the rest of the world for more than 100 years. It is something we do with pride. At the same time, we realise that our activities have an impact on the environment and local communities. We are aware that the drawbacks involved should play a greater role in the choices we make.

2. Schiphol wants to keep on connecting the Netherlands in the future and simultaneously believes it must do so in a more sustainable way. That is why we are going for a **quieter, cleaner and better** Schiphol and presented an 8 -point plan on how to get there on 4 April 2023.[1] An airport and an aviation industry in better equilibrium with the world around it. **It is time to give local communities, our employees and the aviation industry clarity and perspective.**

3. On 24 June 2022, the Dutch government presented its decision about the future development of Schiphol.[2] With this decision, the government wishes to find a new balance between the importance of an international airport to connect the Netherlands with the rest of the world and the quality of the living environment around the airport.

4. In earlier contributions[3] – and again in this response to the consultation – Schiphol has argued that **clarity and perspective are needed for all parties involved**. That is why we reiterate our commitment to a system that not merely focuses on the number of movements (ATMs), but to a system that works with enforceable environmental limits. Growth or reduction of movements should never be an end in itself. **A new system, to be laid down in a new Airport Traffic Decree (LVB), will create certainty for local residents and, at the same time, ensure that the aviation sector is held to ambitious environmental targets that lead to less nuisance and emissions**. Such a system should also provide the aviation sector with opportunities for development within those environmental limits and encourage innovations for reduced nuisance and emissions.

5. According to EU Regulation 598/2014, a balanced approach procedure must be conducted when an EU member state wishes to implement noise-related operating restrictions at an airport with more than 50,000 aircraft movements per year. The government's decision contains such operating restrictions, which means this procedure must be followed. Although the balanced approach procedure primarily focuses on noise reduction and leaves aside other relevant emissions, we believe **this is a necessary step towards that long overdue clarity and perspective.**

6. The government has set out noise targets for both the day (-20%) and night period (-15%) and has outlined three combinations of measures with which it expects to achieve these targets. Schiphol has considered these proposals and concluded that, even though there are some similarities with the measures we are proposing, these proposals come either with technical, legal and/or operational issues.

[1] Schiphol (2023). For a quieter, cleaner and better Schiphol
[2] Ministerie van Infrastructuur en Waterstaat (2022). Hoofdlijnenbrief Schiphol dd. 24 juni 2022 (in Dutch)
[3] Schiphol (2023). Zienswijze Experimenteerregeling (in Dutch)

7. Schiphol has therefore tabled three **effective, enforceable** alternative measures **with structural benefits** from its 8-point plan which address real concerns by local residents but also safeguard our place as one of Europe's major airports and gateways to the world:

    I. a night curfew from 0:00 till 05:00 for arrivals and 06:00 for departures, incl. a maximum of 22,000 night flights
    II. a ban on the noisiest aircraft
    III. a ban on business aviation

Table 1: analysis of noise effects of Schiphol's measures

	Highly annoyed people within the 48Lden contour	Number of affected houses within the 58Lden contour	Severely sleep disturbed people with the 40Lnight contour	Houses within the 48Lnight contour
Combined effect of 1+2+3	-15.5%	-11.2%	-46.8%	-53.6%

8. These measures are not only **effective** as they deliver both real noise and CO2 reduction as well as health benefits, but they are also **cost-effective.** Furthermore, our measures are **enforceable** as they will be legally binding via a new Airport Traffic Decree (LVB). This will ensure that these (and other) measures will be implemented and proven by November 2024. This is ambitious, but feasible, as Schiphol had understood from the Ministry of Infrastructure & Water Management (I&W). Most importantly, the proposed measures will deliver **structural benefits** as they address key concerns by local residents and provide the necessary certainty for all parties involved.

9. These measures will be supported by Schiphol's proposed **annual (additional) investment of € 10 million in local communities and residents.** This measure cannot be quantified in the provided models, but will support innovative building, sound proofing and regional spatial development.

10. Schiphol is very much aware that its measures 'overshoot' the noise targets for the night period. This is very much driven by our proposal for an alternative night curfew. **For Schiphol, this balanced approach procedure is not merely an arithmetic exercise, but very much a societal one.** For instance, our proposed night curfew offers the best of both worlds. It gives local residents the certainty of uninterrupted sleep between 0:00 and 05:00/06:00 while also maintaining strong hub connectivity for the Netherlands. The balanced approach procedure allows for taking into account these considerations.

11. However, our three measures combined do not reach the intended targets for the combined day-evening-night period. To reach these targets, other measures like additional fleet renewal need to be taken to form a new package as output of this balanced approach procedure.

12. To conclude, this balanced approach procedure should – and can - focus on delivering clarity and perspective for all stakeholders involved. In its response Schiphol has tabled three **effective** and **enforceable proposals** with **structural benefits**. We therefore ask the Ministry of I&W to give these measures serious consideration and give them a place in the package which will be presented to the European Commission.

1 Introduction

1. On 24 June 2022, the Dutch government presented its decision about the future development of Schiphol.[4] With this decision, the government wishes to find a new balance between the importance of an international airport to connect the Netherlands with the rest of the world and the quality of the living environment around the airport.

2. According to EU Regulation 598/2014, a balanced approach procedure must be conducted when an EU member state wishes to implement noise-related operating restrictions at an airport with more than 50,000 aircraft movements per year. The government's decision contains such operating restrictions, which means this procedure must be followed.

3. The consultation document presented by the government sets outs three combinations of possible measures which, in the government's view, have sufficient impact to achieve its noise abatement objective. Schiphol and other participants in this consultation have been invited to respond to the selection, composition, effect, and desirability of the three combinations of measures that are presented. Participants are also invited to propose alternative measures or alternative combinations of measures that could achieve the noise abatement objective and can be achieved by November 2024.

4. In earlier contributions[5] – and again in this response to the consultation – Schiphol has argued that clarity and perspective are needed for all parties involved. Schiphol believes that the balanced approach procedure should – and can - be used to create an updated and more sustainable regulatory framework. To emphasise our commitment to achieving a more balanced and sustainable approach between providing world-class connectivity and minimising the impact on local communities and the environment, Schiphol has recently presented a comprehensive plan consisting of eight measures for a quieter, cleaner and better Schiphol.[6] These steps are not focused on capacity as such, but on enhancing the positive aspects and minimising the negative impact of aviation.

5. A new framework, to be established through a new *Luchthavenverkeersbesluit* (Airport Traffic Decree, LVB), should provide the legal basis and focus on the impact and improved protection for local residents and the environment, while also incentivising innovation. Growth or reduction of the number of ATMs should not be a mere target, but the outcome of discussion about both the positive and negative impact of aviation.

6. Schiphol's response to the consultation should be read in this context. Schiphol provides an effective, enforceable and structural alternative, which ensures the much valued connectivity of the Netherlands, while also addressing significant concerns raised by local residents, such as night flights.

7. Schiphol also notes that this procedure and legal framework solely focuses on noise and leaves other emissions like CO2 aside. For Schiphol, this balanced approach procedure is not merely an arithmetic exercise, but very much a societal one. Therefore, we have also taken its effects on society in general, and especially local residents, into account. The balanced approach procedure allows for taking into account these considerations.

8. Additionally, Schiphol is committed to implement the 8-point plan and this balanced approach procedure is key to realise three effective and enforceable measures that will result in structural benefits.

[4] Ministerie van Infrastructuur en Waterstaat (2022). Hoofdlijnenbrief Schiphol.24 juni 2022 (in Dutch)
[5] Schiphol (2023). Zienswijze Experimenteerregeling (in Dutch)
[6] Schiphol (2023), For a quieter, cleaner and better Schiphol

9. Schiphol concludes that some of the measures proposed by I&W and the publicly known alternatives of other stakeholders do not adequately address the necessary balance between connectivity and the quality of the living environment. Furthermore, some of these alternatives may not be structural enough, cannot be enforced properly and/or are too one-dimensionally focused on the number of movements, which distracts from the real issues at stake: reduction of noise and emissions while retaining the benefits of connectivity. When I&W adopts Schiphol's three alternative proposals and implements these in national regulations, a further benefit for I&W will be that it will not be dependent on external factors or parties for the implementation, thereby increasing the likelihood that these measures will be effective by November 2024.

10. In this response Schiphol will first address the target setting and baseline (paragraph 2) as well as the measures proposed by I&W (paragraph 3). Next, we will propose our effective and enforceable measures with structural benefits (paragraph 4), supported by a thorough analysis of both noise effects (paragraph 5) and cost effectiveness (paragraph 6). We will end with a brief conclusion.

2 Target setting and baseline

11. The government has set the following targets for noise abatement during the day and night period:
    a. 20% reduction of the number of highly annoyed people (HAP) within the 48 dB(A) Lden contour
    b. 20% reduction of the number of houses within the 58 dB(A) Lden contour
    c. 15% reduction of the number of severely sleep disturbed (SSD) people within the 40 dB(A) Lnight contour
    d. 15% reduction of the number of houses within the 48 dB(A) Lnight contour

12. These reductions are measured in relation to a baseline scenario. This baseline scenario represents the current situation with 500,000 aircraft movements (including 32,000 night) and considers all planned measures and autonomous developments until November 2024. It also includes (planned) fleet renewal.

13. Schiphol wants to make it clear that it believes that the target for the night period is set too low. Sleep disturbance continues to be a significant concern for Schiphol's neighbours. Although aircraft are now quieter than before, the number of severely sleep disturbed is still significant. Furthermore, as a result of newly built houses within the noise contours of Schiphol, both the number of highly annoyed people and severely sleep disturbed persons has grown by 15% based on the housing registry 2021 compared to that of 2005.

14. In this response, Schiphol is using the baseline scenario of I&W to analyse the effect of three new measures. To do so, Schiphol has incorporated the actual General Aviation traffic data for the year 2022 into the baseline scenario. This approach provides a more accurate representation of the noise load around the airport.

15. In addition, Schiphol has looked closely at the input data for this baseline scenario and would like to challenge two assumptions:
    a. The use of 100% continuous descent approach ("CDA") procedures on the Kaagbaan (06-24) and Zwanenburgbaan (18C-36C) during 2+1 landing peaks is considered unrealistic per 1 November 2024, since fixed arrival routes during the day are a prerequisite for this. Short fixed arrival routes during the day for a number of runways are planned under the Dutch Airspace Redesign Programme (DARP, *Programma Luchtruimherziening)*[7] but are not expected be implemented on 1 November 2024.
    b. Also, the total percentage of CDAs in our annual environmental impact forecast (*Gebruiksprognose 2023*)[8] is less (36%) compared to the baseline of I&W (47%).

[7] Ministerie van Infrastructuur en Waterstaat, Programma Luchtruimherziening (in Dutch)
[8] Schiphol (2022) Gebruiksprognose 2023 (in Dutch)

3 Measures proposed by I&W

16. In its consultation documents[9], I&W has outlined three combinations of measures. While some of the measures do have similarities with its own proposals, Schiphol believes more efficient, enforceable measures which lead to structural benefits are available. Furthermore, some of the measures, in our view, come with either with technical, legal and/or operational issues. In this section we will address these measures:

Combination B	Combination C	Combination D
M10 – reduce secondary runway use M7b Extend night regime (evening + morning) M8 – Reduce use of Buitenveldert Runway M1 – Encourage airlines to use quieter aircraft M14 – Reduce capacity to 440k overall / 29k night flights	M10 – reduce secondary runway use M7b Extend night regime (evening + morning) M8 – Reduce use of Buitenveldert Runway M1 – Encourage airlines to use quieter aircraft M15c – Reduce capacity of night flights to 25k (500k overall)	M7b Extend night regime (evening + morning) M1 – Encourage airlines to use quieter aircraft M14 – Reduce capacity to 440k overall / 29k night flights

17. The measure **'Encourage airlines to use quieter aircraft by differentiation of airport charges' (M1)** makes the wrong assumption that airport charges can be changed at any given moment. Schiphol's charges structure has a (statutory) three-year cycle, with the next cycle starting per 1 April 2025, i.e. after the reference date of 1 November 2024. Also, charges are set by Schiphol within the strict regulatory framework of the *Wet Luchtvaart* (Dutch Aviation Act), and only after consultation with airlines. The government lacks the authority to directly set the rates itself.

18. Even if Schiphol would be able to change charges before this date, the assumption that charges classes S2 and S3 remain unchanged is not realistic. If the rate in class S1 (most noisy aircraft) is raised, this will most likely have an effect on other classes too as the total amount of charges has to be cost-orientated.

19. Measure M1 assumes that cargo carriers with S1 aircraft move to other airports, which would mean an increase in the general travel cost for freight. This is not correct since cargo fees at Schiphol fall under general landing and take-off charges. If cargo aircraft move to other airports, the cost basis for passenger aircraft will increase as well. Furthermore, measure M1 assumes that 87,000 movements in the period April 2023 - April 2024 fall in the S1 category, while in reality the number of aircraft movements in the S1 category amounted to 859 in 2022.

20. It should also be noted airport charges and other (national) taxes constitute a relatively small part of an airline's operating cost. While differentiation can certainly be helpful in rewarding the use of quieter aircraft types, it is important to recognise that major factors like oil prices and local market conditions play a more significant role in determining the choice of aircraft. Schiphol therefore believes that it is important not to overestimate the potential noise reduction that can be achieved through this measure.

21. **The measure 'Extension of night regime' (M7b)** extends the night regime in the morning from 06:40 to 07:00 local time. If this is calculated according to the current standards, we agree that this is a beneficial measure since night flights (before 07:00) count 10 times more than flights after 07:00. However, during this brief period a significant number of slots are available; forcing 1+1 runway use would lead to delays which are known to have a risk of "snowballing" during the rest of the day when they occur in the early morning. Next to that, problems with the NNHS-system are expected (especially with the use of the fourth runway and the legal limitations).

[9] Ministerie van Infrastructuur en Waterstaat (2023) Internetconsultatie Balanced Approach Schiphol (in Dutch)

22. **The measure 'Runway closure (partial closure of the Buitenveldertbaan during specific weather conditions)' (M8)** assumes that flight movements that were designated to the Buitenveldertbaan (09-27) in the baseline scenario, and have been moved given the assumptions mentioned, are redistributed over the remaining runways in accordance with an adapted runway selection system. However, the Buitenveldertbaan is only used in specific weather conditions or during maintenance of other runways when no other alternatives are available. It is the lowest ranked runway in the current operational system at Schiphol. Therefore, Schiphol believes this measure is against the system of preferential runway use and the noise reduction resulting from this measure should be zero.

23. **The measure 'Minimise use of secondary runways' (M10)** has an interdependency with our proposal for a night curfew. Since the 10,000 night flights from our night curfew measure are moved to the day, it is expected that fewer off-peaks occur during the day for which 1+1 runway use is sufficient.

24. **Measures M14 'Reduce capacity to 440k overall / 29k night flights' and M15 'Reduce overall number of night flights'** are focused on reducing the overall numbers of movements during the day and/or the night. We acknowledge that a reduction in movements has the potential to lead to structural nuisance reduction in some areas. However, more effective measures with even better and targeted structural benefits are available. As we have argued and will argue in our own proposal, the number of movements does not accurately reflect the level of nuisance caused by those movements. For instance, a reduction to 440,000 movements per year with lots of heavy wide-body aircraft will have a bigger impact on local residents than 483,000 movements per year with a quieter fleet mix. The same principle applies to the night period as well. To proactively prevent nuisance from occurring, a curfew is a much more effective instrument than a general reduction during the same period. This is because even a single aircraft movement has the potential to disrupt and awaken individuals.

25. Schiphol concludes that, even though there are some similarities with our own proposed measures, all measures above come either with technical, legal and/or operational issues. Therefore, they risk not delivering structural noise reduction for local residents.

4 Proposed alternative measures

26. Schiphol believes that the measures which are to be implemented as part of the balanced approach procedure should reflect the government's desire to create a new balance between the importance of an international airport to connect the Netherlands with the rest of the world and the quality of the living environment around Schiphol. Therefore, as we argued in our 8-point plan[10], these measures should not only address (calculated) noise targets, but also real concerns of all parties involved, in particular local residents.

27. Schiphol proposes alternative measures that offer the best of both worlds: they are aimed at preserving valuable connectivity while simultaneously structurally reducing the environmental impact. **Schiphol's measures are effective, enforceable and deliver structural benefits.** They lead to significant noise reduction (especially during the night) and make the most effective use of scarce capacity at a highly congested airport located in one of Europe's most densely populated areas.

28. The proposed measures are not only **effective** as they deliver both real noise and CO2 reduction as well as health benefits, but they are also **cost-effective**. Furthermore, our measures are **enforceable** as they will be legally binding via a new Airport Traffic Decree (LVB). This will ensure that these (and other) measures will be implemented and proven by November 2024. This is ambitious, but feasible. Most important, they deliver **structural benefits** as they address key concerns by local residents and provide the necessary certainty for all parties involved.

29. Furthermore, Schiphol's measures complement ongoing measures like our joint noise reduction programme (*Minder Hinder)* with LVNL, future proposals to further differentiate the airport charges to stimulate the use of quieter and cleaner aircraft and the aviation sector and government's financial support for isolation and innovation.

30. Schiphol's alternative set of measures consists of three measures:
    I. a night curfew with a night flight cap of 22k movements, incl. a maximum of 22,000 night flights
    II. a ban on noisiest aircraft
    III. a ban on private jets and small business aviation

31. These measures will be supported by Schiphol's proposed annual (additional) investment of € 10 million in local communities and residents by supporting innovative building, sound proofing and regional spatial development. This measure cannot be quantified as its noise effects cannot be modelled using the ECAC Doc29 tool. However, this measure is expected to significantly contribute to noise reduction, especially during the night when people are sleeping.

32. Schiphol's 8-point plan also supports cargo. Schiphol observes that scarcity of airport capacity has resulted in a crowding out of full freighter flights, at the expense of the air cargo marketplace. A further reduction of capacity will result in additional crowding out impacts. A study by Seabury – a cargo consultancy – shows severe consequences for cargo over the longer term. Amongst other things, Seabury estimates that a capacity reduction could result in a -29% to -46% drop in cargo traffic in 2030 compared to 2021.[11] Given the fact that freighters account for only 3% of all movements at Schiphol but represent a relatively high economic value per movement. As per our 8-point plan, Schiphol wants to protect full freight flights by keeping 2.5% of the take-off and landing slots available for full freighter flights. By doing so, Schiphol acts according to its statutory duty to stimulate the use of the airport as high-quality air traffic hub with high network quality and ensures that the airport infrastructure is optimally ensured. Full freighter operations will be subject to the measures proposed hereafter.

[10] Schiphol (2023), For a quieter, cleaner and better Schiphol
[11] Accenture (2023) Schiphol Group: 440k ATM cap and potential air cargo implications

Figure 1: overview of Schiphol's measures per time period

Local time	% of traffic in '22	Night curfew	Ban noisiest aircraft	Ban BA aircraft
00:00-01:00	0,8%	Curfew all		No BA (as is)
01:00-02:00	0,4%	Curfew all		No BA (as is)
02:00-03:00	0,2%	Curfew all		No BA (as is)
03:00-04:00	0,1%	Curfew all		No BA (as is)
04:00-05:00	0,1%	Curfew all		No BA (as is)
05:00-06:00	0,9%	Curfew departures	-13 ΔEPNdB	No BA (as is)
06:00-07:00	2,1%		-13 ΔEPNdB	No BA (as is)
07:00-08:00	6,7%		-12 ΔEPNdB	No BA
08:00-09:00	7,0%		-12 ΔEPNdB	No BA
09:00-10:00	5,5%		-12 ΔEPNdB	No BA
10:00-11:00	7,0%		-12 ΔEPNdB	No BA
11:00-12:00	6,1%		-12 ΔEPNdB	No BA
12:00-13:00	6,2%		-12 ΔEPNdB	No BA
13:00-14:00	6,3%		-12 ΔEPNdB	No BA
14:00-15:00	5,9%		-12 ΔEPNdB	No BA
15:00-16:00	6,7%		-12 ΔEPNdB	No BA
16:00-17:00	5,4%		-12 ΔEPNdB	No BA
17:00-18:00	5,0%		-12 ΔEPNdB	No BA
18:00-19:00	4,9%		-12 ΔEPNdB	No BA
19:00-20:00	6,3%		-12 ΔEPNdB	No BA
20:00-21:00	4,6%		-12 ΔEPNdB	No BA
21:00-22:00	6,4%		-12 ΔEPNdB	No BA
22:00-23:00	3,8%		-12 ΔEPNdB	No BA
23:00-00:00	1,4%		-13 ΔEPNdB	No BA (as is)

4.1 Night curfew between 0:00 and 05:00 / 06:00

33. The proposed night curfew includes a restriction on take-offs between 00:00 and 06:00, no landings between 00:00 and 05:00 and a maximum of 22,000 night flights. The remaining 22,000 night flights take place between 23:00 and 00:00 and between 05:00/06:00 and 7:00. The difference between the arrival and departure curfew stems from the principle that important intercontinental connectivity (the first arriving flights from Asia and North America between 05:00 and 06:00) should be protected.

34. One of the main reasons why a night curfew for several hours is better than simply reducing the amount of night flights is that it allows for a complete break in aircraft noise and emissions. Above all, a night curfew is relatively easy to enforce, it does not have an impact on the aviation safety, nor the network quality and the measure can be implemented by November 2024. Furthermore, emissions will decrease, the noise hindrance will not be relocated to other airports, and it is possible to assess the impact of the night curfew using the ECAC Doc29 sound modelling. All things considered makes this is a very efficient measure, not only from the perspective of noise reduction, but also in terms of many other aspects like sleep deprivation.

35. With the reduction in the number of flights proposed by I&W, residents living near airports would still be subjected to aircraft noise and pollution during the night, which can have negative impacts on health and wellbeing. Basner & McGuire (2018)[12] show that even low noise levels at night, and especially maximum noise levels of single events, significantly increase the probability of awakening.

[12] Basner & McGuire (2018) WHO Environmental Noise Guidelines for the European Region: A Systematic Review on Environmental Noise and Effects on Sleep

Various health studies underline the importance of night curfews to limit sleep disturbance:

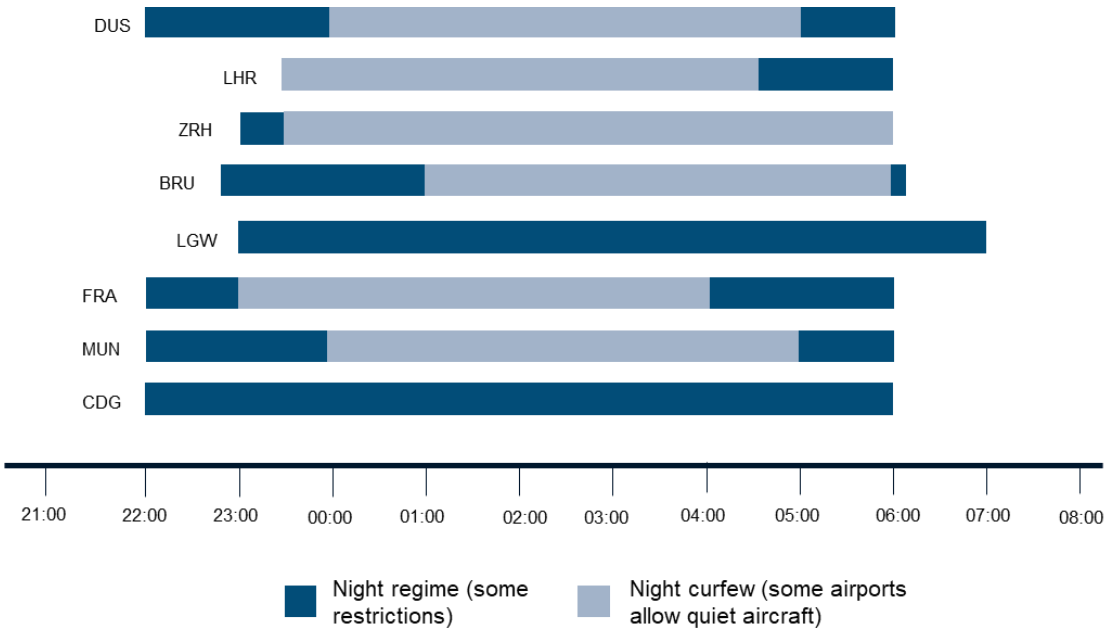
- **Basner & McGuire (2018). For all transportation modes a significant positive association was found between indoor maximum noise levels of single events and the probability of sleep stage transitions to wake or Stage 1. The noise levels at which the probability of an additional awakening was non-zero varied between transportation modes but was between 33–38 dB.**
- **RIVM: "Peak noises can cause awakenings and sleep disturbances. […] Due to the impact of individual sound events, such as the passing of a train, on sleep, there is often a debate on whether peak noise levels may be a better exposure measure for sleep effects than Lnight. [...] Approaches such as [...] providing sufficient intervals of quiet periods between sound events, creating a side with low or no noise, and effectively communicating expected noise levels to residents so they know what to expect can contribute to reducing sleep disturbances."[13]**
- **Schreckenberg et al (2016)[14] found in a study carried out at Frankfurt airport that a night flight ban from 00:00-05:00 resulted in a lower sleep disturbance correlation than before the night flight ban.**

36. Schiphol acknowledges these issues and is therefore in favour of a curfew and not only a reduction of night flights. A night curfew, supported by active enforcement, will provide the certainty that – except for emergencies or very special circumstances – there will be no sleep disturbance between 0:00 and 05:00/06:00.

37. Lastly, a night curfew at Schiphol is and has been one of the most discussed issues over the past years. Also, a night curfew / reduction of night flights was also one of the top suggestions mentioned in the online consultation of the noise reduction programme *Minder Hinder*[15]. Local residents and local governments alike do not only expect less noise nuisance but also point at the health and social benefits of such a measure.[16] It is important to note that night curfews are quite common in Europe and worldwide. In fact, Schiphol is one of the few major hub airports in northwestern Europe without a night curfew as Figure 2 below shows.

[13] RIVM: Effecten van omgevingsgeluid op de slaap (in Dutch)
[14] Schreckenberg, Dirk & Belke, Christin & Faulbaum, Frank & Guski, Rainer & Moehler, Ulrich & Spilski, Jan. (2016). Effects of aircraft noise on annoyance and sleep disturbances before and after expansion of Frankfurt Airport – results of the NORAH study, WP 1 'Annoyance and quality of life'.
[15] LVNL / Schiphol (2020) Minder Hinder Schiphol: antwoorden op reacties en suggesties uit de omgeving (in Dutch)
[16] Gezondheidsraad (2004), Over de invloed van geluid op de slaap en de gezondheid (in Dutch)

Figure 2: simplified overview of night regimes and curfews at selected major airports in Europe[17]



4.2 A ban on the noisiest aircraft

38. Schiphol wishes that the Dutch government implements a policy where the noisiest aircraft are no longer welcome at the airport. The noisiest aircraft cause above-average noise nuisance. By tightening the maximum permissible daytime and night-time (23.00-07.00) noise limits by up to a -12EPNdB margin and -13EPNdB margin respectively and further encouraging the use of quieter aircraft through our airport charges, noise nuisance in the surrounding area will decrease.

39. Schiphol proposes to set a stricter margin during the night, since night flights cause significantly more noise nuisance than day flights. This is confirmed by looking at the relative number of complaints of night flights vs. day flights submitted at our Community Contact Centre (*Bewoners Aanspreekpunt Schiphol*, BAS)[18]. Our proposal gives substance to two recommendations from the 2022 edition of the BAS annual report: (i) the reduction of noise nuisance during the night and (ii) the reduction of noise nuisance resulting from old aircraft types in the evening and night. Furthermore, noise nuisance in the late evening and night by old (freight) type of aircraft was mentioned as one of the top subjects in the online consultation of noise nuisance reduction programme *Minder Hinder*.

40. The proposed noise margins are determined based on a trade-off between potential noise reductions and feasibility by aircraft operators by looking at committed fleet renewal plans to limit operational impact for airlines where possible.

41. This proposal does not have an impact on the aviation safety nor the network connectivity quality of the airport. The proposed measure can be implemented by November 2024 and does not reduce the reliability of the operation of the airport. Further, the nuisance will decrease, the hinder will not be relocated, it is possible to assess the impact of measure using the ECAC Doc29 sound modelling and it has an impact on the reduction of emissions. Taking all factors into account, this measure proves to be highly efficient, not only in terms of noise reduction but also in various other aspects.

[17] Details of each individual airport night regime and curfew differ by airport. Analysis based on airport capacity declarations, public airport information and local regulations.
[18] Bewoners Aanspreekpunt Schiphol (2023) Annual Report 2022 (in Dutch)

Table 2: Analysis of isolated effects of ban on noisiest aircraft

CY	Total number of ATMs (Commercial)	Total number of ATMs night (Commercial 23-07h)	ATMs affected by ban > -12 EPNdB margin (24hrs, commercial)	ATMs affected by ban > -13 EPNdB margin (night, commercial)
2019	496,826	29,878	15,219 (3.1% of all commercial)	3,579 (12.0% of all commercial night flights)
2022	397,646	24,148	2,595 (0.7% of all commercial)	2,612 (10.8% of all commercial night flights)

4.3 A ban on private jets and business aviation

42. Schiphol wishes that the Dutch government stops the facilitation of business aviation and air taxis at Schiphol. Over the past years, business aviation has increased from over 11,000 in 2019 to nearly 17,000 flights in 2022[19]. These flights are not included in the 500k cap for commercial flights and the 32k cap for night flights. Due to operational reasons, their landing and take-off paths are mostly directed over the city centre of Amsterdam. As a result, a small number of movements and passenger traffic generates a relatively high impact on the surrounding area. In addition, small jets generate a disproportionately large amount of CO2 emissions per passenger and noise disturbance in comparison to commercial flights.

43. Business aviation flights and air taxis accounted for approximately 42,000 passengers in 2022, which represents 0.08% of all passengers at the airport. The average number of passengers per business aviation flights is around 2.5.

44. It is important to note that the proposed measure excludes other general aviation flights such as state and military flights, Coast Guard, and police/ambulance helicopters, which make up the remaining approximate 24,000 general aviation flights at Schiphol in 2022. Schiphol cannot and does not want to ban these flights as they provide valuable societal services to our country and region.

45. This proposal first and foremost will lead to nuisance reduction, while the measure does not have an impact on the aviation safety. The measure will also not have a negative impact on the reliability of the operation, and it is possible to assess the impact using the ECAC Doc29 sound modelling. Lastly, the proposed measure will reduce emissions (not only in absolutely numbers, but particularly in relative terms).

[19] Schiphol traffic and transport figures

5 Analysis of noise effects

46. To support its proposals Schiphol has asked an independent third party to conduct the analysis of noise effects. Using the prescribed ECAC Doc29 model, research institute Netherlands Aerospace Centre (NLR), has calculated both the individual and combined effects of the three measures on the four presented noise targets. Results can be found in Appendix A.

47. For modelling purposes, the following assumptions have been used:
    a. To model the impact of a night curfew it is assumed that 10,000 aircraft currently operating in the night curfew are moved to the evening and day (and are not moved to a different time slot during the remaining night period).
    b. Noisiest aircraft are replaced by an average aircraft type of comparable maximum take-off weight.
    c. Private jets and air taxis are removed from the traffic schedule since they are no longer allowed to operate to and from Schiphol.

48. Table 3 shows the impact of the three indicated measures on the equivalence criteria:

Table 3: Analysis of noise effects of Schiphol's measures

Measure	HAP 48Lden	Houses 58Lden	SSD 40Lnight	Houses 48Lnight
1. Night curfew	*-9.1%*	*-6.9%*	*-39.0%*	*-40.7%*
2. Ban on private jets and small business aviation	*-3.0%*	*-1.0%*	*-0.1%*	*-0.2%*
3. Ban on noisiest aircraft	*-5.5%*	*-4.6%*	*-9.8%*	*-13.8%*
Combined effects of 1+2+3	*-15.5%*	*-11.2%*	*-46.8%*	*-53.6%*

6 Analysis of cost effectiveness

6.1 General considerations Decisio & Beelining cost-effectiveness analysis

49. The balanced approach procedure requires the selection of appropriate measures based on their cost-effectiveness. In other words, how can the government's noise goals be achieved in the most cost-effective way.

50. Decisio & Beelining (2023)[20] conducted a cost-effectiveness analysis of the packages of measures presented by the Dutch government in its consultation document[21]. After careful assessment of the Decisio & Beelining cost-effectiveness analysis and the packages proposed, Schiphol would like to share the following comments:

51. Schiphol notes that the Decisio & Beelining (2023, p. 74) use a CO2-price of 94 euro per tonne. Although still prescribed in the guidelines (*MKBA leidraad)*, we note that such a price aligns with a 2.75 – and 3.75 -degrees climate scenario, while Dutch climate law contains reduction targets aimed at limiting global warming to 1.5 degrees. According to Schiphol's information, the current prescribed prices are about to be revised in due course. Therefore, Schiphol has conducted the cost-effectiveness analysis using a 1.5^0C compatible price of 196 euro per tonne[22]. This means that measures also reducing climate-related emissions show larger benefits in the cost-effectiveness analysis, compared to Decisio & Beelining (2023). For comparison, we report results with the low Decisio & Beelining CO2-price as a sensitivity analysis.

52. The generalised travel cost impacts of flight reductions or measures that impact airline schedules appear to be very high. As a consequence, also the reduction in consumer surplus seems to be high, up to a factor 10 of what we would have expected. Schiphol cannot find the methodological explanation in the material provided for these high values.

53. Measure M1 'encourage airlines to use quieter aircraft' assumes an increase in generalised travel costs as cargo operators with S1 aircraft move to other airports. We note that such flights will be replaced by passenger (or cargo) flights that could also decrease generalised travel costs, depending on the destinations served. Hence, we believe the increase in generalised travel costs is an overestimation.

6.2 Cost-effectiveness analysis of Schiphol's measures

54. The analysis below provides the cost-effectiveness estimates for Schiphol's measures. Schiphol has quantified the societal costs and benefits (excluding noise-related costs) associated with the implementation of the measures. The societal costs and benefits include the impacts for consumers, impacts for producers and external effects (CO2 and non-CO2 climate impacts) for the year 2024.

55. In order to derive the cost-effectiveness ratio, we have divided the net societal costs/benefits per measure in a single year by the number of houses >58dB Lden, the number of severely annoyed inhabitants >48dB Lden, number of houses >48dB Lnight and the number of severely sleep disturbed people >40dB Lnight. In addition, Schiphol estimates the cost effectiveness ratio of three measures together. It is assumed that measures can be implemented in 2024.

56. Schiphol notes that this cost-effectiveness study presents cross-border impacts and is not limited to national impacts as is typically the case in social cost benefit analyses (SCBA).

[20] Decisio & Beelining (2023). Measuring the cost-effectiveness of noise-mitigating measures for Schiphol Airport. In the context of the Balanced Approach procedure. Final report, 10-3-2023.
[21] Ministerie van Infrastructuur en Waterstaat (2023). Internetconsultatie Balanced Approach Schiphol (in Dutch)
[22] CE Delft (2023). Handboek milieuprijzen. Methodische onderbouwing van kengetallen gebruikt voor waardering van emissies en milieu-impacts.

57. As noted, Schiphol uses Paris aligned CO2-prices in its calculations, compatible with 1.5 degrees climate warming from the CE Delft '*Handboek Milieuprijzen*.' Besides, we present the results using the CO2-prices from the '*Leidraad MKBA*' to make them comparable with the Decisio & Beelining (2023) cost-effectiveness analysis. These results are shown as 'sensitivity' for the applicable measures, i.e., phasing out business aviation and aggregate cost-effectiveness.

58. Schiphol's cost-effectiveness analysis has been validated externally by ITSM/ University of Bergamo in June 2023.

6.3 Night curfew between 0:00 and 05:00 / 06:00

59. The night curfew is cost-effective. Furthermore, the curfew results in a noise impact reduction that exceeds some of the noise targets as set for this balanced approach procedure. We stress that the government noise targets do not account for the value for the local quality of life of a prolonged quiet period during the night without any traffic, which should be considered in the government's decision-making.

60. Costs and benefits for consumers, governments and the environment are very limited, for reasons outlined below. The curfew yields substantial noise benefits during the night: the number of houses within the 48 dB Lnight contour reduces by 41%, while the number of severely sleep disturbed people reduces by 39%. These reductions imply an annual cost of €9,185-€18,974 per house, and a cost of €2,236-€4,618 per sleep disturbed person. The impact on overall noise reduction is 7% in terms of houses within the 58 dB Lden contour, and a 9% reduction in the number of highly annoyed people.

61. Implementing the proposed night curfew (0:00-5:00 for landings and 0:00-6:00 for departures) reduces operational flexibility of airlines, and consequently increases their costs by approximately €21-44 million per year.[23]

Table 4: cost-effectiveness assessment of a night curfew

	Costs / benefits in mln €		
Consumers/producers	-€ 21 - -€44		
Governments	€ 0		
Environment	€ 0		
Total cost/benefit	-€ 21 - -€44		
	Change w.r.t baseline	% change	Cost effectiveness in € per house/person
Houses < 58dB	-476	-6.9%	€ -44,748 – € -92,437
Severely annoyed people	-10290	-9.1%	€ -2,070 – € -4,276
Houses < 48dB Night	-2319	-40.7%	€ -9,185 – € -18,974
Highly sleep deprived (HSD)	-9528	-39.0%	€ -2,236 – € -4,618

SOURCE: RSG ANALYSIS

62. In its calculations, Schiphol assumes the airlines to absorb the cost increases for 2 reasons: (i) the market is highly competitive, and not all airlines are confronted with the same cost increase. In order to maintain market shares, airlines must absorb their own cost increase; (ii) in a situation with scarcity, airlines first reduce their scarcity rents before increasing prices for consumers. Airlines may also decide to pass on the cost increases to passengers. This would transfer the cost increase for airlines (producers) to a similar decrease in consumer surplus, with a price increase around 3-6 euro per single journey passenger ticket. Other assumptions on cost pass-through would not change the cost-effectiveness value of this measure.

[23] A range of costs is applied to address the uncertainty around airlines' financial impact depending amongst other things on the extent to which affected airlines are able to acquire slots at the preferred time at both ends of the route.

63. Travel time increases are very limited and therefore have been set to zero. OD passengers may experience disadvantages through 'schedule delay' as their flights are rescheduled to a timing less aligned with their desired departure or arrival time. However, different studies show that the valuation of schedule delay for leisure passengers – the vast majority of the impacted passengers – is close to zero. Arguably, rescheduling flights to daytime may be perceived as more convenient, leading to benefits for consumers. As the night curfew relates to the 'deep night' only, transfer flows are not affected and there are no associated changes in generalised travel costs of transfer passengers.

64. A night curfew will have substantial impacts for airlines currently operating during the curfew. PA Consulting conducted an extensive assessment of rescheduling options and the resulting cost implications (see table 5). Airlines will face additional costs as a result of less operational flexibility. Home-based leisure airlines will be most severely impacted, as they operate the majority of night flights and have fewer mitigation options. Cargo airlines are also affected, but these carriers tend to have more options to mitigate substantial cost increases.

65. The biggest challenge for passenger airlines is that a night curfew limits aircraft utilisation, as airlines can make fewer rotations per day. Based on slot availability, there are mitigation options, but these options are sub-optimal and hence lead to additional costs. The following cost components were identified:

    - Increased night operations at other airports (higher handling costs)
    - Increase in crew costs due to overnight stays or out stationed crew.
    - Cancellation of flights (as fewer rotations are feasible)
    - Rescheduling (new destinations, new timings or new frequencies, which deliver lower revenues). The extent to which the affected airlines can obtain slots on both ends of the route is an important determining factor for the cost increase due to rescheduling.

    While based on an extensive and detailed model, the cost estimations are indicative and surrounded by a margin of uncertainty. The revenue loss implications in particular depend on assumptions made around (among others) airline costs, strategic airline responses and passenger behaviour. To address this uncertainty, we apply a lower and upper bound for these costs. The lower bound assumes airlines are flexible in adjusting their networks, while the upper bound assumes airline rescheduling has stronger implications on airline revenues.

Table 5: airline cost increases due to a night curfew

	Impacts in € mln	
	Lower bound	Upper bound
Increase in night flying at other airports	0.5	0.5
Increase in crew costs	1.5	1.5
Profit loss due to flight cancellations	4.9	4.9
Rescheduling revenue loss	14.4	37.1
Total leisure airline costs	21.3	44.0

SOURCE: ANALYSIS PA CONSULTING

66. Based on the design of the measure, the CO2 and non-CO2 impacts of reducing night flights are negligible, as the total number of flights from Schiphol remains unaffected. Even if some airlines cancel flights, some other airlines will be willing to use their slots.

67. A complete closure of the airport during certain hours would also allow for maintenance and repairs to be conducted more efficiently, without the disruption and noise caused by aircraft taking off and landing. Furthermore, for operational staff at the airport (such as security staff), a night curfew would allow for less work during the night and better rosters. Both advantages have not been included in the quantification.

Comparison cost-effectiveness study by Decisio:
The cost-effectiveness study conducted on behalf of I&W also assesses the cost-effectiveness of reducing the amount of night flights to 25k. Their assessment uses a different approach for airline operational costs. For our reduction objective of a night curfew in combination with 22k night flights we find a similar impact on airline costs, while our assessment considers the various mitigation measures taken by airlines (such as rescheduling, switching destinations and cancellation of flights).

In addition, Decisio also quantified costs for consumers that arise through an increase in transfer times. In our curfew proposal (which is focused on the 'deep night'), the impacts on transfer flows are very limited and no additional consumer surplus impacts are foreseen.

6.4 A ban on the noisiest aircraft

68. Besides environmental and noise benefits, fleet renewal reduces fuel costs for airlines and is therefore normally a sensible business case for airlines. Therefore, we estimate that the overall costs of this measure are limited. Excluding the positive impacts on the environment due to lower emissions, we find that the costs associated with this measure are €4.5 million in the year of implementation. These costs will dissipate very soon after implementation, when airlines have completed phasing out their noisiest aircraft. Hence, the measure allows to reduce noise exposure in a very cost-effective manner.

Table 6: cost-effectiveness of phasing out noisiest aircraft

	Costs / benefits in mln €*		
Consumers	€ 0		
Producers	€ -4.5		
Governments	€ 0		
Environment	€ + PM		
Total cost/benefit	€ -4.5 + PM		
	Change w.r.t baseline	% change	Cost effectiveness in € per house/person
Houses < 58dB	-317	-4.6%	-€ 14,206
Severely annoyed people	-6197	-5.5%	-€ 727
Houses < 48dB Night	-784	-13.8%	-€ 5,744
Highly sleep deprived (HSD)	-2382	-9.8%	-€ 1,891

* COSTS ARE NEGATIVE, BENEFITS POSITIVE

SOURCE: RSG ANALYSIS

69. Phasing out the noisiest aircraft does not bring additional costs for consumers. Arguably, passengers may benefit, as noisy and older aircraft tend to be less comfortable than newer aircraft generations. To be on the conservative side, we have ignored these benefits. If an airline is no longer able to fly to a certain destination because of limited fleet flexibility, the slot will be used for another destination or even by another airline, given the slot scarcity at Schiphol. The impact on connectivity and consumer surplus impacts of alternative slot use are assumed to be cancelled out.

70. Airlines may incur cost disadvantages when they cannot deploy all their aircraft at Schiphol. Based on an assessment of the impacted flights and carriers, Schiphol finds that the majority of the airlines have possibilities in their fleet to switch to quieter (and more efficient) aircraft, at limited costs.

71. For a small number of home-based carriers, switching to quieter aircraft can be more difficult and might require additional time. In the meantime, these airlines may be forced to take mitigating measures or ultimately cancel flights. Costs will be associated with these measures, however Schiphol argues these are limited at a Schiphol-wide level, as reductions in operating costs may outweigh additional costs and slots for cancelled flights will be used by other operators (considering capacity scarcity), leading to a producer surplus for other airlines.

72. Despite these considerations, Schiphol provides a cost impact assessment for the home-based carriers that are affected by these measures and have more challenging mitigation options. Based on airline annual reports and industry expertise on airline revenues, Schiphol estimates the total revenue associated with the impacted flights. We assume that cost increases of these mitigation options lead to higher costs. For all affected carriers, this translates into a cost impact of €4.5 million.

73. Phasing out the noisiest aircraft will have positive environmental impacts, as older and nosier aircraft emit more climate-related emissions. Impacts are difficult to quantify with accuracy, as they depend on (i) the extent to which older aircraft are deployed at other airports and (ii) the replacement aircraft that will be used. To align with M1 'stimulate fleet renewal' in Decisio & Beelining (2023, p. 23), we have not included any benefits regarding CO2, non-CO2 emissions or air quality. This means that our cost-effectiveness analysis is on the conservative side.

6.5 A ban on private jets and business aviation

74. Phasing out business aviation is a highly cost-effective measure. Appreciating the very high time valuation of users of business aviation but also considering the impacts on business aviation operators as well as environmental impacts (CO2 and non-CO2 emissions), phasing out general aviation leads to a social benefit of €9.4 million in one year (see table 7). When the CO2-prices as per Decisio & Beelining (2023) are applied (aligned with a 2.75-3.75 warming scenario), the column 'sensitivity' shows that the measures result in net costs for society (instead of a net benefit), but that the cost-effectiveness per house/ person is still high.

75. In addition to the societal benefits caused by environmental gains, phasing out general aviation reduces the number of severely annoyed people by 3.0%, and reduces the number of houses within the 58 dB noise contour by 1.0%. Impacts during the night (houses within 48 dB night contour and number of HSD people) are very limited (-0.2% and 0.1%, respectively), as general aviation activity in the night is limited. The reduction in noise impacts is generated by reducing just 0.08% of all passengers at Schiphol.

Table 7: cost-effectiveness assessment phasing out business aviation[1]

	Costs / benefits in mln €*	*Costs / benefits in mln €*** (sensitivity)*		
Consumers	-€ 16.3	-€ 16.3		
Producers	-€ 4.8	-€ 4.8		
Governments	€ 0.0	€ 0.0		
Environment	€ 30.4	€ 14.6		
Total cost/benefit	€ 9.4	-€ 6.5		
	Change w.r.t baseline	% change	Cost effectiveness in € per house/person*	*Cost effectiveness in € per house/person (sensitivity)****
Houses < 58dB	-71	-1.0%	*Societal benefits: €+131,804*	€ -91,086
Severely annoyed people	-3453	-3.0%	*Societal benefits: €+2,710*	€ -1,873
€/house < 48dB Night	-14	-0.2%	-**	-**
Highly sleep deprived (HSD)	-34	-0.1%	-**	-**

* NO COSTS ASSOCIATED WITH THIS MEASURE

** ALMOST NO BUSINESS AVIATION OPERATIONS DURING THE NIGHT

*** FOR COMPARISON, THE SENSITIVITY ANALYSIS USES THE CO2-PRICES AS APPLIED BY DECISIO & BEELINING, ALIGNED WITH A 2.75-3.75 WARMING SCENARIO

SOURCE: RSG ANALYSIS

76. Phasing out business aviation will lead to a reduction in consumer surplus as passengers currently using business flights at Amsterdam are required to travel in an alternative way. For this calculation, Schiphol assumes that part of the business aviation passengers will substitute to another airport, part of the passengers will switch to a scheduled commercial flight alternative from Schiphol and part of the passengers will switch to another transport mode or does not travel anymore.

77. For the most popular business aviation destinations, many commercial alternatives are available. Therefore, it is likely that part of the remaining passengers switch to these alternatives. If a business class option is available, business aviation users are assumed to prefer this option.

78. Based on an RSG analysis of the destinations served from/to Schiphol, we estimate that 70% of the business aviation passengers travel for business purposes, and the remaining 30% travel to leisure purposes. For business travellers, we assume a time valuation of €500 per hour, and for leisure travellers a time valuation of €100 per hour. These are considerably higher than time valuations used in Dutch aviation cost benefit analyses (€67 per hour for leisure passengers and €122 for business passengers), appreciating the specific nature of business aviation/ private jet passengers.

79. Schiphol assumes that passengers switching to commercial alternatives have an additional travel time of 60 minutes, mainly resulting from additional check-in time. Moreover, switching to commercial alternatives leads to 'schedule delay,' as scheduled flights may not depart at the desired departure time. Considering there are numerous daily flights available at the destinations where most passengers fly, Schiphol estimates schedule delay at 60 minutes. For passengers that stop flying, we assess the generalised travel costs by applying the 'rule of half,' as prescribed in the guidelines for Dutch CBA.

80. Business aviation operators are confronted with decreased profits from business aviation, while commercial operators might benefit. By making conservative assumptions about the excess profits[24] lost by business aviation operators, and those gained be commercial operators, Schiphol estimates the impact for producers.

6.6 Aggregate cost-effectiveness of the measures

81. The table below shows the aggregate cost-effectiveness results of the proposed measures (noisiest aircraft + night curfew + phasing out business aviation).

82. Despite some methodological differences between Decisio & Beelining (2023) and our cost-effectiveness analysis, the Schiphol package compares favourably in terms of cost-effectiveness to most of the measures presented in Decisio & Beelining (2023). It should be noted that the two studies are not fully comparable, as neither the methodology nor the measures in the two studies are identical. As indicated above, the Decisio & Beelining study finds higher costs associated with the measures. We find lower costs for our measures due to methodological difference, but also due to smart design of our measures, allowing airlines and airline passengers to mitigate costs whilst achieving noise reduction. Phasing out noisy aircraft takes airline fleet replacement cycles into account, whereas the night curfew hours are chosen to provide a noise-free night period whilst maintaining network quality.

83. Table 9 presents a high-over comparison between our measures and a selection of measures proposed by I&W, for which the cost-effectiveness has been calculated by Decisio & Beelining. Even using similar (not Paris-aligned) CO2 prices for phasing out business aviation, and an upper bound on airline cost implications of a night curfew, we find substantially lower costs per reduced person or house within a certain noise contour.

[24] In a cost-effectiveness study/cost benefit assessment, only excess profits should be considered. Excess profits are profits beyond what is necessary to maintain a competitive advantage and achieve a fair return on investment.

Table 8: aggregate cost-effectiveness assessment of Schiphol measures

	noisiest aircraft	night curfew (lower-upper bound)	private jets (base case – sensitivity*)	all measures	*All sensitivity**
Houses < 58dB	€ -14,206	€ -44,748 – €-92,437	€ 131,804 – € -91,086	€ -21,247 – € -50,575	€ -41,693 – € -71,021
Severely annoyed people	€ -727	€ -2,070 – €-4,276	€ 2,710 – € -1,873	€ -936 – € -2,227	€ -1,836 – € - 3,127
€/house < 48dB Night	€ -5,744	€ -9,185 – € -18,974	€ -	€ -5,380 – €-12,805	€ -10,556 – € - 17,982
Highly sleep deprived (HSD)	€ -1,891	€ -2,236 – € -4,618	€ -	€ -1,440 – € -3,429	€ -2,827 – € -4,815

* FOR COMPARISON, THE SENSITIVITY ANALYSIS USES THE CO2-PRICES AS APPLIED BY DECISIO & BEELINING, ALIGNED WITH A 2.75-3.75 WARMING SCENARIO

SOURCE: RSG ANALYSIS

Table 9: high-over comparison cost-effectiveness Schiphol measures and selected measures from Decisio & Beelining (2023)

Cost effectiveness			€/house < 58dB	€/annoyed person	€/house < 48dB_N	€/HSD
Schiphol measures	Phase out noisiest aircraft		-€ 14,206	-€ 727	-€ 5,744	-€ 1,891
	Night curfew	Lower bound	-€ 44,748	-€ 2,070	-€ 9,185	-€ 2,236
		Upper bound	-€ 92,437	-€ 4,276	-€ 18,974	-€ 4,618
	Phase out business aviation	Base case	*€ 131,804*	*€ 2,710*	-	-
		Sensitivity*	-€ 91,086	-€ 1,873	-	-
I&W measures – cost effectiveness calculation Decisio & Beelining (2023)	M1: stimulate fleet renewal		-€ 279,139	-€ 17,618	-€ 867,686	-€ 576,783
	M7 evening		-€ 646,183	-€ 19,127	-	-
	M7 evening + morning 7h		-€ 386,749	-€ 15,564	-€ 214,867	-€ 65,881
	M14 reduction to 440k + 29k night		-€ 832,450	-€ 47,603	-€ 1,202,181	-€ 344,591
	M14 reduction to 440 and 32k night		-€ 891,747	-€ 55,708	-	-
	M15 500k and 29k night		-€ 90,351	-€ 6,874	-€ 28,715	-€ 8,231
	M15 500k and 25k night		-€ 173,374	-€ 10,061	-€ 42,667	-€ 11,435

* FOR COMPARISON, THE SENSITIVITY ANALYSIS USES THE CO2-PRICES AS APPLIED BY DECISIO & BEELINING, ALIGNED WITH A 2.75-3.75 WARMING SCENARIO

7 Conclusion

84. Schiphol has been connecting the Netherlands with the rest of the world for more than 100 years. It is something we do with pride. At the same time, we realise that our activities have an impact on the environment and local communities. And we are aware that the drawbacks involved should play a greater role in the choices we make.

85. Schiphol wants to keep on connecting the Netherlands in the future but believes it must do it in a more sustainable way. That is why we are going for a **quieter, cleaner and better Schiphol** and presented eight measures to get there on 4 April 2023. An airport and an aviation industry in better equilibrium with the world around it. **It is time to give local communities, our employees and the aviation industry perspective.**

86. In earlier contributions – and again in this response to the consultation – Schiphol has argued that **clarity and perspective are needed for all parties involved.** That is why we reiterate our commitment to a system that not merely focuses on the number of movements (ATMs), but a system that works with enforceable environmental limits. Growth or reduction of movements should never be an end in itself. **A new system, to be laid down in a new Airport Traffic Decree (LVB), will create certainty for local residents and, at the same time, ensure that the aviation sector is held to (ambitious) environmental targets that lead to less nuisance and emissions.** On the other hand, such a system should also provide the aviation sector with opportunities for development within those environmental limits and encourage innovations for reduced annoyance and emissions.

87. This balanced approach procedure challenges everyone involved in thinking through effective measures to rebalance world-class connectivity and the quality of our living environment. Schiphol believes that this can be done in a smart and sustainable way, which in the end benefits all parties involved.

88. Schiphol has therefore tabled three **effective, enforceable** and **structural** alternative proposals from its 8-point plan which address real concerns by local residents but also safeguard our place as one of Europe's major airports and gateways to the world:

    I. a night curfew from 0:00 till 05:00 for arrivals and 06:00 for departures, incl. a maximum of 22,000 night flights
    II. a ban on the noisiest aircraft
    III. a ban on private jets and small business aviation

89. These measures are not only **effective** as they deliver both real noise and CO2 reduction as well as health benefits, but they are also **cost-effective.** Furthermore, our measures are **enforceable** as they will be legally binding via a new Airport Traffic Decree (LVB). This will ensure that these (and other) measures will be implemented and proven by November 2024. This is ambitious, but feasible. Most importantly, they deliver **structural benefits** as they address key concerns by local residents and provide the necessary certainty for all parties involved.

90. These measures will be supported by Schiphol's proposed **annual (additional) investment of € 10 million in local communities and residents**. This measure cannot be quantified in the provided models, but will support innovative building, sound proofing and regional spatial development.

91. Schiphol is very much aware that its measures 'overshoot' the noise target for the night period. This is very much driven by our proposal for an alternative night curfew. **For Schiphol, this balanced approach procedure is not merely an arithmetic exercise, but very much a societal one.** For instance, our proposed night curfew offers the best of both worlds. It gives local residents the certainty of uninterrupted sleep between 0:00 and 05:00/06:00 while also maintaining our strong hub connectivity.

92. This balanced approach procedure should – and can - focus on delivering clarity and perspective for all stakeholders involved. In its response Schiphol has tabled three (cost-)**effective** and **enforceable proposals** with **structural benefits**. In this regard, Schiphol would like to point out that the Balanced Approach Regulation and the relevant ICAO guidance stress the importance of the interrelationship between the different principal elements and measures under consideration. Schiphol believes that the three alternative proposals and the benefits these have in terms of enforceability, cost-effectiveness and their structural nature, should weigh heavily in the assessment that I&W must make of the responses that it will receive in this formal consultation and that they deserve a place in the final package that I&W will present to the European Commission.

Appendix A – external analysis of measures

Welcome to Amsterdam Airport

Schiphol Group

Dedicated to innovation in aerospace

NOTE

TO *(action)*:
[redacted]
TO (info):
[redacted]
SPOKEN TO:

FROM:
[redacted]
SUBJECT:
Analysis of measures 'More in balance with the living environment'

COMPANY:
Schiphol Nederland B.V.
DEPARTMENT:
Strategy & Airport Planning / team Sustainability
CODE / ORDERNUMBER:
[redacted]
DATE / REFERENCE:
13 June 2023
PAGE:
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Introduction

Amsterdam Airport Schiphol has published a set of eight measures[1] it plans to implement in order to reduce its environmental impact and improve the conditions for its neighbours. The airport commissioned NLR to quantify the noise effects of three of the proposed measures. This note describes the steps taken by NLR and the results of the analysis.

Baseline scenario

The measures are applied to, and subsequently compared to a baseline scenario. For the baseline, this analysis is aligned with the Balanced Approach (BA) study[2] looking into the effects of a reduction of the number of air traffic movements to 440,000. The baseline scenario is identical to the baseline defined in the BA study, except for one aspect: modelling of the noise impact of General Aviation (GA). In the original baseline, the noise impact of GA traffic is not modelled explicitly. Instead, a general increment of 2.5% on the noise exposure is assumed to represent the additional noise due to GA traffic. This increment is only applied to the L_{den} noise exposure: GA is assumed to be negligible during the night.

Although the use of a general 2.5% increment has a long history and is generally accepted for forecast studies, it was considered unsuitable in this case, as one of the measures involves phasing out specific segments of the GA traffic. In order to model this measure and quantify the effects properly, the baseline with a general increment for GA traffic was deemed unfit. As an alternative approach, the new baseline consists of the noise exposure of the commercial traffic of the original baseline to which the noise exposure of the actual GA traffic of 2022[3] has been added.

The effects of this change in baseline on the noise criteria[4] are shown in Table 1.

Table 1 Noise impact comparison of both baseline scenarios

Noise criterium	Original baseline	New baseline	Difference
1. Number of houses ≥ 58 dB(A) Lden	7,081	6,893	-2.7%
2. Number of highly annoyed people ≥ 48 dB(A) L_{den}	113,862	113,693	-0.1%
3. Number of houses ≥ 48 dB(A) L_{night}	5,685	5,699	+0.2%
4. Number of severely sleep disturbed people ≥ 40	24,365	24,400	+0.1%

For the number of houses within the 58 dB(A) Lden there is a difference of 2.7% between both baseline scenarios. For the other criteria, the differences are negligible.

[1] https://www.schiphol.nl/en/schiphol-group/page/for-a-quieter-cleaner-and-better-schiphol/
[2] Balanced approach study Schiphol Airport - Final report, To70 report 22.171.29, March 2023
[3] The airport's operational year 2022 (01-11-2021 through 31-10-2022)
[4] The four noise criteria used in Dutch aviation policy (residential situation 2021) as used in the original BA study[1]

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Measures

The effects of three distinct measures have been modelled, as well as the total effect when applied in combination. This section describes the measures considered and their modelling approach. The results are presented in the next section.

Measure M1: A phase out of private and small business aviation

The first measure involves phasing out all private and small business aviation. The effect of this measure is modelled by removing all GA traffic from the baseline, except for societal air traffic: flights by the coast guard, police, air force and air ambulances. Please note that, considering that the Doc.29 implementation for Amsterdam Airport Schiphol does not support helicopters, helicopter flights are not in the baseline scenario and could not be removed. This means that the remaining GA traffic consist of fixed wing flights performed by the coast guard and the air force only. This limitation is expected to have little impact on this analysis, as most helicopter flights are performed by police services that would not be impacted.

Measure M2: Night time curfew

The airport is considering a night curfew between 00:00 and 06:00 for departures and between 00:00 and 05:00 for arrivals. The airport is expecting a net reduction of night time flights (defined as between 23:00 and 07:00) of 10,000 movements, down from the current 32,000 to 22,000. At the same time, these flights are expected to be rescheduled during the remaining parts of the day (07:00 – 23:00), which means an increase from 468,000 to 478,000 movements.

For modelling purposes, the noise exposure of the baseline scenario (commercial traffic only) is separated into two parts: 1) the night and 2) day and evening together (DE-part). The noise exposure of the night part is reduced by a factor 22/32, while the noise exposure of the DE-part is increased by a factor 478/468, after which both parts are combined again for the total noise exposure by commercial flights. Finally, GA traffic is added, similar to the procedure for the baseline scenario.

Measure M3: A ban on the noisiest aircraft

The airport is considering a ban on operating the noisiest aircraft, based on certified noise levels. Aircraft unable to meet at least a 12.0 EPNdB cumulative margin relative to 'Chapter 3'[5] limits would no longer be welcome at all. For the night, an even more strict minimum of 13.0 EPNdB cumulative margin would be required.

The effect of this measure is estimated by analysing the cumulative margin of all flights of operational year 2022, as provided by the airport. All flights performed with aircraft that do not meet the new criteria are identified, together with their size class[6]. For the analysis, it is assumed that these flights will be replaced by aircraft with a noise performance that is based on the current average of aircraft in the same size class that do meet the noise criteria. This substitution yields a reduction in certified noise levels, which is assumed to be representative for the environmental noise level reduction.

It is important to realise that the measure is more strict at night than during the rest of the day (13.0 vs 12.0 EPNdB cumulative margin). The relative impact is therefore higher during the night: more aircraft are impacted and they are replaced by even quieter aircraft. This means that for L_{den} noise exposure, the effectiveness of the measure depends on the night time traffic volume, relative to the volume of the remainder of the day. At lower night time traffic volumes, the measure has less influence on the L_{den} noise exposure. Starting from the actual data of the reference period (operational year 2022), the effect of the measure has been adjusted for different night time volumes considered in this study. The results, expressed as scale factors for the noise exposure, are shown in Table 2.

[5] As defined in ICAO Annex 16, Volume 1, Chapter 3
[6] Size classes 1-9 based on maximum take-off mass as defined in table 2.2.1 of NLR report "NLR-CR-96650 L" version 12.3

Table 2 Effect of banning the noisiest aircraft at different night time volumes: scale factors to be applied to the noise exposure

Situation	Noise exposure scale factor L_{den}	Noise exposure scale factor L_{night}
Reference data (operational year 2022)	0.9604	0.9164
Night 32,000 of 500,000 total	0.9579	
Night 22,000 of 500,000 total	0.9706	

Results

The effects of each measure on the four noise criteria are shown in Table 3. The table also shows the effects of the combination of the three measures and the baseline previously presented in Table 1.

Table 3 Effects of the measures on the four noise criteria

Situation	Houses ≥ 58 dB(A) L_{den}	Highly annoyed people ≥ 48 dB(A) L_{den}	Houses ≥ 48 dB(A) L_{night}	Severely sleep disturbed people ≥ 40 L_{night}
Baseline (new)	6,893	113,693	5,699	24,400
Measure M1 (GA)	6,822 (-1.0%)	110,240 (-3.0%)	5,685 (-0.2%)	24,366 (-0.1%)
Measure M2 (Night)	6,417 (-6.9%)	103,403 (-9.1%)	3,380 (-40.7%)	14,872 (-39.0%)
Measure M3 (Noisy aircraft)	6,576 (-4.6%)	107,496 (-5.5%)	4,915 (-13.8%)	22,018 (-9.8%)
Measure M1+M2+M3[7]	6,119 (-11.2%)	96,115 (-15.5%)	2,642 (-53.6%)	12,983 (-46.8%)

The table shows that the night time restrictions are most effective, with the two L_{night} related criteria reducing by 39-41%. These night time restrictions also reduce the overall Lden noise exposure (7-9%). In combination with the other measures, the reduction increases to around 50% for the L_{night} related criteria. At the same time, the two L_{den}-related criteria also show larger reductions between 11-16%.

[7] The reductions achieved by the combination of the three measures are less than the sum of the reductions of the three measures. The primary reason is that measure M3 has less impact when used in combination with M2. On top of that, there may be non-linear effects caused by a non-homogeneous housing density.