

Summary

# Military Air-base Ørland – noise insulation

## Principles for cost-benefit analyses and monetary valuation of indoor noise reductions

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*As part of the land use planning regulations for Ørland military air base, future home for Norwegian F-35 military air crafts, the Norwegian Defence Estates Agency are required to at least reduce indoor noise levels below 35 dBA. Indoor sound levels below 30 dBA should be attained unless contra indicated by benefit-cost ratio and/ or technical considerations.*

The Institute of Transport Economics was given a task to describe the principles behind simple cost benefit analyses of noise insulation measures, and suggest a monetary valuation of the benefit of indoor noise reduction from 35 to 30 dBA. An important premise is that night time traffic will be limited. The project period was less than a month due to the urgency of implementing the noise measures as quickly as possible.

The monetary valuations of air craft noise vary a lot. This is not only due to differences in the population, the context, and other exposures, but also because of differences in methodology. Most monetary valuations focus on noise reductions that improve both outdoor and indoor noise levels, where as we are interested in the indoor part.

We describe the principles of simple cost benefit analyses.

From a stated preference study around Fornebu airport in 1994, and own studies, we estimate that the value of a noise reduction from 35 dBA to 30 dBA is worth NOK<sub>2016</sub> 1 450 or ca. €<sub>2016</sub> 157 taking into account the increase in purchasing power since 1994 and a health benefit equal 10 % of the valuation of the noise annoyance reduction.

*Tabell S.1 Monetary valuation of the indoor noise benefit of reduced indoor noise level from a given sound exposure level ( $L_{Aeq24h}$  in dB). NOK 2016. The vertical axis denotes the noise exposure level before and the horizontal axis the noise exposure level after the measure has been implemented.*

	35	34	33	32	31	30	29
36	398	755	1 075	1 361	1 618	1 848	2 054
35		357	677	963	1 220	1 450	1 656
45			320	606	863	1 093	1 299
33				286	543	773	979
32					257	487	693
31						230	436
30							206

With a project horizon of 40 years, the value of a noise reduction indoors from 35 to 30 dBA will be 40 years  $\times$  NOK 1 450  $\times$  expected number of residents when disregarding that we usually discount future benefits.

As an example: With a discount factor of 4 % and a calculated yearly wage increase of 1.3 %, the net discount factor will be ca. 2.7 and the yearly value of a noise reduction from 35 to 30 dBA is consequently multiplied by 24.60 instead of 40.

To be cost efficient a noise insulation measure providing an indoor noise reduction from 35 to 30 dBA benefiting an expected average number of residents of two persons will have to cost less than NOK<sub>2016</sub> 71 340 or €<sub>2016</sub> 7 614 after adding 20 % to account for loss of efficiency. Lower heating expenses due to improved thermal insulation may add to the noise reduction benefits.

Noise insulation against aircraft noise affecting all facades and penetrating roof constructions is more expensive than insulating against road traffic where one of the facades often is significantly more exposed than others. In practice, most noise insulation measures to reduce noise between 35 and 30 dBA near the military air base will not be cost efficient.