

Sweden example:

ICAO Template for good practice examples of environmental assessment (Draft V1.0) <i>Note: The italicized text is for guidance only and merely indicates the kind of information that is likely to be of value for users of the ICAO assessment guidance. You do not need to cover all points if some are not applicable to your case study.</i>	
Organisation/Company: (The name of the body that undertook or sponsored this assessment) LFV (in partnership with Swedavia, Novair, Airbus and Quovadis)	
Project Title: <i>(The title of the project being assessed)</i> SESAR AIREII: VINGA Validation and implementation of next generation airspace	Date of Assessment: November 2011
ASBU Module Code(s) ⁹ : APTA CDO CCD	State's Action Plan ¹⁰ : Sweden
Project Description: <i>(Briefly describe the project or proposed operational change to be assessed for its environmental implications; Please when possible, use schematics for illustration.)</i> The high-level objective of the VINGA project was to demonstrate the potential of reduced CO2 emissions and noise from the en-route phase of the arriving flight into Göteborg Landvetter Airport, Sweden, through the approach, landing, and surface phase until parking on the gate, by using a state-of-the-art validation aircraft and by using best practice. The validation activities then continued in the departure phase, until the aircraft left Swedish airspace. The VINGA validation project therefore contained all components included in the 'traditional' Gate-to-Gate concept, only in a slightly different order. The overall objectives were still the same as a traditional Gate-to-Gate concept; however, by using the same site for the validation activities for both the departure and arrival phase, there were efficiency gains to be achieved, which was very attractive for a project of this magnitude. The VINGA project was an AIRE II initiative that started on the 1st of September 2010 and terminated on the 30th of November 2011.	
Reason for the environmental assessment: <i>(Explain why the environmental assessment was undertaken and, if applicable, include any specific regulation, policy, or rule that requires the assessment to be undertaken)</i> On the 15th of January 2010, the SJU issued a call for tender regarding the provision of flight trial validation solutions for the reduction of CO2 emissions in the SESAR programme (reference SJU/LC/0039-CFP). This call for tender was part of the AIRE II initiative, which is a Trans-Atlantic	

⁹ ~~APTA~~-Approach procedures including vertical guidance; **WAKE**-Wake vortex; **RSEQ**-AMAN / DMAN; **SURF**-A-SMGCS, ASDE-X; **ACDM**-Airport CDM; **FICE**-Increased efficiency through ground - ground integration; **DAIM**-Digital AIM; **AMET**-Meteorological information supporting enhanced operational efficiency; **FRTO**-En route Flexible Use of Airspace and Flexible routes; **NOPS**-Air Traffic Flow Management; **ASUR**-ADS-B satellite based and ground based surveillance; **ASEP**-Air Traffic Situational awareness; **OPFL**-In-Trail procedures (ADS-B); **ACAS**-ACAS improvements; **SNET**-Ground based safety nets; **CDO**-Continuous Descent Operations, PBN STARs; **TBO**-Data link en-route; **CCO**-Continuous Climb Operations

¹⁰ <http://www.icao.int/environmental-protection/Pages/action-plan.aspx>

joint effort to reduce the environmental footprint of aviation.

A pan-European Consortium was created, called VINGA, which responded to the call for tender, and was subsequently appointed by the SJU to execute the proposed project. The project had its kick-off meeting with the SJU on the 1st of September 2010.

Client or competent Authority: *(Explain which body the assessment will be submitted to for their approval or decision making. Was the assessment internal or public? What audiences is it intended to inform?)*

The environmental assessment was submitted to the SESAR Joint Undertaking as part of the AIREII-initiative.

Assessment Approach: *(This section asks for a brief description of your application of the ICAO guidance for each main assessment step. If a step was not undertaken, give a brief explanation of why the step was omitted or is not applicable to this assessment example. Please complete each section individually. In this box you can explain why the ICAO approach to assessment was chosen. If you did not apply the ICAO methodology, please explain how your methodology differed from the ICAO approach.)*

The aim of the fuel efficiency analysis covering the arrival phase was to assess the difference in fuel consumption of the newly introduced RNP STARs followed by RNP AR approaches compared with the traditional P-RNAV STARs followed by an ILS approach. There were three key questions to be addressed:

1. How large is the fuel saving associated with flying the RNP AR arrivals compared with the ILS arrivals for both RWY ends?
2. How much of the savings were related to lateral aspects (i.e. flight path shortening)?
3. How much of the savings were related to vertical aspects?

A methodology for assessing this was developed and implemented by Novair, based on FDR for the actual flights and the use of the Airbus performance software, the Performance Engineer's Program (PEP).

The air traffic departure procedures currently in use at Göteborg Landvetter Airport were evaluated to identify ways to reduce the CO₂ emissions during the departure phase of flight. The effect of changing current departure procedures on noise exposure was also considered.

In order to assess the effect of removing or reducing existing speed and altitude constraints applied to SIDs at Göteborg Landvetter Airport, an actual Novair A321 flight was simulated using the PEP software (based on the sample FDR data received) and PEP was then used to make deviations from the actual flight by changing the speed and altitude constraints applied. The effects on fuel consumption and noise exposure were then assessed.

Preparatory Work: *(Briefly explain the relevant background activities that have been undertaken to prepare for the assessment. This may include decisions or processes such as, deciding that an environmental assessment is required, identifying the assessment client, gathering base data, deciding on years to be assessed, deciding on assessment methods or standards to be applied. There is no need to cover all possible information, simply provide a sufficient explanation of the reasons why the assessment steps and approach were selected. How did you establish which rules, regulations, or standards applied to the assessment?)*

In order to compare the results of different validation activities or between different concepts of operation, it was of importance that the assessments were performed consistently using the same methodology. Previously, different international projects have used different methods to measure fuel efficiency and thus a common standardisation is highly needed

An assessment method was developed in the VINGA project for measuring fuel efficiency in the arrival phase. This method was used to assess the VINGA validation flights, and was based on a white paper, written by Novair and Chalmers University, Gothenburg Sweden. (Appendix 6 in the VINGA final report).

Each Swedish Airport with a RWY longer than 1 200 meters requires an environmental permit. The Swedish environmental legislation does not permit any changes to the existing permit. Making changes to the environmental permit is a long process and the verdict of the environmental court to the proposed changes can be unpredictable. There is, however, a possibility to make smaller adjustments to the permit, by applying for a change at the County of the Administrative Board (regional environmental authority). This process is much faster, approximately eight weeks long. This possibility was used in the VINGA project.

The application to the County of the Administrative Board contained the geographical paths of the planned RNP AR procedures, the estimated number of flights, and expected environmental benefits. This application was preceded by a dialogue between the Authorities and Göteborg Landvetter Airport.

A reference noise boundary index, used in Sweden, indicates a location suitable for residential living, stringently associated to the possible exposure of noise levels at or below 70 dB (A) three times per day. Noise contours from the Airbus 321 were developed during the pre-validation phase, and they clearly indicated that no new residents in the vicinity of the airport were exposed to any noise, exceeding 70 dB (A).

The acoustic department of Swedavia uses a commercial noise tool developed by the FAA, called INM 7.0b. INM is a standard widely used by many organisations to assess community noise around airports. The core calculation modules of INM are based on the standard document AIR1845 produced by the Society of Automotive Engineers (SAE) Aviation Noise Committee (A-21) and are also compliant with other international standards documents including European Civil Aviation Conference (ECAC) Document 29 and ICAO Circular 205.

Describe the proposed [operational] change, its purpose and alternatives: *(Explain what will change as a result of the proposal to be assessed – this may repeat the information in the earlier project description. Explain why this project is required and what purpose it serves, and what alternatives have been considered. Information on why these alternatives were rejected is useful but not essential)*

The key results of the VINGA project showed that the implementation of RNP STARs and RNP AR approaches has a potential of fuel savings in the magnitude of 22-90 kg (70-285 kg CO₂) per flight, depending on RWY in use, compared to the traditional P-RNAV STAR structure followed by an ILS approach. This corresponds to fuel savings in the magnitude of 3-11% per flight, measured from a given distance, corresponding to a radius of 200 NM from the airport reference point. The savings was achieved by flight path shortening and by allowing the validation aircraft to leave the enroute phase at an optimum ToD, followed by an unconstrained CDO.

The VINGA project also showed that implementation of RNP STARs followed by RNP AR approaches does not include any major differences for the ATM system in comparison with implementing any other closed procedure.

The analysis of speed constraint removal in the departure phase showed that 55 kg of fuel (**165 kg CO₂**) per flight could be saved with negligible changes to the noise contours in respect of the Swedish environmental legislation.

A close dialogue and collaboration with the relevant CAA is the vital key for the success of a project of this magnitude. Development and changes requires close collaboration between ANSPs, Airspace Users, industry, airports and regulatory authorities, whereby the latter must be included in any process at an early stage and have an active role to play. It is also important that the regulatory bodies actively encourage and support various projects regarding development of new solutions. The importance of sharing project information between the project members and authorities at an early stage has been a key finding of the VINGA project. This is to assess if the proposed changes are in line with the views of the authorities on the issues, and if there are different views, to find a solution.

Describe the scope and extent of the assessment: (How was it decided that this assessment was needed – “screening”. Describe the impacts to be assessed, for example, aircraft noise, CO₂ or NO_x emissions, climate impacts or air quality impacts. Explain the decision making process that determined this scope and the level of detail to be used in the assessment – “scoping”. Also describe any formal processes to consult upon or agree on the scope, for example, via a nominated competent authority if applicable. Explain, for example, if the scope was set using expert judgement or a pre-assessment checks or information gathering. Also describe how the decision to undertake a more detailed assessment, or not, was taken. How were the base-case and proposed case(s) determined, why were particular years chosen?)

Describe the assessment itself: (Describe any standards or mandatory requirements for the assessment to be undertaken together with the methodology, monitoring or model used to determine the extent of the environmental impacts for the proposal. Give an indication of the extent or time-horizons that were chosen (if not already described earlier). Was quality management applied? For example, was there a process to ensure that the input data for the environmental assessment was consistent with other parallel assessments? Were interdependencies encountered and how did you address any trade-off issues? Was the expertise for this assessment available from internal resources or procured externally?)

Describe the results and how they were communicated: (Explain in general terms what the results of the assessment were, how this was used, for example to what extent it informed decision making or approval for the project. Was it produced as a draft for consultation or simply as a final report? Were the results validated or verified in any way – for example were the assessment processes or quality management processes independently audited? Did the results feed into a wider process, for example, a business case assessment?)

- Dissemination event. Different stakeholders were invited. The event included a demo-flight of the VINGA concept with an Airbus 321

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Written report to SJU.

Lessons learned: *(Explain here what worked well, what could be improved, what you would do differently next time –If applicable please explain if you think the ICAO assessment guidance could be improved and in what way. If you did not use the ICAO methodology can you identify aspects of your methodology that could provide benefits to future iterations of the ICAO guidance? What aspects of the ICAO guidance would you apply to your own methodology for future assessments?)*

Development and implementation of new technology requires large investments in hardware and human resources. To give all involved stakeholders a confidence in potential participation in candidate projects, it may require involvement from the CAA as early as possible in the process, to clearly indicate if the chosen path is not accepted from an authority point of view. This would generate an optimum process for all parties involved.

It is the view of the VINGA project that the current Swedish legislation is not adopted to efficiently conduct validation project, for easy implementation in the day-to-day operation, where obvious environmental benefits can easily be achieved.

From a Swedish perspective, the airports have a vital role to play in implementation of new ATS routes close to the airport. Göteborg Landvetter Airport was responsible for the communication activities in the frame of the VINGA project. The project believes that this is an appropriate method in a project like this was. An airport is always exposed to risks, when changing the flight paths in the vicinity of the airport. Based on this, it is of vital importance that the airport uses every possibility to have a dialogue with surrounding municipalities.

Comments: *(Optional - Offer here any other advice or hints that may be of value to others using ICAO environmental assessment guidance.)*

As a result of the VINGA project Göteborg Landvetter Airport now have two RNP AR-approach procedures in the day-to-day operations.