

Assessing trends in aviation noise and emissions in Europe using advanced modelling capabilities – IMPACT & AAT

2nd ECATS Conference

Athens - 9 November 2016



Laurent Cavadini

Environment Unit (DPS/POL)

EUROCONTROL



Ivan de Lépinay

Environment Department

EASA

Introduction

IMPACT and the Aircraft Assignment Tool - **AAT** – were first introduced at the 1st ECATS Conference

- In 2013
- Tools at the very early stage of their development...

Three years later...

- IMPACT and AAT have become mature tools
- These have been effectively combined and used to support the European Aviation Environmental Report 2016

IMPACT overview

A modelling platform to perform both noise and fuel/emission assessments of aviation

- Accessible via a secured web portal

Developed and maintained by EUROCONTROL

- Initially to support SESAR-related environmental assessment needs

A CAEP-approved tool having successfully contributed to the CO₂ Standard analysis in CAEP/10

IMPACT overview

Built from the already existing **STAPES** and **AEM** environmental models:

	STAPES	AEM
Scope	Noise (multi-airport)	Fuel burn & emissions (global)
Development & maintenance	Software: ECTL Airport database: EASA & ECTL	ECTL
Calculation methods	ECAC Doc.29 3 rd Ed. ICAO Doc 9911	Fuel: tabulated BADA FF data Emissions: BFFM2
CAEP-approved	Yes	Yes
Distributed	No	Yes

IMPACT overview

Robust interdependency analyses

- Noise vs fuel & emissions in the vicinity of airports

Through the use of common and consistent input data

- Aircraft & engine types
- Trajectories

IMPACT features a detailed aircraft trajectory calculator

- Total Energy Model (TEM) using BADA 4 data
- Use of ANP + BADA in the vicinity of airports

IMPACT modelling workflow

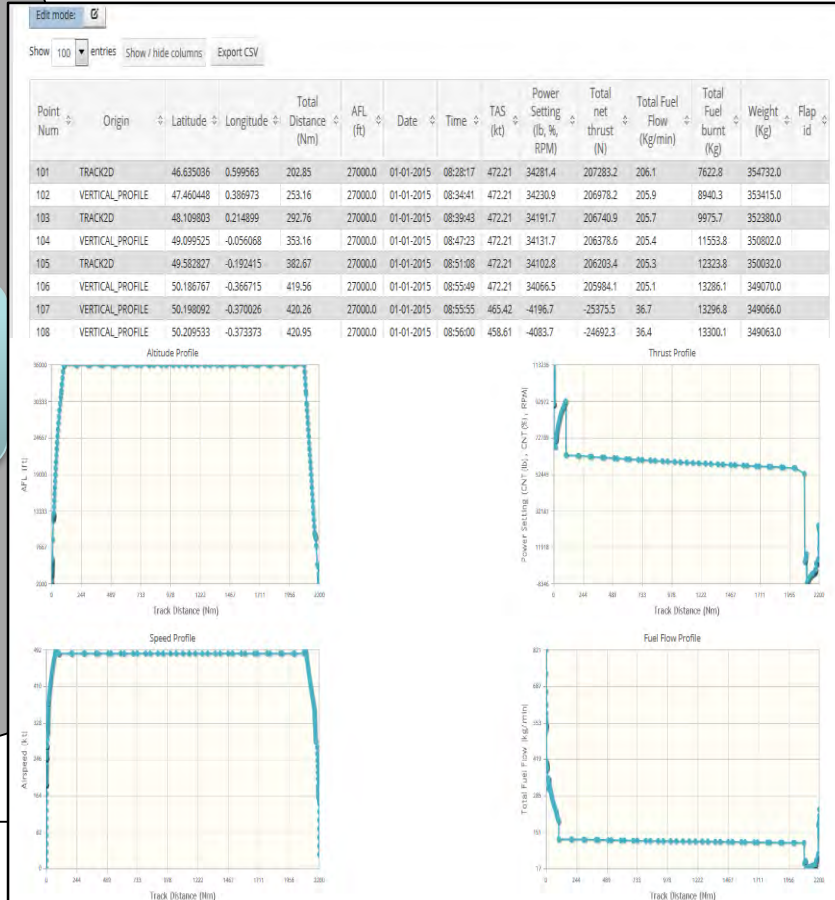
IMPACT Web Portal

User Workspace

Study /
Scenarios
creation

Models
parameters
configuration

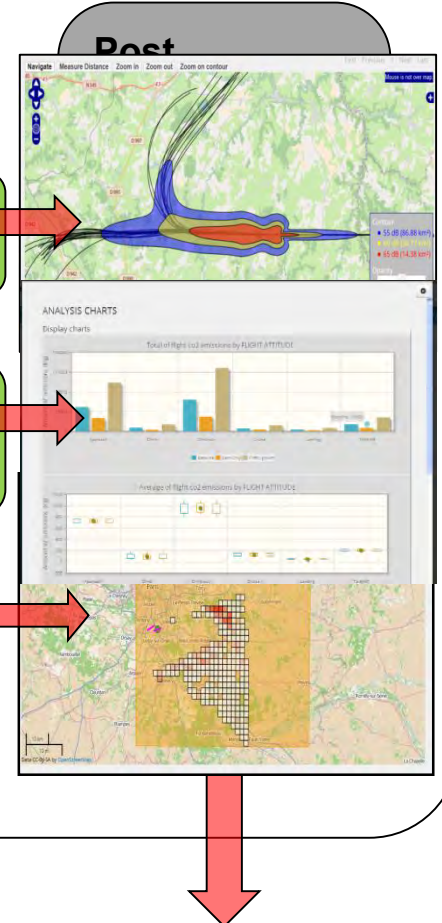
Raw input
data
validation



Calc.
ule

ision
c.
ule

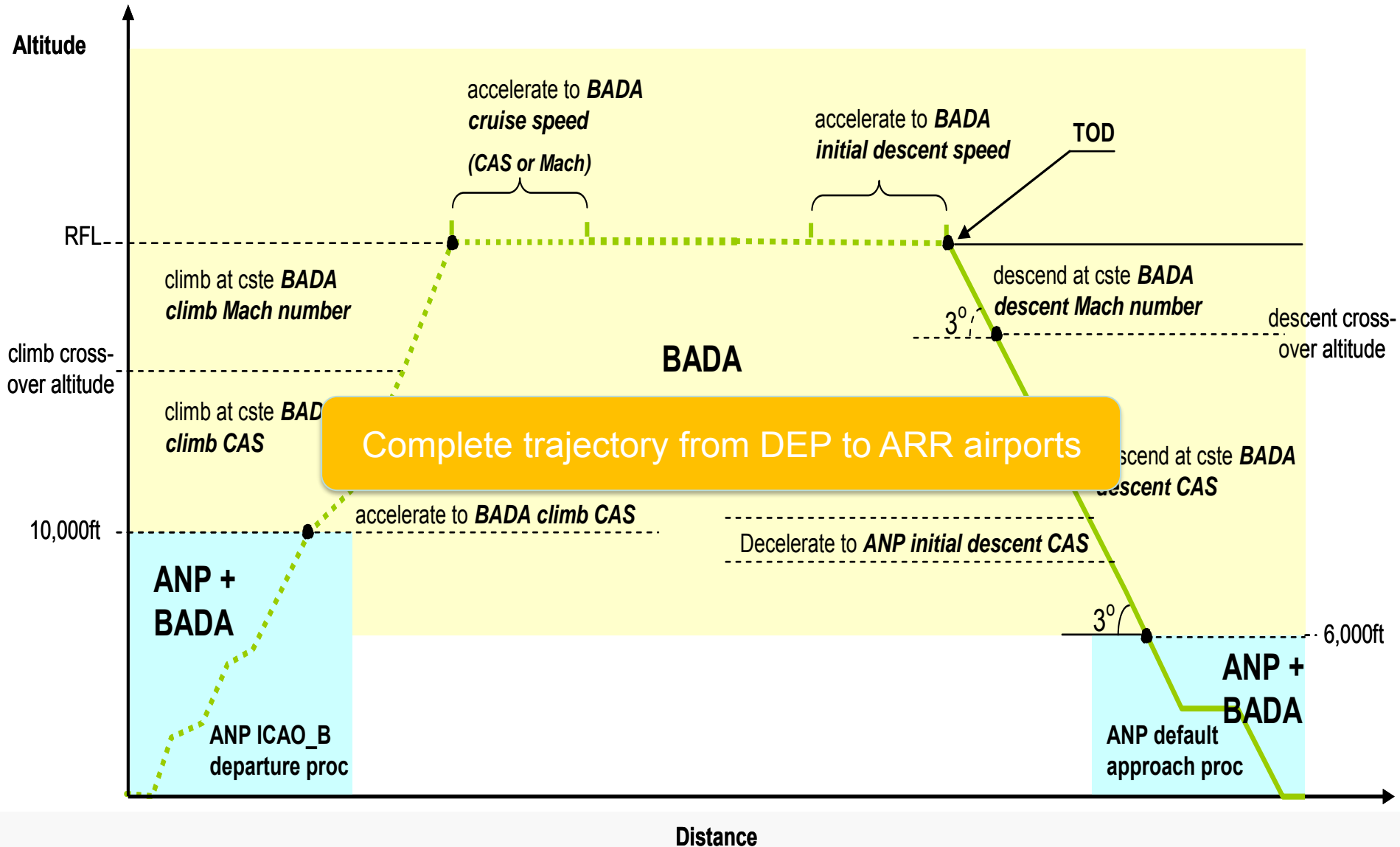
ine
DB



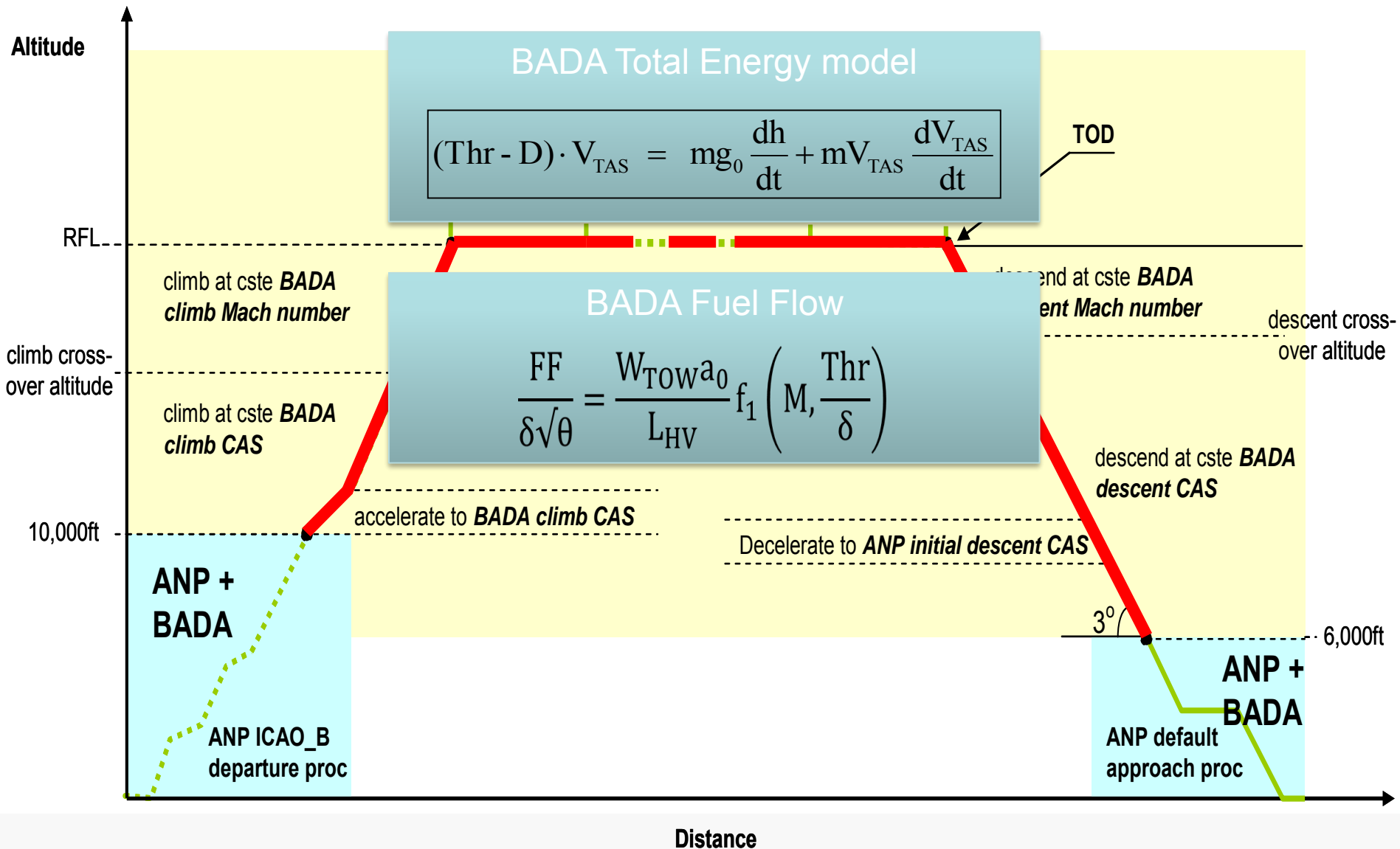
Upload Raw Input Data
(runways, routes, operations, etc.)

Download Results

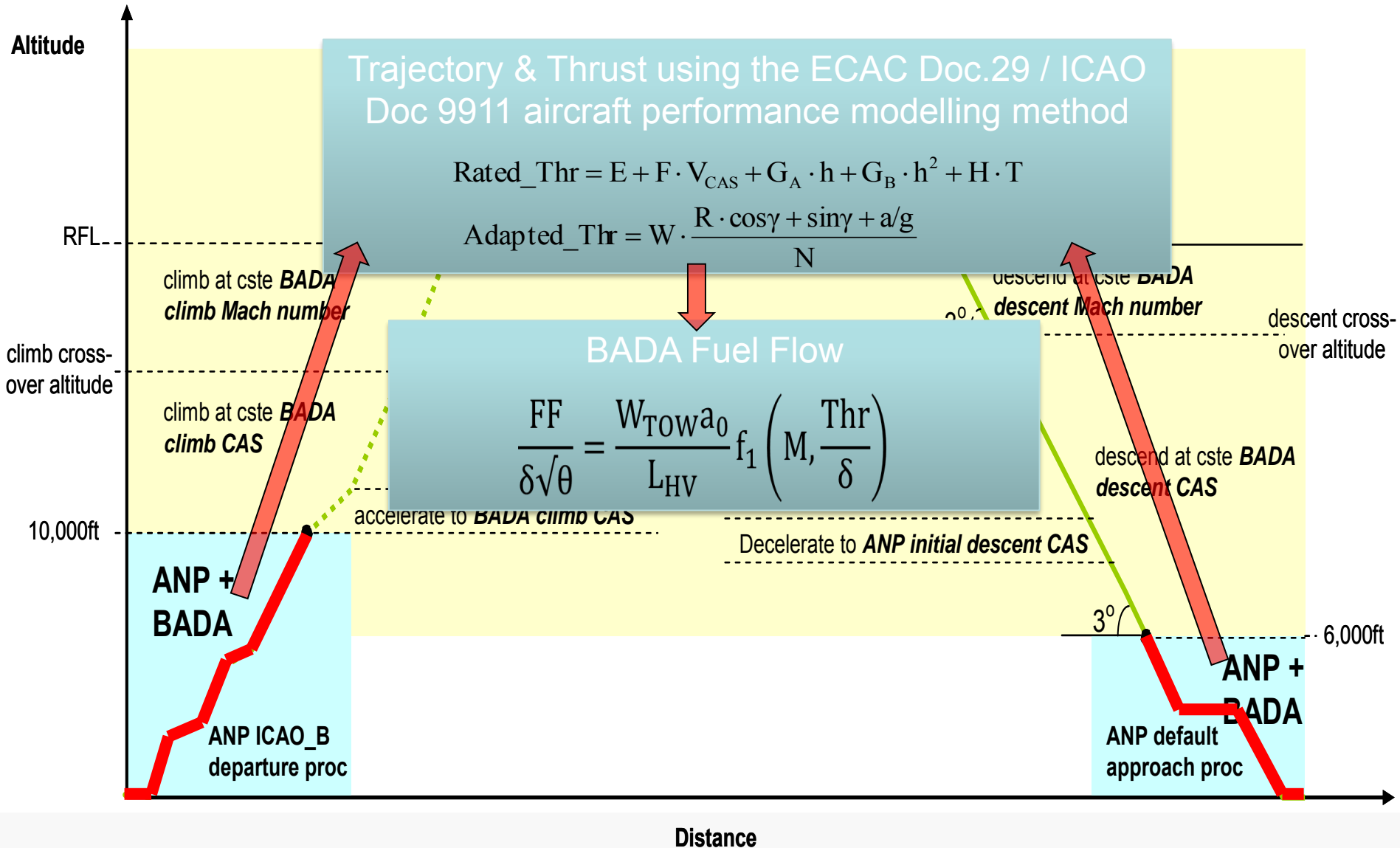
IMPACT common trajectory calculator



IMPACT common trajectory calculator



IMPACT common trajectory calculator



IMPACT outputs

The main results produced by IMPACT include:

- noise contours (shapefiles), surface and population count
 - Use of the European Environment Agency (EEA) population database
- fuel burn and emission masses of a wide range of pollutants
 - Aggregated by phase of flight, etc.
- gridded (i.e. geo-referenced) emission inventories within the LTO portion
 - as an introduction to further – more detailed – Local Air Quality (LAQ) assessments

IMPACT - benefits of the web approach...

No installation issues

No need for powerful computers...

Any machine with a web browser

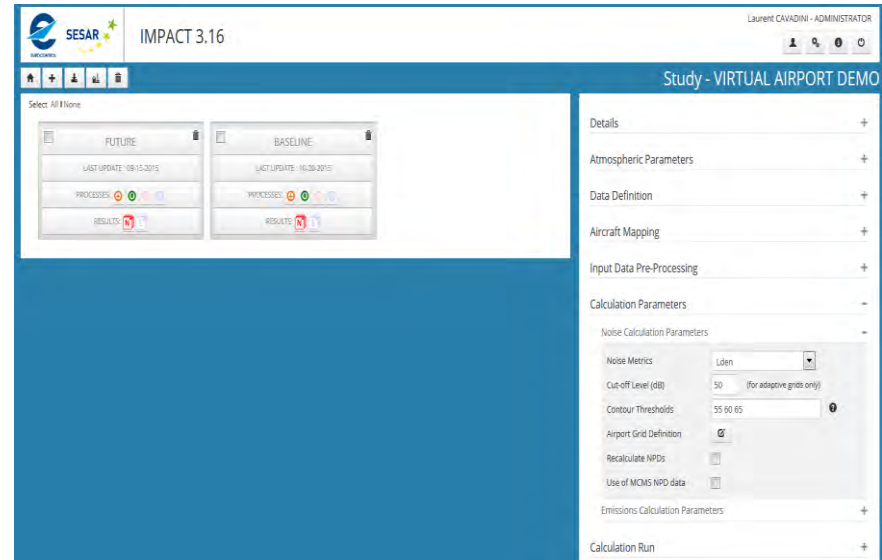
Centralized models & databases management

Easy user licence management

User accounts

Protection of sensitive reference information

Ex: BADA data



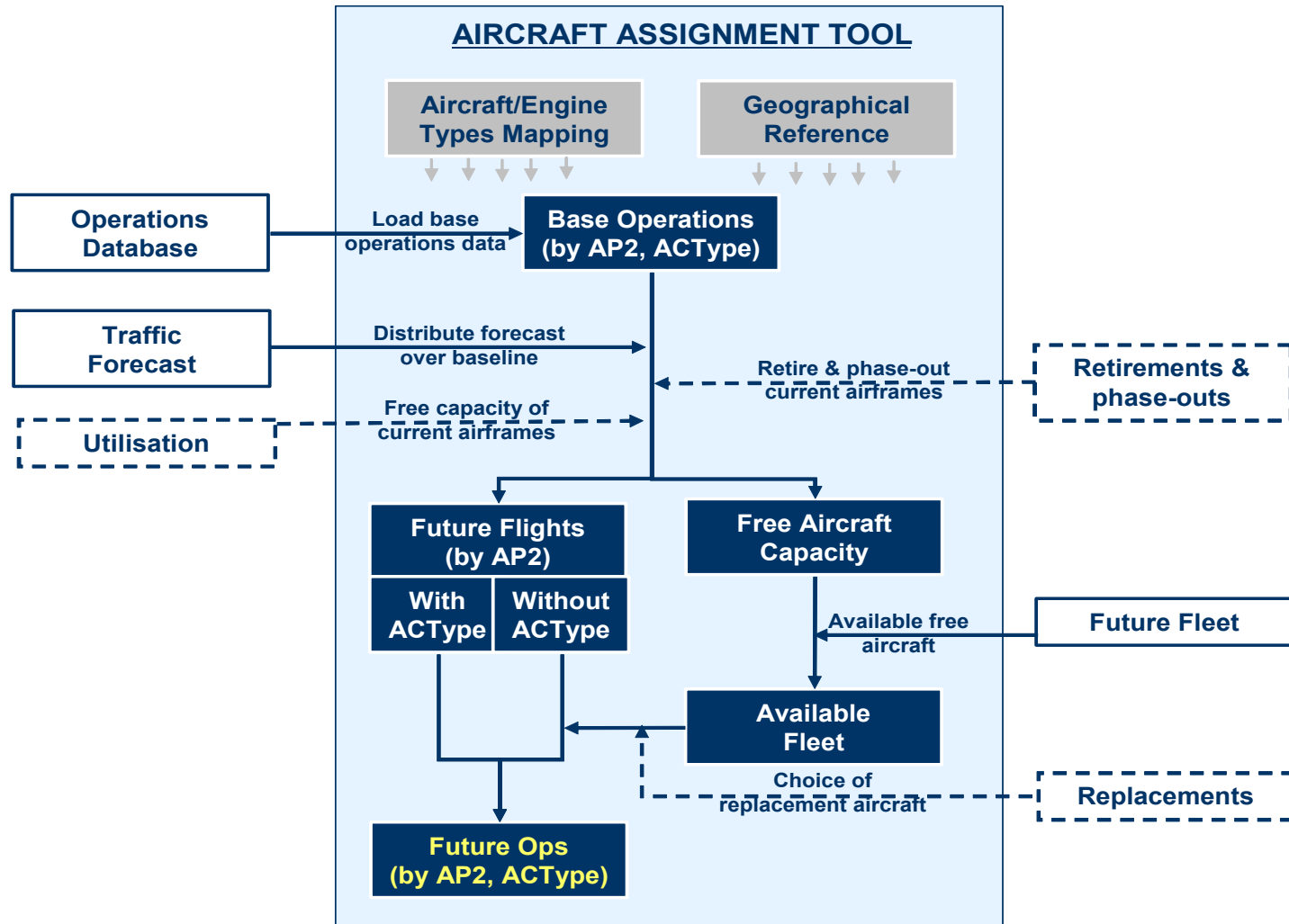
AAT Overview

The Aircraft Assignment Tool (**AAT**) is a fleet and operations forecasting capability jointly developed by EUROCONTROL and EASA

- a generic tool that takes as input an existing demand and fleet forecast and converts it into a forecast of movements by particular aircraft types on specific airport pairs
- Assumptions (aircraft transport and range capability categories, market share, retirement curves, etc.) are defined by the user
- The geographical scope depends on the forecast (from a single airport pair to full global operations)

AAT was reviewed by the CAEP Forecasting and Economic Analysis Support Group (FESG) and was used in the CO₂ standard's cost-effectiveness analysis (CAEP/10)

AAT Principle

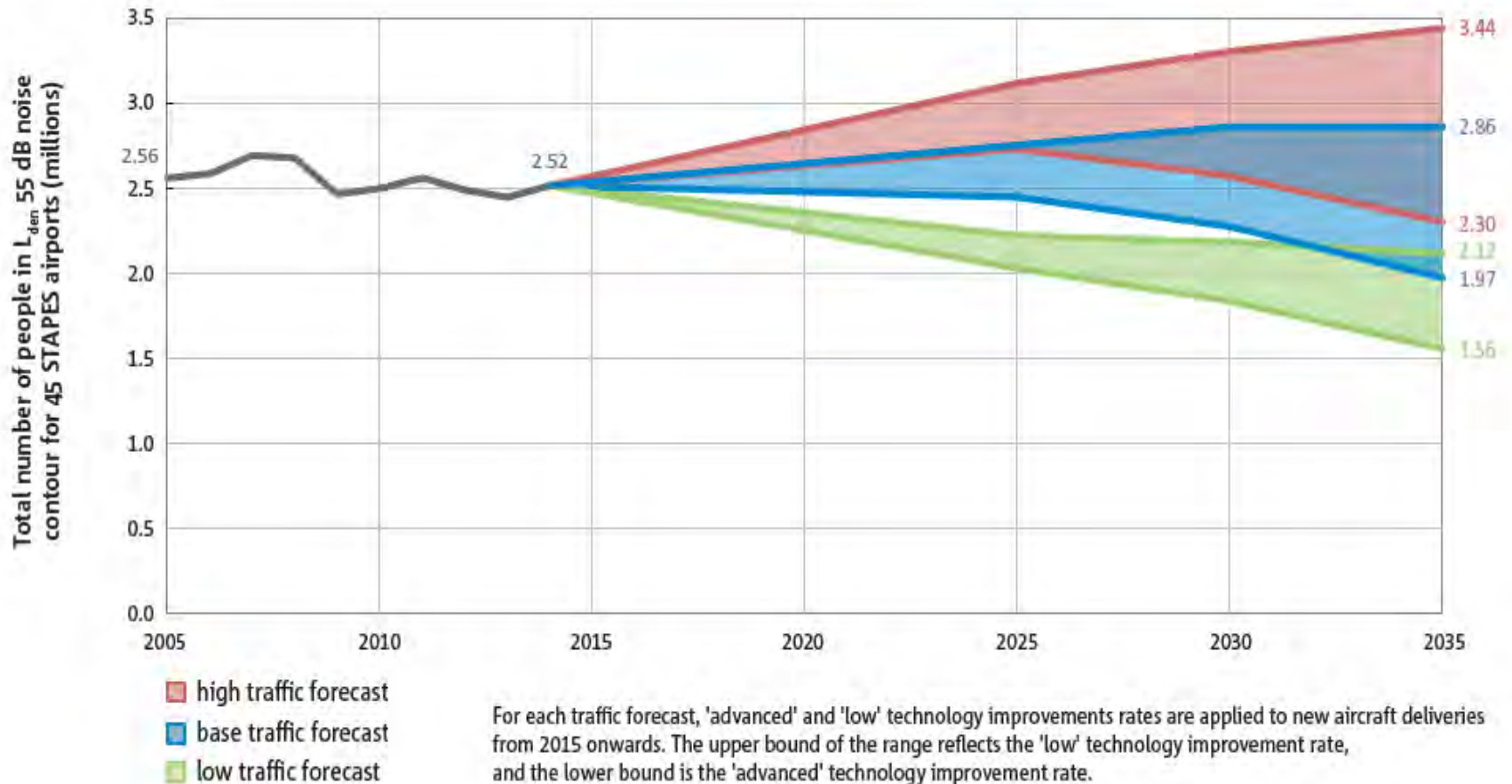


EAER Report 2016

IMPACT and AAT have been combined to produce the environmental results of the *Sector Overview* section of the European Aviation Environmental (EAER) Report 2016

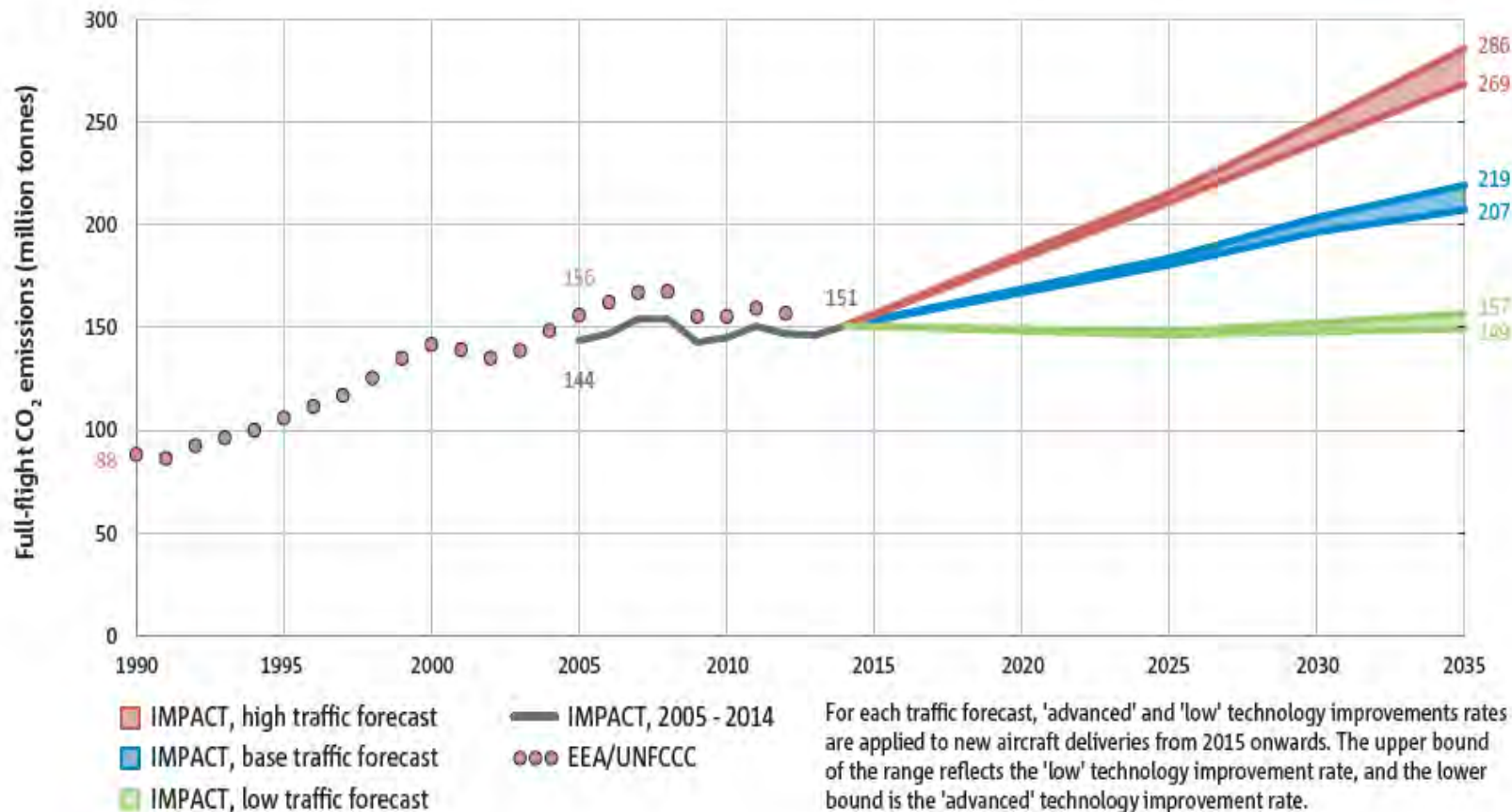
- Trends in noise and emissions in Europe until 2035 under various traffic forecasts and aircraft technology scenarios
- AAT was integrated into the EUROCONTROL/STATFOR 20-year forecast toolset for the passenger market segment
- Output from AAT (a/c operations by city-pairs) were used by IMPACT to perform the environmental analysis
- IMPACT used the PRISME operation database for the “historical” portion of the analysis (2005-2014)

EAER Report 2016



L_{den} 55 dB population exposure

EAER Report 2016



Full-flight CO₂ emissions for all departures from EU+EFTA

Thank you!

Any questions?

Contact for IMPACT: impact@eurocontrol.int

Contact for AAT: statfor.info@eurocontrol.int

EAER report 2016: www.easa.europa.eu/eaer/