ASCENT Project 48

Analysis to Support the Development of an Engine nvPM Emissions Standards

MIT

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Objective:

ICAO-CAEP has worked to develop a new nvPM standard over the last 5 years. FAA is a key contributor to this process. This project supports FAA's decision making by providing technical analyses related to nvPM emissions and the costs and benefits of regulating these emissions.

Project Benefits:

The analyses produced in this project provide FAA with a rigorous scientific basis to inform decisions related to the nvPM standard and promote an efficient implementation process that provides industry with regulatory certainty.

Research Approach:

To implement the nvPM standard, we focus on:

- Developing a method to predict nvPM mass and number emissions
- Generating candidate stringency options for use by policymakers
- Conducting an environmental cost-benefit analysis
- Developing "no-change" emissions criteria to decide when engine re-measurements are needed
- Modeling the effect of fuel composition on nvPM emissions to identify benefits of sustainable jet fuels
- Use combustor models to evaluate relationship between LTO and cruise nvPM emissions

Major Accomplishments (to date):

- Novel approach to predict nvPM emissions published in ES&T (Agarwal et al., 2018)
- Cost-benefit analysis for all proposed stringency options
- Analyses are regularly presented to ICAO-CAEP during teleconferences and meetings of CAEP-WG3

Future Work / Schedule:

- Determining the impact of LTO-cycle emissions regulations on cruise emissions
- Modeling cruise nvPM emissions for new combustor technologies

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