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MAC CURVES

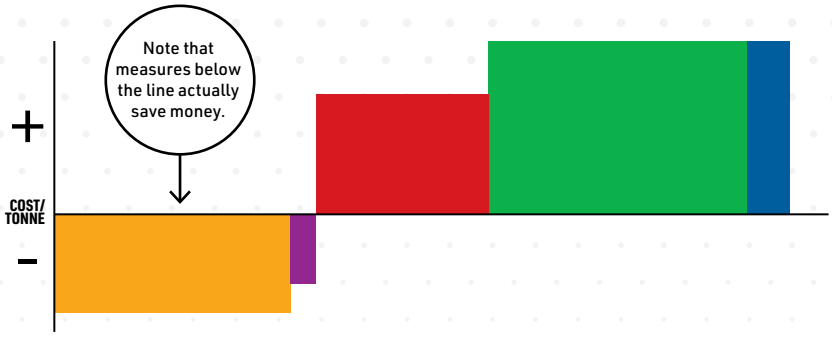
Under the framework of the ICAO-UNDP-GEF project, ICAO has designed a tool to support States and their stakeholders prioritize the most appropriate international aviation CO_2 emissions mitigation measures, in light of their respective costs and CO_2 emissions reductions. The tool is particularly focussed on developing States and Small Island Developing States (SIDS).

Numerous measures are available to States and their aviation stakeholders seeking to reduce CO_2 emissions from international aviation. Limited financial and technical resources represent a challenge for the implementation of these measures and make prioritizing a necessity. Marginal abatement cost (MAC) curves illustrate the relative CO_2 emissions reductions among possible measures on a comparative cost basis.

Each proposed CO_2 emissions mitigation measure requires a specific investment to achieve CO_2 emissions reductions.

Similarly each proposed CO_2 emissions reduction measure has a limit in terms of the maximum possible reductions.

Marginal abatement cost (MAC) curves are a way to compare measures on a common basis, comparing measures in terms of cost per tonne of CO_2 emissions reduced while highlighting the total potential reductions.



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Based on the analysis of the mitigation measures included in the State Action Plans submitted by ICAO Member States, ICAO has developed global MAC curves, which simplify the process of assessing the CO_2 emissions reductions and the costs for individual measures and so help States and aviation stakeholders put them in priority order. A MAC Curve Tool can be tailored to the individual reality of States, allowing them to input their local data, create MAC curves and therefore prioritize the measures to be implemented in light of their own circumstances and conditions.

ICAO IDENTIFIED MITIGATION MEASURES

- Purchase new aircraft
- Improve fuel efficiency through development or modification
- Replace engines
- Develop sustainable aviation fuel (SAF)
- Improve pre-departure planning (DMAN) and arrival planning (AMAN)
- Improve collaborative decision-making (A-CDM)
- Improve air traffic management in non-radar airspace
- Improve fuel efficiency of departure and approach procedures
- Introduce continuous climb and descent procedures
- Improve aircraft guidance on apron
- Improve taxiing
- Minimise weight
- Minimise flaps (takeoff and landing)
- Minimise reverser use
- Reduce speed
- Optimise aircraft maintenance (engine washing and zonal drying)
- Select aircraft best suited to the mission
- Install fixed electrical ground power and preconditioned air to enable auxiliary power unit switch-off
- Use cleaner alternative sources of power generation (for fixed electrical GPU and PCA)
- Construct taxiways and speed exits

MAC curves are a powerful decision-making tool. They were developed through ICAO's **Transforming the Global Aviation Sector: Emissions Reductions from International Aviation** joint assistance project with the United Nations Development Programme (UNDP), financed by the Global Environment Facility (GEF). ICAO is supporting developing States and SIDS in their efforts to reduce CO_2 emissions from international aviation, under the overarching ICAO initiative on States' Action Plans on CO_2 emissions reduction activities. The deliverables of the ICAO-UNDP-GEF project aim to increase the capacity of States and their stakeholders to take meaningful and coordinated action to address international aviation environmental issues.

For more information about the ICAO Marginal Abatement Cost Curve Tool, visit ICAO's website at **www.icao.int/environmental-protection/Pages/ICAO_UNDP.aspx**

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