TFTEI cooperation with TFIAM

Progress in activities in 2025 and outlook

Simone Schucht, Stefan Åström (co-chairs TFIAM)

Zbigniew Klimont, Gregor Kiesewetter (lead CIAM),

Rob Maas (TFIAM advisor)

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General theme of the TFIAM / TFTEI cooperations

- TFIAM and TFTEI (EGTEI) has a long period of cooperation in various forms,
- Most importantly cooperations regarding emission control technologies,
  - Their efficiencies,
  - Their costs,
  - Their applicability

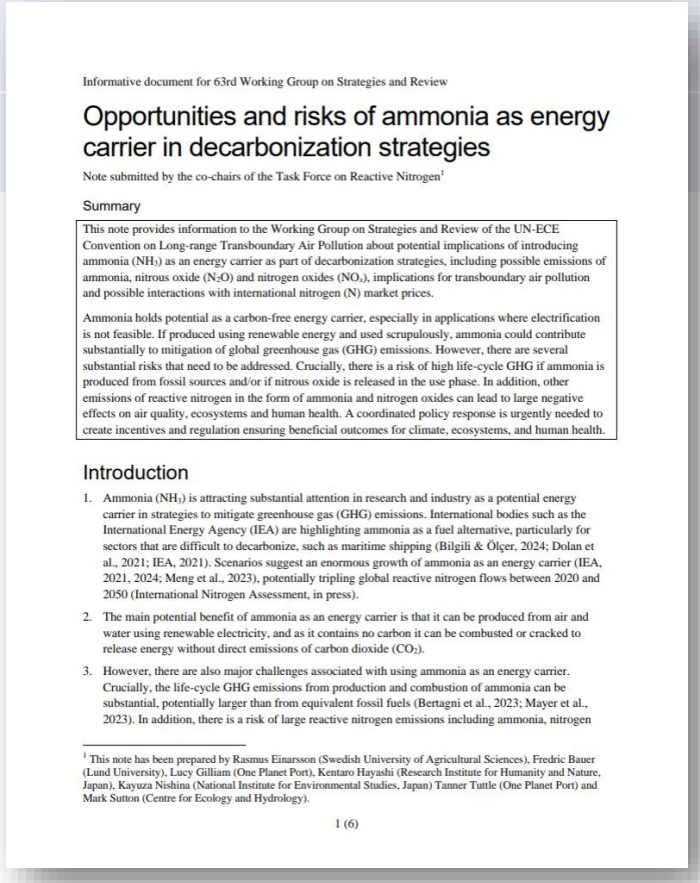
Structure of this presentation

- Overview of current cooperations,
- Looking forward to future cooperations,

Status of TFIAM/TFTEI Cooperation activities

TFIAM & TFTEI support the policy process with scenario analyses

Workplan task	Status
Assess implications of ammonia as an energy carrier & write information note (WP 2.1.7, TFRN with TFIAM, TFTEI)	Not yet in GAINS
TFRN have a sub-task force on the issue:	
More TFIAM, TFTEI, TFRN coordination needed under 2025/2026	



Informative document for 63rd Working Group on Strategies and Review

Opportunities and risks of ammonia as energy carrier in decarbonization strategies

Note submitted by the co-chairs of the Task Force on Reactive Nitrogen[1]

Summary

This note provides information to the Working Group on Strategies and Review of the UN-ECE Convention on Long-range Transboundary Air Pollution about potential implications of introducing ammonia (NH_3) as an energy carrier as part of decarbonization strategies, including possible emissions of ammonia, nitrous oxide (N_2O) and nitrogen oxides (NO_x), implications for transboundary air pollution and possible interactions with international nitrogen (N) market prices.

Ammonia holds potential as a carbon-free energy carrier, especially in applications where electrification is not feasible. If produced using renewable energy and used scrupulously, ammonia could contribute substantially to mitigation of global greenhouse gas (GHG) emissions. However, there are several substantial risks that need to be addressed. Crucially, there is a risk of high life-cycle GHG if ammonia is produced from fossil sources and/or if nitrous oxide is released in the use phase. In addition, other emissions of reactive nitrogen in the form of ammonia and nitrogen oxides can lead to large negative effects on air quality, ecosystems and human health. A coordinated policy response is urgently needed to create incentives and regulation ensuring beneficial outcomes for climate, ecosystems, and human health.

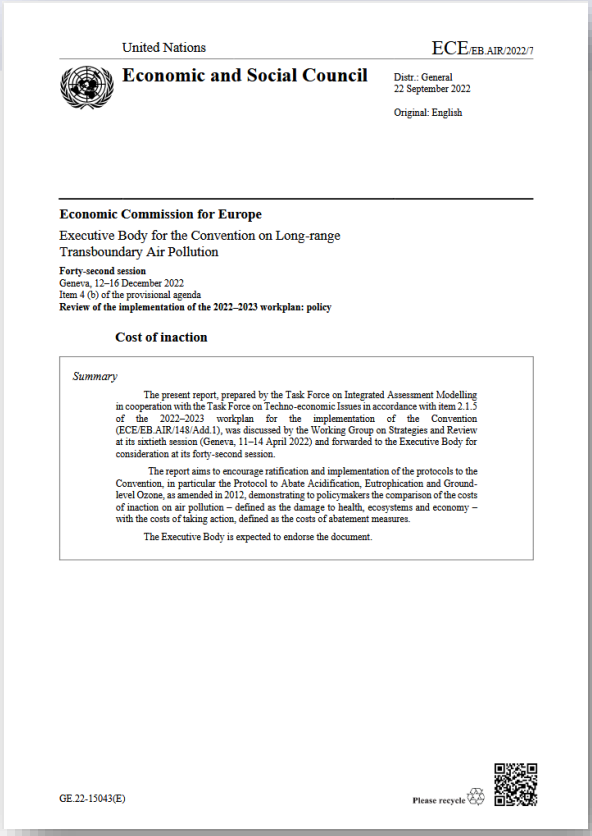
Introduction

1. Ammonia (NH_3) is attracting substantial attention in research and industry as a potential energy carrier in strategies to mitigate greenhouse gas (GHG) emissions. International bodies such as the International Energy Agency (IEA) are highlighting ammonia as a fuel alternative, particularly for sectors that are difficult to decarbonize, such as maritime shipping (Bilgili & Ölçer, 2024; Dolan et al., 2021; IEA, 2021). Scenarios suggest an enormous growth of ammonia as an energy carrier (IEA, 2021, 2024; Meng et al., 2023), potentially tripling global reactive nitrogen flows between 2020 and 2050 (International Nitrogen Assessment, in press).
2. The main potential benefit of ammonia as an energy carrier is that it can be produced from air and water using renewable electricity, and as it contains no carbon it can be combusted or cracked to release energy without direct emissions of carbon dioxide (CO_2).
3. However, there are also major challenges associated with using ammonia as an energy carrier. Crucially, the life-cycle GHG emissions from production and combustion of ammonia can be substantial, potentially larger than from equivalent fossil fuels (Bertagni et al., 2023; Mayer et al., 2023). In addition, there is a risk of large reactive nitrogen emissions including ammonia, nitrogen

[1] This note has been prepared by Rasmus Einarsson (Swedish University of Agricultural Sciences), Fredric Bauer (Lund University), Lucy Gilliam (One Planet Port), Kentaro Hayashi (Research Institute for Humanity and Nature, Japan), Kayuza Nishina (National Institute for Environmental Studies, Japan) Tanner Tuttle (One Planet Port) and Mark Sutton (Centre for Ecology and Hydrology).

1 (6)

TFIAM & TFTEI produce special reports on request

Workplan task	Status
Promote guidance documents (WP 1.3.10 and 2.2.1, with TFRN, TFIAM, TFTEI)	Guidance documents presented in different meetings and available on UNECE, TFIAM and CIAM web-sites
Latest cooperation – Cost of Inaction	

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Economic Commission for Europe

Executive Body for the Convention on Long-range Transboundary Air Pollution

Forty-second session
Geneva, 12–16 December 2022
Item 4 (b) of the provisional agenda
Review of the implementation of the 2022–2023 workplan: policy

Cost of inaction

Summary

The present report, prepared by the Task Force on Integrated Assessment Modelling in cooperation with the Task Force on Techno-economic Issues in accordance with item 2.1.5 of the 2022–2023 workplan for the implementation of the Convention (ECE/EB.AIR/148/Add.1), was discussed by the Working Group on Strategies and Review at its sixtieth session (Geneva, 11–14 April 2022) and forwarded to the Executive Body for consideration at its forty-second session.

The report aims to encourage ratification and implementation of the protocols to the Convention, in particular the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, as amended in 2012, demonstrating to policymakers the comparison of the costs of inaction on air pollution – defined as the damage to health, ecosystems and economy – with the costs of taking action, defined as the costs of abatement measures.

The Executive Body is expected to endorse the document.

GE.22-15043(E)

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TFIAM & TFTEI stimulate national integrated assessment capacity and exchange experiences

Workplan task	Status
Stimulate national IAM capacity (WP 1.1.3.3, TFIAM), particularly in EECCA, Türkiye and West Balkan countries (WP1.2.2, MSC-W and CIAM with CEIP, TFIAM, TFTEI)	TAIEX workshop and specific session at TFIAM organised in 2025
	ASEAN Workshop on Private Sector Engagement for Air Quality Improvement – 18–19 September, Bangkok (Hybrid)
	Joint participations at TFIAM and TFTEI helps avoiding overlaps

Work plan items 2026-2027

Science

Work plan item	Activity/Deliverable	Lead Body(ies)	Resource requirements
1.1.57	Stimulation of national integrated assessment capacity in EECCA, Türkiye, and West Balkan countries	MSC-W, CIAM, CEIP, TFIAM, TFTEI	EMEP Budget
Permanent activity	Specification of new technologies, their effectiveness and their costs	TFIAM & TFTEI	

Thank you!

TFIAM co-chairs

Stefan Åström (Sweden) Stefan.Astrom@anthesisgroup.com

Simone Schucht (France) simone.schucht@ineris.fr

CIAM head & deputy head

Zbigniew Klimont klimont@iiasa.ac.at

Gregor Kiesewetter kiesewet@iiasa.ac.at

TFIAM advisor

Rob Maas robertus.maas@gmail.com

For presentations & conclusions from TFIAM and EPCAC meetings and documents:

Task Force on Integrated Assessment Modelling (TFIAM) under the LRTAP Convention | IIASA

For data and documents from CIAM:

Centre for Integrated Assessment Modelling (CIAM) | IIASA