*EVS38*
*Göteborg, Sweden, June 15-18, 2025*

# International Cooperation under IEA's Electric Vehicles Technology Collaboration Program

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Executive Summary

The International Energy Agency (IEA) established a Technology Collaboration Program on "Electric Vehicles" in 1993. Today 17 member countries and the European Commission participate in fourteen working groups related to electric vehicles, components, deployment, infrastructure, and environmental/economic issues. Recent activities and key results from these working groups will be described.

## 1 Introduction

The International Energy Agency (IEA) is made up of 32 member countries and has a network of 40 collaborative research programs, designated as the Technology Collaboration Programs (formerly called Implementing Agreements) as part of the IEA's Energy Technology Network. These programs foster the collaboration of government organizations, national laboratories, research institutes, universities and industrial companies. The aim is to speed up the technical and non-technical problem-solving in the field of technologies to shape a secure, reliable, and affordable energy future. One of the key technologies is transport. It is one of the major sectors of energy demand.

The IEA Implementing Agreement for co-operation on Hybrid and Electric Vehicle Technologies and Programmes (IA-HEV) was set up in 1993 as a basis for collaboration on pre-competitive research and the production and dissemination of information. In 2024, the name of the agreement was changed to the Electric Vehicles Technology Collaboration Program (EV-TCP). Today, the EV-TCP has 17 participating member countries and the European Commission. The EV-TCP member countries are Austria, Belgium, Canada, China, Denmark, Finland, France, Germany, Ireland, Italy, Norway, South Korea, Spain,

An Executive Committee (ExCo) directs the work of the task forces, plans new initiatives, and disseminates the information produced. Countries voluntarily participate in various task forces (working groups) on specific technologies of their choice. Country investments are leveraged through the sharing of pre-competitive research results.

## 2 Activities

Activities are carried out under working groups, or Tasks [1]. Countries join various Tasks depending upon their particular interests. An individual Task typically has about 3-10 participating countries. Recent working groups have focused on small electric vehicles [2], scaling up to mass adoption of EVs [3], automated electric vehicles [4], environmental effects of EVs [5], consumer adoption of EVs [6],

interoperability of charging infrastructure [7], vehicle/grid integration, and electric freight vehicles [8].

The thirteen current working groups and their activities are:

Task 1: "Information exchange" - The activities of this task include hosting country experts' meetings, an annual report [1], a newsletter, social media communications, and a web site (www.evtcp.org).

Task 23: "Light electric vehicle parking and charging infrastructure" – This task is documenting solutions for best practices, conducting workshops for interested communities, and creating turnkey guidelines for local governments.

Task 38: "Marine Applications of Hybrid and Electric Systems (e-Ships)" – The objective of this task it to characterize the technology, economics, energy and environmental aspects, applications and market potential of e-Ships; to develop methods and recommendations for data collection and key figures for modelling; and to distill findings into key relevant messages and provide data and recommendations to policymakers to accelerate adoption and market acceptance.

Task 45: "Electrified Roadways (e-Roads)" – The objective of this task is to develop a greater global understanding and awareness of electrified roadways (E-Roads), and related technologies. It includes a study of international standards (JARI, SAE, ISO/IEC), technical approaches, grid interactions, integration of the power grid into the road infrastructure, and identifying benefits/challenges related to e-Roads. It focuses on four technologies-of-interest, namely dynamic wireless power transfer, non-road conductive (overhead), non-road conductive (side), and in-road conductive systems.

Task 46: "Life Cycle Analysis of electric vehicles" -- The objective of this task is to conduct life-cycle analyses of selected EVs, by analyzing the environmental effects of electric buses, trucks, and their necessary charging infrastructure. The main emphasis is a common LCA approach for these vehicle classes. It includes battery electric vehicles, hydrogen fuel cell vehicles and e-fuel vehicles. It includes the production, operation and the end-of-ife treatment of the vehicles, in comparison to conventional vehicles. It also addresses the life cycle analysis of V2X services.

Task 47: "Increasing efficiency of ground freight related to port electrification" -- The objectives of this task are to develop an understanding of the global challenges and opportunities in port electrification to advance ground movement of people and goods in ports; to identify various technologic and economic barriers to expansion of e-Freight in relation to port electrification; and to analyze standards development and key sub-system commonality between various technologies.

Task 48: "Battery Swapping" -- The objective of this task is to investigate the influences of battery swapping on battery chemistry, grid infrastructure, environment, and business models; to identify challenges and business cases for swapping of EV batteries; and to strengthen the global information exchange on battery swapping technology, help the formation of battery swapping ecosystem and traceability mechanism, and offer suggestions for policy makers and stakeholders.

Task 49: "EV Fire Safety" -- The objective of this task is to identify challenges and potential solutions to fire safety for EVs; to collect and share objective information on different EV fire safety related aspects to increase the overall trust in electric vehicles. The task collects statistics on EV fire incidents, since risk assessments based on limited statistics could lead to a too negative perception of EV fire safety risks, thus hampering the roll-out out EV's and charging infrastructure, e.g. in underground parking facilities. The task stimulates knowledge exchange on EV fire safety aspects by sharing experiences between country experts to increase insights in EV fire safety risks and to share best practices in preventing or mitigating EV fire incidents (from both the technological and regulatory perspective). Target groups are building and parking owners, OEMs (vehicles and charging infrastructure), fire rescue workers, transport and tow companies, insurance companies, policy makers, regulations, and EV drivers and the general public.

Task 50: "Light Electric Vehicles" – In this task, vehicles considered are three- and four-wheeled light electric vehicles (LEVs) which are either classified as L-category vehicles, Kei cars, or microcars. The objective of this task is to identify technical challenges and business opportunities for LEVs. The task is collecting information in the thematic areas of social/behavioral characteristics and international perspectives

on opportunities and obstacles for a wider application of LEVs, considering region-specific aspects; vehicle concepts, technologies, and costs for state of the art, current market developments and trends; and standards and regulations (homologation, usage) and the impact of current regulations and recommendations for desirable adjustments.

Task 51: "Batteries Re-Use" -- The objective of this task is to identify challenges, R&D needs, and techno-economic analysis for battery re-use. It is exploring EV battery re-use techniques and battery re-use initiatives; investigating technical issues for re-purposing EV batteries for new energy storage solutions; identifying potential regulations and safety standards for managing end-of-life batteries; and conducting life cycle analysis (LCA) to document the benefits of re-use.

Task 52: "EVs & Circularity" -- The objective of this task is to conduct analyses of the complete EV life cycle, including supply chain, production, use, and end-of-life. It is analyzing the current aspects of circularity issues of today's EVs and identifying the main challenges and barriers towards increasing circularity. It is also assessing potential future developments to increase circularity, by identifying the main opportunities for increasing circularity, and identifying how materials can be used and reused at their highest value while minimizing waste and environmental impacts.

Task 53: "Interoperability of Bidirectional Charging" -- The objective of this task is to test the conformance of the upcoming ISO15118-2X amendments referring to bidirectional charging, and participate in the development of interoperable bidirectional charging activities in an international framework. The task is analyzing the current status quo and ISO5118-20 standard implementation as per today; performing physical tests in specialized labs in order to understand the challenges and barriers; developing solutions that achieve genuine interoperability of bidirectional charging in practice; and transferring transfer of the resulting solutions for the adoption into industry standards, ensuring interoperability for grid services.

Task 54: "Recycled Materials for EVs" -- The objective of this task is to address the environmental and resource challenges associated with sourcing critical raw materials in EV battery production, such as lithium, cobalt, and nickel, and the potential benefits of using recycled materials from retired EV batteries. The task is promoting the use of recycled materials in EV batteries to reduce reliance on virgin sources of criterial materials. It is building a global network of stakeholders from administration, industry, policy, and research, focused on recycled materials for EVs. It is tracking the evolution and advancement of EV battery technologies to assess their impact on recycling practices. It is exploring the economic and environmental benefits of recycled materials. And it is providing objective information on relevant global policies, industrial developments, and technological advancements in battery recycling.

Beyond the current active tasks, potential areas for new tasks being considered for the future include critical materials supply chain for EVs, electric aircraft and drones, impact on the grid from mass adoption of EVs, best practices for deployment of EVs in developing countries, and stranded energy considerations for safety of rescue workers.

# 3 Conclusions

The International Energy Agency's Electric Vehicles Technology Collaboration Program (EV TCP) enables member countries to discuss their respective needs, share key information, and learn from an ever-growing pool of experience from the development and deployment of hybrid and electric vehicles.

# References

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