IEA WIND Task 11

Topical Expert Meeting #113

"Net Zero Electricity System Studies"

Organising Team TEM#113 / Host: SEAI

Dublin City Centre, Camden Court Hotel, Ireland

April 8-9th, 2024

TASK 11 “Technology Exchange”

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Wind Strategy, Collaboration & Outreach on Urgent Topics of Wind Energy Research - SCOUT

- Context:

Task 11 promotes and disseminates knowledge on emerging wind energy topics by international co-operative activities. This is accomplished through Topical Expert Meetings (TEMs), in which active researchers, industry and government experts meet to exchange information on R&D topics of common interest to the IEA Wind TCP members.

Four TEMs on strategically relevant topics are organised every year.

TEM#113 Introductory Note

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INTRODUCTORY NOTE

IEA WIND TASK 11 TOPICAL EXPERT MEETING #113

ON

NET ZERO ELECTRICITY SYSTEM STUDIES

Abbas Rabiee – Université Laval
John McCann, Arash Alavi – SEAI
Hannele Holttinen, Damian Flynn – IEA Wind Task 25, Recognis/UCD
Philipp Beiter, Tyler Stehly – IEA Wind Task 53, NREL

A. VALUE FOR IEA WIND TCP

BACKGROUND

Net zero has gained great importance in discussions surrounding climate change and energy transition. The concept refers to achieving a balance between the greenhouse gases emitted into the atmosphere and those removed or offset. In May 2021, the IEA released a landmark report entitled "Net Zero by 2050, a Roadmap for the Global Energy Sector[1]" which outlines a pathway to achieve global net zero emissions by 2050. The report highlights the importance of rapid and widespread changes across all sectors of the economy, including electricity, industry, transportation, and buildings.

Setting targets for achieving net zero emissions has become one of the primary ways for countries to plan towards their climate change ambitions. Whilst details vary, most net zero plans involve significant reductions in the use of fossil fuels and adopting variable renewable energy (e.g., wind and solar). From a wind perspective, it is important that we encourage the use of well-defined wind cost, performance, and value assumptions and discuss the issues, needs and solutions. In 2023, 32 countries – including all 27 EU Member States – have enacted net zero targets into law, with 2050 as the target date. In addition to the countries with net zero targets encoded in law, more than 120 countries across the world have net zero targets in proposed legislation, in published policy documents, or under discussion, with target dates ranging from 2030 to 2070, though 2050 is by far the most common. Detailed analyses for how net zero targets are achieved, however, are not publicly available for the majority of cases.

TEM#113 attendance

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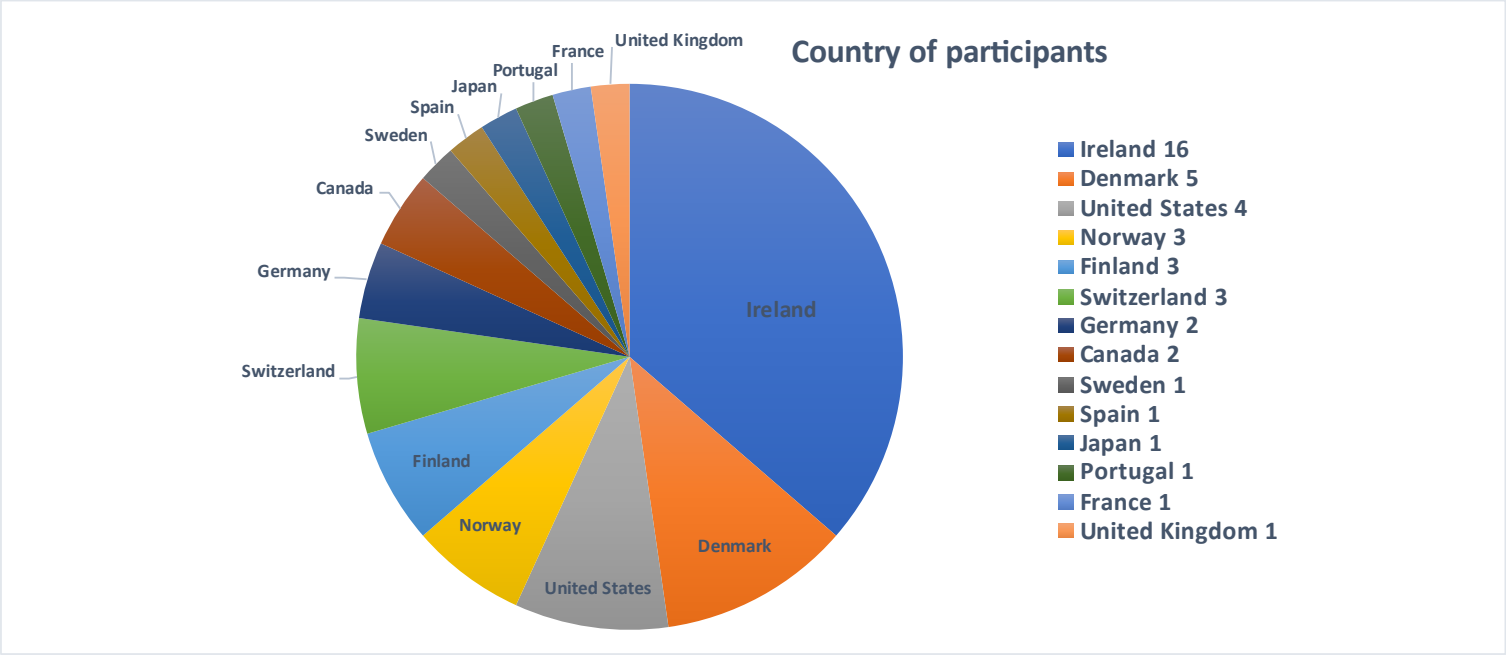
- 44 registered participants from 14 countries



TEM#113 list of participants

In-person meeting
Camden Court Hotel
Dublin, Ireland

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seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

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Participants TEM#113 on
Net Zero Electricity System Studies

April 8th-9th 2024

First Name	Last Name	Country	Company / Organisation
Mikael	Amelin	Sweden	KTH Royal Institute of Technology
Philipp	Beiter	United States	National Renewable Energy Laboratory
Julien	Cabrol	Norway	Norwegian Water Resources and Energy Directorate
Meadhbh	Connolly	Ireland	ESB Electricity Supply Board
Lucy	Cradden	Ireland	Commission for Regulation of Utilities
Kieran	Craven	Ireland	Environmental Protection Agency
Nicolaos	Cutululis	Denmark	Technical University of Denmark
Pádraig	Daly	Ireland	Sustainable Energy Authority of Ireland
Martin	Densing	Switzerland	Paul Scherrer Institute
Joseph	Dillon	Ireland	Energy Reform
Ana	Estanqueiro	Portugal	National Laboratory of Energy and Geology
Damian	Flynn	Ireland	University College Dublin
Bethany	Frew	United States	National Renewable Energy Laboratory
Meabh	Gallagher	Ireland	Environmental Protection Agency
Emilio	Gómez Lázaro	Spain	Universidad de Castilla-La Mancha
Gianni	Goretti	Ireland	ESB Generation and Trading
Craig	Hart	France	IEA
Niina	Helistö	Finland	VTT Technical Research Centre of Finland
Hannele	Holttinen	Finland	Recognis / Task 25
Malte	Jansen	United Kingdom	University of Sussex
Juha	Kiviluoma	Finland	VTT Technical Research Centre of Finland
Matti	Koivisto	Denmark	Technical University of Denmark
Magnus	Korpås	Norway	Norwegian University of Science and Technology
Eamonn	Lannoye	Ireland	EPRI Europe
Debra	Lew	United States	Energy Systems Integration Group
Forest	Mak	Ireland	Sustainable Energy Authority of Ireland
Ignacio	Marti	Switzerland	IEA Wind Task 11 / Planair
John	Mc Cann	Ireland	Sustainable Energy Authority of Ireland
Madeleine	McPherson	Canada	University of Victoria
Denis	Mende	Germany	Fraunhofer Institute for Energy Economics and Energy System Technology
James	Merrick	Ireland	Geal Research
Fabian	Neumann	Germany	Technical University Berlin
Emer	O'Connor	Ireland	Commission for Regulation of Utilities
Antje	Orths	Denmark	Energinet
Jonathan	O'Sullivan	Ireland	ESB Electricity Supply Board
Abbas	Rabiee	Canada	Laval University
Jan	Remund	Switzerland	Meteotest AG / Task Manager of IEA PVPS Task 16
Jean-Pierre	Roux	Ireland	Sustainable Energy Authority of Ireland
Andrew	Smith	Ireland	University College Cork
Tyler	Stehly	United States	National Renewable Energy Laboratory
Phil	Swisher	Denmark	Ea Energy Analysis
Ryuya	Tanabe	Japan	Central Research Institute of Electric Power Industry
Fabian	Wagner	Denmark	Technical University of Denmark
Magnus	Wold	Norway	Norwegian Water Resources and Energy Directorate

Day 2: Breakout sessions' Agenda

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Day 2: Tuesday, 9th April, 2024

Time	Topic	Presenter
9:00 AM	**TEM 113 Breakout Sessions**	
9:00 AM	Introduction to objectives of session	All
9:10 AM	Short break and division in breakout sessions	
9:15 AM	**Breakout Session 1: *State of the art***	Small groups
10:30 AM	Results presentation & discussion	All
11:00 AM	Break	
11:15 AM	**Breakout session 2: *Knowledge gaps and disagreement***	Small groups
12:30 PM	Results presentation & discussion	All
1:00 PM	Lunch break	
2:00 PM	**Breakout Session #3: *Research needs identification*** *Where do we need research? How should we prioritise research?* ***Topics and priorities to be developed from break out discussion***	Small groups
2:45 PM	Results presentation & discussion	All
3:00 PM	**Full group open discussion: *Research needs identification*** *Where do we need research? How should we prioritise research?* ***Topics and priorities to be developed from break out discussion***	All
4:00 PM	Break	
4:15 PM	Interactive poll or Additional Discussion	
4:30 PM	**Collect main points & identify follow-up responsibilities**	All
4:45 PM	Wrap up	
5:00 PM	Event close	

Day 2: Breakout sessions

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- Preliminary Survey to 44 participants (**23 answers**)

Objective:

Due to time limitations during the TEM and in order to maximise its effectiveness by encouraging focused debate on specific key issues, the participants were invited to:

1. Rank the importance of the proposed discussion topics
2. Choose the sub groups they would like to join for the breakout sessions

Survey's results session 1: State of the Art

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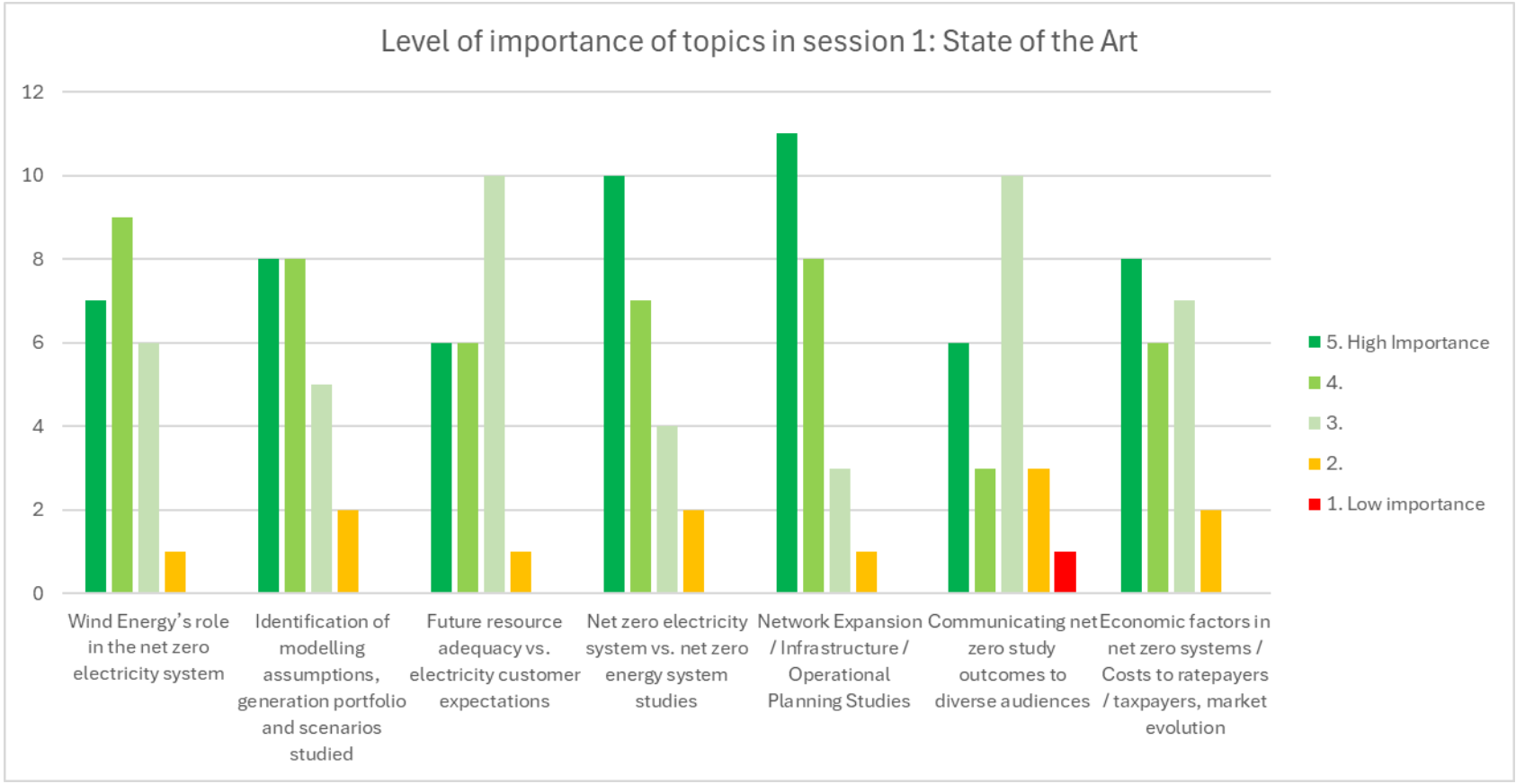

Survey's results session 1: State of the Art

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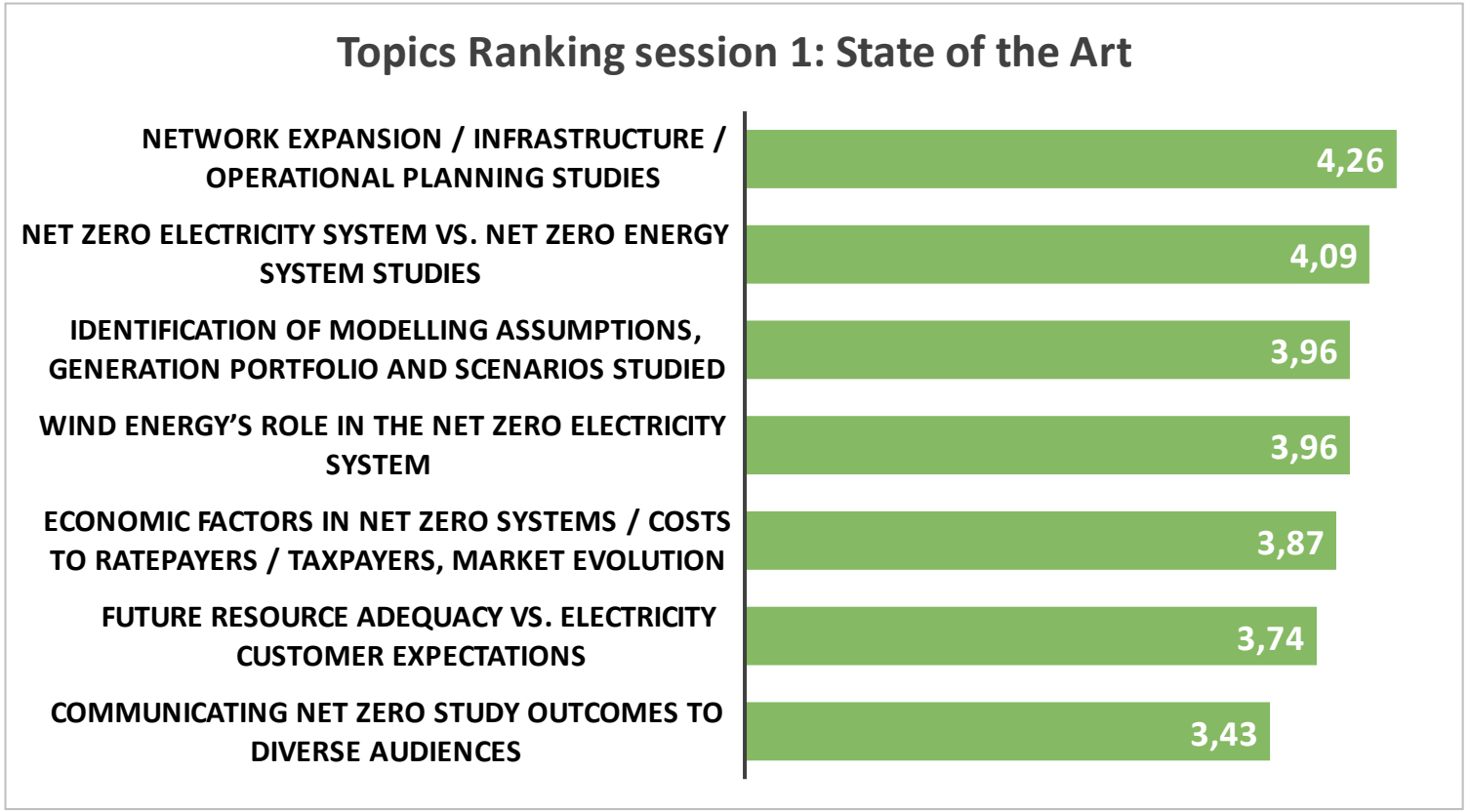

Survey's results session 1: State of the Art

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- **4 proposals** for additional topics
  - Including coupled sectors in electricity system net zero models e.g. heat
    Data transfer between models/workflow management through software modules
  - Industry transition pathway planning
  - The role of consumers in the operation of near Zero Energy Electric Power Systems: Demand Side Management/Response
  - Electricity market integration and subsidization of wind energy

Survey's results session 1: State of the Art

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- Interest of participants for sub groups in session 1

Topic	Nb of interested participants
Net zero electricity system vs. net zero energy system studies	15
Identification of modelling assumptions, generation portfolio and scenarios studied	12
Wind Energy's role in the net zero electricity system	11
Economic factors in net zero systems / Costs to ratepayers / taxpayers, market evolution	9
Network Expansion / Infrastructure / Operational Planning Studies	8
Communicating net zero study outcomes to diverse audiences	6
Future resource adequacy vs. electricity customer expectations	5

Survey's results session 2: Knowledge gaps and disagreement

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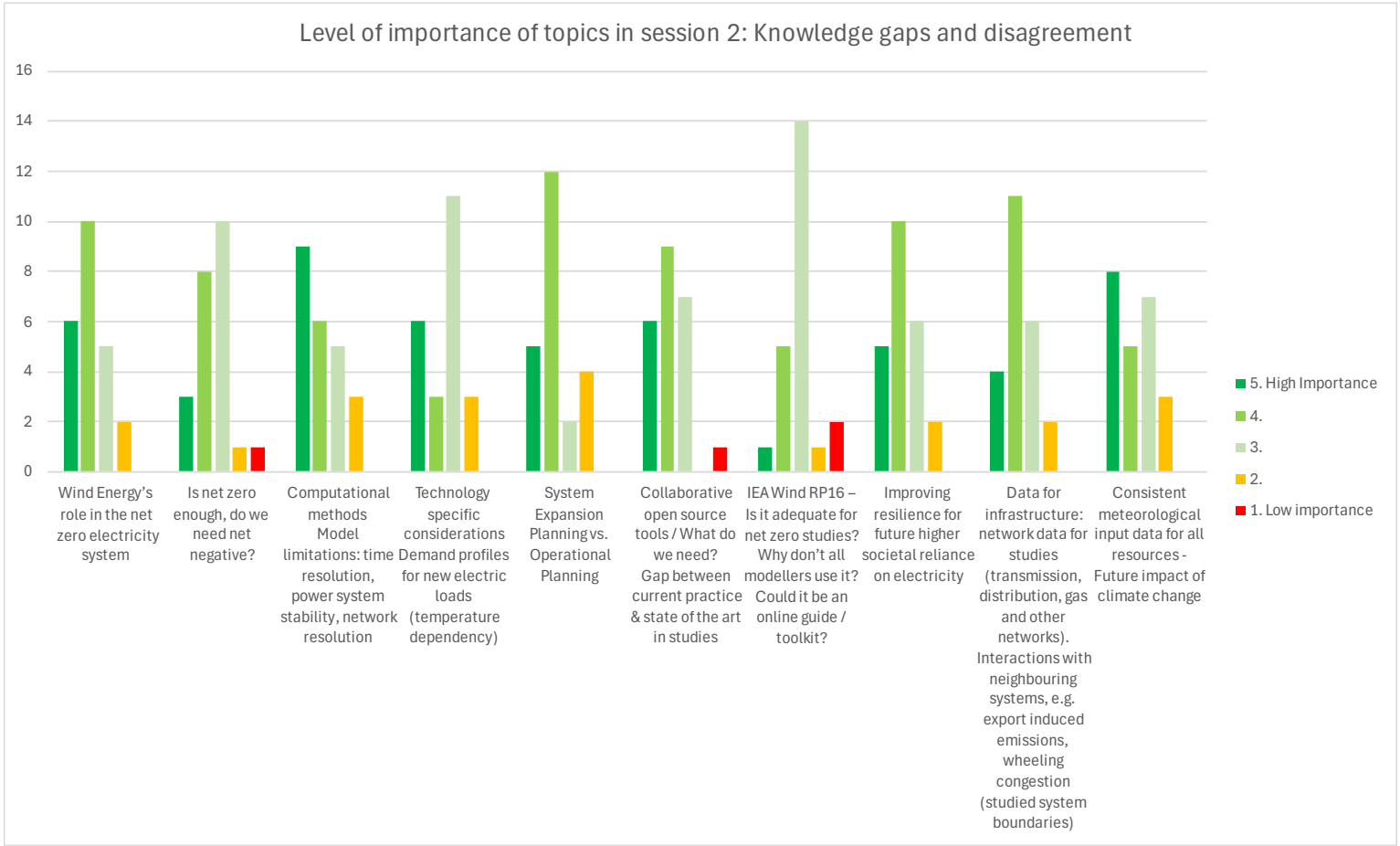

Survey's results session 2: Knowledge gaps and disagreement

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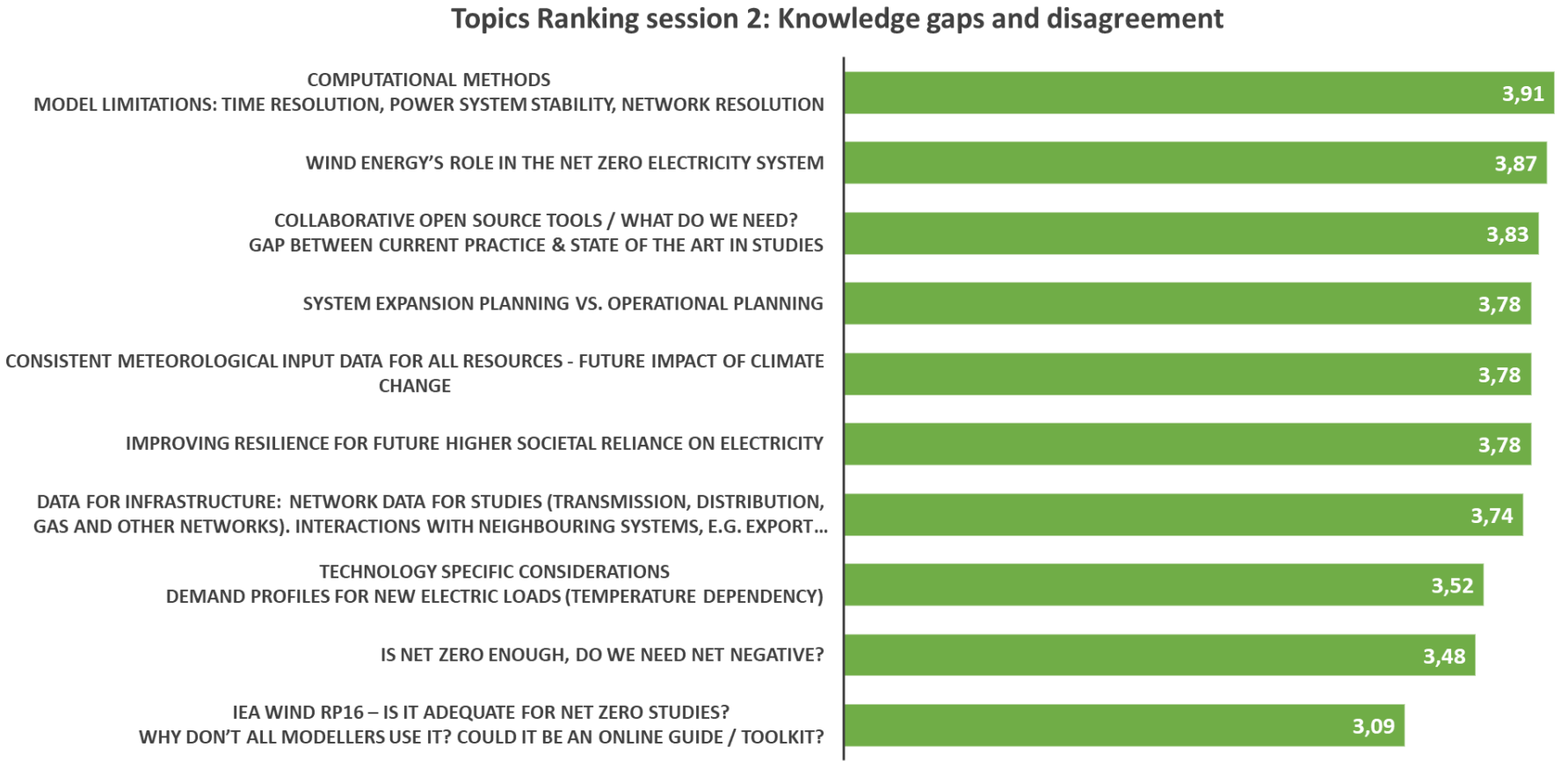

Survey's results session 2: Knowledge gaps and disagreement

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- **2 proposals** for additional topics
  - Integrated models vs. combined separate models
  - * Modelling assumptions about energy storage and demand flexibility in net-zero studies? E.g. how much does the results depend on tech/cost improvements e.g in the hydrogen sector

    * Role of central planning vs. markets in investments and power system operation

Survey's results session 2: Knowledge gaps and disagreement

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- Interest of participants for sub groups in session 2

Topic	Nb of interested participants
Computational methods / Model limitations: time resolution, power system stability, network resolution	12
Wind Energy's role in the net zero electricity system	12
Improving resilience for future higher societal reliance on electricity	10
System Expansion Planning vs. Operational Planning	9
Data for infrastructure: network data for studies (transmission, distribution, gas and other networks). Interactions with neighbouring systems, e.g. export induced emissions, wheeling congestion (studied system boundaries)	8
Is net zero enough, do we need net negative?	8
Technology specific considerations / Demand profiles for new electric loads (temperature dependency)	7
Collaborative open source tools / What do we need? Gap between current practice&state of the art in studies	7
Consistent meteorological input data for all resources - Future impact of climate change	5
IEA Wind RP16 – Is it adequate for net zero studies? Why don't all modellers use it? Could it be an online guide / toolkit?	4

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Thank you!!!

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The IEA Wind TCP agreement, also known as the Implementing Agreement for Co-operation in the Research, Development, and Deployment of Wind Energy Systems, functions within a framework created by the International Energy Agency (IEA). Views, findings, and publications of IEA Wind do not necessarily represent the views or policies of the IEA Secretariat or of all its individual member countries.