

IEEE Power and Energy Society Satellite Committees Entity Annual Report

2025

Entity: IEEE PES China Satellite Technical Committee-Electric Vehicle

Website: None

Chair: Prof. Minggao Ouyang

Vice-Chair: Mr. Bin Wu, Mr. Haiqing Xu, Mr. Yao Wang

Secretary: Mr. Wen Wang

Immediate Past Chair: None

1. Significant Accomplishments:

1.1 Committee Structure

The IEEE PES China Satellite Technical Committee-Electric Vehicle has 8 subcommittees, Electric Drive Subcommittee, Battery System Subcommittee, Vehicle-to-Grid Subcommittee, Charging and Swapping Technical Subcommittee, EV Service and Operation Subcommittee, EV Participating Electricity Market Trading Subcommittee, Energy and Transportation Nexus Subcommittee, and EV Grid Integration Experimenting and Testing Subcommittee. At present, there are about 435 individual members of the committee.

The following figure shows the current subcommittees.

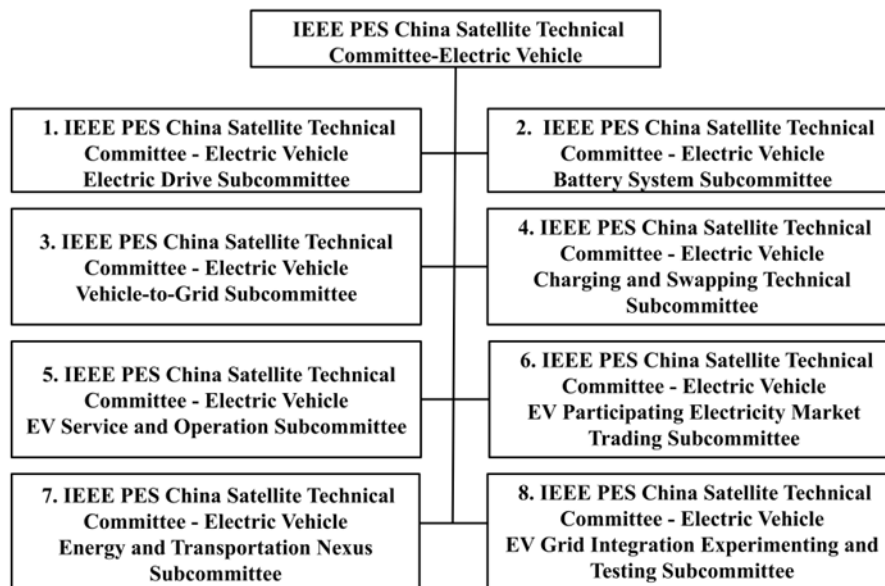


Figure 1. IEEE PES China Satellite Technical Committee-Electric Vehicle Subcommittees List

1.2 Committee Meetings

The 2025 IEEE PES China Satellite Technical Committee-Electric Vehicle Annual Meeting and and Vehicle-Network Interaction and Virtual Power Plant Development Forum were successfully held

on May 14, 2025 at the 3rd Floor Lecture Hall of Shanghai Automotive Exhibition Center. The forum gathered many industry experts, scholars and enterprise representatives to discuss the cutting-edge technology, development trend and practical application in the field of electric vehicle-grid interaction, and set up a high-level communication platform to promote the development of the industry.



Figure 2. Key members of the 2025 Technical Committee

The Annual Meeting is co-hosted by IEEE PES Electric Vehicle Technical Committee (China), Professional Committee on Intelligent Charging and Swapping Network for Electric Transportation of China Electrical Engineering Society (CEES), Project Team of the National Key R&D Program "Key Technologies for Safe Charging and Discharging of Large-Scale Electric Vehicles and Vehicle-Grid Intelligent Interaction", Electric Power Research Institute of State Grid Tianjin Electric Power Company, Jiangsu Key Laboratory of Smart Grid Technology and Equipment, and School of Electrical Engineering, Southeast University. It is co-organized by IEEE PES Electric Vehicle Electric Drive Technology Subcommittee, IEEE PES Power Battery Technology Subcommittee, IEEE PES Vehicle-Grid Interaction Technology Subcommittee, IEEE PES Electric Vehicle Charging and Swapping Technology Subcommittee, IEEE PES Electric Vehicle Service and Operation Technology Subcommittee, IEEE PES Electric Vehicle Participation in Power Market Trading Technology Subcommittee, IEEE PES Electric Vehicle Integration with Energy and Transportation Systems Technology Subcommittee, IEEE PES Electric Vehicle Grid-Connection Test and Detection Technology Subcommittee, Chenggong College, Southeast University, Charging and Swapping Technology Branch of China Association of Automobile Manufacturers (CAAM), and China Charging Pile Network.



Figure 3. Meeting schedule



Figure 4. 2025 IEEE PES China Satellite Technical Committee-Electric Vehicle annual meeting venue

Mr. Wang Qi, Deputy General Manager of Southern Power Grid Electric Vehicle Service Co., Ltd. made a report entitled “**Southern Power Grid Interprovincial Vehicle-Grid Interaction Demonstration Innovative Practices and Reflections**”, sharing the innovative practices of Southern Power Grid in the field of vehicle-grid interaction. He introduced the achievements of Southern Grid in platform construction, product development, standardization and theoretical research. SouthGrid Electric has built a unified vehicle-grid interaction aggregation platform of SouthGrid, accessed a large number of charging piles with regulation capability, and developed products such as V2G charging piles and liquid-cooled supercharging equipment. Wang Qi also mentioned that Southern Power Grid has participated in a number of national standards and national key research and development program projects, and will continue to improve the vehicle-grid interaction business system and promote technological innovation and practical application in the future.



Figure 5. Speech by Mr. Qi Wang

Mr. Yang Du, Deputy Director of the Center of State Grid Shanghai Electric Power Research Institute, made a report titled “**Key Technologies and Typical Cases of Supply-Demand Interaction in Shanghai Urban Power Grid**”. He pointed out that Shanghai power grid faces challenges such as high proportion of foreign power and high load density. Shanghai has carried out several demonstration projects on vehicle-grid interaction and constructed a mega-city virtual power plant, which has the ability of large-scale electric vehicles to participate in grid regulation. Du Yang also mentioned that Shanghai has achieved remarkable results in the field of virtual power plant and vehicle-grid interaction, including the formulation of international standards and the development of multi-morphology aggregation regulation technology, etc., and will further explore precision regulation and new technology applications in the future.



Figure 6. Speech by Mr. Yang Du

Mr. Lili Li, Distinguished Researcher of Tsinghua Energy Internet Innovation Research Institute, discussed the commercialization process of V2G technology in his report “**Embracing the Deepseek Moment between Automotive and Electricity, the Key to Breakthrough and Prospect of V2G Commercialization**”. He pointed out that V2G technology has the potential for disruptive user experience and large-scale application, and may become a global phenomenon. At present, the bottleneck of V2G commercialization lies in production relations rather than productivity, which needs

interaction faces problems such as high randomness of demand, complex constraints, high concurrency and high precision requirements, etc. In this regard, Azalea has built an algorithmic framework that includes scenarios-algorithms-data, and realized a fusion decision-making system that supports multi-objective comprehensive optimization based on safety, battery maintenance, cost reduction of electricity charges, and vehicle-grid interaction. Xiang Chen also mentioned that Azera has participated in several virtual power plant projects at home and abroad, and will continue to explore the business model and technology application of vehicle-grid interaction in the future to promote the development and innovation of the industry.



Figure 9. Speech by Ms. Chen Xiang

Prof. Feng Donghan from Shanghai Jiaotong University shared his research results on the topic of **“Demand Forecasting and Resource Allocation of Charging and Switching Infrastructure under the Environment of Vehicle-Network Interaction Technology Evolution”**. Firstly, he reviewed the development history of electric vehicles in Shanghai and pointed out that policy factors are crucial to the development of electric vehicles, and then he predicted the future development trend and concluded that the number of private electric vehicles will exceed that of fuel vehicles around 2030. Then, the development of charging facilities, resource allocation, operation optimization and market participation mode are elaborated. It is proposed to realize the planning and allocation of charging facilities in different regions based on geographic information POI, and to maximize social benefits through multi-objective optimization. Emphasizing the effect of shifting peaks and filling valleys through the charging demand response pilot in Shanghai, it also points out that it is necessary to establish the integration mechanism of the power market and the spot market to contribute to the development of vehicle-grid interaction.



Figure 10. Speech by Prof. Donghan Feng

Prof. Shan Gao of Southeast University shared the content related to vehicle-grid interaction in microgrid scenarios with the topic of **Research on Vehicle-Grid Interaction Mechanisms in Microgrid Scenarios**. The basic model and architecture of microgrid were introduced, and it was pointed out that electric vehicles can be used as mobile distributed energy storage units in vehicle-grid interaction, which need to be coordinated and controlled by aggregation. In terms of microgrid modeling, it is emphasized that relying on actual charging data, the characteristics of vehicle charging behavior are obtained after preprocessing, and clustering analysis is conducted accordingly. The charging load prediction and orderly guidance method is described, using deep neural networks for prediction and establishing an adaptive matching algorithm. Charging behavior prediction and interaction potential assessment are also explored to determine the vehicle adjustable boundary. Finally, taking the multi-energy microgrid scheduling as an example, the vehicle-grid interaction strategy under the consideration of multiple uncertainties is introduced, including the establishment of a three-phase robust optimization scheduling strategy.



Figure 11. Speech by Prof. Shan Gao

Prof. Laifeng Shi, Director of Charging and Discharging System Development Office of Research Institute of Dongfeng Motor Group, gave a speech entitled **“Research and Application of Vehicle Network Interaction Technology Based on Vehicle Power Supply”**, which elaborated on the

research and application of vehicle network interaction technology based on vehicle power supply. He illustrated the relationship between electric vehicles and charging infrastructure promoting each other from the perspective of vehicle enterprises, pointing out that the industry development trend is shifting from quantity to quality, and vehicle enterprises pay more attention to charging quality and speed. It puts forward the direction of vehicle-network interaction with new energy vehicles as the core, which is reflected in the functions of V2L, V2V and V2G, and introduces Dongfeng Motor's practical achievements in these aspects, such as realizing the bidirectional function of on-board charging machine, so that the vehicle can discharge for the loads, other vehicles or the power grid. Looking into the future, it said that it will build an energy ecology of optical storage, charging and discharging, and called on the state, the industry, the power grid, vehicle enterprises and pile enterprises and other parties to contribute to the development of AC V2G.



Figure 12. Speech by Prof. Laifeng Shi

Mr. Dan Chu, General Manager of Energy Management Operation Center of Wan Gang Star Charging Technology Co., Ltd, shared his views on the topic of “**Analysis of Typical Operation Scenarios of Star Charging's Three-Network Integration Ecological Vehicle-Network Interaction**”. He pointed out that vehicle-network interaction faces pain points in operation, such as technology, market, facilities and revenue. He introduced Star Charge's tri-network integration structure, from charging network to virtual power plant operation network to micro-grid development history and results. It also demonstrated the operation scenarios and revenues of vehicle-network interaction through a number of cases, such as the pilot of community private piles and the pilot of spot price penetration in public transportation charging scenarios, emphasizing that vehicle-network interaction needs to be overlaid with multiple transaction categories to obtain stable revenues. It also explains the abstraction of car network interaction capability, including control strategy, prediction capability and transaction development capability.



Figure 13. Speech by Mr. Dan Chu

Mr. Yan Wang, Executive General Manager of Jiangsu Zhirong Energy Technology Co., Ltd. shared the topic of **“Intelligent Operation of Charging Stations and Application of Virtual Power Plant Technology under Vehicle-Grid Interaction Scenario”**. He proposed that vehicle-grid interaction should be expanded to include charging station construction, operation and load control, and that power grids, operators and vehicle owners should all benefit. Emphasizes that the reliability of charging facilities is the technical base, and the aggregation and regulation of optical storage, charging and discharging resources are the application means. It introduces the overall architecture of intelligent operation and maintenance, including charging station situational awareness, charging pile state evaluation and battery health evaluation, etc., and realizes unmanned intelligent operation and maintenance by deploying multiple devices. Discusses issues such as the participation of virtual power plants in power market transactions, and suggests the establishment of proprietary virtual power plants with electric vehicles as the scenario to benefit small and medium-sized operators.



Figure 14. Speech by Mr. Yan Wang

Mr. Shuoqi Wang, co-founder/CEO of Beijing Chainyu Technology Co., Ltd. made a speech titled **“Reshaping the Energy Landscape: AI+Vehicle Network Interaction Enabling Intelligent Energy”**, sharing the new industry of vehicle network interaction 2.0 - Chainyu Technology's vehicle network interaction products and technology system. He pointed out that although car network

interaction is facing problems, the future prospect is bright. Introduced the pilot cities and projects, emphasizing the role of the company as a technology service provider. Explain the key points of construction and operation of vehicle network interactive field stations, including scene selection, product selection, operation mode, etc.. Focusing on the complexity of the rules for issuing control commands and clearing and settlement, and demonstrating the company's supercharging + V2G combination products and energy management platform. Finally, it introduces the pilot projects, such as the Shenzhen-Hong Kong Vehicle-to-Grid Interaction Pilot Project.



Figure 15. Speech by Mr. Shuoqi Wang

Mr. Yi Wu, Deputy Director of Vehicle Life Division of Shanghai United R&T Energy Technology Co., Ltd, shared his views on the topic of **“From ” Charging “ to ‘Discharging’ : Unlocking the New Ecology of Grid Synergy of Community Charging Piles in Shanghai”** . Introducing the characteristics of electricity consumption and energy structure in Shanghai, elaborating on the potential and advantages of V2G technology, and emphasizing the huge regulating capacity of private charging piles participating in vehicle-grid interaction. Explained the company's work on vehicle-grid interaction in Shanghai, including the construction of V2G DC charging piles, business model building and technology testing. Introduced the golden triangle cooperation model of “Technology + Traffic + Battery” formed by joining hands with Alipay and Ningde Times, which is committed to building a community intelligent and orderly charging and discharging system, and exploring the new model of “Intelligent and Orderly Charging Pile + V2G + Virtual Power Plant” .



Figure 16. Speech by Mr. Yi Wu

The 2025 IEEE PES China Satellite Technical Committee-Electric Vehicle Annual Meeting and Vehicle-Network Interaction and Virtual Power Plant Development Forum was successfully held to promote technical exchanges and cooperation in the field of electric vehicle-grid interaction, and injected strong vitality into the vigorous development of vehicle-network interaction and virtual power plant. Participants in the forum fully exchanged, in-depth discussion, collision of many cutting-edge views and innovative ideas for the future direction of the industry to provide a key guide and decision-making reference for the construction of a more efficient, intelligent, green energy and transportation integration ecology laid a solid foundation, sketching out a picture full of hope and potential for the better development of the picture.

2. **Benefits to Industry and PES Members from the Committee Work:**

The IEEE PES China Satellite Technical Committee-Electric Vehicle supports high-quality industry development, driving innovation and implementation of core technologies such as vehicle-grid interaction and virtual power plants, and delivering replicable solutions. It builds a high-end communication platform, deepens the integration of industry, academia and research, and establishes an international dialog bridge for Chinese scholars to help PES members grasp industry trends and expand cooperation. Promote technical standard synergy and data sharing, reduce innovation costs and enhance industry competitiveness.

3. **Benefits to Volunteer Participants from the Committee Work:**

Participating as a volunteer in the IEEE PES China Satellite Technical Committee-Electric Vehicle brings multiple significant benefits to volunteers. Firstly, it builds a high-end platform for direct communication with top experts, scholars, and enterprise elites in the global electric vehicle field, helping volunteers expand their industry network and gain access to potential cooperation opportunities and resource connection channels. Secondly, volunteers can deeply participate in the organization and execution of core industry conferences, technical forums, and innovative activities, accumulating valuable professional practical experience, improving comprehensive abilities such as project management, communication and coordination, and leadership, and adding highlights to their personal career resumes. Thirdly, they can prioritize accessing the latest research results, cutting-edge technological trends, and market development dynamics in fields such as electric vehicle-grid interaction, virtual power plants, and battery technology innovation, timely grasp core industry

information, and always stay at the forefront of industry knowledge. In addition, during the process of participating in the committee's work, volunteers' professional capabilities and contributions will be widely recognized in the industry, effectively enhancing their professional visibility and credibility in the electric vehicle field, opening up broader space for career development, and helping to achieve personal career goals and value improvement.

4. Recognition of Outstanding Performance:

In 2025, a number of outstanding teams and individuals emerged from the work of the IEEE PES China Satellite Technical Committee-Electric Vehicle, gaining wide recognition and high praise from the industry. In the field of electric vehicle-grid interaction and virtual power plant technology innovation, several core teams conducted in-depth research and practical exploration around key topics such as large-scale aggregation of community charging piles, multi-scenario vehicle-grid interaction operation, and optimization of virtual power plant resource scheduling, forming a series of innovative and practical technical solutions and application cases that provide an important reference paradigm for industry development.

5. Coordination with Other Entities (PES Committees, CIGRE, standards, etc.):

No coordination with other entities in 2025.

6. Coordination and Involvement with Young Professionals:

The Committee attaches great importance to the cultivation and empowerment of young professionals and builds a platform for their growth through diversified initiatives. A special session for young scholars was set up in the 2025 Annual Meeting and the Forum on Vehicle-Grid Interaction and Virtual Power Plant Development, encouraging young professionals to share their research results and participate in the discussion of cutting-edge topics. At the same time, we have opened the youth participation channel of the joint research projects of the committee to support young people's in-depth participation in the innovative research and development of core technologies such as Vehicle-to-Grid Interaction and Virtual Power Plants, and to provide young professionals with opportunities for international academic exchanges and participation in the formulation of standards, so as to accelerate their growth into the backbone of the industry.

7. New Technologies of Interest to the Committee:

The new technologies of interest to the Committee fall into the following eight areas:

- 1) Electric Drive Subcommittee
- 2) Battery System Subcommittee
- 3) Vehicle-to-Grid Subcommittee
- 4) Charging and Swapping Technical Subcommittee
- 5) EV Service and Operation Subcommittee
- 6) EV Participating Electricity Market Trading Subcommittee
- 7) Energy and Transportation Nexus Subcommittee
- 8) EV Grid Integration Experimenting and Testing Subcommittee

8. Global Involvement

The committee actively promotes international exchanges and cooperation in the field of electric vehicles and builds a bridge for global technical dialog. With the international platform of IEEE PES, the committee will invite international experts to participate in online seminars and share the latest

progress of global vehicle-grid interaction and virtual power plant technology in the 2025 annual meeting. Also, we will build an international talent exchange platform to attract overseas young scholars and industry elites to participate in the joint research and academic activities of the committee, which will help the synergistic development of global electric vehicle technology.

9. Problems and Concerns:

Despite the remarkable achievements made by the committee in 2025, there are still some urgent problems and challenges in the development process.

The mechanism of cross-field synergy needs to be improved. The development of electric vehicle technology involves a number of cross-cutting fields, and the current technological integration, resource sharing and collaborative innovation among different fields are not efficient enough, and there are problems such as non-uniformity of technical standards and difficulties in data interoperability, which affect the transformation and landing of the overall innovation results.

Disparity exists between talent structure and demand. With the rapid development of emerging technologies such as vehicle-network interaction and virtual power plants, the industry has an increasingly urgent demand for composite talents with both deep professional expertise and cross-field knowledge, and the talent training system still needs to be optimized.

Technology commercialization faces bottlenecks. Some cutting-edge technologies are affected by factors such as policy support and unclear market profit model, so the commercialization and promotion speed is slow, and it is difficult to effectively transform the technical value and market value.

10. Significant Plans for the Next Period:

Based on the results of the work in 2025, the committee will continue to deepen the technical innovation of electric vehicles and industry collaboration in 2026.

We will continue to focus on core areas such as vehicle-grid interaction, virtual power plant, battery technology upgrading, etc., organize cross-field symposiums and joint research projects between industry, academia and research institutes, and promote technical standard synergy and industrialization of achievements.

We will further improve the multi-level talent cultivation system, provide cutting-edge technology training and academic lectures, and build a platform for young talents to grow, so as to realize an accurate match between talent supply and industry demand. Jointly optimize the policy environment and profit mechanism with government and enterprises, promote the pilot promotion of typical scenarios such as community charging pile aggregation and optical storage charging and switching integration, and accelerate the commercialization of the technology. Strengthen cooperation with IEEE PES and related organizations, participate in international standard development and academic exchanges, and enhance China's international discourse on technology.

Submitted by: Xiangjun Li

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