Viet Nam Energy Partnership Group

TECHNICAL WORKING GROUP 1: POWER SECTOR STRATEGIC PLANNING

THE FIRST MEETING IN 2022

Date: 04 November 2022

Venue: Melia Hotel, 44 Ly Thuong Kiet, Hoan Kiem, Ha Noi

Time: 9:00 – 12:30

Main contents:

1. Update from the Government on policies and national orientations of the power sector towards the sustainable energy transition;
3. To exchange international perspectives on challenges and opportunities of the power sector in contributing to achieving the net zero target by 2050;
4. To agree on VEPG TWG 1 2023 focus themes and work plans on Power Sector Strategic Planning.

Chair/ Co-chair:

- **Mr Nguyen Tuan Anh,** Deputy Director General of Electricity and Renewable Energy Authority, Ministry of Industry and Trade (MOIT);
- **Mr Loui Algren**, Long-term advisor, Danish Energy Partnership Programme, DEA.

Participants:
71 delegates attended physically in the Meeting, including:

- Representatives from MOIT, including EREA and ERAV;
- Representatives from embassies, development partners, and international organisations: UNDP, European Union Delegation, UK Embassy, Danish Embassy, Norwegian Embassy, Danish Energy Agency, GIZ, AfD, ETP/UNOPS, WWF;
- Representatives of NGOs, think tanks, and the private sector: IE, PECC3, VIET SE, Equinor, The Asian Group and Wartsila.

In addition, the Meeting welcomed nearly 60 online delegates from embassies, development partners, associations, and enterprises.

Agreed Conclusions and Actions: (see next page)

Agenda: Annex 1

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AGREED CONCLUSIONS AND ACTIONS:

AGREED CONCLUSIONS	ACTION BY
• Proposed TWG1 Workplan for 2023: - 2 TWG1 meetings in 2023: March/April and September/October; - The next VEPG Steering Committee Meeting (SCM) was proposed to be held on 13 December 2022; the following VEPG SCM in 2023 would be held in June-July 2023; - Start discussing about the long-term VEPG & VEPG Secretariat sustainability in terms of technical and financial aspects after the EVSET Facility ends in December 2027.	VEPG Secretariat
• Proposed priority topics: - The method of allocating the scale of power sources, especially renewable energy sources, to localities, and provinces, ensuring the regional and provincial planning will be consistent with PDP 8; - Planning on the connection of power sources and power grids in accordance with national and provincial plans; - The solution to controlling the progress of the planned power project; - Planning for the development of hydrogen and energy storage systems in the energy system towards 2050.	EREA, MOIT
• The Task Forces will be discussed in the next TWG1 Meeting when the PDP VIII is approved, as the Task Forces will focus on PDP8 implementation challenges.	EREA, DEPP
• The VEPG Secretariat will note all questions, recommendations and ideas from participants and VEPG stakeholders and send them to the Chair and Co-chair for consideration and further discussion.	VEPG Secretariat

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Annexe 1 – AGENDA

08.00-08.30	**Registration/Log-In & Guidance for Webinar Users**
08.30-08.45	**Opening and introduction** *Chair Mr Nguyen Tuan Anh* *Co-chair Mr Loui Algren* • Opening and introduction to the Agenda.
08.45-09.00	**VEPG Secretariat Report** • Introduction of the new VEPG Secretariat; • Changes of the VEPG in 2022; • Adoption of the Agenda and Q&A.
09.00-10.00	**Session 1- Strategic Power system planning** • ***EREA/MOIT****: Orientation of the energy transition in Vietnam(15 minutes;* • ***DEPP****: What-if Scenarios for power transition and recommendations for Viet Nam – Strategic objectives for a holistic scenario construction approach (15 minutes);* • ***IE:*** *Role of Storage/Hydrogen in the energy system towards 2050 (15 minutes);* • ***Participants***: Q&A*(15 minutes).*
10.00-11.40	**Session 2 – Technology Options for Power System Planning perspectives** • ***DEPP***: *Balancing the power system towards 2050: what are the most cost-effective solutions? (20 minutes);* • ***Mitsubishi***: Co-firing hydrogen with LNG in gas turbines: Technical and economic feasibility *(20 minutes);* • ***ETP/UNOPS****: Options for the net-zero carbon emission roadmap of SOEs (20 minutes);* • ***World Bank:*** *Vietnam Country Climate and Development Report (CCDR): power system planning findings, implications and recommendations for implementation (20 minutes);* • ***Participants*****:** Q&A *(20 minutes).*
11:40 – 12.30	**Session 3 – Discussions on priority topics and the work plan 2023** • Discussions and agreement on TWG priority topics and task forces; • Propose the VEPG TWG1 2023 Workplan; • Conclusions and closing of the Meeting.
12:30 – 14:00	**Lunch**

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Annexe 3 – MINUTES

Agenda Item	Summary
Opening Remarks	***Mr Nguyen Tuan Anh, Chair of the TWG***, delivered a welcome speech to in-person and online participants of the TWG1 on Power Sector Strategic Planning. The power sector always plays an important role in the socioeconomic development of a country. Therefore, Viet Nam has paid special attention to the planning of the power sector and achieved impressive results during the last ten years. However, to ensure the country's sustainable development, as stipulated in Resolution 55, and to reach the net-zero emissions targets by 2050, the power sector will face many challenges. It will require more efforts from MOIT and synergies between other ministries, and the strong cooperation of international development partners and national players. The objective of the Meeting is to discuss the status and development orientations of the Government to the power sector and to share experiences and perspectives from Development Partner and stakeholders. The Chair encouraged TWG stakeholders to participate actively and discuss in the Meeting, as MOIT is willing to listen to and will carefully consider ideas and recommendations from all stakeholders while building suitable policy and completing the legal framework for the sustainable development of the power sector. ***Mr Loui Algren, Co-chair of the TWG1***, thanked the Chair for the cooperation and collaboration for many years, thanked the VEPG Secretariat for organising the Meeting, and welcomed the participants. He highlighted the importance of power Sector Planning for developing the national energy sector. He shared that in Denmark, this issue has been considered and researched for many years, particularly after the oil crisis in the 1970s, using increasingly advanced tools. He expressed that DEPP is willing to share its experiences and tools in collaboration with EREA to build good long-term planning, which will be necessary for Vietnam to reach the net-zero emissions target in 2050 cost-efficiently. Finally, he expressed his happiness to see a large crowd of participants with various strong and relevant expertise and encouraged their active contribution to the Meeting and this TWG. The Co-chair then briefly went through the Agenda with each session's main themes and purposes.
VEPG Secretariat's Report	***Mr Thierry Lefèvre, Team Leader of the VEPG Secretariat/EVSET Facility,*** briefed on VEPG's activities and restructured TWGs, and proposed focus themes and work plan of the TWG 1 for the year 2023. In 2022, all Technical Working Groups have organised their first meetings to discuss comprehensive aspects of the energy sector development toward sustainable energy transition. During these meetings, participants discussed policies and technical issues in-depth to make practical recommendations for a sustainable energy transition by establishing and operating task forces. Up to now, 3 task forces have been created and are under operation: Offshore Wind Development Task Force, Energy Efficiency in Buildings, and Wholesale Electricity Market. Development Partners and

	Stakeholders interested in Task Forces could contact VEPG Secretariat for more detailed information, and connection with TF leads. On the personnel of the VEPG, the year 2022 witnessed some changes in the VEPG Governance, including the new VEPG focal points from the World Bank and MOIT, new co-chair of the TWG2 on RE, TWG3 on Grid Integration and Grid Infrastructure and TWG5 on Energy Market. In particular, the VEPG Secretariat has been transferred from GIZ to the Stantec-led Consortium under the EU - Viet Nam Sustainable Energy Transition (EVSET) Facility, in which the VEPG Secretariat is one of its main components. The other four Facility components include Technical assistance to MOIT, Technical assistance to non-MOIT, monitoring the SETP and the SETP communication and visibility. Finally, the Secretariat proposed the TWG1 workplan for 2023, including the priority topics to be discussed under TWG1, a tentative timeline for the two TWG1 meetings to be held in 2023, and other general VEPG activities. The proposed workplan and propriety themes are in Annexe 3.
Orientation of the energy transition in Vietnam ***EREA, MOIT_***	***Mr Nguyen Hoang Linh, EREA, MOIT,*** presented the national strategies and orientations on the energy transition. The Viet Nam Government has determined the energy transition as an important direction for the country's sustainable development. This mission was directed under the issuance of the Prime Minister Decision 2068/QD-TTg on the National Strategy on Renewable energy to 2030, with a vision to 2050; Politburo Resolution 55-NQ/TW on Orientations of the national energy development strategy to 2030 with a vision to 2045; and PM Decision 1658/QD-TTg on National green growth strategy for the period of 2021-2030, with a vision to 2050. In addition, the Legal Framework and incentive policies and mechanisms have boosted the development of renewable energy sources in Viet Nam since 2019. The presentation analyses the trend of the energy demand until 2050. Overall, the demand growth rate will reduce due to the use of high-EE equipment and a sharp increase in alternative fuels after 2030. Following the direction of the Government and Politburo on the energy transition and to reach the net zero GHG emission target by 2050, the PDP VIII has been developed comprehensively to promote the development of RE while still ensuring the stability of the power system at a reasonable cost. The energy transition is a long and complicated process that requires strong cooperation between Government and international partners to mobilise capital resources and develop technological autonomy capacity.
What-if Scenarios for power transition and recommendations for Viet Nam – Strategic objectives for a holistic scenario construction approach	***Mr Loui Algren, DEPP,*** shared some highlights of the Viet Nam Energy Outlook report published by EREA and DEA. The study is based on three energy system models: TIMES, Balmorel and PSS/E, and explored five main scenarios: (1) Baseline scenario reflects existing policies and contracted new plants; (2) Green Power scenario includes a higher share of renewables and less coal; (3) Green transport scenario includes a higher share of electrification of the transport sector supplied by RE and modal shift to public transport, (4) Air pollution scenario adds the costs related to human health impacts from air pollution; and (5) Net-Zero scenario includes a pathway to almost net zero GHG emissions in 2050 defined by a CO_2 budget.

DEPP	It is recommended that transitioning to net-zero requires coordination between all sectors. One is a large level of electrification of the transport and industrial sectors. The study showed that Utility-scale PV (UPV) is expected to be the cheapest resource, and a considerable amount could be integrated in the long term. Therefore, the Government should consider more UPV and onshore wind before 2030 and integrate as much UPV as possible in the long term. However, if UPV potential is deemed smaller, it should be replaced by wind power. For the LNG market, it is forecasted that the imported fuel used in the power sector could grow 10-fold in 2030. The Government should carefully consider the dependency on uncertain fuel prices in national energy planning.
Role of Storage/Hydrogen in the energy system towards 2050 **IE**	***Mr Nguyen Ngoc Hung, Institute of Energy,*** explained the role of Energy Storage and Hydrogen for the energy industry by 2050 through the analysis of the development scenarios in the draft Energy Master Plan and Power Development Plan VIII. In the decarbonization scenario of the draft energy master plan, final energy demand is expected to reduce sharply by approximately 8% in 2030 and 22% in 2050 compared to the BAU scenario due to the more aggressive implementation of EE measures. The structure of energy sources is expected to change significantly, with the addition of Hydrogen-based fuels, including hydrogen, ammonia, and synthetic fuels, and a higher share of electricity, accounting for 40% of the energy sources in 2030 and 59% in 2050. As a result, CO_2 emissions will peak in 2035 with approximately 450 million tons of CO_2. The roles of energy storage are considered when reducing the scale of coal-fired power plants and increasing RE generation in the PDP VIII. To increase the flexibility and maintain the stability of the power system, besides developing a reasonable proportion of gas-fired power plants, energy storage: hydro pumped storage (HPS), Storage Battery (BESS) is anticipated, particularly after 2035. In conclusion, Energy storage and hydrogen will be crucial solutions to deliver the energy transition, of which hydro-pumped storage and BESS play essential roles in integrating VRE. In addition, hydrogen-based fuel plays a key part in decarbonisation in long-distance transport, heavy industries, and power generation.
Q&A	***Private sector:*** Why is the capacity of self-consumption rooftop solar limited to 1MWp? Will the Government consider removing this cap to enable a more significant self-consumption RTS and developing a comprehensive legal framework for rooftop solar hand in hand with the PDP VIII? *Answer:* Recently, thanks to the incentive mechanisms of the Government, Viet Nam has seen a booming development of solar power. However, transmission and distribution grids have not kept up with the development of renewable energy sources, including rooftop solar power. From now until 2030, there is not enough time to develop the power grid. Therefore the capacity of the power is somehow limited, and large-scale projects are constrained from being developed. However, in the draft PDP VIII, MOIT still

	encourages self-consumption solar projects without capacity limitation as long as they can comply with the stipulated level of self-consumption. ***Energy consultant***: it is reported in the EOR that in the future, solar power will be the main player in the power sector; how could this source overpass the huge potential of wind power? What is the cost for offshore wind used in the presented model? *Answer:* The report's expected installed capacity of offshore wind power is not high, mainly due to cost issues and other uncertain factors such as marine planning and technological difficulties. Thus, in the short term, the report recommends piloting a small-scale offshore wind power project with a low capacity as a basis for building a long-term offshore wind power development plan. ***AfD:*** We saw that a large share of energy demand in the transport and industry sectors is electrified. In this case, there is a need for grid reinforcement, and how about grid financing and planning development? *Answer:* The EOR report identified the need to upgrade the power grid system to allow the integration of renewable energy sources. The report outlines additional requirements based on the comparison between the baseline scenario and a net-zero emissions scenario. One of the key findings in the report is to improve the cost efficiency of power transmission lines and long-distance high-voltage transmission between load centres. ***GIZ*:** The lesson from Europe's energy crisis is that improving energy efficiency is extremely important. This issue has been studied in Germany for a long time. Is there a scenario for Vietnam that promotes EE, how to deal with the high costs of energy-efficient equipment in industrial parks and households? *Answer:* The EOR report includes energy efficiency indicators, but these are ambitious targets, so the report also considers feasibility and compliance levels. The report provides a sensitivity scenario for Vietnam to achieve 50% compliance with this indicator. In the long term, to achieve the net-zero emissions goal, efficient energy use is necessary, besides switching to clean energy sources.
Balancing the power system towards 2050: what are the most cost-effective solutions **DEPP**	***Mr Loui Algren, DEPP***, presented the overview of power system balancing: A power system must balance second by second. Traditionally, the main challenge has been balancing the variation in demand with dispatchable power plants. But with increasing amounts of variable RE connected to the grid, the dynamics of balancing change, and the need for balancing could increase. Thermal Power Plant: In 2030, the imported coal-fired power plants should reduce generation to around 2,500 FLHs (Full Load Hours). In 2040, all generation from coal and gas-fired power plants should be reduced to approximately 1,000-2,000 FLHs, and in 2050 the generation should be stopped entirely in line with the net-zero target. Need for Storage: Storage could play a prominent role in balancing the power system but only after 2030. BESS and PV go together: 2.5 to 5-hour storage is optimal to balance the daily pattern, and all scenarios have a high correlation between PV and BESS capacity. Therefore, the Government

	should ensure a regulatory framework for demand-response and prepare to implement BESS on a large scale after 2030. Regional imbalance of demand/supply: Renewable resources are not always located close to the demand: North and Southeast are the largest net importers of electricity, and Highlands and South Central are the largest exporters of electricity. Centre Central is a prominent transit region connecting the northern regions with the Highlands. The total interregional transmission capacity should be reinforced to around 41 GW in 2030 from 29 GW in 2020. Need for transmission: to reach the net-zero target in 2050, HVDC lines should be in operation by 2035, and the AC grid should be reinforced as soon as possible.
Co-firing hydrogen with LNG in gas turbines: Technical and economic feasibility ***Mitsubishi***	**Mr Ryohei Irisa, Mitsubishi** introduced the technical and economic feasibility of co-firing hydrogen with LNG in gas turbines with technical details of two groups of H_2 and NH_3 gas turbines. This solution has been deployed in many countries worldwide, including Viet Nam. In Viet Nam, thermal power plants that have applied this solution include Nghi Son 2, O Mon 1, Mong Duong 1, Thai Binh 1, Van Phong 1 and Phu My 1. Furthermore, Mitsubishi Heavy Industries committed to supplying two hydrogen-capable M501JAC gas turbine power trains (1X1) to Intermountain Power Agency and Plans to co-fire 30% Hydrogen in 2025 and operate on 100% Hydrogen no later than 2045.
Options for the net-zero carbon emission roadmap of SOEs **VIETSE**	Regarding the options for the net-zero carbon emission roadmap of State-owned enterprises, Ms Ngo To Nhien - director of VIETSE – stressed the essential roles of SOEs in the power system. They supply electricity to a large proportion of the system, providing up to 48% of installed capacity and about 58% of electricity output (excluding electricity imports). The concentration of SOEs is mainly in coal-fired power (67%), hydro (59%), and gas (80%). However, SOE's investment in renewable energy is almost nonexistent. Therefore, as Viet Nam is committed to reducing CO_2 emissions, SOEs will be directly affected, posing a complex problem for the national electricity system. Accordingly, ETP/VIETSE provided a technical analysis of the impacts of energy transition and CO_2 emission reduction of SOE production. They proposed possible solutions to reduce emissions of SOE's coal-fired power plants, such as (i) fuel transition (co-firing with biomass); (ii) improving efficiency and flexibility to provide auxiliary services; (iii) applying carbon capture and storage (CCS) solutions with flexible operation of the power system; (iv) replacing some depreciated or paid-back/profitable plants with renewable energy plants; and (v) implementing storage in depreciated or paid-back/profitable plants.
Vietnam Country Climate and Development Report (CCDR): power system planning findings, implications and recommendations	**Ms Chiara Rogate**, **World Bank**, delivered a presentation on the clean energy transition in Viet Nam with technical analyses on mobilising financing. Viet Nam is an emerging economy with rapid economic development. Therefore, the energy demand is expected to double every ten years despite aggressive energy efficiency gains. Currently, electricity production mainly relies on coal and gas sources, leading to the rapid

for implementation **World Bank**	growth of GHG emissions. Therefore, Viet Nam's Government is considering options for low-carbon expansion of the power sector. The presentation explained the challenges in mobilising large-scale financing for energy transition but indicated that global experience and local expertise could overcome these challenges. In general, there is no lack of funding available – reforms and development partner support can unlock the potential. Additional opportunities include sectoral policy lending, results-based financing, and carbon pricing instruments. Recommendations for energy transition policy framework: • Use power system planning as a flexible policy and investment decision guidance tool; • Accelerate renewable energy deployment – in particular, offshore wind; • Expand and modernise the power grid to integrate variable renewable energy at scale; • Achieve timely development of natural gas supply needed to substitute coal development; • Intensify energy efficiency and demand moderation measures; • Mobilise private-sector financing with targeted public-sector support.
Q&A	**GIZ** raised the issue of cost forecasting, given the prediction that Viet Nam emissions will peak in 2035. (1) By 2025, coal-fired power plants will have to reduce their generation. (2) the National Assembly discussed the issue that the Government would not interfere in land acquisition and clearance, so the cost of land for solar PV will be very high in the future. Has this cost trend been taken into account in the modelling? (3) He also raised the necessity for a mechanism for flexible capacity, particularly in the context of highly fluctuating fuel prices, technology changes, and geopolitical issues. It looks like this issue has not been addressed in the modelling. *Answer:* Yes, an increase in coal price will lead to an increase in the cost of coal power, therefore, affecting its dispatch order. For example, this year, generation output from coal was lower than planned because of the more expensive imported coal price. Therefore, fuel price forecast is an input to the modelling, which explores various scenarios to ensure energy security and reach the net-zero emission target, as presented above. The issue of land use for solar power has been calculated in the report and is still being under discussion for application in the long term. Developing 800 GW of solar power in net-zero emission scenarios will require about 3.3% of the national area. ***Mitsubishi*** asked if the national power planning considers power price and calculates the power price in scenarios. ***Answer:*** The power price has been considered when the Government and DPs prepare power development scenarios. The draft PDP VIII has calculated the power prices in different scenarios to achieve the net-zero target. When comparing the electricity prices between scenarios, before and after committing to a net-zero emission target, the model shows that

	electricity prices are forecasted to increase by 5% to 10% in 2030 and 25% to 30% in 2050. ***Private sector:*** to reach the net-zero target by 2050, Viet Nam should focus on not only the development of solar power but also offshore wind. Besides, green hydrogen also needs to be considered when calculating and shaping the long-term national power planning, recommending the combination of BESS and green hydrogen. ***VIET SE:*** Viet Nam can develop offshore wind power that would supply power not only for the grid but can also be used to produce green hydrogen. This source of hydrogen is recommended to increase the flexibility of the power system and for greening transportation. Scenarios have been researched and proposed to recommend suitable solutions for the country. In addition, it is also necessary to consider the market's reaction; for example, when the storage price decreases, the storage investment from BESS also needs to be considered an effective solution. Regarding electricity prices, VIET's research focuses on solutions to offset losses of state-owned enterprises due to the differential between their higher electricity production cost (due to increasing coal, gas, etc. prices) and their electricity selling price.
Conclusions **VEPG Secretariat**	Regarding the TWG work plan, the Chair and Co-chair agreed on the Secretariat's proposal. Proposed focus topics for TWG1 in 2023 include: • The method of allocating the scale of power sources, especially renewable energy sources, to localities, and provinces, ensuring consistency with PDP VIII; • Planning on the connection of power sources and power grids in accordance with national and provincial plans; • The solution to controlling the progress of the planned power project; • Planning for the development of hydrogen and energy storage systems in the energy system towards 2050. • In addition, GIZ proposed contributing to the hydrogen-related issue and would like to ask for a task force on this topic. GIZ is willing to work with another development partner to tackle this issue. VIET proposed to conduct a study on power price forecast, to be discussed in the next TWG1 Meeting, because even if the Government applies an auctioning mechanism for RE sources, it is more likely that a ceiling price will be used. Therefore, research on electricity price forecast is relevant and useful as it will allow to calculate the share of the different RE sources, ensuring that the power price is appropriate in the context of Viet Nam. The Chair clarified that this TWG1 discusses general power development policy, pricing policies, and mechanisms. Currently, MOIT is working on power prices to select suitable investors. In addition, MOIT has issued Circular 15 stipulating methods for building price brackets for electricity

	generation of transitional solar power and wind power plants. In the coming time, MOIT will continue working with EVN on this power pricing issue. The VEPG Secretariat noted participants' questions, recommendations, and proposed topics for further discussion in the next TWG1 Meeting.
Closing	Chair Mr Nguyen Tuan Anh delivered the closing remarks and thanked the speakers for their detailed presentations on various aspects of the power development strategies and the delegates for their participation and comments/inputs. The TWG has discussed and agreed on priority topics of the TWG1 for the next Meeting. The VEPG Secretariat will consolidate comments/inputs of the delegates, recommendations, and support proposals of the development partners to the Chair and Co-chair for considering the establishment of appropriate task forces. The Chair announced the closing of the Meeting.

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Annexe 3: Presentations

Presentations are available for download below:

English:

https://vepg.vn/documents-of-the-twg-1-on-pssp_04-nov-2022/

Vietnamese:

https://vepg.vn/tai-lieu-phien-hop-nhom-ctkt1-ve-quy-hoach-chien-luoc-nganh-dien_-04-11-2022/