



Ministry of Industry and Trade



Hợp tác
Đức

DEUTSCHE ZUSAMMENARBEIT

Implemented by

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



SMART GRIDS

FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY

Published by:

GIZ/Smart Grids for Renewable Energy and Energy Efficiency (SGREEE) Project

As of:

June 2022

Photos by:

GIZ Energy Support Programme

Contact:

GIZ Energy Support Programme

Smart Grids for Renewable Energy and Energy Efficiency (SGREEE) Project

giz Deutsche Gesellschaft für

Internationale Zusammenarbeit (GIZ) GmbH

Unit P042A, Coco Building, Thuy Khue, Tay Ho District, Ha Noi, Viet Nam

T +84 (0) 24 3941 2605

F +84 (0) 24 3941 2606

E office.energy@giz.de

I www.gizenergy.org.vn

GIZ is responsible for the content of this publication.

On behalf of the

German Federal Ministry for Economic Cooperation and Development (BMZ)

TABLE OF CONTENTS

- 04 **Foreword by Nguyen Anh Tuan - ERAV Director General**
- 06 **Foreword by Tobias Cossen - GIZ ESP Director**
- 08 **Viet Nam energy context**
- 12 **Introducing Smart Grids for Renewable Energy and Energy Efficiency (SGREEE) project**
- 14 **At a glance: SGREEE's 20 key achievements**
- 25 **SGREEE Action Areas: a report**
 - 26 AA1 - Legal and regulatory framework
 - 46 AA2 - Capacity development
 - 56 AA3 - Technology cooperation
- 64 **Five minutes with Tran Tue Quang - ERAV Deputy Director General**
- 66 **Five minutes with Markus Bissel - SGREEE Project Director**
- 68 **What ERAV and GIZ talk about SGREEE?**



Smart Grids for Renewable Energy:
**A SMART AND POSITIVE IMPACT FOR
ENERGY TRANSITION IN VIET NAM**

Welcome from Nguyễn Anh Tuấn, Director General of the Electricity
Regulatory Authority of Viet Nam (ERAV)



The activities of the project are very practical and extremely useful for the energy transition in Viet Nam

Energy transition is now a worldwide trend amid the global challenge of climate change. With the strong commitments of the Prime Minister at the UN Climate Change Conference (COP26), all ministries – including the Ministry of Industry and Trade (MOIT) – are actively building an efficient, safe and suitable energy transition.

Smart Grids play a very important role in this transition. One of the tasks assigned to the Electricity Regulatory Authority of Viet Nam (ERAV) is to study the regulations and mechanisms to develop the Smart Grids to efficiently integrate renewable energy sources, as well as to issue a price mechanism for renewable energy projects, thereby supporting the energy transition in Viet Nam.

The goal of GIZ's Smart Grids for Renewable Energy and Energy Efficiency (SGREEE) project is to support MOIT/ERAV in the process of completing the legal framework related to promoting and supporting the development of renewable energy sources in the Power System and Smart Grid in Viet Nam. The project has supported the implementation of research and recommendations on the Demand Response Programmes, as well as the assessment and proposal of other projects about Smart Grid technology in Viet Nam. Recommendations on amending the Roadmap for implementation of Smart Grids will be very useful for ERAV in the research process to promote the infrastructure development of Viet Nam in a smart and reliable way.

All three Action Areas of the SGREEE project have a positive impact, and they complement each other. The activities of the project are very practical and extremely useful for the energy transition in Viet Nam. They should be continually implemented and studied in depth to support the country's energy transition.

What I find interesting about working with GIZ is that along with supporting policy-making agencies, GIZ also pays great attention to supporting capacity building for young staff, supporting expertise activities, sharing in-depth technical experiences in developing technical requirements and legal frameworks for Smart Grid development, renewable energy operation, as well as building good relationships with experts in Germany in this field.

The process of energy transition requires an electrical system with very high flexibility to be able to integrate a large number of new energy sources including renewable energy. In which the system will develop a large amount of distributed energy that allows stable energy in smaller areas, even to the level of electricity users. ERAV will continue to cooperate and coordinate with relevant agencies to research, develop mechanisms, policies, and orientations to ensure the implementation of the roadmap for the development of Smart Grids to meet the operational requirements of electrical systems in the process of energy transition.

We hope that we will receive the cooperation and companionship of GIZ as well as international organisations and countries around the world to ensure that Viet Nam's energy transition achieves the goals set out by the Government of Viet Nam.

NGUYỄN ANH TUẤN

Director General

Electricity Regulatory Authority of Viet Nam



Viet Nam and Germany:
A DYNAMIC DUO FOR ENERGY TRANSITION

Welcome from Tobias Cossen, Programme Director of the GIZ Energy Support Programme (ESP)

The net zero goal is a global target that requires the participation of all countries, and Viet Nam made a strong commitment to the goal at COP26. As the energy sector accounts for two thirds of total emissions globally, and soon also in Viet Nam, it is crucial to maintain a focus on energy transition.

Energy transition has recently become an increased interest in Viet Nam. Fossil fuels are being depleted and highly polluting; renewable energy sources help countries reduce their dependence on other nations' energy sources.

Germany and other high-income countries have a strong interest in supporting sustainable development in middle-income countries such as Viet Nam. Sustainable development helps their society, grows their economy, and mitigates climate change. Therefore, GIZ has been implementing many projects in Viet Nam in this field, focusing on the support of policy development, the improvement of capacity, and the promotion of technology cooperation and transfer.

Renewable energy and energy efficiency are among the priority areas for cooperation between the governments of Germany and Viet Nam. During the past few years, in order for Viet Nam to adapt to global trends and to create a national competitive advantage in the future, the GIZ Energy Support Programme (ESP) has worked with partners such as the Ministry of Industry and Trade, the Central Economic Committee, the National Assembly, and Vietnam Electricity, as well as local investors and financial institutions, to support developing a more sustainable energy sector. We will continue to work on sustainable energy and to help Viet Nam develop a strong policy framework for the energy transition.

Energy infrastructure transformation is a necessary condition for a successful energy transition, and the implementation of the Renewable Energy and Energy Efficiency (4E) project and the Smart Grids for Renewable Energy and Energy Efficiency (SGREEE) project shows Germany's commitment to supporting the transformation of energy infrastructure in Viet Nam.

The SGREEE project started in 2017 when Viet Nam did not yet have a complete energy transition concept and had not yet committed to net zero. The project focuses on the integration of renewable energy, an important first step towards energy transition, and it is a technical support project, not providing funds to partners. Research during the SGREEE project has identified gaps in Viet Nam's grid infrastructure and provided comprehensive analysis of the country's strengths and weaknesses. Based on this, the project has recommended state-of-the-art technologies and techniques for Viet Nam to adopt.

Along with the technologies, improvements on the legal framework have also been suggested, which can help facilitate the implementation of new technologies. Capacity has been developed to master new technologies and ensure investment efficiency.

Viet Nam has undeniably been successful when implementing the Smart Grid Roadmap from 2012 after 10 years of implementation. Now is an opportune time for the strategy to be reviewed and improved to adapt to today's available technologies



I hope that Viet Nam will maintain this pace of development

and business models. SGREEE has brought in international experiences and know-how to help Viet Nam make a better and more relevant Roadmap.

Viet Nam's ambitious goal for energy transition shows that the government of Viet Nam is doubling down on a low-carbon development strategy, which will contribute to promoting sustainable growth and achieving socio-economic development goals in 2045 and beyond.

As assessed by many international and local organisations, Viet Nam has great potential in renewable energy such as wind, solar, and biomass. In fact, not only does Viet Nam have natural potential in renewable energy, it also shows great potential to attract investments in developing renewable energy. When appropriate incentive mechanisms were issued to promote renewable energy in recent years, we witnessed a booming growth in solar and wind power.

I hope that Viet Nam will maintain this pace of development so renewable energy sources will play a more important role in the country's energy transition. With the support of the international community and the unwavering commitment of the government, I am confident that Viet Nam will soon achieve its goal of a prompt and sustainable energy transition, considerably contributing to combating climate change and moving quickly towards the country's net zero goal.

Finally, I would like to wholeheartedly thank the Vietnamese Ministry of Industry and Trade, the Electricity Regulatory Authority of Viet Nam, the German Federal Ministry for Economic Cooperation and Development (BMZ), and of course all our hard-working colleagues in the SGREEE project specifically and GIZ generally.

Best of luck to Viet Nam in its energy transition,

TOBIAS COSSEN

*Programme Director
GIZ Energy Support Programme*



**Domestic
renewables will
allow Viet Nam
to reduce energy
imports and
continue powering
the country's
socio-economic
development**



WITH GREAT POWER DEMANDS COMES GREAT RESPONSIBILITY

As a country of 100 million people that has seen an explosive economic growth during the past few decades, Viet Nam's people and businesses are demanding more energy. But what role can renewables play in a country traditionally fuelled by coal?

Viet Nam's rapid economic development has resulted in a fast-growing energy sector. Electricity production in Viet Nam grew from 8.6 TWh in 1990 to 220 TWh in 2018 – an increase of more than 2,500 percent.

Today the country has a high power grid connectivity rate, including remote areas in its border and island regions – according to Viet Nam Electricity (EVN), 100 percent of districts are connected to electricity; 99.7 percent of communes and 98.69 percent of rural households have access to the power grid. Viet Nam now requires additional energy production to sustain its development, as the country's forecasted growth rate for electricity demand is currently 8.9 percent.

While hydropower has been dominant in Viet Nam – supplying close to 40 percent of the national energy supply in recent years – the country has also long relied on domestic and imported coal, oil, natural gas, and other fossil fuels to meet electricity demands.

As of 2019, coal accounted for more than 40 percent of Viet Nam's power production, and in 2020 the country imported over 54 million tonnes of coal to augment the 48.38 million tonnes it produced in-country.

Meanwhile, oil and natural gas together provide Viet Nam with approximately 18 percent of its power needs. Viet Nam has steadily increased its oil imports to offset a decline in domestic oil production. It imported 5.17 million tonnes in 2018, more than quadrupling its oil imports from the previous year. The country's natural gas exploitation is similarly expected to decline after 2022, which would likely stimulate increased liquid natural gas imports.

During the last decade, the government of Viet Nam has publicly prioritised the further development of its domestic renewable energy sources. According to a Resolution of the Politburo of the

Communist Party of Viet Nam Central Committee in January 2020, domestic renewables will allow the nation to reduce energy imports and continue powering the country's socio-economic development. This will also cut emissions and bring Viet Nam closer to realising its UN Climate Change Conference (COP26) pledge to reach net-zero emissions by 2050.

In with the new

The country currently utilises, to varying extents, four primary sources of renewable energy: hydro, wind, solar, and biomass.

The Mekong and other rivers provide Viet Nam with considerable power generation – at least 200,000 TWh as of 2020 – though droughts periodically compromise the reliability of the country's hydroelectricity supply.

Since 2019, Viet Nam has led ASEAN in solar and wind electricity adoption. The Viet Nam's solar Feed-In Tariff (FIT) – which expired recently – catalysed a further increase in the country's installed solar photovoltaic (PV) capacity, boosting its power installed capacity from 86 MW in 2018 to 16.5 GW by the end of 2020. Solar companies in Viet Nam have been notably productive in recent years, generating more solar power than the country's current power grid was capable of processing.

Viet Nam's long-term installed capacity goals include reaching targets of 51,540 MW from solar power and 48,110 MW from wind power by 2045.

The country also uses biomass such as sugarcane bagasse for energy, but as of 2020 this source only contributed less than one percent of the country's energy production. The Viet Nam Politburo's 2020 Resolution announced the country's intention to develop additional biomass power projects.



Targets include reducing greenhouse emissions by 20 percent by 2045

Viet Nam's adoption of Smart Grids is a realisation of former Prime Minister Nguyen Tan Dung's Decision – initially published in 2012 – to develop a complete smart energy infrastructure that rivals those of the most advanced ASEAN nations.

The Viet Nam Politburo's Resolution 55 further announced that the country should develop intelligent power grids to ensure the reliability and security of the national energy supply and enable it to hit the demand targets of the Viet Nam 10-year Socio-economic Development Strategy for 2021-2030. These targets include reducing greenhouse emissions by 15 percent by 2030 and 20 percent by 2045.

The country's Smart Grids, set for implementation after 2022, will employ Internet of Things (IoT) functionality to deliver energy efficiencies that enable Viet Nam's progress toward these targets.

Through the Smart Grids for Renewable Energy and Energy Efficiency (SGREEE) project, Viet Nam's Ministry of Industry and Trade is currently collaborating with the German development agency Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH to upgrade its power grids with Smart Grid technology, which will optimise energy efficiency as Viet Nam ramps up production of renewables and other energy sources to power its rapid development trajectory.





WHAT IS A SMART GRID?

The Smart Grid introduces a two-way interchange where both electricity and information can be exchanged – in both directions – between the power utilities and the consumers. This growing network of communications, automation, computers, and control help make the grid more efficient, more reliable, more secure and more sustainable.

The Smart Grid allows for especially volatile renewable energy, such as wind and solar power production and plug-in electric vehicles, to be integrated in a large scale into the national grid.

INTRODUCING SGREEE



Smart Grids for Renewable Energy and Energy Efficiency:
contributing to Viet Nam's energy transition and sustainable
development of the Vietnamese energy sector

“

**The project supports
the Government of Viet Nam in the
implementation of its Smart Grid
Roadmap and works closely with
ERAV to support experts
in developing a Smart Grid**

The GIZ Energy Support Programme – or ESP – was established in 2013 as a partnership between Viet Nam’s Ministry of Industry and Trade (MOIT) and Germany’s implementing agency Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

As a priority area of cooperation between Viet Nam and Germany, the ESP aims to contribute to Viet Nam’s energy transition and the sustainable development of the Vietnamese energy sector by working in three Action Areas across all projects.

The first Action Area is “Legal and Regulatory Framework”. The second is “Capacity Development”. The third Action Area is “Technology Cooperation”.

SGREEE and its activities

The Smart Grids for Renewable Energy and Energy Efficiency (SGREEE) project was commissioned in 2017 by the German Federal Ministry for Economic Cooperation and Development (BMZ) within the German Climate Technology Initiative (DKTI).

GIZ’s political partner in the SGREEE project is Viet Nam’s Ministry of Industry and Trade (MOIT) and the implementing agency is the Electricity Regulatory Authority of Viet Nam (ERAV). The original project end date of December 2021 was extended six months until June 2022 due to the coronavirus pandemic.

The project supports the government of Viet Nam in the implementation of its Smart Grid Roadmap, which was approved in November 2012 by the Prime Minister as Decision No.1670/QĐ-TTĐ to promote the modernization and automation of the national power transmission and distribution system. It works closely with ERAV to support experts in the Vietnamese power sector in developing a “Smart Grid”, resulting in a digitised and more flexible national power supply system. This facilitates better integration of renewable energy and higher energy efficiency.

The three Action Areas of the ESP are also applied to SGREEE.

For “Legal and Regulatory Framework”, SGREEE provides ERAV and other policymakers with information as well as strategic advice for improving Viet Nam’s regulatory framework for a Smart Grid. Upgrading a traditional electrical grid with a Smart Grid and ensuring the implementation of a Smart Grid going forward facilitates the use of renewable energy sources and increases energy efficiency through the improved monitoring and adjustment that comes with a more flexible and digitised technology. All of this serves the purposes of energy transition and meeting the increasing demand for electricity in Viet Nam.

The support on optimising the legal and regulatory framework is especially aimed at experts and stakeholders involved in updating the Smart Grid Roadmap (SGRM) – shaping other relevant regulations and improving their understanding of the usefulness of internationally proven legal and regulatory requirements so they can adjust them to the Vietnamese context.

In “Capacity Development”, SGREEE has established the Smart Grid Viet Nam Knowledge Hub, which is a website that consolidates information about Smart Grids, such as news and events, legal documents, and relevant publications and presentations. SGREEE has also established a Smart Grid knowledge network in the form of a group on Facebook with almost 1,000 members. It consists of Vietnamese experts and stakeholders among the government, policy makers, businesses, research institutes, and civil society organisations. The members discuss and exchange knowledge and experiences about the development and management of Smart Grids and state-of-the-art technologies and international approaches.

Capacity development on Smart Grid technologies, innovative power system operation, and planning with high shares of renewable energy has included training courses, in both in-person and e-learning formats, study tours to Europe, and “Smart Grid Viet Nam Week 2019”, Viet Nam’s first national event on Smart Grid development that included Future Lab and Academy Day workshops.

In “Technology Cooperation”, power sector experts have learned and exchanged knowledge and experiences about available state-of-the-art technology solutions for an intelligent power supply system on an international level and insights into the benefits these measures can have for the Vietnamese power sector.

This is facilitated by evaluating the technologies theoretically, developing and testing pilot schemes, then testing and evaluating system configurations that integrate different technologies and assessing their feasibility in the Vietnamese context.



AT A GLANCE:

SGREEE'S 20 KEY ACHIEVEMENTS

Five years of work in SGREEE's three Action Areas – Legal and Regulatory Framework, Capacity Development, and Technology Cooperation – has resulted in achievements that all involved parties are proud of

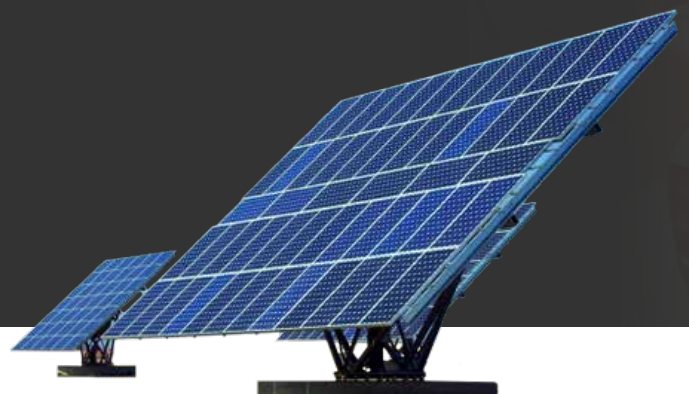


1. CONDUCTING GAP ANALYSIS AND REGULATORY REVIEWS

The SGREEE project conducted a gap analysis and review of the regulatory framework to establish a solid and comprehensible basis for policy advisory on the further development of the legal and regulatory framework for Smart Grids and associated smart energy technologies in Viet Nam.

2. AMENDING AND SUPPLEMENTING TECHNICAL REQUIREMENT FOR VRE INTEGRATION

Because of attractive Feed-In Tariffs (FITs) that incentivise solar and wind power projects, Viet Nam has witnessed an explosive increase in volatile renewable energy (vRE) sources in its power system. GIZ supported the ERAV in amending and supplementing technical requirements for vRE integration to existing Transmission Code and Distribution Code with the purpose of adapting increasing penetration of vRE sources.





3. PROMOTING IMPLEMENTATION OF DR PROGRAMMES

The SGREEE project assisted in promoting implementation of Demand Response (DR) programmes by designing suitable incentive-based and price-based mechanisms for Viet Nam, which can be scaled up in the near future.

4. REVIEWING AND PROPOSING UPDATES ON VIET NAM'S SMART GRIDS ROADMAP WITH SMART GRID INDEX EMBEDDED

The SGREEE project was tasked with reviewing and suggesting updates for Viet Nam's Smart Grids Roadmap, which was approved in 2012. The research results will be references for MOIT and EVN to develop a set of their Smart Grid indexes and apply them for their power corporations. The eight SGIs are green energy, energy market, supply reliability, data analytics, monitoring and control, customer satisfaction, cybersecurity, and integration of distributed energy resources.

5. ORGANISING THE FUTURE LAB EVENT

The Future Lab event was organised in hybrid format jointly between MOIT/ERAV, GIZ, and the Danish Energy Agency (DEA) and focused on grid-based services provision of electric vehicle (EV) smart charging, behind-the-metre batteries, and blockchain technology in the context of Viet Nam.



6. LAUNCHING VIET NAM SMART GRID WEEK

Smart Grid Week Viet Nam 2019 was the first ever series of conferences and workshops about Smart Grids in Viet Nam. Nearly 300 national and international participants attended the conferences.



7. BUILDING INFORMATION SHARING NETWORKS

The Knowledge Hub (smart-grid.vn) is one of the country's first public platforms on the topic. With almost 1,000 members, the Smart Grid Viet Nam Network on Facebook (facebook.com/groups/smartgridvn) provides a forum for national and international experts to discuss and share their professional experience about Smart Grid solutions.



8. RENAC GREEN ENERGY SUMMER SCHOOL

The RENAC Green Energy Summer School was organised as a part of the Green Energy Summer School in August 2019 by the Renewables Academy AG (RENAC) in Berlin, Germany. During the summer school, SGREEE's partners took part in the section "Introduction to Grid Integration of Variable Renewable Energy" (GESS IIIb).

9. VIET NAM ATTENDING THE SOLAR AND STORAGE INTEGRATION WORKSHOP

In October 2019, a delegation of Vietnamese partners attended the ninth Solar and Storage Integration workshop and 18th Wind Integration workshop in Dublin, Ireland, where high-ranking officials and experts from 35 different countries had the unique opportunity to exchange experiences and viewpoints.



10. E-LEARNING PLATFORM

Due to the COVID-19 pandemic, SGREEE offered partners an e-learning platform, which reached more participants with bespoke materials. The virtual training equipped local experts with comprehensive knowledge of the challenges faced by the country's power system when integrating a large amount of renewable energy plants into the grid.



11. BUILDING QUALITATIVE ASSESSMENT FRAMEWORK FOR NEW TECHNOLOGIES

To serve as a reference point for future Smart Grid technology deployment plans in Viet Nam, SGREEE studied the development trend of Smart Grids worldwide and assessed the feasibility of implementation in Viet Nam's context. The activity built a qualitative assessment framework for upcoming technologies and determined their relative feasibility in Viet Nam through open discussion between consultants and stakeholders.

12. SUPPORTING THE FORMULATION OF OFFICIAL REGULATIONS

GIZ carried out a number of non-training activities. As the National Load Dispatch Centre submitted a proposal on how a new guideline on relay protection could be designed, GIZ supported ERAV in formulating those requirements into official regulations.



13. INTRODUCING VPP TECHNOLOGY

The SGREEE project worked with Vietnamese stakeholders, local and international consultants to study the Smart Grid development trends worldwide and assess the feasibility of implementation in Viet Nam. SGREEE provided a comprehensive introduction into the Virtual Power Plant (VPP) technology and explored its possible deployment in Viet Nam to address the challenge of integrating distributed, renewable energy sources into the power grid.

14. PROVIDING EXPERT GUIDANCE DURING MAJOR OCCURRENCES

When a major event occurred in Viet Nam's power transmission system leading to substantial load shedding and consequently to severe frequency and voltage disturbances on 13 May 2021, GIZ facilitated the discussion on the problem and provided inputs and technical guidance. Within the SGREEE project, GIZ with their consultants provided expert knowledge in state-of-the-art in-demand forecasting in power systems with a high share of Distributed Energy Resource (DER). SGREEE supported ERAV in preparing a document with precise definitions of system security criteria applicable to long-term system planning, operational planning and real-time operations in Viet Nam.



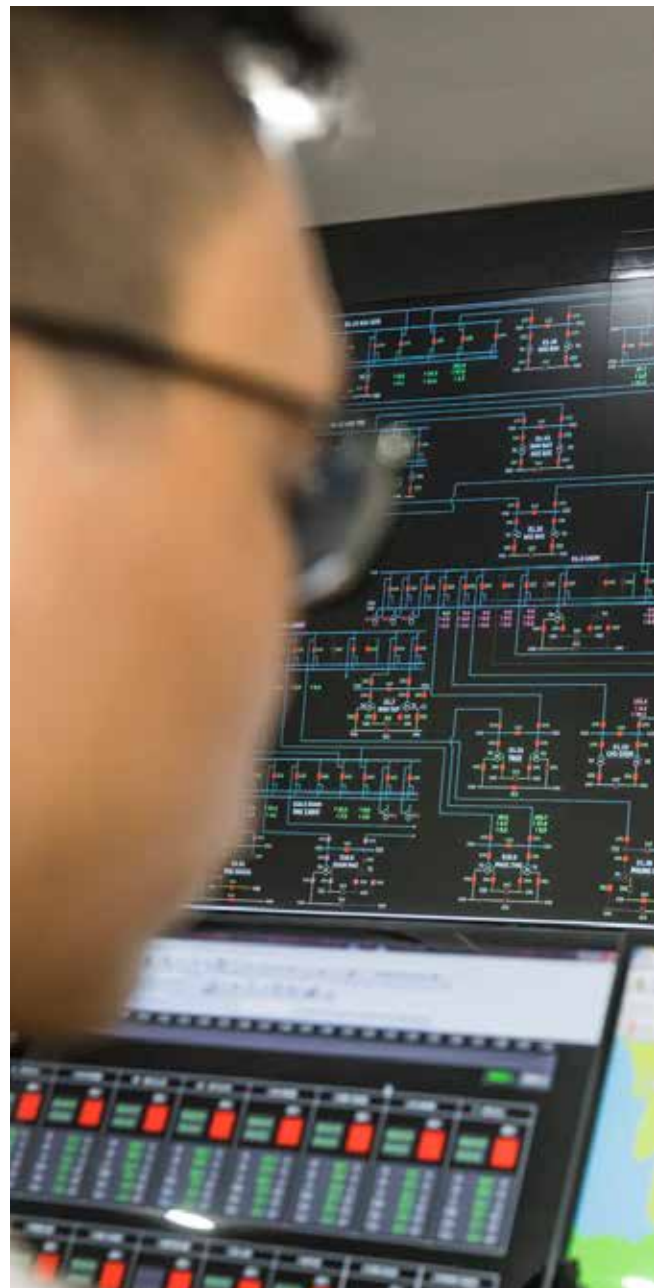


15. RECOMMENDING ROLLOUT OF ROOFTOP PVS

The SGREE project identified opportunities for improvement within the existing medium- and long-term forecasting procedures, providing international experience on the latest methodologies and tools for demand forecasting, and updating the procedures accordingly. SGREE recommended suitable devices as well as the knowledge for installation, operation and technological demonstration to show general feasibility of Smart Controllers for rooftop PV plants and their usability in real applications by Vietnamese grid operators.

16. PROVIDING HANDS-ON DISPATCHER TRAINING SIMULATOR (DTS) TRAINING

To provide hands-on training on state-of-the-art operation of power system using a Dispatcher Training Simulator (DTS) for different stakeholders of the Vietnamese power grid, with a focus on power system simulation, training was conducted on a virtual grid, in which the actual transmission grid of Northeast Germany and the distribution grid of Berlin were used to provide realistic grid configuration for the participants.



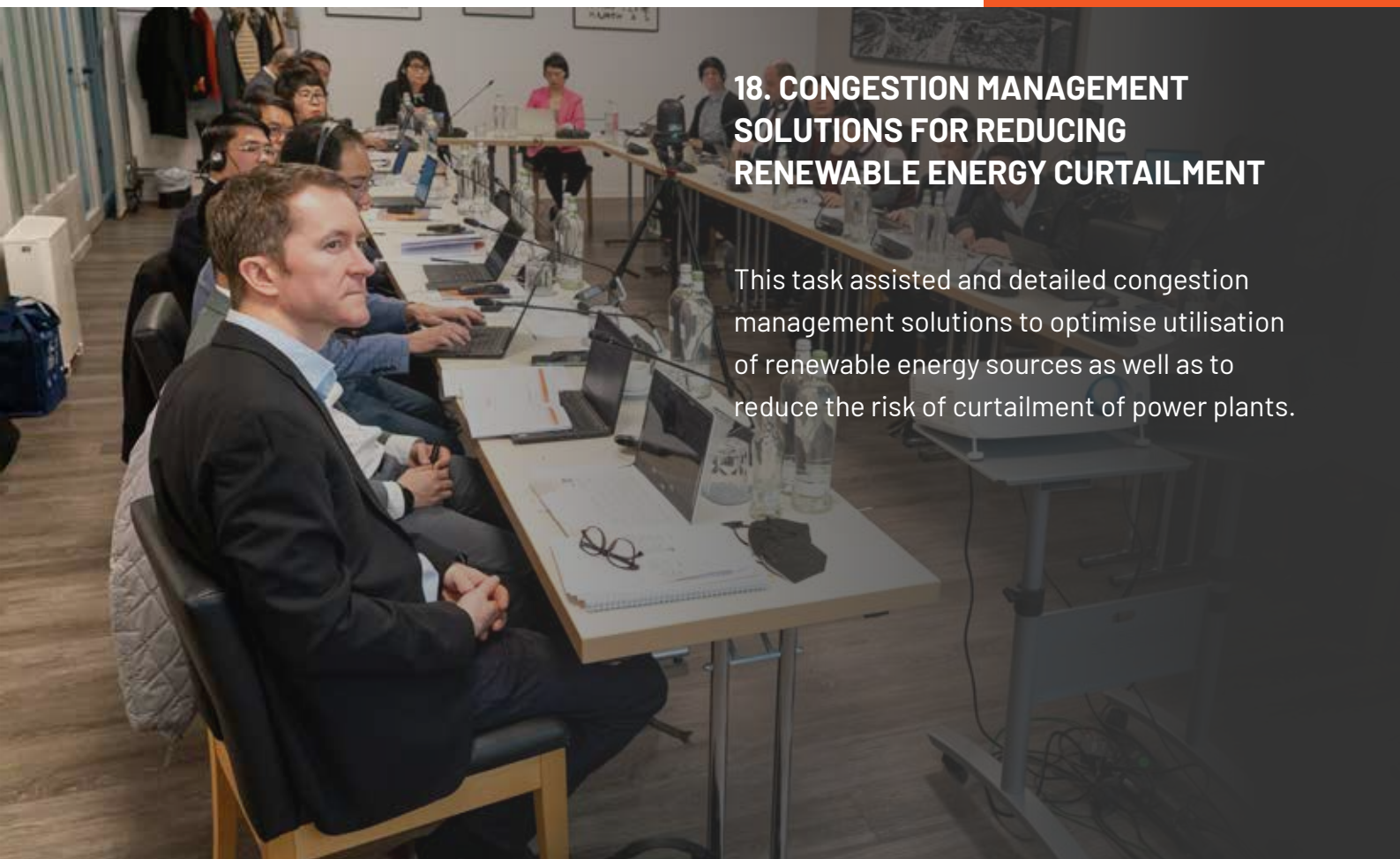
17. ORGANISING VIET NAM ACADEMY DAY 2019, 2020 AND 2021

The Viet Nam Academy Day was an annual workshop event co-organised by GIZ and ERAV to enhance research into and the widespread adoption of Smart Grid technologies for the power network to capture renewable energy and support the development of the country's Smart Grid Roadmap.



18. CONGESTION MANAGEMENT SOLUTIONS FOR REDUCING RENEWABLE ENERGY CURTAILMENT

This task assisted and detailed congestion management solutions to optimise utilisation of renewable energy sources as well as to reduce the risk of curtailment of power plants.





19. PROPOSING REVISION OF ELECTRICITY LAW

The SGREEE project supported ERAV in developing required documents for the revision/amendment of the country's Electricity Law. Since there are a number of issues that need to be reviewed and revised, the study covered three aspects: (1) Power system operation, (2) Power market, and (3) Legal.

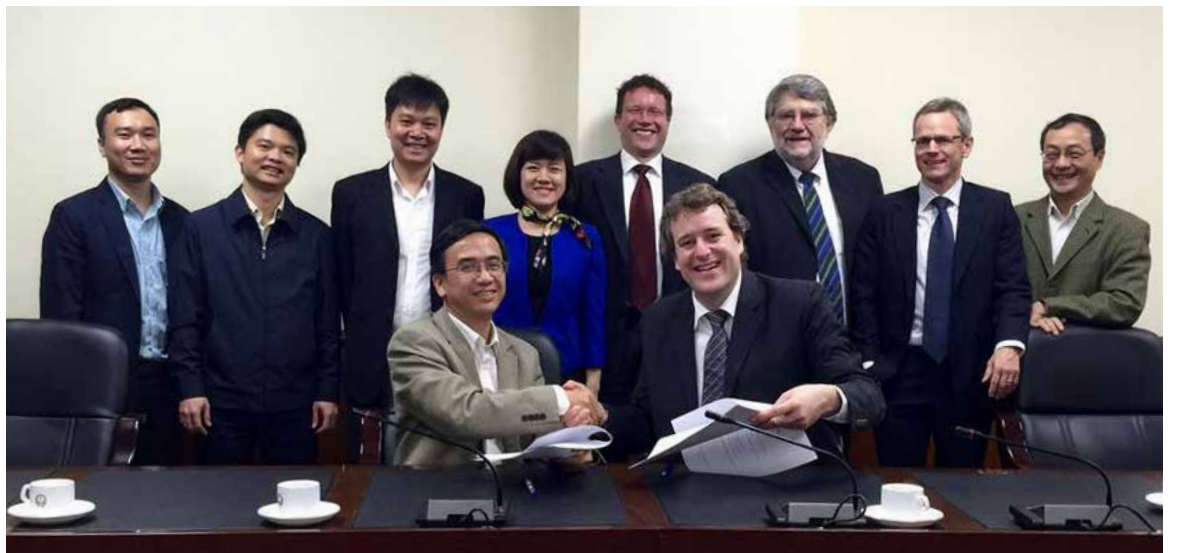
20. VIET NAM ATTENDING BETD 2019 AND 2022

A Vietnamese delegation attended the Berlin Energy Transition Dialogue (BETD) in April 2019 which was an ideal opportunity for exchange between SGREEE's Vietnamese partners and other high-ranking energy officials from nearly 100 countries worldwide. In March 2022, GIZ brought high-ranking members of the Vietnamese government – including core members of Viet Nam's Smart Grid Development Steering Committee, various energy organisations and selected private sector participants – to BETD 2022 with the participation and a speech on a vision for offshore wind in Viet Nam of MOIT's Vice Minister Dang Hoang An.



5 YEARS
30 EVENTS
3 ACTION AREAS







“

We couldn't have done it without vision, patience, collaboration and the expertise of the talented people involved

SGREEE Action Areas:

A REPORT

Legal and regulatory framework

Capacity development

Technology cooperation





Action Area I: Legal and Regulatory Framework



Legal and Regulatory Framework is the first and key pillar among three Action Areas of the SGREEE project. This Action Area focuses on strategic advice on future power system development and establishment of a sector-wide stakeholder dialogue, and supporting the development of regulations with the emphasis on the grid integration of renewable energy as well as the flexibilisation and digitalisation of the power system with smart technologies.

Descriptions of the key activities of this Action Area can be found across the following pages. They include:

1.1 Strategic advice on Smart Grid development

1.2 Supporting the development of regulations for Smart Grids

1.3 Supporting the policy/stakeholder dialogue for policy making and awareness raising



1.1 STRATEGIC ADVICE ON SMART GRID DEVELOPMENT

1.1.1. Gap analysis and review of the regulatory framework

The overall objective of this assignment is to establish a solid and comprehensible basis for policy advisory on the further development of the legal and regulatory framework for Smart Grids and associated smart energy technologies in Viet Nam, also including policies for financing and incentivising the smartification of the power system.

Within the assignment, the following major aspects were performed:

- *An international overview on relevant good practice, insights and common convictions for the regulation of Smart Grids that are beneficial for renewable energy and energy efficiency (SGREEE);*
- *An analysis of Viet Nam's existing regulatory framework for SGREEE;*
- *A merging of the above points that indicates potentially significant legal and regulatory gaps;*
- *Recommendations on actions and provisions that would close identified gaps*

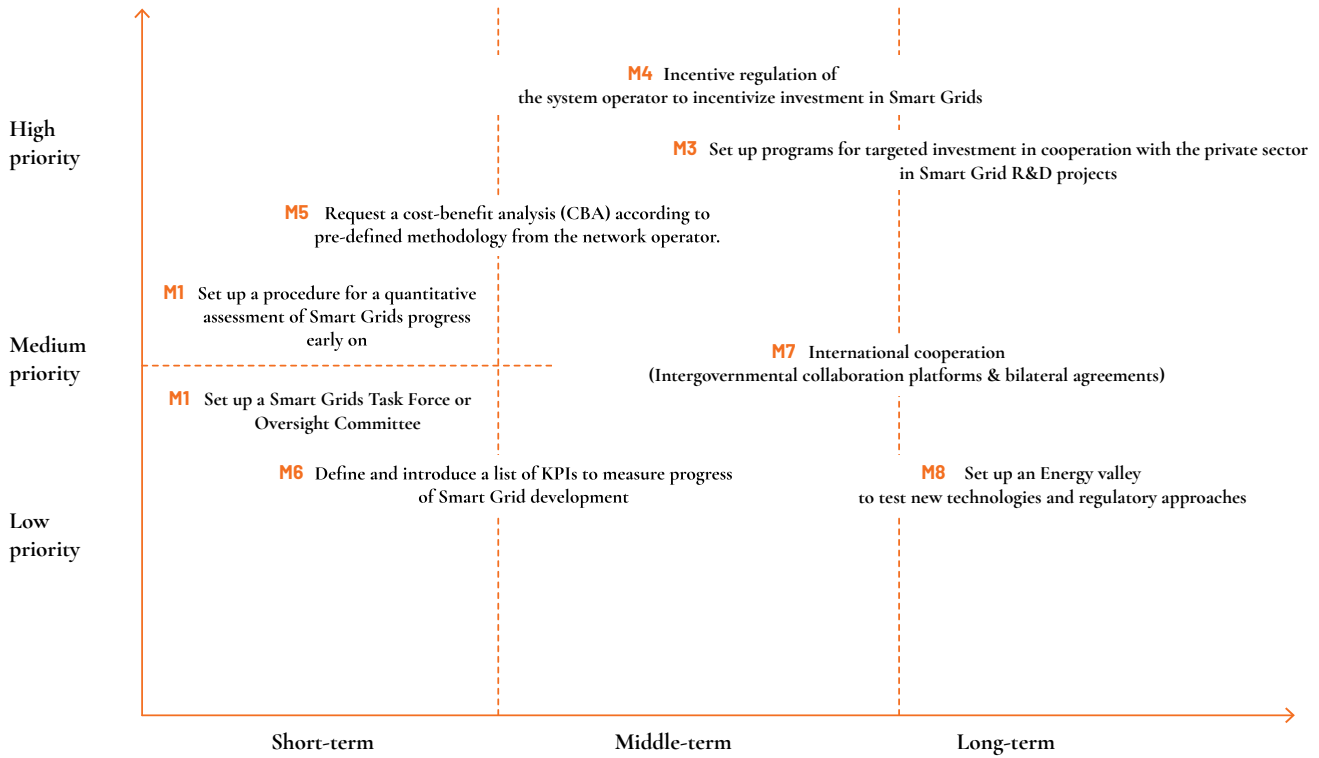
The final report accomplished several goals. It comprehensively reviewed the most recent best practices related to the regulation of Smart Grids from around the world and the associated aspects.

It then summarised the most important details of the current state of regulation in Viet Nam. The situation in Viet Nam was contrasted with the international best practices in a gap analysis, which laid the groundwork for the policy recommendations presented in the final chapter.

In this way, the authors identified three core areas of action necessary for Viet Nam to successfully implement Smart Grids, which should rely on a sound and stable Smart Grids policy. These action areas include grid-sensitive integration of RES, smart and flexible supply and demand.

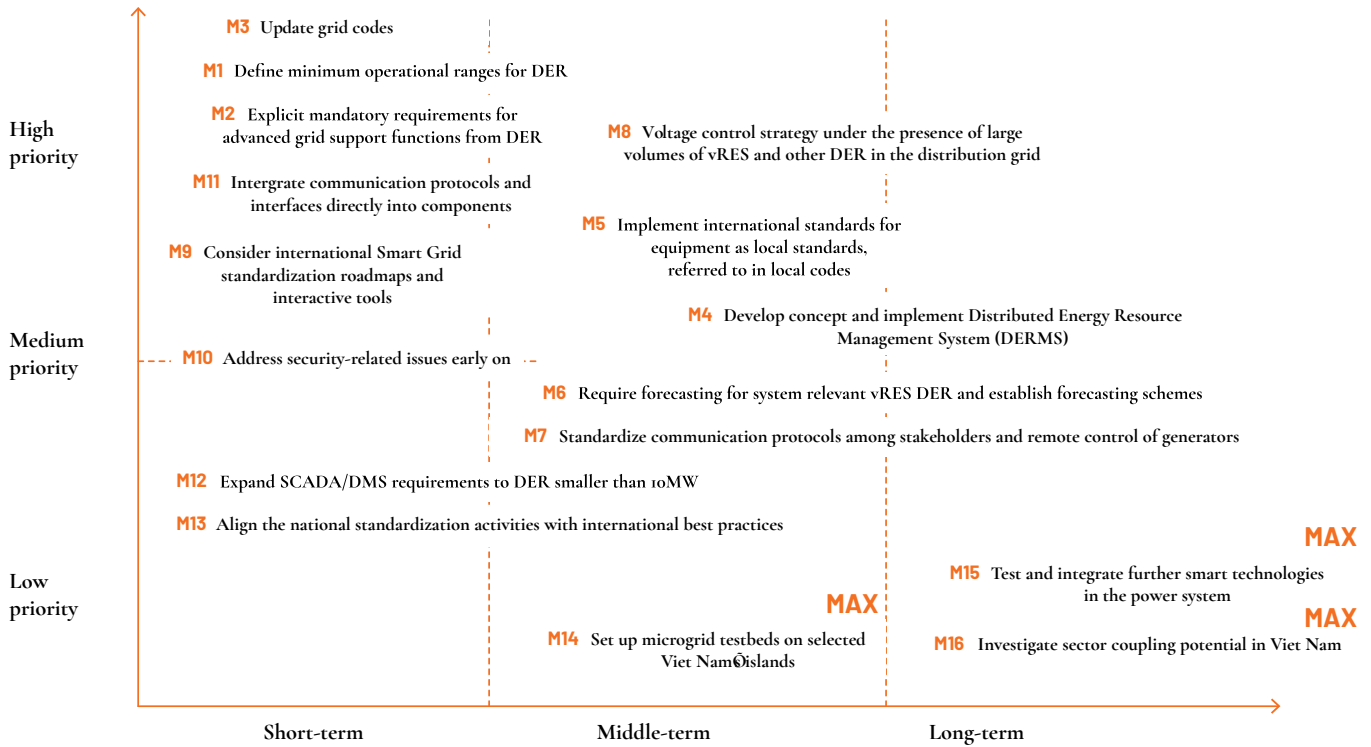
All the measures recommended by the authors were categorised according to the time horizon and degree of priority. Furthermore, additional measures were proposed as part of a more ambitious Smart Max scenario.

SUMMARY



Summary of the measures recommended with respect to Smart Grid policy and additional measures

SUMMARY



Summary of the measures recommended for a smart transmission and distribution networks. Measures associated with the Smart Max scenario are marked with "MAX"

Overall, the recommendations rely specifically on the fulfillment of a number of high-level goals:

- *Cost efficiency*
- *Cost transparency*
- *Technology neutrality*
- *Application of a competitive approach, whenever possible*
- *Incentive-based mechanisms*
- *Equal treatment (e.g. with regard to subsidies and other support mechanisms)*

It is important to point out that the implementation of Smart Grids is not the goal in itself but rather a means to achieve a more efficient and cost efficient grid operation, as well as broad stakeholder involvement.

The most important lesson learned from the overview of good practices is that progressive innovation and rapid system transformation will require a more dynamic and responsive regulation, active monitoring of system operations as well as market competitiveness and corrective measures to provide appropriate signals and incentives to system stakeholders. Finally, similar to other countries active in the area of Smart Grids development, Viet Nam can greatly profit from a more active involvement in international collaboration through dedicated organisations where it can build more capacity and expertise and obtain valuable expertise in the effective implementation of Smart Grids in the country.

Read the final report



Please scan the QR code or click the link to read the final report: <http://smart-grid.vn/publications/final-report-sgreene-action-area-1-legal-and-regulatory-framework-gap-analysis-review-of-the-regulatory-framework-for-smart-grid-development-that-enables-integration-of-renewable-energy-a/>

1.2 SUPPORTING THE DEVELOPMENT OF REGULATIONS FOR SMART GRIDS

1.2.1. Revision of Grid Code and Distribution Code

Given the issuance of attractive feed-in tariffs (FITs) that incentivise solar and wind power projects, Viet Nam has witnessed a skyrocketing penetration of volatile renewable energy sources in the country's power system. This situation has caused increasing technical issues in terms of monitoring and operation while the existing Transmission Code (Circular 25) and Distribution Code (Circular 39) have not considerably covered the sufficient technical requirements for facilitating the integration of emerging variable renewable energy (vRE) sources.

The overall objective of this assignment is to support ERAV in amending and supplementing technical requirements for vRE integration to existing transmission code and distribution code with purpose of adapting increasing penetration of vRE sources. The work should be done by comprehensively reviewing and assessing: (1) the existing grid code and distribution code; (2) the temporary least technical requirement and (3) the draft amending and supplementing circular (aforementioned) in comparing to international standards with regard to technical requirements for vRE grid connection, operation and power quality control, which safeguards the power system's sustainability, stability and reliability purposes.

Within the assignment, the following point were covered:

- *To what extent manufacturers are able to meet the proposed technical requirements for wind and solar generators. This can include: the extent to which the requirements are becoming standard in equipment and international grid codes, what costs to comply may exist and whether these are considered reasonable, and if unreasonable costs do exist, what changes could be made to the proposed requirement(s) that will deliver the same intended outcome*
- *To what extent the grid code and the proposed amendments ensure system security, and whether there are any alternative options to achieve the same outcome*
- *Whether the grid code including the proposed amendments creates any unnecessary barriers to entry of any specific generation technology type and, if so, how these could be avoided or mitigated*

- To what extent the requirements of the grid code and the proposed amendments are inconsistent with other international grid codes
- Related practical evidence/examples as to how other jurisdictions balance their grid code frameworks in terms of cost versus capability
- Commentary as to whether the proposed standards align with other grid code frameworks or are there other means by which these outcomes could be achieved, such as markets or operations

After thorough study and consultation process, on 18 November 2019, MOIT issued Circular 30/2019/TT-BCT on amending and supplementing a number of articles of the existing Grid code (Circular 25/1016/TT-BCT) and Distribution code (Circular 39/2015/TT-BCT) in order to maintain and operate the national power system or power plants, in the most efficient, reliable, economic and secure manner while facilitating vRE integration.

Read the final report

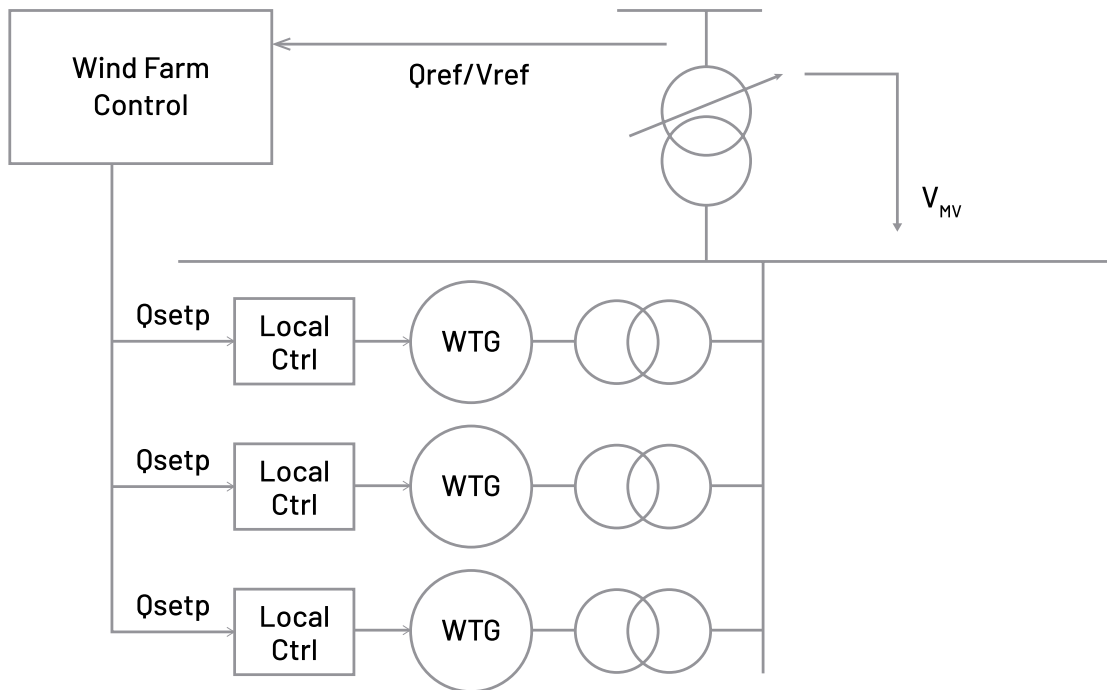


Please scan the QR code or click the link to read the final report: <http://smart-grid.vn/publications/final-report-revision-of-grid-code-and-distribution-code-for-facilitating-variable-renewable-energy-integration/>

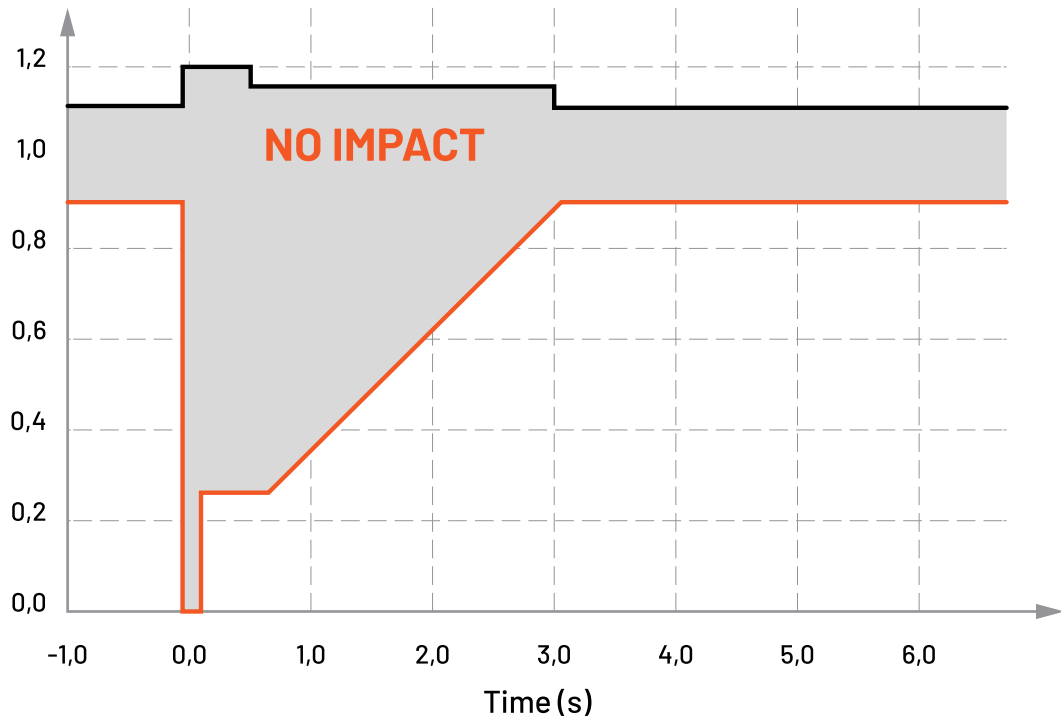
Read the fact file



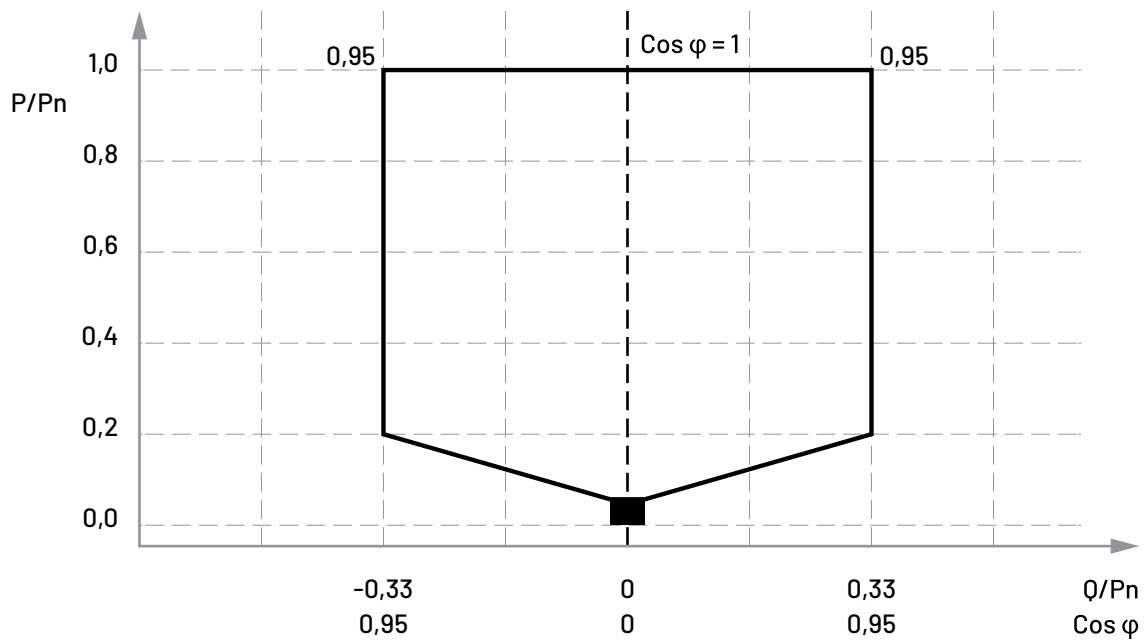
Please scan the QR code or click the link to read the fact file: <http://smart-grid.vn/publications/fact-file-summary-of-grid-codes-for-facilitating-variable-renewable-energy-integration-viet-nam/>



Voltage control concept of a wind or PV farm with grid connection point at HV¹



LVRT/HVRT curve



Reactive power characteristics applied for wind and solar power plants

1.2.2. Promoting the implementation of Demand Response (DR) in Viet Nam

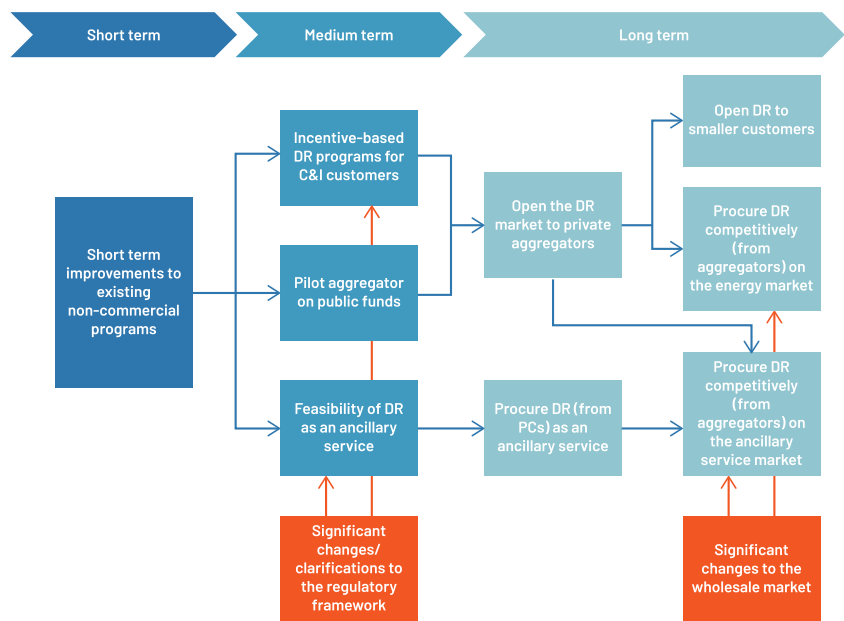
Implementing Demand Response (DR) in Viet Nam can bring multifaceted benefits to the country and provide economic, reliability, and system management benefits. While there have been successful DR pilot projects in the country, a number of barriers remain to the implementation.

The overall objective of this assignment is to provide advisory services in connection with the implementation of voluntary demand response programmes in the commercial and industrial sectors in Viet Nam which focuses on the following three DR programmes:

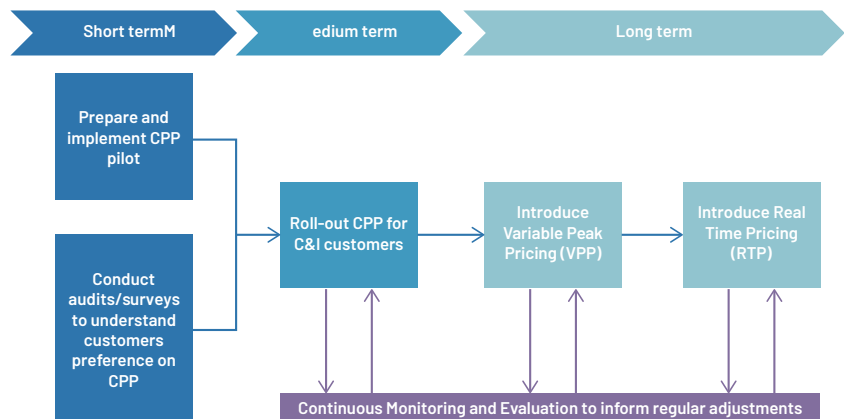
- *Curtailable Load Programme (CLP)*
- *Emergency Demand Response Programme (EDRP)*
- *Real-time peak-load electricity tariff programme*

Within the assignment, the consultant conducted a review of the current demand response regulatory and policy framework in Viet Nam, examined the institutional context, and conducted stakeholder consultations to assess the present state of implementation of DR. This was followed by a review of international DR best practices, especially those that are most relevant to the Viet Nam context. Finally, the consultant contrasted those international models and experience with current approaches in Viet Nam and developed recommendations for DR programme implementation in Viet Nam for both incentive-based and price-based programmes in the short, medium and long term.

The path to Viet Nam's DR deployment: several long-term options for Incentive-based DR



The path to DR deployment: peak load electricity tariff



As well as the conducting of the dedicated cost benefit analysis methodology, a tool of DR programmes for Viet Nam has been created. This will be the helpful framework and basis for designing DR programmes as well as implementation measures.

Read the final report



Please scan the QR code or click the link to read the final report: <http://gizenergy.org.vn/en/item-detail/SGREEE-AA1:-Promoting-Implementation-of-Demand-Response-Programs-in-Vietnam>

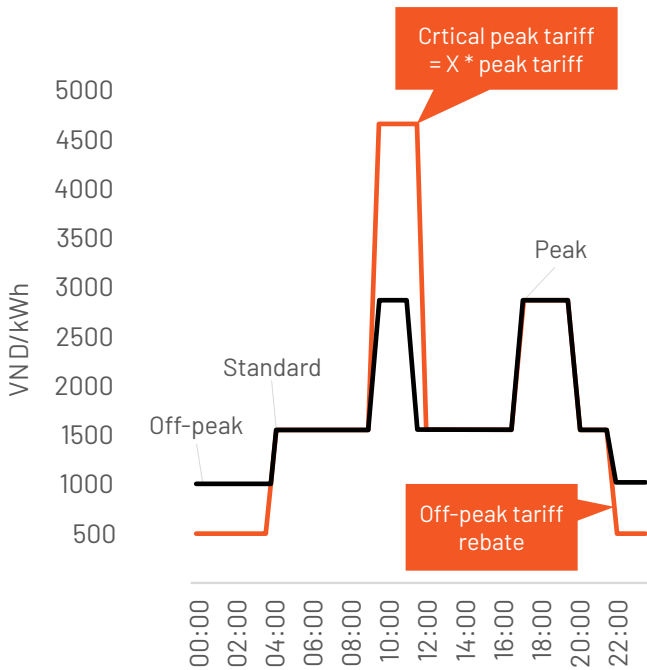
1.2.3. Critical Peak Pricing Demand Response and Demand Response Aggregator model

The overall objective of this assignment is to focus on Designing a suitable Critical Peak Pricing (CPP) Demand Response programme for Viet Nam (i.e, CPP tariff design, communication procedures, required infrastructure etc.) and to carry out small testing activities to examine the proposed CPP DR programme to enhance the recommendations with suitable adjustments (if any) in order to prepare the basis for scaling-up the programme in the near future.

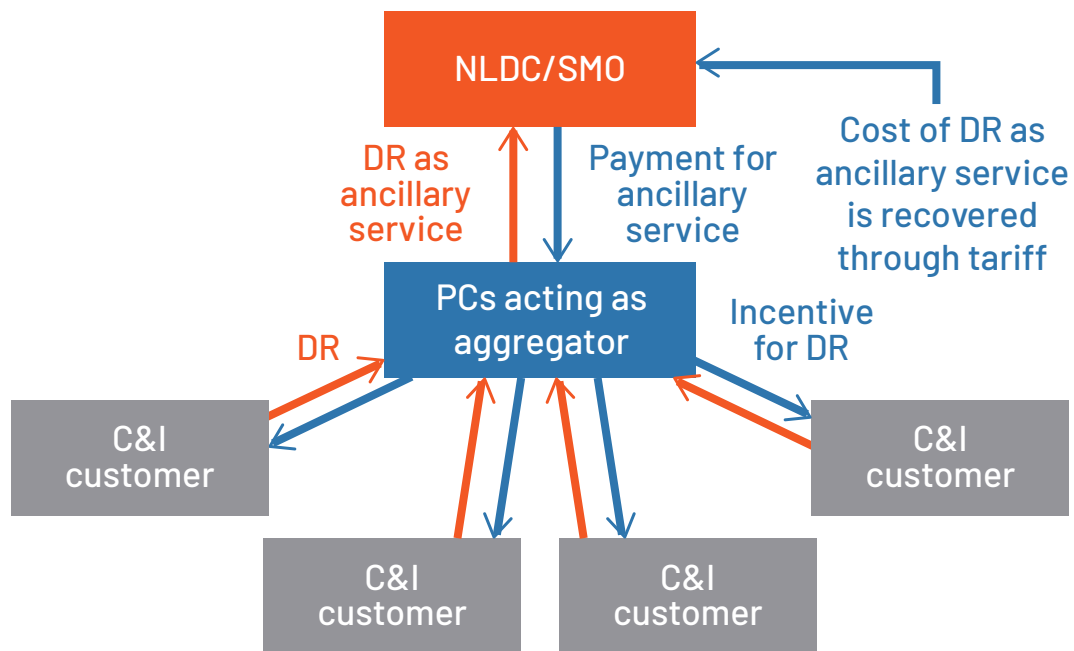
Those objectives were achieved by creating a model for DR activities implemented through CPP, which uses price incentives to encourage customers to reduce their demand in critical periods, and supporting the implementation of DR programmes based around payments of direct incentives to contracted customers to reduce their demand.

The outputs from the assignment are as follows:

- A defined CPP model, including calculated tariffs, designated target customer groups, estimated impacts and a set of operating procedures including communications protocols between system operators and customers. This will provide the necessary basis for the implementation of such a CPP programme by Viet Nam Electricity (EVN) under the guidance of the MOIT and ERAV Emergency Demand Response Programme (EDRP)
- The CPP model is supplemented with further analysis of the potential use of Demand Response (DR) direct incentives with the development of a methodology to estimate the required levels of direct Demand Response (DR) incentives and the costs and benefits of such programmes. This analysis supports ongoing efforts to address the legal constraints on the use of these incentives by providing evidence of their effectiveness and desirability. Currently, two such programmes have been developed but not implemented due to these constraints – a Curtailable Load Programme (CLP) and an Emergency Demand Response Programme (EDRP)
- Besides, the potential Demand Response (DR) aggregation models for Viet Nam’s electricity market will also reviewed and recommended



CPP concept illustrated



DR Aggregator model provide ancillary services

1.2.4. Congestion management to reduce curtailment of vRE

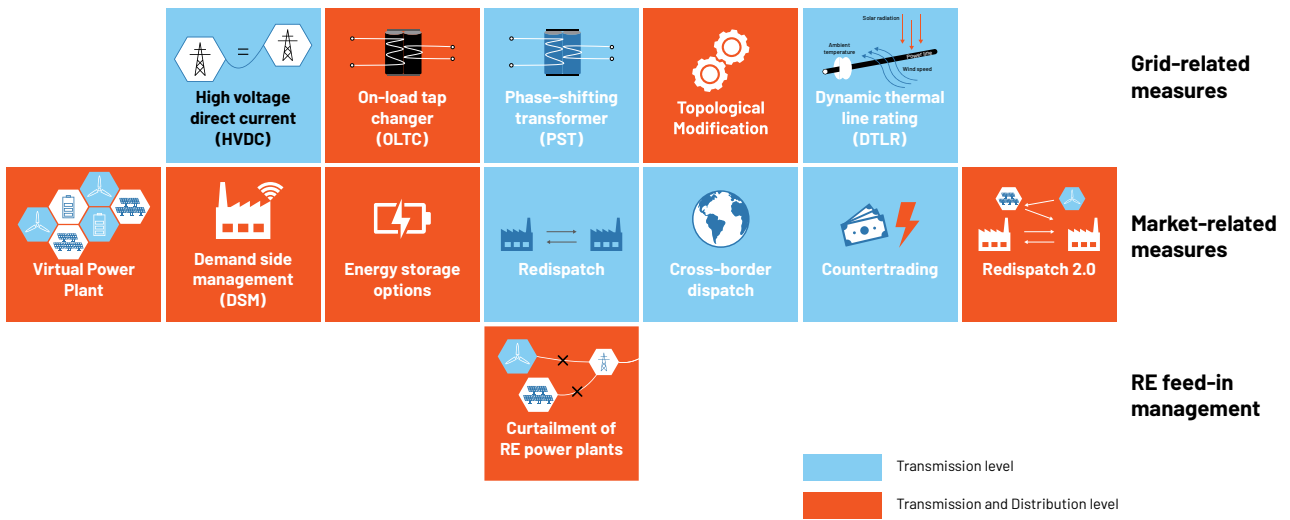
The overall objective of this assignment is to develop detailed solutions (short-term, medium-term and long-term) for congestion management in order to reduce the risk of curtailment of renewable energy power plants compatible with Viet Nam's power system and power market.

Within the assignment, the Vietnamese electricity grid and economy were analysed. The main focus was on the electricity sector in Viet Nam, the regulatory framework, the status of the electricity grid and the current market environment. The identification of gaps in Viet Nam's grid management is used to present international best practices for grid management. The recommended Grid Management Measures (GMMs) are prioritised under consideration of the following evaluation criteria:

- *Technical applicability in Viet Nam*
- *Implementation duration*
- *Investment costs*
- *Operating costs*
- *The overall effectiveness for the respective challenge area and beyond*

The following order of measures is the most beneficial and best address the challenges and requirements of the Vietnamese electricity system for integrating a high proportion of vRE:

- *Load dependent FIT*
- *Large scale BESS at transmission level*
- *BESS at distribution level*
- *DTLR*
- *HVDC and PST*
- *Market structuring in bidding zones*
- *Inclusion of small RE power plants in Redispatch*
- *Market structuring with nodal pricing*
- *DSM*



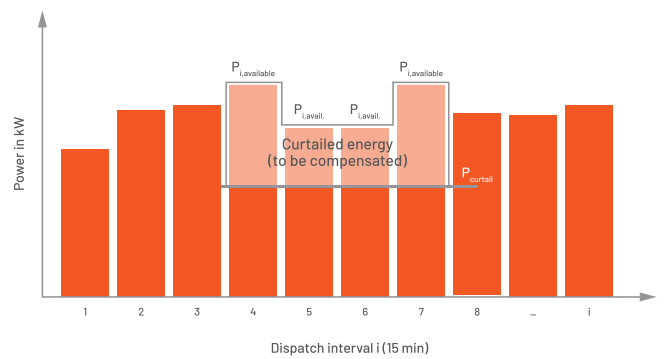
Planned Congestion Management Measures

Furthermore, the study on the need of additional financial compensation mechanism approaches to support vRE curtailments has also been conducted to provide some options for Viet Nam while vRE penetration is skyrocketing. These options are a) to introduce an additional financial compensation mechanism alongside the existing feed-in tariff in Viet Nam, or b) to comparatively increase feed-in tariff.

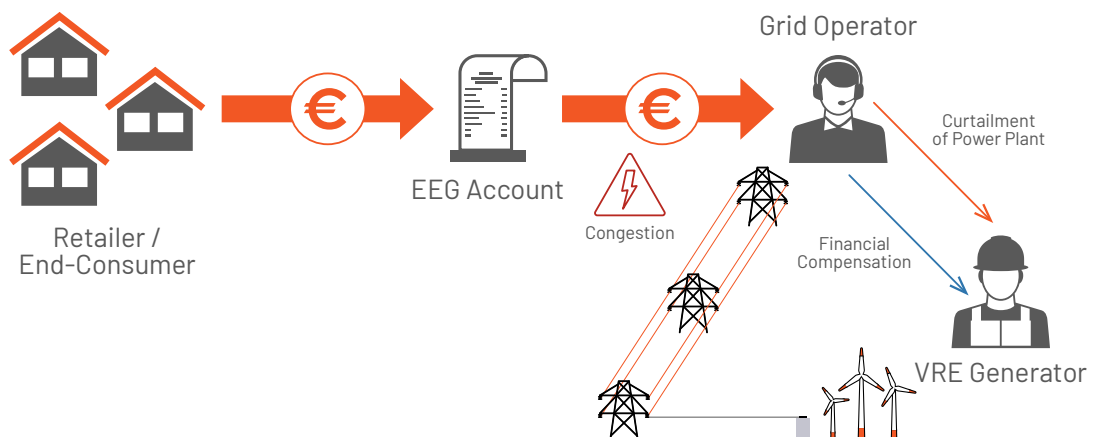
Read the final report



Please scan the QR code or click the link to read the final report: <http://smart-grid.vn/publications/congestion-management-to-reduce-curtailment-of-vre/>



Peak calculation method (Compensable energy)



Overview of cash flow in German compensation payment mechanism

1.2.5. Proposing revision of Smart Grid Roadmap with Smart Grid index embedded

The overall objective of this assignment is to review and suggest for updating the current Viet Nam Smart Grid Roadmap, which was approved in 2012, with integration of indicators set for evaluating the progress of Smart Grid development (with clear evaluation methodology and specific qualitative and quantitative volume for each indicator) to be aligned with international benchmarks and applicable to Viet Nam's circumstance.

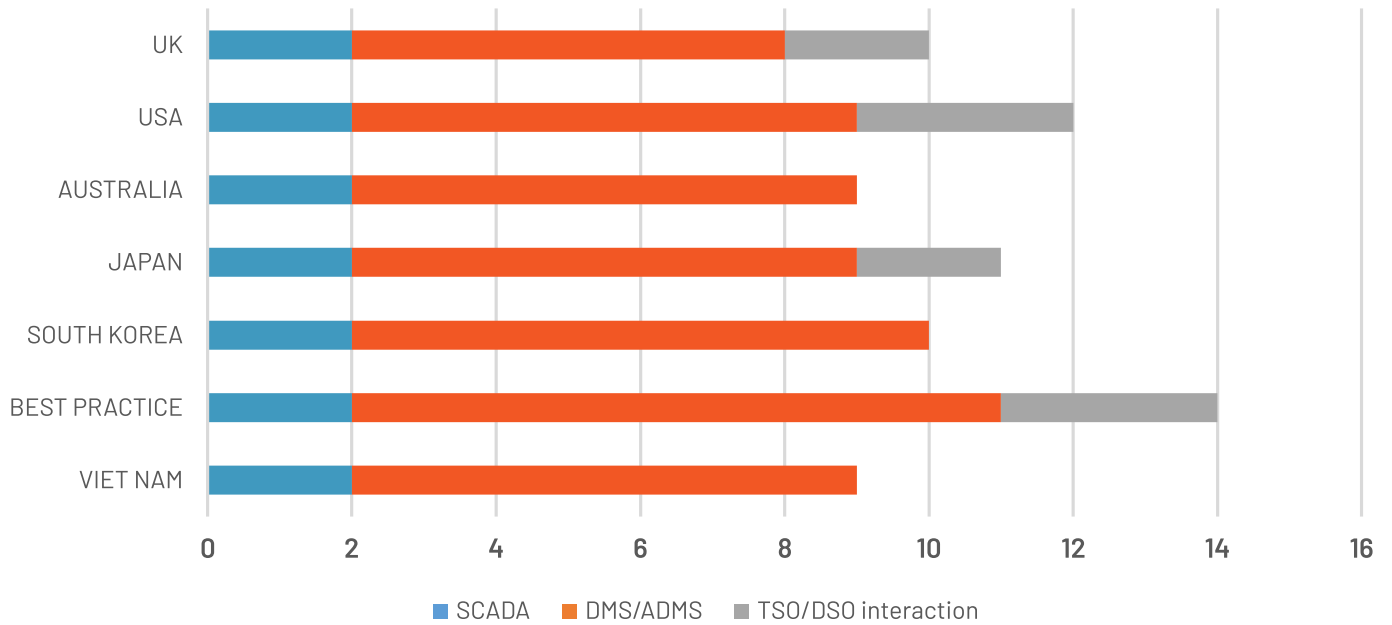
Monitoring & Control	Data Analytics
Green Energy	Cybersecurity
Supply Reliability	DER Integration
Customer Empowerment & Satisfaction	Energy Market

Within the assignment, the following tasks were conducted:

- Comprehensive assessment on legal framework of Viet Nam's Smart Grid Road Map and its implementation progress in the past nine years. The assessment was classified into eight indexes that cover the whole Smart Grid spectrum: 1) Monitoring and Control, 2) Data Analytics, 3) Supply Reliability, 4) DER Integration, 5) Green Energy, 6) Cybersecurity, 7) Customer Empowerment and Satisfaction and 8) Energy Market
- Comprehensive assessment of international best practices on Smart Grids development and recommendation from international best practices. Five countries, members of the International Smart Grid Action Network (ISGAN), have been selected to present international best practices. Those countries are South Korea, Japan, Australia, the USA and the UK
- Evaluation of the Smart Grid Roadmap development in Viet Nam and its position across the international best practice countries. The dedicated evaluation methodology and tool have been designed for Viet Nam
- Recommendations provided for improvement of Viet Nam's Smart Grid Indexes

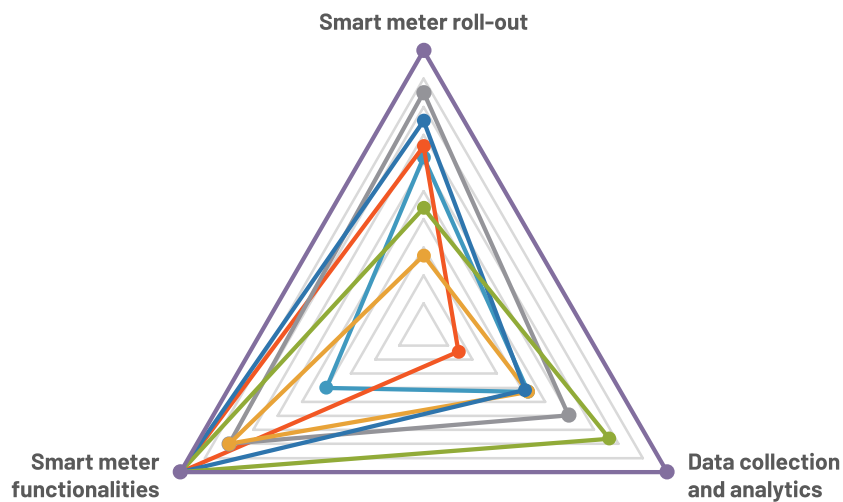


Monitoring & Control

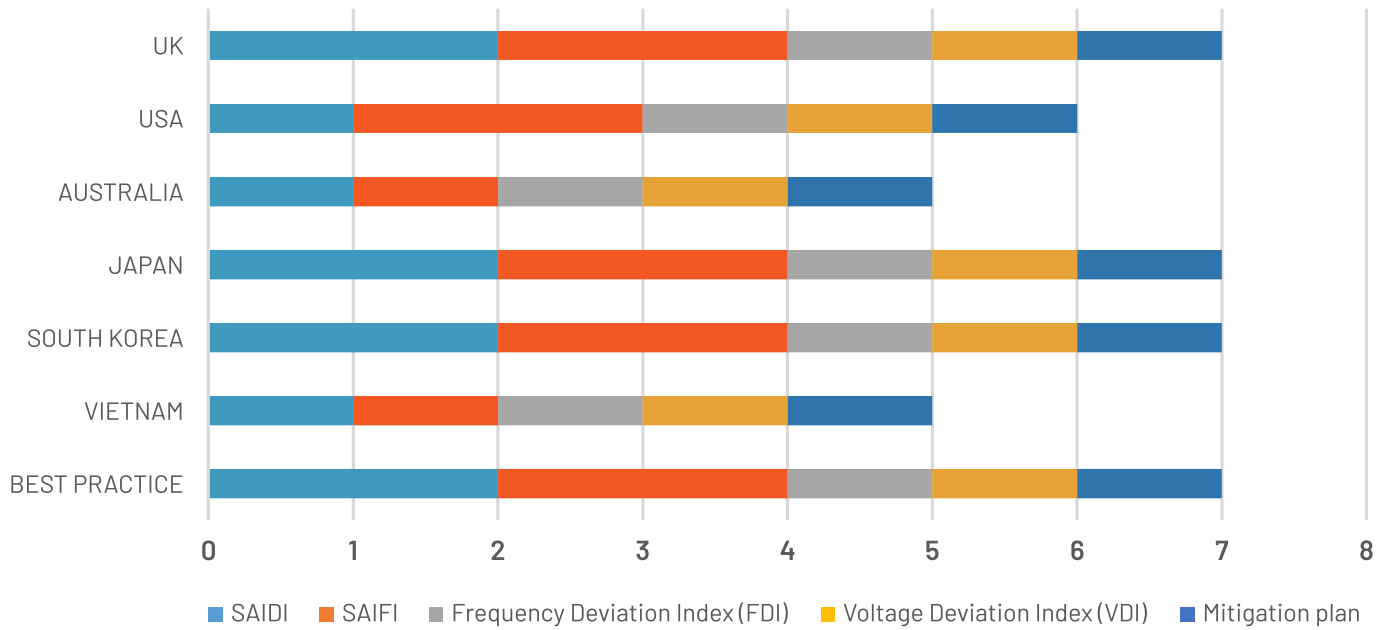


Data Analytics

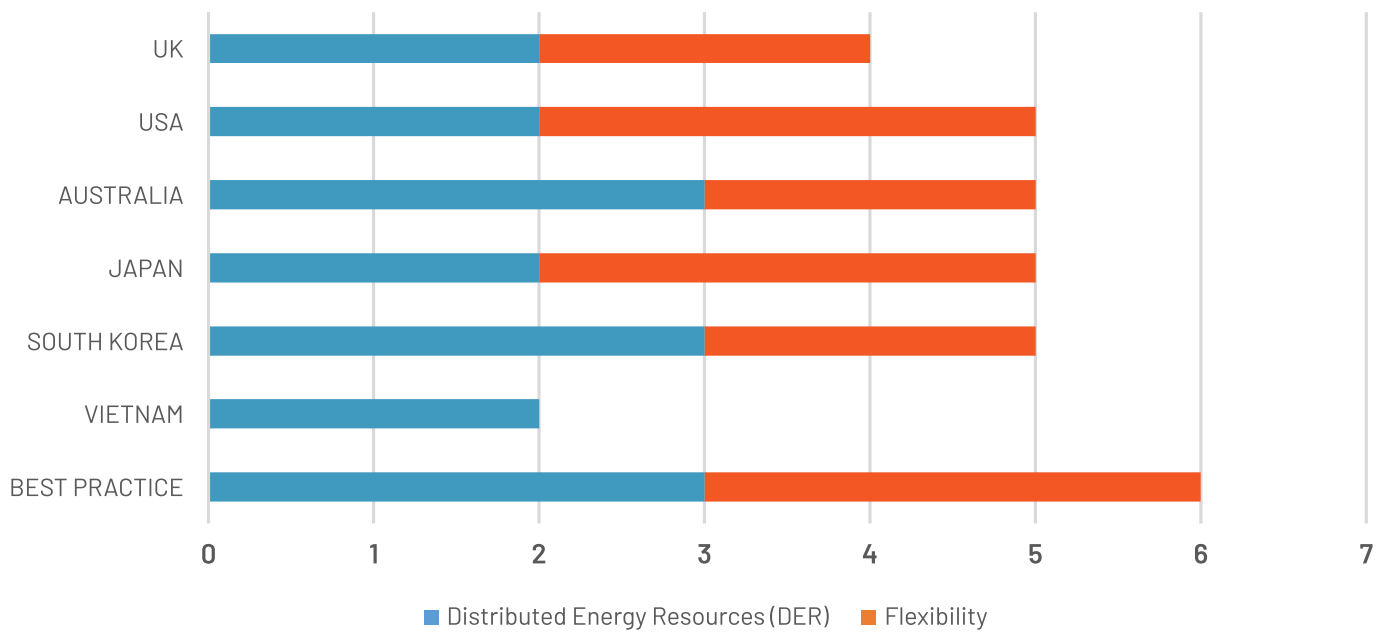
● VIET NAM
 ● SOUTH KOREA
 ● JAPAN
 ● AUSTRALIA
 ● USA
 ● UK
 ● BEST PRACTICE



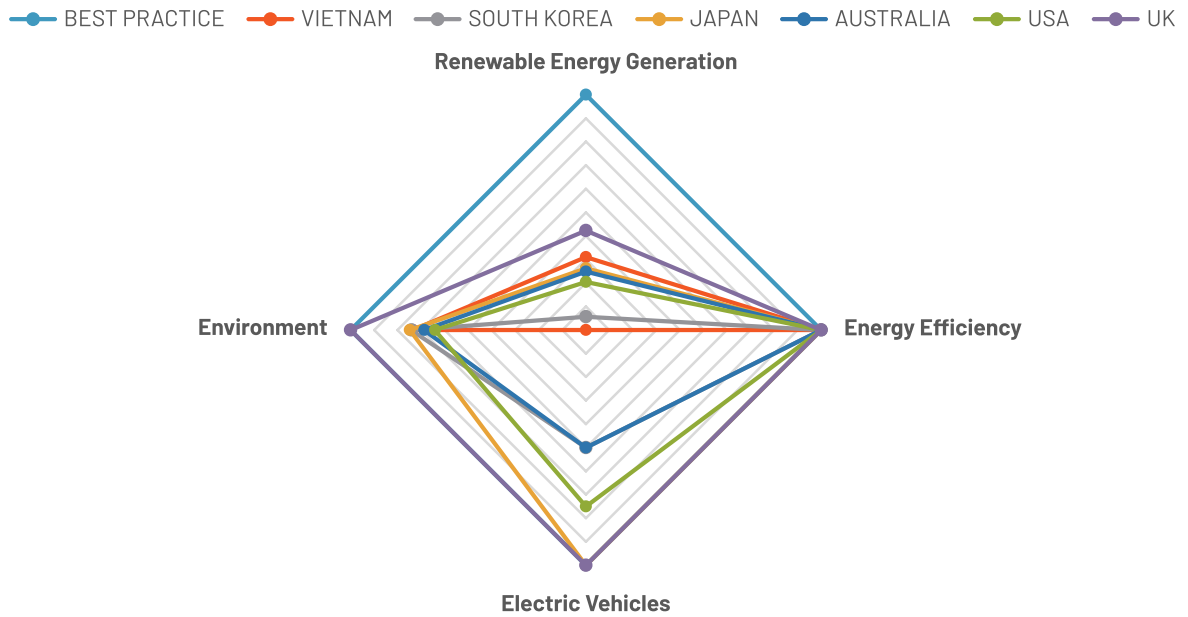
Supply Reliability



DER integration



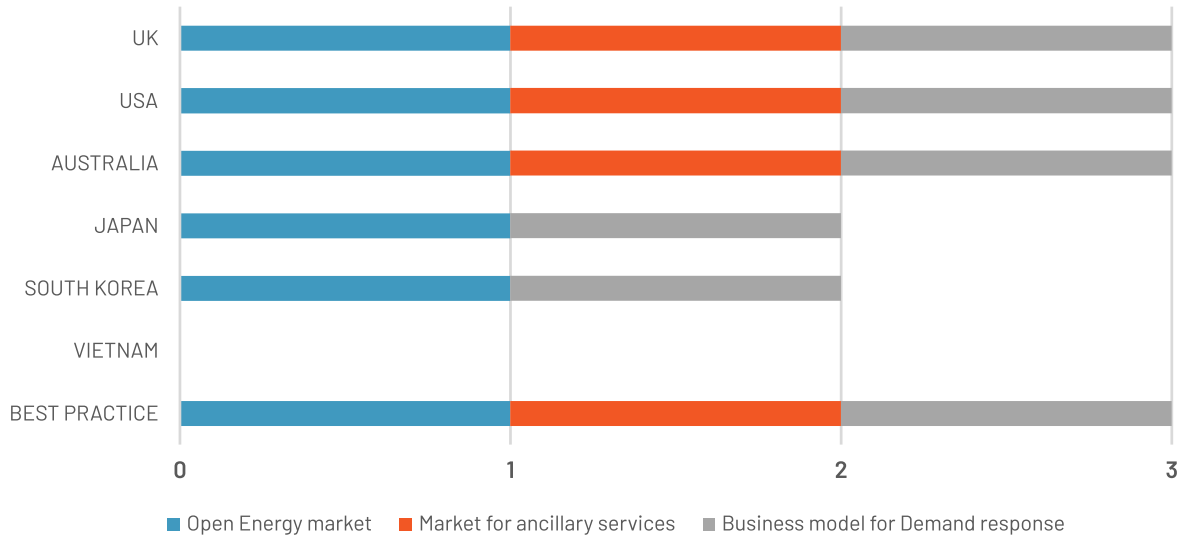
Green Energy



Customer Satisfaction

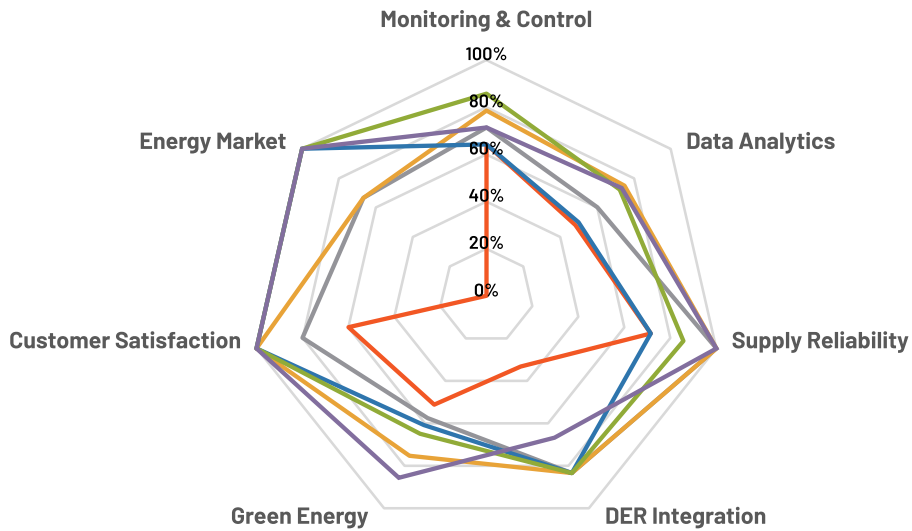


Energy Market



Smart Grid Index

VIETNAM SOUTH KOREA JAPAN AUSTRALIA USA UK



Read the final report



Please scan the QR code or click the link to read the final report: <http://smart-grid.vn/publications/smart-grid-index-evaluation-methodology-and-tools/>



1.2.6. Support to elaborate proposal dossier on revision of Electricity Law

The Government requested the amendment of Electricity Law stated in the Resolution No.140/NQ-CP dated 2 October 2020 on the Action Plan for the Implementation of the Politburo's Resolution 55. Therefore, the overall objective of this assignment is to support ERAV in developing required documents to submit to the Government for approval on the registration task of revision/amendment of Electricity Law into the law formulation programme in accordance with the Law on Promulgation of the Legislative documents.

Since there are number of issues that need to be reviewed and revised, the study covered three aspects:

- *Power system operation aspect*
- *Power market aspect*
- *Legal aspect*

MOIT has submitted the dossier of the law amendment proposal to the Ministry of Justice for appraisal before submitting to the Government and National Assembly for approving the task registration. GIZ will continue to support the next phase of detailed elaboration of the proposed Law's amendment.

Read the dossier



Please scan the QR code or click the link to read the dossier in Vietnamese: <https://moj.gov.vn/qt/tintuc/Pages/chi-dao-dieu-hanh.aspx?ItemID=3283>

1.2.7. Transmission Code and Distribution Code Merging (Mobilise MPE & IoE within Frame Contract)

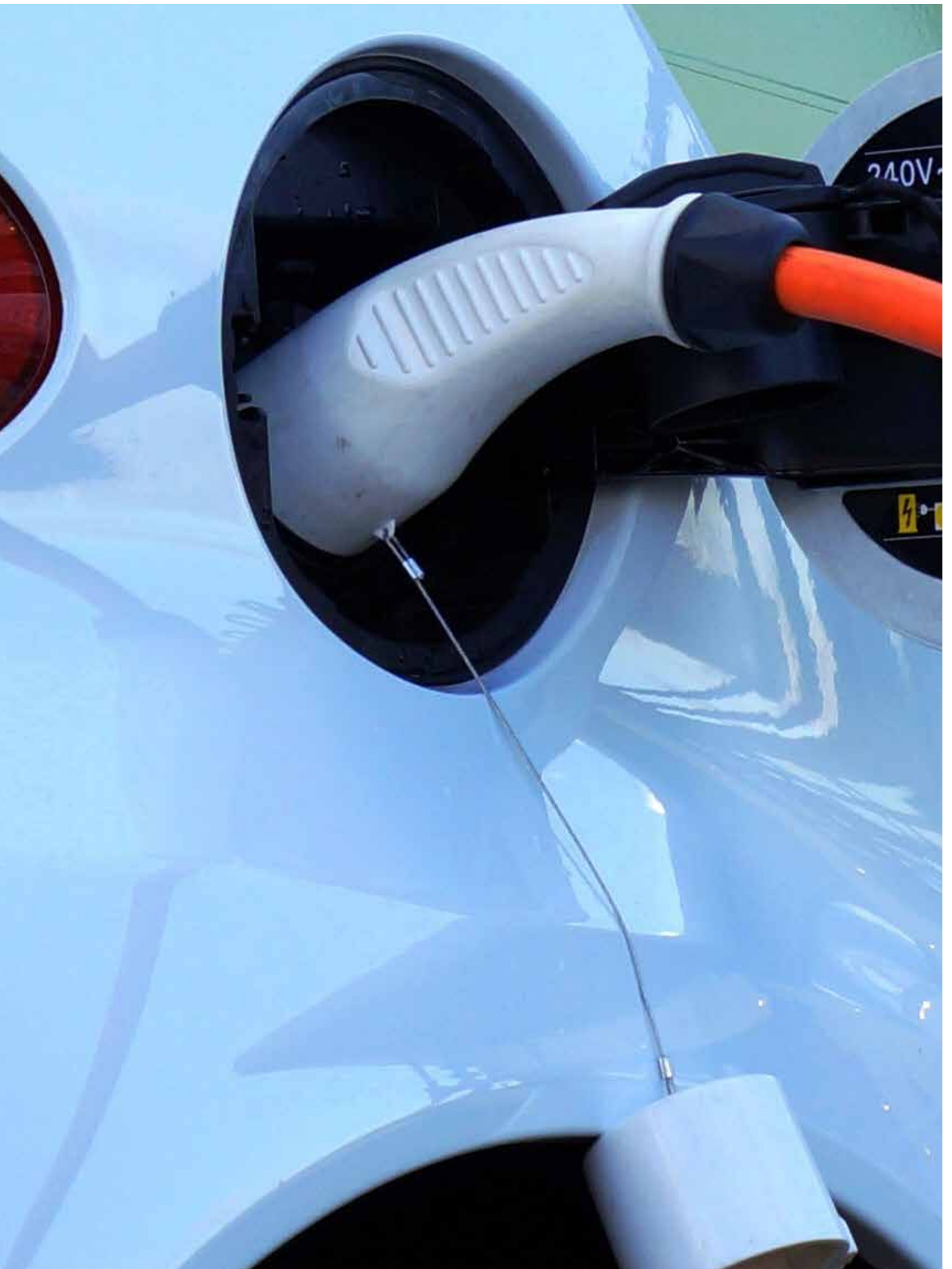
ERAV requested to support the merging transmission code and distribution code into single unified grid codes with the purpose of improving the adequacy and relevancy as well as avoiding overlapped technical requirements, which might cause difficulty to entities of the power system, and ensuring compliance such as:

- *Overlapped content in both codes (i.e., connection procedures, responsibility of organisations)*
- *Technical requirement as of the greater than 30MW generator that connects to the distribution network but reflects to Transmission Code*

This assignment's aim is to improve the adequacy and relevance of the technical codes by facilitating consultancy service packages that cover both technical and legal aspects as follows:

- **Package 1 - technical aspect:** *to review, evaluate and analyse the contents of Transmission Code and Distribution Code; propose adjustments, consolidation, and draft consolidated circular of Transmission Code and Distribution Code*
- **Package 2 - technical aspect:** *to review and evaluate technical proposals of the draft Consolidation Circular*
- **Package 3 - legal aspect:** *to review and evaluate the legal contents of the draft and prepare a set of registration documents/submission to promulgate the consolidated Circular in accordance with the Law on Promulgation of the Legislative documents*





1.3 SUPPORTING THE POLICY/ STAKEHOLDER DIALOGUE FOR POLICY MAKING AND AWARENESS RAISING

1.3.1. Future Lab for expert exchange and elaboration (2021)

The “Future Lab 2021” event was organised in a hybrid format with an approach of 80% traditional workshop for knowledge transfer and 20% for facilitating discussion and brainstorming methods. This was a joint event between MOIT/ERAV, GIZ and the Danish Energy Agency (DEA). The event focused on the following core topics:

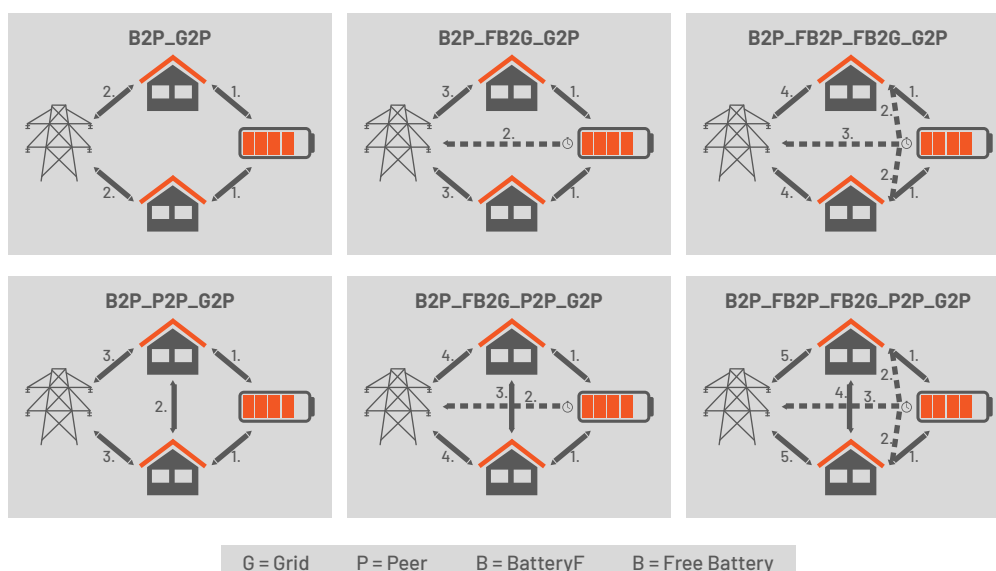
- Application of “Electricity vehicle (EV) smart charging” and/or “Behind the meter batteries” as grid services (e.g. peak shaving/load shifting, voltage and frequency support etc.), and technical and economical opportunities and challenges
- Application of Blockchain in “EV smart charging” and/or “Behind the meter batteries” (e.g., smart contract, self-executing programmes, peer-to-peer power exchange, cybersecurity improvement in settlement (timestamp), peer-to-peer certificate trade (origin, CO₂ emissions), certification of data (fingerprint of a dataset on the blockchain etc), and technical and economical opportunities and challenges

For each of those topics, there were presentations from GIZ and DEA, which described two different approaches and opinions on the topic. The idea was also to understand the background of those differences to provide the basis for the audience to discuss what will be the relevant application to the Vietnamese context. There was also a guided group discussion where participants mapped out the reasons for possible differences between the two approaches or opinions. Afterwards, participants discussed and analysed the challenges and opportunities to develop suggestions for how to approach the topic in the Vietnamese context.

Read the final report



Please scan the QR code or click the link to read the final report: <http://smart-grid.vn/publications/future-lab-2021-final-report/>





Action Area II:
**Capacity
Development**

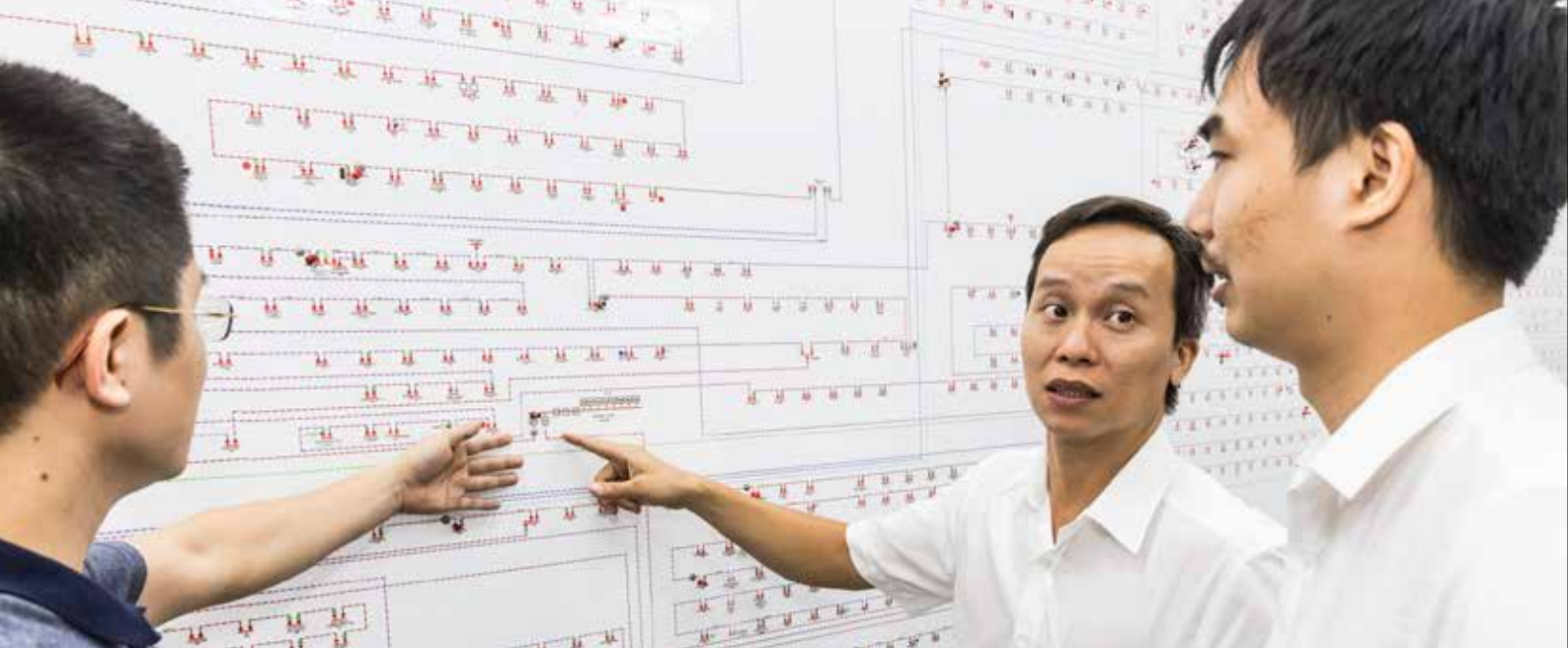


With activities of Capacity Development, the SGREEE project supported to expand knowledge on Smart Grid technologies and know-how, and build capacity for partners and stakeholders through various training, workshops and study tours.

In this Action Area, the project focused on establishing a Knowledge Network on Smart Grid technologies for Vietnamese power system experts, including providing training on Smart Grid technologies, innovative power system operation and planning with high shares of renewable energies.

Descriptions of the key activities of this Action Area can be found across the following pages. They include:

- 2.1 Fostering knowledge on smart energy solutions***
- 2.2 Training on grid operation with Renewable Energy and Smart Grid technologies***
- 2.3 Training on grid planning, including exemplary development of scenario-based grid extension options***
- 2.4 Study tours of practitioners and decision-makers***
- 2.5 Non-training activities***



2.1 FOSTERING KNOWLEDGE ON SMART ENERGY SOLUTIONS

2.1.1. Smart Grid Viet Nam Knowledge Platform

The Smart Grid Viet Nam Knowledge Platform consisted of a web-based knowledge hub and a Facebook network, which was created in 2019.

The Knowledge Hub (smart-grid.vn) is one of the country's first public platforms on the topic. It shares concepts, solutions, experience, development progress and official documents related to Smart Grid applications in Viet Nam. Meanwhile, with almost 1,000 members, the Smart Grid Viet Nam Network on Facebook (www.facebook.com/groups/smartgridvn) provides a forum for national and international experts to discuss and share their professional experience about Smart Grid solutions, its applications and trends, both in Viet Nam and worldwide.

2.1.2. Smart Grid Week Viet Nam 2019

The Smart Grid Week Viet Nam 2019 was a series of conferences and workshops. This was the first time that a Smart Grid specific event has been organised in the country. Nearly 300 participants attended the conferences. International and national experts came from the public and private sectors, as well as research and academia organisations. Speakers were representatives of government agencies, national and international companies and research institutions.

The event consisted of four activity days:

- **Day 1:** Official opening
- **Day 2:** Power System Innovation Day, which focused on emerging power system technology solutions and business models for "Industry 4.0"

- **Day 3:** Smart Grid Symposium Viet Nam had in-depth discussions and collected inputs from experts on the topics of (1) Flexibility options for renewable energy (RE)'s high shares; (2) RE's impact on the power system and (3) Enabling a Smart Grid with regulatory frameworks
- **Day 4:** Future Lab: Internet of Energy opened discussion forums about vision for the power system. The participants identified the Vietnamese energy system's future challenges and discussed how the presented ICT solutions could remove those hurdles.



Read the summary



Please scan the following QR code to read the summary: gizenergy.org.vn/en/item-detail/report-smart-grid-week-2019

2.2 TRAINING ON GRID OPERATION WITH RENEWABLE ENERGY AND SMART GRID TECHNOLOGIES

2.2.1. RENAC Green Energy Summer School

Under the SGREEE project, training was organised as a part of the Green Energy Summer School in August 2019 by the Renewables Academy AG (RENAC) in Berlin, Germany. During the summer school, SGREEE's partners took part in the section "Introduction to Grid Integration of Variable Renewable Energy (GESS IIIb)".

The course was a unique opportunity to get an exceptional insight into renewable energy sources, the various technologies of harnessing them and how to save the energy captured through energy efficiency. Each week of the three-week programme offered a different theme of renewable energy or energy efficiency, designed for different target groups, taking into consideration their knowledge on the subject and their background.

The Green Energy Summer School serves as a platform to study in a team with professionals from many different countries while bringing renewable energy and/or energy efficiency know-how to perfection.

2.2.2. International workshop on solar and wind integration

Under the SGREEE project, a delegation of Vietnamese partners attended the ninth Solar and Storage Integration workshop and 18th Wind Integration workshop on 15 - 18 October 2019 in Dublin, Ireland.

The overall objective of the trip was to support the participants to gain a better understanding of the technical and political aspects of the grid integration of renewable energy, challenges of system integration of wind and solar energy with energy storage systems and corresponding solutions in different developed countries. The two workshops were an ideal opportunity for the exchange among high-ranking energy officials and international experts from government agencies, academic and private sectors from over 35 countries.

Learning from international experiences and lessons in integration of solar power and storage into power systems and large-scale integration of wind power into power systems as well as on transmission networks for offshore wind power plants in recent years, the participants could draw conclusions and lessons for Viet Nam.



2.2.3. E-learning platform

Due to the COVID-19 pandemic, SGREEE offered partners an e-learning platform, which reached more participants with bespoke materials.

With a tailor-made syllabus for Viet Nam, the virtual training equipped local experts with comprehensive knowledge of the challenges faced by the country's power system when integrating a large amount of renewable energy plants into the grid, potential mitigation strategies and international best practices.

The instructors were leading experts from Germany and the U.K, while the participants were nominated by their institutions in the energy sector.

The learning materials were organised and learning paths, courses and modules were designed to match each learner's existing knowledge. The training consisted of animated presentations with detailed audio explanations complemented by a test for every module. The whole training could be completed within two days, but participants could study at their own pace. They would receive a certificate of achievement after finishing the course.

2.3 TRAINING ON GRID PLANNING, INCLUDING EXEMPLARY DEVELOPMENT OF SCENARIO-BASED GRID EXTENSION OPTIONS



2.3.1. Forecasting activity

To meet its high energy needs and to diversify the energy supply, Viet Nam has set ambitious goals for expanding variable renewable energies. Meanwhile, the government of Viet Nam is supporting the installation of smaller rooftop photovoltaic (PV) systems. Triggered by these attractive conditions, the Vietnamese power market is witnessing a boom in rooftop PV projects. By the end of 2020, their installed capacity would reach 1GW.

Given the multiple impact of rooftop PV on the power system and the significant increase of these generators in Viet Nam, it is of increasing importance to introduce a power forecasting methodology. Only a forecasting system that covers all of the existing variable Renewable Energy (vRE) plants allows safe grid operation and sound dispatch planning, and helps to reduce operational costs.

GIZ transferred knowledge to ERAV, the National Load Dispatch Centre (NLDC), EVN and further key actors in the Vietnamese energy sector for creating rooftop PV forecasts. Main components of this activity are a study that outlines the general concept of behind-the-metre forecasts and presents several user cases. Secondly, in an application-oriented project, energy and meteo systems will set up a forecasting system for rooftop PV plants in Viet Nam and deliver operational forecasts to NLDC.

This activity consists of two parts. The first is the elaboration of a study that presents best practices in forecasting rooftop PV generation and several international user cases. The second is the set up of an operational behind-the-metre forecasting and nowcasting system, which predicts rooftop PV generation in Viet Nam.

The feasibility and scope of both projects depend primarily on the availability of real-time measurement data and plant data. The plant data needs to be provided by GIZ and its partners.

The first task of this activity is a study on rooftop PV forecasts. It covered: solutions in different developed countries. The two workshops were an ideal opportunity for the exchange among high-ranking energy officials and international experts from government agencies, academic and private sectors from over 35 countries.

Learning from international experiences and lessons in integration of solar power and storage into power systems and large-scale integration of wind power into power systems as well as on transmission networks for offshore wind power plants in recent years, the participants could draw conclusions and lessons for Viet Nam.

- *Challenges resulting from significant rooftop PV production for operational processes of distribution system operators (DSO) and transmission system operators (TSO). e.g. dispatch, grid congestion management*
- *Regulatory issues for data collection regarding rooftop PV plants*
- *Best practices in forecasting rooftop PV production: methodological approach and data requirements*
- *Nowcasting: how to achieve precise short-term forecasts with real-time measurement data*
- *Configuration of forecasts (resolution, update frequency, regional scope (e.g., province, zip code))*
- *International case studies on operational rooftop PV forecasting with focus on Germany (use of forecasts by grid operators)*

The deliverable is a report on the methodological approach for rooftop PV forecasting and international best practices.

The second task of this activity is a Rooftop PV forecasting project. This covers the setting up of an operational rooftop PV production forecasting system for small-scale PV systems in Viet Nam. The forecasting system is based on input from several data sources. Crucial data are live measurements from rooftop PV systems that are installed in the country. With access to real-time measurements from solar inverters from the German manufacturer SMA Solar Technology.

The feasibility and scope of the forecasting system depend on the number and regional distribution of the

available inverter data and the completeness of the provided plant data. The forecasts will be delivered to NLDC for operational purposes in a format and frequency to be agreed. The foreseen period for delivering the rooftop PV predictions is six months.

The final report on the operational forecasting period summarises the results and outcomes, drawing further conclusions regarding the value of rooftop PV predictions for the Vietnamese power system and a possible implementation of a rooftop PV forecasting system in Viet Nam.

The report compiles the results from the delivery of operational forecasts to NLDC. This includes an evaluation of the accuracy and recommendations for further improvement.

The main deliverables of this task is the collection of required information from the Power Corporations (PCs), the set up of a forecasting system at energy and meteo systems for rooftop PV systems in Viet Nam, the delivery of operational rooftop PV forecasts to NLDC, PCs and ERAV, and a report on the results of the operational forecasting period. The results were presented and discussed to ERAV, NLDC and the Power Corporations during a workshop.

GIZ actively supported ERAV, NLDC and the power companies during the forecasting period with:

- *Development of framework for regulation of rooftop PV forecasting*
- *Strategies for integrating rooftop PV forecasts into daily operations of Load Dispatch Centres*
- *Strategies for integrating rooftop PV forecasts into PC's demand forecasts*
- *Evaluation of the benefit of rooftop PV forecasts for the Vietnamese power sector*
- *Proposal for setting up a forecasting system in Viet Nam and defining roles of stakeholders*



2.3.2. Renewable energy integration into the Distribution Grid

The main objective of this activity is to identify problems and challenges associated with the operation of distribution networks with high penetration of variable renewable energy.

During the inception mission with the Central Power Corporation (EVNCPC) and other distribution network operators, the following topics were their special interests:

Power quality:

- *Power quality related training and research support about assessing impacts on power quality, voltage/frequency fluctuation of local power grid from solar power plants*
- *Guidelines on power quality analysis. The guideline should be based on the principles of IEC61000-3-6 but still be independent. The methods should be better applicable than the methods described by IEC61000-3-6*

Rooftop PV:

- *Process to assess the impact of rooftop PV installations on LV networks, which does not require to analyse each individual project in full detail*
- *Examining their existing power system analysis software (PSS-Adept) regarding the required functionality to analyse the impact of PV installations on LV and MV networks*

Protection:

- *Need for support regarding the impact of distributed generation on the protection of MV and LV feeders. It is required to provide recommendations about the protection of solar PV installations themselves and the impact of solar PV installations on the existing feeder-protection*

Therefore, this activity focused on:

Report on power quality

Elaboration of a report about power quality challenges associated with the grid integration of variable renewable energy (especially PV) at LV and MV levels. This report addresses the physical principles and the existing technical guidelines and standards.

Training on power quality

In addition to the e-learning course on power quality, there was an online training to EVNCPC, the Southern

Power Corporation of the Electricity of Vietnam (EVN SPC) and the PC on power quality related aspects, particularly on the impact of solar PV installations on power quality. The online course was built on the contents of the corresponding e-learning course.

Elaboration of a draft guideline to analyse the impact of rooftop PV on power quality aspects

A guideline about power quality analysis of rooftop PV (connection to LV and MV grids) included the relevant mathematical formulas and methodologies as well as examples demonstrating the methods.

Elaboration of a process for grid impact assessment of rooftop PV

The difficulty with rooftop PV is the volume of installations and the volume of applications, which must be treated by distribution companies. Therefore, it is essential that a process be put in place, which does not require a detailed grid study to verify the grid impact on rooftop PV during the application phase of an installation.

It is important that analysis be carried out during the application process. Otherwise, there is a high risk that the installation of rooftop PV will cause grid congestion and overvoltage problems. Therefore, a multi-stage process should be defined, which allows a quick identification of installations with low grid impact and those projects that require more detailed studies:

Step 1: Training on the application of the guidelines

There was a demonstration of the application of the guidelines, which was followed by a training session based on realistic examples during a two-day workshop.

Step 2: Report on protection and rooftop

The report is about the impact of rooftop PV on protection (LV- and MV-protection). It addresses aspects relating to the protection of rooftop PV-inverters themselves and the impact that rooftop PV-inverters may have on the selectivity of existing protection at LV and MV grids.

Step 3: Workshop on protection and rooftop PV

At the two-day workshop (four sessions with three hours per session), there were presentations about international best practices on protection of rooftop PV installations and the impact of rooftop PV on MV and LV protection selectivity.

2.4 PRACTITIONERS AND DECISION-MAKER STUDY TOURS



2.4.1. Berlin Energy Transition Dialogue Conference 2019

The Berlin Energy Transition Dialogue (BETD) 2019 was an ideal opportunity for exchange between SGREEE's Vietnamese partners and other high-ranking energy officials from nearly 100 countries worldwide.

During the international study tour from 8-12 April 2019, the Vietnamese delegation learned about experiences and lessons not only from global renewable energy and smart grid development at the BETD 2019 but also from Germany as a whole. They gained a better understanding of the technical and political aspects of energy transition, focusing on the challenges of system integration of wind and solar energy and the corresponding solutions in Germany.

2.4.2. Final study tour for Viet Nam's Smart Grid Development Steering Committee at BETD 2022

As part of a five-day study trip in March 2022, GIZ brought high-ranking members of the Vietnamese government – including core members of Viet Nam's Smart Grid Development Steering Committee, various energy organisations and the private sector – to Germany to conduct various dialogues on the subject of energy transition. The main topics were energy efficiency, renewable energy and high-level exchange.

Embedded in that study trip was the participation of Vice Minister of Industry and Trade Mr Dang Hoang An at BETD 2022. After the event, high-level dialogues on the topic of energy transition were held between the German Federal Ministry for Economic Affairs and Climate Action (BMWK) and the Vietnamese Ministry of Industry and Trade as part of the first Germany - Viet Nam Energy Day.

2.5 NON-TRAINING ACTIVITIES

GIZ also carried out a number of non-training activities. Key activities are:

2.5.1. Relay protection

The background is that the NLDC submitted a proposal on how a new guideline on relay protection can be designed. Therefore, GIZ supported ERAV in formulating those requirements into official regulations.

2.5.2. Short circuit

Current grid code regulations state that the maximum permitted short circuit current at 500kV and 220kV substations must not be greater than 50kA. In 110kV networks, maximum permitted short circuit currents are 40kA. With future grid expansions, especially with additions of new power plants and transmission lines, short circuit currents will increase. Though this is a positive aspect, short circuit currents must be artificially limited – with additional reactors, for example, if short circuit currents exceed substation ratings. Alternatively, substation equipment must be replaced, which is very expensive.

The first related activity, as requested by ERAV, was a study by SGREEE about the development of future short circuit levels and recommendations about required short circuit ratings of substations, which will be used to revise the current specifications of the grid code.

The second related activity was SGREEE providing advice on the short circuit methodology to be applied. As classical short circuit methods can underestimate the remote contribution of wind and PV farms, international TSOs should start to either calculate short circuits using dynamic models and stability simulations – which is very time consuming – or to apply other more advanced methods. The suggestion was the British short circuit standard G74, which is the most accurate and soon to be standardised method.

2.5.3. Grid code revision

After a major event occurred in Viet Nam's power transmission system leading to substantial load shedding and consequently to severe frequency and voltage disturbances on 13 May 2021, GIZ facilitated the discussion on the problem and provided inputs and technical guidance for the following scenarios:

In the first case, the grid code should be revised accordingly. It would be better to analyse the series of events and to identify appropriate measures to avoid

such severe consequence in future by a) defining stability constraint transfer limits across the interconnectors and b) installing dynamic reactive power control equipment that can maintain the voltage within reasonable limits during severe disturbances.

In the second case (controller parameters), controller settings should be revised. It should be checked whether improved parameters can be implemented within the limits of the existing grid code.

In the third case (non-compliance with the grid code), it is not possible to resolve the issues by modifying the grid code. Instead, the existing grid code compliance procedures should be revised in order to ensure that all wind and PV farms actually comply with the grid code.

All scenarios were deeply discussed based on technical analysis provided by GIZ consultants. Based on this, several recommendations were presented to ERAV as requested.

2.5.4. ICT security

With the expansion of distributed energy resources (DER) and Viet Nam's opening for the private sector, a growing number of solar and wind park operators entered the Vietnamese energy market. At the same time, the energy supply is increasingly dependent on the support provided by an intact information and communication technology (ICT). This ultimately leads to an increasing data exchange between EVN and external entities.

Against this background, Viet Nam is dealing with regulating ICT security issues in its national power system. A crucial question in this context is which institution in Viet Nam should have the competence to regulate ICT security issues in the power market.

SGREEE, in collaboration with an international expert pool, supported its partners ERAV (regulatory authority) and EVN (public utility) with know-how transfer to guarantee a smooth integration of renewable energy resources. Based on two brief case studies on the topic, SGREEE provided its partners with international experiences, in which the regulatory framework of Germany and Austria for ICT security in the power market was presented.

2.5.5. Protection policy review of the Vietnamese power system

NLDC has prepared a draft protection policy document for the Vietnamese transmission (220kV and 500kV) and distribution (110kV only) power system, including generating plants connected to these voltage levels

(Report “Technical requirements for protection and automation relay system in power plants and substations”). This activity is to support ERAV with the review and finalisation of the protection policy document for the Vietnamese transmission (500kV, 220kV) and distribution (110kV only) networks.

The SGRREE project conducted technical review on the draft Protection Policy report, which primarily referred to the protection strategy and settings recommendations made in the EDF reports and commented on their implementation in the draft policy document. Review of the EDF reports was limited to transmission or 110kV connected equipment, including generating plants. The technical review of the draft protection policy document based on National Grid UK and other international best practice on protection philosophy and settings for transmission (500kV, 220kV) and distribution (110kV) networks.

2.5.6. Mekong Delta study

Up to 2,300 MW of wind and solar power projects have been approved, and 4,300 MW are waiting for approval for being included into the power plans in the Mekong Delta provinces of Ca Mau, Soc Trang, Ben Tre, Tra Vinh and Bac Lieu in the recent years.

The SGRREE project conducted a study on analysing the situation and offering quick upgrading options of transmission and distribution grid in this area to absorb a suitable capacity of wind and solar power. The study also provided investment solutions and estimation of grid extension to absorb all 6,000 MW of wind and solar projects by the year 2025, among which 4,300 MW are to be appraised soon.

2.5.7. Short term demand forecasting

With the expansion of DER over the past years, especially vRE, demand forecasting has become a more complex task. Taking into account the increased complexity of power systems with a large share of vRE, early movers in energy transition, such as Germany, have developed new methodologies to create demand forecasts. These approaches take into consideration the impact of vRE production on distribution power grid levels and lead to a higher accuracy of demand forecasts, both at regional level and at specific grid nodes. They have also become a mandatory process in the re-organisation of the redispatch process in Germany (Redispatch 2.0).

Within the SGRREE project, GIZ with their consultants provided expert knowledge in state-of-the-art in demand forecasting in power systems with a high share of DER. The scope of this task is restricted to short-term demand

forecasts – one-hour ahead, day-ahead up to month-ahead – including:

Task 1: Assessment for the current status of demand forecasting at PC level in Viet Nam, including the assessment of the existing regulations and legal framework for load forecasting in Viet Nam and a study of the current status of load forecasts based on case studies conducted with three PCs, including:

- *Assessment of the existing requirements and regulations regarding demand forecasting*
- *Currently applied load forecasting procedure*
- *Supporting instruments and software (algorithms, methodologies)*
- *Assessment of the input data used for load forecasting,*
- *Input data collection, management and processing methodologies*

Task 2: Report on international best practice in load forecasting with focus on the case study of Germany and Chile, including:

- *Presentation of power systems and load forecasting procedures*
- *Consideration of variable renewable energies in short-term load forecasts*
- *Presentation of user cases*

Task 3: Recommendations for load forecasting at PC level in Viet Nam, taking into account renewable energy sources.

Based on the results from Task 1 and Task 2, the consultants developed and proposed a load forecasting procedure (based on data requirements, data management and processing methodologies, the applied methodologies including power forecasts, evaluation and improvement of the forecast data) and provided recommendations and development procedures for month-ahead, week-ahead, day-ahead and one-hour ahead forecasts.

2.5.8. Review the definition of security criteria of Viet Nam’s power system

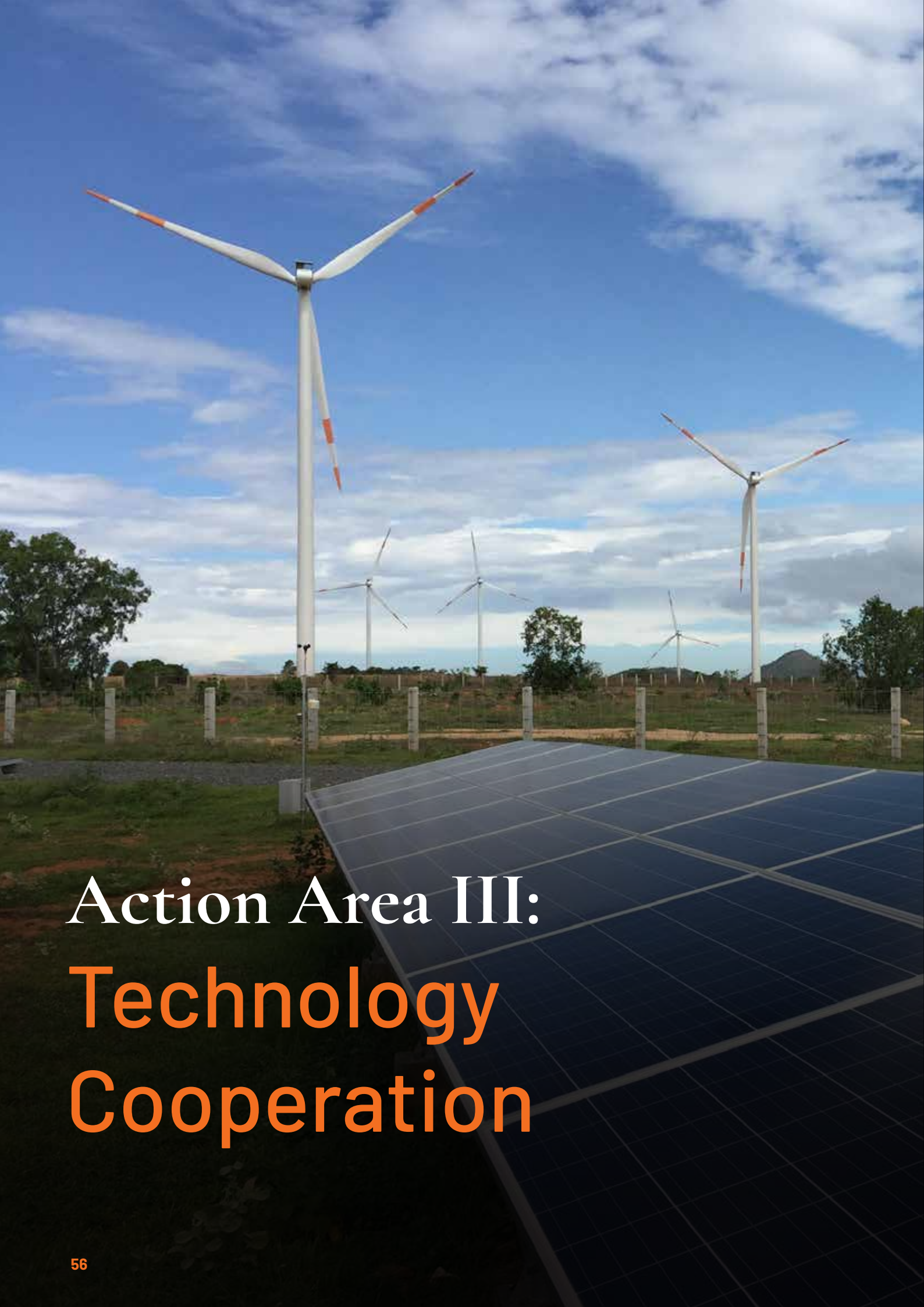
Several requirements of Viet Nam’s Grid Code (Circular 25/2016/TT-BCT) refer to a N-1 criterion, which is defined under number 51 of Article 3 (Interpretation of terms): “51. N-1 criterion is a criterion for planning, design, investment, construction and operation of an

electricity system that ensures the electricity system operates normally in accordance with the operating standards, permissible operating limits when a breakdown occurs in the system or a component is taken from the system for maintenance and repairs.”

One of the targets of Resolution 55 of Politburo is to develop a smart and effective grid that is capable of interconnecting with the regional power grid, meeting N-1 criteria for the area of the important load and N-2 for the area of special load.

Discussions with several Vietnamese stakeholders involved in planning and operations of the national power system showed that this definition of N-1, N-2 security is not sufficiently precise and more specific definitions would be required for network planning and network operations. Therefore, SGRREE supported ERAV in preparing a document with precise definitions of system security criteria applicable to long-term system planning, operational planning and real-time operations in Viet Nam.





Action Area III: Technology Cooperation



In Action Area 3, the SGREEE project aimed to promote the application of state-of-the-art Smart Grid technologies and intensify applied research and development, such as feasibility testing for smart technology system configurations in laboratories.

Descriptions of the key activities of this Action Area can be found across the following pages and include:

- 3.1 Promoting application of state-of-the-art technology***
- 3.2 Intensifying applied research and development***



3.1 PROMOTING APPLICATION OF STATE-OF-THE-ART TECHNOLOGIES



3.1.1. Technology assessment

Smart Grid development has been an integral part of power system development in Viet Nam since 2012. Deployment of Smart Grid technologies depends on the relevancy of the technology and utility constraints. To serve as a reference point for future Smart Grid technology deployment plans in Viet Nam, the SGREEE project worked with Vietnamese stakeholders, local and international consultants to study the Smart Grid development trends worldwide and assess the feasibility of implementation in Viet Nam.

The activities include the following main tasks:

Task 1: Review of past and ongoing Smart Grid activities and projects in Viet Nam.

Task 2: Outlook on upcoming national and international smart energy trends with potential relevance for Viet Nam's energy system in the future.

Task 3: Development and introduction of criteria for the analysis of smart energy technology solutions.

Task 4: Analysis and pre-selection of suitable smart energy technology solutions.

The overall objective of this assignment was to establish a solid and transparent basis for SGREEE's upcoming promotion activities in the field of technology cooperation that facilitates linking discussions between Vietnamese and international experts and promoting the application of state-of-the-art Smart Grid related technologies.

The assessment was divided into the following sections:

Task 1: Past and ongoing Smart Grid activity survey in Viet Nam

Survey Vietnamese stakeholders on Viet Nam's Smart Grid Roadmap and implementation progress at each stakeholder.

Task 2: Identified trends and products in smart energy technology solutions Trends and products that have not yet widely developed in Viet Nam are identified and explored in terms of definition, benefits and impacts, challenges and drawbacks, international experiences and metric-based impact assessment. In this task, 14 Smart Grid technologies were selected.

Task 3: Criteria for Smart Grid technology assessment

Smart Grid technologies are evaluated in terms of impact on power system challenges, economic viability, applicability and level of existing knowledge.

Task 4: Smart Grid technology assessment for Viet Nam

Assessment of the feasibility of implementing these technologies in Viet Nam, which serves as a prerequisite for follow-up cost-benefit analysis.

Key achievements included the build of a qualitative assessment framework for upcoming technologies to determine their relative feasibility in Viet Nam and the initiation of open discussions between consultants and stakeholders regarding upcoming Smart Grid technologies to be used in Viet Nam.



Read the final report



Please scan the QR code or click the link to read the final report: http://gizenergy.org.vn/media/app/media/SG_Technology%20Assessment_Final%20Report_EN.pdf

3.1.2. Virtual Power Plant

The assignment aims to inform SGREEE to provide a comprehensive introduction into the Virtual Power Plant (VPP) technology and explore its possible deployment in Viet Nam to address some of the challenges of the energy transition.

Main tasks of the activity are:

Task 1: Review of VPP development in the world.

Task 2: Review of current Vietnamese power sector for the VPP application.

Task 3: Recommendations for current OCC of solar power plants in Viet Nam.

Task 4: Overall design of VPP pilot phase.

Task 5: Detail Design of a VPP pilot phase in Viet Nam.

The increasing proliferation of renewable energy plants and other distributed energy resources (DER) worldwide, including Viet Nam, raises concerns about how to efficiently control and incorporate these assets into power systems.

One technology to solve the above problems is VPP, which has emerged as a key solution for monitoring, forecasting and remotely-controlling a large number of decentralized assets. While the benefits of the VPP are increasingly acknowledged and demonstrated in operational applications, Viet Nam so far does not have any experience with this technology.

Apart from the above-mentioned tasks under the VPP project, the assessment also takes into account findings from activities that have been performed for SGREEE in other projects, in particular, comments on the draft regulation for power forecasting in Viet Nam and ICT security in power systems with a brief case study on Germany and Austria.

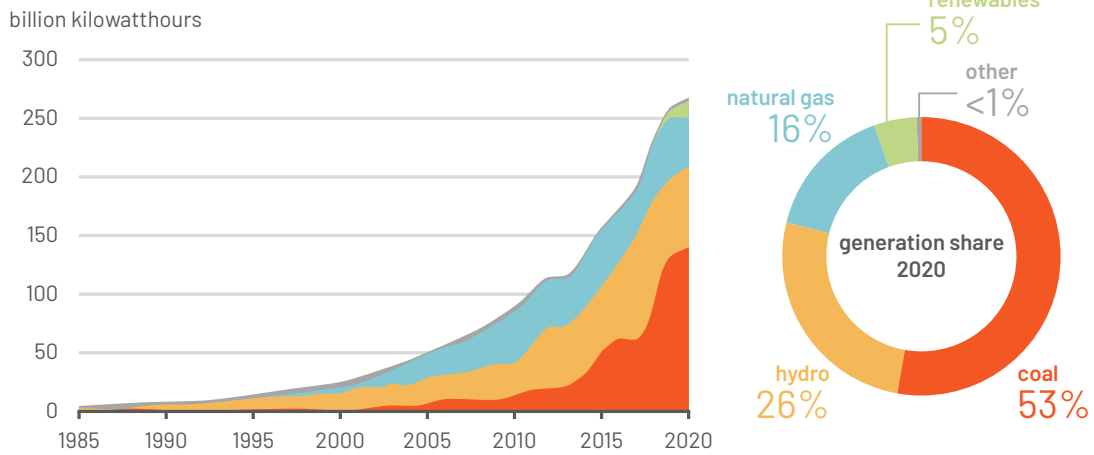
Comparisons of the VPP technology and the OCC software already applied in Viet Nam, the proposal of a VPP testing phase to more efficiently monitor and control real-time and future production of widespread rooftop PV systems for a better system integration, and outlined implementation of a VPP testing phase with Vietnamese Power Companies as the main operator.

Read the final report

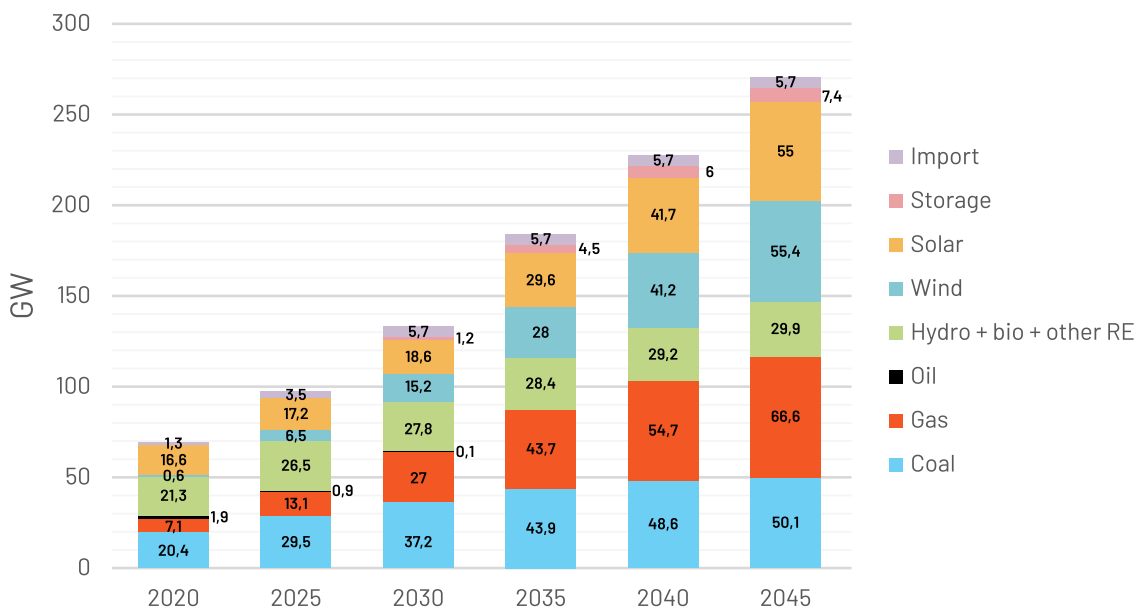


Please scan the QR code or click the link to read the final report: gizenergy.org.vn/en/item-detail/final-report-virtual-power-plant-technology-and-potential-application-vietnam

Viet Nam annual electricity generation, by source (1985-2020)



Development of electricity generation by technology. Source: EIA



Future development of the generation mix according to the draft PDP8

3.1.3. Medium and long term demand forecasting

Medium term and long term are understood as monthly and yearly ahead, respectively. This activity is aimed at existing methodologies, identifying opportunities for improvement within the existing procedures, providing international experience on the latest methodologies and tools for demand forecasting, and updating the procedures accordingly.

The activity consists of the following main tasks:

Task 1: Assessment

Assessment of the existing regulations and framework for load forecasting in Viet Nam and development of understanding about the current state of implementing load forecast in Viet Nam based on experience that NLDC and selected PCs have had in terms of forecasting.

Task 2: International experience

Conducting a review of international experience in medium and long-term demand forecasting methods, technologies/software, and procedures that may have potential application in Viet Nam's power sector.

Task 3: Recommendations

Developing an enhanced medium and long term load forecasting process and present solutions to identified issues in the form of updated demand forecasting framework for Vietnam's medium and long term demand forecasts.

Support for updating Decision 07/2013/QĐ-ĐTĐL detailing the monthly, yearly ahead demand forecast process and support for updating the modern and advanced technologies of the monthly, yearly demand forecast in the countries where those have been applied successfully under the circumstance of vRE high penetration.

3.2 INTENSIFYING APPLIED RESEARCH AND DEVELOPMENT

3.2.1. Support in applied research and development through a demonstration project for rooftop controllers

This activity aims to provide suitable devices as well as the knowledge for installation, operation and technological demonstration to show general feasibility of Smart Controllers for rooftop PV plants and their usability in real applications by Vietnamese grid operators.

This task is divided into a consulting work package and a service work package, with each package divided into two phases.

The first phase included the installation of Smart Controllers at the Hanoi University of Science and Technology (HUST) laboratory and training of laboratory staff. This phase was to prove the general functionality of the devices. The second phase was the installation of Smart Controller in three PV rooftop sites in Quang Nam Province and monitoring and control testing between the controllers and the regional Load Dispatch Centre and Power Company.

Demonstrated the general feasibility of smart controllers and their usability in real applications by Vietnamese grid operators and the support of locally applied research and development.

3.2.2. Hands-on training of power system simulation in the grid laboratory (DNV-GL)

The focus of this assignment is to perform hands-on training using a Dispatcher Training Simulator (DTS) for different stakeholders of the Vietnamese power grid, with a focus on power system simulation.

As a part of the course, training was conducted on a virtual grid that was prepared by DNV company, in which the actual transmission grid of Northeast Germany and the distribution grid of Berlin were used to provide realistic grid constellations for the participants.

The training course was divided into eight different modules, which covered a wide spectrum of topics including smart grid technologies, power grid simulations, energy market aspects and soft skills relevant for stakeholders of the electrical energy system.

Key topics of the training included:

- *Human behaviour: based on European Commission Regulation "System Operation Guideline" this training program explicitly includes behavioural skills especially*

communication stress management and behaviour in critical grid situations

- *Grid protection and failure analysis: present and discuss optimised protection concepts adapted to the functional diversity of modern protection devices and through increased use of remote monitoring and control*
- *Frequency and voltage stability: requirements on switching management operations, safe operation of renewable energy plants, n-1 criteria*
- *Grid restoration*
- *High voltage, direct current (HVDC) technology and phase shifting transformers*
- *Overall power system management based on existing regulations*
- *Tools for system operation and fast frequency response*
- *Safe operation of variable renewable energy and impact on E-Mobility*

Participants carried out a technical feasibility check for three different Smart Grid system configurations, which have undergone a technical feasibility check about grid stability.

Participants also improved their capacities to assess the suitability of technology solutions for a Smart Grid beneficial to renewable energy and energy efficiency.

Participants understood about laboratory testing methods based on simulation and emulation to assess the stability of Smart Grid system configurations.

Eight participants evaluated the quality of the training course provided at the end of the course with good/excellent scores. 13 participants passed the exam and were awarded certificates.

Read the fact file



Please scan the QR code or click the link to read the fact file: <http://gizenergy.org.vn/en/item-detail/fact-file-training-power-system-simulation-grid-laboratory>

3.2.3. Viet Nam Academy Day 2019, 2020 and 2021

The Viet Nam Academy Day is an annual workshop event co-organised by GIZ and ERAV to enhance research into and the widespread adoption of Smart Grids for the power network to capture renewable energy and support the development of the country's Smart Grid Road Map.

Speakers from research institutions and experts in the power system field are invited to give speeches and participate in discussions with the audiences, which are stakeholders from the Vietnamese power sector such as the Vietnam Electricity, the National Load Dispatch Centre, the Regional Load Dispatch Centres, Power Corporations, along with other associations, research institutes, universities, international organisations and private companies.

During the workshops, the speakers presented their research on Smart Grids, energy efficiency and the integration of variable renewable energy in Viet Nam and worldwide.

Discussion between experts and researchers to study the latest research on Smart Grids, promoting innovations and applications of the issue in Viet Nam, as well as the promotion of academic studies on Smart Grids and applications of the studies.



Read the presentations at Academy Day 2020



Please scan the QR code or click the link to read the presentations: <http://gizenergy.org.vn/media/app/media/VAD%202020%20EN%20Presentations.7z>



FIVE MINUTES WITH **MR. TRAN TUE QUANG**



As a leader with high professional qualifications, Mr. Trần Tuệ Quang – ERAV’s Deputy Director General has extensive experience and direct dedication to the development of the Electricity Regulatory Authority of Viet Nam in particular and the country’s electricity sector in general. He has spent substantial time working with GIZ to implement the SGREEE Project. Let's listen to his sharing about the project.



The project’s research and recommendations will help ERAV in the process to promote the development of Smart Grids in Viet Nam

How has it been to work on the SGREEE Project?

What impressed me most when working with GIZ on the SGREEE Project was receiving professional and highly specialised project advice from the project's energy consultants such as MPE (Moeller & Poeller Engineering GmbH) and IES (Intelligent Energy Systems).

Which of these three project Action Areas do you believe will be the most impactful?

I think Capacity Development had the most positive impact. The project's staff were able to participate in many training activities with content ranging from basic to advanced. Despite the challenge of Covid-19, many activities could be organised using online platforms. In the long term, besides capacity development for managers, the research and recommendations in other fields all have positive and complementary effects in the process of supporting ERAV in deploying Viet Nam's Smart Grid Roadmap.

How much influence do you believe that the SGREEE Project will have on the future of Viet Nam's energy sector?

The objective of the SGREEE Project is to support the MOIT/ERAV in the process of improving the legal framework related to promoting and supporting the development of renewable energy sources in the power system and Smart Grids in Viet Nam. The development in the energy sector is always a long term path, and sometimes it is not easy to see immediately concrete impacts of the SGREEE Project on the energy sector. However, the project's activities such as international experience-sharing and capacity development for state managers will be a good premise for the long-term development of the energy sector. The project's research and recommendations will help ERAV in the process to promote the development of Smart Grids in Viet Nam in particular, thereby contributing to the development of Viet Nam's energy sector in general.

How do you see the Vietnamese energy transition evolving from now on?

With the commitment of the Vietnamese Government at COP26, I firmly believe that the energy transition in Viet Nam in the future will receive much support from international organisations.



A photograph of Mr. Markus Bissel, a man with glasses and a light blue shirt, speaking into a microphone. He is standing in front of a large screen displaying a presentation slide. The background is a stage with red curtains.

FIVE MINUTES WITH **MR. MARKUS BISSEL**

With more than 20 years of experience in the energy sector, Markus Bissel is one of GIZ's foremost experts on energy supply and services. We caught up with the SGREEE Project Director and Team Leader of Energy Efficiency for the 4E project

“

The Vietnamese energy transition faces a multitude of challenges as it moves in the field of tension between energy-intensive industrial growth goals, socio-economic goals, and CO₂ reduction goals

How has it been to work on the SGREEE project?

First of all, I would like to express my appreciation for the trusting, respectful, and cooperative partnership we have had with our political partners, MOIT and ERAV. Only through this cooperation, it was possible to achieve the common goals that the Vietnamese and German governments agreed on about five years ago. For example, due to constant technical developments and changes in the power grid, MOIT's needs for capacity development often changed, and sometimes we had to organise training courses or workshops very quickly. This was only possible because of the intensive and regular communication exchange GIZ had with ERAV. From GIZ's point of view, the first-time selection of ERAV as a political partner in the context of German-Vietnamese development cooperation was a great success, and GIZ is looking forward to future cooperation with ERAV on further projects.

What has surprised you and exceeded your expectations in your cooperation with MOIT and ERAV on the SGREEE project?

We were surprised by the inquisitiveness of the ERAV employees involved and their great interest in technical and regulatory topics. There were regularly new requests from ERAV on specific topics to ensure a secure and more efficient power grid operation and to meet the ever-changing requirements due to the rapid increase in decentralised renewable energy generation into the grid. As a result, as well as the capacity building measures provided by other donors, ERAV has a broadly trained staff. Of course, the project was particularly challenged by the COVID-19 pandemic, but even during this time good progress was made due to the use of modern communication technologies and corresponding behavioural adjustments of all staff involved.

How much influence do you believe that the SGREEE project will have on the future of Viet Nam's energy sector?

The project has succeeded in bringing the personnel closer to international standards in the field of a modern power grid regulator, which leads to a strengthening of the position of ERAV within MOIT. The capacities of technical specialists and executives at the power grid have also been strengthened, so in this process of opening the power market to new actors, necessary and sensible regulatory interventions can be implemented in a more qualified manner. The project also supported ERAV in reviewing the regulations for Smart Grids. In particular, due to the expansion of renewable energies, decentralised energy generation into the grid, relevant regulations such as the Grid Code were adapted accordingly. The contributions to the revision of the Smart Grid Roadmap – the central document for the development of Smart Grids in Viet Nam – were also forward-looking.

How do you see Viet Nam's energy transition evolving?

It faces a multitude of challenges as it moves in the field of tension between energy-intensive industrial growth goals, socio-economic goals, and CO₂ reduction goals. In the emerging era of Viet Nam's energy transition, various core topics are thematically in the foreground. Renewable energies have the particularity of producing volatile energy depending on time of day as well as weather conditions. There are also controllable producers such as biogas and biomass. New technologies even show a potential for energy export. It is important for decision-makers in the Vietnamese energy sector to cooperate to make this potential usable. On the other hand, there are load-variable large-scale consumers such as refrigerated warehouses, or lean production set-ups, which are able to adapt their production to the power supply and energy supply pressure. Heat pumps can be activated at night to absorb wind energy. The feed-in of e-mobility is also one of the benefits of driving integrated goals such as CO₂ reduction.

GIZ supports this at various levels in the form of advice, workshops and know-how transfer on how this interaction can succeed in the Viet Nam context. We have been supporting this for years in the form of workshops, basic research and best practice, and lessons learned from the German energy transition.





“

We now have good premises to support Viet Nam's energy transition in the future

A CORNERSTONE FOR VIET NAM'S ENERGY TRANSITION

I felt very comfortable when working with related officials in the areas of project activities. The SGREEE project provided a lot of knowledge in the field that interests me, especially on detailed technical regulations of the power grid and the applicability of Smart Grid technologies around the world.

I obtained a lot of experience in coordinating and implementing projects. These experiences will prove useful in future work, especially when project activities have to meet requirements from many parties.

The SGREEE project has greatly supported the development of Smart Grids and the goal of integrating renewable energy in Viet Nam. We now have good premises to support Viet Nam's energy transition in the future.



NGUYỄN THẾ HỮU

Director, Power System Department, ERAV

Hữu was in charge of explaining the project's activities when the SGREEE project went through the approval procedures at the Ministry of Planning and Investment, as well as during the implementation of the project in all three Action Areas. He participated in specific activities such as consulting with the Terms of Reference, commenting on consulting reports, and participating in a number of seminars.

LEARNING AND DEVELOPMENT

GIZ has accumulated a lot of experience in cooperation in Viet Nam – everything from the regulations, processes and approaches to implementing projects to technical support cooperation in general and the SGREEE project in particular. This is an advantage but also a challenge because requirements for GIZ will be increasing. The SGREEE project is the first, official and long-term cooperation project between ERAV and GIZ during the last four years. The experts of ERAV and I have learned many things, not only about the expertise but also about the management and implementation of projects during the time cooperating with GIZ.

The SGREEE project started in 2018. At that time the topics and requirements for energy transition in Viet Nam were unclear. Energy transition is an inevitable and high-value trend, so it takes time to evaluate the contribution and influence of all fields and aspects, including Smart Grid. In Viet Nam, the Smart Grid topic has been officially mentioned and implemented since 2012. The development of the Smart Grids in general and the specific application of the functions of the Smart Grid in particular in the Vietnamese power system will contribute to achieving security of electricity supply, while improving the quality of electricity supply and ensuring sustainable development.



NGUYỄN QUANG MINH

Director, Power Market Development Research and Training Centre, ERAV

Minh managed overall activities of the SGREEE project. He is in charge of capacity building activities for stakeholders and projects related to the implementation of the Demand Response (DR) programmes.



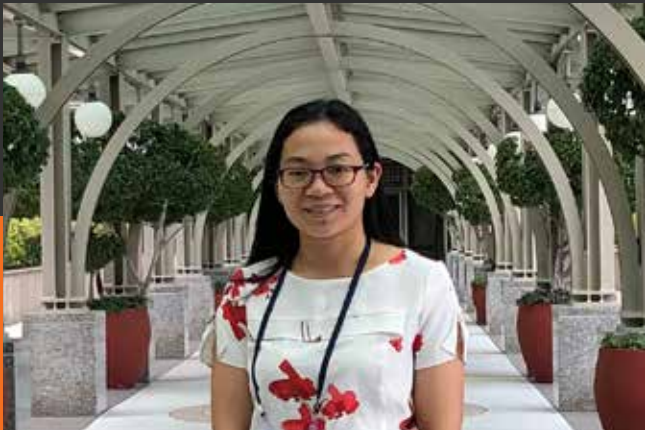


“

The experts of ERAV and I have learned many things, not only about the expertise but also about the management and implementation of project during the time cooperating with GLZ

IMPROVING KNOWLEDGE AND SELF DISCOVERY

Participating in supporting the Smart Grids project is a great pleasure for me. More than just the work that needs to be done, the project implementation process also helped me improve my professional knowledge, as well as discover my other skills. In 2019, I had the first chance to become one of the hosts for Smart Grid Week in Viet Nam. This was a great programme and I was really happy to receive a lot of positive feedback for a job well done. Through project management support, I have learned lessons on how to effectively manage technical support projects while ensuring quality and progress. The experts from GIZ are all friendly, enthusiastic and highly specialised. They are all willing to support the experts from ERAV in the process of project implementation. The objective of the SGREEE project is to support MOIT/ERAV in the process of completing the legal framework related to promoting and supporting the development of renewable energy sources in the energy system and Smart Grids in Viet Nam. All three Action Areas of the project have an important and complementary role in promoting the development of Smart Grids, and the energy transition in Viet Nam.



ĐỖ HỒNG THANH

Deputy Director, Power Market Development Research and Training Center, ERAV

The Power Market Development Research and Training Center is the unit assigned by ERAV to be the focal point to manage technical research projects and international technical cooperation. Thanh worked with staff to support the Technical Department in the management of progress and quality control of reports in the three Action Areas of SGREEE. She also supported the project with procedures related to foreign experts working in Viet Nam.





I have learned lessons on how to effectively manage technical support projects while ensuring quality and progress



EVERYBODY LEARNS, EVERYBODY WINS

Working on the SGREEE project has been a new and interesting experience for me. I was in charge of the first Action Area – Legal and Regulatory Framework – which meant identifying topics, carrying out research and working closely with ERAV on a daily basis. We were always ready to provide support to them with in depth research, analysis or recommendations for regulatory frameworks.

I have seen different perspectives, different points of view and different concerns from both sides, which I could not see when I was working in the government management agency. This allows me to understand and sympathise with the problems of both sides. There are solutions to harmonise the interests and objectives of related parties so that the project can finally achieve the overall goal. All challenges, difficulties and obstacles can be solved through open discussion in the spirit of mutual trust. The project's contributions have helped ERAV to complete the tasks assigned by the competent authorities. This helps us feel motivated to continue to cooperate and support ERAV in particular and Viet Nam in general.

The activities and achievements of the Smart Grids Project in general and Legal and Regulatory Framework in particular are the first contributions to Smart Grids development strategies. At the same time, they support the energy transition in Viet Nam towards the goal of net-zero carbon emissions by 2050. With the rapid development of technology globally, I believe that Viet Nam will need to continue to follow and update the strategy, roadmap, and sector planning. GIZ will continue to support ERAV along the way.



DUYANG MẠNH CƯỜNG

Senior Project Officer, GIZ/SGREEE

Cường has been in charge of Action Area 1, Legal and Regulatory Framework, since January 2019. He was responsible for studies and recommendations of international lessons learned to support the improvement of the legal side of state management of electricity regulation, led by ERAV.



“

Viet Nam will need to continue to follow and update the strategy, roadmap, and sector planning. GIZ will continue to support ERAV along the way

HELPING VIET NAM TAKE A GREAT STEP TOWARDS THE FUTURE

Smart Grid technology is new to Viet Nam, so the boom in wind and solar power sources over the last several years means that the relevant Vietnamese institutions need to learn from countries where smart grid technologies and renewable energy are already commonplace. So supporting technology cooperation between Germany and Viet Nam has been a fantastic experience for me, as it gave me the chance to help foster the integration of Smart Grids into the Vietnamese power sector and facilitate the rise of renewable power sources in the country.

I feel privileged to have witnessed the most dynamic development of renewable energy integration in Viet Nam, and I have learned so much about Smart Grid technology through cooperating with stakeholders in the German and Vietnamese power sectors, including our key partner ERAV.



TRẦN TIẾN HÒA

Former Project Officer, GIZ/SGREEE

Hòa was in charge of Action Area 3, Technology Assessment, and a part of Action Area 2, Capacity Building. His tasks included assessing Smart Grid technology, providing recommendations for Virtual Power Plant technology in Viet Nam, supporting the development of a rooftop solar forecasting model, and organising Academy Days.





“

**I feel privileged
to have witnessed
the most dynamic
development
of renewable energy
integration in
Viet Nam**

GIZ COLLEAGUES WERE FLEXIBLE AND ENTHUSIASTIC

Every new and exciting activity comes with its own challenges, and that's where I had many interesting experiences and discoveries. Implementing new projects can encounter difficulties but together with GIZ colleagues we did our best in the spirit of sincere and effective cooperation to implement the project.

Participating in the project has taught me a lot from the experience of German experts in policymaking, building legal frameworks, and solving technical issues. I also gained a lot of experience in the methodology, working process, construction, and implementation of project activities.

My colleagues at GIZ were great. They were always ready to listen and made the maximum effort to support the implementation of the SGREEE project. They were very flexible and enthusiastic about providing initiatives, ideas, and solutions, which significantly helped us overcome our challenges.

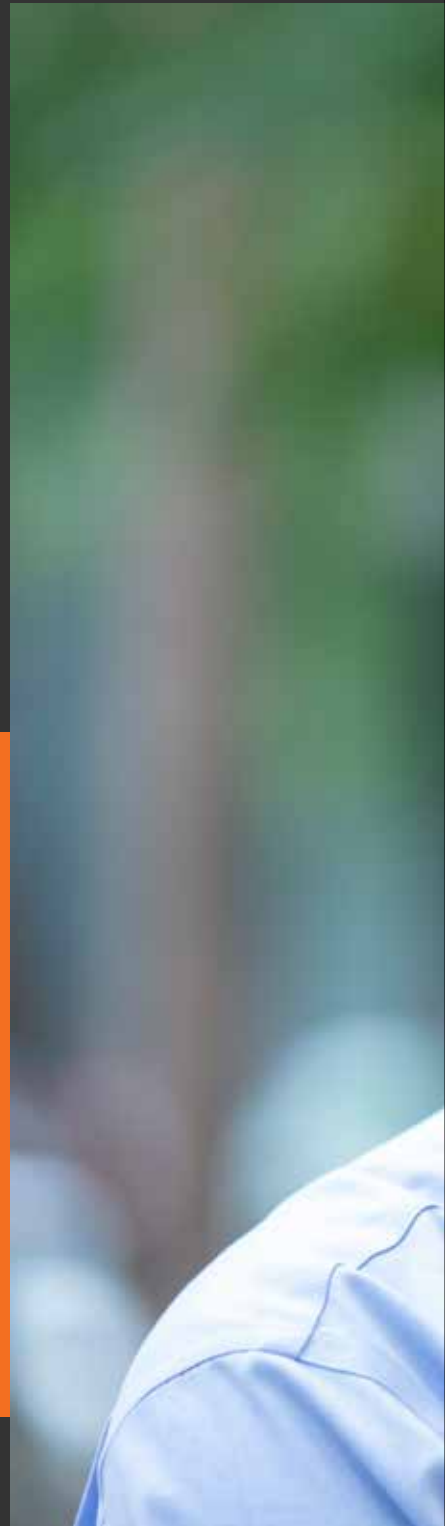
The activities of the project were very practical and will continue being extremely useful for the energy transition in Viet Nam.



TỬ VĂN HÙNG

Deputy Director, Power System Department, ERAV

As Hùng's role was to implement the technical cooperation sub project of the SGREEE project, he participated in almost all project activities within the three Action Areas: developing the legal framework for Smart Grid development, improving the capacity of the public and private sectors in implementing Smart Grids, and strengthening cooperation and the technological linkage between Vietnamese and German partners.



“

**Implementing
new projects can
encounter difficulties
but together with GIZ
colleagues we did our
best in the spirit of
sincere and effective
cooperation**





I was very happy to meet and work with partners and colleagues from abroad



A GREAT AND PLEASURABLE LEARNING EXPERIENCE

It has been a great pleasure for me to cooperate with GIZ. I've learned a great deal about operating a bilateral project, especially how international consultants work. I was very happy to meet and work with partners and colleagues from abroad. Of course, I've also been presented with new knowledge about the energy sector. The SGREEE project provided a lot of useful international knowledge, information, and experience to Viet Nam that supported us in developing a policy framework related to the specific nature of Smart Grids development in our country. This will ensure that the Vietnamese government will implement a sensible, forward-looking, and country-relevant energy transition roadmap in the country.



NGUYỄN THẾ THÀNH

Specialist, Power Market Development Research and Training Center, ERAV

Thành supported project activities and administrative procedures related to the SGREEE project. He was in charge of project documentation, immigration procedures for experts, and other procedures to support internal management procedures.



There can be no energy transition without an intelligent and flexible power system, and for this you need smart technologies and a system designed for the needs of tomorrow

GAINING DEEPER INSIGHTS INTO CHALLENGES AND SOLUTIONS OF THE POWER SECTOR

I really enjoyed working with a skilled and motivated team on the SGREEE project and supporting the energy transition in Viet Nam. In a time where renewables are trending, I was glad to bring my experience as a solar power plant engineer, especially on grid integration of renewable energy into the power system. The work with ERAV was fruitful and cooperative. Luckily we were given the opportunity to locate our project office at ERAV, which helped a lot with the direct cooperation.

During my work with the project, I was able to get deeper insights into the challenges and their solutions of the power sector in Viet Nam, both from the regulatory and the technical point of view. Of course, as an engineer coming from the private sector into the field of development cooperation, I was able to gain insights into many things that were new to me, such as tender procedures, event management, studies and reports, but also technical knowledge that I can apply to my work now in Germany as a transmission system operator.

The capacity of solar and wind power in Viet Nam increased rapidly during the project, so the need for a smarter grid that is able to integrate high shares of renewables increased as well. There can be no energy transition without an intelligent and flexible power system, and for this you need smart technologies and a system designed for the needs of tomorrow. The SGREEE project activities took place at exactly the right time.



JONAS HAGERMANN

Former Technical Advisor, GIZ/SGREEE

Jonas worked on the SGREEE project for more than two years. He was involved in all of the project's three Action Areas, from the preparation of the project's operational plan before the official project start and supporting activities in all action areas, to organising the Smart Grid Week at the end of 2019.



We all shared an enormous enthusiasm for promoting and supporting Viet Nam's energy transition





A VALUABLE AND NECESSARY PARTNERSHIP

I was very happy to be a part of this highly engaged team and I truly value everyone's contributions and the common spirit of collaboration. We all shared an enormous enthusiasm for promoting and supporting Viet Nam's energy transition.

The work we performed is essential in order to create the basis for an increase in renewable energy production in Viet Nam. The promotion of new technologies on the generation side, the consumption side, and the storage side must all be linked together by a Smart Grid framework to facilitate an efficient energy transition in the country.

As our partner, ERAV expressed their appreciation of the knowledge exchange and inputs, our expertise and advice, as well as the cooperation with us and our consultants as a cornerstone for a successful energy transition.



HENRI WASNICK
Technical Advisor, GIZ/SGREEE

Henri's key activities were in Action Area 2, Capacity Building, especially on solar rooftop forecasting and developing local power companies' capacities on how to use and implement forecasts.

Green Growth | Energy Efficiency | Rethinking Plastics

Utilising smart grids for optimum power results

Over the past few years, although there has been a climb in investment in renewable energy, authorised agencies and financiers have expressed concerns about capacity-absorbing electricity of the national power grid.

Vietnam's electricity system is facing... of the country's rapid development...



Nghiên cứu áp dụng công nghệ nhà máy điện ảo tại Việt Nam

Tổ chức Hợp tác Phát triển Đức-Giá (GIZ) vừa giúp Việt với Cục Điều tiết Điện lực Bộ Công Thương tổ chức hội thảo trực tuyến "Ngành cứu áp dụng công nghệ nhà máy điện ảo tại Việt Nam".

Grid news items with images and headlines like 'Bảng tin học năng lượng mới nhất'.

THANH NIÊN logo and news snippets.

Vỡ quy hoạch điện mặt trời: Gỡ nút thắt cổ chai về lưới điện

Theo ông Jonas Hagemann, việc tác động chủ yếu hiện tại những khu vực tập trung nhiều nhà máy sản xuất điện trong khi lượng điện tiêu thụ và công suất truyền tải đều thấp.

Liên quan hệ thống đường dây truyền tải quốc tế, Thanh Niên đã tổ chức phòng năng lượng tái tạo và hiệu quả năng lượng, thuộc Chương trình hỗ trợ năng lượng Bộ Công Thương-GIZ.

Để một bên tham gia hỗ trợ Bộ Công Thương VN trong lĩnh vực điện, GIZ có nhân đội dự án kinh doanh và truyền tải điện thương mại như thế nào?

Ông Jonas Hagemann: Sau một chuyến đi Tập đoàn điện lực VN (EVN) công bố cho thấy các nhà máy điện được xây dựng với tốc độ khá nhanh, tổng công suất điện nội địa được lắp đặt tăng từ 150 MW năm 2014 lên 4.400 MW. Trong khi đó có sự tăng đột biến phân phối và truyền tải điện thương mại nhiều.

Nhà máy điện hiện tại những khu vực sản xuất nhiều nhất là khu vực miền Bắc và vùng xuất khẩu điện đầu tiên là Ninh Thuận hoặc Bình Thuận từ châu Âu đến miền Bắc.

nhà máy điện gas và điện mặt trời hòa lưới là do sự cần thiết hiện tại cho quy định để Công chúng bảo quản các khu vực điện.

Để lập kế hoạch nguồn điện mặt trời cũng bị ảnh hưởng nhiều bởi hệ thống truyền tải.

Vietnam needs clear energy development: Int'l

Only help provide a vision with specific targets of renewable energy in the road map ahead.

CHƯƠNG TRÌNH QUỐC GIA VỀ SỬ DỤNG NĂNG LƯỢNG TIẾT KIỆM VÀ HIỆU QUẢ

Đề xuất giải pháp quản lý lưới điện, hỗ trợ năng lượng tái tạo

Ông NGUYỄN VĂN ĐÌNH, Phó Giám đốc Trung tâm Nghiên cứu và Phát triển Năng lượng Tái tạo và Hiệu quả Năng lượng (SGREE) của Bộ Công Thương.

Ông NGUYỄN VĂN ĐÌNH, Phó Giám đốc Trung tâm Nghiên cứu và Phát triển Năng lượng Tái tạo và Hiệu quả Năng lượng (SGREE) của Bộ Công Thương.

Ông NGUYỄN VĂN ĐÌNH, Phó Giám đốc Trung tâm Nghiên cứu và Phát triển Năng lượng Tái tạo và Hiệu quả Năng lượng (SGREE) của Bộ Công Thương.

Ông NGUYỄN VĂN ĐÌNH, Phó Giám đốc Trung tâm Nghiên cứu và Phát triển Năng lượng Tái tạo và Hiệu quả Năng lượng (SGREE) của Bộ Công Thương.

Ra mắt Nền tảng học trực tuyến về hòa lưới năng lượng tái tạo tại Việt Nam

Cục Điều tiết Điện lực Việt Nam (ERAV) trực thuộc Bộ Công Thương và Tổ chức Hợp tác Phát triển Đức-Giá (GIZ) vừa ra mắt lần đầu tiên Nền tảng học trực tuyến về chủ đề nối lưới nguồn năng lượng tái tạo (NLTT) tại Việt Nam.



Ngày 2.12 tại Đà Nẵng, với sự tham gia của đại diện ERAV, Tập đoàn Điện lực Việt Nam, các đối tác liên quan và Dự án Lưới điện Thông minh và Hiệu quả Năng lượng (SGREE), Dự án SGREE đã được Bộ Công Thương và Bộ Công Thương tổ chức ra mắt.

SOLARQUARTER logo and website header.

GIZ's Virtual Workshop Proposes Grid Management Recommendations For Optimal Operation Of Renewable Energy

Website footer with logos and navigation.

Công Thương

Tim hướng đi cho lưới điện thông minh ở Việt Nam

Công Thương Do là một dụng cụ chính của hệ thống "đảm bảo giải pháp công nghệ" để thúc đẩy phát triển kinh tế Việt Nam, diễn ra vào ngày 15/02/2019, tại Hà Nội với sự tham gia của 50 đại biểu đến từ Bộ Công Thương cùng các bộ ban ngành liên quan, chuyên gia trong nước và quốc tế, nhằm thảo luận và đề xuất các giải pháp để xây dựng và vận hành hệ thống lưới điện thông minh ở Việt Nam.

Hội thảo nằm trong các hoạt động của Dự án Lưới điện thông minh cho năng lượng tại Việt Nam và nằm dưới sự đồng tài trợ của Cục Điều tiết Điện lực - Bộ Công Thương và Tập đoàn EVN.

Phát biểu tại hội thảo, ông Nguyễn Thế Hùng - đại diện Cục Điều tiết Điện lực - cho biết: "Sau gần 7 năm thực hiện Quyết định số 167/QĐ-TTg ngày 07/10/2012 của Thủ tướng Chính phủ phê duyệt Đề án phát triển lưới điện thông minh tại Việt Nam, Bộ Công Thương đã có những bước tiến đáng kể trong việc nghiên cứu, triển khai và vận hành các hệ thống lưới điện thông minh ở Việt Nam. Tuy nhiên, để đạt được mục tiêu của Đề án, cần có những bước tiến mới, đặc biệt là trong việc nghiên cứu và triển khai các hệ thống lưới điện thông minh ở Việt Nam. Hội thảo này nhằm mục đích thảo luận và đề xuất các giải pháp để xây dựng và vận hành hệ thống lưới điện thông minh ở Việt Nam."



VIETNAM ECONOMIC TIMES

Smart Grid Development meeting held

Khởi đầu tuần lễ Lưới điện Thông minh Việt Nam 2019

Ngày 15/02/2019, tại Hà Nội, Tuần lễ Lưới điện Thông minh Việt Nam 2019 đã chính thức khai mạc. Sự kiện do Bộ Công Thương và Tổ chức Hợp tác Phát triển Quốc tế (ODA) đồng tài trợ.

Đến dự có các đại biểu từ Bộ Công Thương, các bộ ban ngành liên quan, chuyên gia trong nước và quốc tế. Ông Nguyễn Thế Hùng, đại diện Cục Điều tiết Điện lực, Bộ Công Thương, phát biểu tại buổi khai mạc.

Ông Hùng nhấn mạnh tầm quan trọng của việc nghiên cứu và triển khai các hệ thống lưới điện thông minh ở Việt Nam. Ông cho biết, việc nghiên cứu và triển khai các hệ thống lưới điện thông minh ở Việt Nam là một thách thức lớn, nhưng cũng là một cơ hội để Việt Nam nâng cao năng lực cạnh tranh và phát triển kinh tế. Ông đề nghị các chuyên gia tham gia hội thảo cùng nhau thảo luận và đề xuất các giải pháp để xây dựng và vận hành hệ thống lưới điện thông minh ở Việt Nam.



húc đẩy các ứng dụng mới của lưới điện thông minh tại Việt Nam

2/2022, tại Hà Nội, Hội thảo nghiên cứu và triển khai các ứng dụng mới của lưới điện thông minh tại Việt Nam đã diễn ra. Hội thảo do Bộ Công Thương và Tổ chức Hợp tác Phát triển Quốc tế (ODA) đồng tài trợ.

Hội thảo nhằm mục đích thảo luận và đề xuất các giải pháp để xây dựng và vận hành hệ thống lưới điện thông minh ở Việt Nam. Hội thảo có sự tham gia của các chuyên gia trong nước và quốc tế.



ĐẢNG CỘNG SẢN VIỆT NAM

Đảng Cộng Sản Việt Nam

Đảng Cộng Sản Việt Nam là một đảng chính trị duy nhất tại Việt Nam. Đảng được thành lập vào ngày 3/2/1930. Đảng có 4 triệu đảng viên và 75 triệu người dân Việt Nam là thành viên của Đảng.



Khởi đầu Tuần lễ Lưới điện thông minh Việt Nam 2019

Chiều 15/2, Tuần lễ Lưới điện thông minh Việt Nam 2019 do Cục Điều tiết Điện lực (Bộ Công Thương) và Tổ chức Hợp tác Phát triển Quốc tế (ODA) đồng tài trợ đã khai mạc tại Hà Nội.

Đến dự có các đại biểu từ Bộ Công Thương, các bộ ban ngành liên quan, chuyên gia trong nước và quốc tế. Ông Nguyễn Thế Hùng, đại diện Cục Điều tiết Điện lực, Bộ Công Thương, phát biểu tại buổi khai mạc.



Vietnamf

Thúc đẩy các ứng dụng mới của lưới điện thông minh tại Việt Nam

Việt Namf là một công ty chuyên cung cấp các giải pháp và dịch vụ cho ngành năng lượng. Công ty có sự tham gia của các chuyên gia trong nước và quốc tế.

Việt Namf đang nghiên cứu và triển khai các ứng dụng mới của lưới điện thông minh ở Việt Nam. Công ty mong muốn hợp tác với các chuyên gia trong nước và quốc tế để nghiên cứu và triển khai các ứng dụng mới của lưới điện thông minh ở Việt Nam.



LAO ĐỘNG

KINH DOANH

Khuyến nghị sửa đổi Lộ trình phát triển Lưới điện thông minh của Việt Nam

Việt Nam cần cần thiết cần có một lộ trình phát triển Lưới điện Thông minh nhằm đảm bảo tính bền vững của hệ thống điện quốc gia. Tâm thế đổi mới, đổi mới công nghệ, đổi mới quản lý và điều hành, phân bổ nguồn lực và tích hợp các nguồn năng lượng phân tán.

Việt Nam cần cần thiết cần có một lộ trình phát triển Lưới điện Thông minh nhằm đảm bảo tính bền vững của hệ thống điện quốc gia. Tâm thế đổi mới, đổi mới công nghệ, đổi mới quản lý và điều hành, phân bổ nguồn lực và tích hợp các nguồn năng lượng phân tán.



PetroTimes

Academy Day 2021 - Thúc đẩy nghiên cứu lưới điện thông minh

Academy Day 2021 là một sự kiện nhằm thúc đẩy nghiên cứu và triển khai các ứng dụng mới của lưới điện thông minh ở Việt Nam. Sự kiện do Bộ Công Thương và Tổ chức Hợp tác Phát triển Quốc tế (ODA) đồng tài trợ.

Academy Day 2021 có sự tham gia của các chuyên gia trong nước và quốc tế. Sự kiện nhằm mục đích thảo luận và đề xuất các giải pháp để xây dựng và vận hành hệ thống lưới điện thông minh ở Việt Nam.





Please scan the QR code
to read this magazine.

