SECOE
SUSTAINABLE ENERGY CENTER OF EXCELLENCE

"CONNECTING POLICY, TECHNOLOGY & FINANCE THROUGH KNOWLEDGE"

*Workshop Report*

# Integrating Renewables into the Grid Workshop

Astana, Kazakhstan

22 - 25 Aug 2017

Prepared by the Sustainable Energy Association of Singapore (SEAS)

## Contents

# CBP-07. Integrating Renewables into the Grid Workshop
# 22 - 25 Aug 2017

The utility electric grids are facing major transformation, driven by increased penetration of renewable energy resources. A good understanding of the grid connection aspects of the renewables will be an added-advantage for any stakeholders involved in this area.

This course provided a comprehensive discussion on the technical, policy & financial aspects on grid integration of renewables, covering a wide spectrum of topics including system design, modelling, and technical assessment and grid operational issues. Case studies were presented to illustrate the impact of renewables which are largely intermittent on the grid infrastructure and operation.

The participants learnt the characteristics of the renewables impacting the smooth grid integration, how these characteristics affect system operation, the key system operational issues, tools for overcoming these issues and the system modelling and assessment concepts. This helped them to understand the motivation of their counterparts whether they work for renewable energy developers, the utility, regulators and policy makers or investors. They also learnt about smart grids and how they can be a tool for sustainability, efficient energy management and a must for future ready cities

28 participants (listed in Annex 1) from 9 countries attended the 4-day workshop. There were 9 resource speakers, 6 from Singapore, 2 from Germany and 1 from Scotland, presented and shared their knowledge and expertise with the participants in the workshop.

## Programme Day 1 – Tue, 22 Aug 2017

The workshop opened with an introduction to the Sustainable Energy Association of Singapore, the Sustainable Energy Centre of Excellence and the Ministry of Trade and Industry; the organizers of the workshop.

This was followed by a brief introduction to the programme and a Speed Networking session where the participants introduced themselves. A representative from each country was also given an opportunity to speak for 5 minutes on the state of renewable integration and the gaps and challenges they are facing in their respective countries.

The speakers then started the workshop proper by setting the stage for the next 3 days. A brief discussion was given on the different types of grids and this was followed by a presentation on how renewables are changing the way electricity markets are designed and operated stressing that there is an opportunity for the participants in the room to leap-frog some of the more advanced grids by adopting some of the strategies laid out in the course.

The day closed off with a technical presentation on Wind Energy and how it is integrated into the grid. There was good participation and interaction from the participants during this session as there is significant potential for Wind Energy in their countries.

## Programme Day 2 – Wed, 23 Aug 2017

The first half of the day 2 looked at the integration of solar PV and storage into the grid. With the participants now having a good idea of the two sources of renewables that cause the most challenges, the speakers went on to talk about the Dynamics of reshaping the grid to include renewables and the challenges around legal and regulatory conditions that are required to make this successful.

There was then a short video presentation from for Susumu Yoneoka who spoke about the financing options available from ADB for the upgrading of weak grids. Although Susumu could not be here, the session went well with several questions addressed via Skype and email.

The rest of the day was reserved for technical issues and challenges faced when integrating renewables into the grid. Although this section was very technical, it created a lot of interaction between the speakers and the participants. There were a number of engineering specific questions addressed, especially with regards to Wind Energy.




## Programme Day 3 – Thu, 24 Aug 2017

Day 3 started with a wrap up of the Challenges faced by the grid, followed by two proposed solutions. These were the use of storage and demand response to manage intermittency and balance the grid.

With an understanding of the solutions available, the speakers shared details on how to design an Electricity market with Renewable Integration, using examples from Kazakhstan and the region. The session was delivered in Russian which increased the interaction from the participants.

The Day ended with a group work session. The participants were given an example of a real problem that occurred in the Taiwanese grid recently and asked to provide potential solutions to the problem. This exercise got them thinking and set the stage for their final presentation on the last day.

## Programme Day 4 – Fri, 25 Aug 2017

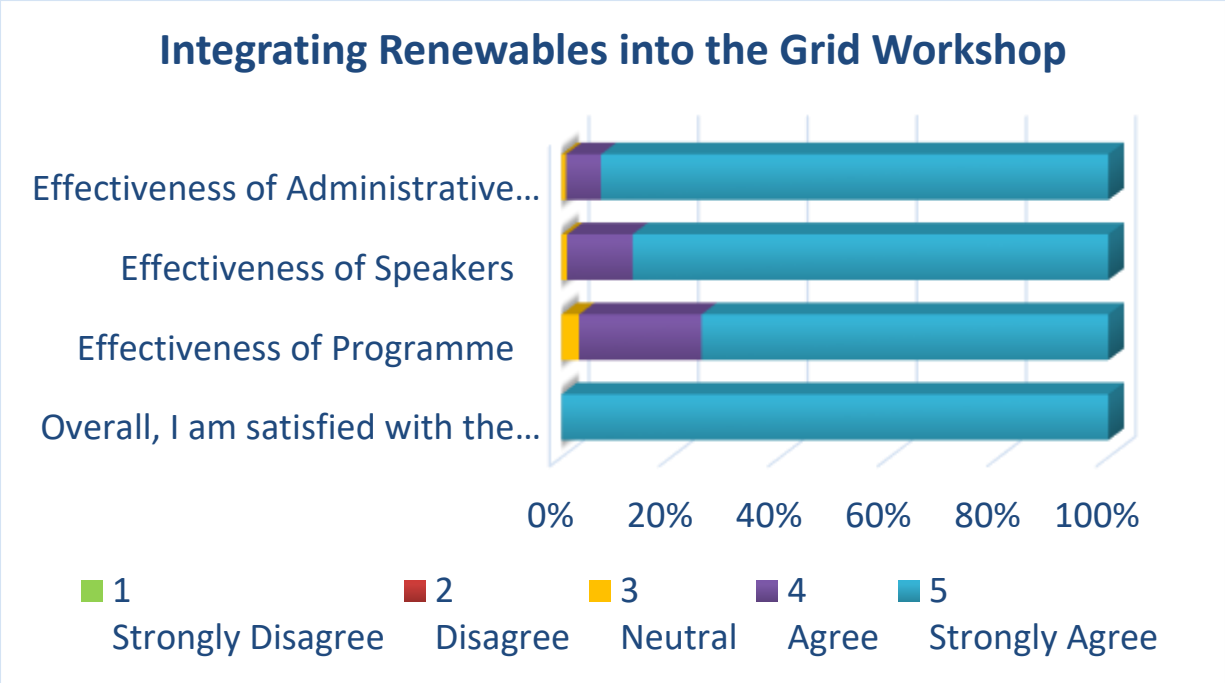
The final day of the workshop was reserved for Case Studies and Country presentations. The speakers showed examples of how grids have evolved over the last few years with the increase of RE integration.
A case-study on the Renewable Energy Integration Demonstrator Singapore (REIDS) was delivered via a Video recording. This gave participants an overview of the good work that is being done in Singapore in this space.

The workshop concluded with each of the participating countries working on and presenting the lessons they had learned over the week and how they can apply some of these lessons to their grids.

Overall, the workshop was a success with excellent interaction and discussions between the participants and the speakers. During the discussions it was highlighted that there was a lot of potential work to be done in making transmission and distribution networks 'RE ready'. However, there was a lack of funding to drive these initiatives.

## Feedback

The participants' responses are as follows:



## Annex 1 – Participant and Speaker List

| No. | Title | Full Name | Job Title | Name of Institution/ Organisation | Country |
|---|---|---|---|---|---|
| 1 | Mrs | Viktorya Keshishyan | Head of Division | Ministry of Energy Infrastructures and Natural Resources of the Republic of Armenia | Armenia |
| 2 | Mr | Rufat Aghayev | Senior Adviser | The Ministry of Energy of Azerbaijan Republic, State Administration of Gas Control | Azerbaijan |
| 3 | Mrs | Shahasta Mustafayeva | Adviser | State Agency on Alternative and Renewable Energy Sources | Azerbaijan |
| 4 | Mrs | Nurangiz Farajullayeva | Senior Adviser | Ministry of Energy of Azerbaijan Republic | Azerbaijan |
| 5 | Ms | Abasova Khatirekhanim | Adviser | Ministry of Energy of Azerbaijan Republic | Azerbaijan |
| 6 | Mr | Sanan Abbasov | Head of Department | State Agency on Alternative and Renewable Energy Sources of AR | Azerbaijan |
| 7 | Mrs | Bialkouskaya Liubou | Leading Specialist | Minsk Regional Department for Supervision over Rational use of Fuel and Energy Resources, Department for Energy Efficiency | Belarus |
| 8 | Mr | Uladzimir Shauchonak | Deputy Head of the Department | Department for Energy Efficiency, State Committee for Standardization of the Republic of Belarus | Belarus |
| 9 | Mr | Kanstantsin Chorny | Chief of Department | Committee on Economy of Vitebsk Regional Administration | Belarus |
| 10 | Mr | Zviad Gachechiladze | Deputy Director | Georgian National Energy and Water Supply Regulatory Commission | Georgia |

| No. | Title | Full Name | Job Title | Name of Institution/ Organisation | Country |
|---|---|---|---|---|---|
| 11 | Mr | Abdullakh Abishev | Chief Expert | Committee for Roads Ministry of Investment and Development of Kazakhstan | Kazakhstan |
| 12 | Ms | Baramyssova Saule | Manager of Division | JSC KEGOC | Kazakhstan |
| 13 | Mr | Zhenis Dyussenov | Head of Department | JSC Financial Settlement Center | Kazakhstan |
| 14 | Mr | Rustam Sadykov | Head of Unit | National Energy Holding Company OJSC | Kyrgyz |
| 15 | Mr | Nurgazy Zheenbekov | Expert | National Energy Holding Company OJSC | Kyrgyz |
| 16 | Ms | Alina Kuznetosova | Leading Specialist | Ministry of Industry and Trade of the Republic of Tatarstan | Russia |
| 17 | Mr | Bolshakov Andrey | Director of Power Engineering | SO UPS, JSC <<Branch Regional Dispatching Office, Energy System of the Republic of Tatarstan>> | Russia |
| 18 | Mr | Maxim Paramonov | Engineer | JSC <<GRID COMPANY>> | Russia |
| 19 | Mr | Sadykov Alexander | Senior Engineer | JSC <<GRID COMPANY>> | Russia |
| 20 | Mr | Sergeev Aleksei | Deputy Minister | Ministry of Industry and Trade of the Republic of Tatarstan | Russia |
| 21 | Mr | Ivan Ivanov | General Director | JSC, NELE | Russia |
| 22 | Mr | Vafo Abdulvorisi | Chief Specialist | Ministry of Economic Development and Trade of the Republic of Tajikistan | Tajikistan |
| 23 | Mr | Alimov Khasan | Chief Project Engineer | JSK "Teploelectroproekt" | Uzbekistan |
| 24 | Mr | Alisher Kamoliddinov | Junior Researcher | International Solar Energy Institute | Uzbekistan |
| 25 | Mr | Artikov Ravshan | Deputy Director | JSK "Spedazenergosetproekt" JSK "Uzbekenergo" | Uzbekistan |
| 26 | Ms | Shirin Sadullaeva | Junior Researcher | International Solar Energy Institute | Uzbekistan |

| No. | Title | Full Name | Job Title | Name of Institution/ Organisation | Country |
|---|---|---|---|---|---|
| 27 | Mr | Tukhtaev Kozimkhodja | Head of Department | JSK "Uzbekenergo" | Uzbekistan |
| 28 | Mr | Yevgeny Nikolayev | 1st category expert of the Prospective Development Dept. | Ministy of Industry and Trade of the Republic of Tatarstan | Russia |

**Registered but did not attend**

| No. | Title | Full Name | Job Title | Name of Institution/ Organisation | Country |
|---|---|---|---|---|---|
| 1 | Mr | Sapargaliyev Madiyar | Chief Specialist | JSC Financial Settlement Center | Kazakhstan |

| No. | Title | Full Name | Job Title/ Position | Name of Institution/ Organisation | Country |
|---|---|---|---|---|---|
| 1 | Mr | Mark Netto | Co-Founder | 75 Ventures Pte Ltd | Singapore |
| 2 | Mr | Mathias Steck | Executive Vice President | DNV GL | Singapore |
| 3 | Mr | Chen Li | Principal Consultant | DNV GL | Singapore |
| 4 | Mr | Cornelis Jan Van Oeveren | Country Manager | DNV GL | Singapore |
| 5 | Dr | Kelvin Tan | Head of Section | DNV GL | Singapore |
| 6 | Dr | Andreas Schroter | Executive Vice President | DNV GL | Singapore |
| 7 | Dr | Lewington Ilka | Principal Consultant | DNV GL | Singapore |
| 8 | Dr | Paul Gardner | Principal Engineer | DNV GL | Singapore |