

Workshop Report

Smart Cities Workshop: Smart Multi Energy Systems

Astana, Kazakhstan

7 – 10 June 2017

Prepared by the Sustainable Energy Association of Singapore (SEAS)

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CBP-01. Smart Cities Workshop: Smart Multi Energy Systems

7 – 10 June 2017

The last decade has seen the articulation of a national future vision across developing and developed economies to build smart cities, smart communities, smart homes and smart buildings, in a bid to enhance to quality of life for their citizens. The energy system being just one of the many areas i.e., healthcare, education, transport, security, water etc, that intelligent devices has made their presence known. This has been driven by ubiquitous availability of information and communication technologies. In energy, the advancement and availability of technologies related to renewable energy, Hybrid AC/DC Micro Grid, building management systems, energy storage, sensors and communications networks as well as data analytics provides the opportunity to integrate disparate systems within a multi-use site onto a systems-on-systems optimizing platform. Such a smart multi energy system is a spring board to transform big data using intelligent algorithms into smart data that will enable complex systems to achieve optimal energy balance with minimal wastage. This smart data can further enhance site operators achieve more accurate predictive and prescriptive maintenance, failure detection and prediction, as well as monetize the assets through real time interactions with the energy market. The interoperability and compatibility with legacy systems is mandatory to fully realize the benefits of system-on-system control platforms.

The objective of this workshop was to educate policy makers and technology adopters regarding the complexities and benefits of “smart” system-of-system level solutions for the energy sector.

By the end of the course, the participants were able to:

- Have overall understanding on the diversity of “smart city” development and demonstration
- Appreciate the complexities and key enabling conditions for developing a smart multi energy system.
- Understand basics of the electricity and energy markets, resilient and intelligent energy systems and key infrastructure deployment considerations and the influence of the building in the energy demand landscape.
- Present an outline of their national challenges

The first workshop from a series of 7 programmes planned to run alongside the Future Energy Expo 2017 was on Smart Multi Energy Systems on 7 – 10 June 2017.

21 participants from 7 countries attended the 4-day workshop. Participants are listed in Annex 1. There were 6 resource speakers from Singapore presenting in the workshop. The speakers were from organisations such as the Energy Research Institute @ NTU, DNV GL, Surbana Jurong, Red Dot Power and 75 Ventures sharing their knowledge and expertise with the participants.

Programme Day 1 – Wednesday, 7 June 2017



SEAS Chairman, Mr Edwin Khew, welcomed the participants and speakers to the workshop and was followed by a welcome address and introduction to Singapore, SECOE and SEAS by Ms Kavita Gandhi, Executive Director of SEAS.

The first day session discussed background of Smart Multi Energy Systems (SMES) and the important role in establishing a smart city. The participants had a broad understanding of how a Smart City is planned and how they can include Smart Energy Systems into their Smart Cities.

The programme proper started with a session on Smart and Future Ready Cities – Global “Smart” Projects Snapshot, delivered by Tan Szue Hann, Head of Sustainability, Surbana Jurong. Szue Hann an architect by training gave an overview of how city planners think about and design Smart Cities, giving examples of Singapore, Pattaya and Los Angeles. This session gave the participants an overarching view of a Smart City.

The next session was delivered by Praveen Chandrashekar, Senior Executive Associate (ESD), Surbana Jurong, continued the discussion on Smart Cities, but from an engineering viewpoint. This gave the participants an understanding of the differences in views when designing smart cities.

Programme Day 2 – Thursday, 8 June 2017

The first half of Day 2 was covered by Mr. Vijay Sirse, CEO of Red Dot Power. As a practitioner operating in industry, his session was meant to give an overview of the Energy Market in Singapore as well as the Interruptible Load and Demand Response Schemes.

Kicking off with an overview of the National Energy Market of Singapore (NEMS), Vijay then proceeded to explain how the energy is priced using a competitive bidding system, practiced by the generators. Once the participants understood the dynamics of the market, he then elaborated on 2 schemes, the Interruptible Load Scheme and the Demand Response Scheme. Both schemes apply the concept of a 'Virtual Power Plant' to overcome challenges that could be faced by the operators of the electricity transmission and distribution networks, like Singapore PowerGrid (SPPG). He explained how the application of such 'Smart' management systems can improve reliability while reducing the cost of energy and eliminating the need for peaking power plants, which are typically not very environmentally friendly.

The session was well received by the participants, with those from Georgia being extremely interested as they are very close to launching their energy market by the end of the decade. They were very interested in the mechanics for deployment of the above-mentioned schemes.

The second half of the day was spent on the first round of Country Presentations. Participants from each of the 7 countries introduced their countries and the key challenges their country's energy system was facing.

Programme Day 3 – Friday, 9 June 2017

On Day 3 Mr. Seow Kang Seng with his extensive experience in Energy Market Authority (EMA), gave an overview of gas & energy networks in Singapore and their transition from analogue to digital state. Discussions and examples were shared on Distributed Energy systems, micro-grids, storage, district scale heating and cooling systems. He concluded by sharing what he believed to be future challenges that will be faced by the Energy & Power Systems.



The session continued with Dr Sanjay Kuttan on active designs vs passive designs in buildings. He explained that because buildings are a large component of a city's energy demand, understanding how to manage the consumption of buildings will have a great impact on how to manage the smart energy systems.

Dr Sanjay then elaborated about sensors, sensor networks and the ICT core. These are essential elements required to obtain data. The data can then be processed and analyzed for a better understanding of the systems in play. The data also allows us to optimize and model changes and future developments to the

system. Lastly, with the use of algorithms, we can forecast and project energy supply and demand accurately thus allowing us to optimize effectively.

Programme Day 4 – Saturday, 10 June 2017

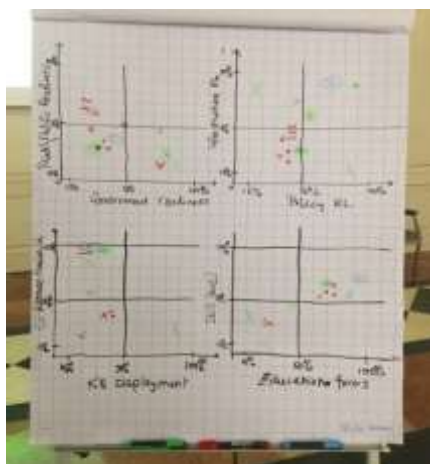
On the final day of the programme, there were some group discussion and the speakers spent time with each group advising / providing feedback on the final presentations.

The participants then proceed with the final presentations from each of the participating Countries. These presentations focused mainly on the barriers faced by each country when considering the implementation of Smart Multi Energy Systems. Once the presentations were completed, they proceeded to rank their countries.

The objective of the above exercise was to give the participants some tangible policy areas that they could work on when they returned to their home countries. This tied all of the previous days sessions together in the perspective of where they are in Smart City development in each of their respective countries.



Results



To end the session, we adjourned to the Singapore Pavilion at the Expo 2017. Mr. Khew gave a closing address before congratulating and handing out certificates to the participants.

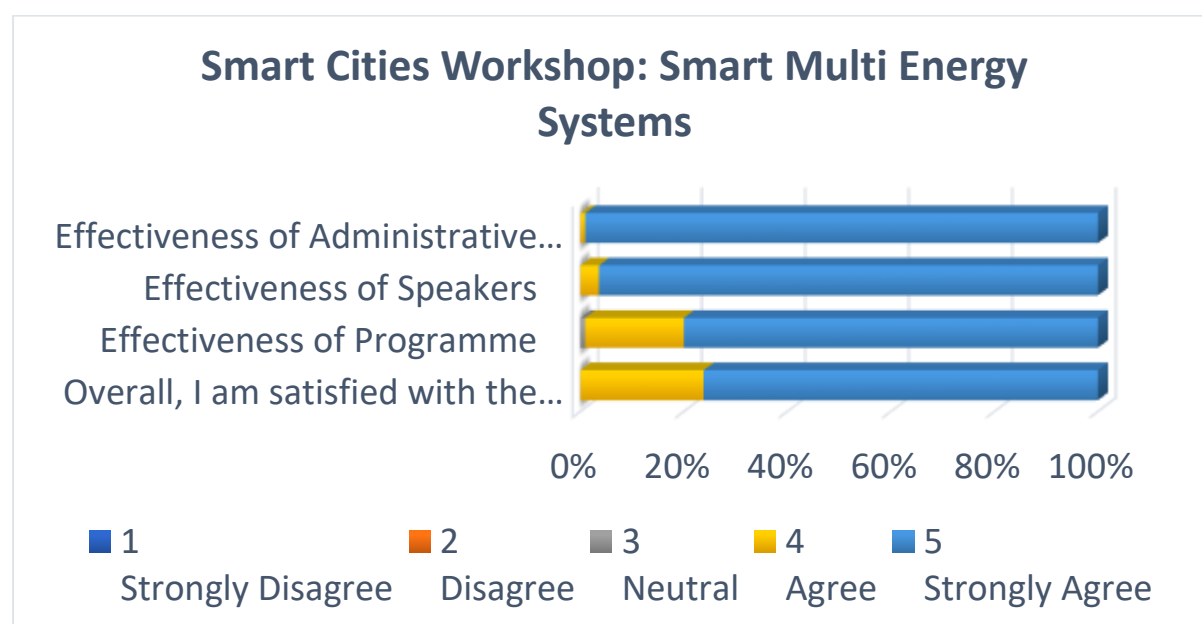
The evening ended with the participants joining in for the opening ceremony of the Singapore Pavilion.



Feedback

At the end of the workshop, the participants' responses were extremely positive in all aspects of the programme and logistics.

Detailed feedback and comments can be found in Annex 2.



Annex 1 – Participant and Speaker List

No.	Title	Full Name	Job Title/ Position	Name of Institution/ Organisation	Country
Participants					
1	Mr	Abbas Aliyev	Head of the Determination of Alternative and Renewable Energy Resources and Observation Laboratory	"Azalternativenergy" LLC, State Agency on Alternative and Renewable Energy Sources of Azerbaijan Republic	Azerbaijan
2	Mr	Abaskanov Nurbek	Deputy Chairman of the Board	National Energy Holding Company OJSC	Kyrgyzstan
3	Mr	Azizboy Khaitmukhamedov Ergashbayevich	Head of Department	International Solar Energy Institute	Uzbekistan
4	Mr	Bekov Kubanych	Expert	National Energy Holding Company OJSC	Kyrgyzstan
5	Ms	Beridze Natia	Chief Specialist	Ministry of Energy of Georgia	Georgia
6	Mr	Chorny Kanstantsin	Chief of Investment and Innovations Department	Committee on Economy of Vitebsk Regional Administration	Belarus
7	Mr	Dukh Aliaksey	Chief	Gomel Regional Management of Energy Efficiency	Belarus
8	Mr	Erkin Juraev	Project Leader	Physical-Technical Institute, Academy of Science	Uzbekistan
9	Mr	Jafar Huseynov	Department Head	The Ministry of Energy, State Office of Controlling Energy	Azerbaijan
10	Ms	Mazanik Tatsiana	Senior Specialist	Energy Efficiency Department of the State Committee for Standardization of the Republic of Belarus	Belarus

No.	Title	Full Name	Job Title/ Position	Name of Institution/ Organisation	Country
11	Mr	Murodbek Kuralov Artikaliyevich	Head of Department	International Solar Energy Institute	Uzbekistan
12	Mr	Naghizade Jeyhun	Head of Department	The Ministry of Energy of Azerbaijan Republic, State Administration of Gas Control	Azerbaijan
13	Ms	Papayan Anna	Leading Specialist	Ministry of Energy of Infrastructures and Natural Resources of the Republic of Armenia	Armenia
14	Mr	Rustam Rashidovich Kobulov	Project Leader	Physical-Technical Institute, Academy of Science	Uzbekistan
15	Ms	Sandroshvili Ketevan	Department Head	Electricity System Commercial Operator (ESCO) - The Power Market Operator of Georgia	Georgia
16	Mr	Shukakidze Giorgi	Deputy Head of Department	Ministry of Energy of Georgia	Georgia
17	Mr	Sumbadze Nikoloz	Chief Specialist	Georgian National Energy and Water Supply Regulatory Commission	Georgia
18	Mr	Tur Ihar	Head of the Department	Energy Efficiency Department of the State Committee for Standardization of the Republic of Belarus	Belarus
19	Mr	Yusifov Jabir	Deputy Head of the Department	State Agency on Alternative and Renewable Energy Sources of Azerbaijan Republic	Azerbaijan
20	Mrs	Uali Zhuldyzay	Uali Zhuldyzay	Uali Zhuldyzay	Kazakhstan
21	Mrs	Zhuk Tatsiana	Senior Specialist	Vitebsk Branch of the Department for Energy Efficiency, State Committee for Standardization of the Republic of Belarus	Belarus

No.	Title	Full Name	Job Title/ Position	Name of Institution/ Organisation	Country
1	Mr	Mark Gerard Netto	Co-Founder	75 Ventures Pte Ltd	Singapore
2	Dr	Sanjay S/O Chittarajan Kuttan	Program Director	Energy Research Institute, Nanyang Technological University (ERI@N)	Singapore
3	Mr	Edwin Khew Teck Fook	Chairman	Sustainable Energy Association of Singapore	Singapore
4	Ms	Nor Azlyn Supingi	Assistant Director	Sustainable Energy Association of Singapore	Singapore
5	Ms	Kavita Gandhi	Executive Director	Sustainable Energy Association of Singapore	Singapore
6	Mr	Tan Szue Hann	Head	Surbana Jurong Pte Ltd	Singapore
7	Mr	Vijay Kumar Murgeppa	Founder Chairman and CEO	vTrium Energy Pte. Ltd and Red Dot Power	Singapore
8	Mr	Seow Kang Seng	Principal Consultant	Personal Capacity	Singapore
9	Mr	Praveen Hassan Chandrashekar	Senior Executive Associate (ESD)	Surbana Jurong Pte Ltd	Singapore

Annex 2 – Detailed Feedback



Name of Programme: Smart Cities Workshop: Smart Multi Energy Systems
Date(s) of Programme: 07/06/2017 to 10/06/2017
No. of Participants: 21
Number of Evaluations Submitted: 21
% of Evaluations Submitted: **100.00%**

	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree	Total
Overall, I am satisfied with the workshop	0%	0%	0%	24%	76%	100%
Effectiveness of Programme	0%	0%	1%	19%	80%	100%
Effectiveness of Speakers	0%	0%	0%	4%	96%	100%
Effectiveness of Administrative Support & Facilities	0%	0%	0%	1%	99%	100%

