**1. SMART ENERGY NETWORK**

To devise innovative and sustainable energy solutions and prevent energy losses, developing smart energy technologies is necessary, while being conscious of the urban environment protection. It was emphasized that coupling of digital technologies (such as IoT, AI, mobile and cloud computing) with energy infrastructure as well as the gathering and utilization of bigdata is crucial. For example, independent microgrid can be important for enhancing the security, reliability, sustainability, resilience, and economics of electric power system.

**2. HYPER-CONNECTED LIFE**

Today, we live in a shrinking world thanks to advanced Information & Communication Technologies, 5G mobile communications, and advanced transportations, etc. What are the challenges of an increasingly interdependent world? current digital connectivity is too device-centric . It should be more changed to a human-centric model, supporting human ability to build a cooperative co-existence with digital connectivity services. The technologies will enable hyper-connected life, and provide more efficient way to keep the relationship with pandemic, especially combined with ICT.

**3. EDUCATION FOR SMART SOCIETY**

The key issue was that the engineering education need to be change to meet the needs of the changing society. The future society may require not just technically innovative engineers, but also socially innovative engineers. And the educational gap among the counties can be reduced by the power of education technology that is carefully designed. Hence, engineering education need to be more cross-disciplinary and be more inclusive in terms of gender and region, which can be based on the increased use of digital learning environment. Finally, we would need to also perceive data privacy is a critical issue, and establish a system to protect data originators.

**4. CLIMATE CHANGE**

Participant agreed on the notion that we have only a narrow window left to decarbonize society to limit global warming to 1.5 degree Celsius as reported by IPCC. Managing risks to cities, and meeting SDGs and global climate goals will require an integrated and systems scale response. Hence, how we engineer our urban infrastructure would modify urban resilience as well as greenhouse gas emissions from the cities. Not just technology development, but also systematic policy and social consensus is crucial dealing with the , and.

The main theme of CAETS 2020 conference is "Engineering a Better World - Smart Society," and the conference aims at covering both technical & sociopolitical aspects to make our society more sustainable in a smarter way (or via more efficient routes). Smarter societies are already emerging all around us, and we must be prepared and wise enough in facing the infinite opportunities and challenges of these changes. We all must take advantage of the new technologies and at the same time prevent the crises and side effects of using them. The conference is organized to be a platform for figuring out together what current issues and challenges we will face in developing sustainable societies. While we think about the issues and questions, we have to put our minds together to solve the problems reasonably.

**Session 1 – Chinho Park, Moderator**

In this context, Session 1 plans to cover the issues related with “, and to vision our

To create sustainable societies and stop climate crises, we need to develop new technologies, again centered on issues related with urban areas, together with proper political leadership and citizen's support.

Session 1 began with a speech by a non-technical person, Ashleigh Edwards, who is a freshman student at Johns Hopkins University, U.S.A. She started her speech by saying that “I grew up in a place built on 'dirty energy', waking up with coal dust on the windowsill. Though this industry protected the livelihood of my forefathers, it threatened the livelihood of my generation. As I grew, reports of imminent global warming and a dim future grew as well. Though the coal trains slowed past my house and soon became fully absent, once in a hundred-year floods became once a year and the whole coastline of my home country burns once a year. The scary future that your generations were shown as kids is my present, it is our "now"…. And she finished her speech by asking the following question to the specialists invited to session 1 and to the audience. She said, “To the intellectuals and engineers seated before me, I have a simple question with a complex answer: "How will you do your part in protecting the future of society? How will you change the way we power our world?"

Three speakers and panelists delivered their expertise and insights to the audience: The first speaker was from Korea Telecom (KT), Korea, Dr. Sunguk Justin Moon, Senior Vice President and Head of Enterprise New Business Division, and he shared with us “KT’s Vision for Smart Energy Network.” KT developed energy digital transformation and open innovation platforms recently to solve urban energy issues, namely KT-MEG and e-Brain. The second speaker was from Hitach, Japan, Dr. Ayumu Morita, General Manager of Hitachi Research Laboratory, R&D Group, Hitachi, Ltd. He delivered his talks about “Hitachi’s R&D Activities for Smart Grid” and demonstrated many showcase examples and demonstration projects in Japan related with smart energy network. The third speaker was from Illinois Institute of Technology (IIT), U.S.A., a University Distinguished Professor and Director of Galvin Center for Electricity Innovation. He talked about “Microgrids for Enhancing the Security, Reliability, Sustainability, Resilience, and Economics of Electric Power Systems,” and he showed how the entire IIT campus and nearby Chicago city area could be operated in a independent microgrid structure.

Then three panelists, Dr. Jong-Woong John Choe, a CEO and Founder of Encored, Korea, Brian Vad Mathiesen, a Professor at Aalborg University, Denmark, and Dr. Andreas Ulbig, a Founder and COO of Adaptricity, Switzerland, delivered their views on future smart energy network in urban environment, emphasizing the importance of digital technologies (such as IoT, AI, mobile and cloud computing) coupled with energy infrastructure as well as the gathering of big data and its utilization aligned with new business models.

Session 1 ended with the wrap-up comment by the moderator, saying “The problems we created are very complex, and there is no “panacea” or a cure-all solution to these problems. Although we created the problems that Ashleigh mentioned, we also created technologies that can cure them. Let’s all work together to make our society more sustainable by doing OECD, which stand for Optimize, Electrify, Capture, and Decarbonize” our energy generation and consumption systems and modernizing our energy infrastructure to wards Smart Energy Network.”

**Session 2 – Inkeun Lee, Moderator**

The title of Session 2 is ‘Hyper-connected Life’. Today, we are living in a shrinking world thanks to advanced Information & Communication Technologies, 5G mobile communications, and advanced transportation, etc. We would like to look at what has enabled hyper-connected societies and discuss challenges and desirable future of an increasingly interdependent world.

Session 2 was introduced by a young engineer, Dongsoo Jun who is studying for a PhD in at Yonsei University. He explained that the recent development in ICT has dramatically increased connectivity, which is bringing fundamental changes to our lives. This change may be a great opportunity for us, but we also have challenges to overcome. He asked the experts two questions. These are ‘How can the utilization and protection of data be harmonized?’ and ‘What will the use case of hyper-connected life look like?’

The first speaker, Dr Won Pyo HONG (President and CEO of Samsung SDS) presented under the title of ‘Realizing a hyper-connected life through ICT’. He summarized how our lives are evolving into hyper-connected life through continuous advancements in ICT, focusing on the crucial roles of four technology enablers, Connectivity, Intelligence, Automation and data security. The second speaker, Hugh Bradlow (President of Australian Academy of Technology and Engineering) gave a talk titled ‘Technology and the Pandemic: A scorecard’. He introduced Australia's experience during the pandemic. He showed a technological change between SARS in 2003 and Covid-19 this year. There has been tremendous technological development. He stressed that the pandemic has been the trigger for widespread technology adaption. He also highlighted the shortcomings of the technology and the relationship between technology and the society. The last speaker, Young Tae KIM (Secretary-General of International Transport Forum) made a speech titled ‘Transport and Hyper Connected Life: Opportunities and Challenges’. He explained how transport, traditional means of physical connection, is changing with technological advances. He explained five tasks in transport, digitalization, universal access, safety and security, connectivity and decarbonization, adding the opportunities and challenges that these will bring us. In addition, he emphasized that citizens' perception, behavior and ethical issues were as important as technological development. He also mentioned the hygiene of public transportation in order to address the Pandemic.

Then three experts participated in the discussions. Donyun Kim (Professor of urban design at Sungkyunkwan University) talked about Smart City. He explained how advanced technologies would change our cities. He claimed our cities would be hyper-connected places with new tech, such as 5G, IoT and AI and these contribute to improve citizens’ happiness and quality of life. Ann Louise Johansson (General Manager, Qamcom Research & Technology, Sweden) introduced Stockholm’s ambition to be the smartest city in the world in 20 years. They will create a smart and connected city using digitalization and new technologies, making life simpler and better for citizens. Dimitra Simeonidou (Chair professor, High Performance Networks, University of Bristol) argued that current digital connectivity was too device-centric and should be changed to a human-centric model, supporting human ability to build a cooperative co-existence with digital connectivity services. She also suggested that future connectivity services should provide very high level of user experience that is now unimaginable, driven by new cognitive, predictive and contextual capabilities.

The speakers and panelists well covered the future of hyper-connected life. Speakers explained the technologies that enable hyper-connected life, the relationship with pandemic and how our lives would change in transport combined with ICT. Panelists shared their perspectives on Smart City and a desirable relationship between devices and human-beings. The Moderator thought they answered Dongsoo in sufficient detail and gave insights to the audience as well.

**Session 3 – Il Moon, Moderator**

The title of Session 3 is ‘Education for Smart Society’. The theme is engineering education, which is crucial for preparing the future society. The key issue was that the engineering education need to be change to meet the needs of the changing society. The future society may require not just technically innovative but also socially innovative engineers. And the educational gap among the counties can be reduced by the power of education technology that is carefully designed. Session 3 was introduced by Jeong woo Park who is the 2nd year student at Minerva School at KGI. Her is a question whether current engineering education is on the right track to make student to be prepare for the future problems that they need to face and solved. He emphasized the importance of interdisciplinary approach in education, and expected the education systems providing opportunities to enhance problem solve capability of the students.

The first speaker, Dr. Jian Wang, Chairman, Alibaba Group Technology Committee, presented the importance of innovation in the field of education based on his personal experience, under the title of ‘Education and Innovation in Smart Society’. He summarized his lives as a professor at Hangzhou, a researcher at Microsoft, a CTO at Alibaba Group, and representative at non-profit organization to address the importance of innovative thinking and attitude. He suggested that, with a long term vision, it is crucial to take advantage of different approaches and synergies of different fields working together, when you want innovation.

The second speaker, Dr. Ainomaija Haarla Academy of Technical Sciences at Finland, gave a talk titled ‘Engineering Education for Future Smart Society’. She introduced a smart and sustainable society, which she called “Society 5.0”. She urged that Society 5.0 will need more engineers not only with technical solutions but also with new type of skills, including leadership, communication, and patience to deliver the idea, and so forth. Moreover, recent COVID-19 pandemic taught us that we cannot predict the future, and need to be ready for changes and be creative. Hence, engineering education need to be more cross-disciplinary and peer-learning is un-used potential, which can be based on the increased use of digital learning environment.

The last speaker, Sooin Lee, CEO and Co-founder of Enuma, made a speech titled ‘Better Education for All’. She explained that international education-gap is getting worse by showing the estimated number of out-of-School Learners increasing from 264 million to 500 Million before and after 2020. Hence, she emphasized that this education-gap can reduced by the power of self-learning education technology. And she showed that the education technology can be effective with universal design and using game-based learning software.

Three experts participated in the discussions. Myongsook Susan Oh (President, Korean Society for Engineering Education) added more insights on the importance of diversity and inclusion in the engineering education. Especially, she emphasized that the number of gender difference enrolled in engineering colleges needs to be reduced, and minority group needs more chance to get high quality engineering education locally as well as globally. Geoff Chase, Distinguished Professor, University of Cantebury defined education as a “foundation technology” that can make changes. He insists that education needs to be more productive, which is not just delivering facts but delivering learning capability. In this aspect, he suggests that new technology, such as AI and online-learning solutions, can be a solution for increasing the productivity of education. Cristina Riesen, Founder and CEO at Educreators Foundation) also agreed on the effectiveness of education technology and the spread of online education overall. He shared examples of using AI-based solutions, and bigdata for personalized education. However, she alarmed us data privacy is a critical issue, and insisted that systems to protect data originators has to be established.

Overall, the speakers and panelists well covered the future of engineering education. They all had consensus on the changing needs of engineering education, and envisioned the power of technologies that can be more productive in closing the education-gap among countries, communities, and preparing the future.

**Session 4 – Won-Tae Kwon, Moderator**

Major topic of Session 4 is ‘Climate Change Issues and Challenges in Urban Environment’. ‘The United in Science 2020 report’, published on 9 September, has presented the latest scientific findings related to climate change for the period of 2016-2020. The key findings includes that global warming is +1.1℃ since the 19th century; greenhouse gas(GHG) concentrations reached new record highs, and impacts of warming affects glaciers, oceans, nature, economies and human living conditions due to extreme events (such as heavy rain falls, tropical storms, heat waves, droughts, forest fires, etc.). For Session4, we would like to discuss on the role of cities to stop climate crises and how to transform ur ban societies for sustainable future.

Session 4 has started with an opening speech by Ms. Ji Hyeon (Cherry) Sung, a 14-year-old environmental activist attending Chadwick International and the youngest campaigner of Greenpeace Korea. She stated the current crises, climate change and COVID-19, have caused the most vulnerable being affected the most and it is more necessary than ever to establish and comply policies for sustainable future. Ms. Sung asked the CAETS 2020 participants four questions including ‘Can the Earth and humankind be healed together?’.

The first speaker, Mr. Sang-Hyup Kim, President of the Jeju Research Institute, Korea presented ‘Jeju Green Big Bang: a case of carbon free island Jeju, Korea’. He introduced Korea’s Low Carbon Green Growth policy (which has declared in 2008) in retrospect and Green Big Bang and Carbon Free Island (CFI) Jeju. The CFI 2030 is about reducing greenhouse gas emissions ambitiously through achieving objectives including 100% RE and 100 % EV. Four pillars of green big bang are renewable energy, energy storage system, electric vehicle and smart grid. Some of the technological and social issues includes energy curtailment and getting the social consensus from the people.

Prof. Richard J. Dawson of Newcastle University, UK discussed about ‘Climate resilient cities and infrastructure’. His main topic is how we engineer our urban infrastructure would modify urban resilience as well as greenhouse gas emissions from the cities. He reviewed some key challenges and set out how an integrated systems scale response is required to achieve resilience to climate change in urban areas. He summarized that managing risks to cities, and meeting SDGs and global climate goals will require an integrated and systems scale response.

Frank Rijsberman, Director General of Global Green Growth Institute, introduced ‘Green technology to fight the climate crisis’. He emphasized that we have only a narrow window left to decarbonize society to limit global warming to 1.5 degree Celsius as reported by IPCC. Technology (RE, EV, Hydrogen, zero-energy buildings, smart agriculture, AI, etc.) has a critical role to lay in the transformation to a sustainable and inclusive economic model that we call “green growth”.

Session 4 also had three panelists, Dr. Akhilesh Gupta, Adviser and Head of Scientist-G & Strategic Programmes, Minister for Science, India, François Bertiere, CEO of Bouygues Immobilier, France, and Yeora Chae, Climate, Air quality and Safety division in Korea Environment Institute, Korea. Dr. Gupta introduced India’s National Network Research Program on Urban Climate. Then, Mr Bertiere introduced Paris Climate Action Plan and finally Dr. Chae introduced Customized Heatwave Policy based on Contextualized Impacts: Heatwave Impacts Forecasts using big data.

During the discussion session, there were several questions to the speakers and active discussions among speakers and panelists. For Session 4, we shared thoughts and plans on how to create sustainable societies and to stop climate crisis by developing new technologies and policy measures from several case studies. We hope this discussion give some stepping stone for the sustainable future of cities.