2021
Honda Y-E-S Forum

Honda Y-E-S Forum 2021 online

Integrating Sustainability into Future Urban Design

—Sustainability for a Better Quality of Life—

HONDA FOUNDATION

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Professor, Institute of industrial Science (IIS),
The University of Tokyo

Mr. Kiyoshi Amada,
Director General, Infrastructure Management Department,
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Mr. Satyam Mohla,
New Value Creation at Digital Transformation
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Honda Y-E-S Awardee

Mr. Le Yen Thanh,
Founder & CEO, Phenikaa MaaS Technology JSC,
2015 Honda Y-E-S Awardee

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Mr. Dinh Truong Giang,
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Mr. Pel Cheapanhasith,
Technical Officer, Electricite du Cambodge, 2015 Honda Y-E-S Awardee

Ms. Khandala Khamphila,
Lecturer, Faculty of Agriculture and Forestry, Champasack University, Lao PDR, 2009 Honda Y-E-S Awardee

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Closing Remarks

Dr. Akira KOJIMA,
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Junior Environmental and Social Expert, Myanmar Koei Int'l Ltd., 2016 Honda Y-E-S Awardee

Y-E-S Attendees

What is Honda Y-E-S Program?

Honda Foundation started the Honda Y-E-S (Young Engineer and Scientist's) Award program to foster future leaders of science and technology fields in 2006. It is implemented in Vietnam, India, Cambodia, Lao PDR and Myanmar, and Bangladesh from 2019. It is distinctive in that it is not restricted to tuition but may be used for a broad range of activities. Another very unique characteristic of the system is that its details are matched to the receiving country's needs and circumstances. Furthermore, the awardees can receive an additional grant, Honda Y-E-S Award Plus/Honda Y-E-S Plus Expansion, if they continue their study and training within certain period after the receipt of the Honda Y-E-S Award, either via master's, doctoral, or study abroad programs in Japanese universities, or via internship programs in Japanese research organizations or private companies. We also hold the Honda Y-E-S Forum to engage young scientists and engineers from Japan and other Asian countries, including the Honda Y-E-S awardees, in discussion with experts in various fields, on issues in modern society examined from the perspective of young scientists and engineers.

Vietnam

1. Y-E-S Award Year 2. Current Affiliation 3. Program to appear

Le Yen Thanh

1. 2015 Y-E-S Awardee
2. Founder and CEO, Phenikaa MaaS Technology JSC
3. Opening Remarks and Panel Discussion 1

Nguyen Van Quang

1. 2017 Y-E-S Awardee
2. PhD Student, Tohoku University
3. Keynote speeches and Poster Contest Presentations of the first day (as a moderator)

Dinh Truong Giang

1. 2018 Y-E-S Awardee
2. Alpha Edu
3. Presentation by the Y-E-S Awardee and Panel Discussion 2

India

1. Y-E-S Award Year 2. Current Affiliation 3. Program to appear

Bindu Sancheti

1. 2017 Y-E-S Awardee
2. Investments at Nexus Venture Partners
3. Presentation by the Y-E-S Awardees and Panel Discussion 2

Aniket Kamthe

1. 2017 Y-E-S Awardee
2. Associate Consultant, Bain and Company

Satyam Mohla

1. 2017 Y-E-S Awardee
2. New Value Creation at Digital Transformation Supervisory Unit, Honda Innovation Lab, Tokyo
3. Keynote speech and Presentations by Honda Y-E-S Awardees of the second day (as a moderator) and Panel Discussion 1

Cambodia

1. Y-E-S Award Year 2. Current Affiliation 3. Program to appear

Song Vergenylundy

1. 2018 Y-E-S Awardee
2. Master Student, Tech University of Korea
3. Presentation by the Y-E-S Awardees

Cheapanhasith Pel

1. 2015 Y-E-S Awardee
2. Technical Officer, Electricite du Cambodge
3. Panel Discussion 2

Lao PDR

1. Y-E-S Award Year 2. Current Affiliation 3. Program to appear

Leego VANH

1. 2012 Y-E-S Awardee
2. Tourism Division (Department of Information and Tourism) of Luang Namtha Province, Lao PDR
3. Presentation by the Y-E-S Awardees

Khandala Khamphila

1. 2009 Y-E-S Awardee
2. Lecturer, Faculty of Agriculture and Forestry, Champasack University, Lao PDR
3. Panel Discussion 2

Myanmar

1. Y-E-S Award Year 2. Current Affiliation 3. Program to appear

Pyae Phyo Kyaw

1. 2015 Y-E-S Awardee
2. Project Consultant, Mandalay's WaterWorX Project
3. Panel Discussion 2

Suu Malar Win

1. 2016 Y-E-S Awardee
2. Junior Environmental and Social Expert, Myanmar Koei Int'l Ltd.
3. Presentation by the Y-E-S Awardees and Closing Remarks

Opening Remarks

Day 1

Mr. Hiroto Ishida
President of Honda Foundation

Greetings from President at the Y-E-S Forum

Thank you for the introduction.

I would like to thank everyone who joined today's forum accessing from countries across the world.

On the occasion of holding this forum, I would like to deeply express my gratitude for all the support and cooperation from diverse fields, including guest speakers, Y-E-S administration offices, and its affiliated universities who promoted this forum and the Research Poster Contest under various restrictions by the spread of the novel coronavirus. At the same time, we would like to express our sincere thanks to all the healthcare workers and related people involved in tackling the pandemic all over the world for their dedication and efforts.

Our Honda Foundation was established by Honda brothers, Soichiro and Benjiro in 1977. The reason why they created the Foundation is to promote the concept of ecotechnology.

This concept is based upon Soichiro's very strong belief that technology is not merely for efficiency or profit, but should be created and used in harmony with nature and social environment. Then ecotechnology is very wide concept and it includes various fields of technology for human happiness.

For this purpose, Honda Foundation are carrying out 4 activities. These are, Hosting International Symposia, Donating Honda Prize, Hosting Colloquia, and Developing Y-E-S Award program.

Y-E-S Award aims to discover and foster the next generation of young engineering and scientific leaders who will pursue ecotechnology in Asian countries, starting with Vietnam in 2006, followed by India, Laos, Cambodia, Myanmar and Bangladesh. Since 2015, this Honda Y-E-S Forum has been organized as an extension of the award program. Its main purpose is to create opportunities for young people to learn about cutting-edge theories in science and technology and experience them in practice, providing a venue for the growth of young scientists of the future.

It also aims to expand the human network through communications among awardees and with other scientists through cooperation between countries involved in the program. PCM, Preparation Committee Members, consisting of Y-E-S awardees from each country, have planned, discussed, and organized the forum from the scratch.

This 4th Y-E-S Forum was planned to be held last year in Tokyo but we were driven to postpone it due to COVID-19.

Our PCM, however, changed their mind to hold it online for the first time and tried to revise the program to fit online format.

We are so proud of their forward-looking attitude and hard work.

It exactly is one of big harvests they learnt from this forum.

As Albert Einstein once said: "in the middle of difficulty, lies opportunity." So, please utilize this opportunity fully and have fruitful discussions and learnings. I would like to conclude my greeting by asking for your continued cooperation with the Foundation. Thank you.

Mr. Le Yen Thanh
Founder & CEO, Phenikaa MaaS Technology JSC,
2015 Honda Y-E-S Awardee

Opening Remarks by Representative of Y-E-S Awardees

Dear distinguished guests, ladies, and gentlemen,
Good afternoon and welcome to the Honda Y-E-S Forum 2021. I am Thanh Le—the Honda Y-E-S Awardee 2015 from Vietnam. As the chairperson of the forum Preparation Committee, I am honored and delighted to present to you the 4th Honda Y-E-S Forum.

Starting from 2015, the Honda Y-E-S Forum has been proven a platform for Honda Y-E-S Awardees from Cambodia, India, Laos, Myanmar, and Vietnam to get together and promote a friendly exchange environment with students, academic experts, and researchers in Japan. The purpose of the Forum is to raise the consciousness of issues in the region and the role that science and technology should fulfill in resolving them.

From the three previous editions of the Honda Y-E-S Forum, we have discussed Eco-technologies in Pollution, Energy and Transportation, and this edition of the 4th Forum, we decided to raise public awareness about Eco-technologies in Urban Design. Rapid Urbanization causes many problems in Environment, Social and Economic, that is why sustainability in Urbanization is very important.

Hence, we decided the theme of this Forum is "Integrating Sustainability into Future Urban Design", with this theme we aim to raise awareness about the necessity of integrating sustainability into urban design for the improvement of the quality of life.

This Honda Y-E-S Forum Online 2021 is the first edition which lasts two days, and also the first Online edition as a solution from the Preparation Committee during the COVID-19 pandemic. We hope that by hosting this Forum online, we can spread our messages to more audiences around the world. During the forum, the challenges faced by different countries and the possible solutions each country should approach to achieve a sustainable urban design and the quality of life will be discussed by experienced professors, researchers and students.

We all are also very excited and looking forward to seeing the innovative ideas presented by young students and researchers in Japan as well as other countries through the Poster Contest with the topic "Technology-Driven Urban Design for Sustainability".

Last but not least, I want to express my gratitude to all Program Committee Members for their great contributions, the constant support from Honda Foundation, the professors, guest speakers, panelists and students who join this forum. Thanks to all the great support, we are able to host this Forum successfully.

I hope that through this forum, we can take one step forward in "Integrating Sustainability into Future Urban Design".

Thank you.

Keynote Speech 1

Day 1

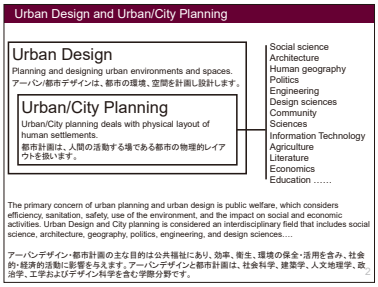
Prof. Takeru Sakai

Professor, Campus Planning Office, Graduate School of Human-Environment, Kyushu University

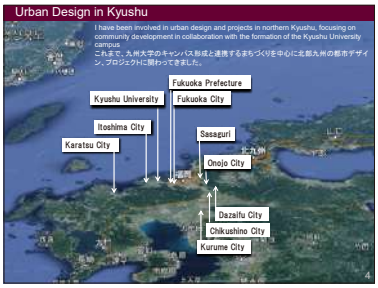
Urban Design

Hello, everyone. My name is Sakai. I would like to thank the members of Honda Foundation for inviting me and preparing all the programs, as well as for giving me the opportunity to give a presentation today.
The theme is "Urban Design."

Urban design is planning and designing urban environments and spaces. The primary concern of urban planning and urban design is public welfare, which considers efficiency, sanitation, safety, use of the environment, and the impact on social and economic activities. Urban design and city planning is considered an interdisciplinary field that includes social science, architecture, geography, politics, etc.



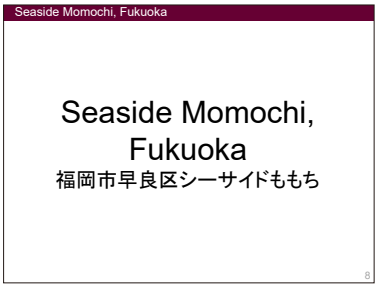
I have been involved in urban design and projects in northern Kyushu, focusing on community development in collaboration with the formation of the Kyushu University campus.



The population of Japan is 125 million. The population of Kyushu is 13 million, and the population of the Fukuoka metropolitan area is 2.5 million. Located in western Japan, Fukuoka has been one of the most important ports in Japan since ancient times and has developed as a commercial city.

Fukuoka had been developing with (1) commercial areas in the center, (2) industrial and residential areas in the east, and (3) residential areas in the southwest of the city.

In consideration of the topography and development status of Fukuoka, the master plan defines land use, development locations, residential areas, and conservation green areas, etc., and controls the development of the city.

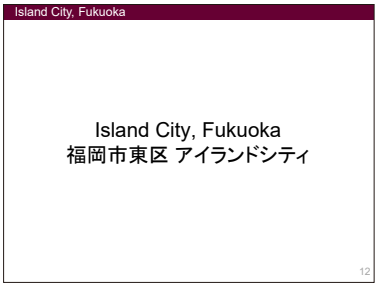


First, I would like to introduce Seaside Momochi as the first case study. Fukuoka organized the Asian Pacific Expo to promote the development of the new town of Momochi. It commemorated the 100th anniversary of Fukuoka's municipal government. And with this success, Fukuoka set its goal to become a hub city in Asia.

The urban design of Seaside Momochi was proposed to commemorate the exposition. Fukuoka Tower was left at the center of the site as the legacy of the expo.

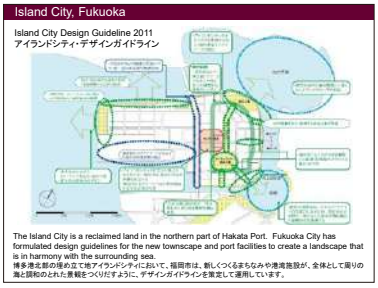
Thirty years have passed since the new town was built, and Seaside Momochi has become a well-known residential area with information-technology companies, broadcasting stations, a sports dome, museums and beach parks.

The second case is Island City, Fukuoka.



The northern part of Hakata Port is a good tidal flat where migratory birds gather. The business operator carried out environmentally friendly projects, including the protection of tidal flats when constructing Island City.

Island City is reclaimed land in the northern part of Hakata Port. Fukuoka has formulated design guidelines for the new townscape and port facilities to create a landscape that is in harmony with the surrounding sea.



The Fukuoka municipal government pays attention to the scenery from the approach of ships so that the mountains in the background can be seen just as well as the urban area.

The residential area was formed with the aim of forming a walking space and a walking scale, with 12,000 people living in 200 ha.

Projects for land sale were selected from an open call for proposals. Large-scale projects were constructed through administrative guidance. The landscape advisors were consulted before architectural projects were approved.

A large park and an indoor botanical garden were built in the center of Island City as a place for citizens to relax.

The pedestrian bridge captures changes in the sequence and line of sight of the surrounding green spaces and towers.

The third case is Kyushu University, Ito New Campus.

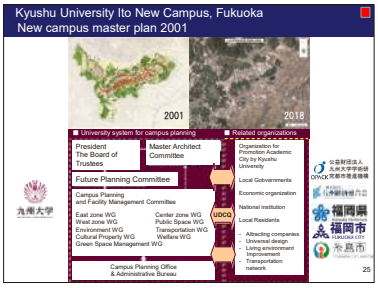
Kyushu Imperial University was established in 1911 and we moved to the new campus and completed the relocation in 2018, three years ago.

Why was the new campus needed? The old campuses had the following issues: (1) dispersion, (2) aging space, (3) aircraft noise and (4) difficulty in local redevelopment. In 1968, a US Air force Phantom fighter plane crashed on Hakozaki Campus, so they thought it's a dangerous campus, let's move to another place.

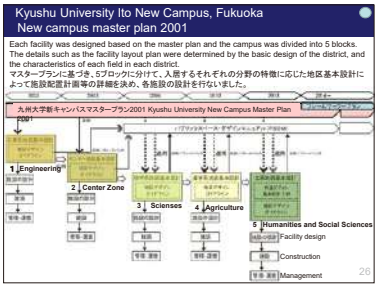
The objectives of the integration and relocation of university campuses were to build (1) an open university that can adapt to changes in the times and continue to maintain vitality, and (2) to the creation of a suitable research and educational environment.

Kyushu University conducted a study inside and outside of the university involving experts and formulated a master plan based on a seven-year field survey, concept, and plan from 1993 to 2000.

This is the system diagram for the planning and management of the new campus. The on-campus system is inside the dotted line on the left, and the off-campus organizations are on the right. Working groups (WGs) were set up according to themes such as planning of each zone, the environment, cultural properties, and transportation. And specialized faculty members joined each WG. Each of the WGs summarized conditions and conducted necessary studies leading up to construction. We also asked an outside expert in the Master Architects Committee to inspect the plan at the planning stage to check if it was in line with the master plan. Furthermore, we have continued to make efforts to connect with local neighborhood associations and residents, such as cooperation with off-campus organizations, top management, and administrative staff, as well as urban design conferences.



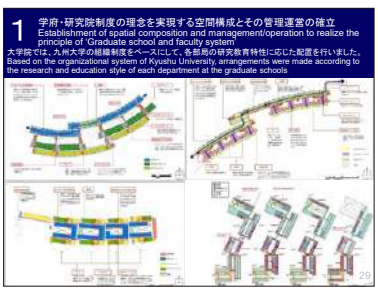
Each facility was designed based on the master plan and the campus was divided into five blocks, because the University was too large, the size of a city. The details such as the facility layout plan were determined by the basic design of the district, and the characteristics of each field in each district.



In the master plan, nine overall goals were set and maintenance was promoted. I'll explain each one.

First one: Establishment of spatial composition and management/ operation to realize the principle of a "graduate school and faculty system." The main facilities are divided into undergraduate and graduate schools. The graduate schools are located on the 3rd floor and above, and the undergraduate schools are located on the lower 1st and 2nd floors, with lecture rooms, study rooms, shops, restaurants, and faculty secretariat.

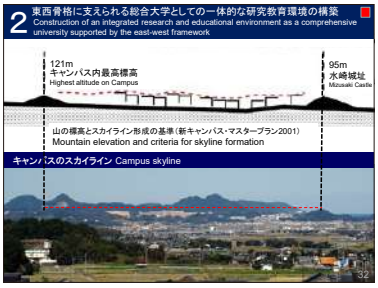
Based on the organizational system of Kyushu University, arrangements were made according to the research and education style of each department at the graduate schools.



The second: "Construction of an integrated research and educational environment as a comprehensive university supported by the east-west framework." In 2004, a design manual for public spaces (spaces other than buildings plus semi-indoor spaces such as pilotis) was created in order to harmonize the whole campus while utilizing the individuality of each block. This was supervised by the campus committee.

The design manual provides specific design directions and methods for landscapes, planting, signs, lighting, art, furniture, colors, materials, and details across the east and west of the campus.

We set the standard in the master plan to prevent buildings protruding above the line connecting the east and west mountain peaks of the campus site. That created a gentle skyline that harmonizes with the mountains of the Itoshima Peninsula.



On the campus, we have secured viewpoints to view the surrounding landscape. From the campus, you can see Hakata Port, downtown Fukuoka, and the paddy fields and mountains of the Itoshima Peninsula.

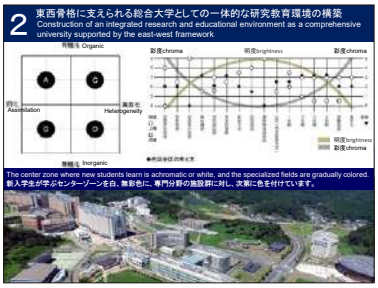
Buildings that serve as landmarks for pedestrians have been placed on campus. We call them "eye stops."

We have created a "universal level route" that allows you to move horizontally 2 km across the campus east to west without getting wet in the rain, and maintained the unity of the campus.

Since the campus is in a hilly area, the slope continues to be gentle, but we have devised ways to make it easier for pedestrians to walk by increasing the horizontal surface to make it easier to walk at night with lighting.

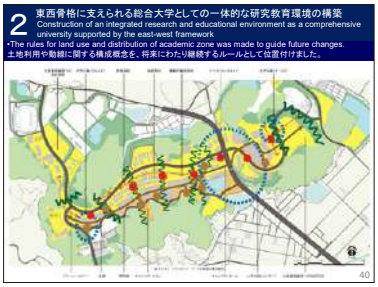
A gate was set up in each block as a path for people, wind, greenery, insects, and animals.

The center zone where new students learn is achromatic or white, and the specialized fields are gradually colored.



Art: According to the design manual, the committee supervised and placed art in various places.

The rules for land use and distribution of academic zones was made to guide future changes.



The third: Strategic fostering of the "Town on Campus" center for industry-academia and community cooperation and international exchange with a perspective that includes management.

The business community, local governments, and university spent two years formulating the academic city plan for the Itoshima Peninsula in 2001. This figure shows the entire development. In the area around Kyushu University, the pink area is positioned as the core zone, and the urban areas are gathered around the railway extending east to west. The locations of research institutes, residences, and recreation resorts are dispersed according to the environment of the peninsula. After that, in parallel to the development of the campus, the surrounding local governments implemented the plan separately.

Over the 20 years since the formulation of the Academic City plan, many facilities were built little by little, and the population of the Itoshima Peninsula increased by 30,000.

This is the current situation of the city and the peninsula. Ito Campus is in the center of the hills, and an agricultural area extends between the city and the university.

On the west side of the campus, community development of local residents is being promoted toward the concentration of residential areas and business facilities in the hills.

Development by land readjustment is progressing around the campus, and it will take some time to complete commercial facilities and residential areas.

The fourth: Vitalization of research and education and promotion of lifestyle support through utilization of private-sector facilities and encouragement of relocation.

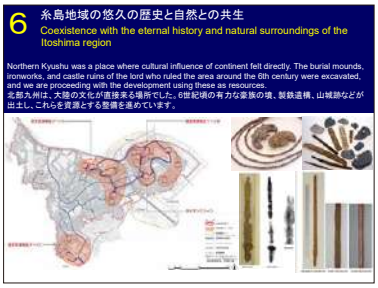
There are 14 facilities where you can eat and drink on Ito Campus, and there are also private restaurants around the campus.

Daily necessities stores, bookstores, medical facilities, and convenience stores have also been enhanced to support the campus life of students and faculty members.

The fifth: Coexistence of symbolic spaces that create their own traditions and spaces that can flexibly change and regenerate. Unique architecture is placed at the arrival points on the campus to create a symbolic space. Those were designed by famous architects.

Large and small sites have been prepared to accommodate future changes.

The sixth: Coexistence with the eternal history and natural surroundings of the Itoshima region. Northern Kyushu was a place where continental cultural influences were felt directly. The burial mounds, ironworks, and castle ruins of the lord who ruled the area around the 6th century were excavated, and we are proceeding with the development using these as resources.

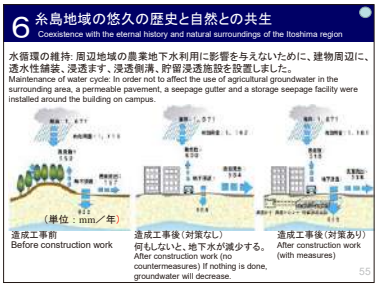


The Sayanokami spring source, which is the source of the Obaru River, was preserved as a biodiversity conservation zone.

With the goal of "not reducing even one species," the Environmental WG is working continuously with the cooperation of volunteers.
The environmental impact assessment report was released in 2000 and an environmental monitoring survey was continued for 20 years to compensate for uncertainty. As a result, the development of Kyushu University has not had a fatal impact on the surrounding environment.

Students, faculty, and off-campus volunteers participated in the researchers' efforts to regenerate the forest.

Maintenance of the water cycle: In order not to affect the use of agricultural groundwater in the surrounding area, a permeable pavement, a seepage gutter and a storage seepage facility were installed around the buildings on campus.

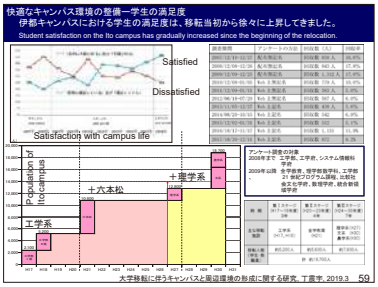


Water supply center: A unique method that combines biological treatment and reverse osmosis membranes to reuse 60% of the water used on campus, effectively utilizing water resources, and reducing costs.

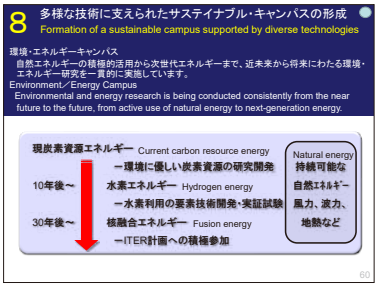
The seventh: Development of a safe, secure, and comfortable campus environment.
A campus mall as a pedestrian-only space was set up over 2 km from east to west. In addition, facilities for undergraduates and visitors were placed in various places in the lower floors.

A large number of security poles equipped with emergency call devices and cameras are connected to the general surveillance center, contributing to a safe and secure campus.

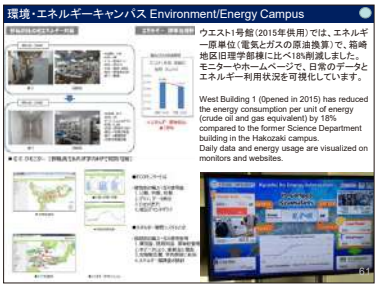
Student satisfaction on Ito Campus has gradually increased since the beginning of the relocation.



The eighth: Formation of a sustainable campus supported by diverse technologies. Environmental and energy research is being conducted consistently from the near future to the future, from active use of natural energy to next-generation energy.



West Building 1 (opened in 2015) has reduced energy consumption per unit of energy (crude oil and gas equivalent) by 18% compared to the former Science Department building in the old campus. Daily data and energy usage are visualized on monitors and websites.



The ninth: Construction of an experimental city that takes on the challenge of creating new systems. The world's largest hydrogen material research base was established on Ito Campus, Kyushu University.

As a part of improving the convenience of the campus, demonstration experiments of autonomous driving, traffic control by AI, road-to-vehicle communication, and on-demand operation are being conducted.

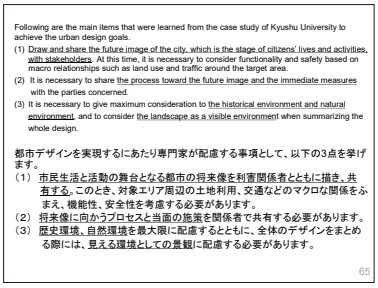
Many other demonstration experiments are being conducted on the Ito campus, such as wind lenses, next-generation fuel cells, power generation monitors, pole type sensor nodes, IC cards, students' PCs and education and Big Data accumulation.

The following are the main items that were learned from the case study of Kyushu University to achieve the urban design goals.

(1) Draw and share the future image of the city, which is the stage of citizens' lives and activities, with stakeholders. At this time, it is necessary to consider functionality and safety based on macro relationships such as land use and traffic around the target area.

(2) It is necessary to share the process toward the future image and the immediate measures with the parties concerned.

(3) It is necessary to give maximum consideration to the historical environment and natural environment, and to consider the landscape as a visible environment when summarizing the whole design.


Following are the main items that were learned from the case study of Kyushu University to achieve the urban design goals.
(1) Draw and share the future image of the city, which is the stage of citizens' lives and activities, with stakeholders. At this time, it is necessary to consider functionality and safety based on macro relationships such as land use and traffic around the target area.
(2) It is necessary to share the process toward the future image and the immediate measures with the parties concerned.
(3) It is necessary to give maximum consideration to the historical environment and natural environment, and to consider the landscape as a visible environment when summarizing the whole design.

都市デザインを実現するにあたり専門家が配慮する事項として、以下の3点を挙げます。
（1） 市民生活と活動の舞台となる都市の将来像を利害関係者とともに描き、共有する。このとき、対象エリア周辺の土地利用、交通などのマクロな関係をふまえ、機能性、安全性を考慮する必要があります。
（2） 将来像に向かうプロセスと当面の施策を関係者で共有する必要があります。
（3） 歴史環境、自然環境を最大限に配慮するとともに、全体のデザインをまとめる際には、見える環境としての景観に配慮する必要があります。

65

Thank you for listening.

Q&A Session: Summary

Following the speech a Q&A session was held. The main discussed questions included:

- What kind of solutions are implemented to reduce the negative impact of the campus on biodiversity?
- If open design as a base of development goes too far, some local historical sites might be affected. What is your insight about this one?
- What are the benefits and demerits of the campus in nature compared with campuses in the city?

The answers for these questions have been summarized below.

Ito Campus of Fukuoka University protects biodiversity on its campus from the effects of human presence and activity by preserving the river valley, thereby preserving springs and groundwater for agriculture. In consideration of the historical and natural environment, more than half of the ancient mounds are kept as green space. Ito Campus benefits from its rural location by having lots of space and its own farm but it is far from downtown Fukuoka, making commuting difficult.

Keynote Speech 2

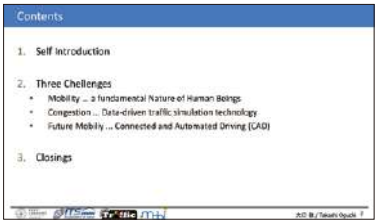
Day 1

Prof. Takashi Oguchi
Professor, Institute of industrial Science (IIS), The University of Tokyo

Mobility Challenges to achieve Smart City

Thank you for the introduction. My name is Takashi Oguchi and it is my honor to speak to all of you.

Today my talk starts with my self-introduction, followed by three topics: first, mobility; second, congestion; and third, future mobility.



Let me introduce myself. I work for the Department of Human and Social Systems of the Institute of Industrial Science at the University of Tokyo.

The University of Tokyo has faculties and graduate schools but also affiliated institutes; the Institute of Industrial Science is one of those affiliated institutes.

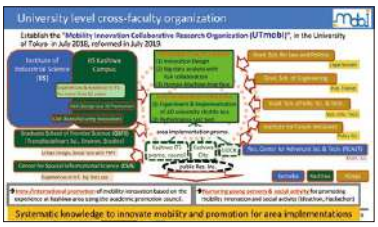
The Institute includes five departments, and I work for, as I mentioned, the fifth one, Human and Social Systems, but we are forming research centers.

I'm leading the Advanced Mobility Research Center, also called as ITS Center, and this is related to the advanced technology in transport systems.

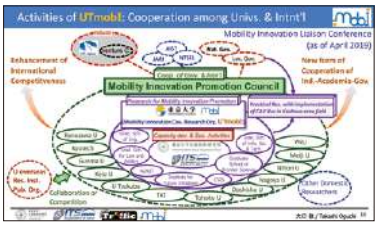
These are the members of our research center, you can see, from 1 to 5, all the department members are also involved in this research center, so there is a very wide range of activities we are now conducting.

At the University of Tokyo, we have a separately located campus, called Kashiwa Campus, and there we have an experimental field, where we are conducting some experiments, including automated-driving vehicles' tests and also a kind of traffic signal implementation here.

Here I'm showing one activity, called "UTmobI," the Mobility Innovation Collaborative Research Organization. It is a cross-faculty and interdisciplinary research activity at the University of Tokyo, including not only engineers but also policy-study people, legal-system people and so on.



And not only inside the University of Tokyo, but we also have collaboration with the national and local governments. UTmobI leads to form the so-called Mobility Innovation Promotion Council with many Japanese universities, in addition, to form a kind of liaison with the national research institutes, to promote innovative activities in transport systems.



Let me move on to the first topic. Let's start to consider again: What is mobility for human beings?

Because of the pandemic crisis we are faced with a huge challenge but it might be a kind of a chance. We are again thinking about the sustainability of our society and also sustainability related to global-warming issues and renewable-energy issues and material recycling. On the other hand, in Japan we are facing a very superaged society and urbanization and in rural areas depopulation is a big issue. And we're concerned about diversity. On the other hand, from the technology side, the transformation of the economy is very rapidly increasing and automated driving is an issue of the transport system, a once-in-a-century innovation.

For the future mobility, we are trying to start considering again the nature of mobility or transportation. Think about plants. They have the ability of photosynthesis, so they can stay alive even staying at the same place. On the other hand, animals, including humankind, need to get food to stay alive and need to excrete waste from their bodies. So you can see the indispensability of mobility to get food.

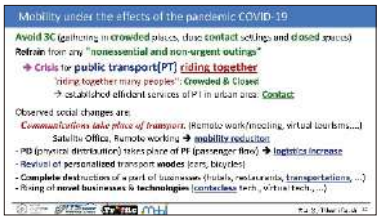
That's the nature of mobility. But humans, *homo sapiens*, are bipedal land animals, so the nature of our mobility is basically walking or maybe running, not swimming or flying. Running could be extended with intelligence, so we develop bicycles and kickboards, human-powered machines, and we also tame animals as a kind of extension of the running function, or use some machines, led by tame animals. Road construction is the system supporting these running machines.

About a hundred years ago, thanks to an invention by Karl Benz in Germany, and after 20 years, the epoch-making production of the Ford Model T which enabled industrialization was introduced. With these epoch-making machines, we had the motorized society in the world. They named it the "automobile." What is "automobile"? Why did they put "auto" in the name? Maybe because it's independent from others, such as horse, camel or human power. Moving machines autonomously, as if by magic, saving the labor of human power. And easy and high-speed movement can be achieved with these automobiles.

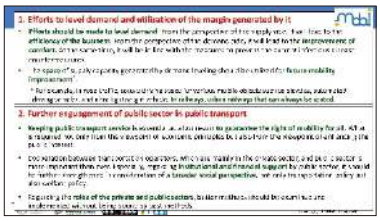
After several decades, automotive transport faced the so-called three evils: Environmental pollution issues, traffic accidents and traffic congestion. On the other hand, around the 1990s the informatic society arrived, which could be very useful for transportation with system oriented thinking to connect elements of transport systems like humankind, moving bodies and road infrastructure. The system was called as ITS, Intelligent Transport Systems.

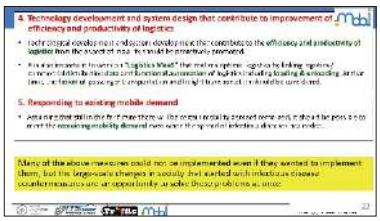
Over the past several years, the development of automated driving systems have been tried and are becoming very popularized at this moment. They started with a challenge by Stanford University, who won the award of the DARPA grand challenge in 2005. Here I use only the term "automated driving," or vehicle automation, not "autonomous." "Autonomous" is something that, how should I say, has some huge meanings included. Actually this is still a machine and "automation application" would be a more appropriate wording, I think. In these past few years the word gradually changed and "connected and automated driving" is now a rather common usage, because connectivity with wireless communication is very crucial to implement automated driving systems in the real world.

Considering about the pandemic conditions, 3C, which means gathering in crowded places, close-contact settings and closed-space conditions, should be avoided due to the pandemic issues. Nonessential and non-urgent outings should be avoided. Then we again start to consider about mobility. What is mobility?

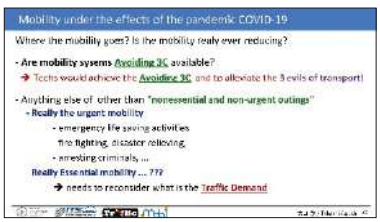


UTmobI in the University of Tokyo, proposed five items for reconsidering about mobility, but because of time limitations I will skip explaining about these five items.



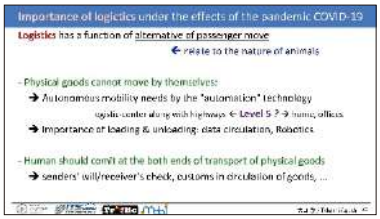


Pandemic is a chance to reconsider and reform mobility systems in the near future. Nonessential and non-urgent outings, what does it mean? We are thinking about that. "Really urgent mobility" is rather obvious. But what is really "essential" mobility? We start to reconsider about traffic demand.



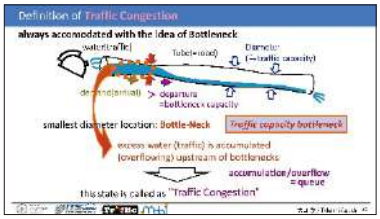
In textbooks, traffic demand can be divided into principal demand and derivative demand. Actually, transport engineers are always mainly concerned about derivative demand and congestion issues and accident issues. Now we start to consider the derivative demand can be classified into two types. The first is passive derivative demand. This is the really passive one. We don't really want to move, but it is derivative demand. On the other hand, the other one is active-desire-related. So for example, to have an on-the-spot experience, we like to go, or as a nature of humankind, to search for encounters with things or share time and place with others and so on. The focus on the active derivative demand comes to be rather important after the experience of the pandemic.

Once people try to reduce mobility, the importance of logistics comes into focus. Still we need to consider that the issue of logistics is related to human behavior.

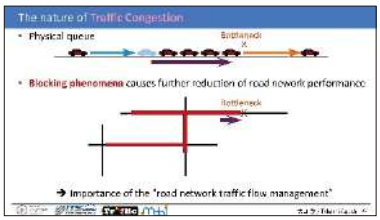


Next topic is related to traffic congestion.

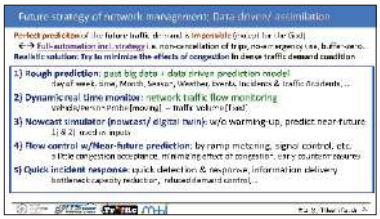
Let me introduce a very basic textbook explanation of what traffic congestion is. Congestion is always related to the concept of the bottleneck. What is a bottleneck? Consider the road system as a tube and the traffic is water pouring into the tube. The tube may have different diameters and that could be interpreted as traffic capacity. When traffic demand, the water pouring in, exceeds the diameter of the narrowest location, the narrowest location comes to be the bottleneck. In this picture you can see that it is a tube neck, but we call it a bottleneck, a traffic-capacity bottleneck. The excess water or traffic accumulates, flowing upstream from this bottleneck. Observing this overflow, or accumulation, we call this phenomenon "traffic congestion". This is the issue, traffic congestion.



And actually, we have a physical waiting line or queue of vehicles forming to the upstream and other roads suffer from this congestion. This is a serious issue for a traffic network. Therefore, network management is mostly important for alleviating traffic congestion.

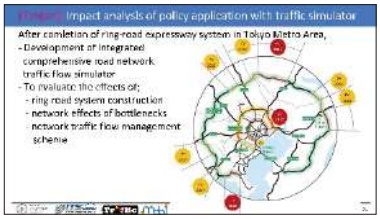


In the future some may say that, with totally autonomous vehicles with perfect control, we can avoid this congestion completely, but in reality I don't think so. A realistic solution would be to try to minimize the effects of traffic congestion. For that purpose there are five challenges we should take up in the future.



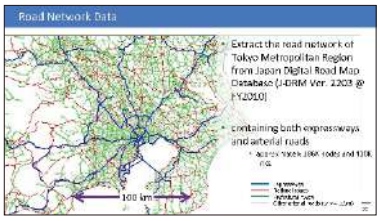
The first one is based on Big Data or data-driven prediction-system models. But these are not almighty. We need to also check real congestion issues with real-time monitoring technology. The third one is a kind of software technology for nowcast simulations, starting from the observed real-time monitors. The fourth one is some control measures to minimize the effects of traffic congestion. The last one is something different: countermeasures, quick response to accidents or incidents.

For a process to establish a part of these five items, I led a past project which were related to forming huge traffic simulator systems to analyze the three ring-road constructions surrounding the Tokyo area.

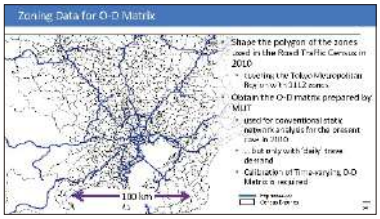


This is an example of the animation of the huge traffic network simulator, reproducing the traffic congestion issues and also evaluating the effects of the three ring roads construction.

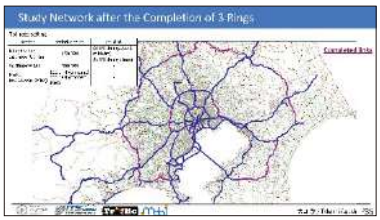
Here we are showing the road network we required for forming this system and also the demand we need to form huge data.



This is beforehand, without the three ring roads

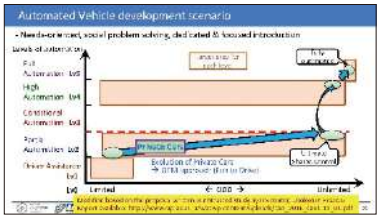


and after forming the three ring roads. Then maybe we should maximize the function of those three ring roads.

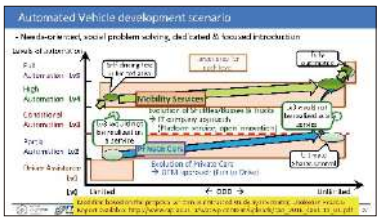


Lastly I will talk about future mobility issues. Sorry, I've already spent too much time, so I will talk very briefly.

Maybe some or many of you already know about the different levels of automation of vehicles, starting from level one to level five. Up to level two is human-driven vehicles supported by the automated-driving system. The Levels three, four and five are controlled by the system. Through our considerations, we concluded that car manufacturers try to promote enhancing the level-two vehicles and, going to the right-hand side, the applicability of those systems will be increased, not only on expressways/ motorways/highways, but also in urban areas, mixed situations with other moving bodies.



On the other hand, really automated systems are introduced in very limited areas, like the depopulated rural areas, heart of the city with very slow-mobility systems, and so on. It will help mobility in the aged society or disabled people. These processes will lead to the really extreme autonomous society. And also, level three is something difficult to implement, but I will skip to explain this issues.



In this slide, the hierarchy of road systems is explained.

With this hierarchical system there are several different types of automated-driving systems and services that could be implemented.

But the applicability of automated driving is limited. Not all the systems are covered by automated systems. Maybe a kind of well-coordinated, hierarchical system design integrated with existing transport systems are mostly important.

This is picture which shows the signs of having a livable heart of an urbanized area.

Lastly, I'll just say my closing remarks.

Mobility is a measure of achievement of a well-being society. The word "mobility" means accessibility to social activities. As I mentioned, even derivative demand which may have active desire should be met by mobility systems. Considering about smart cities, they should not only provide space as a city but also support vivid, happy and exciting human lives there. Automated driving systems would be one application of artificial intelligence (AI). But smart city should not controlled by AI, but we should try to control AI by human beings. I think this is one of the most important things. That's all of my talk. Thank you very much.

Q&A Session: Summary

Following the speech a Q&A session was held. The main discussed questions included:

- Is it important for developing countries to make a long-term plan for future mobility?
- What are pros and cons of autonomous driving in future mobility designs? The increase of autonomous vehicles can cause traffic congestion. How can we prevent conflicts between autonomous vehicles and traffic congestion?
- What kind of data are needed for data-driven management in future mobilities?

The answers for these questions have been summarized below.

Developing countries suffer from the "three evils" of pollution, traffic accidents and traffic congestion. They need to introduce future mobility to solve these problems and leapfrog to a more advanced stage of development. Autonomous vehicles have value but may increase congestion and impose burdens on urban management and public services if they are introduced in an unplanned manner. To avoid problems, the technology must be part of comprehensive solutions including political and economic measures and combined with public transport and support for vulnerable users. Unmanned vehicles can reduce the need for human labor. Data required to achieve these solutions include data on real traffic phenomena, of many types and from many sources.

Poster Contest Presentation

Day 1

Poster Contest Presentation

Entry List and Results of Research Poster Contest

Finalists for 1st, 2nd, 3rd Prize and Audience Award

Team	Abstract Title	Organization	Name/Leader	Country
A	Heuristic Methods for Constructing Cost-Effective Networks among Urban Weighted Regions —Application to Large-Scale Drone Airway Networks Considering Land Compensation—	The University of Tokyo	Shota Tabata	Japan
B	Impact of Covid-19 on Paratransit Operate with Ride-Hailing Apps in Asian Developing Cities: The Phnom Penh Case	Institute of Technology of Cambodia	Panha Yang	Cambodia
C	DEVELOPMENT OF A DECENTRALISED WASTEWATER TREATMENT SYSTEM TO COMBAT CONVENTIONAL AND EMERGING POLLUTANTS PRESENT IN URBAN SEWAGES: ON SITE EVALUATION IN NEW DELHI	Indian Institute of Technology Delhi	Rishabh Shukla	India
D	Characteristics of Urban Housing Borey Development in Phnom Penh —An Analysis of Historical Development and Location Characteristics—	Hokkaido University	Chhunhong Lao	Cambodia
E	A Safety Level Evaluation Model Based on Network Analysis Enhancing Accessibility & Evacuation Safety in Ho Chi Minh City's Alleyways	The University of Tokyo	Tran Thi To Uyen M. N.	Vietnam
F	Strategies for conservation of historic architecture for sustainable building stock management: Proposing decision-making model for optimal ratio of renovation for conversion to profit-making facilities	The University of Tokyo	Kaori Isawa	Japan
G	RESEARCH ON DESIGNING AND MANUFACTURING A PROTOTYPE WITH HIGH FUEL EFFICIENCY FOR THE "HONDA ECO MILEAGE CHALLENGE"	Ho Chi Minh City University of Technology	Pham Quang Minh Tran Quang Khai	Vietnam
H	A Multidimensional Date-driven Exhaustive and Evolutionary Solution to Control-Map-Control the Urban Air Pollution	Indian Institute of Technology Delhi	Utsav Bhardwaj	India
I	Assessment of Water Stress and Water Quality in the Upper Thai Binh River Basin, Vietnam	VNU-Vietnam Japan University	Htet Thu Soe	Myanmar
J	Electronic Waste Recycling: Generating Wealth from Waste via Zero Discharge Technology	Indian Institute of Technology Delhi	Prashant Ram Jadhao Ramdayal Panda	India

Results of Research Poster Contest

Award	Team	Organization	Name/Leader	Country
1	**E**	The University of Tokyo/ Imai Laboratory	Tran Thi To Uyen M. N.	Vietnam
2	**J**	Indian Institute of Technology Delhi	Prashant Ram Jadhao Ramdayal Panda	India
3	**C**	Indian Institute of Technology Delhi	Rishabh Shukla	India
Audience Award	**H**	Indian Institute of Technology Delhi	Utsav Bhardwaj	India

1st Prize

A Safety Level Evaluation Model Based on Network Analysis
Enhancing Accessibility & Evacuation Safety in Ho Chi Minh City's Alleyways

TRAN Thi To Uyen M.N.
Department of Architecture, Graduate School of Engineering, The University of Tokyo, Japan/ to-uyen@iis.u-tokyo.ac.jp

Background and Research Problem

- City planners and local governments face difficulties to improve safety standards in traditional neighborhoods.
- Struggle to balance conservation and modernization of the urban tissue.
- Focus on cities that have experienced rapid urbanization and densification.

Ho Chi Minh City's Alleyway Neighborhoods

- Still houses about 85% of city dwellers.
- Vital for socio-economic diversity in urban communities.
- Characterized by their labyrinthine shaped network, dead-end streets, and narrow street widths.

Research Aim and Strategy

- Develop a model to evaluate and enhance the safety of street networks using the Network Voronoi Algorithm.
- Modify the network topology through soft interventions like alley widening or adding new links in the network.

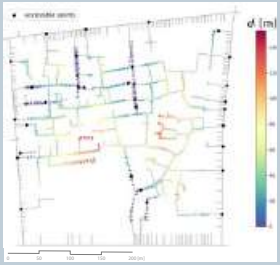
Analytical area in Ward 2, District 5, HCMC

Data processing method and methodology

- Creation of the network data and classification of edges by street width.
- Safety threshold set at 3.5m defining the accessible & inaccessible networks.
- Accessible & evacuation points: generators for Network Voronoi calculations.

Safety Evaluation Variables

1. Accessibility Risk



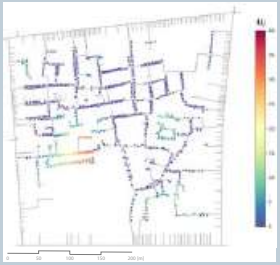
Response of emergency services

- Risk of a location measured by its distance to the nearest point accessible by an emergency vehicle.
- If $d_i = 0$ a location is accessible (dark blue).

Accessibility risk of node i is given by

$$d_i = \begin{cases} \text{shortest distance from } i \text{ to the nearest accessible node} & (i : \text{inaccessible node}) \\ 0 & (i : \text{accessible node}). \end{cases}$$

2. Unreachability Risk



Possible disruptions in the network and evacuation route of residents
Simulation of all possible scenarios and calulation of the evacuation route using the shortest path.

- Count how many times a house is disconnected from a safe area.
- If $u_j = 0$, two-way evacuation route exists.
- If $u_j \geq 1$, node is located on a tree-shaped network.

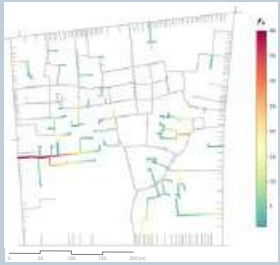
Unreachability of house node j ($= 1, 2, \ldots, n$) is given by

$$u_j = \sum_{i=1}^{m} \delta_{ij},$$

$$\text{where } \delta_{ij} = \begin{cases} 0 & \left(\begin{array}{l} \text{if house node } j \text{ is connected} \\ \text{to any evacuation node when} \\ \text{edge } i\ (= 1, 2, \ldots, m), \text{adjacent} \\ \text{to any house, is removed} \\ 1 \text{ (otherwise).} \end{array} \right). \end{cases}$$

n: Total number of house nodes
m: Total number of edges adjacent to any house

3. Edge Responsibility



- Count how many houses are disconnected from any evacuation point if an edge is removed.
- In a tree topology ($r_k \geq 1$), even a single point of failure can disrupt the connection from a node to a safe area.

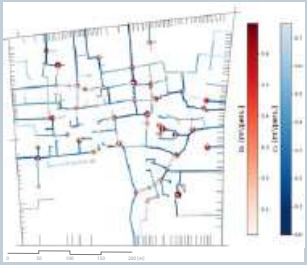
Edge responsibility of edge k is given by

$$r_k = \sum_{j=1}^{n} \delta_{kj},$$

$$\text{where } \delta_{kj} = \begin{cases} 0 & \left(\begin{array}{l} \text{if house node } j \text{ is connected} \\ \text{to any evacuation node when} \\ \text{edge } k \text{ is removed} \\ 1 \text{ (otherwise).} \end{array} \right). \end{cases}$$

n: Total number of house nodes

4. Flow capacity



Evacuation simulation from each house to an evacuation point

- *Edge capacity* = density of evacuees on edge at peak time.

Edge capacity of edge k is given by

$$c_k = \frac{A_k}{\max_{i \in I} (P_{ki})}.$$

A_k : *Area of edge* k
P_{ki} : *number of residents on edge* k *in time* t

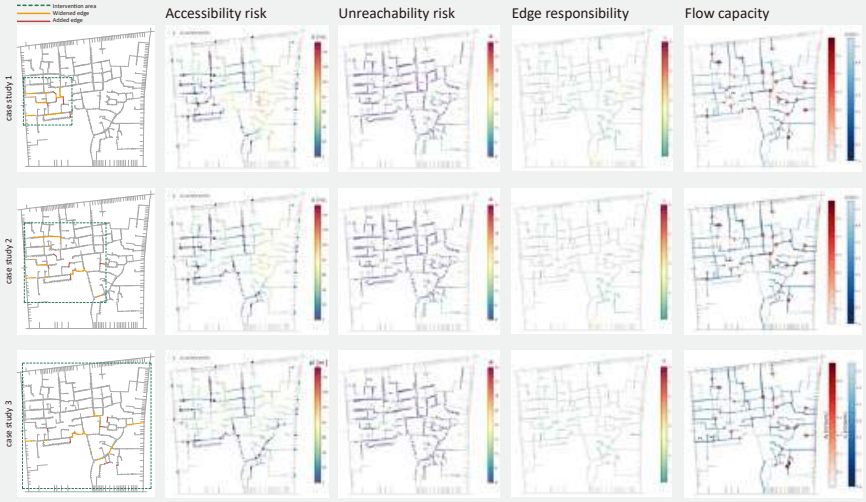
- *Bottleneck risk* = detection of locations with risks of delay during the evacuation process.

Bottleneck risk of edge k is given by

$$b_k = c_k - c_{kv}.$$

c_{kv} : *edge capacity of edge* k*'s adjacent edge in the direction of the evacuation path*

Case studies of improvement



Results

- The most vulnerable locations in the network are affected by the network topology, the distance to a safe area, street widths, and the distribution of houses in the network.
- Modifying the network topology and street widths are highly efficient while having a small impact on the local community.
- Targeting the weakest point in the network for improvement interventions is the most efficient result of network-wide safety improvement for the accessibility risk, unreachability risk, and edge responsibility, but this is not valid for the concept of flow capacity (only local result).
- However, the flow capacity detects which intersections in the network are located at the border of the Voronoi network cells, where residents evacuate in opposite directions; whereas the others have a higher bottleneck risk, which cannot be derived from the network topology.

Conclusion

- The prospective intervention projects are compared in terms of safety improvement, economic impact (defined by the modified area), and social impact (defined by the number of households forced to relocate or give away a part of their land plot).
- Powerful tool for urban planners and local governments to manage and estimate the efficiency of future infrastructure improvement projects.

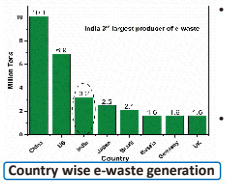
2nd Prize

Electronic Waste Recycling: Generating Wealth from Waste via Zero Discharge Technology

Prashant Ram Jadhao, Ramdayal Panda
Supervisors: Prof. K. K. Pant (kkpant@chemical.iitd.ac.in), Prof. K. D. P. Nigam (drkdpn@gmail.com)
Chemical Engineering Department, Indian Institute of Technology, Delhi, New Delhi - 110016, India.
Email Id: pjadhao12@gmail.com, ramdayalpanda7@gmail.com

Background and Motivation

E-waste Generation:

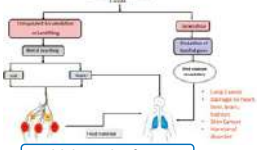


- Worldwide 53.6 million tons of e-waste was produced in 2019 and anticipated to reach 74.7 million tons by 2030
- Only 20% of the total e-waste is being recycled through formal sector

Country wise e-waste generation

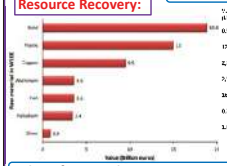
Health Hazards:

- Majority of the e-waste is managed through landfill and incineration, which pollutes the environment and leads to human health hazards



Health hazards of e-waste

Resource Recovery:

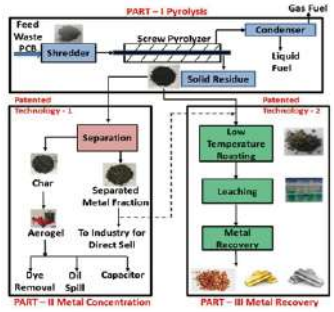


- Compare to ores, the concentration of Au is almost 25 – 250 times higher in e-waste (PCB of computer), while concentration of Cu is 20–40 times higher

Value of materials present in e-waste

- Resource recovery from e-waste will help to conserve the natural resources and will also help to mitigate the environmental and human health hazards
- Therefore, there is an urgent need to develop an eco-friendly technologies for recycling of e-waste

Methodology



Overall methodology of the recycling process

1. Pyrolysis of e-waste for conversion of polymers into oil and combustible gases
2. Separation of metallic fraction using ultrasonication and aerogel synthesis
3. Low temperature roasting – water leaching for extraction of metals into solution

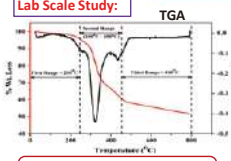
Acknowledgment

विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF SCIENCE & TECHNOLOGY
सत्यमेव जयते
DRIIV
Office of Delhi S&T Cluster (PSA, Govt of India Initiative)

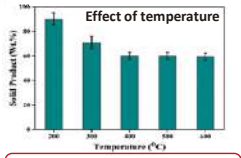
Result and Discussion

Part I – Pyrolysis of e-waste

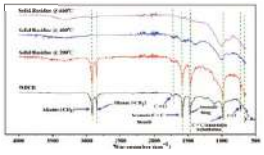
Lab Scale Study:



Maximum weight loss is in the range of 250 °C to 450 °C



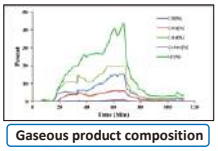
400 °C was found to be optimum for maximum degradation of polymers



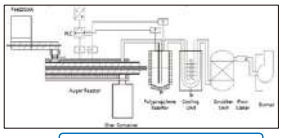
FTIR analysis shows that most of the organic material was decomposed at 400 °C

Pilot Scale Study:

- The gaseous product mainly consisted of H_2, CH_4, CO and CO_2, having the heating value 28.5 MJ/kg
- Obtained oil mainly consists of phenyl and benzene ring compounds with a heating value of 32.7 MJ/kg

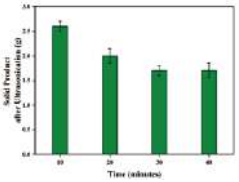


Gaseous product composition



10 kg/h pilot plant for pyrolysis

Part II – Separation of metallic fraction and aerogel synthesis



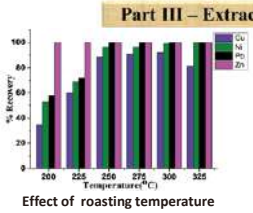
Effect of time on separation of metallic fraction

Metal	Metal Content in WPCB	Metal content in separated metallic fraction	% transferred to metal fraction
Cu	25%	65%	88
Pb	3%	10%	97
Al	1.40%	4%	97
Ni	0.64%	1.6%	87
Ag	432 ppm	1341 ppm	100
Au	2 ppm	5.5 ppm	100

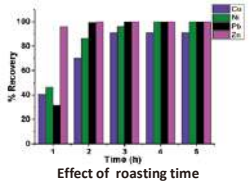
- More than 90% of the metals were separated after ultrasonication of pyrolyzed solid product

Synthesized Aerogel

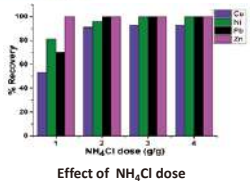
Part III – Extraction of metals (Low temperature roasting)



Effect of roasting temperature



Effect of roasting time



Effect of NH_4Cl dose

- Optimum parameters for roasting are: temperature of 300 °C, roasting time of 4 h and NH_4Cl dosage to PCB ratio of 3 g/g
- Under the optimized roasting conditions, around 93% Cu, 100% Ni, 100% Zn, and 100% Pb were recovered

Technology integration for zero waste disposal

Technology Impact

- UN adopted ambitious 2030 agenda for sustainable development. This agenda identified 17 sustainable development goals (SDGs).
- Management of e-waste is closely linked to 6 SDGs

Conclusions

- Pilot scale study has been successfully demonstrated for conversion of e-waste plastic into valuable liquid and gaseous products
- Approximately 90 wt.% metallic fraction (feed to product basis) was separated in 30 min using ultrasonication
- Around 93% Cu, 100% Ni, 100% Zn, and 100% Pb were recovered at temperature of 300 °C, time of 4 h and NH_4Cl dose of 3 g/g
- The present technology provides an eco-friendly solution for the sound management of e-waste along with recovery of metals and production of valuables products.

References

1. P. R. Jadhao, E. Ahmed, K. K. Pant, K. D. P. Nigam, Environmentally friendly approach for the recovery of metallic fraction from waste printed circuit boards using pyrolysis and ultrasonication, Waste Management,2020, 118, 150-160.
2. R. Panda, P. R. Jadhao, K. K. Pant, S. N. Naik, T. Bhaskar, Eco-friendly recovery of metals from waste mobile printed circuit boards using low temperature roasting, Journal of Hazardous Materials, 2020, 395, 122642.

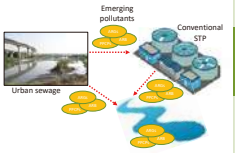
3rd Prize

DEVELOPMENT OF A DECENTRALISED WASTEWATER TREATMENT SYSTEM TO COMBAT CONVENTIONAL AND EMERGING POLLUTANTS PRESENT IN URBAN SEWAGES: ON-SITE EVALUATION IN NEW DELHI

Rishabh Shukla
Department of Biochemical Engineering and Biotechnology
Indian Institute of Technology Delhi

Background

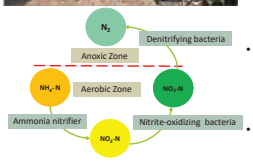
- Presence of Antimicrobial resistance (AMR) and micropollutants in the aquatic environment is a global concern.
- Available conventional treatment technologies are inefficient in removing emerging pollutants from urban sewages.
- Untreated and treated urban sewage are mainly responsible for the discharge of emerging pollutants into the environment.



Objectives

- To develop an eco-friendly, cost and energy-efficient biological wastewater treatment system to remove major conventional and emerging pollutants from the wastewater.
- To investigate the potential of our developed system in removing Antibiotic Resistant Bacteria (ARB), Antibiotic Resistance Genes (ARGs) and Pharmaceuticals and Personal Care Products (PPCPs) from the urban sewage of New Delhi.

Modified Trickling Filter (MTF)

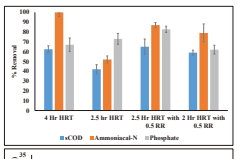


- The MTF has two sequential treatment zones - **aerobic zone(upper) and anoxic zone(lower).**
- Aerobic zone performs **nitrification** whereas anoxic zone carry out **denitrification.**
- In aerobic zone, ventilation holes were provided through which oxygen can be easily diffused from the atmosphere through the bed by natural ventilation.
- **Polyurethane sponges** were used as biofilm support media. These porous sponges prevent the washout of the bacterial cells from the reactor and **provide longer SRT**.
- Longer SRT allows growth of slow growing bacteria like nitrifiers.

Study site: Barapullah Drain, New Delhi

- Second largest drain of Delhi
- Untreated sewage of Barapullah drain is directly contaminating the river Yamuna
- Receives discharge mainly from households and hospitals
- MTF of **treatment capacity 2KLD** was installed at the drain

Conventional pollutants removal performance



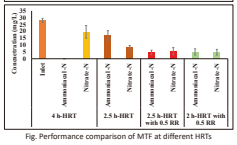


Fig. Performance comparison of MTF at different HRTs

- MTF capable of removing ammoniacal nitrogen, nitrate-nitrogen, COD and phosphate at the lower hydraulic retention time of 2 Hr.

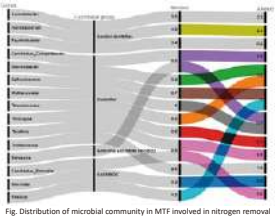


Fig. Distribution of microbial community in MTF involved in nitrogen removal

- Various nitrifiers, denitrifiers, aerobic denitrifiers and ANAMMOX bacteria were distributed in each zone of MTF system.
- The co-existence of simultaneous nitrification and denitrification (SND) process, results in the enhanced nitrogen removal from the system.

Emerging pollutants removal performance

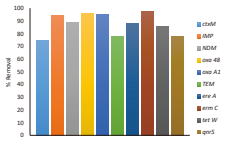


Fig. Removal of ARGs through MTF

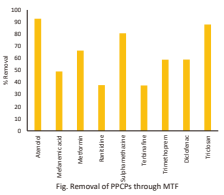
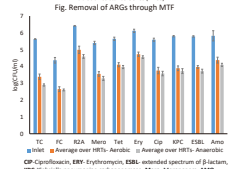


Fig. Removal of PPCPs through MTF



CIP-Ciprofloxacin, ERY- Erythromycin, ESBL- extended spectrum of β-lactam, KPC-Klebsiella pneumoniae carbapenemase, Mero- Meropenem, AMO- Amoxicillin, TET- Tetracycline, TC- Total coliform, FC- Faecal coliform

Fig. Removal of ARB through MTF

Table. Overall performance summary of MTF

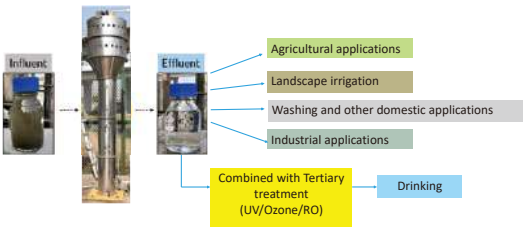
Parameters	MTF
Conventional pollutants	COD= 60% AN= 80% Nitrate= 37% Phosphate= 63%
ARB	Water= 92-99% Sludge= No excess sludge
ARGs	Water= 72% Sludge= No excess sludge
PPCPs	Water= 68% Sludge= No excess sludge
Operating conditions	2hr HRT
Wastewater treatment cost	₹ 0.7/L

- ARB, clinically significant ARGs and PPCPs were efficiently removed through MTF.
- Different group of microorganisms in MTF excretes enzymes which help in the degradation of EPs.
- Poly urethane sponge act as biofilter on which micropollutants can be adsorbed.

Salient feature of MTF

- High removal efficiency for organics and nutrients
- Efficiently **removes EPs** from wastewater
- No need of external aeration **(energy efficient)**
- Simple process control and less maintenance
- Flexible to be combined with advance treatment options
- **Negligible sludge generation**
- High sludge retention time
- Compact design and **small foot print** for installation
- Can be operated at lower HRTs
- Cheap and durable biofilm support media i.e., polyurethane sponge

Future applications



Conclusions

- MTF is a promising sustainable system for wastewater treatment in developing countries like India, where discharge of untreated sewage is a common practice.
- The performance result of MTF showed an excellent potential to overcome the limitation of conventional WWTPs.
- The overall results indicate MTF reactor is promising for decentralised wastewater treatment and can be used for small community applications.

Contact information

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Audience Award

A Multidimensional Data-driven Exhaustive and Evolutionary Solution to Control-Map-Control the Urban Air Pollution

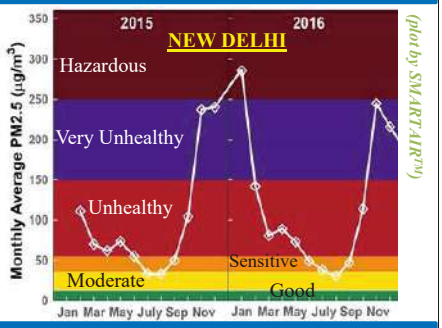
Utsav Bhardwaj, Indian Institute of Technology Delhi

Introduction: Magnitude of the Problem Addressed

- 7 million premature deaths recorded per year in the world due to Air Pollution, including 4 million in the Asia-Pacific region (as per WHO).
- India is one of the worst affected countries, with national capital region (including New Delhi) as one of the most polluted cities in the world.
- 1.2 million Air Pollution related deaths recorded in India in 2017 alone. Average Life Expectancy was reduced by 1.7 years.
- Large values of PM2.5 and PM10.
- Large concentrations of SO_2, NO, NO_2, CO, O_3.

Air Quality Index (AQI) in New Delhi is almost always much higher than safe limit

Poor Visibility in New Delhi due to Air Pollution



Critical Review of the present state and Way Forward

Smog Tower

Wind Augmentation Purifying Unit (WAYU)

Implemented Solutions

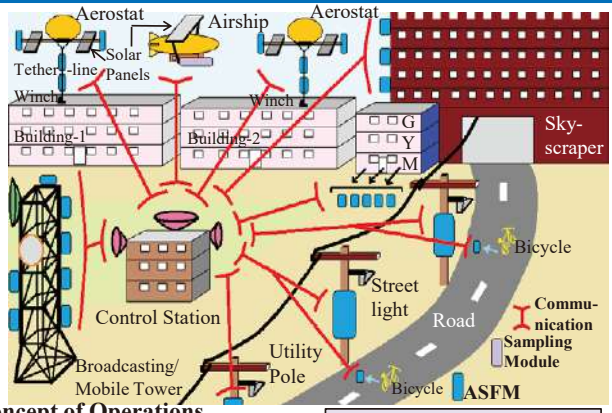
- Solutions implemented in Delhi till now have been severely criticized from different aspects (scientific basis, effectiveness, cost, etc.).
- Highly unfavorable economic aspects (for Smog Towers alone)
  - Cost of a Smog Tower (only 1 has been installed till now): **US$1.68 million**
  - No. of such Smog Towers required to cover entire Delhi: **2.5 million**
  - Total Cost: **US$4,200 billion** (**37.6** times of the GDP of entire Delhi)
- All possible solutions need to be critically evaluated before a reliable and sustainable pollution control strategy can be outlined.
- With current air pollution levels, highly intensive and multidimensional pollution control solutions are needed to observe any incremental reduction in the Air Quality Index (AQI).

Solution: Smart network of ground-based, elevated and airborne Air Sampling-cum-Filtration Modules (ASFMs)

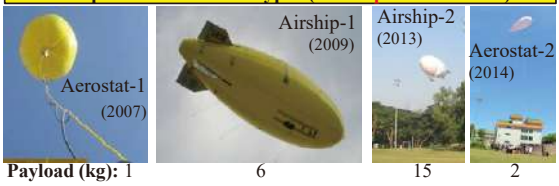
Install ASFMs in airspace around the solution-entities (Smog Tower, WAYU, etc.) and at far-away distances. Capture particulate matter and gaseous pollutants. Measure local air velocity in realtime with each ASFM using an onboard sensor.

- Mount solar-powered ASFMs over utility poles, broadcasting and mobile towers, and skyscrapers at different heights.
- Deploy solar-powered He-filled aerostats over rooftops, towers, bridges, etc.; with tether-lines of several meters (max 2500 m). Install ASFMs at the aerostat as well as entire tether-line. Incentivize the initiative of common people providing a small space for winches.
- Incentivize the use of air-cleaning bicycles for routine transportation. Paddles and wheels filter the air using ASFMs.
- Install ASFMs in the commercial/home gym equipment. The rotary/translational motions force the air through ASFMs.
- Deploy He-filled solar powered autonomous airships equipped with spatiotemporal sampling algorithms for sampling missions.

Implementation (Pilot Project): at IIT Delhi campus (involving students' bicycles, gym, buildings, poles, etc.) with Lab support

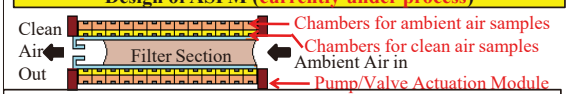


Component Level Prototypes (Developed and Tested)



Payload (kg):	1	6	15	2
Cost (US$):	1120	2800	4200	1680

Design of ASFM (currently under process)



Major Components of an Onboard System: ASFM, Transceiver Module, Control System, and Actuation Module

Concept of Operations

Sample Collection at ASFMs → Sample-set Retrieval → Testing and Characterization of Samples (Filter Sample + Chamber Samples) at Lab

Continual Evolutionary Rectification Process — **Data**

Solo/Combinatory Filtration Performances, Spatiotemporal Maps of Pollution Parameters (chemical composition, particles' number density and size/shape, gases' ppm) and Air Velocities, Dispersion/Transport Patterns of Pollutants ← Server (Lab + Control Station)

Iterative Loop — **Pattern Recognition**

Optimize the network of ASFMs (update orientations, ON/OFF statuses, sampling frequencies, algorithms for analysis, predictive tools, targeted AQIs) depending on their type and current absolute/relative coordinates

Control Station: [Server] + [Data Analytics Module] + [Dashboard]

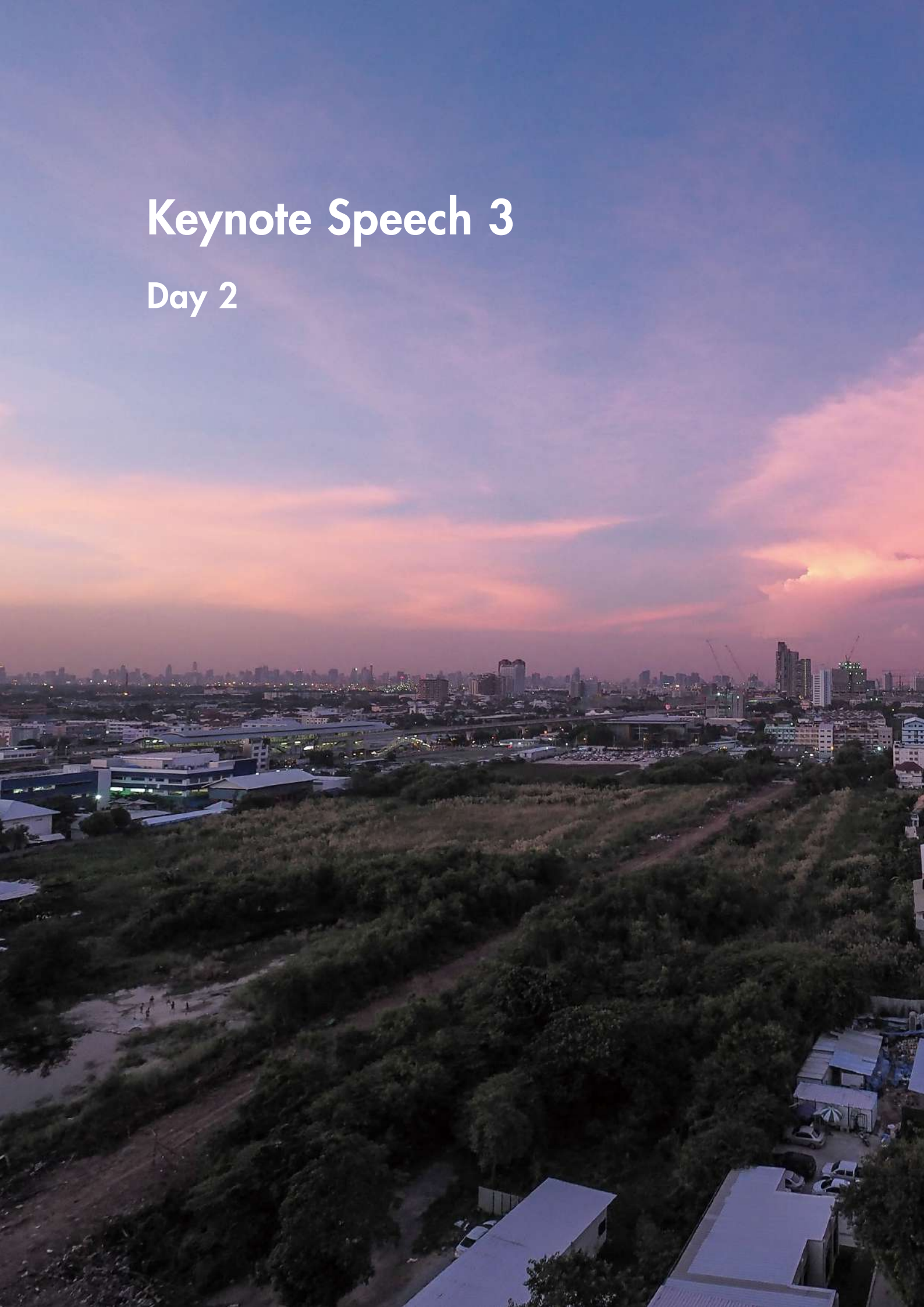
Evaluation Parameters: Percentage reduction in PM2.5, PM10, and concentration (ppm/ppb) of gaseous pollutants; Cost Incurred per unit percentage reduction

Conclusions

The study paves a way to determine (1) Relative effectiveness of various pollution control solutions (Smog Tower, WAYU, etc.) w.r.t. placement (2) Optimum network of ASFMs: distribution pattern, orientations, etc. (3) Intensive source apportionment methodology, and (4) Outline of Pollution Control Strategy.

Keynote Speech 3

Day 2

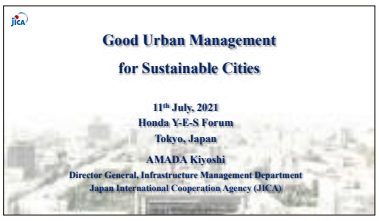


Mr. Kiyoshi Amada

Director General, Infrastructure Management Department,
Japan International Cooperation Agency (JICA)

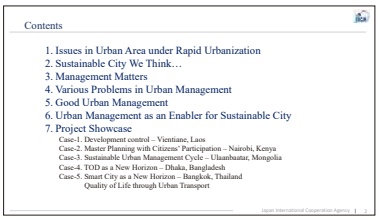
Good Urban Management for Sustainable Cities

All the audience members, guests, preparation committee members and other staff of the Forum, and staff and senior members of Honda Foundation, good afternoon from Tokyo, maybe good morning and good evening to those participating somewhere else. It is my great honor to make a presentation as a kickoff of the second-day program of Honda Y-E-S Forum 2021. I will discuss about sustainable cities and urban design, particularly from the viewpoint of good management.



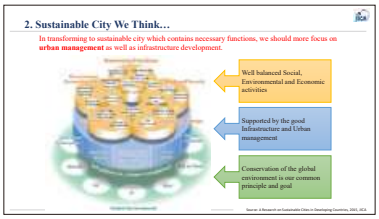
Later I will touch upon the cases of five cities. I know that many audience members are participating from around the world. I hope many participants are particularly from Vientiane and Bangkok on the map.

Today I will talk about issues of urbanization, sustainable cities, urban management and some project cases.

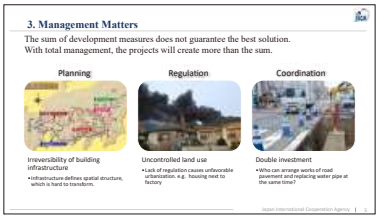


Now what is going on in urban areas, particularly in developing countries? First, urbanization is in progress with unprecedented speed and scale. Urban population of developing countries has increased from 0.7 billion to more than 3 billion over the past 40 years and is expected to reach almost 6 billion in 2050. 66% of developing countries' populations will live in urban areas. Secondly, urbanization has been functioning as the engine of socioeconomic growth. Accumulation and integration in urban areas create value efficiently. Innovation is accelerated to make city life more convenient and our economy more productive. But we cannot forget that severe problems are generated or exacerbated by rapid urbanization. Traffic jams, life conditions, drinking water, air pollution, even economic losses and social problems, and others. Climate change is not an issue within urban areas, but carbon dioxide emissions concentrated in cities must be tackled for carbon neutrality.

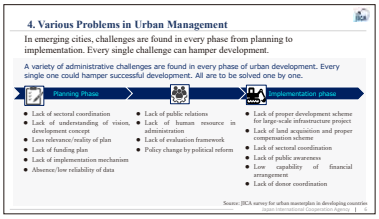
So what kind of city do we wish to live in? What do we expect in a sustainable city? "Sustainable city" is kind of a magic word that enjoys merits of urbanization at the maximum level and prevents and mitigates problems to the minimum level. We, JICA, think there are five elements of a sustainable city. First, environmental friendliness. Second, convenience. Third, creativity. Fourth, safety and security. And the last, equity and fairness. Those should be sustained by good infrastructure and urban management based on the global environment.



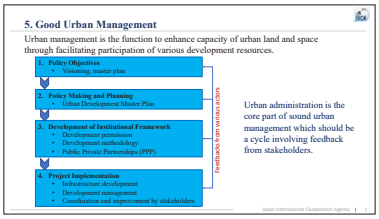
Here I would like to emphasize the importance of management in order to achieve sustainable cities, in other words, to enjoy the benefits of urbanization and at the same time to solve the problems. Why? Planning is critical before building infrastructure, which has heavy irreversibility. We need regulations. For example, landowners' property rights may be restricted as far as necessary for the public interest. Also, coordination is required among a numerous number of various stakeholders in a city. With total management, urban development or mass development projects as a whole will make benefits.



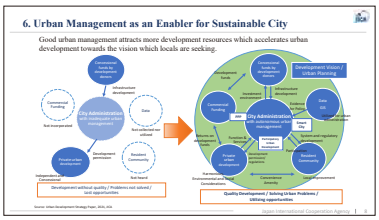
Such urban management does not work well in many developing countries. That's one of the most critical reasons why many cities are faced with enormous problems. There are various types of problems in urban management. From the planning phase to the implementation phase, problems arise. For example, lack of sectoral coordination, public relations not well constructed, low capability of financial arrangements, and so on.



We need good urban management. First, policy objectives need to be clear. Vision is essential for all stakeholders. Then, making policies and developing a plan. An institutional framework needs to be developed. Finally, development activities are implemented. This cycle will reflect feedback from stakeholders.



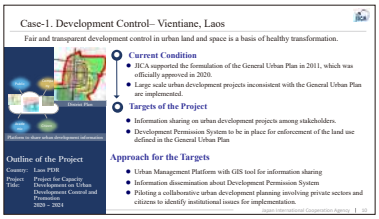
Such good urban management works as an enabler for sustainable cities. Please look at the diagram. City administration is a key for good urban management. They can learn from their own experiences. Good management can generate more development resources even from the private sector. We need to develop our capabilities more and more. JICA supports developing countries for that purpose.



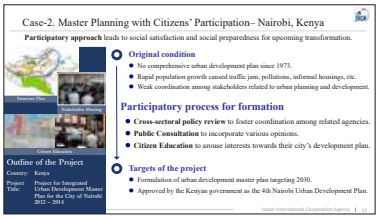
Now let me introduce some cases in which JICA is involved, for clues of understanding urban management and capacity building.

7. Project Showcase

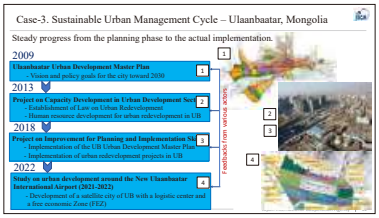
Case 1: In Vientiane, Laos, General Urban Plan 1991 had been existing and the 2011 version was approved just last year. However, during that period development projects inconsistent with these plans have been implemented. JICA supports the Lao government in their capacity building for information sharing and development permission.



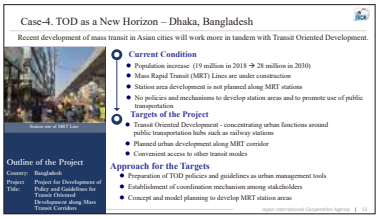
Case 2: Urban master plan of Nairobi in Kenya. When the Kenyan government prepared an urban development master plan for Nairobi, JICA supported it. During that process, strong emphasis was on citizens' participation. We together with the Kenyan government invited the citizens to a public consultation process that was held 68 times to understand and incorporate various opinions for the development vision and sectoral plans. It was a part of the strategic environmental assessment (SEA). Events such as student essay contests and painting contests of the future vision of Nairobi were held. You can see one example of the paintings that children made. Such contests were held to arouse the interest of citizens toward their own city's development.



Case 3: Management cycle in Ulaanbaatar, Mongolia. The process started in 2009. Vision and policy goals toward 2030, then the plan was implemented. Just a week ago, New Ulaanbaatar International Airport was opened with Japanese assistance. Now JICA is discussing with Mongolia an urban development plan for the surrounding area of the new airport.

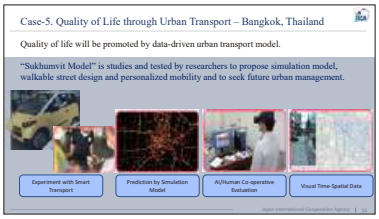


Case 4: TOD, Transit-oriented Development Plan, in Dhaka, Bangladesh. The Bangladeshi people and government wish to have mass rapid transport in their city to overcome traffic congestion and other urban problems. The MRT is now under construction with Japanese assistance. In tandem with development of the MRT, the TOD project is ongoing for a sustainable city.

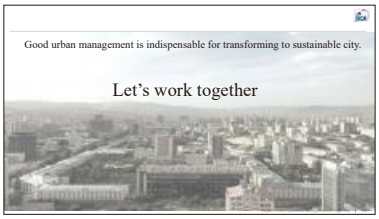


Case 5: Smart city. Bang Sue station of the Red Line of the Bangkok Metro. For smart cities, usually technology and data are emphasized. But a human-centered approach is essential for the smart city itself. Here also, please pay attention to smart energy as well as smart mobility to reduce CO_2 emissions toward carbon neutrality.

It doesn't mean we ignore the importance of technology and data. Please refer to an experimental case, also in Bangkok. Researchers of both Japan and Thailand work together to evaluate quantitatively alternative transport measures by calculating from data of transportation and citizens' preferences. They are trying to promote quality of life in the city area.
Not only in these cities, but also we have other cases in other regions, like Latin America and the Middle East.



So I hope you will utilize your enormous knowledge, capability and wisdom for sustainable city management.



At last, let me introduce our vision. JICA is a Japanese governmental organization whose mandate is development cooperation with developing countries. We will take the lead, aspiring to a free, peaceful and prosperous world with trust. Thank you for listening. Thank you very much.

Q&A Session: Summary

Following the speech a Q&A session was held. The main discussed questions included:

- How should countries establish a method for urban management and coordinate with many stakeholders?
- Can regulations from the government be an obstacle for the sustainable city development process?
- How has JICA tried to address this issue in these countries?
- Some countries are pursuing a goal of smart city development. Is that the same thing as sustainable city development? Are these ideas complementary or are they different?
- What does JICA think about energy problems in developing countries and what role does it have in sustainable city development?

The answers for these questions have been summarized below.

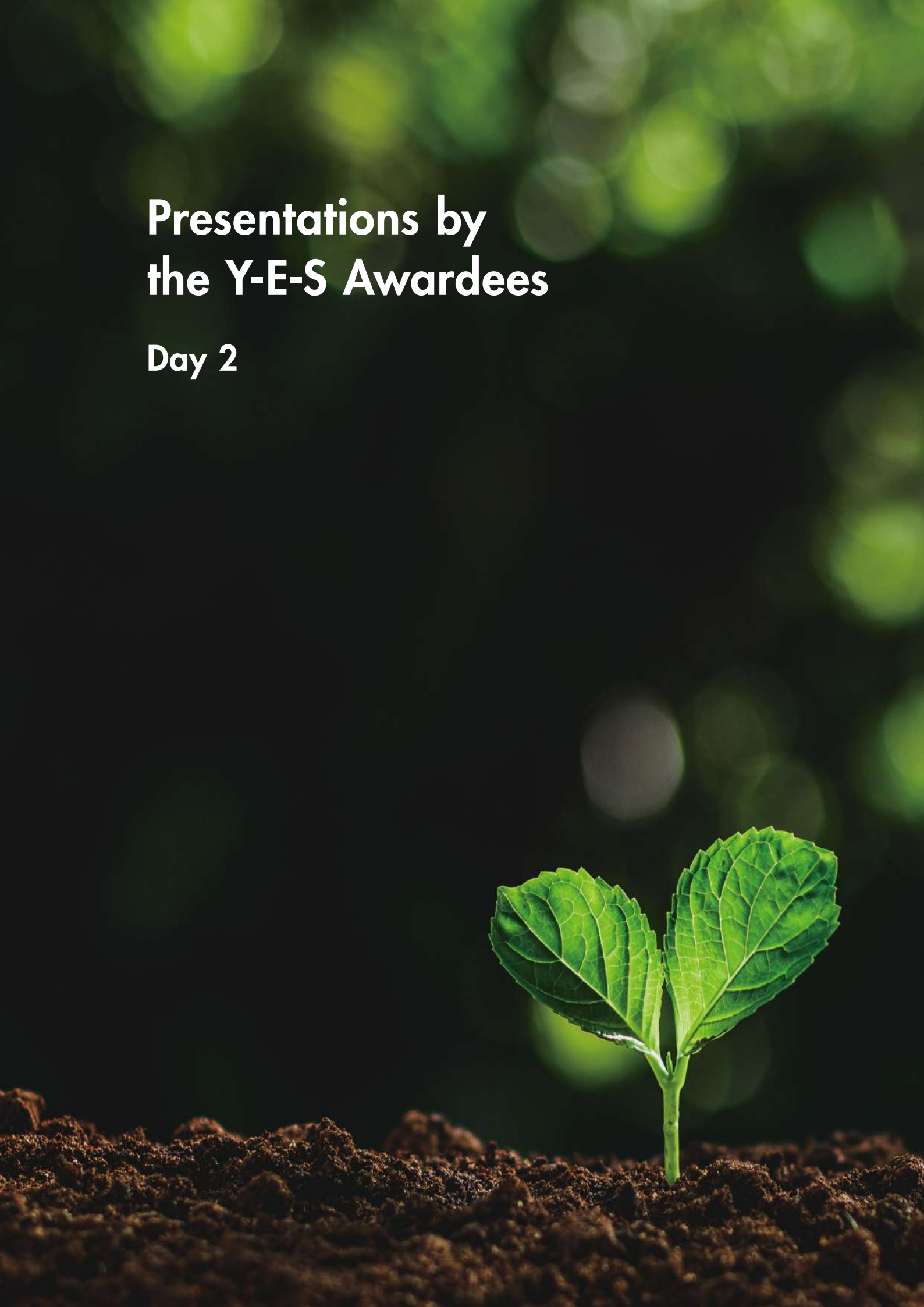
Sustainable urban development requires a great deal of coordination among numerous agents and stakeholders. These include the private sector, individual citizens, actors from outside areas, and the public sector. The government must not command the process but must play a leading role, with good communication. Part of JICA's job as an international development agency is to promote that communication, facilitating consultation with citizens and showing governments overseas how the Japanese government communicates and coordinates with the private sector and citizens.

Two key concepts are smart cities and sustainable cities. A sustainable city doesn't have to be a smart city, but smart cities assist sustainability by making effective use of modern technology and data. A sustainable city uses technology and data to focus on human needs.

In terms of the role of energy in sustainable development, energy is generally produced far from cities, so the role of the city in energy sustainability is to improve efficiency. JICA is involved in tackling these issues.

Presentations by the Y-E-S Awardees

Day 2



Myanmar

Mr. Pyae Phyo Kyaw 2018 Y-E-S Awardee
Ms. Suu Malar Win 2016 Y-E-S Awardee

Ensuring Urban Sustainability through Green Infrastructure

Good afternoon, everybody! Welcome to my presentation!
As a representative of Myanmar Team, today I'm here to talk about how we can mitigate the negative impacts of rapid urbanization through the implementation of green infrastructure.

First of all, I'd like to begin my presentation by showing current trends of urbanization across the world. Since the past few years, the number of populations residing in urban areas and their associated growth has been increasing dramatically. This urbanization process is expected to continue and according to data from United Nations, the urban population will reach 5 billion in 2028 and 6 billion in 2041. As you can see from figure on the right corner of this slide, the urban population of the less developed countries has been growing faster than that of the more developed countries since 1970. At the present, Asia population makes up 59.76% of total world population and rate of urban population in Asia has been constantly growing since 1955 as shown in the figure on the top corner and it is predicted to keep growing in the future.

As a consequence of this rapid urbanization, we are facing several challenges such as pollution, high release of GHG emissions, unequal access to infrastructure and the worst of all, cities are becoming more vulnerable to climate change. So, this is the time that we should take advantages of these challenges to enhance urban sustainability. So, let's find out what is the meaning of urban sustainability. Generally, a sustainable city can be defined as a city which provide opportunities to promote economic growth & prosperity, while ecosystems and natural resources are well protected and GHG emissions are reduced in order to lead more inclusive and livable environment.

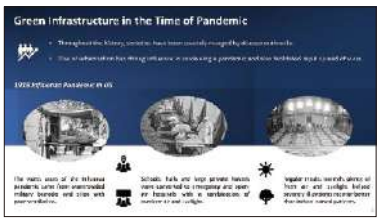
Now let's see the major topic of my presentation. It's about how Green Infrastructure can contribute in promoting urban sustainability. As reported by the WB Group, natural infrastructure or engineered structures with nature designed to enhance a natural system, and to produce more resilient and lower-cost services can be seen as GI (e.g., wetlands, green roofs, green parks, permeable road surfaces and so forth). And in this section, I'd like to present some benefits that GI carry. Depending on the type of approaches, GI offer various solutions such as flood risk reduction, air pollutants absorption, provisions of habitats for biodiversity, it also provides social benefits in terms of mental health improvement due to higher accessibility

to places for social interaction and aesthetic pleasure. And more importantly, GI cost less than conventional gray infrastructure and also lead to cooling costs and health service costs reduction which seem pretty attractive to be adopted. In the next sections, I'm going to elaborate different approaches of GI with some case studies evidence.

In this section, you are going to see different GI approaches around the world and their environmental, social and economic benefits are presented in qualitative terms. But due to the time constraint, let me highlight only one case study here. It is Stream Restoration Project in Seoul which is started to implement in 2003 and this is one of the prominent GI examples of all time and its purpose is to revitalize the Cheonggyecheon Stream that was covered for decades by a highway overpass. It is reported that the complete project brings benefits in 34% reduction of air pollution, 3.5 % increase in business and reduction of surrounding temperature.

Now let me discuss the importance of infrastructure for economic growth. We all know that infrastructure development is vital for economic growth and once we have made mistakes, it is hard and expensive to recover. So, it is very important to make right decisions in infrastructure investment. In the past, developed countries had encountered some failure in infrastructure investments due to their high reliance on grey infrastructure. So, we, the people from developing countries still have opportunities to learn from the mistakes of developed countries as we are still having a big gap in infrastructure development and we should put more effort to adopt GI. And more interestingly, in the recent year, there is an evolution of new concept called Green Growth in the economic sector with a purpose of promoting economic growth while carbon emissions and the use of natural resources are reduced in a proper manner. And you can also see some popular GI investment in this slide such as solar farm, wind farm and carbon capture and storage projects.

This time I'd like to present important contributions of GI in the time of pandemic which is related to all of us at the time being. As we all know, our societies have been severely damaged by disease outbreaks throughout the history. And one thing we need to know is that dramatic rise of globalization and urbanization has huge influence in containing a pandemic. Now, let's see how GI has played as an important role in the time of 1918 influenza spread in US. During WWI, the worst cases of the influenza pandemic came from overcrowded military barracks and ships with poor ventilation. When the pandemic hit US, health officials converted schools, halls and large private houses to emergency and open-air hospitals to reduce the number of infections and deaths. Interestingly, medics at that time found that regular meals, warmth, plenty of fresh air and sunlight helped severely ill patients recover better than indoor nursed patients. In the next slide, we're going to see what kind of solutions GI can provide to address challenges induced by Covid 19 Pandemic.



Since the beginning of pandemic, we have been staying under a lot of restrictions to contain the spread of coronavirus. Lockdowns and travel restrictions lead to decline in physical and mental health. And many researchers have pointed out that exposure to greenness is important to mitigate adverse health outcomes and at the same time, demand for safe, accessible and well-connected green spaces have been increasing among the urban dwellers. (e.g., community gardens, tree-lined streets, green

corridors, domestic gardens, etc.) So, we can say that Covid 19 pandemic taught us the importance of greenness in planning and management of future urban design.

Now let's move on to the topic of how GI mitigate negative impacts of natural disasters. In this section, I'd like to focus on challenges of infrastructure failure in my country. Myanmar is vulnerable to natural disasters and 50% of total number of disasters are related to flood, 23% by storm, 15% by earthquake and the rest by 12% according to 2015 data. And flood is common disaster in Yangon which is the biggest city of Myanmar with over 5 million population in the metro area. And 42% of households in Yangon are reported being flooded every year. When we research causes of flood in Yangon, we found that being a low-lying area with large population, disposal blockages, increased rainfall intensity, impervious paved surface and insufficient drainage system are major factors leading to severe flooding in the city. In the next slide, you'll see how other countries adopted GI in response to flooding.

Singapore was a country with severe flooding in the past years. Their government promoted projects to reduce flood risk. But they relied on grey infrastructures which resulted negative impacts. Therefore, the national water agency of Singapore launched the Active, Beautiful, Clean (ABC) program in 2007 to encourage designs such as rain gardens, bioretention swales, and wetlands, etc. And according to the assessment of this program, flood-prone areas in Singapore have decreased substantially from 629 ha in 1989 to 56 ha in 2011 and the cities with these practices are well protected against floods. So, we like to recommend cities with high flood risk to learn from Singapore experience.

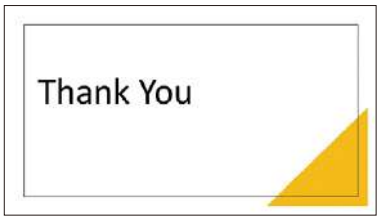
In the previous sections, I have discussed how GI respond to negative impacts of global pandemic and natural disaster. Now we are going to see the role of GI play in air pollution mitigation. In the city Yangon, air pollution is also as serious as flooding. Being the most populated city and the most important driver for Myanmar's economy, there is a large amount of pollution that arises as a result of these features. And major sources of air pollution in Yangon include huge influx of cars and industry, burning of wastes and trees are removed to make ways for streets. As you can see in the figure, air quality index of the first five months of 2019 was regarded as "unhealthy for sensitive groups" as it is exceeded AQI 100 and also the annual average AQI is at about 90 which is only "moderate" level. In the next slide, we're going to find the role of GI in air pollution mitigation.

Some scholars have pointed out that GI practices have potential to mitigate pollution impacts by removing atmospheric particles. Please keep in mind that GI is used to refer to green walls, bushes, hedges, parks and street trees in this context. Although some studies link green infrastructure with health benefits such as reducing respiratory and cardiovascular diseases, mental health disorders, etc., there are still lack of evidence of GI's impact on the concentrations of specific pollutants and how it is related to human health. In the rest section of my presentation, you are going to see what are the common challenges to implement GI and what measures we recommend to overcome these challenges.

In order to achieve effective implementation, it is necessary to be context-specific and need to be in line with appropriate technology. In fact, we have several challenges to successful GI and I would like to discuss common challenges we found in implementation of GI in different urban settings around the world. We need to be careful that GI performance and its benefits are context and site-specific. In that case, lack of context-specific design standards can lead to undesirable results. Also lack of capacity and resources especially of local municipal and lack of funding resources are major hindrance. According to many studies, it is still unclear how to estimate the costs and benefits and this makes GI financially unattractive for investors. In some countries, people are not easily accessible to GI due to unequal distribution and poor integration of regulatory bodies also remain as a key challenge.

Based on the challenges we learnt in the previous slide, I'd like to present some recommendations to overcome barriers. For widespread adoption of GI, the government agencies must develop policies, laws and regulations and consequently, design guidelines that are tailored to local conditions and respond to the needs of local people need to be considered in planning and design stage. Moreover, community participation needs to be encouraged to reduce unequal access to GI. And to promote investments in GI, the benefits of GI interventions need to be presented in quantitative terms. Lastly, we need to learn from other countries' experience to develop GI designs that can be adapted to our specific regions.

Well, that brings to the end of my presentation and these are all the things that I like to share with you about how we can benefit from green infrastructure in promoting the sustainable urban society.
Thank you!



Q&A Session: Summary

Following the presentation a Q&A session was held. The main discussed questions included:

- What kind of green infrastructure is used in Myanmar?
- How can green infrastructure help the already developed and densely populated cities?
- What kinds of changes can developing countries undertake to tip the scales in favor of promoting investment in green infrastructure?

The answers for these questions have been summarized below.

Myanmar's infrastructure is underdeveloped, so it is at the early stage of developing policies and institutions to execute green infrastructure projects. There are many opportunities to develop green infrastructure in vacant areas, but also many ways of integrating green technology with existing buildings and infrastructure, even in densely populated urban settings. To promote investment in green infrastructure, Team Myanmar favors a bottom-up approach, of raising awareness, getting local feedback and encouraging cooperation between private investors and communities, rather than a top-down approach of regulations and policy mandates.

Cambodia

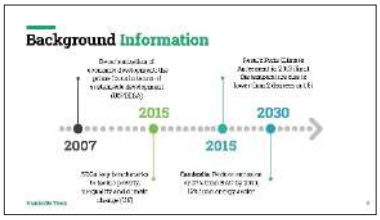
Mr. Song Vergenylundy 2012 Y-E-S Awardee
Ms. Cheapanhasith Pel 2018 Y-E-S Awardee

Renewable Energy Transition in Cambodia's Electricity Sector

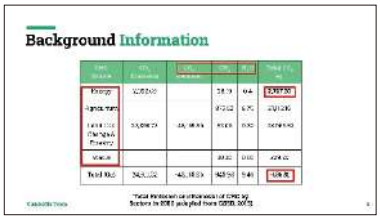
Hi, everyone! Representing a team of 2 from Cambodia, I will be presenting our work under the title of Renewable Energy Transition in Cambodia's Electricity Sector as a part contributing to a sustainable future and a better quality of life.

This presentation will be covering these important parts starting with some background information used for the research to the conclusion of what has been achieved throughout the work with some recommendations.

Slide 3: Climate change has strongly been addressed and sustainable development has been promoted since 2007, and a global framework to avoid dangerous climate change by limiting the global temperature rise to well below 2°C have been set out during the Paris agreement in 2015. In response to the threat of climate change, Cambodia has made a pledge to reduce its greenhouse gas emission on its development plans.

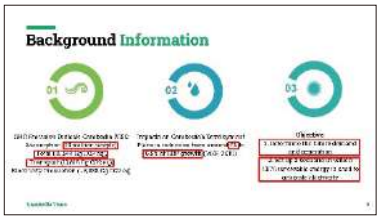


Until now, Cambodia has carried out GHG inventory only twice, back in 1994 and 2000. In these two studies, the scope covered merely three types of greenhouse gases and four sectors. As of 2000, the total estimated emission of these GHG were around 2,700 Gg CO_2 equivalent in the energy sector, and a deficit in CO_2 removal of 456.81Gg CO_2 eq was observed.



According to Intended Nationally Determined Contribution (INDC) report, there would be an increase in GHG Emission to 25,000Gg CO_2 eq in 2050 following a projected population of about 23 million under the baseline scenario. Out of this predicted GHG emission from energy sectors, transport is expected to hold the largest share.

According to Ministry of Economy and Finance in 2019, it is forecasted that Cambodia is highly likely to experience more extreme weather events in the coming years as a result of climate change. This will impact the GDP growth to decrease from around 7% to roughly 6.5% from 2017 to 2050.



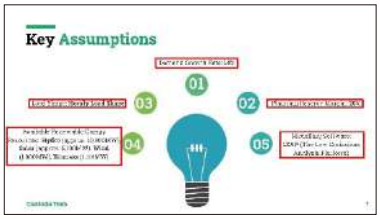
The objective of the research is to first determine future electricity demand and generation in Cambodia, and second is to establish a visionary scenario in which all potential renewable energy sources are used to generate electricity in Cambodia.

Now, let us look at some terminologies used in this research.
First, Renewable energy refers to energy that are naturally replenished on a human timescale including carbon neutral sources like sunlight.

Second, A Business as Usual or Baseline scenario is created by assuming that everything would be operated as usual. The official GDP and population would also be used in the simulation of this scenario. More importantly, no intervention of policy measure is allowed either to achieve sustainable energy systems or to reduce GHG emission.

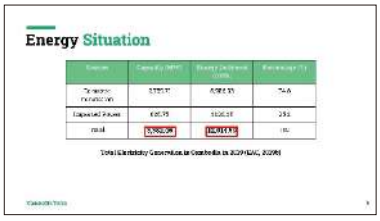
Whereas, Visionary Scenario is constructed under an assumption of penetrating all estimated potential installed capacity of domestically available renewable energy into the generation capacity, which means that all fossil-fuel based power plants would be put into retirement by 2050.

Some assumptions also have been made as follows:

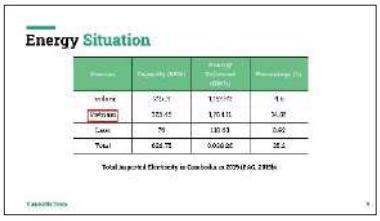


1. The projected demand is built on the fundamental assumption of power demand growth rate of 14% rather than based on the demand growth rate of each consumer.
2. Due to insufficient amount of data to calculate planning reserve margin, this study adopts the value of 20% which is taken from the presentation on Energy Power Plant in Cambodia prepared by Ministry of Mine and Energy in 2017.
3. Because of unavailability of recent data, this study uses the time slice of whole year with hourly details. This allows the construction of hourly peak load shape based on available data in the annual report of EDC in 2017.
4. According to MME (2016), these are the total potential installed capacity sources of renewable energy available in Cambodia.
5. To achieve the objective, Leap software is used for this whole research study.

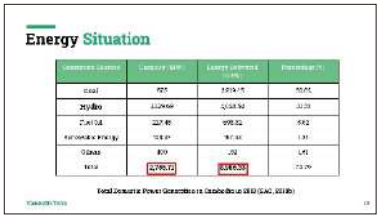
Before proceeding to the simulation, we should first get to know how the energy situation is like. As of 2019, Cambodia still rested on imported electricity from the neighboring countries for approximately a quarter amount of the total power. The generation capacity in 2019 was around 3300MW, which could deliver the total amount of electricity of around12000 GWh.



In terms of imported electricity, Vietnam sells the largest amount of power of nearly three-fifths of the total power imported from neighboring countries, followed by Thailand.

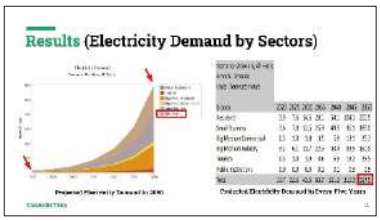


While approximately one-fourth of the total power was imported in 2019, the rest was domestically produced. The total domestic generation capacity was recorded of around 2,700MW which could supply the total power of around 9000GWh, in 2019. Hydropower and coal power plants were observed to take up most of the overall production.

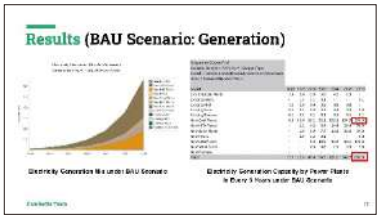


After inputting all the available data with some assumptions, we can get the results based on the two scenarios. If we look at the left figure, the electricity demand is projected to rise from about 10 thousand GWh in 2019 to around 600 thousand GWh in 2050, and household is predicted to share the largest demand of electricity.

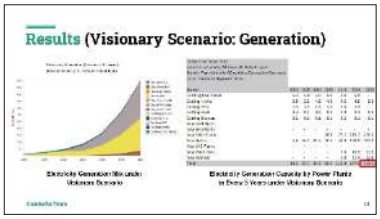
It is worth mentioning that the Visionary Scenario is constructed under the Baseline Scenario so that the evaluation on the maximum penetration of renewable energy sources can be made in accordance with the BAU demand. Thus, though both figures, (left and right) display different names of scenarios, they still present the same values of electricity demand.



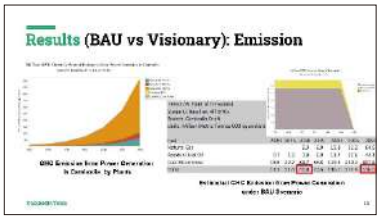
By following everything as planned in Power Development Plan report, the total amount of electricity generation in 2050 is projected to reach nearly 664 thousand GWh under Baseline Scenario. It should be noticed that by that year, existing coal plants and residual oil plants would all retire, thus contributing no amount of electricity. Most of this generation comes from the installation of new coal plants with the estimated capacity of around 364 thousand GWh. With this generation capacity, not only would Cambodia be able to meet the electricity demand in 2050, but Cambodia would also be able to get rid of importing electricity from neighboring countries.



In line with the fundamental assumption made for the visionary scenario that all potential renewable energy sources would be in complete use by 2050 and no single fossil-fuel based power plant would be operated. The total generation under Visionary Scenario is merely 513 thousand GWh, which would account only around 85% of the total demand in 2050. However, it should also be noticed that fossil-fuel based power plants are allowed to share its generation capacity due to their contract, but they all would have been retired by the year of 2050.

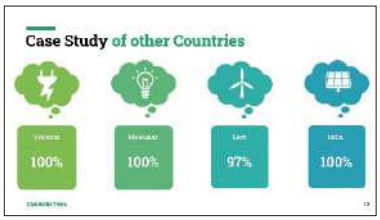


In this study, under the Baseline scenario, it is found out the projected GHG emission would be up to slightly over 40 thousand $GgCO_2$-eq in 2030 which is more than three times the projected emission in Cambodia's INDC (Intended Nationally Determined Contribution) plan. Additionally, in 2050, it would reach roughly 516 thousand $GgCO_2$-eq which is strikingly higher than the value predicted in INDC.

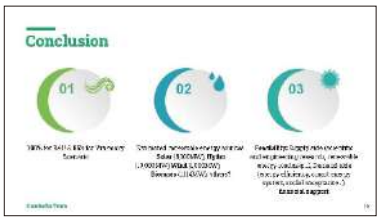


Now, let us look at some researches that have been done in case of 4 other countries.

According to (WWF World Wild life Fund for Nature Report, in 2016), under Sustainable Energy Sector Scenario, Vietnam, Myanmar has the potential of 100% renewables in the electricity mix by 2050 with solar as the energy mix of around 43% and 46% respectively, while Laos could have at least 97% of renewables in the electricity mix by 2050 with around 30% of solar energy. And according a research done by the Green Werk in 2016, it is possible for India that 100% of renewables in the electricity mix by 2050, with around 30% of solar energy.



As a result, under the scenario of BAU, Cambodia will be able to ensure electricity security while allowing no more room to continue importing electricity from all neighboring countries by 2050. However, for visionary scenario, the estimated generation capacity does not meet the demand as the projected generation in 2050, specifically it only covers 85% of the projected demand. Hopefully, there be more available renewable energy sources to cover the other 15% of visionary scenario.



This gap is possible to be closed by calling for interventions in both sides of management: supply and demand, where further scientific and engineering research can be performed to update the potential installed capacity of existing renewable energy in the supply side. In terms of the demand side, future studies can be centered around the integration of improved energy efficiency in electricity consumption patterns or the introduction of smart energy system, and there is also a special need for the involvement of social science research to cope with consumers' behaviors, so that electricity demand and supply would be matched.

These are the references used for this research work.

This is the end of our presentation, and questions are welcomed. Thank you very much.

Q&A Session: Summary

Following the presentation a Q&A session was held. The main discussed questions included:

- Renewable energy is still unreliable. Can renewable energy really replace the current energy sources?
- What kinds of solutions is the Cambodian government pursuing to approach the problem of the economics of renewable energy?
- What kind of research investment is happening in Cambodia to make renewable energy a reality?

The answers for these questions have been summarized below.

Currently renewable energy suffers from poor reliability, but solving the issues is only a matter of time because countries everywhere are trying to offset emissions and people have to find ways to switch to renewable energy whether they like it or not. Storage systems such as batteries and hydro pumps are one class of solutions for intermittency, especially in remote areas not served by the national grid. Hydro power is particularly promising for Cambodia. Cambodia is working on these solutions and is working toward net zero. ADB and international private investors are assisting with funding. Regarding the economics of renewable energy, capital cost is high, especially for developing countries such as Cambodia. Government support will be needed to attract investors. The Electricity Authority of Cambodia has introduced the feed-in-tariff for this purpose and investors are expressing interest. Policies such as carbon credits or renewable-energy portfolio standards would also be helpful in the future.

Vietnam

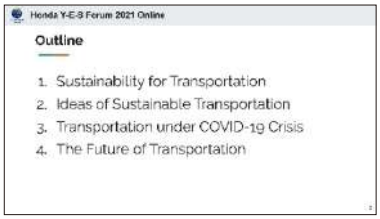
Mr. Le Yen Thanh 2011 Y-E-S Awardee
Mr. Nguyen Van Quang 2015 Y-E-S Awardee
Mr. Dinh Truong Giang 2017 Y-E-S Awardee

Integrating Sustainability into Urban Transportation in SEA

Hallo, everyone. This is a presentation from Vietnam PCM Team and it has been nice to become the representative of Vietnam to send a message to the forum.

Making existing cities and new urban development more ecologically based is an urgent priority in the global push for sustainability. One of the biggest and most important factor in Urban development process is Transportation Development. That is the reason why we decided to choose the topic: integrating sustainability into urban transportation in SEA. Our speech focus mainly on the Transportation Development, what we can learn from Japan, which direction Vietnam have been already following and how we can improve more.

Our presentation is divided into three parts: No. 1: Sustainability for Transportation, No. 2: Ideas of Sustainable Transportation from some countries in Asia, No. 3: Transportation under COVID-19 Crisis and the last one, No. 4: The Future of Transportation.



Now, I'll get a move to part No. 1: Sustainability for Transportation.

First of all, we need to define what sustainable transportation is. Sustainable transportation has been used for quite some time now, and it is the means of transportation that is safe and has a low impact on the environment. Sustainable transportation is commonly referred to as 'Green Transportation'. Examples of sustainable transportation include walking, cycling, carpooling, and "green" vehicles.

What are the problems that we have to face from urban transportation? Here, we can see four popular problems. No. 1: Traffic movement & congestion. Traffic congestion is one of the most serious problems in big cities and it has made people's lives more difficult. Thirty years ago, there were fewer cars on the street and people did not suffer on traffic. Traffic congestion is also causing significant damage to the national economic development, reducing labor efficiency and increasing unnecessary costs, especially investment into solutions for traffic congestion.

No. 2: Accidents. Traffic accidents are among the major causes of mortality all over the world. This is an alarming issue as many people lose their lives at a very young age due to motor vehicle accidents. There are many causes of traffic accidents, but the main cause is still the awareness of people in traffic, infrastructure and the public transport system.

No. 3: Environmental impact. The operation of motor vehicles is a polluting activity. While there are innumerable other activities which cause environ¬mental pollution as a result of the tremendous increases in vehicle ownership, society is only now beginning to appreciate the devastating and dangerous consequences of motor vehicle usage. Pollution is not the only issue.

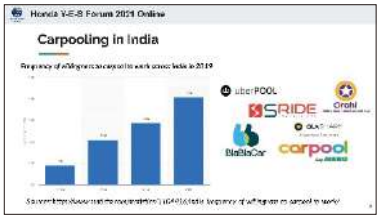
No. 4: Parking difficulties. Many car drivers stuck in city traffic jams are not actually trying to go anywhere: they are just looking for a place to park. For them the parking problem is the urban transport problem: earning enough to buy a car is one thing but being smart enough to find somewhere to park it is quite another.

That is the reason why we need to apply sustainable transportation into our lives. Here, we can see seven benefits of sustainability into transportation: Provides safer transportation, reduced traffic congestion, emits less pollution, promotes community health, save energy, save money and also create more jobs.

Now, we are going to move on to Part 2: Ideals of sustainable transportation from some countries in Asia.

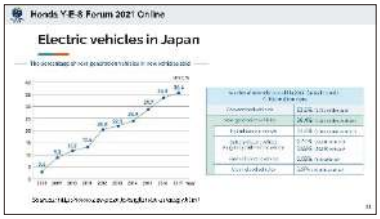
No. 1: Carpooling in India. In my slide, you can see that a lot of brands provide carpooling services in India, like uberPOOL, SRIDE, BlaBlaCar, carpool.

Indian cities are currently witnessing a trend of growing private ownership (cars and two-wheelers) of vehicles and declining public and non-motorised transport use. As per the Road Transport Year Book, 230 million vehicles are plying on Indian roads in 2016 out of which 86% of vehicle share is of the private vehicles. These trends have implications on India's energy consumption, energy security, pollution, congestion, health and safety. That is the reason why people in this country are ready to use this service daily ,41% of population choose in 2019.



No. 2: Electrical Bus Project in Vietnam. This is a key project of Vietnam in the coming years to reduce the impact of traditional vehicles on the environment and encourage a large number of people to use it. It is VINBUS. We can see some impressive numbers at the official launch of VINBUS: more than 250 buses, over 15 routes, 100 connections and 3 region services.

No. 3: Electric vehicles in Japan. In the line chart, we can see the significant increase in the portion of next-generation vehicles sold in Japan. In 2008, this figure stand at 2.6% and went up to over 36% in 2017. This figure is predicted to keep increasing strongly in the feature.
This strong presence demonstrates Japan's high quality in the fields of technology, industry and human resources. Globally, the market share for Japanese EVs is approximately 30%. Leveraging its strengths, Japan aims to further promote EVs produced by Japanese automakers to tackle global climate change around the world.

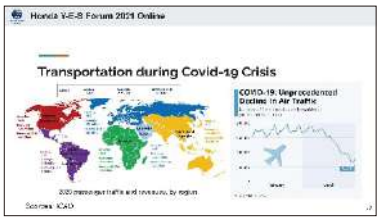


Now, we will move on part 3: Transportation Under Covid-19 Crisis.

First of all, we need to see how Covid-19 pandemic impacts to the world, especially to transportation. First, traveling via public transportation are limited. Recreational and unnecessary travel is strongly discouraged. Workers and employees are recommended to work remotely. Personal transportation and delivery services has been increasingly adopted.

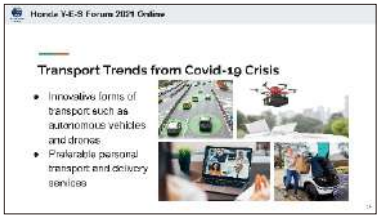
No. 2: Traveling between countries are ceased or limited for only emergency. International flights have been reduced, suspended, or canceled. Limited diplomatic flights for emergency are allowed.

That leads to the travel restriction, negative impacts on transportation companies, especially aviation companies. In addition, threaten the economic activities of other sectors depending on transport. Tourism, supply-consumption chain, commercial and manufacturing activities are affected by transportation services.



But on another hand, we can see some positive trends from Covid-19 crisis. First, innovative forms of transport such as autonomous vehicles and drones, for delivering goods to high-risk group, or transporting infected persons, etc., for delivering goods to high-risk group, or transporting infected persons, etc. or for disinfecting, monitoring social distancing, assimilating announcements

And preferable personal transport and delivery services to avoid contacting with potential infectious sources and to adapt new-normal lifestyle: working remotely.

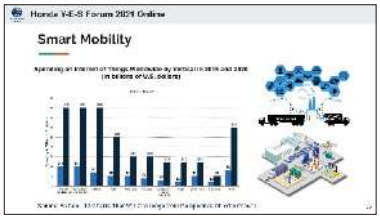


Now, we will move on the last part of our presentation, No. 4: The Future of Transportation. In this part we will learn about four future models of urban transport.

No. 1: Smart Mobility. Smart mobility refers to using modes of transportation alongside or even instead of owning a gasoline-powered vehicle.

Base on the industrial revolution 4.0, we have IoT, AI, BigData, so enterprise can innovate many smart mobility solutions for co-operates like Smart Logistics System, Smart Delivery System , VMS (Vehicle Manament System)... , so that they can save cost, improve performance . Government can have a better transportation design.

Look at the bar chart, we can see that logistics is one of the sector had the significant increase from 10 to 40 billion dollars over a period from 2015 to 2020. It also indicates the importance of this sector in life.



No. 2: Mobility-as-a-Service (MaaS). Mobility as a service (MaaS) is a range of digital solutions designed to make transportation more efficient and simple. MaaS aims to integrate all aspects of customer journeys into a single, user-friendly service or application. This includes trip planning, booking, ticketing, payment, and updates.

MaaS is the next stage in the evolution of transportation. MaaS is already being implemented in many countries.

Look at my slide, we can see the very impressive number, 2.3 billion, it comes from the total number of private car trips replaced with Maas trips in 2023.

Mobility as a Service can provide numerous benefits, both to transportation authorities and to consumers. We believe that MaaS will be developed in South East Asia countries in the future.

The next one is Electric Vehicles. We are stepping into the era of Electric Vehicle. By 2022 elect vehicles will cost the same as their internal-combustion counterparts. And we are gonna have more than 400 mil elect vehicles in 2040 (due to Bloomberg report).

This is a very big markets that all car companies are stepping into. In Asia, the electric vehicle market size in 2023 is visioned up to 145 billion USD.

No. 4: Autonomous Vehicles. An autonomous car is a vehicle capable of sensing its environment and operating without human involvement. A human passenger is not required to take control of the vehicle at any time, nor is a human passenger required to be present in the vehicle at all. An autonomous car can go anywhere a traditional car goes and do everything that an experienced human driver does.

The Society of Automotive Engineers (SAE) currently defines 6 levels of driving automation ranging from Level 0 (fully manual) to Level 5 (fully autonomous). These levels have been adopted by the U.S. Department of Transportation.

The big brands in this fields that we can mention about include Honda, Tesla, Toyota ...

That leads to the end of my presentation. Hopefully, you can see the problems of transport that we are facing and some ideas in how to apply sustainable transport into our life. After all, making existing cities and new urban development more ecologically based is an urgent priority in the global push for sustainability. Thank you so much for listening.

Q&A Session: Summary

Following the presentation a Q&A session was held. The main discussed questions included:

- What are the best sustainable transportation systems for developing countries, which have low financial and technological requirements?
- Present preference of personal transport during the pandemic can lead to a certain preference for personal transportation? What can we do to provide safe transportation to enable public transportation usage during this pandemic?
- What are the biggest obstacles for autonomous vehicles that will prevent them from being a realistic vision? Will autonomous vehicles be available by 2025 or 2030 realistic? What are the challenges?

The answers for these questions have been summarized below.

Regarding sustainable transportation systems for developing countries, which require cheap, low-tech solutions, developing and encouraging use of public transport is best. The preference for personal transportation during the COVID-19 pandemic is a barrier for this approach. The only solution is to hope it ends soon. Transportation is not the main cause of CO_2 generation. For autonomous vehicles, the biggest obstacle in developing countries is infrastructure. Autonomous vehicle technology must be adapted to local conditions, such as new cities and traffic conditions. This is in contrast to developed countries, where legal and regulatory frameworks are the bottleneck.

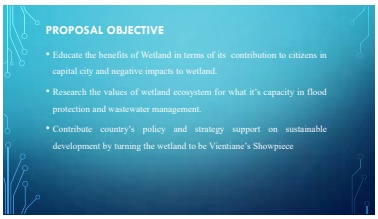
Laos

Mr. Leego VANH 2009 Y-E-S Awardee
Ms. Khandala Khamphila 2009 Y-E-S Awardee

Future urban design for Eco-society Integrated Implementation on Long-term Designing the Wetland for Eco-society Case study: That Luang Wetland, Vientiane Capital

Distinguished president of Honda Foundation, ladies and gentlemen. It is very nice to see everyone for this Forum. I'm Leego VANH, on behalf of PCM members from Lao Team on this presentation. Our topic is integrated implementation of long-term design of wetlands for eco-society.

For our research purpose, we would like to educate society about the benefits of wetlands and the negative impacts to wetlands, and we also need to know how governments are making efforts to resolve the relevant issues in wetlands. This is the critical part of the beginning of the presentation.



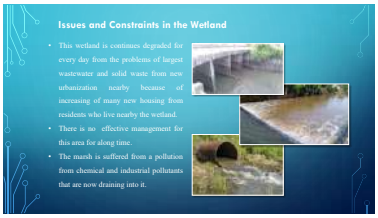
Actually, we try to understand, why does the government restore the wetlands? We have some main reasons for this. Because this place is where large amounts of storm water and wastewater collects from residents in the capital. Although there are many studies and projects about solutions for wastewater management, those previous projects were not successful. So the government would like to revitalize this area going forward for sustainable management.

As can be seen on the photo, there are many new projects that will happen in Laos. In particular, you can see the That Luang Lake specific economic zone, which is our case study for this presentation.

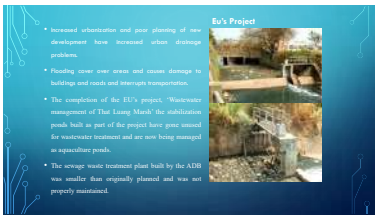
I will explain its background in short. A few decades ago, this place was a large rice field, but the area was affected by flooding every year. After that, people abandoned it to aquaculture ponds and grassland and some areas are filled by new construction such as houses, restaurants and factories.

As shown on the map, we can see that the That Luang Wetland is the biggest wetland in the capital city. On the map, water is released from mini-wetlands and then flow into the That Luang area. After that the water runs in canals down to the Mekong River.

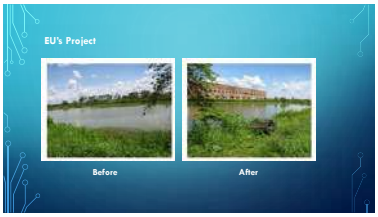
The wetland confronts a serious situation. It is degraded continuously with important issues such as wastewater and solid waste from urbanization around the wetland. There is no efficient management plan for a solution and some industrial pollutants also drain into this area.



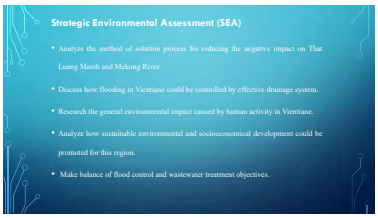
This is an EU project conducted in 2009. We can see that a water dam and bar screen are built to trap solid waste. This invention looked very helpful in the short term but it was not effective as a long term solution, especially for the That Luang Wetland, because of rapid urbanization and too much waste to control.



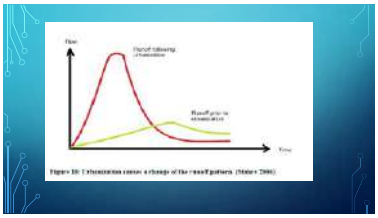
After completion of EU's project in 2009, this project made a wetland for wastewater treatment. After that many people tried to fill this wetland and this area was filled up with people from surrounding areas. The government made strong efforts to address this problem and has tried to control it for many years but was not successful.



The assessment includes problems and solutions. Indeed, there are more criteria for assessment. However, I only show some relevant factors that match wetlands management.



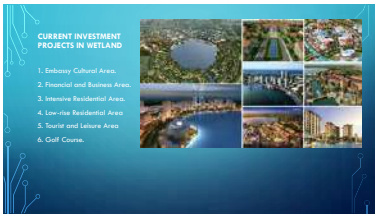
The graph shows the runoff pattern between time and flow. We can see that, if there is more urban expansion in wetlands area, the water will runoff alongside with it. This leads to risk of flood. This is an important point, as government has to provide balance to control flooding and wastewater management to preserve the wetlands area.



These are the goals of wetlands management in our research. We can see that the government is trying to renovate the wetlands and manage it properly in terms of environmental protection, wastewater management and also to make partnerships to develop the wetlands for Eco-society and smart life.

As can be seen on the left, the wetland is nearly gone because of the great deal of housing in area and when we compare on the right side we see the new transformation that is clearing off surrounding residential areas. However, the GOV and the Project have to provide compensation to the landowners in the project area.

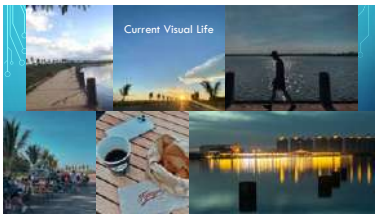
This is China Investment project. There are many beneficial effects in the area. This will be a center of economic and tourism attractions. This development will not disturb the wetlands and will be well-preserved. Lots of modern infrastructure and facilities will be built in the near future.



These are some finished projects such as condominium, big canals, and the public park. There is still more construction to complete by 2040. What we can see is the presence of a large drainage system. The water is refreshed and the landscape is improved.

This is a current process and it is a beautiful view. To see this new landscape is to see the future of modernization in the capital city.

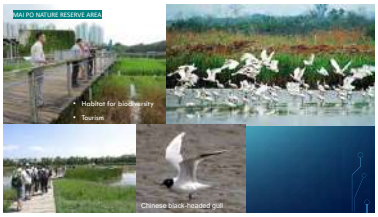
Actually, not much construction is finished , but it is pleasant to visit. People can do many activities there, such as fishing, exercising, and having a cup of coffee from food stands.



In my opinion, the degree of preservation of wetlands depends on a country's condition. So we have some examples of preserved wetlands in the following countries. Firstly, in Laos we have the That Luang Wetland. This place is preserved for flood regulation, wastewater management, tourism and economic development.

This wetland is a nature park, and it is pleasant place to visit. The Korean government succeeded in renovation of this wetland by constructing facilities inside. There are long bridges passing through the wetlands where people can take photos of the landscape, and there is a river pass into the middle of wetlands.

Another wetland is the Mai Po wetland. This is a nature-preserve wetland located in Long District, Hong Kong. Many tourists visit every year. Birds are the signature; around 55,000 birds migrate to this place. However, at present, the population of these species has apparently fallen to 21,000. The main impact is degradation of their habitat. This is the reason that the Hong Kong government needs to preserve this wetland and protect the bird species.



This is our final example. It is in Japan. I will talk about "Stork Friendly Farming." This area can show how Japan can handle negative effects from modern agriculture in the wetlands. Over the last 30 years, modern farming has interfered at this paddy field; this led to a decline in numbers of the white stork. The white stork is a large bird in the stork family. In its management plan, the Japanese government needs to revitalize the wetlands to promote eco-farming as they renovate wetlands. They know that the water is a major eco-system that is a habitat and food source for birds, and in the end they could sustain the white stork population again.

Finally, I would like to say thank you for your kind attention. I hope everyone in the audience will comprehend the idea of this research. Now we have five minutes for Q & A so if you have any questions, please feel free to ask. I will answer if I can, and if I cannot I will try to answer later by e-mail Please just leave your email address in the chat box. Thanks you very much. *Arigato gozaimashita*.

Q&A Session: Summary

Following the presentation a Q&A session was held. The main discussed questions included:

- What kinds of scientific and technical innovations can we use to enhance drainage systems?
- What sort of technological or regulatory challenges are there to ensure that these wetlands can be preserved?

The answers for these questions have been summarized below.

Regarding scientific and technical innovations that can be used to enhance drainage systems, in Laos these plans follow the Lao government's plan, which is in line with green and sustainable growth. Drainage systems follow international standards for SEZs, which in Laos focus on vitalizing wetlands while attracting electronics and research industries.

Regarding wetland encroachment, development is fine if measures such as flood control, base water measurement and cost-effective investment are conducted. Wetland preservation is useful for tourism and for flood control, contributing to sustainable urbanization. This provides a model for sustainable development in developing countries. Indigenous development of technology is important for sustainable development.

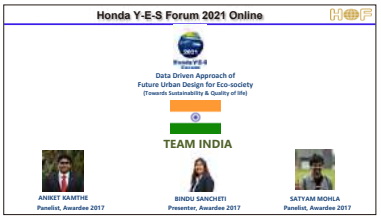
India

Ms. Bindu Sancheti 2017 Y-E-S Awardee
Mr. Aniket Kamthe 2017 Y-E-S Awardee
Mr. Satyam Mohla 2017 Y-E-S Awardee

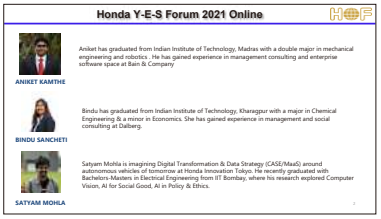
Data Driven Approach of Future Urban Design for Eco-society

Hello everyone. This is Bindu Sancheti from team India and today we are presenting in the Honda YES forum 2021.
The theme for India is Data-Driven Approach of Future Urban Design for Eco-society and we are aligned towards the broader theme of moving toward better sustainability and quality of life.

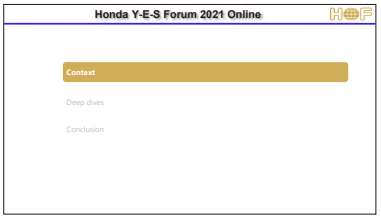
In our team, we have Aniket Kamthe who is a panelist and a YES awardee from 2017. Me, who is presenting the presentation and also an awardee in 2017 and also Satyam Mohala who is also a panelist and awardee from 2017.



Here you can take a broader look at how our team composition looks like. Aniket is working in the management consulting space, I am working as a social consultant at Dalberg and Satyam is working in the Honda Innovation lab using computer vision and AI for Social good.



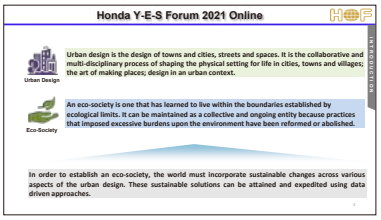
If I talk about the broader segmentation of the presentation, it is divided into three major buckets. The first is the context section where we talk about why data should be used in the context of urban design, second is the deep dive where we look at various sectors in which data can be used and third is the conclusion where we talk about the risk and mitigations which we will be needed if we are going to follow this particular approach of using data to enhance urban design.



So, lets first deep dive into the context section and then we can look at other sections respectively. So there are three questions which we need to answer–

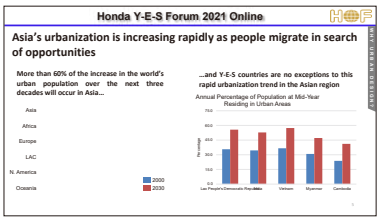
- What is urban design?
- How can be urban design integrated into eco-society?
- What are the various techniques to use and how data can be used to get sustainable urban design?

Talking about what is urban design, Urban design is the design of towns and cities, streets and spaces. It is the collaborative and multi-disciplinary process of shaping the physical setting for life in cities, towns and villages etc.



On the other hand, if you talk about eco-society, An eco-society is one that has learned to live within the boundaries established by ecological limits. It's a symbiotic relation between humans and the environment we live in and that is realized through eco society. In order to establish an eco-society, the world must incorporate sustainable changes and approaches of the urban design. That can be attained by data-driven methods that will be explained in further slides.

Talking about why urban design is important in the context of Asia, as you can see on the left hand of this slide, in terms of urbanization, More than 60% of the increase in the world's urban population over the next three decades will occur in Asia and that particular number is alarming given that other continents are not facing such rapid urbanization. Hence it is important to understand the various challenges with urbanization and how to solve them. Moreover, let's talk about the PCM countries as they are the focus of this presentation. As you can see, Y-E-S countries are no exception to this rapid trend. By 2050, most of the PCM countries will also be facing the same issue. If you look at India specifically, in 2019 the % of the population which resided in urban areas was 34.5% which increases to 52% in 2050.



As we have already talked about Asian countries have faced rapid urbanization and it is inevitable for PCM countries. Let's also talk about drivers that make the current cities incapable of handling these rapid urbanization trends.

The first one we should look at is Poor governance and misaligned policies in terms of the policy making which is done by the local and central government. They are not equipped to deal with such densely populated areas and lack of proper city planning is a problem.

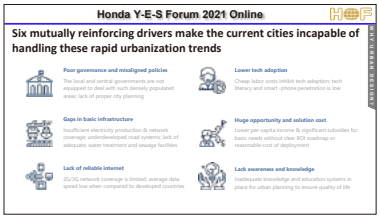
Second is the gaps in basic infrastructure, for example, if mass population is moving from rural to urban areas - they will require facilities like electricity, road systems and so on and that is not available in city areas currently which is a huge problem.

The third is the lack of reliable internet because now we are moving digital ecosystem where everyone wants to be connected but since the urban infrastructure is not able to handle such a high population will create issues in terms of internet connectivity.

We should also focus on lower-tech adoption. Many of these countries are not very developed and enhanced and educated which is a problem for technology adoption and use of smartphones.

Additionally, there is another challenge of huge opportunity and solution cost, these countries are low per capita income countries and need significant subsidies to even provide basic needs. We can't deploy smart systems and smart technologies very easily without considering the cost involved in this.

Lastly, it is important to acknowledge that people in these countries lack awareness and knowledge about what urban planning is and how it can be efficiently implemented. So, hence, these issues have created a huge driver in making these countries and cities incapable of handling the rapid urbanization trends.



Since we have discussed the drivers which are creating problems, let's also talk about the problems at hand and the problems we are facing currently.

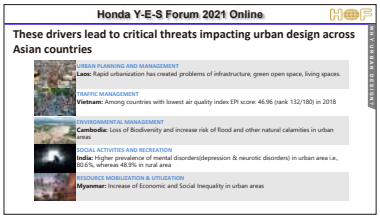
For example, if you talk about urban planning and management, Laos is facing a huge problem of infrastructure, green open space, living spaces.

Secondly, if we look at traffic management, Vietnam is struggling with issues like low air quality index where there is ranked 132 out of 180.

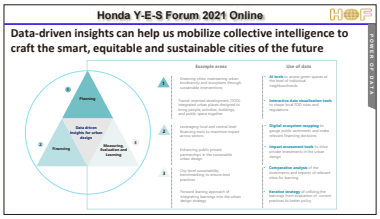
Additionally, environmental management is also one particular area where we are not doing well, for example, Cambodia is facing issues like increasing loss of bio-diversity and risk of flood due to rapid urbanization.

If we talk about India, we have seen a higher prevalence of mental disorders in urban areas because of the lack of social settings and activities which can handle the urban load.

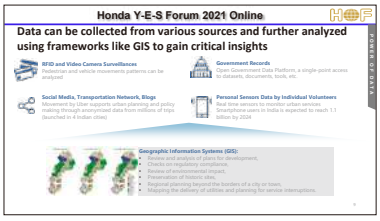
And lastly, if we talk about resource mobilization and utilization, we have seen that Myanmar is facing increase the economic and social disparity in urban areas due to improper allocation and mobilization of the resources in the cities.



Given that we have already realized that rapid urbanization is a huge problem in PCM countries and Asia as a whole and we are not well equipped to handle the urban load, let's investigate how data can come into play and how data can be used as the new oil for leveraging the insights that we have in order to craft smart and equitable cities of the future. If I talk about the entire sustainability and urban design paradigm, we can divide it into three main sectors (i) planning: how do we plan cities better using data, (ii) financing: how do we finance cities better using the data driven insights and (iii) measuring, evaluation, and learning aspects where we use these insights to evaluate what we have done and hence, learn from them to create better societies. We will be focusing mainly on the planning section here given that it is the first step to realize the dream of sustainable cities. Once we have investigated planning, we can look at financing and MEL processes. So, if we talk about planning, we have presented various examples where planning data can be harnessed. I would like to walk through a few examples in the planning segment. For example, in greening cities, AI tools can be very useful where we can utilize them to assess green spaces at the level of individual neighborhoods and then it will be used to create plans and policies to green cities. Secondly, I would like to highlight TOD which is used to create integrated urban places designed to people, activities, etc. together. Here, we can use interactive data visualization tools to shape local rules and regulations and hence, incorporate these insights into the broader urban design ecosystem.

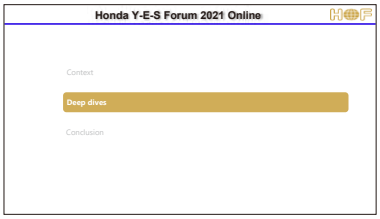


Since, we have already talked about data to create urban and smart cities, let's talk about where we get the data from. It is a very important question to know how data can be harnessed because the first step of harnessing the data for the insights is to understand where we source it from. It can be sourced from various places (i) RFID and video camera surveillances which are common in cities (ii) government records: for example, there can be various open government data platforms or single point access to datasets, (iii) Using big data through social media, transportation networks and blogs and lastly (iv) personal sensors data by individual volunteers. Once we have gathered the data from all data sources, it is very important to analyze that and in order to analyze the data in a proper way we can use frameworks like the GIS framework which can help us to gain critical insights in terms of review and analysis of the plans and development, checking of compliance, etc.

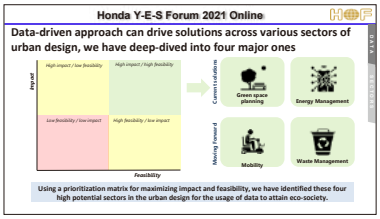


Here, we are taking an optimistic approach and talking about cities which are already harnessing data to create insights. For, example, if we talk about Songdo city, they are using fully connected devices to equip themselves as a smart city. Also, LA where they are smarting the streetlights using various technologies.

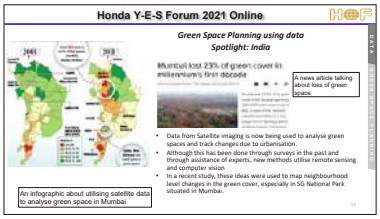
Since we have understood the context and the need of data for urban design, let's deep dive into various sectors.



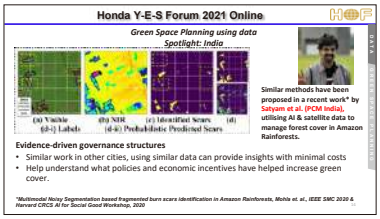
Since there are various sectors where data driven approach can be used, we have created a prioritization matrix and used those to boil down into four sectors specifically.



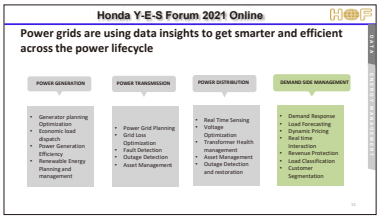
Here, we talk about an example of India where green space planning is done using data. We can use satellite imaging to analyze the green spaces and hence use that particular dataset to inform our decisions better.



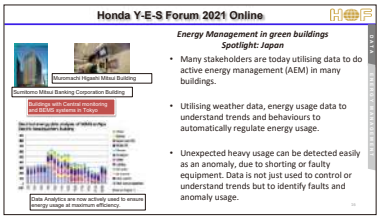
This work is done by Satyam San, a PCM in India, where he has used AI and satellite data to manage forest cover in Amazon rainforests.



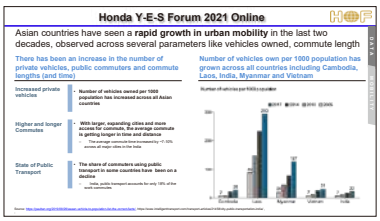
Next, we will talk about how we will use data for energy management. Energy management can either be power generation, power transmission, power distribution or demand side management and here we have highlighted examples of demand side systems specifically.



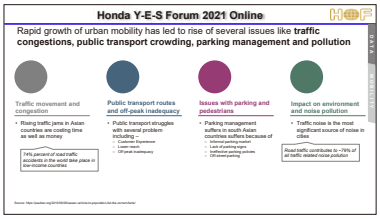
As you can see, energy management is being used in green buildings in Japan where they have analyzed weather data, energy usage data to understand trends and behaviors in energy usage.



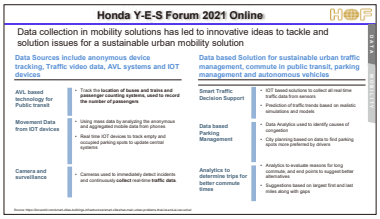
Talking about mobility, as you can see Asian countries have seen rapid growth in urban mobility in the last two decades and we have seen increased private vehicles, higher and longer commutes, and overall bad state of public transport. Hence, we need to understand how data can be used for creating avenues of better mobility.



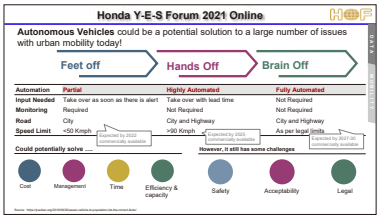
Rapid growth of urban mobility has created various issues like traffic congestion, public transportation crowding, parking management and even environmental and noise pollution.



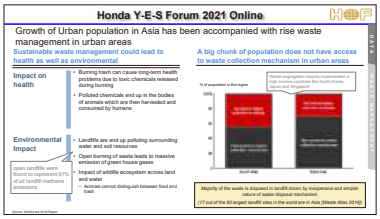
Hence, we can use data from various sources like AVL based tech for public transit, movement data from IOT devices, and camera and surveillance to create data driven solutions.



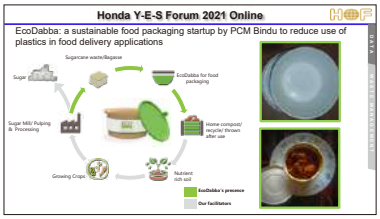
Here, we have talked specially about the promise of autonomous vehicles to solve for the urban mobility issue.



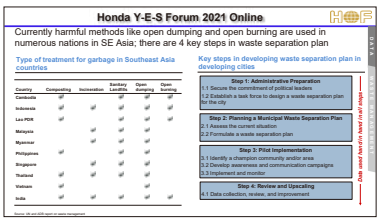
Lastly, we talk about how data can be used for waste management. We already know that improper waste management can create various issues and hence, it is very important to create proper waste management issues.



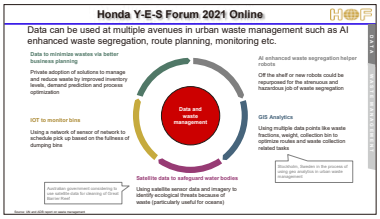
This is a startup by me, EcoDabba, where we replace plastics with sustainable containers so that they don't create waste. EcoDabbas can be used for food delivery needs of various population.

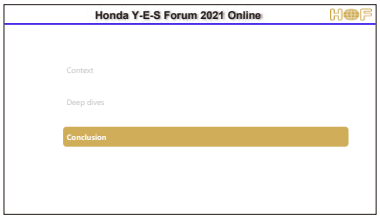


On the LHS, we talk about the various issues faced by Southeast Asian countries and on the RHS, we talk about the key steps for developing better waste separation plans in developing cities.

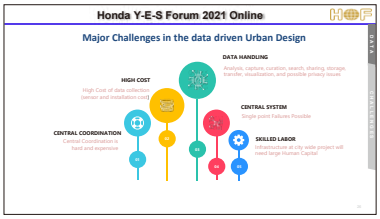


Data in waste management can be used across avenues like enhanced waste segregation, etc.

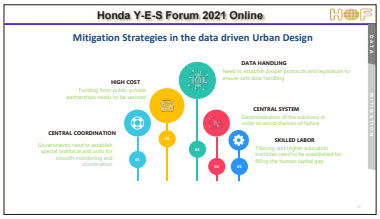




To conclude, we will talk about the various challenges in the data driven urban design like central coordination related issues, high cost, data handling issues, etc.



Finally, we want to highlight the mitigation strategies which can be used to create a sustainable urban design society for us.
Thank you.



Q&A Session: Summary

Following the presentation a Q&A session was held. The main discussed questions included:

- Why do countries need to have such a data-driven approach for urban design?
- A lot of data requires a lot of infrastructure. Not only to collect it but also to analyze it and take meaningful insights. Does that kind of infrastructure exist in India or in any other Southeast Asian country?
- What kind of privacy issues do you see and how can we balance this pursuit of data collection with the privacy of users?

The answers for the questions have been summarized below.

Developing countries need a data-driven approach to urban design because data are essential for correct and efficient business decisions. Large volumes of data from concentrated sources are already available. Cities need to be optimized; data analysis provides the means to do this. Efforts are ongoing in India to consolidate data and create the necessary infrastructure for data analysis, but much remains to be done. Expertise and approaches from developed countries will be helpful. However, data collection must respect privacy and not extend into intrusive surveillance as in China. Laos and Vietnam have problems in this regard too. Consent-based data use requires robust laws to respect privacy and legislative bodies ("committees") with clear popular mandates. Legislation is a critical and integral part of the quest for data-driven solutions. A committee for this purpose was recently founded in India.

Panel Discussion 1

Day 2

Panel Discussion 1: Summary

The role of collaboration among industry, academia and government for sustainable

Facilitator:

Dr. Atushi Sunami, Executive Advisor to the President, Adjunct Professor, National Graduate Institute for Policy Studies (GRIPS); President, Sasakawa Peace Foundation

Panelists:

Prof. Takashi Oguchi, Professor, Institute of industrial Science (IIS), The University of Tokyo

Mr. Kiyoshi Amada, Director General, Infrastructure Management Department, Japan International Cooperation Agency (JICA)

Ms. Tran Thi To Uyen, PhD student, The University of Tokyo

Ms. Kaori Isawa, PhD Student, The University of Tokyo

Mr. Satyam Mohla, New Value Creation at Digital Transformation Supervisory Unit, Honda Innovation Lab, Tokyo, 2017 Honda Y-E-S Awardee

Mr. Le Yen Thanh, Founder & CEO, Phenikaa MaaS Technology JSC, 2015 Honda Y-E-S Awardee

Sunami: How is industry adapting to upcoming issues in sustainability and urban design?

Mohla: Government must lead, and industry and academia take their cues from government. Private industry can ensure that AI is used profitably but government must use policies and regulations to ensure that companies consider sustainability in all their activities.

Thanh: Cooperation among government, industry and academia is difficult because industry moves faster than government and academia lacks people with the right knowledge, indicating that the three sectors must cooperate more closely.

Oguchi: Industry provides innovation and vitalization and government plays a supporting role.

Amada: Government provides direction and speed but industry provides the innovation and production. For example, government indicates that hybrid vehicles are necessary but the private sector provides the innovation to develop them. Governments in the developed world must support developing countries, for example in fighting climate change.

Sunami: How can students adapt themselves to the changing future?

Tran: The younger generation must be responsive to changing situations, focusing on past and current urban issues while remaining sensitive to newly emerging challenges. Students naturally begin by absorbing learning from their professors but go on to think independently at the graduate level.

Isawa: Students are exposed to rapid change in technology and systems so they have insights on solving problems. Existing frameworks reduce the cost of solving problems but sometimes must be adjusted or even scrapped.

Mohla: Students follow government and industry agendas and try to solve problems that society is currently facing. Sustainability is important in regions like Scandinavia but India is only beginning to address it. Students should try to look 10 years into the future. For example, policy and ethics regarding AI will be important 10 years from now, as will climate change, so students need to learn about them now.

Thanh: Vietnam has a good environment for learning to adapt to the future, with startup and innovation contests, and many students begin interning in the third or fourth year of university. Vietnamese students are willing to learn outside their chosen fields. Industry experience early in the university career is vital.

Oguchi: Professors impart specialized knowledge and students then seek out original findings, but should also learn how people work together in general. Industry experience early in the university career is vital. Engineering companies should provide insights to social scientists regarding future trends.

Sunami: (To two students) What is your plan after you finish your studies?

Tran: Plans to do more research due to change in major. Agrees that industry experience early in the university career is vital.

Isawa: Plans to become a researcher and teacher for the future of students.

Sunami: What is the role of academics in general?

Oguchi: Academia can provide specialized knowledge, free from industry's profit motive. Academia should challenge industry's ideas. Academia can help resolve conflicts between government and industry. Academics today are more willing than in the past to join with other sectors to solve problems, rather than remain in their ivy towers.

Amada: SATREPS is a program of cooperation among researchers and academics from Japan and developing countries such as India, to tackle problems such as global warming. Some private companies are also involved.

Amada and Mohla: The India Institutes of Technology (IITs) are a good example of government guiding education and research, as well as implementing the fruits of research. They are established in collaboration with other countries' governments.

Sunami: How about collaboration between academia and industry?

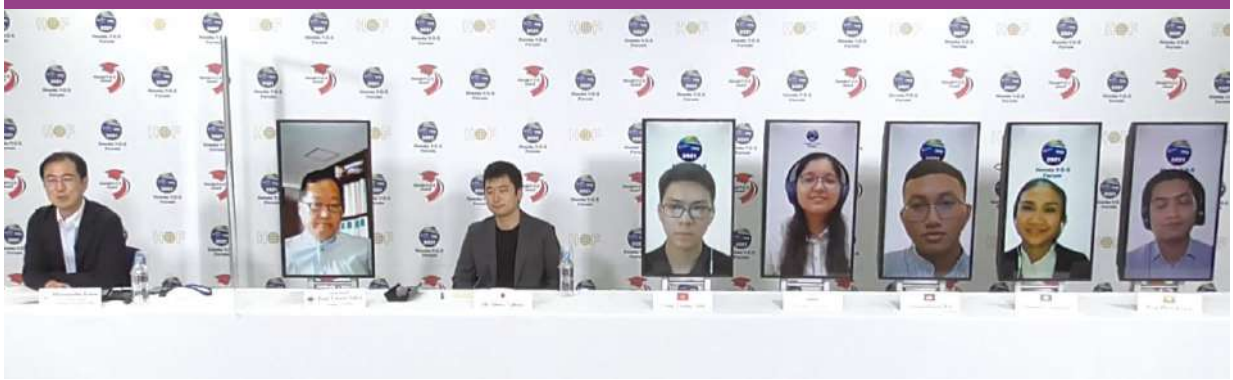
Mohla: Talented people from IITs are absorbed into private industry. This leads to increased collaboration between academia and industry.

Thanh: Such collaboration is very good for students' skill development. Startup companies are important in this process as new technology often comes from startups. Collaboration between startups and academia enables universities to solve real-world problems, so students can contribute to industry applications.

Panel Discussion 2

Day 2

Panel Discussion 2: Summary



Youth's involvement in designing a low-carbon emerging city

Facilitator:

Dr. Mitsunobu Kano, Executive Director of Honda Foundation; Vice Executive Director and Professor, Okayama University

Panelists:

Prof. Takeru Sakai, Professor, Campus Planning Office, Graduate School of Human-Environment Studies, Kyushu University

Mr. Shota Tabata, PhD Student, The University of Tokyo

Mr. Dinh Truong Giang, , Alpha Edu, 2018 Honda Y-E-S Awardee

Ms. Bindu Sancheti, Investments at Nexus Venture Partners, 2017 Honda Y-E-S Awardee

Mr. Pel Cheapanhasith, Technical Officer, Electricite du Cambodge, 2015 Honda Y-E-S Awardee

Ms. Khandala Khamphila, Lecturer, Faculty of Agriculture and Forestry, Champasack University, Lao PDR, 2009 Honda Y-E-S Awardee

Mr. Pyae Phyo Kyaw, Project Consultant, Mandalay's WaterWorX Project, 2015 Honda Y-E-S Awardee

Kano: How do we make sure that urban design aligns with the vision of Net Zero 2050? What are the transformational changes needed in the ways we live and consume to fulfill the SDGs and Net Zero 2050?

Tabata: Urban design is the foundation of human behavior, so it has strong potential to solve environmental problems. Systems already exist to reduce energy consumption, pandemic risk, etc.

Kano: For best effect, top-down approaches and bottom-up approaches should be aligned.

Dinh: Sustainable transportation is a big development problem for Vietnam. The best approaches are to encourage use of public transit and to continue developing technology.

Kano: Solutions that put more vehicles on the road (or bigger, like cars instead of motorcycles?) may increase congestion.

Dinh: The Vietnamese government wants to promote public transit to reduce numbers of vehicles on the roads, but COVID-19 is impacting those plans.

Pel: The five primary variables in sustainable urban design are human ecology, energy, land and resource conservation, water and air quality. Focusing on energy, smart energy systems should be integrated

into existing energy systems to achieve carbon zero by 2050. Problems in 2050 will not be the same problems faced today. Each country's stage depends on its situation. For example, Cambodia should focus on renewable resources such as hydro, solar and wind for electricity generation, not electrification of vehicles, for now.

Sancheti: Populations are moving toward urbanization, so people must incorporate sustainability into their lives to move society toward net zero. Small steps such as eliminating plastic containers can be very helpful.

Khandala: Transformational changes start with raising awareness through education. Educated students can then proceed to develop technologies through opportunities such as competitions.

Kyaw: Developing countries should start from the community level, because local governments and municipalities can do much with very little support from national governments. Start with awareness raising, energy-efficient buildings and moving toward 100% renewable energy. On changing one's living patterns, drastic change is needed. COVID-19 has shown that current systems are fragile. Movings toward ethical consumption and transforming a linear economy into a circular economy.

Sakai: Urban design must be planned and designed to align with the future net-zero society.

Kano: What might be the most efficient paths toward reducing CO_2 emissions?

Sancheti: People need to understand what they are consuming and what its path to creating the carbon footprint is. Infrastructure is needed to support individuals in making conscious choices. In this way urban design and net zero are interlinked.

Kano: How can we train our youth to equip them to deal with the growing stresses in the ecosystem and bring quality urban design? What can youth do to transform urban jungles into resilient smart cities?

Kyaw: On the first question, both formal and informal education are important. With the internet and accessibility, enabling environments such as platforms should be created where youth can connect, collaborate and innovate with each other to solve issues at the local level. Youth are very good at teaching themselves. On the second question, youth are working in the city government, digitizing city maps and improving organization.

Khandala: Raising awareness should start early, in elementary school. Exercises such as school cleaning provide opportunities to raise awareness.

Kano: Producing easy-to-understand educational materials for this purpose is a good step.

Pel: On the first question,where your skills and the needs of the world cross, there lies the purpose! students must know what society needs and know where the job opportunities are to meet those needs. Institutes, forums or other platforms to disseminate ideas, including formal and informal means, can keep citizens informed. Access to educational programs in developed countries is helpful in developing countries, where such programs may not be available. These programs encourage cooperation, which gets youth involved. Governments can model policy on global agreements such as the Paris Climate Agreement. In the meantime, activities at the community level are also critically important. Stand-alone solar power can be used for farming activity, for example. Households can upgrade their homes. Every little bit helps.

Kano: Young people need education not only in facts but in how to be creative. Making comprehensive plans is difficult because everyone has different ideas, so collaboration is hard but it is necessary.

Sancheti: Three pillars to involve youth in urban planning and sustainable design: government incentives to pursue careers in sustainable development, education that is relevant to current situations, and connecting education and policies to employment opportunities. On transforming urban jungles, step-by-step change is the right approach, rather than trying to do everything at once. Provide solutions that enable people to take individual small steps. Youth can drive such policies and actions in the long term.

Dinh: Everyone can contribute regardless of what major they studied/are studying. Many aspects of life need to be studied because urban design will impact a lot of aspects.

Tabata: Urban jungles are not bad in themselves, because they are becoming more sophisticated. Learn from the differences between cities in developing countries and those in developed countries such as Japan.

Kano: History can provide a guide on how various countries grappled with problems in the past.

Sakai: History also helps developing countries avoid the mistakes of the developed world. All elements of an ecosystem must be seen as a whole. Anticipate problems and work on ways of solving them before they appear. On the concrete-jungle problem, low-rise buildings in city centers cannot be replaced in the near future. Change building specifications to make gradual improvements over time. City planning involves decades, not years. Third, build relationships between sectors, and between makers and users. Create designs that facilitate communication.

Comments on Research Poster Contest

Day 2

Dr. Kazuko Matsumoto
Executive Director, Honda Foundation Honorary Adviser,
Japan Education and Research Support Foundation

First of all, I would like to congratulate all the awardees of this poster contest. During the contest preparation process, we had a list of concerns about whether we would have as many poster applications as in previous years. And we also had concerns about whether many people would participate as an audience to listen and vote. Since this year we had our first experience of an online forum, this was a bit of a concern for us. But it was not so. Fortunately, we had 55 applications this year, which is the highest number of posters ever. The number of participants is also 600 and is also the highest number. So this may be the effect of holding the contest online.

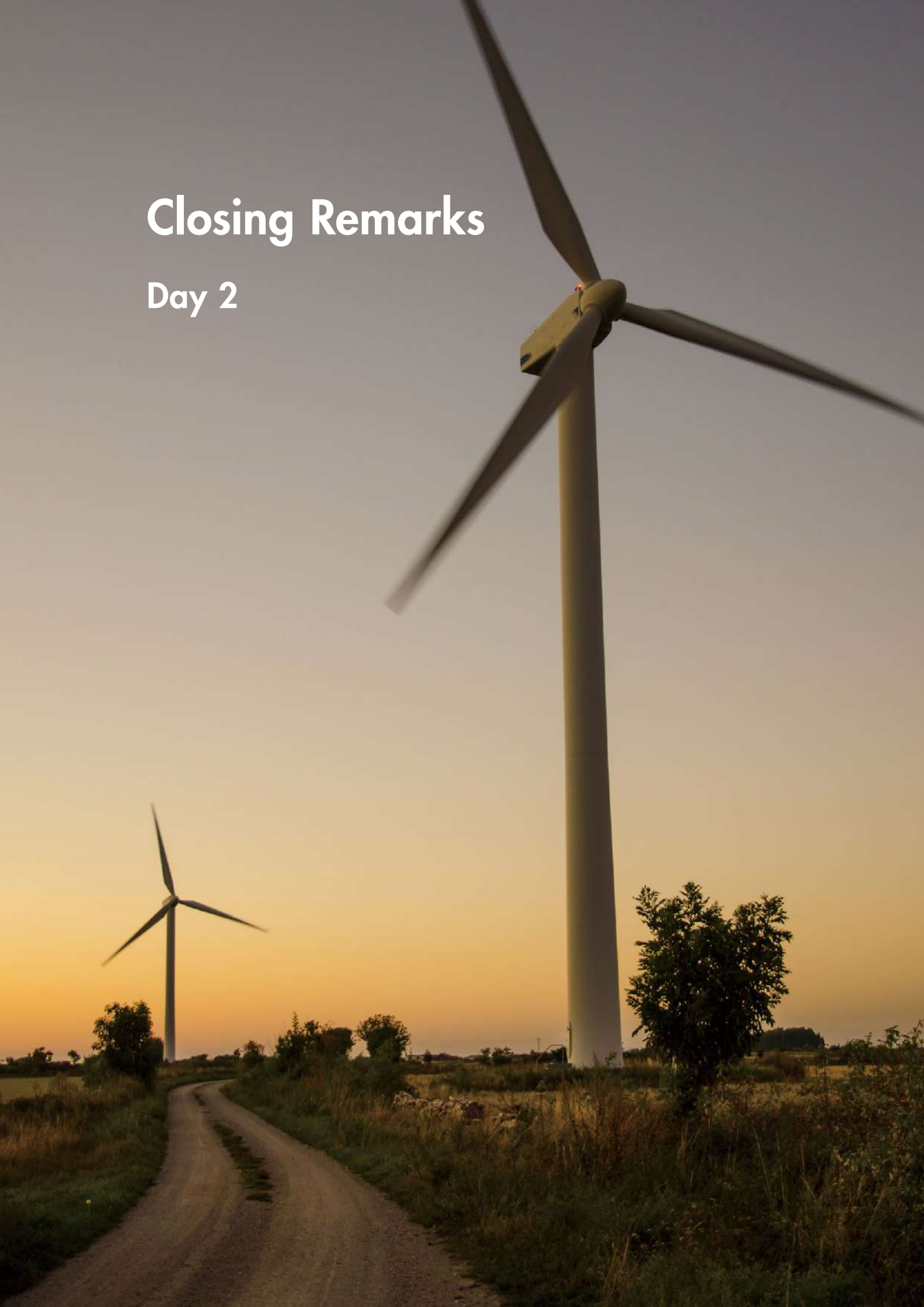
I'm pleased to see the Y-E-S forum and the poster contest have been attracting so many impressive reputations among young students and people at universities and institutions in Asia. Since so many research posters have been submitted, and each of them has its own characteristic research targets and motives, it is not easy for us to evaluate and select the awardees. There are so many excellent research posters in many areas of urban design. I believe the referees have used their wide and flexible viewpoints so that the evaluation is fair throughout all research areas. The three awardees studied various fields of urban design. One is for evaluation of level of safety in urban cities. Another is on development of decentralized wastewater treatment systems. Another one is on electronic waste recycling systems. And also the audience award was on urban air pollution cleaning systems. All of these have different areas and methodologies, but they create urban designs for the future. If I may borrow words from the previous panel discussions, these systems will contribute in the future to convert jungle cities into modern, resilient cities. I believe so.

I think this poster contest is a very good opportunity for young people to get to know each other, who are facing common social problems and pursuing sustainable urban design. Even if you have not been selected in the contest this time, I hope you have learned a lot from the presentations and panel discussions, in addition to enhancing your networks with other people.

Urban design is an interdisciplinary area, including various disciplines and technologies. You need to have diversified standpoints beyond your own expertise. This is a difficult situation but it can be a very fruitful research area in the near future. To build a future plan for urban design. The word "eco-technology" is the spiritual base of Honda Foundation, on which the Foundation has been carrying out all the activities including this poster contest. The word suggests that technologies should be developed not only in pursuit of industrial and economic growth but should also be advanced with the ultimate goal of human wellbeing. For such a human goal, Honda Foundation always looks for fresh, flexible and diversified viewpoints in Y-E-S young participants to tackle social issues in the spirit of eco-technology. We hope this contest will help to make ties between young Asian people and Honda Foundation to create a brighter future. Thank you for your participation.

Closing Remarks

Day 2



Dr. Akira Kojima

Advisor, Japan Center for Economic Research

On behalf of Honda Foundation I would like to express our deepest appreciation to everybody participating for the successful completion of the forum. What did you get from this intensive weekend, sacrificing two days of the weekend? Just fatigue? I got fatigue, but a happy fatigue, because we had a good learning and I myself felt the very great potential on the part of the young generation. Discussions, presentations and agenda-setting by committee members, logistics by the Foundation people, were very impressive. This is the first ever trial of an online Y-E-S Forum. I found it was beautifully managed and new possibilities for future Y-E-S Forums. This time our focus was mainly on urban transportation and smart city planning. I understand this is really an important part of our even larger challenge. The challenge is to create a better world, better society and better life, and here the eco-technology concept enters. As [stated in the introduction] by the Honda Foundation president, Dr. Ishida, yesterday, the very concept of eco-technology has been with us since the very outset of Honda Foundation in 1977. These concepts and approaches are becoming even more important today. In recent years we often hear such phrases as "planetary boundary" and "global commons." Human beings have been exploiting our planet too much. The consequence is a climate crisis. We have serious natural disasters such as floods, super-typhoons, forest fires and droughts, which are increasing in frequency and seriousness. In 2015 the so-called Paris Agreement was ratified by some 190 countries and regions and came into effect the following year. This is the international framework for tackling climate change.

In the same year, 2015, the SDGs, the Sustainable Development Goals, were unanimously adopted at the UN Sustainable Development Summit. The SDGs set out 17 goals, which interestingly have been grouped together into three dimensions resembling a three-tiered wedding cake, with the bottom tier relating to the global environment. Here the Paris Agreement and SDGs and our concept of eco-technology converge. In today's discussion, I found many of our "letter-C" concepts. Many "letter-C" concepts came to my mind: Crisis, Challenges, Chances, Capabilities. As for the crises, climate change, COVID-19 pandemic, CO_2, contamination of air and water, congestion. And for challenges, carbon-neutrality, circular economy, city planning, capacity building, conservation and so forth. Some speakers mentioned about stakeholders. Here I found another five Cs: Country, community, company, citizen and capital. But other than these five-C stakeholders, I found one more important stakeholder. That is the planet. The planet may be the most important stakeholder. To tackle all these "C" issues, we need more Cs: Creativity, comprehensiveness and collaborative approach. Here also, eco-technology matters. To activate eco-technology we need cooperation, collaboration and continuation. Here I want to add one more C-word. That is "Can do." You can do it. We can do it. For this purpose. You all join in the challenge of eco-technology to realize a better society and life. Again, you can do it, we can do it. So I strongly appreciate all your challenges and wonderful performances during these two days of discussion. May I thank you again.

Ms. Suu Malar Win

Honda Y-E-S 2016 awardee

Good Evening, everyone.

I am Suu Malar Win from Myanmar and I am a Honda Y-E-S 2016 awardee. As we have reached the end of the second day forum, I would like to express a few words of gratitude to all those who made this virtual forum successful.

It is a great privilege and an honour to be a part of this forum and I would like to pay my deep respect to all the participants for the engagement you contributed to this forum.

On behalf of our PCM team, I would like to convey my sincere gratitude to all the guest speakers (Prof. Takeru Sakai from Kyushu University, Prof. Takashi Oguchi from the University of Tokyo and Mr. Kiyoshi Amada from Japan International Cooperation Agency) for taking time out of your busy schedules to support our forum. Also I would like to thank Dr. Atsushi Sunami, Dr. Mitsunobu Kano and panel members for their brilliant contribution to panel discussions. Your presence was truly invaluable for us and without any doubt, it helped the event a great success.

I also like to express my appreciation to the winners of the Poster Contest and all the contestants for enlightening us with your wonderful ideas in tackling global challenges and we wish you great success in your future career.

We are very grateful for the support we received from Honda Foundation both during the preparation and organising the event. Without any dedication and support of Honda Foundation, this unique event would have not been successful.

We hope that this Forum has not only provided you with information about challenges, opportunities and solutions in promoting urban sustainability, but also created a place where you can expand your connections with many professionals from diverse institutions and countries.

We hope that this network will stay on and we are going to leave this forum with new determinations to collaborate to create a sustainable society. We hope to see you again in the next forum with growing enthusiasm.

Thank you.

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