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ASIA ANALYSIS



JAPAN:
Challenges around
global data sharing
for orphan diseases

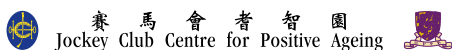
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With a growing elderly population, Hong Kong's Elderly Health Service has an increasingly important role in promoting both good physical and mental health

The future of the renewable energy market in Asia is explored here by VHR Global Recruitment, including a focus on Taiwan's ambition to phase out nuclear power by 2025

Harnil Oza explains how Blockchain technology is improving the world of marketing via information tracking, influencing consumer expectation and embracing transparency

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INTRODUCTION

In this second edition of Asia Analysis, we enjoy a number of insights from the region, with fascinating topics such as health and social care, energy, environment, blockchain and finance. We hear from Makoto Suematsu, President of the Japan Agency for Medical Research and Development (AMED), who details the challenges around global data sharing for orphan diseases. One key point the author highlights is that when it comes to rare and undiagnosed diseases, data sharing plays a crucial part in ensuring a correct diagnosis for patients.

Other Asia industry insights include the future of the renewable energy market in the region, something that is explored here by VHR Global Recruitment, including a focus on Taiwan's ambition to phase out nuclear power by 2025. We discover that Asia's renewable energy capacity has nearly doubled during the last five years, making up a significant chunk of the global supply of 2,351 gigawatts.

We also provide insight into the work of China's Minister of Finance Liu Kun, who is responsible for strengthening a proactive fiscal policy in one of the world's biggest and most powerful economies. Certainly, since China introduced reforms in the late 1970s to

create a "socialist market economy", known in the West as the Opening of China, the country has consistently had one of the world's fastest-growing economies.

Finally, I want to mention our analysis of the Hong Kong Elderly Health Service. We find out that with a growing elderly population – and with it, a growing number of carers – Hong Kong's Elderly Health Service has an increasingly important role today in promoting both good physical and mental health.

I hope that you will thoroughly enjoy browsing through this publication and that you will join us for many more in the years ahead. ■

Jonathan Miles
Editor



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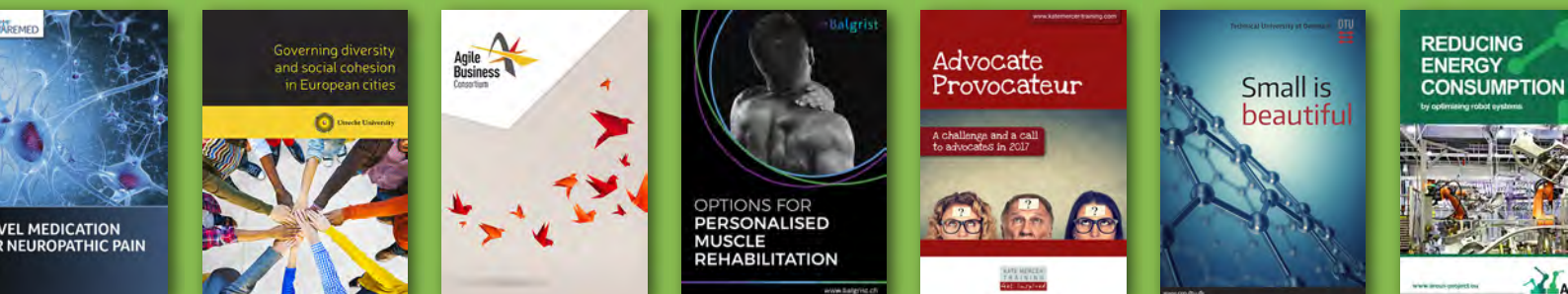
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Japan: Challenges around global data sharing for orphan diseases

Makoto Suematsu, President of the Japan Agency for Medical Research and Development (AMED) details the challenges around global data sharing for orphan diseases

Japan Agency for Medical Research and Development (AMED) was launched in April 2015 under the robust initiative of Prime Minister Shinzo Abe and the Cabinet Secretariat in Japan to fast-track medical research and development (R&D). Among the nine pillars of medical research fields in AMED, those in which we are changing for global data sharing today are rare diseases and human genetics and infectious disease research. In these research areas, data sharing among different countries is indispensable for saving the lives of patients and communities.

When it comes to rare and undiagnosed diseases, data sharing plays a vital role in ensuring a correct diagnosis for patients. There are generally two categories of patients who suffer from diagnostic odyssey under undiagnosed states: 1) Unknown and ultra-rare diseases that are not mentioned in any articles or textbook and; 2) Known diseases (including what many countries designate as intractable diseases and conditions only known for their syndrome names), which are so difficult to detect that patients remain largely undiagnosed. From the viewpoint of undiagnosed patients,

however, the two categories are practically the same. With intractable diseases, very few definitive treatments have been established, so physicians working in isolation have little chance of preventing the deterioration of symptoms or of mitigating patients' pain, therefore, cooperation with patient support groups, pharmaceutical companies and those in diverse other fields is essential.

Of particular importance is data sharing across national borders. To deal with rare and undiagnosed diseases, it is critical to empower international cooperation to build data and knowledge bases to get as much patient data as possible registered. It is also necessary to constantly accumulate and update data on patients' age, symptoms, pathogenic gene variants and addresses to contact physicians who take care of patients and families. Such efforts not only help speed up diagnosis but also provide valuable information to pharmaceutical companies developing cures and the fruit of their research can be delivered more quickly to patients. Based on the premise that all patients have the right to participate in clinical research and trials, the present authors believe a data sharing platform must be established that will help researchers analyse patients' data from multiple perspectives, including those of science, bioethics, R&D feasibility and pain mitigation (which is the primary concern of patients). The collected data should facilitate and reinforce R&D efforts by cooperating pharmaceutical companies and ventures.

Undiagnosed Disease Program (UDP) was first started in NIH Hospital by Dr William Gahl, who has expanded the idea to UDP-International. Japan has a half-century history of rare disease (NANBYO) researchers but a domestic network never existed. AMED launched Initiative on Rare and Undiagnosed Diseases (IRUD) during October 2015. From the start, AMED aims to build up a data-sharing network which covers Japan and today, consists of 438 hospitals that includes not only major university hospitals but regional core children's hospitals.

To accelerate accumulation phenotypic information, together with gene variant data into the data and

knowledge base, IRUD Exchange, AMED made contracts with institutes in which researchers with accepted proposals belong to, so as to share a policy of "no share, no budget." Besides publication lists, AMED is now checking track records which show how individual researchers and their groups contribute to submitting the data necessary for precise diagnosis to IRUD Exchange and those indicating the number of rare disease patients whom the diagnosis was provided for. As a result of efforts paid by all IRUD participants, more than 10,000 rare disease patients' data were stored in IRUD Exchange and now available in Matchmaker Exchange, which includes U.S., Europe and Australian data but not Asian data before us.

“Japan Agency for Medical Research and Development (AMED) was launched in April 2015 under the robust initiative of Prime Minister Shinzo Abe and the Cabinet Secretariat in Japan to fast-track medical research and development (R&D). Among the nine pillars of medical research fields in AMED, those in which we are competing for global data sharing today are rare diseases and human genetics and infectious disease research.”

The four principles of bioethics (respect for autonomy, non-maleficence, beneficence and justice) must be duly observed and comparable weight should be given to the protection of privacy. Under given conditions, however, global data sharing in order to find out new patients, as many as possible over the world, is the first step to establish a global registry system for patients with orphan diseases which I dream of. ■

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Adaptive Robotic Gripper: The pathway to grasp the wave of Industrial 4.0 and smart manufacturing

Jen-Yuan (James) Chang, Professor at the Department of Power Mechanical Engineering at the National Tsing Hua University, Taiwan, tells us why the Adaptive Robotic Gripper is the route to grasp the wave of Industrial 4.0 and smart manufacturing

In Industry 4.0 applications, being able to hand and grasp objects of any shape precisely and reliably are essential in smart manufacturing operations. In this article, several essential considerations concerning the development of a robotic gripper are discussed and illustrated by an adaptive robotic gripper developed through research funded by Ministry of Science and Technology, Taiwan. Possibilities of such adaptive robotic gripper with artificial intelligence are discussed in the context of applications in smart manufacturing.

With the advancement of technologies and increasing demand for grasping objects automatically, robots have been widely used in industrial, commercial and even home applications. For applications in daily life and in the smart manufacturing environment, a robotic gripper, which could be used universally to grasp objects of any shape, has become its engineering importance. Featuring high accuracy, high repeatability and strong gripping force, an industrial robotic gripper which can be attached to a robot's end-effector is commonly designed to possess a single degree of freedom actuation, resulting in simple opening and closing operations. Although it has the aforementioned advantages, it is hard to adapt such design to dif-

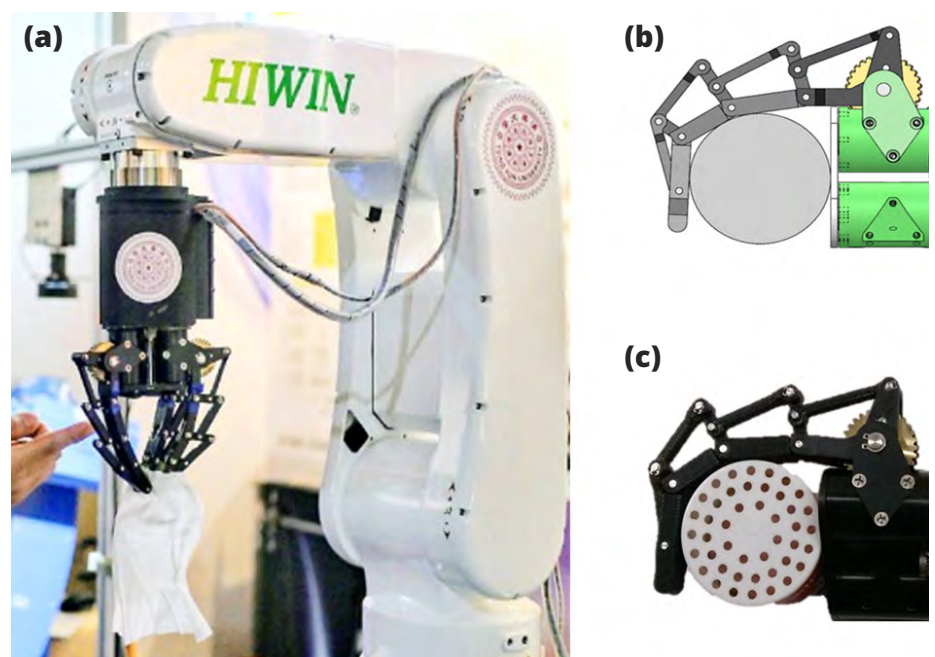


Figure 1. (a) The NTHU adaptive gripper installed on the robot arm pinching a tissue paper. This is an illustration of how the gripper's finger can adapt to the shape of the object (b) by simulation and (c) by experiment

ferent objects. In present practice with such an of actuation design, when a target object is changed, a different adaptor to suit for the object's shape is required. As such, to reach the flexibility of grasping, changing adaptor in this single degree of freedom gripper is necessary.

The most dexterous gripper currently available is the Human's Hand, which was demonstrated by researchers from Johns Hopkins University. To mimic the characteristics of a human

hand, a multiple degrees of freedom humanoid robotic hand has been widely researched with efforts placed on the minimisation of actuators, such as motors (the mechanical structures in a limited space). Although its dexterity is satisfactory, the cost is extremely high and is not sufficiently compliant to adapt to a different shape. To offer compliance, some soft materials have been used in the robotic hands as well, the best example of which was demonstrated by researchers from Harvard University.

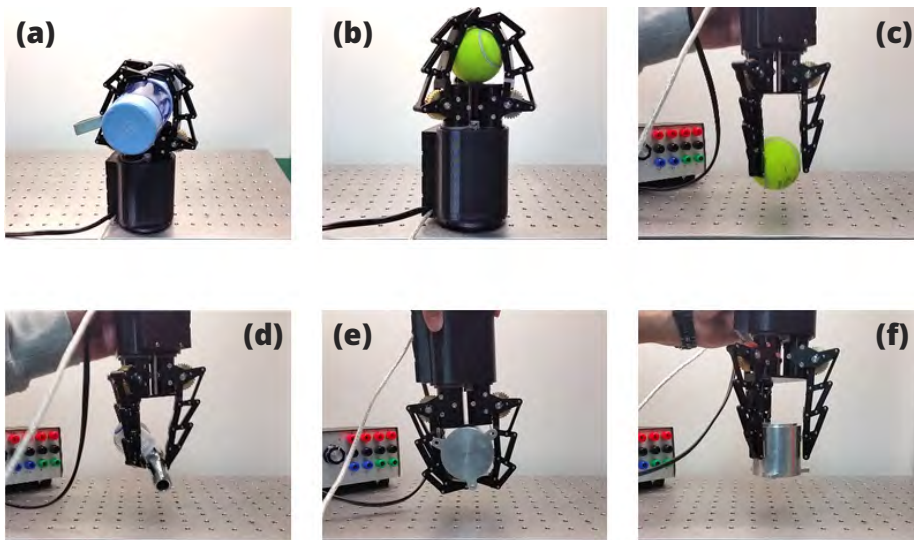


Figure 2. These photos show the adaptation of the NTHU Gripper in grasping (a) cylindrical bottle, (b) and (c) tennis ball, (d)-(f) hardware with irregular shapes

Although a soft gripper can offer good compliance and adaption to shapes, its accuracy and payload, in fact, are very limited due to soft materials.

“With the advancement of technologies and increasing demand for grasping objects automatically, robots have been widely used in industrial, commercial and even home applications.”

To reduce the driving sources, such as the number of motors used but to keep or even improve the adaptability of the gripper, the adaptive robotic gripper as shown in Figure 1 has been developed by Professor Chang’s research group from the Department of Power Mechanical Engineering at National Tsing Hua University, Taiwan. Through funding support from the Ministry of Science and Technology, Taiwan, the research results were technology transferred to HIWIN Technologies Corp. for the development of commercial adaptive grippers that can be used in smart manufacturing applications. As illustrated in Figure 1(b) and Figure 1(c), the so-called compliance or adaptation can be achieved by the multiple four-bar linkages packed in series. Each linkage can be

assumed to be rigid to be able to transmit a strong gripping force to grasp an object. With the well-engineered design of the mechanism of the four-bar linkages in series, adaptation and compliance can be achieved. Based on the four-bar linkage in the series design concept, Professor Chang’s group have developed mathematical functions for each adaptive gripper finger joint to allow the development of adaptive robotic gripper for different service and industrial robotic applications. With the analytical model and mechatronics integration, the fingers of this NTHU adaptive gripper not only offer compliance and adaptation performance similar to the human finger but they also provide satisfactory engineering performance in terms of receptivity and reliability. The NTHU adaptive gripper offers a wide range of payload performance. It can easily lift up and hold a 3 kg object, as well as to pinch a piece of tissue paper, as illustrated in Figure 1(a).

Mimicking the human hand in which dexterity is achieved primarily by the thumb, the index and the middle fingers with the ring finger and little

finger are pretty much used to help hold objects. Certainly, three fingers designed with the series four-bar linkages are adopted in this NTHU adaptive gripper to save on the cost but also offer the same performance and dexterity. Each finger is placed evenly by 120 degrees and is attached to the controller unit of the gripper. However, the adaptation of the gripper is further extended by allowing each finger to rotate independently at desired orientations. As demonstrated in Figure 2, the orientation of the gripper finger can be adjusted according to the shape of the object. Such adaptation is not possible in the present robot gripper, which certainly offers the possibility of eliminating a change of adaptor in the present industrial robotic gripper. Should such a dexterous adaptive robotic gripper be integrated with the machine vision, machine learning and artificial intelligence (AI), the intelligent grasping operation can truly be achieved in smart manufacturing, as well as in Industry 4.0 applications.



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A look at the Hong Kong Elderly Health Service

With a growing elderly population – and with it, a growing number of carers – Hong Kong’s Elderly Health Service has an increasingly important role in promoting both good physical and mental health, as this article reveals

Hong Kong’s Elderly Health Service was established in 1998 to oversee primary healthcare for the older population, improve their ability to self-care, encourage healthy living and strengthen family support to minimise illness and disability.

Of Hong Kong’s 7.3 million population, just over 1.2 million people are aged 65 or over – and the number is rising.

The service’s stated mission is to: provide client-orientated services; adopt a whole-person, multi-disciplinary team approach; develop expertise and professionalism in primary healthcare of the elderly; and to promote intersectoral collaboration and community participation.

It comprises 18 elderly health centres and 18 visiting health teams.

Elderly Health Centres

Health centres aim to address the multiple health needs of the elderly by providing integrated primary healthcare services. They serve to identify health risks and detect diseases earlier for timely intervention and prevention of complications in a multidisciplinary approach in primary care settings.

Anyone aged 65 or over is eligible to enrol as a member of an Elderly Health Centre. As enrolled members, they are provided with services including health assessment, counselling, health education and curative treatment.

Visiting Health Teams

Visiting Health Teams work in the community and residential care settings to provide health promotion activities for the elderly and their carers, in collaboration with other service providers.

The teams aim to increase people’s health awareness, self-care ability and to enhance the quality of caregiving. All services are provided free of charge.

Visiting team services take a “train the trainer approach”, meaning they are targeted at not only elderly people themselves but also carers, such as family members, home helpers, domestic helpers, staff working in residential care homes and volunteers.

The Elderly Health Service’s Public Health & Administration section supports the work of elderly health centres and visiting health teams by collecting and analysing data from daily service operations to monitor the health status of Hong Kong’s elderly population and inform research.

Elderly Health Service website

The Elderly Health Service’s website contains a wealth of information for elderly people and their carers on health and ageing.

Topics covered include the importance of distinguishing between changes related to normal ageing, such as hearing loss or mild shortness of breath that does not affect daily activities and other, potentially more serious symptoms that should not be ignored in order to seek early treatment for a disease.

There is also advice on getting a health check and information on some common health problems, including bone and joint issues, cancer, dementia, diabetes, hypertension and heart disease, infections, mental illness, stroke and more.

There is extensive guidance on a range of other issues that contribute to and influence health, including



maintaining good mental health, exercise, leisure and travel and healthy diet and shopping smart.

“Health centres aim to address the multiple health needs of the elderly by providing integrated primary healthcare services. They serve to identify health risks and detect diseases earlier for timely intervention and prevention of complications in a multidisciplinary approach in primary care settings.”

The website also has a dedicated section for carers covering key skills, including: lifting, transfer and proper positioning for the prevention of sores and muscle contracture; feeding the frail elderly; post-stroke care; dementia care; wound care; nutrition monitoring; and oral health.

Carers’ Corner also emphasises the importance of effective communication, which can be crucial in reducing misunderstandings, conflicts and stress and promoting good interpersonal relationships.

With Hong Kong’s population gradually ageing, the importance of maintaining healthy lifestyles in later life, early identification and treatment of disease and knowledge for carers will only continue to grow.

The Elderly Health Service’s role will be to promote not only a focus on the basic essentials of good physical health but also the broader factors that will aid the transition to retirement, staying active and maintaining good mental health. ■

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The evolution of a unique dementia care centre in Hong Kong

Professor Timothy Kwok, Director of Jockey Club Centre for Positive Ageing lifts the lid on the development of a unique dementia care centre in Hong Kong

Care of the ever-increasing number of older people with dementia is a major challenge to most countries worldwide. Hong Kong is no exception. As the great majority of the care costs are met by families, the support for family caregivers is of paramount importance in the design of dementia care policy.

This was the primary motivation behind the collaboration between the Chinese University of Hong Kong and the Hong Kong Jockey Club in setting up of Jockey Club Centre for Positive Ageing (JCCPA) in 2000. The core service is to provide day and respite care to people with dementia. We have 76 daycare places and 17 beds on a separate floor for respite/residential care. In contrast with other residential homes, during the day, all residents under respite/residential care join in activities on the other floors for daycare.

JCCPA provides social stimulating activities and physical activities which have proven benefits to cognitive and general health of older people with dementia. As we do not receive any public funding, the centre has been run as a self-financing non-government organisation. To ensure quality service, we adopt the person-centred care approach and enforce a restraint-free environment. Our care staff are multidisciplinary and we have other visiting professionals providing more specialised services, for example,

music therapy, podiatry, family counselling, dietetic on an ad hoc basis. Recently, we have extended our service to transitional care for people with dementia who have become deconditioned by a hospital stay for acute illnesses.

One single care centre has limited social impact. That is why JCCPA has been active in dementia care research, training and public education. In research, we have demonstrated by randomised trials that family caregiver training delivered online or via telephone is effective in improving family caregiver self-efficacy,^{1,2} calligraphy improves spatial orientation in older people with dementia,³ cognitive training with or without client empowerment programme improves the cognitive function of older people with cognitive impairment (in press).

In caregiver training, we held a series of talks on dementia care which are open to family caregivers. We have built a website for family caregivers (adcarer.com) to provide information on the skill of dementia care and relaxation methods. We have held training courses for full time foreign domestic helpers.

In professional training, we started a one-year advance diploma course in dementia care four years ago. In collaboration with University of Stirling, Scotland, through more than 200 facilitators that we have trained, we have

delivered the [Jockey Club Best Practice in Dementia Care](#) programme to over 1,100 care staff in nursing homes, hospitals and day care centres. Evaluation of this training programme indicated that knowledge and attitude in dementia care has been enhanced. More importantly, the course has promoted cross-agency engagement and empowerment.

“Over the years, JCCPA has evolved into a unique dementia care centre which combines service, training, research and public education. Looking ahead, we shall continue to innovate in dementia care models, particularly in the application of technology in dementia care.”

When it comes to the education of the public on what we do, we have launched several territory-wide educational programmes to promote positive knowledge and attitude towards dementia among the general public and to establish a dementia-friendly Hong Kong. In 2010, we launched a public campaign to change the Chinese translated term of dementia which had very negative connotations. Out of over 1,300 proposed new terms, the term “brain degeneration syndrome” was chosen. This was widely reported in the public media and has been used by the media ever since. The initiative also prompted the local medical community to change the term to “cognitive impairment syndrome”. In addition, our two-year



“Jockey Club ‘Dementia Friendly Communities’ Campaign” delivered talks and workshops to over 4,000 people in public and private sectors about how to help people with dementia in their neighbourhood and workplaces. Since then, the Social and Welfare Department has launched the territory-wide dementia friend campaign.

“JCCPA provides social stimulating activities and physical activities which have proven benefits to cognitive and general health of older people with dementia.”

With the funding support from the Hong Kong Jockey Club, we are due to launch an online simple cognitive screening test to promote early detection of dementia. This will be followed by clinical diagnosis by trained primary care doctors and post-diagnosis

support which seeks to empower and facilitate advance care planning in family caregivers and care recipients.

Over the years, JCCPA has evolved into a unique dementia care centre which combines service, training, research and public education. Looking ahead, we shall continue to innovate in dementia care models, particularly in the application of technology in dementia care. With the expected rapid increase in demand for quality dementia care services in Hong Kong, Mainland China and South East Asia, our centre is well placed to be a regional professional training centre for dementia care.

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Japan: A glimpse into environment and energy issues

The work of the Ministry of the Environment and Ministry of Economy, Trade and Industry in the Government of Japan are examined here

The Ministry of the Environment (MOE) Government of Japan is headed up by Yoshiaki Harada, Minister of the Environment. ⁽¹⁾ The Ministry is responsible for global environmental conservation, nature conservation and pollution control. ⁽²⁾

Greenhouse gases

When it comes to the Ministry's policy on the global environment, one aspect of this concerns World Data Centre for Greenhouse Gases (WDCGG; a World Data Centre (WDC) of the World Meteorological Organization (WMO) which has been in operation since 1990 by the Japan Meteorological Agency (JMA). As the only WDC that specialises in greenhouse gases, it archives, collects and distributes data gases, such as CO₂, CH₄, CFCs and N₂O and other related gases in the atmosphere.

In March 2019, WDCGG commenced the online provision of CO₂ observation data* from Japan's Ibuki Greenhouse gases Observing SATellite (GOSAT) for April 2009 ⁽³⁾, in addition to existing surface-based data, more of which the website goes on to explain.

"Integration of remote sensing satellite data and existing surface-based in situ data is expected to promote the wider use of this information and facilitate long-term monitoring of global distribution and sub-continental CO₂ emission/absorption estimates.

"WDCGG plans to continue improving its services for the collection, archiving and distribution of satellite data worldwide, including for GOSAT-2 (the successor to GOSAT), to support the monitoring of climate change and assist policy making, thereby helping to reduce environmental risks to society." ⁽⁴⁾

Climate change

The Ministry of the Environment notes that as climate change impacts have manifested in parts world, the Summary for Policy-Makers of the Intergovernmental Panel on Climate Change (IPCC)'s 1.5°C special report issued in October 2018 says that: "Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate."

In addition, at the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 24) held in December 2018, the Paris Agreement implementation guidelines were adopted and commonly applied to all Member States and highlight the importance of countermeasures against the further increase of global warming. The website of MOE develops this point further when promoting hold their International CCUS Symposium for Low-Carbon Society' that took place in February 2019.

"However, in order to realise a decarbonising society, not only the extension of conventional efforts but also new innovation are necessary. In addition, such innovations are now considered to be a source of growth.

"Under such situations, the Ministry of the Environment (MOE) has proceeded with technical demonstration projects of CCUS (Carbon dioxide Capture, Utilisation and Storage) which can greatly reduce CO₂ from large-scale emission sources to the atmosphere." ⁽⁵⁾

The plastic waste issue

Continuing the environmental theme of this article, we find out on the website of the Ministry of Economy, Trade and Industry (METI) that they have come up with the 'Roadmap for Popularizing Development and Intro-

duction of Marine Biodegradable Plastics', to deal with the issue of plastic waste. This compiles the expected major challenges in and measures for encouraging businesses to popularise the introduction of marine biodegradable plastics. We read more about this important aspect of energy policy on METI's website, in that is united the efforts of the public and private sectors by focussing on technical, economic and institutional challenges in giving direction for developing new materials and technologies that are biodegradable in the marine environment. ⁽⁶⁾

“As for the electricity supply and demand for the summer of FY2019, a reserve margin of 3%, which is the minimum ratio required for a supply of electricity across Japan, is expected to be secured.”

By way of background information, it is worth noting here that Mr Hiroshige Seko is Japan's Minister of Economy, Trade and Industry. ⁽⁷⁾ The Ministry of Economy, Trade and Industry (METI) focuses on a wide range of policies, including economic & industrial policy, external economic policy and energy and environment policy. ⁽⁸⁾ Let's look at a further examples of this now.

Electricity supply and demand

One interesting policy area METI highlights concern the results of the electricity supply and demand for the winter of FY2018, plus data on the outlook and measures for electricity supply and demand for the summer of FY2019. The Electricity and Gas Basic Policy Subcommittee, under the Electricity and Gas Industry Committee of the Advisory Committee for Natural Resources and Energy, compiled the data. More of this is explained by METI, which includes a call for citizens to cooperate in energy-saving efforts and the study of supply and demand of electricity during the summer and winter.

“As for the electricity supply and demand for the summer of FY2019, a reserve margin of 3%, which is the minimum ratio required for a supply of electricity across Japan, is expected to be secured.

“Aiming to provide full-fledged electricity supply-demand measures to address Japan's situations

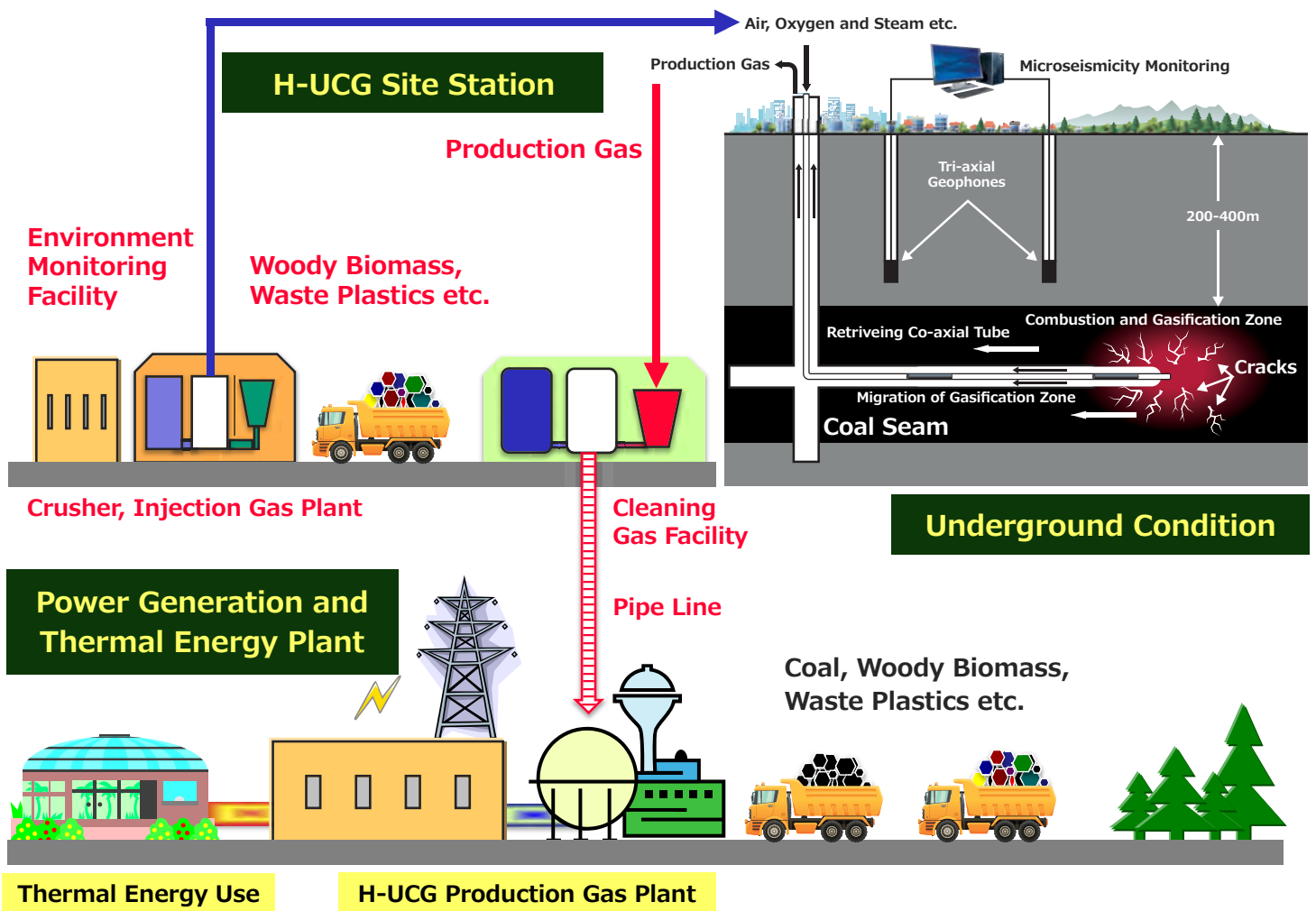
surrounding electricity after the Great East Japan Earthquake. Japan has been studying supply and demand of electricity in summer and winter, the seasons when electricity demand increases across Japan.”

One of the key points here is that the subcommittee decided not to request the cooperation of the public in energy conservation during summer 2019. Having said that, METI still wishes the public to cooperate in energy-saving efforts and conservation measures to help the environment at a reasonable pace, as has been the case in Japan for a number of years now. ⁽⁹⁾ ■

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H-UCG (Hybrid Underground Coal Gasification) Project for Local Energy Source in Japan

Ken-ichi ITAKURA, University Professor at the Muroran Institute of Technology, introduces a project that concerns the current energy situation in Japan and the problems associated with this

Firstly, when it comes to the energy situation in Japan and its associated problems, almost 99% of coal is imported from foreign countries due to the current economic conditions. However, much un-mined coal remains in the country under difficult conditions to mine it out, since the geological conditions here are severe and have many faults. As such, UCG (Underground Coal Gasification) techniques are applicable.

Problems of conventional UCG system

The conventional UCG process has had problems to overcome when applied to the coal seam of Japan.

One of the problems is gas leakage towards the surface through the cracks. Secondly, is subsidence caused by the UCG cavity in the coal seam. A third problem is groundwater contamination. These problems are induced

by the fracturing activity during UCG process.

Hybrid UCG (H-UCG)

We have developed a safe, higher gasification efficiency and environmentally friendly UCG system. To solve the above problems caused by the fracturing of coal and rock, we apply acoustic emission/microseismic activity (AE/MS) monitoring techniques to visualise the combustion

and gasification reactor and control the fracturing activity using injection agents from the surface.

Key technologies of H-UCG

Higher gasification efficiency

In spite of co-axial type UCG, to retrieve horizontal co-axial UCG achieves higher gasification efficiency which is the same as a conventional UCG system. It is a lower cost system.

A safe and environmentally friendly system

By controlling the fracturing in the coal seam and rocks by AE/MS monitoring during UCG, it is possible to visualise the underground gasification reactor and its safe operation.

Total environmental monitoring

Using the internet, all environmental data is remotely monitored – the air, the ground surface, underground and on groundwater.

Safe and continuous handling of UCG production gas

Discharge plasma units decomposed the production gas continuously, such as hydrogen sulfide.

H-UCG

Woody biomass chips and waste plastic chips are gasified in an underground reactor. These chips are also used to control the temperature of the reactor.

CO₂ storage into the UCG cavity

When the process is finished, CO₂ gas is stored permanently inside the UCG cavity with a paste mixture. It contributes to the CO₂ reduction and supports the UCG cavity.

Benefits of our project

- It provides a local energy source for the energy grid.
- It gives a stable production of power and a thermal energy supply to the local area in an environmentally friendly and safe process.
- It provides a low-cost form of energy production.
- The usage of UCG produced gas has some flexible options to fit in with local needs.

Invitation of sponsors and partners

Now, we are planning the feasibility field experiments to evaluate the

technology on safe and efficient gasification efficiency, in an economic way. To realise this field experiment, we are seeking sponsors and partners.

Recent publications

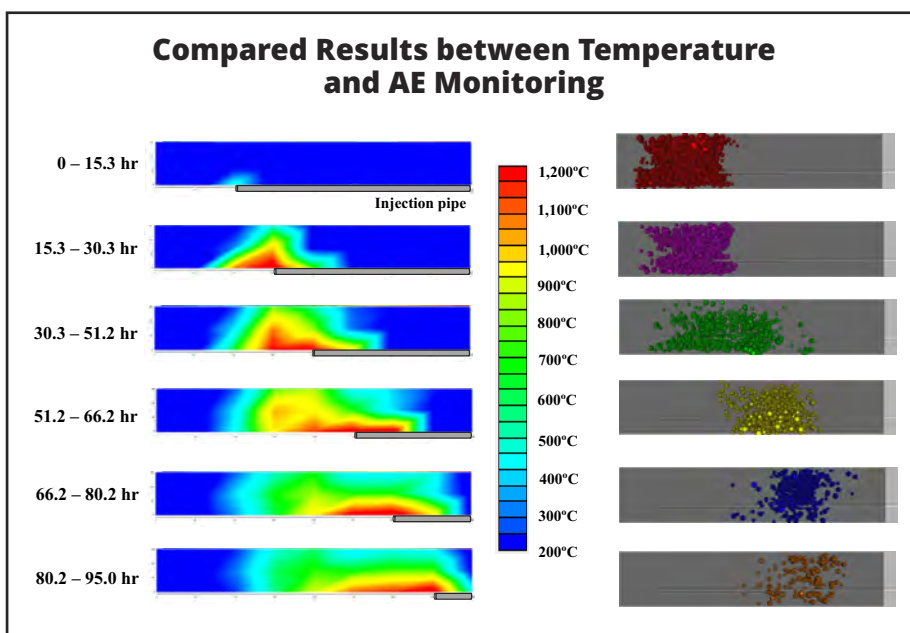
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Hybrid-Underground Coal Gasification



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What is Polar Research and Expedition Consultancy?

Here, Wilson Cheung Wai Yin from the Polar Research & Expedition Consultancy (PRECON) tells us why this organisation was set up – to encourage the cost-effectiveness of scientific field research in the Polar Regions

Polar Research & Expedition Consultancy (PRECON) was founded to improve the cost-effectiveness of scientific field research and exploration projects by engaging the public about the operation and sharing the experience and professionalism with these regions. With such an approach, we help the research team achieve their goal with less of a financial burden helping to encourage more research and exploration in the Polar Regions when it comes to natural science, humanities and social science. Meanwhile, we offer the populace a unique experience as well as access to these remote

regions and the opportunity to learn about the connection between Polar Regions and humankind, to understand the scientific value of the area and ultimately, contribute to the sustainable environment.

Commercial research and expedition support in the Polar Region

The history of polar exploration is concise. However, “change” has been termed a normal state of affairs in the Polar Regions, but the pace and extent of current ecological, societal and geopolitical transformations are unprecedented. These hot topics

make it essential to study the Polar Regions. To enhance the awareness of the Polar Region and promote its importance for humankind in terms of wilderness value, an international cooperation space and a spirit of exploration are urgently needed.

Having served in the Polar expedition industry since 2011, we noticed that most Polar research and expedition projects were supported at the national level, which limited the researchers, as well as non-government-funded institutes access to these regions and freedom of exploration, even they have vast ideas and projects. Due to



the extreme conditions and remoteness of the Polar Regions, the operational cost of each expedition is a primary concern for most scientists to conduct field research, not to mention the general public who interest in polar research.

To fill the niche market, we offer a professional and complete management package that facilitates the commercial/civil led expedition at a wide range of destinations, especially in extreme and remote regions, namely the Arctic (all seven countries), the Antarctica, Greenland, Nepal and Tropical Regions in Southeast Asia. Our services cover both planning and operating aspects, including itinerary design and expedition planning, permits application and environmental impact assessment, Polar safety training & pre-expedition training expedition project management and logistic consultation, as well as safety and risk management, equipment pilot test and technical support. Our one-stop tailor-made advice and solutions can contribute significantly when it comes to

supporting scientific research and expedition projects.

Why should the shareholder choose Precon?

We believe the key to a successful expedition is based on all the elements of preparation! Therefore, PRECON has put the most effort into offering expedition planning advice, providing logistical solutions and risk assessment helping the shareholder make a reliable decision in polar-related business. An expedition inevitably incurs various risks but a carefully planned expedition can minimise risk and cost while maximising the outcome. In other words, a consultant with a broad network of specialist, hard-won knowledge and experience is crucial to the success of polar exploration and research.

We are specialists in risk management and we put safety first. Working in the polar field, no matter how well we prepare and plan, we cant predict every outcome. The local weather, ice condition, regulation and biosecurity

would influence the whole action and management. Therefore, working in the polar regions, we always need an adaptable mindset to plan for the rapidly changing conditions. Besides the polar safety training we offer, with our broad network and considerable polar experience, we can identify the potential threats and hazards in advance and generate efficient preventive measures to mitigate the risks. In the event of any problems arising, we can react effectively and tackle the problem with our experienced pre-planned solutions.

A permit application is the starting point for legal research on the Polar Regions. Handling various laws and regulations can be confusing and time consuming for new scientists. We assist our clients in preparing the materials needed for a permit application to ensure the expedition is adequately documented. Our experiences and expertise will help researchers deal with the complex regulations and also the environmental impact assessments.

We are experienced and professional in managing an expedition. Our experts can generate the best day-by-day itinerary to suit the needs of each expedition. Apart from the logistics, our consultation service also offers first-hand, specific and unrivaled knowledge for your team, including operational tactics, budget control, expedition trends, itineraries implementations and even pioneering technologies in the field, such as manned submarines, helicopters, ROVs. etc.

Thus, to collaborate with us for polar scientific field research and exploration expedition is undoubtedly essential to maximise the outcomes, safety, efficiency and productivity of the projects.



Showcase 1: Geology Survey at East Greenland

We were invited to join a team of geologists in North Eastern Greenland for a two-month season of fieldwork. Our primary role here was in facilitating the safe and efficient operations in a remote region, which has unique risk factors.

The study aimed to survey particular areas of the North East Greenland coast to find source rock and reservoir rock for fossil fuels. The survey spanned a large geographic area and it was deemed necessary to fly in inflatable boats by Twin Otter and then conduct camp moves by small boat.

Typical daily operations consisted of medium distance travel by inflatable boat 20-30 miles, hiking into the survey area, scientific survey assistance, sample collection and return to camp. Because of daily sightings of polar bears, we kept a night watch rotation, with every member taking a three and a half hour shift. Particular



challenges going into the field season were lots of late-season sea ice in the fjords we were working in, operating in high-density polar bear habitat and remote deep field location.

As our responsibility lay primarily in safe operations, we maintained a bear safe camp, as well as providing boat and equipment maintenance and

field training for all members. When out doing survey work, we were often able to assist in data collection and sampling, which substantially sped up the process of scientific work.

Ultimately, the field season was deemed a success. All of the survey areas were covered on time and all risks were managed well.



Showcase 2: Student Polar Research Programme (SPRP)

Starting in 2017, we launched the Student Polar Research Programme (SPRP). By involving donors, the young researchers, as well as the marine scientists, we offer a sustainable way to travel and explore the polar region.

During the Arctic seasons of 2018 and 2019, we assisted the Hong Kong research teams with professors, post-graduate researchers, environmental NGO leaders, environmental engineers, high school students and their teachers and donors to conduct field studies at Svalbard, Norway. PRECON provided one-stop services from itinerary design, expedition team staffing, charter vessel, permit application, document management and logistic arrangement to equipment pilot test.

As a result, the donors had a unique experience at the polar region with the scientific team and connected the wilderness in the deep root. Meanwhile, the young scientists enjoyed the lower cost of operation to reach the field for collecting data. PRECON



enacted their research in marine microalgae, ice algae, Arctic circulation, lichen, a dangerous pollutant, nuclear radiation and microplastic. PRECON assembled a team of experts to work closely with the students, identified particular sites of scientific interests, supervised data collection plans, data management, analysis and report and provided them with sound advice and reliable logistic support to maximise the outcomes, efficiency and productivity of their projects, making the expedition an inspiring and life-changing experience to the students.



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The future of the renewable energy market in Asia

The future of the renewable energy market in Asia is explored here by VHR Global Recruitment, including a focus on Taiwan's ambition to phase out nuclear power by 2025

Asia's renewable energy sector has been growing steadily over the last few years. Economic growth has exceeded 4% year on year and due to rapid urbanisation and industrialisation throughout the region, energy consumption has doubled since 1995. Needless to say, this has driven up energy demands at a prodigious rate. Because of this, green energy production is growing in every sector. Solar, wind and hydroelectric energy are more stable than traditional fossil fuels and are helping to lower air pollution in the area. We know that a 100% green energy future is possible and that the renewable energy market creates more jobs than the fossil fuel industry loses. But what does this mean for Asia and how is the region building its renewable energy infrastructure?

How Asia's renewable energy sector has grown

Asia's renewable energy capacity has nearly doubled in the last five years, making up a significant chunk of the global supply of 2,351 gigawatts. This is roughly a third of the world's total energy and this number is growing all the time as more renewable energy enters the system and older fuel sources are phased out. Over 2018, Asia accounted for 61% of new renewable energy installations, proving the region is a powerhouse for development and implementation.

China's role in green energy

The majority of renewable development in the area comes from China. In 2018, China accounted for 20 Gw

generated just through wind power alone. The total amount of global energy generated by wind power now stands at 564 Gw. As one of the most reliable methods of generating energy, it's not surprising that it is predicted to be one of the fastest growing energy supplies as we move into a post-nuclear future.

Post-Nuclear Taiwan

Taiwan is one country planning on phasing out nuclear power by 2025, an ambitious target as around 15% of the country's energy is currently generated through this method. However, due to a recent referendum, it was revealed that 44% of Taiwan mistakenly believed that the majority of their energy supply came from nuclear sources and so voted to maintain the country's nuclear power stations. The government is continuing with the planned phase-out of nuclear power despite this vote, as General Electric no longer supplies some of the critical parts of these systems, making maintenance difficult. Beyond that, the issues surrounding nuclear pollution and safety are of paramount importance to those who live near the stations, who campaigned for their discontinuation.

There is a similar plan to phase out coal power by 1% a year, until the country no longer relies on the outdated fuel source for 40% of their energy needs. However, it is possible the country may suffer power shortages if there isn't sufficient investment in green energy.

Wind energy is going to be significant in Taiwan's future. But which method of production will they use?

Horizontal versus vertical integration in wind power

Wind-turbine projects choose between two methods of production. Some tend towards using external suppliers and buy outsourced components to assemble their turbines. This is known as the horizontal integration strategy. Others go in the opposite direction and build components themselves, known as vertical integration.

It is likely we'll see a combination of both practices in Asia and Taiwan specifically. Taiwan has the technological capabilities for vertical integration, which allows for complete control over the installation. However, this does require a large amount of in-house manufacturing for new parts.

“Taiwan is one country planning on phasing out nuclear power by 2025, an ambitious target as around 15% of the country's energy is currently generated through this method.”

On the other hand, horizontal integration can bypass high production costs, while not compromising on quality. Specialised manufacturers can provide new machines on a large scale, which Taiwan will need to ensure it isn't left without sufficient energy for its citizens.

Having a mix of both practices allows for Taiwanese engineers to learn vital skills and develop their careers, while also ensuring investment in infrastructure around the country. ■

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An underwater topographic survey for Taiwan offshore wind farms

An underwater topographic survey for Taiwan offshore wind farms is detailed here by Gwo-shyh Song, Associate Professor at the National Taiwan University

Concerning the development of an offshore wind farm in Taiwan, the first data obtained is from the underwater terrain or the so-called bathymetric measurement. Based on this data, we can map the topographic map under the water. Designers will, therefore, can determine the location of each wind turbine foundation based on this underwater topographic map. According to modern construction technology, the maximum depth of the foundation is only located at 50 metres deep. It is more difficult is to construct in a place where the depth of water is only 50 metres deep so this increases the cost.

But the measurement of underwater terrain is not just to understand the depth of the wind turbine location, because all power produced by the wind turbine must be transmitted by the power cable to the electricity generated by the transmission line into the grid for distribution. As a result, on the western offshore of Taiwan, in addition to the construction of hundreds of wind turbines placed on the seafloor, there will be electric cable network fitted between the foundations and cable routes extended from the sea to the land.

Many wind farms developed in Taiwan are located offshore. Their position is dozens of kilometres away from land and covers a very large area. There-

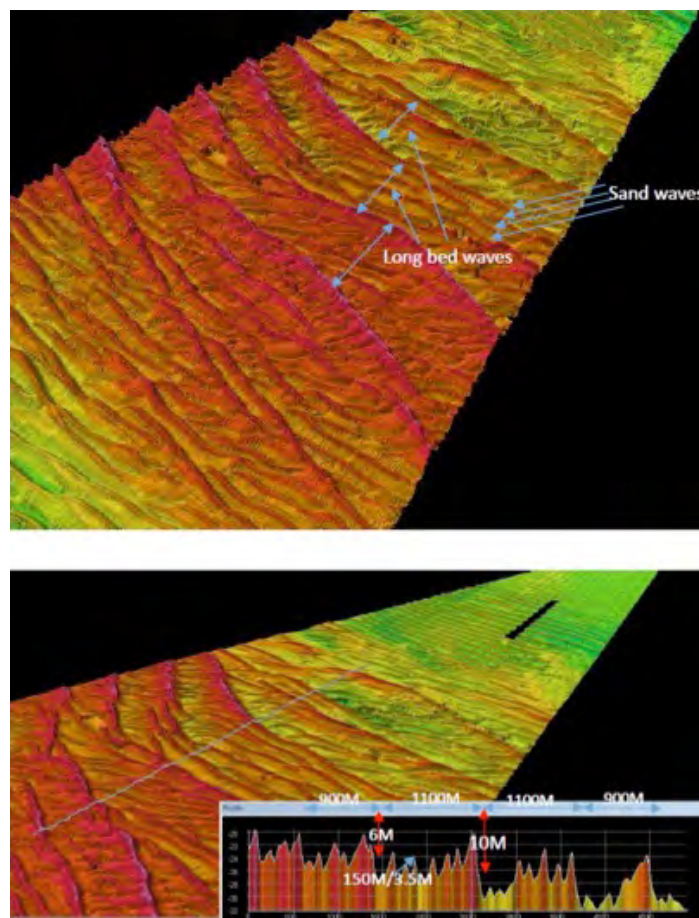


Figure 1: 3D underwater topography showing sand waves feature in F3 site 11th region

fore, for the proper laying of these cables, it is necessary to conduct a very accurate bathymetric survey to obtain a high-resolution data set from a wide area. The equipment used here is called multibeam echo sounder. Unlike single beam sounders, multi-beam systems use beamforming to extract directional information from the returning sound waves, producing a swath of depth readings from a single ping. The full swath across the

survey track includes a narrow track and forms over hundreds of multiple receive beams that are so narrower less than 1 degree depending on the system. With this design, with these collected data, it usually can map shipwreck, sand waves and pipeline using 3D visualisation technique.

With these cables laying on the seabed, there are several key points that must be noted:

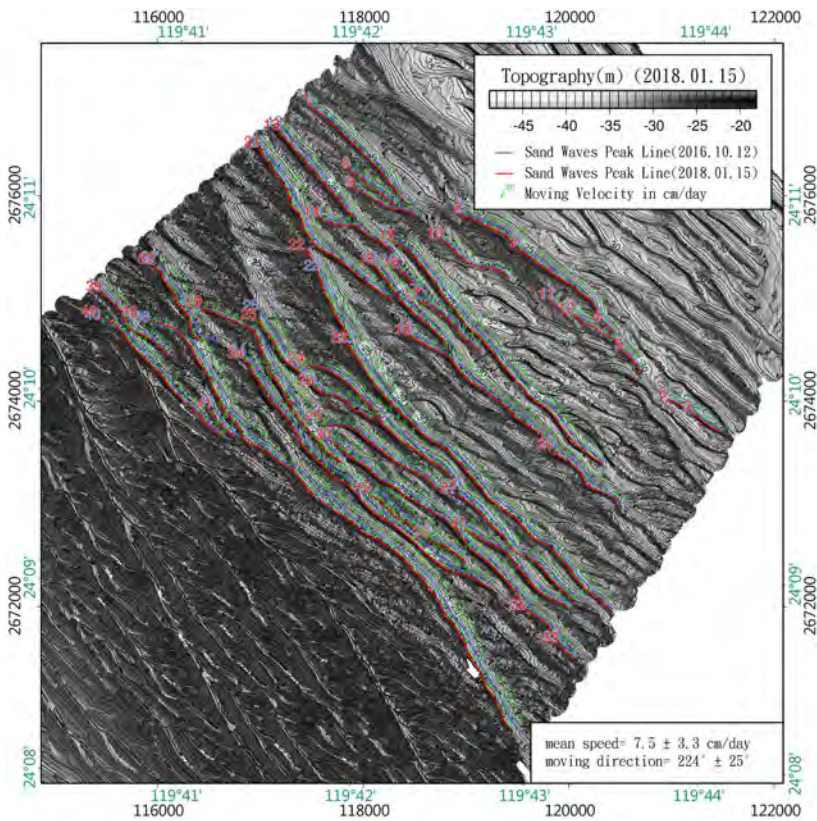


Figure 2: Sand waves motion vectors in F3 site 11th region

- The shorter the distance the cable is laid, the more the cost of construction can be reduced;
- To protect the cable from the activities of fisheries, the cable is spread over the sandy seabed and covered with sediments, in addition to the biological reef or rock area;
- Cable do not pass through areas with large terrain slopes, such as steep slopes or soft places, where earthquakes can easily produce a landslide or slump to break the cable, or where in large sand waves territory, the direction of parallel sand waves must be laid so that the cables do not span between the waves and hang on to the seabed;
- In places where the topography of seafloor is prone to topographic changes, the characteristics of terrain changes must be understood for the laying of cables; for example, there are a series of sand waves in Taiwan Strait area, which move

forward or in the direction of the bottom current.

In the wind farm areas of the Taiwan Strait, after previous surveys, because there are strong bottom currents in the area, over half of the wind farms have large sand waves (or dunes) shown on the seabed, shaped with more than hundreds of metres long and 10 metres or about three stories high.

Take the Formosa III (F-3) Wind Farms as an example; this wind farm is located in the central western Taiwan offshore or northern area of the Penghu Island. It occupies three areas, each of which is around 100 square kilometres and a development license has been applied for here by Macquarie Investment Management Limited. Hence, it covers an area around 280 square kilometres and its west margin is over 70 kilometres away from the coastline of Taiwan. They are scheduled to install about 170 6M watts wind turbines so that the devel-

opment of power generation can go to one gigawatt of electricity.

Global Aqua Survey Limited was commissioned by Macquarie to investigate the migration of sand waves in the F3 Wind Farms area. As a result, in 2016 and 2017, the Reson's SeaBat 8101 multibeam echo-sounder was used to collect the bathymetrical data in the whole region.

Figure 1 shows the underwater topographic map of the 11th wind farm in F3 area, where the vigorous development of sand waves can be seen in the area with a depth of 20-30 metres. In the area, there are many groups of long bed waves 1 kilometre long and 6-10 metres tall, covered with sand waves 150 metres long and 3.5 metres tall on the surface of these long bed waves.

In order to analyse whether these sand waves will move, one kind of presentation resulting from the variance analysis of the two-year data is shown in Figure 2. This picture uses some motion vectors to show how the sand waves moved within the area and indicate that the sand waves moved in southwestern direction at a mean speed of 7.5cm per day or 27.4 metres per year in that period of time.



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Blockchain: A revolution in marketing

In this article, Harnil Oza explains how Blockchain technology is improving the world of marketing via information tracking, influencing consumer expectation and embracing transparency

Blockchain technology was perceived by many as a global revolution in many areas, as well as a tool used by drug dealers and smugglers.

In reality, blockchain is a fascinating invention that can change the world.

Imagine blockchain as a distributed book, which is located simultaneously on all devices connected to its network. Whenever the data register is changed, the information is updated on each of these devices. This network method of tracking information has supported the growth of decentralised digital currencies such as Bitcoin and Ethereum.

But the blockchain has many potential applications in other areas that have already begun to shape certain consumer expectations, a market entry strategy and data collection. Moving forward, the revolution that blockchain technology has begun will force large companies to position themselves differently in the modern world, where decentralisation and transparency will become important components.

Changes in consumer expectations

Consumer expectations are already changing as a result of the release of tools, such as HybridBlock, which provide users with information about blockchain and cryptocurrency. They can train newcomers in this field and provide them with all the tools for career advancement in order to become more qualified and savvy.

As consumers and companies learn more about blockchain opportunities, they will begin to choose products and services that are decentralised. For example, the launch of the OPEN Platform project in Silicon Valley provides a turnkey solution for the integration of block networks between on-chain and off-site applications. This means that developers, marketers and companies will be able to create

marketing tools and applications with minimal knowledge of how a blockchain is organised.

OPEN CEO Ken Sangha says that they understand what the next wave of marketing applications could be and that CMO (chief marketing specialists) will focus on blockchain technology and cryptocurrency. He noted that blockchain technology is designed to securely and transparently exchange data between a large group of people without the need for centralised oversight to ensure data security.

Through the use of the blockchain, customers will be able to control how the campaign processes certain data, or to track the origin of a particular item. Blockchain provides consumers with the platform they need to make centralised institutions more open and accountable to society.

Capital becomes more affordable

According to the report of CB Insights, the second most common reason for the failure of start-ups is that their creators simply “run out of cash”. At the same time, they are in dire need of funds to promote marketing campaigns. But now, they can use the new way of financing their ideas.

Thanks to the introduction of blockchain technology and cryptocurrency, start-up developers now have access to capital through tools that have not existed just a few years ago. As an example, it's enough to take TrustToken, a technology that allows people all over the world to buy a stake in real estate or small businesses.

Each asset or business can acquire its own token, which will be traded on any cryptocurrency exchanges, such as Ethereum or Bitcoin. TrustToken technology can help with auditing asset ownership and control of each transaction, resulting in a blockchain strength that will improve traditional markets around the world.



Evaluation of customer attitudes on demand

Leading global technology companies are investing billions of dollars in the development of artificial intelligence (AI). Amazon founder Jeff Bezos recently announced that his company is going to double its work in the field of AI-based technologies, which will revolutionise the interaction of consumers with manufacturers.

But small businesses are at a disadvantage when it comes to developing technologies based on AI. While large companies own a huge amount of data with which they can combine machine learning algorithms, small organisations cannot boast of it.

With a blockchain, consumers and companies will be able to buy and sell data through decentralised, but very transparent markets. Synapse is one such platform that allows consumers to sell their data in exchange for SYN tokens and customers to track individual users. On a broader scale, this can help create a dynamic AI ecosystem that can become smarter and more efficient over time. Ultimately, this will lead to a completely new AI-based economy.

Iris is another blockchain-based platform designed to allow consumers to sell their data (in this case, health data). At the same time, it allows researchers and corporations to access large databases on demand. With proper stimulation, this platform can serve as evidence that consumer data can be shared on mutually beneficial terms.

Another company in this area is ClearPoll, which uses blockchain technology to safely record respondent choices. It also allows organisations to test different ways to stimulate customers and obtain client opinions.

Respondents get rewarded for their participation in the survey, which makes it easier for manufacturers to assess customer opinion when using POLL tokens. ClearPoll also offers detailed survey data from a database of several thousand different polls.

Adaptation of brands to the successful use of blockchain

The blockchain revolution will gradually expand. Just as it changed the situation in the field of content and commerce, it will be able to change the customers' expectations regarding the producers over the next few years.

While today, it may seem like a relic of libertarians and technicians, powerful and secure technology is becoming increasingly popular. As a result, manufacturers who adopt the principles of revolutionary technology will win in the struggle for potential customers who are interested in supporting innovative companies.

Large companies already go hand in hand with blockchain and look to the future. For example, Burger King released its own blockchain-based cryptocurrency and IBM is helping Chinese retailers improve product security.

If you think that you need to think only about technologies, such as augmented reality and machine learning, you might miss out on the opportunities that blockchain offers.

Blockchain is already here and it is not going anywhere. This means that marketers have new perspectives and opportunities for communicating with consumers, raising capital and collecting data.

But, above all, this means that marketing leaders must embrace all of these innovations since decentralisation and transparency are becoming the norm in modern society. ■

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Strengthening a proactive fiscal policy in China

This article provides insight into the work of China's Minister of Finance Liu Kun, who is responsible for strengthening a proactive fiscal policy in one of the world's biggest and most powerful economies

China's Minister of Finance Liu Kun is responsible for strengthening a proactive fiscal policy in one of the world's biggest and most powerful economies.

Since China introduced reforms in the late 1970s to create a "socialist market economy", known in the West as the Opening of China, the country has consistently had one of the world's fastest-growing economies.

This has brought about huge changes, both economic and social, including the rapid growth of the private sector, a rise in foreign investment and burgeoning demand for consumer goods. Indeed, China is the world's largest manufacturer and exporter, the second-biggest importer of goods and the fastest-growing consumer market.

Average incomes have risen, though so too have income disparities, while China's unequal transportation system and differences in human and natural resources have produced significant variations in regional economies.

President Xi Jinping's "Chinese Dream" has the dual goals of achieving the "Two 100s": firstly, China becoming a "moderately well-off society" by 2021, the 100th anniversary of the foundation of the Communist Party; and secondly, for China to become a fully developed nation by 2049, the 100th anniversary of the founding of the People's Republic.

Liu Kun has been China's Minister of Finance since March 2018. He oversees the formulation and implementation of fiscal and taxation strategies, policies for macroeconomic regulation and control, international negotiations on finances and debt and central government's fiscal revenue and expenditure management.

As party secretary of the Ministry of Finance, he is in charge of the Department of Taxation, the Department of Budget, the Department of Defence and the Department of Personnel & Education.

A key priority for the Ministry, as mandated by the Central Economic Work Conference held at the end of 2018, is strengthening and improving the implementation of a proactive fiscal policy.

In a recent speech, Liu Kun said that: "from the perspective of building a well-off society in an all-round way, it is necessary to support the fiscal policy to consolidate China's economic stability and progress."

"In recent years, we have paid great attention to the advantages of the fiscal policy control structure and adhered to the supply-side structural reform as the main line and achieved remarkable results," he adds.

"At the same time, we must also see that China's supply system is still not adapting to changes in the demand structure and it is difficult for the economy to achieve a virtuous circle.

"Implementing a proactive fiscal policy and intensifying efficiency, while stabilising aggregate demand, increasing support for supply-side structural reforms, promoting the resolution of deep-seated structural problems in economic development, is conducive to enhancing the quality advantages of China's economy."

The Minister acknowledged that the real economy faces many difficulties and risks in key areas, as well as relatively large downward pressure.

"To consolidate China's overall economic stability and steady progress, it is necessary to continue to imple-



“Since China introduced reforms in the late 1970s to create a “socialist market economy”, known in the West as the Opening of China, the country has consistently had one of the world’s fastest-growing economies.”

ment a proactive fiscal policy and increase efforts to improve efficiency, stabilise employment, stabilise finance, stabilise foreign trade, stabilise foreign investment, stabilise investment and stabilise expectations.”

Tax reduction and fee reduction are seen as key measures to deal with the downward pressure on the economy, the Minister said, as it reduces the burden on enterprises, stimulates SMEs and promotes industrial transformation and innovation.

2019 has seen a focus on tax cuts set out in a “big gift package” to the people. This includes a reduction in corporate tax and social security contributions worth nearly 2 trillion yuan, described as the “largest tax reduction in history.”

There has been a reduction in VAT for industries such as manufacturing from 16% to 13% and from 10% to 9% for sectors including construction and transportation.

In addition, since 1st January, small and micro-enterprises with monthly sales of less than 100,000 yuan have been exempted from value-added tax.

Furthermore, since the start of this year, six special deduction policies for personal income tax related to children’s education and continuing education have benefited around 48.8 million people. Overall, 91.6 million people do not have to pay any personal income tax.

Another key element of achieving a well-off society is fighting the “three major battles” of supporting technological innovation, supply-side reform and rural development.

“The financial sector plays a particularly important role in supporting the three major battles,” Liu Kun says.

“By grasping the most direct and most realistic interests of the people, highlighting the publicity and fairness of finance and improving the fiscal and taxation arrangements, we can effectively play the role of preventing and defusing major risks, eliminating poverty and improving the quality of the ecological environment.”

Nevertheless, China’s efforts to improve the implementation of a proactive fiscal policy have brought enormous pressure on the fiscal balance. In order to make up the resource gap caused by large-scale tax and fee reductions, the central government has reduced general expenditures and arranged for local transfer payments to exceed 7.5 trillion yuan, the largest seen in recent years.

In the face of these fiscal reductions, it is up to government at all levels to “take the lead in tightening their lives”, the Minister said, to ensure annual budgets balance and policies are implemented.

“Always adhere to hard work, diligence and saving,” he adds.

“We must take the tight days as the long-term policy of financial work and implement and reflect them in the whole process and all aspects of financial work.” ■

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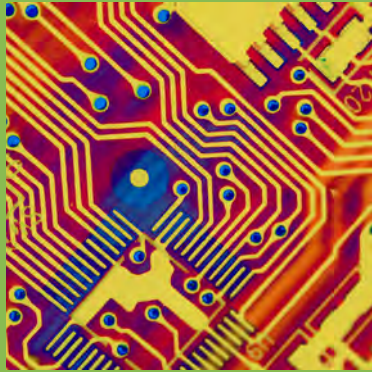
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