The ROPES: Cultivating Green Tech Talent for the Sustainable Future

APEC Human Resources Development Working Group

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Produced by
Chen, Hao-Ming
Workforce Development Agency, Chinese Taipei

For
Asia-Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616
Tel: (65) 68919 600
Fax: (65) 68919 690
Email: info@apec.org
Website: www.apec.org

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Content

1. Background

This project responded to the increasing global demand for sustainable development and green technology, particularly in the Asia-Pacific region, where rapid urbanization, population growth, and rising energy needs posed significant environmental and economic challenges. The project aimed to cultivate a diverse and skilled workforce that can support the region's transition to a greener, more sustainable economy while promoting inclusivity, especially for marginalized communities and underrepresented groups.

The Asia-Pacific region played a crucial role in global green tech innovation, accounting for a significant portion of renewable energy employment. Since 2019, Asia had been responsible for 60% of the world's renewable energy jobs, reflecting the region's potential as a hub for green technology. However, achieving the goals of a sustainable and inclusive green economy required addressing the significant shortage of skilled workers in green tech industries. The ROPES project sought to tackle this gap by analyzing current talent development systems, reskilling opportunities, and fostering public-private partnerships.

The project's central objectives included improving training pathways, promoting access to green jobs, and supporting workforce transitions towards more sustainable industries. By facilitating social dialogue among officials, industries, and academia, the ROPES project developed strategies that support green tech talent development and promoted diversity and inclusion. A central focus is placed on helping businesses and policymakers identify the skills and technologies necessary to achieve net-zero carbon emissions or carbon-neutral goals.

One of the ROPES project's innovative elements was its emphasis on public-private cooperation. By fostering collaboration between officials and industries, the project sought to ensure that sufficient resources and technologies are invested in green workforce development. The project also addressed the just transition framework, ensuring that workers displaced by the shift from traditional energy sources to

renewable alternatives received adequate training and support.

2. Workshop Information

Under this project, Chinese Taipei held a one-day workshop in September 2024. This workshop aimed to bring together policymakers, industry leaders, and educators to exchange best practices and explore innovative strategies for green workforce development. Key discussions focused on the pathways for green skills training, inclusivity in the green technology industry, and strategies to promote the just and fair transition in green economy through the perspective of human resource development.

Another key element of the ROPES project was its alignment with APEC's broader goals of inclusive and sustainable growth and human resource advancement. It supported the APEC Putrajaya Vision 2040 by contributing to the goals of inclusive economic growth, environmental sustainability, and human resource development. By emphasizing green technology workforce cultivation, the project enhanced APEC economies' capacity of addressing climate change and environmental crisis while fostering innovation and competitiveness of workforce.

Through its efforts to promote inclusivity, the ROPES project ensured that underrepresented groups, including women and minorities, had opportunities to participate in and benefit from the green technology revolution. The project set a target for at least 30% of female participation in the workshop, highlighting gender equality and the role of women in green workforce development. This approach not only supported an APEC-wide gender empowerment agenda but also stressed the importance of social inclusion in a just transition in green economy.

In summary, the ROPES project represented an innovative initiative to address the workforce challenges associated with the energy transition in the Asia-Pacific region. By fostering skills development, enhancing public-private cooperation, and promoting diversity, the project aimed to create a resilient and sustainable workforce capable of driving the region's green tech industries forward. Its alignment with APEC's strategic goals ensured that the project's outcomes would have lasting impacts on economic growth, sustainability, and social inclusion.

3. Workshop Summary Report

Workshop on the ROPES Forging Green Talent Solutions for an Inclusive Future

Thursday, 5 September 2024, at 10:00-16:05 (GMT+8)

3.1 Opening and Welcome Remarks

- ***Mr. Shih-Chang Chen, Deputy Director-General, Workforce Development Agency, Ministry of Labor***

Since its inception, the APEC Workshop on ROPES aimed to foster regional collaboration to search solutions for the urgent needs of green talents. This initiative brought together policymakers, industry leaders, and representatives of training institutions to share the best practices in cultivating the workforce needed for a green economy.

In 2024, Chinese Taipei launched the workshop “Forging Green Talent Solutions for an Inclusive Future,” which focused on filling the skills gap in green technology and supporting marginalized communities. By strengthening training pathways and promoting inclusivity, the workshop aimed to ensure that all sectors of society benefited from the green transition. Moreover, the output of the Workshop paved the way for mutual learning among APEC members to facilitate regional collaboration on human resource development in green industry.

- ***Mr. Zhao Li, Lead Shepherd, APEC Human Resources Development Working Group***

The APEC workshop on "Forging Green Talent Solutions for an Inclusive Future" highlighted the expanding green energy sector, including wind, solar, and biomass energy. Key technical skills such as renewable technologies, project management, and soft skills like teamwork and communication were emphasized. However, workforce gaps, especially gender disparities and barriers for marginalized groups, persisted. To address these, inclusive programs focusing on equality, targeted

outreach, supportive pathways, and collaboration were deemed crucial. The workshop aligned with APEC's commitment to inclusive growth, ensuring everyone benefited from the green transition.

Leading experts in the fields of technology and workforce development, in Chinese Taipei were focused on developing an innovative economic model by promoting digital transformation and advancing towards a net-zero transition. Their goal was to achieve inclusive growth, creating a smarter and more sustainable economy. This approach emphasized building a green energy sector that fosters innovation while ensuring opportunities are accessible to all. Additionally, an international event in Paris, the 2024 WorldSkills Competition, was taken place in Lyon, France, where Team Chinese Taipei was expected to perform well.

- ***Ms. Rosanna A. Urdaneta, Coordinator, Capacity Building Network, APEC Human Resources Development Working Group***

It was a pleasure to welcome all participants to the Ropes Forging Green Talent Solutions for an inclusive future workshop. The leadership of the Workforce Development Agency and the APEC-HRD Working Group led efforts to advance green talent solutions. It emphasizes the importance of green skills development in response to climate change and the push for a net-zero economy by 2050. The growth of green technologies created opportunities, but it was essential to prioritize education and upskills to address job displacement. The ROPES project focused on marginalized communities, and this workshop united policymakers and experts to share insights on workforce adaptation, inclusivity, and green tech development. A comprehensive report followed, outlining the best practices for future green initiatives.

3.2 Thematic Presentation – the ROPES: Cultivating Green Tech Talent for the Sustainable Future

- ***Mr. Shu-Yuan Pan, Associate Professor at National Taiwan University (NTU)***

The importance of green technology talent development in supporting economic and sustainable growth was emphasized. This approach included three pillars: economic, environmental, and social development. The key strategies involved skill development, stakeholder participation, and innovation integration.

Developing new skills in sectors like energy and semiconductors, particularly through digital technology and data analysis. Involving different stakeholders in the green transformation to ensure inclusivity. Promoting innovation for sustainable development paved the way for economic growth and social well-being.

The project incorporated five key elements: requirements, opportunities, participation, empowerment, and stakeholder involvement, aiming to create green jobs and support a net-zero economy. Additionally, the presentation highlighted the importance of international collaboration, especially in capacity-building initiatives, to tackle challenges like CO2 emissions.

The strategy emphasized inclusive approaches that left no one behind, focusing on gender equality, labor rights, and digital tools to maximize policy and industry performance. The goal was to support a green economy that addressed current challenges and ensured fair participation, with a specific focus on vulnerable groups such as women and minorities.

In sectors like energy and semiconductors, they could focus on re-skilling workers from traditional industries while promoting smart technology for talent cultivation. For instance, companies like TSMC demonstrated how to support talent through competitive salaries and targeted programs. It was recommended that management practices be strengthened by incorporating data analysis and feedback loops to improve policies aimed at creating green jobs. This approach not only improves workforce capabilities but also optimized strategies for a sustainable future.

3.3 Keynote I – Best Practices for Green Workforce Development in Green Transformation

This session aimed to explore and share key strategies for green workforce development in support of the ongoing green transformation, focusing on approaches adopted by various economies to address the talent shortage and skills gap in green industries. As demand in green sectors grew, preparing a capable workforce became increasingly important to ensure there were sufficient talents to facilitate a smooth transition to a green economy. Experts from diverse sectors were invited to provide insights into how economies cultivated green talent through public-private partnerships, vocational training programs, and inclusive approaches.

- ***Ms. Ellen Bomasang, Principal (Energy, Climate, & Gender), Abt Global, US.***

The impacts of climate change have become more profound, leading to global challenges. The burning of fossil fuels has been the primary source of greenhouse gas emissions, contributing to rising temperatures and severe weather events. This situation compelled policymakers to prioritize low-carbon transitions and renewable energy, making the shift to a green economy a pressing reality.

A green economy, as studied by the United Nations (UN), improved human well-being while reducing environmental risks. The pursuit of a green economy brought significant benefits, including job creation, poverty reduction, and inclusion facilitation. The International Labour Organization (ILO) also predicted that effective policy implementation could lead to 24 million new jobs by 2030.

However, green transformation presents challenges, such as high upfront costs and job losses in traditional industries. It was important to plan carefully to navigate these risks. Dialogue with workers and stakeholders was essential for policy formulation and acceptance. For example, Los Angeles developed a just transition strategy for oil and gas workers, ensuring that those affected received necessary support while phasing out fossil fuel extraction.

Apart from ongoing communication with stakeholders, inclusivity is crucial in this transition. It was vital to promote inclusive employment approaches, especially

for women, youth, and other marginalized groups. For instance, the City of Kingston in Canada established the Workplace Inclusion Charter to encourage employers to adopt inclusive hiring practices. Ms. Ellen Bomasang urged everyone to promote more inclusive employment practices to create more opportunities for marginalized groups to participate in that vital sector.

- ***Dr. So-Young Lee, Senior Researcher, Institute for Global Environmental Strategies (IGES), Japan. (Economy: Republic of Korea)***

The presentation focused on the macro-level analysis of Asia, highlighting specific applications in different regions. The public increasingly recognized the concept of "Just Net-Zero Transitions", which addresses issues of inclusivity and equity. In pursuit of net-zero, workers in different sectors were impacted differently. As the transition progresses, officials must create new job opportunities and provide support to affected workers. However, these transitions were not only about technological advancement or infrastructure expansion, but they also involved a wide range of factors, such as economic, political, culture, and geographical elements.

Therefore, transition policies and action plans must be tailored to the unique characteristics of each region. Research on a just transition in Asia-Pacific was limited. Since 2021, he had collaborated with scholars on this issue, and in September 2023, they published a report that examined social injustices during net-zero transitions in Asia. The report highlighted how different economies and regions responded to environmental challenges and social inequality. For example, in some places, local officials lacked transparency, which limited public participation in energy planning. In other regions, just transitions had been extended to the food systems, as many areas relied on agricultural lifestyles. Different regions faced different challenges in pursuing just net-zero transitions.

Achieving a just transition required integrating social and environmental policies, with strategies tailored to local contexts. This responsibility was shared among all stakeholders, including marginalized groups, to ensure fairness throughout the

transition process. Dr. So-Young Lee recommended establishing a cooperative platform for just and sustainable development, where stakeholders could share and discuss these diverse cases and provide empirical support for future policymaking.

- ***Mr. Ratchaphak Tantisanghirun, Engineer, Practitioner Level, Department of Alternative Energy Development and Efficiency (DEDE), Thailand.***

Thailand experienced a rapid growth of the green industry, where jobs in the sector increased by 22.4% in 2023, while the supply of green talent only grew by 12.3%, leading to a significant talent shortage. To address this, Thailand developed a Nationally Determined Contribution (NDC) roadmap aimed at achieving net-zero emissions by 2065. This plan was expected to create 1 million jobs in the green industry by 2037. To meet the growing demand for green talent, Thailand implemented several training programs and regulatory frameworks.

One of the key initiatives was the Energy Efficiency Revolving Fund; the official provided loans to local commercial banks to support investments in green energy projects. Over time, the banks were expected to gradually increase their own investment and eventually operate independently of official funding. In addition, the Thai official introduced regulations mandating that energy-intensive factories and buildings appoint a Person Responsible for Energy (PRE). These PREs were required to submit annual energy management reports to the official, ensuring better energy practices. To support this, the official provided training programs for energy managers, with the Department of Alternative Energy Development and Efficiency overseeing key assessments.

The Thai official launched a series of green talent training programs to support its policy goals, including courses related to electric vehicles, as the economy aimed for a 30% market share for electric vehicles by 2030.

- ***Mr. Taj Ahmad Eldridge, Managing Director, Jobs For The Future (JFF), US.***

Jobs for the Future (JFF) believed that every job had the potential to become a green job through the efficient use of resources. JFF classified green jobs into three types based on the level of green skills integration: additive jobs, which incorporated new green skills while maintaining traditional roles; blended jobs, where roles evolved as workers gained new skills; and job-changing jobs, where roles completely changed due to the full integration of green skills.

To illustrate the connection between green job development and skill acquisition, the concept of Green Transition Cycle was introduced. The cycle began with the seed stage, where jobs and skills were newly developed and required ongoing adjustment. Then it progressed through scaling and mature stages, where advanced technologies and green skills became integral to the workforce, and finally reached the risk stage, where jobs that rely on unsustainable practices were phased out.

In the U.S., inclusivity was crucial in the green transition. Removing barriers for marginalized groups, such as women, minorities, and rural communities was essential. Rural areas often lacked access to resources, and historically underserved groups including African Americans and Indigenous peoples were disproportionately affected by climate change.

As green transition progressed, it was equally important to create quality jobs that attracted and retained workers. The Quality Job Framework provided guidance for employers on creating an appealing work environment. It comprised four elements: compensation, structure, advancement, and agency & culture. This framework ensured that workers remained engaged and found value in their work.

Finally, Mr. Taj Ahmad Eldridge encouraged economies to foster cross-sector collaboration to build inclusive and supportive pathways for green jobs. Employers should expand job structures to offer livable wages and comprehensive benefits. When enacting green jobs legislation, local officials must ensure that no group was left behind.

- ***Mr. Norazam Bin Mohd Zain, Analyst, Malaysian Green Technology and Climate Change Corporation (MGTC), Malaysia.***

Malaysian Green Technology and Climate Change Corporation (MGTC) was an official agency under the Ministry of Natural Resources and Environmental Sustainability. MGTC played a key role in achieving Malaysia's net-zero emissions target by 2050. Since 2014, MGTC had collaborated with the International Labour Organization and other ministries to address challenges in transitioning to a green economy.

In 2015, they launched the Green Technology Master Plan (GTMP) to accelerate green technology development. In 2021, under the Twelfth Malaysian Plan, green industries were identified as a key pillar for sustainable growth. This led to the relaunch of the Green Jobs Website, which now listed over 35,500 green job vacancies and provided a dedicated platform for job seekers and employers in the green industry. Additionally, MGTC announced plans to publish the Green Jobs Guidelines in December 2024, which would serve as a comprehensive framework for identifying and promoting green job opportunities. These guidelines were expected to help organizations align their employment goals with Malaysia's environmental targets.

The demand for green jobs was reported to be rapidly increasing, particularly in sectors such as solar energy, green buildings, sustainable agriculture, electric vehicles, and waste management. To meet this growing demand, MGTC offered various training programs, such as energy manager certification and skills development for energy auditors, to equip the workforce with the necessary skills for the green economy. These policies and programs were part of Malaysia's broader strategy to ensure a sustainable and inclusive green transformation.

3.4 Keynote II – The Importance of Fostering Inclusivity in Green Technology Workforce Development

- ***Mr. Vincent Tsai, General Manager, Taiwan International Windpower Training Corporation Ltd. (TIWTC)***

TIWTC plays a vital role in the offshore wind power industry, focusing on talent development, gender equality, and inclusivity. Since its Establishment in 2018, TIWTC has assisted local talents in obtaining international certifications, such as the Global Wind Organization (GWO) certification. With a 50% market share, TIWTC trained over 3,000 green workers and issued more than 9,000 certificates.

The offshore wind industry offered significant employment opportunities for young people while promoting gender diversity. To facilitate the gender diversity in the offshore wind industry, Global Wind Energy Council (GWEC) launched several programs to increase women's participation in this sector. Currently, 57% of TIWTC's staff are women, and Chinese Taipei leads globally, with 95% of offshore wind companies having female managers. TIWTC also actively engaged with local communities near offshore areas, offering youth opportunities to gain experience in industry and further attract more talents.

Through partnerships with local officials, universities, and communities, TIWTC fostered gender inclusivity and international collaboration, expanding its services to Japan; Korea; and Viet Nam. The company remains committed to advocating for women's participation and the inclusion of marginalized groups in the green transition.

3.5 Panel Discussion

The central theme of this workshop was the cultivation of green talent. However, a more critical issue was the transition itself. As economies moved toward green transformation, different communities in various regions faced unequal challenges and struggled to access the necessary resources for a smoother transition. Therefore, the focus also needed to be on "equity" to ensure that everyone could equally participate in the new economy and benefit from the opportunities it brought.

The panel discussion was divided into two parts: the first part focused on how to ensure "equity" and "inclusivity" during the transition, ensuring that everyone could benefit from the green economy. Additionally, it addressed ways to support small and medium-sized enterprises in seizing the opportunities presented by the green economy. The second part examined labor policies and skills development, ensuring that workers were prepared to face future challenges and were provided with fair opportunities to participate.

(1) Theme I- Equitable Green Transition

The panelists were as follows,

- ***Dr. So-Young Lee, Senior Researcher, Institute for Global Environmental Strategies (IGES), Japan (Economy: Republic of Korea)***

  Unlike other speakers who emphasized the practices of large corporations, Dr. So-Young Lee's presentations focused specifically on how small and medium-sized enterprises (SMEs) can promote gender equality while facilitating green transitions. Her research primarily takes place in developing economies in Southeast Asia, including Laos, Cambodia, and Viet Nam, highlighting the needs of women and individuals with disabilities.

  For instance, in rural areas of Laos, her team addressed environmental pollution while creating job opportunities for marginalized groups. They taught locals to use

more eco-friendly cooking methods and promoted employment for individuals with disabilities, who wore shirts stating, “Please do not only see my disabilities, but also my abilities.”

Additionally, her team collaborated with the Ministry of Natural Resources and Environment to advance projects that incorporate gender equality and support for marginalized groups into local policies. These issues were included in the official policy agenda, and her team planned to continue working with local officials and communities to implement these inclusive measures.

Furthermore, Dr. Lee shared various perspectives on green transitions. While some argued that digitalization is a crucial part of the green movement, she personally expressed disagreement, preferring to avoid excessive reliance on electronic products. She emphasized that the application of technology should not focus solely on technology itself but should aim to enhance quality of life. She envisioned a future where lifestyles are more inclusive.

- ***Mr. Norazam Bin Mohd Zain, Analyst, Malaysian Green Technology and Climate Change Corporation (MGTC), Malaysia.***

To promote gender equality and green job opportunities in rural Malaysia, Mr. Norazam Bin Mohd Zain explained that MGTC worked closely with the Ministry of Natural Resources and Environmental Sustainability of Malaysia to implement programs focusing on greenhouse gas reduction, energy conservation, water savings, and waste management. These initiatives aimed to raise awareness and utilization of green technology among local communities. MGTC also provided training for housewives, teaching them to adopt eco-friendlier cooking methods, thereby improving their quality of life and offering additional economic benefits.

To enhance skills in rural communities, MGTC launched the “Whole-land Training Week,” which offered various training courses accessible to both urban and rural participants. In addition to attending in-person training, individuals could also apply for online courses, significantly improving the accessibility of training

resources. Furthermore, MGTC provided official-subsidized training programs, ensuring that participants could access these courses without any fees. These initiatives reflected the organization's commitment to enhancing workforce capabilities and supporting a sustainable transition.

- ***Mr. Vincent Tsai, General Manager, TIWTC Ltd***

Mr. Vincent Tsai discussed the challenges of attracting young talent and promoting diversity in industry. He noted that with sufficient skills acquired through university education, approximately 50-60% of the local workforce required only basic training to enter the industry. As Chinese Taipei anticipated a labor shortage in the near future, the authorities implemented training programs to help workers acquire essential skills and create job opportunities in the offshore wind sector, benefiting thousands of trainees.

Mr. Tsai emphasized the importance of developing green pathways and raising awareness about the benefits of these transitions. While regulations could appear restrictive, he highlighted the potential of leveraging incentives, such as tax breaks to encourage companies to offer more green job opportunities. He underscored the critical role of Industry participation in ensuring inclusive and diverse engagement in the green transition.

Mr. Tsai suggested that this approach could be replicated by other economies. He identified Chinese Taipei's advantage lies in the accessibility of tertiary education, which allowed for the cultivation of quality talent. However, he acknowledged that regions with different educational levels might face unique challenges in achieving similar outcomes.

(2) Theme II- Building Green Tech Skills

- ***Mr. Taj Ahmad Eldridge, Managing Director, Jobs For The Future (JFF), US.***

Mr. Taj Ahmad Eldridge highlighted the importance of cross-border cooperation, citing the collaboration on the blue economy between California and Chile as a vital strategy for addressing future challenges. He emphasized that partnering with local industries, particularly those facing financial constraints, is equally important. By forming such partnerships, enterprises can create new job opportunities and mitigate the impact of the green transition.

Mr. Eldrige also stressed the need to establish clear standards to provide workers with specific goals to achieve. He noted that the effectiveness of education and training programs must be properly measured. For example, in the U.S., many individuals participated in local training programs a few years ago but were unable to fully apply the knowledge they had acquired. This underscored the necessity of balancing supply and demand in workforce development.

Looking ahead, Mr. Eldridge emphasized the importance of prioritizing digital transformation and ensuring that the workforce is equipped with the necessary skills to meet future demands. He also highlighted the importance of inclusivity, urging that special attention be given to marginalized groups to ensure they benefit equally from these advancements.

- ***Mr. Ratchaphak Tantisanghirun, Engineer, Practitioner Level, Department of Alternative Energy Development and Efficiency (DEDE), Thailand.***

Mr. Ratchaphak Tantisanghirun highlighted the factors motivating workers to acquire new skills. He noted that when certain jobs offer better pay, workers are encouraged to recognize the need for skill development and actively seek relevant training opportunities. In response, DEDE provided corresponding training programs to help workers gain these skills. Employers played a key role by regularly submitting reports on current job vacancies, enabling DEDE to track labor market needs. To address these needs, DEDE offered subsidies to industries, encouraging them to create

quality positions. Additionally, the Association of Thai Industries collaborated closely with DEDE, facilitating direct communication to advance talent development initiatives.

To further expand green job training, Mr. Tantisanghirun explained that DEDE encouraged private training institutions to offer related courses, with the requirement that these programs be accredited by official agencies. This approach broadened training opportunities, ensured standardization, and maintained high training quality

- ***Mrs. Nadiejda Quintana, Director of Standardization and Certification of Labor Competencies, Ministry of Labor and Employment Promotion, Peru***

Mrs. Nadiejda Quintana emphasized the importance of green and digital skills as key workforce issues. She noted that in economies such as Chile; Colombia; and Mexico, programs are already in place to support women and vulnerable workers. However, she observed that the focus on these issues varies among companies due to the challenges posed by the energy transition.

Mrs. Quintana reflected on the workshop, stating that she gained valuable insights from the experiences shared by various economies. In Peru, she noted that many workers still need to improve their skills. She emphasized that, apart from focusing on general workers, it is also essential to prioritize training for trainers. To equip workers with techniques that meet industry demands, trainers themselves must possess the corresponding skills. She added that If an economy lacks the necessary technologies, it could seek support from other economies. Mrs. Quintana highlighted that APEC could play a crucial role in facilitating such exchanges to advance sustainable development across the region.

- ***Mr. Shu-Yuan Pan, Associate Professor of Department of Bioenvironmental Systems Engineering, College of Bioresource and Agriculture, NTU***

Mr. Shu-Yuan Pan emphasized the growing focus of nearly all industries on green transitions, making it essential to understand regional and industrial needs to support this movement. Reflecting on the day's discussion, Mr. Pan highlighted three key takeaways:

1. Inclusivity: Inclusive policies, such as decarbonization programs, ensure that more groups are included in the green economy.
2. Innovation: New technologies, such as wastewater management, are essential for advancing the green economy.
3. Integration: Effective organizational management and capacity building enhance the efficiency of green transitions.

Mr. Pan also stressed the importance of public-private cooperation and continuous education in developing a workforce capable of meeting the industry's evolving needs. Regarding international cooperation, he identified six key elements:

1. Policies: Economies can share updated regulations through exchange platforms, enabling each region to develop localized policies that facilitate cooperation and green transitions.
2. Economic incentives: Cross-border cooperation can be motivated through well-calibrated economic incentives.
3. Data: The use of scientific data supports informed decision-making and policy formulation.
4. Research and Development: Research outcomes should be integrated into policies and incentive systems to drive technological advancements.
5. Databases: Digital databases are essential for analyzing data, supporting collaboration and facilitating informed decisions.
6. Education: Promoting environmental and green education raises public awareness about environmental protection and sustainability.

3.6 Suggestions

Based on the best practices and insights shared during the workshop, the following suggestions were proposed for developing green talent policies.

(1) Promoting Public-Private Partnerships for Green Talent Development: Strengthened collaboration between officials and private sectors is essential for creating more training opportunities in green technologies. Joint efforts could include apprenticeships, mentorship programs, and internships, ensuring participants are equipped with practical and necessary skills.

(2) Fostering Inclusivity in Green Workforce Programs: Initiatives should focus on marginalized groups, ensuring equal access to green technology training. Outreach programs targeting women, youth, indigenous peoples, and individuals with disabilities can help bridge the talent gap and promote diversity in emerging green sectors.

(3) Supporting Localized Green Transition Efforts: Tailored green job programs that address the specific needs of individual economies were highlighted. For instance, Thailand's energy efficiency programs were noted as effective in driving localized green economy growth and engaging communities through actionable plans.

(4) Upskilling for a Just Energy Transition: Skills training courses and programs in areas such as renewable energy and waste management should focus on upskilling workers displaced by the green transition, ensuring they remain relevant and employable in evolving industries.

ANNEX I: Workshop Agenda

Workshop on the ROPES: Forging Green Talent Solutions for an Inclusive Future

5 September 2024

Time	Agenda
Preparation	
09:30-10:00	**【Registration】**
Opening Ceremony	
10:00-10:10	**【Guest Introduction】**
10:10-10:25	**【Opening Remarks】** · Mr. Shih-Chang Chen Deputy Director-General, Workforce Development Agency, Ministry of Labor · Mr. Zhao Li Lead Shepherd, APEC Human Resources Development Working Group · Ms. Rosanna A. Urdaneta Coordinator, Capacity Building Network, APEC Human Resources Development Working Group
10:25-10:30	**【Group Photo】**
Thematic Presentation	
10:30-10:45	**the ROPES: Cultivating Green Tech Talent for the Sustainable Future** · Mr. Shu-Yuan Pan Associate Professor of Department of Bioenvironmental Systems Engineering, College of Bioresource and Agriculture, NTU (Economy: Chinese Taipei)

Keynote I	
10:45-11:30	**Best Practices for Green Workforce Development in Green Transformation** · Ms. Ellen Bomasang Principal (Energy, Climate, & Gender), Abt Global, US (Economy: The United States) · Dr. So-Young Lee Senior Researcher, Institute for Global Environmental Strategies (IGES), Japan (Economy: Republic of Korea) · Mr. Ratchaphak Tantisanghirun Engineer, Practitioner 2 Level, Department of Alternative Energy Development and Efficiency (DEDE), Thailand (Economy: Thailand)
11:30-13:30	**【Lunch】**
Keynote I	
13:30-14:00	**Best Practices for Green Workforce Development in Green Transformation** · Mr. Taj Ahmad Eldridge Managing Director, Jobs For The Future (JFF), US (Economy: the United States) · Mr. Norazam Bin Mohd Zain Analyst, Malaysian Green Technology and Climate Change Corporation (MGTC), Malaysia (Economy: Malaysia)
Keynote II	
14:00-14:15	**The Importance of Fostering Inclusivity in Green Technology Workforce Development** · Mr. Vincent Tsai General Manager, TIWTC Ltd. (Economy: Chinese Taipei)

14:15-14:35	**【Tea Break】**
Panel Discussion I	
14:35-15:20	**Theme of Discussion** Equitable Green Transition **Topics** · Formulating strategies to advance women's participation in the green transition · Promoting access to decent green jobs for marginalized communities **<u>Panelists</u>** · Ms. Ellen Bomasang Principal (Energy, Climate, & Gender), Abt Global, US (Economy: The United States) · Dr. So-Young Lee Senior Researcher, Institute for Global Environmental Strategies (IGES), Japan (Economy: Republic of Korea) · Mr. Nor Azam Bin Mohd Zain Analyst, Malaysian Green Technology and Climate Change Corporation (MGTC), Malaysia (Economy: Malaysia) · Mr. Vincent Tsai General Manager, Taiwan International Windpower Training Corporation Ltd, Chinese Taipei (Economy: Chinese Taipei) · Recaps and applications: enhancing equitable green transition **<u>Chair</u>** Ms. Ying-Jun Lin, Project Team Co-overseer, Chinese Management Association
Panel Discussion II	
15:20-16:05	**Theme of Discussion** Building Green Tech Skills

	Topics · Public-private partnerships in workforce development to address skill gaps · Future directions in cultivating inclusive green tech workforce **Panelists** · Mr. Taj Ahmad Eldridge Managing Director, Jobs For The Future (JFF), US (Economy: The United States) · Mr. Ratchaphak Tantisanghirun Engineer, Practitioner Level, Department of Alternative Energy Development and Efficiency (DEDE), Thailand (Economy: Thailand) · Mrs. Nadiejda Quintana Director of Standardization and Certification of Labor Competencies, Ministry of Labor and Employment Promotion, Peru (Economy: Peru) · Mr. Shu-Yuan Pan Associate Professor of Department of Bioenvironmental Systems Engineering, College of Bioresource and Agriculture, NTU (Economy: Chinese Taipei) · Recaps and applications: cultivating essential green skills **Chair** Ms. Ying-Jun Lin, Project Team Co-overseer, Chinese Management Association
Wrap-up	
16:50	The End

ANNEX II: Brief Biographies of Speakers and Panelists

The ROPES: Cultivating Green Tech Talent for the Sustainable Future

Shu-Yuan Pan
Associate Professor
NTU

Mr. Shu-Yuan Pan is currently an Associate Professor at Department of Bioenvironmental Systems Engineering, College of Bioresources and Agriculture, NTU, and the Vice Chief Executive Officer of the Agricultural Net Zero Technology and Management Innovation Research Center at NTU. He obtained his B.S. from the Department of Geography at NTU in 2009, and his M.S. and Ph.D. from the Graduate Institute of Environmental Engineering at NTU in 2011 and 2016, respectively. He served as a visiting researcher at Argonne National Laboratory, and conducted postdoctoral research at Lawrence Berkeley National Laboratory.

In 2019, Dr. Pan joined NTU as a tenure-track Assistant Professor, and then was promoted as an Associate Professor in 2023. Pan leads the "Green Technology Lab" at NTU, dedicating to the development of circular economy technologies in accordance with international movements and local demands, such as circular economy and net-zero transformation in agriculture. Pan has published more than 100 SCI articles (Google citation >9500 with an h-index of 52) and has received 8 patents.
Pan is also the author of a book entitled "CO2 Mineralization and Utilization". Moreover, several of his papers have been acknowledged as highly cited papers in the field of engineering by ESI. He is a Professional Engineer (PE) in environmental engineering licensed in Chinese Taipei. He was awarded a "2023 Class of Influential Researchers – Asia and Pacific" (I&EC Research, ACS), and a "2022 ACS Sustainable Chemistry & Engineering Lectureship" Award (USA). Pan has ranked on the list of "World's Top 2% Scientists" since 2020.

In 2020, he was recognized for the Most Cited Paper Award (Elsevier), and received the prestigious Einstein Young Scholars Fellowship (Chinese Taipei). In 2013, he was named Green Talent by BMBF (Germany) for his graduate work. Pan has trained and mentored more than 40 students and professional staff members. Pan has several Advisee Awards, including "Best Poster Award" by Chinese Institute of Environmental Engineering (Chinese Taipei) in 2022, "Living Lab Project Awards" by CTCI Education Foundation (Chinese Taipei) in 2020 and 2021, and "Student Paper Award" by Taiwan Agricultural Engineers Society (TAES) (Chinese Taipei) in 2020, 2021, 2022 and 2023.

Best Practices for Green Workforce Development in Green Transformation

Ellen Bomasang
Principal (Energy, Climate, & Gender)
Abt Global

Ms. Ellen Bomasang is an international development professional whose focus has been clean energy, climate, and inclusive growth across emerging economies in Asia, Africa, Eastern Europe, Latin America, and the Middle East for nearly 30 years. She started her career in renewable energy, concentrating on policy, finance, and rural access issues.

Her project work spans innovative finance, planning, policy and regulatory reform, private sector engagement, rural electrification, and gender equality and social inclusion or GESI. In the GESI space, she has led the design and delivery of interventions to close gender gaps in employment and skills, entrepreneurship, access to finance, and livelihoods, enhancing women's and other historically excluded populations' skills and increasing their participation in decision-making.

Ellen has built a track record of successfully leading complex, multi-million dollar projects for various bilateral and multilateral donors, including USAID, the World Bank, ADB, UNDP, and the private sector. Ellen currently works at Abt Global as a Principal for Energy, Climate, and Gender. She has a bachelor’s degree in economics and a master’s degree in Public Policy. She is currently pursuing a PhD in International Development at the University of Birmingham (UK)

So-Young Lee
Senior Researcher
IGES (Institute for Global Environmental Strategies)

Dr. So-Young LEE is a Senior Researcher at the Institute for Global Environmental Strategies (IGES) based in Japan where she manages research on just sustainability and climate co-benefits for the underprivileged. She has been involved in projects with ADB on Climate and Gender; UNEP and WRI on Initiative for Climate Action Transparency; AFI on Inclusive Finance; IISD on Recovery Tracker, etc.

An environmental sociologist, So-Young has taught at Korea University, ROK; Beijing Normal University, China; Waseda University, Japan and produced extensively including recent publications "Net-Zero Transitions for All? Considering Applications in Asia" in Sustainability Science 18, "Creating Social Co-benefits for Sustainable and Just Society" in Aligning Climate Change and Sustainable Development Policies in Asia (Springer), "Tracing Sustainability Transitions in Seoul Governance: Enabling and Scaling Grassroots Innovations" in Climate Change Governance in Asia (Routledge), "Participatory climate governance in Southeast Asia: Lessons learned from gender-responsive climate mitigation" in Routledge Handbook of Climate Justice (Routledge), among others. She obtained a Diploma from the LSE and a PhD from Essex University both in Sociology.

Ratchaphak Tantisanghirun
Engineer, Practitioner Level
Department of Alternative Energy Development and Efficiency (DEDE)

Mr. Ratchaphak Tantisanghirun is a respected professional in Thailand's energy sector, known for his steady contributions to domestic energy policy and sustainable development. As a recipient of the Royal Thai Scholarship, he had the opportunity to further his education abroad, graduating from Purdue University with a degree in engineering. This educational background provided him with a solid foundation in technical expertise, which he has applied throughout his career in the energy field.

After completing his studies, Mr. Tantisanghirun returned to Thailand and began his career at the Ministry of Energy. Over the years, he has taken on various roles within the Ministry, each allowing him to contribute to the development of Thailand's energy policies. His work has particularly focused on promoting renewable energy and energy efficiency, areas he believes are essential for Thailand's future.

Mr. Tantisanghirun has also been involved in fostering collaboration within the ASEAN region, working to build partnerships and facilitate dialogue among member states. He has always approached his work with a focus on practical outcomes and a commitment to public service, aiming to balance Thailand’s energy needs with environmental considerations.

Though he is modest about his achievements, Mr. Tantisanghirun's efforts have played a part in advancing Thailand’s energy transition. He remains dedicated to supporting the economy's journey toward a more sustainable and secure energy future.

Taj Ahmad Eldridge
Managing Director
Jobs For The Future (JFF)

Mr. Taj Eldridge leads Jobs For The Future Climate Innovation practice to analyze the intersection of the green economy and workforce preparedness within the United States. Eldridge will speak about the needed skills for transitioning into the green economy within the United States and how stakeholders can better prepare individuals for these opportunities.

Norazam Bin Mohd Zain

Analyst

Malaysian Green Technology and Climate Change Corporation (MGTC)

Mr. Norazam Bin Mohd Zain is an analyst in the Sustainable Energy Division at Malaysia Green Technology Corporation (MGTC). He has been actively involved in various energy-related projects, focusing on energy audits, management, and efficiency. He has also contributed to transforming houses of worship in Malaysia under the Ministry of Natural Resources and Environmental Sustainability. His role includes planning, executing, and monitoring projects, as well as contributing to domestic policy development in sustainable energy.

The Importance of Fostering Inclusivity in Green Technology Workforce Development

Vincent Tsai
General Manager
TIWTC

- Current Position

  IOVTEC – Chairman (2013-now)

  CWIND Taiwan – President (2018-now)

  IOG Shipyard – President (2018-now)

  IOVM – President (2021-now)

  Fugro IOVTEC – President (2020-now)

  TIWTC – General Manager (2018-now)

  Taichung Maritime Engineering Trade Association – Executive Director (2019-now)

  Taiwan Cetacean Observer Association - Director (2024-now)

  TIWTC Japan – President (2024-now)

Vincent has a master's degree from Department of Engineering Science and Ocean Engineering of NTU. Therefore, he is skilled at marine engineering and subsea survey. Before founding IOVTEC, he accumulated relevant experience more than ten years in subsea survey industry.

In 2018, TIWTC was founded and he became the General Manager of it. He is now in charge of internal management and setting goals for company's future growth. He leads the whole IOG and TIWTC, continuously fulfils the vision of localizing the experiences and know-how for renewable energy industry in Chinese Taipei and looking into expanding to the APAC area.

Panel Discussion

Nadiejda Quintana

Director

SCLC

Ministry of Labor and Employment Promotion of Peru

Nadiejda Quintana is Director of Standardization and Certification of Skills at the Ministry of Labor and Employment Promotion of Per. She has more than 15 years of work experience in managing capacity development projects in public and private management in sectors agriculture, mining, water-sanitation and construction. Nadiejda graduated with a Bachelor's degree Economist in Lima University and then went to Pacific University where she earned her Master's degrees in Management People.