

Enabling Workforce Readiness for Clean Energy Transformations in Southeast Asia

A Toolkit of Best Practices
From the Region



CONTENTS

6	Executive Summary
10	Introduction
14	Recommendations with implementation examples
15	Pillar One: Data-Informed Integrated Policy
20	Pillar Two: Workforce Ecosystems
30	Pillar Three: Just Transitions
36	Appendix: References and resources for policies and implementation

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About CEM

The Clean Energy Ministerial (CEM) is a high-level global forum to promote policies and programmes that advance clean energy technology, to share lessons learned and best practices, and to encourage the transition to a global clean energy economy. Initiatives are based on areas of common interest among participating governments and other stakeholders. The CEM brings together a community of the world's largest and leading countries, companies and international experts to achieve one mission – accelerate clean energy transitions.



About the Tara Climate Foundation

Tara Climate Foundation is an Asia-based philanthropic organisation established in 2021 and headquartered in Singapore. Its mission is to accelerate Asia's just energy transition as the cornerstone of a thriving and more sustainable future for the region. Supporting close to 400 partners across 12 Asian geographies — including think tanks, research institutes, advisory groups, and industry associations — Tara provides grants, convenes stakeholders, and facilitates knowledge-sharing to advance clean energy development, drive clean industrialisation, and enable a people-centred energy transition, underpinned by a strong commitment to supporting sustainable finance, climate goals, and corporate alignment.



About CEM Empowering People Initiative

Co-led by Canada and the European Commission, this initiative seeks to: share lessons on needed and successful policies that support just clean energy transitions; highlight different policy mixes to support workers and communities with models that meet the unique needs and circumstances of different member countries, industrial sectors and stakeholder communities; and advocate for diversity and inclusiveness in HR policies, working conditions and corporate governance and address the needs of youth, gender equality, including pay equity, retention of diverse staff, the promotion of inclusive culture, among other measures that would serve to marshal and develop all available talent to strengthen the global energy sector.



EXECUTIVE SUMMARY



Southeast Asia (SEA) stands at the threshold of a significant paradigm shift, driven by the ‘twin transitions’ of technology development and climate adaptation. SEA governments have taken bold steps toward clean energy goals, but additional coordination and resources are needed to ensure the workforce is prepared to flourish in this new economy. Many countries have included provisions for just clean energy transitions and inclusion of women, youth, transitional and informal workers, indigenous peoples and other underserved populations, which require additional policy and implementation drivers to realise.

To meet this challenge, the Clean Energy Ministerial’s Empowering People Initiative (CEM EPI) collaborated with the Tara Climate Foundation to develop this Toolkit for SEA governments and their implementation partners to support just clean energy skilling and transitions.

The Toolkit includes:

- (1) **Key recommendations** categorised under three essential ‘pillars’: Data-informed Policy; Workforce Ecosystems; and Just Transitions.
- (2) **Examples** of these recommendations at various stages of implementation in SEA.
- (3) **References** categorised and vetted by CEM experts and knowledge partners in SEA.

Recommendations in this toolkit seek to ensure the readiness of ‘green’ talent, and that this skilled labour force is aligned with projected clean energy growth in support of just transitions across the region. As such, these recommendations are not intended to be a prescriptive framework, and rather seek to serve as guidelines for SEA governments and their implementation partners across the workforce ecosystem. No single actor can train a technician, place a graduate, or support a displaced worker alone. A skilled, inclusive clean energy workforce depends on six groups — learners and workers, government, employers, training providers, non-profits and organised labour — working in sustained coordination.

This toolkit aims to impact each of these stakeholder groups in provisioning for workforce readiness for the clean energy transition; and an overarching snapshot of this report has been presented in the infographic ahead.

¹ <https://www.giz.de/de/downloads/giz2024-en-asean-recotwin.pdf>

The Workforce Ecosystem



POWERING SOUTHEAST ASIA: A Three-Pillar Strategy for A Future-Ready Clean Energy Workforce

A strategic framework for building a resilient, inclusive clean energy workforce in the Southeast Asian (SEA) region.



1 DATA-INFORMED POLICY

Comprehensive evidence-based policy



Integrate workforce development and inclusivity into policy frameworks.



Adopt a data-driven approach to aligning workforce and equity goals with private sector demand.

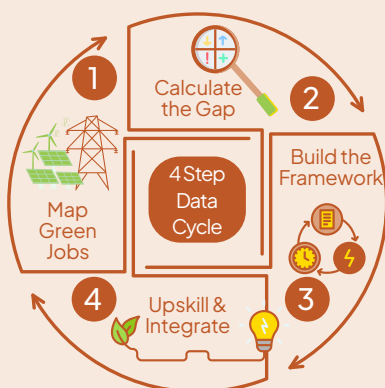
EXAMPLES

- 1 Green Jobs Act & NGJHRDP — Philippines
- 2 National Green Growth Strategy — Viet Nam
- 3 Critical Occupation List (MyCOL) — Malaysia
- 4 Roadmap for Green Workforce Development (Bappenas/MEMR) — Indonesia

EXAMPLE FROM INDONESIA

Leveraging Data to Build a Skilled, Inclusive Workforce

With support from GIZ and the ILO, Indonesia paired national workforce planning with rigorous labour-market data — mapping green jobs, sizing the skills gap, and building the training pathways to close it.



1,911
green jobs and 95+ occupational profiles now inform Indonesia's workforce planning.

Robust data closes the gap between targets and workforce reality.

2 WORKFORCE ECOSYSTEM

Support Multi-stakeholder consortia



Develop multi-stakeholder consortia connecting learners, employers & training providers.



Increase clean energy worker diversity through career awareness & social supports.



Establish standards-based training programmes.

EXAMPLES

- 1 SkillsFuture Singapore (SSG) — Singapore
- 2 ASEAN Centre for Energy (ACE) — Regional
- 3 Youth Climate Leaders (UniKL-MICET) — Malaysia
- 4 STEM Girls for Energy Transition (WiME) — Indonesia
- 5 Mee Panyar — Myanmar
- 6 ASEAN TVET Council — Regional

EXAMPLE FROM SINGAPORE

SkillsFuture Singapore

Singapore's national skill body coordinates government, employers, unions, and training providers around one shared goal: keeping the workforce ready for the green, digital, care, and Industry 4.0 economies.

Programme Details

- SkillsFuture Credit — individual subsidies that remove cost as a barrier to training
- Mid-Career Training Allowance — income support for workers switching sectors
- Company Training Committees & Skills Development Partners — translate national frameworks into workplace-level plans
- Community Development Council partnerships — reach SMEs at the grassroots level



Private sector engagement is the connective tissue between how workers are trained and how the sector plans for them.

NATIONAL GREEN ECONOMY GROWTH AGENDA — ASEAN SNAPSHOT



BRUNEI
Vision 2035



CAMBODIA
Climate Change
Strategic Plan
2024 – 2033



INDONESIA
Green Workforce
Development Roadmap
and Action Plan 2025 – 2045



LAO PDR
National Green Hydrogen
and Ammonia Roadmap
2025



MYANMAR
Myanmar Climate
Change Master
Plan 2018 – 2030



MALAYSIA
National Energy
Transition Roadmap
2023



PHILIPPINES
Green Job Act of 2016



SINGAPORE
Singapore Green Plan 2030



THAILAND
Power Development
Plan 2024



TIMOR-LESTE
Strategic
Development Plan
2011 – 2030



VIETNAM
National Green Growth
Strategy 2021 – 2030



Embed clean energy
into TVET and other
academic and
training pathways.



Foster employer
engagement across
the whole talent
pipeline.

- 7 VSSE Lifelong Learning Platform — Viet Nam
- 8 ASEAN/SEAMEO green skilling — Regional
- 9 WEF Jobs and Skills Accelerator — Indonesia

50%+
of energy firms
globally report
hiring bottlenecks

3 JUST TRANSITIONS Operationalise Equity and Inclusion



Operationalise just
transition frameworks
for women, youth,
informal workers &
underserved people.



Prioritise job quality
to support workers'
self-sufficiency and
mobility.



Position clean energy
jobs as one of a suite of
solutions for workers
transitioning from fossil
fuel sectors.

EXAMPLES

- 1 Women in Energy Viet Nam Network (WEVN) — Viet Nam
- 2 ASEAN Women in Energy-Climate Initiative — Regional
- 3 CEM Equality in Energy Transitions Initiative — Global
- 4 Regional consultation forum model for coal regions — Indonesia
- 5 Leadership in targeting quality and inclusive employment — Malaysia

EXAMPLE FROM VIETNAM

606k

individuals trained
via SSG-supported
training in 2025 (up
from 550,000 in
2024)

~330

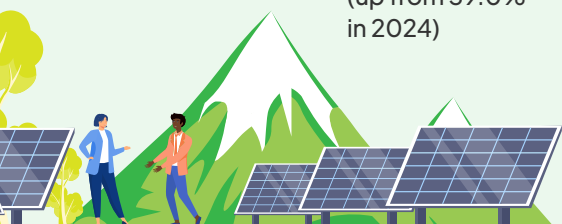
Career Transition
Programmes
across 21 sectors
(as of July 2025)

24k+

companies
engaged, 95% of
them SMEs

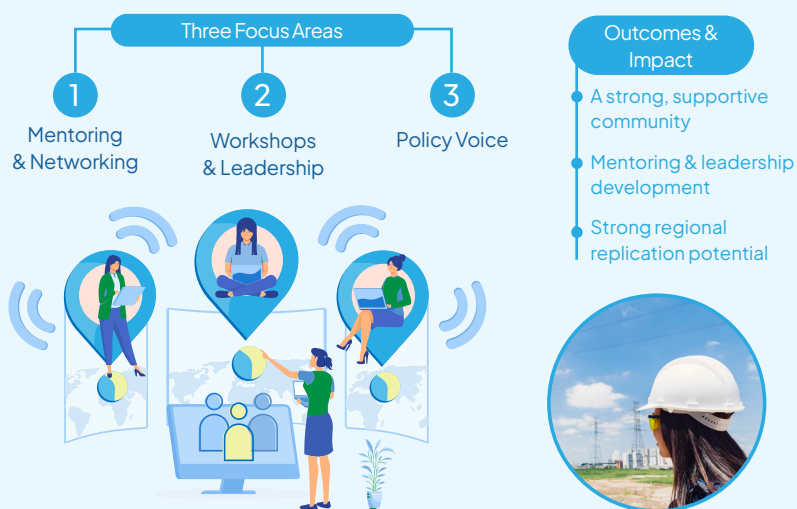
58.1%

of digital-skills
training was AI-
related in 2025
(up from 39.0%
in 2024)



Vietnam Women in Energy Network (WEVN)

The first dedicated forum connecting women professionals across Vietnam's energy sector — state-owned enterprises, private companies, organisations, and universities.



Enable networks for women in energy across sectors

INTRODUCTION

Context

Energy demand in Southeast Asia (SEA) is rising faster than almost anywhere else in the world. Home to roughly 9% of the world's population ([around 700 million people](#)) but only about 4% of the global gross domestic product (GDP), the Association of Southeast Asian Nations (ASEAN) is nonetheless on track to generate around [20% of global energy demand growth to 2035](#) if current policies stay in place. Electricity demand is climbing even faster than energy demand overall, more [than 7% in 2024](#), close to double the global average. Current trends point to it doubling again by 2050, driven by rapid urbanisation, industrial growth and rising living standards. The 8th ASEAN Energy Outlook (AEO8), published by ASEAN Centre for Energy (ACE) shows similar trends. Under [AEO8's baseline projection](#), ASEAN's total energy consumption could nearly triple between 2022 and 2050, driven by the same economic and demographic growth that has made the region a manufacturing powerhouse.

None of this growth happens without people to plan, build and operate it. [The most recent regional analysis from the International Renewable Energy Agency](#) (IRENA) projects that renewable energy sector jobs in ASEAN will climb from around 1.3 million today to about 3.9 million by 2030 and 4.6 million by 2050 under its 1.5°C aligned scenario. [Under AEO8's Carbon Neutrality Scenario](#), ACE estimates around 11.8 million RE jobs will be created by 2050 as the region decarbonises, offset by roughly 3.4 million jobs lost to fossil fuel plant decommissioning over the same period.

An [International Energy Agency \(IEA\) report](#) on the renewable energy and energy efficiency workforce points to three obstacles holding back skilled labour supply: energy careers simply do not draw enough interest from prospective workers, relevant training remains hard to find or access, and energy policy too often gets made without a matching workforce plan behind it. A separate [assessment by ASEAN and the International Labour Organisation \(ILO\)](#) covering

all member states arrived at a related finding: **although ASEAN countries have made genuine headway weaving green priorities into national development planning (see table below), the connection between labour policy, education systems, and technical and vocational education and training (TVET) pathways on one side, and targeting green jobs on the other, still needs reinforcing.** The region's large young population gives it a natural advantage of workforce supply, but that advantage is currently undercut by the gap between the skills workers have and what clean energy employers need.

Snapshot of Southeast Asia's National Green Growth Agenda

Country	Policy basis
Brunei	Vision 2035
Cambodia	Climate Change Strategic Plan 2024–2033
Indonesia	Green Workforce Development Roadmap and Action Plan 2025–2045
Lao People's Democratic Republic.	National Green Hydrogen and Ammonia Roadmap 2025
Malaysia	National Energy Transition Roadmap 2023
Myanmar	Myanmar Climate Change Master Plan (2018–2030)
Philippines	Green Job Act of 2016
Thailand	Power Development Plan 2024
Singapore	Singapore Green Plan 2030
Timor-Leste	Strategic Development Plan 2011–2030
Viet Nam	National Green Growth Strategy 2021–2030

Source: ASEAN Centre for Energy.

This gap has not gone unrecognised at the regional level. ASEAN has taken concrete institutional steps towards supporting green jobs over the

past several years, including the [Declaration on Promoting Green Jobs for Equity and Inclusive Growth of the ASEAN Community](#) (2018); the establishment of [the ASEAN TVET Council](#) by the ASEAN Labour, Education and Economic Ministers (2020) to coordinate the integration of green and future skills into vocational education across the region; and the [Joint Statement](#) from the ASEAN Labour Ministries Meeting on the Actionable Plan for Green Jobs towards a Sustainable and Inclusive ASEAN Workforce (2025).

Southeast Asia's clean energy manufacturing and deployment value chains have already created significant employment – the [IEA counts more than 85 000 jobs](#) generated across the region's clean energy value chain since 2019, concentrated in solar photovoltaic (PV) and battery manufacturing hubs in Viet Nam, Thailand, Malaysia and Indonesia. An important trend to note is that roughly 70% of clean energy jobs tied to construction will be created between 2031 and 2040, meaning the next decade is a critical time to build workforce capacity, while fossil fuel employment is projected to decline over the same period, creating a “just transition” challenge for displaced workers.

Policy momentum is building at both the regional and national levels, but SEA still lacks capacity to scale skilling efforts aligned with clean energy

and justice goals. Despite this momentum, a persistent skills mismatch remains the core readiness gap: education and training systems are still weighted towards fossil fuel disciplines, women remain underrepresented in engineering pathways (roughly 3–15% of graduates), and TVET and other curricula are only beginning to mainstream clean energy skills.



Photo Credit: ASEAN Centre for Energy

Going forward, it is important to reiterate that various ASEAN framework milestones, regional growth in workforce capacity, as well as policy momentum across Southeast Asia demonstrate sustained regional commitment and provide institutional foundations this toolkit's recommendations are designed to build on.

About this toolkit

Southeast Asia's clean energy transition will deliver on its job creation potential only if the region's workforce systems – education, training, employer engagement and social protection – are ready to meet it. This toolkit is designed to help close the gap. It offers practical, evidence-based recommendations for building workforce readiness for the clean energy economy for policy makers and their partners, including training and education providers, employers, organised labour, non-profits and nongovernmental organisations (NGOs), and utilities.

Building on the [Integrated Policymaking and](#)

[Empowering Communications \(IPEC\) toolkit](#), the Empowering People Initiative (EPI) of the Clean Energy Ministerial (CEM) partnered with the Tara Climate Foundation to convene experts to support networking and information sharing (see Textbox on Webinar Outcomes), and produce this toolkit for policy makers and their partners in Southeast Asia working on just transitions.

The toolkit is designed to address the following:

- **Knowledge exchange:** Share lessons and best practices from global and regional initiatives in workforce development.

- **Leverage resources:** Identify gaps and highlight toolkits, regulatory frameworks and private sector engagement strategies for SEA countries.
- **Community strengthening:** Support the strengthening of youth, policy makers and industry actors to convene as part of a regional ecosystem supporting green skills development and just transitions.

Its scope and content are based on panellist and participant input across the webinar series dedicated to Enhancing Livelihoods and Creating Workforce Readiness for Clean Energy and Sustainable Transformations in Southeast Asia; bilateral meetings with SEA experts and decision-makers; literature review, and analysis by CEM's workforce development experts.

The toolkit is organised around three essential pillars supporting workforce readiness for a just clean energy transition:

- **Pillar One: Data-Informed Policy** covers effective policy frameworks for green skilling and how labour market data and projections can support implementation.
- **Pillar Two: Workforce Ecosystems** addresses how key stakeholders – training providers, employers and other partners – can be engaged, supported and coordinated.
- **Pillar Three: Just Transitions**, while a theme throughout the toolkit, focuses specifically on ensuring no one is left behind in the clean energy economy.

Each pillar includes a series of recommendations and detailed examples sourced from SEA, with references to learn more and replicate effective programmes in your own country or community. Readers may move through the pillars in sequence or turn directly to the pillar most relevant to their current priorities.

Webinar Outcomes (December 2025–May 2026)

The Clean Energy Ministerial (CEM) and CEM-Empowering People Initiative, co-led by Canada and the European Commission, in partnership with Tara Climate Foundation, concluded a Webinar Series on **Enhancing Livelihoods and Creating Workforce Readiness for Clean Energy and Sustainable Transformations in Southeast Asia** earlier this year.

Spread across six months, this three-part series sought to foster dialogue, learning, and collaboration among SEA stakeholders and global partners to strengthen skills and workforce readiness to adequately meet the demands of clean energy and sustainable development pathways. The webinar discussions focussed on (i) Knowledge Exchange, by sharing lessons and best practices from global and regional initiatives in workforce development; (ii) Resource Needs, by identifying gaps and highlight toolkits, regulatory frameworks, and private sector engagement strategies for SEA countries; and (iii) Community Strengthening, through deliberate engagement with

youth, policymakers, and industry actors supporting green skills development and just transitions.

Participants and speakers ranged from over 30 countries, with a majority of participants representing Southeast Asia including high-level interventions from Director Michael Sinocruz from the Philippines' Department of Energy; Mr. Prahoro Yulijanto Nurtjahyo Head of HR Development Agency, Ministry of Energy and Mineral Resources (MEMR) Indonesia; Dr. Yeonbin YANG from Korea Energy Economics Institute; as well as from partners like IEA, UNESCAP, GIZ, ACE, Youth for Energy Southeast Asia, WEF, ILO, HDF Energy, Rajamangala University of Technology Phra Nakhon (RMUTP), ISEAS – Yusof Ishak Institute, Vietnam Sustainability Social Enterprise, and CEM Equality in Energy Transition Initiative. Each webinar had a mix of Southeast Asian representation from both government and non-government agencies, including from Brunei, Cambodia, Indonesia, Malaysia, the Philippines, Singapore, Thailand, Timor Leste and Viet Nam.

- The first webinar (10 December 2025) brought high-level government representation from Indonesia, the Philippines, Korea and others to introduce frameworks, resources and communities dedicated to green skilling and just transitions. It provided an overview of the clean energy market in Southeast Asia and identified shared skills development and just transition challenges regionally and globally, which were addressed in subsequent sessions.
- The second webinar (12 March 2026) showcased clean energy job projections for SEA and information about demand-driven reskilling efforts that are successfully removing barriers for women and youth. Speakers included experts from international and regional organisations, academia as well as government representation Cambodia, Indonesia, Malaysia, Thailand, The Philippines, and Singapore. As part of the formal agenda of this webinar, participants also weighed in on the scope of this toolkit to validate direction.
- The final webinar in the series (21 May 2026) included experts from governments, private sector and clean energy skilling to highlight solutions from across Southeast Asia and globally in the areas of cross-ministry collaborations, working with TVETs and academia on green skilling, engaging industry and employers, leveraging regional partnerships, and fostering equity and quality pathways. A preview of this toolkit was provided, with specific feedback from the audience integrated into the initial drafts. Figure below provides a snapshot of key feedback received from the webinar series, and greater detail of the webinar series – and encompassing findings – can be accessed [here](#).

Feedback from Stakeholders on Toolkit

Overarching



Importance of ASEAN coordination and harmonisation



More emphasis on just transitions



Ensuring that the “how to” is included with recommendations



ASEAN diversity makes it important to “contextualise” the toolkit

Workforce trends



Emphasis on the “twin transition” – digital and green skills



Importance of private sector drivers



Placed-based solutions for coal regions

Workforce ecosystem



Entrepreneurship and leadership roles for women



Including disabled and neurodivergent people



Include role of utilities



Role of public employment services and organised labour

Effective learning



Importance of internships and other hands-on experiences



Public-private partnerships for apprenticeships

Regional frameworks



Standardisation of skill sets



Harmonisation of certifications and portability of credentials

Recommendations with Implementation Examples

This section forms the main part of the toolkit: the specific, actionable recommendations SEA governments and their implementation partners can draw on to build workforce readiness for the clean energy transition, paired with real examples of each recommendation in practice.

Content is organised under three essential pillars: **Data-Informed Policy**, covering the policy frameworks and labour market data needed to plan and implement green skilling; **Workforce Ecosystems**, covering how training providers, employers and other stakeholders can be engaged, resourced and coordinated; and **Just Transitions**, which – while a theme running throughout the toolkit – focuses specifically on ensuring no one is left behind, including displaced fossil fuel workers, women, youth and other underserved groups. Readers can move through the pillars sequentially or jump directly to the one most relevant to their current priorities.

Each recommendation is followed by several examples, sourced from Southeast Asia, showing how governments and partners in the region are already putting these ideas into practice, along with references for readers who want to learn more or replicate a given approach. The examples of recommendations cited here serve as a how-to guide illustrating the toolkit's key recommendations, with the assumption that specific strategies are contextualised to fit the audience and cultural norms. These recommendations are not intended as a prescriptive, one-size-fits-all framework, but as adaptable guidance reflecting the diversity of conditions and needs across ASEAN member states.



Photo Credit: ASEAN Centre for Energy

Pillar One: Data-Informed Integrated Policy

Effective workforce development in the clean energy transition begins with robust, real-time data and integrated institutional governance. Policy frameworks must bridge macro-level climate commitments with the practical mechanics of the labour market.

Without policy, individual training programmes and employer initiatives operate in isolation, disconnected from national targets and from one another. A government can set an ambitious renewable energy target without specifying who will build, operate and maintain the underlying infrastructure, at what scale, or with what training – and that gap is where workforce plans commonly stall. Robust data help close part of this gap: they

allow governments to anticipate demand before shortages occur, target scarce training budgets at the occupations that need them most and hold programmes accountable for reaching groups of women, youth and displaced fossil fuel workers and others that a purely top-down approach tends to miss.

SEA countries increasingly promote robust climate and economic development policies, but detailed provisions to build capacity, support harmonisation, and ensure job quality and other just transition indicators are lacking. New and emerging data sources and projections help align labour support with current and future demand, and ensure accountability for justice goals.

RECOMMENDATION:

Integrate workforce development and inclusivity into policy frameworks.

Just energy transitions in SEA countries will not happen through climate and energy policy alone. To realise the full potential of green jobs for a broad sector of society, a comprehensive and coordinated policy framework that addresses both demand- and supply-side barriers should be adopted, as shown in figure below. This includes

aligning clean energy targets and labour and education strategies, as well as strengthening interagency coordination to reduce policy fragmentation. In practice, laws, regulatory frameworks and cross-ministerial nodal institutional structures have been most impactful in this regard.

Clean Energy Skilling and Just Transition Policy Framework (Adapted From Cem Epi 2023)



Source: Adapted From CEM EPI 2023

Example: Coordinating policies and programmes to implement the Philippines Green Jobs Act

In the Philippines, the twin challenges of energy security and climate action spurred the [Philippines Green Jobs Act](#) of 2016, which multiple agencies continue to enact as they work towards increasing renewable energy to at least 50% of the power generation mix by 2040. Barriers to reaching energy goals include the potential displacement of coal workers, including those in indigenous communities; the underrepresentation of women and youth; funding gaps for training; and a shortage of technical expertise.

The Green Jobs Act is a pioneering legislation that established a comprehensive framework for transitioning to an inclusive, sustainable and climate-resilient green economy through creation of the [National Green Jobs Human Resource Development Plan \(NGJHRDP\)](#), updated in 2024. Developed collaboratively by the Department of Labor and Employment, the Technical Education and Skills Development Authority, and the Professional Regulation Commission, the NGJHRDP identifies workforce needs, training priorities, and strategic actions to support the country's transition to a green economy.

In support of this framework and in partnership with the ILO, these agencies convened labour, workers and academic partners to operationalise implementation of the act. Initial outcomes of this process included:

- Establishment (and active functioning) of a mechanism for cooperation among 15 key government agencies, social partners, and key stakeholders and experts.
- Capacity building of government and social partners, enabling them to measure green jobs and analyse environmental, economic and labour market linkages.

- Forums to facilitate the integration of results from various studies into policy-making and the development of relevant national frameworks (including the Philippine Development Plan, the NGJHRDP and the Nationally Determined Contribution [NDC]).

Development and implementation of a green jobs promotion strategy, including capacity-building for green jobs “champions” and development of knowledge products.

Recent efforts have included a cross-ministry effort between the Department of Energy and the Commission on Higher Education to deploy and scale undergraduate and graduate advanced energy systems programmes, and a project with the United Nations Environment Programme (UNEP) to assess impact of the transition on coal regions.



“The heart of the energy transition is not about technology. It is about the people. Our transition is fundamentally about empowering communities, building inclusive opportunities, and ensuring that no one is left behind.”

Michael Sinocruz, Director, Energy Policy and Planning Bureau of the Department of Energy, CEM Webinar 10 December, 2025

Example: Cross-ministerial coordination under Viet Nam’s National Green Growth Strategy

[Viet Nam’s National Green Growth Strategy for 2021–2030](#) (with a vision to 2050) is implemented through an Interministerial Coordinating Board

operating under the National Steering Committee on Climate Change. The board is chaired by a deputy prime minister, with the Ministry of Planning

and Investment serving as standing vice-chair alongside representatives from the ministries of finance, industry and trade, agriculture, and natural resources and environment, giving the strategy a foundation for cross-sectoral coordination at a senior political level.

The [National Power Development Plan VIII](#) explicitly frames the energy transition as fair, and includes measures to strengthen technical and managerial skills within the electricity sector. This complements the [National Climate Change Strategy](#) to 2050, issued in 2022 following

Viet Nam's net zero pledge at the 26th Conference of the Parties (COP26), which set out the country's broader vision for mitigation and adaptation. Together with the National Green Growth Strategy described above, these documents reflect a broader shift towards embedding just transition considerations directly into economic and energy planning, rather than treating them on separate tracks. As is common across the region at this stage, strengthening the specificity of coal-region transition planning, benefit-sharing mechanisms and social protection provisions remains an area of active development.

RECOMMENDATION:

Adopt a data-driven approach to align workforce and equity goals with employment demand.

New tools for labour market analysis, along with increasing research around the gap between present skills and those needed for future jobs, can make it easier for governments and their partners to plan to attain climate goals while responding to market conditions with agility and

accuracy.

Mechanisms for data collection and how they will be used should be included in policy-making, as well as operationalised as an integral driver of implementation planning.

Example: Leveraging data to develop a skilled and inclusive workforce in Indonesia

Indonesia has committed to achieving net zero emissions by 2060, or sooner. The national [Electricity Supply Business Plan \(RUPTL\)](#) for 2025–2034 sets out an accompanying pathway for the power sector, targeting 42.6 GW of renewable energy capacity and 10.3 GW of energy storage by 2034. Meeting these targets will require a workforce equipped for large-scale renewable energy deployment.

To address the workforce and skills needs associated with Indonesia's energy transition and net zero emissions targets, the Government of Indonesia, with support from Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the ILO and others, has adopted a structured approach to workforce development for the green economy and energy transition.

This includes the [Roadmap for Green Workforce Development](#) led by the Ministry of National

Development Planning (Bappenas) and the Policy Agenda on [Human Capital Development for the Energy Transition towards Net Zero Emissions](#) led by the Ministry of Energy and Mineral Resources. Together, these frameworks provide long-term direction for coordinated skills development, workforce planning, labour market information systems and multistakeholder partnerships to support the transition. Moreover, this Roadmap has been designed to also systematically support and enable the following:

Occupational mapping exercises were conducted to identify existing and emerging occupations required by the green economy and energy transition, helping government and industry understand current and future workforce requirements and skills needs across priority sectors. Through this process, 1,911 green jobs and 487 new job types were identified.

- Leveraging **labour market data** and **projections** to better understand the difference between the existing skilled workforce and what is needed to reach clean energy goals. Labour market data analysis using Indonesia's National Labour Force Survey (Sakernas) and occupational data showed that only 2.6% of existing employment can be classified as green jobs, while more than one-third of jobs demonstrate green potential. The analysis also revealed significant gender gaps, with women accounting for only 14% of the green workforce. These findings are helping policy makers prioritise green workforce development, gender equality and social inclusion, and future skills investments.
- These findings feed into **multistakeholder platforms** coordinating workforce policy, skills development and financing across government, industry and training providers, and into detailed occupational profiles for more than 95 green energy sector occupations. Industry-informed skills gap assessments have translated these data into five priority upskilling modules, including smart grid operations and advanced solar PV installation, delivered through inclusive, gender-responsive training rolled out via a train-the-trainer approach.
- At the **subnational level**, the East Kalimantan, East Java and Riau-Islands Provincial Governments via the German-Indonesian cooperation project are working to integrate the national green jobs agenda in regional development plans; analyse the status quo, potentials and challenges of green workforce development in the context of the energy transition; and strengthen coordination among government, industry, training providers, labour representatives and development partners.

Responding to the changing nature of jobs:

Clean energy occupations are not evolving in isolation. Digitisation and artificial intelligence (AI) are simultaneously reshaping how energy systems are planned, monitored and maintained – from smart grid operations to predictive maintenance on renewable assets – meaning many “green” roles increasingly require digital competencies alongside technical ones. Robust labour market data systems can help governments track this convergence in real

time: identifying which occupations are being reshaped by automation and AI, which new hybrid green-digital roles are emerging, and where training curricula are falling behind the pace of change. Countries that build this data capacity now will be better positioned to adjust workforce planning as both transitions accelerate together, rather than treating green skilling and digital skilling as separate policy tracks.

Example: Malaysia's Critical Occupation List tracks green and AI-transformed jobs together

Since 2015, TalentCorp, an agency under the Ministry of Human Resources (KESUMA), has published the Malaysia's Critical Occupations List (MyCOL), an annual employer-survey-based assessment of occupations facing persistent labour shortages across the country's economic sectors. Rather than tracking green and digital transformation separately, TalentCorp's 2024 Impact Study of Artificial Intelligence, Digitalisation and the Green Economy on the Malaysian workforce assessed both forces together across ten key sectors, including

energy and power: of 949 job roles assessed, 896 (94%) were found to require at least one green skill, and the study identified 60 emerging roles combining green and digital competencies. This combined dataset directly informs national planning frameworks, including the National TVET Policy 2030 and the National Energy Transition Roadmap, and shapes decisions on immigration policy, academic programme design and reskilling pathways through TalentCorp's MyMAHIR platform.

Summary: Data-Informed Policy Pillar

Policy integration is essential, and achievable through more than one institutional model:

Just energy transitions in Southeast Asia require coordinated policy frameworks linking climate/energy goals with labour, education and economic development strategies. Some countries integrate workforce and just transition provisions through a single purpose-built law; others embed the same considerations with broader, economy-wide strategy coordinated by a standing interministerial body. Both approaches address supply- and demand-side barriers through interagency coordination, data collection, credentialing standards, and support for underrepresented workers and displaced fossil fuel employees.

Robust data helps close the gap between targets and workforce reality:

Governments that pair labour market analysis with skills-gap research are better positioned to align workforce development with equity goals and private sector demand, whether through an annual employer-survey instrument that tracks green and digital skills demand together, or a structured occupational mapping exercise feeding directly into a national workforce roadmap.

Multistakeholder coordination is the common mechanism across every model: Whether organised around a single law, an economy-



wide strategy, an annual labour market survey or subnational planning platforms, each example in this pillar relies on sustained coordination across government agencies, industry and – where data reveal gaps such as underrepresentation of women in the green workforce – targeted equity measures, rather than any single ministry or dataset acting alone.

Data is Central to a Workforce Skills Cycle



Pillar Two: Workforce Ecosystems

The workforce ecosystem is the mechanism through which the direction set through policy is realised. Even a well-designed policy framework, of the kind described in Pillar One, cannot on its own train a technician, place a graduate in employment or support a displaced coal worker through a career transition. These outcomes depend on the sustained co-ordination of training providers, employers, social service organisations, and learners and workers themselves. Where this ecosystem is fragmented, the consequences are tangible: training providers may design curricula without employer input, producing graduates in skills for which there is limited demand; effective programmes may reach only those learners who already possess the time, information and

financial means to access them; and workers displaced from fossil fuel industries may lack a clear pathway to retraining or income support. Strengthening the connections among these actors is therefore not a secondary consideration relative to sound policy, but the mechanism by which policy intent is translated into an employed workforce.

SEA governments, private sector, NGOs, TVETs and other trainers, and stakeholders are taking action to address the clean energy skills gap, but better coordination of efforts is needed. Best practices to engage, support and coordinate key stakeholders in the ecosystem help correlate training and jobs, and ensure that learners and workers who need extra support receive it.

RECOMMENDATION:

Develop multi-stakeholder consortia connecting learners, employers, training providers.

Successful workforce development programmes require a range of interconnected stakeholders in sustained relationships, following effective processes to address all aspects of workforce development. This helps align labour demand and supply, correlates education and training to

available jobs, and ensures supports are available for those who need them. A healthy workforce ecosystem is especially critical where resources and coordination are needed to remove barriers for women, youth, informal workers and other underrepresented groups.

Example: Regional consortium leveraged for skilling and just transition efforts

The **ASEAN Centre for Energy (ACE)** is an intergovernmental organisation, established in 1999, that implements the ASEAN Plan of Action for Energy Cooperation (APAEC) under the policy direction of ASEAN Ministers on Energy Meeting (AMEM) and Senior Officials Meeting on Energy (SOME), and plays a pivotal role in regional integration and information sharing through multilateral energy collaboration, policy development and capacity building.

Under APAEC, ACE has driven major regional infrastructure and integration efforts such as the [ASEAN Power Grid](#), demonstrating the kind of sustained, multicountry coordination that clean energy skilling and just transition work can also draw on. Southeast Asian governments and

their partners stand to benefit from creating or aligning with consortia of this kind, unified around the region's shared goal of equity and energy resilience, to share resources and best practices and accelerate ecosystem building.

ACE leads much of the region's technical and policy work on clean energy including on skilling, while the ASEAN Secretariat's broader coordinating role connects this work to parallel efforts across ASEAN's labour and social sectors. Together, these efforts advance just transition and green skills development through initiatives including:

- **Policy blueprints**, such as the ASEAN Declaration on Promoting Green Jobs

for Equity and Inclusive Growth of ASEAN Community, APAEC (current version 2026–2030), ASEAN Renewable Energy Long-Term Roadmap, and AEO8, which provides projections under multiple scenarios, including carbon neutrality. Their work coordinating TVET and gender awareness activities are detailed elsewhere in this toolkit.

- **Stakeholder convenings**, including the ASEAN Labour Ministries Meeting on Actionable Plan for Green Jobs towards a Sustainable and Inclusive ASEAN.
- **Future plans**, including development of an ASEAN Framework and Action Plan for a Just and Inclusive Transition to Green Jobs and the establishment of the ASEAN Green Jobs Centre of Excellence.

Example: National consortium for green, digital and other skilling efforts in Singapore

SkillsFuture Singapore provides government-funded training, including green skills, through a centralised platform to help individuals manage career transitions, explore job opportunities and access thousands of industry-relevant training courses. It includes resources for employers

who need talent development and business growth assistance, as well as materials for training providers. Its [online training platform](#) includes a wide range of future-ready skills, including in the green skills training aligned with the Singapore Green Plan 2030.

OUTCOMES AND IMPACT

606,000

individuals took up supported training in 2025, up from 555 000 in 2024.

More than
1 in 2

Singaporeans aged 30 to 75 have now utilised their SkillsFuture Credit, which provides funding for workplace reskilling.

51%

of graduates from the SkillsFuture Career Transition Programme secured employment within six months of completion.

23,000

business enterprises sent workers for funded training in 2025.

RECOMMENDATION:

Increase the number and diversity of clean energy workers by supporting career awareness, entrepreneurship and workplace policies.

Over [half of energy firms globally](#) report hiring bottlenecks. In addition, [Youth for Energy, Southeast Asia \(Y4E-SEA\)](#) reported that [79% of youth in SEA](#) feel that the government is not putting enough emphasis on education and awareness of green technology and career opportunities. Even when awareness exists, the IEA Educators' Employment Survey indicates that tuition and course fees, lost wages during training, and transportation can be barriers.

When planning green skilling efforts, governments and their partners can create opportunities for



women, youth, indigenous people, informal workers and other underrepresented groups by designing workforce programmes that address systemic barriers, such as child and family care, transportation, time to spend on training, access to quality, job-aligned training, and ensuring paid work-based learning opportunities, including apprenticeships.

Support and resources are also necessary to help clean energy entrepreneurs who are building small businesses in communities to the benefit of their local economy and environment. These opportunities are especially important for those previously engaged in the informal economy.

Example: Malaysian Youth Climate Leaders programme raises awareness of green career pathways

The Universiti Kuala Lumpur, Malaysian Institute of Chemical and Bioengineering Technology (UniKL-MICET), initiated the Youth Climate Leaders: Empowering High School Students Through Climate Change Literacy programme. This programme was designed to equip students with the tools, knowledge and confidence to become climate advocates and emerging leaders within their schools and communities.

This programme brought together universities

and local governments to codesign responses to real-world challenges. UniKL-MICET led the design of a structured curriculum, developed and delivered the educational content, and provided ongoing mentorship and evaluation. The Alor Gajah Municipal Council was a vital local partner, facilitating community participation and ensuring local relevance. The Alor Gajah District Education Office helped integrate the programme with national education priorities, maximising the programme's reach and sustainability.

OUTCOMES AND IMPACT

70%

increase in climate awareness on the part of participants

- stronger leadership and communication skills for students through group projects and public presentations
- future plans: more hands-on projects related to renewable energy, sustainable urban planning and nature-based solutions; mentorship network.



Photo Credit: ASEAN Centre for Energy

Example: STEM Girls for Energy Transition: A mentorship programme in Indonesia

STEM Girls for Energy Transition was implemented by Women in Mining and Energy (WiME), a nonprofit organisation, from 2024–2025. The initiative aimed to empower young women in STEM fields (science, technology, engineering and mathematics) and strengthen their participation in Indonesia's energy transition, particularly from underrepresented regions in Eastern Indonesia.

The programme began with a comprehensive outreach and recruitment phase designed to reach female STEM students and recent

graduates. Through a combination of online promotion – including social media engagement, webinars and information sessions – and offline outreach activities with universities, the programme reached a total of 434 individuals. From this process, 26 applicants applied to participate in the mentorship programme. After interviews assessing their interest in gender equality and the renewable energy sector, 21 mentees were selected and paired with 21 experienced female mentors from the energy sector across government institutions, civil

society organisations and private companies. Each mentor had a minimum of ten years of professional experience, ensuring that mentees could benefit from practical industry insights and professional guidance.

The core of the initiative was a six-month structured mentorship programme with personalised guidance through one-on-one mentor-mentee sessions held at least once per month, supported by a bilingual (Bahasa Indonesia and English) mentorship syllabus and toolkit developed by WiME. The toolkit provided structured guidance for mentors and mentees, including discussion topics, learning goals and reflection exercises, ensuring that the mentorship experience remained consistent and impactful across all pairs.

In addition to mentorship, the programme capacity-building sessions covered gender norms and inclusive leadership, national and global climate policy frameworks and renewable energy solutions, and decentralised energy systems.

A key highlight was the field learning visit to South Sulawesi in April 2025, which brought together 14 mentees for an intensive in-person capacity-building experience, including dialogue with the provincial Office of Energy and Mineral Resources and a visit to the Jeneponto wind power plant, one of Indonesia's largest wind energy facilities.

Source: Submitted by Women in Mining and Energy Indonesia for inclusion in this Toolkit in 2026. Submissions have been edited.

OUTCOMES AND IMPACT

- outreach reaching 434 individuals through digital and in-person engagement
- 21 young women from east Indonesia selected and matched with 21 experienced female mentors
- intensive in-person field experiences for 14 mentees to enhance exposure to real-life clean energy applications
- internships, employment opportunities, or research collaborations related to renewable energy and mining for several participants; for others, mentorship experiences leveraged to develop thesis topics or professional projects aligned with energy transition themes
- other participant impacts: enhanced confidence and leadership skills; improved career readiness; increased awareness of gender and equality in energy; and strengthened professional networks.



Photo Credit: ASEAN Centre for Energy

RECOMMENDATION:

Establish standards-based training programmes

SEA governments can leverage 'lessons learned' in peer countries in the region and globally by ensuring training is developed in accordance with best practices and is consistent with regional standards and work practices to assist with worker portability. The region in general will benefit from efforts to harmonise training and training standards across borders to support worker portability and a consistent understanding of definitions and what constitutes work quality.

Best practices for training

- created with industry/employer input and validation
- developed using a research-supported instructional design process
- aligned with a defined occupation that is in demand in the relevant market
- based on standards, certifications and/or input from a representative sample of subject matter experts
- curricula, format and social supports are tailored to the subject audience
- includes assessment that measures acquired knowledge and skills
- provides opportunities to practice job tasks and receive feedback
- mechanism to evaluate and improve programme, including stakeholder feedback.

Example: Regional mechanisms for harmonising skills and standards across ASEAN

SEA already has regional infrastructure built for cross-border skills harmonisation, which clean energy training standards can draw on rather than being developed in isolation. [The ASEAN Qualifications Reference Framework \(AQRF\)](#), endorsed by ASEAN Labour, Education and Economic Ministers in 2014–2016, lets member states compare national qualifications against a shared set of level descriptors so a credential earned in one country can be understood and trusted in another. Its companion mechanism, [Mutual Recognition of Skills](#), developed with ILO support since 2012, focuses specifically on technical and vocational skills and has run skills-benchmarking exercises in trades such as bricklaying and electrical wiring in Cambodia, Lao PDR and Myanmar.

In the energy sector specifically, the [ASEAN Energy Management and Accreditation System \(AEMAS\)](#), shows what a regionally owned certification scheme looks like in practice. Established by ACE in 2010 and endorsed by the ASEAN Ministers of Energy Meeting, AEMAS trains and certifies energy managers using a single regional curriculum, with certification recognised across all ASEAN member states; it also certifies end-user organisations through its tiered Energy Management Gold Standard. AEMAS is a directly relevant precedent for any SEA-wide clean energy workforce credential built under this toolkit's recommendations.



Photo Credit: ASEAN Centre for Energy

Example: Integrated workforce development for distributed energy- Training and planning in a frontier clean energy market in Myanmar

Distributed solar and storage are already central to how energy reaches people in Myanmar. An estimated 30% of operating companies have invested in them, while formal training and labour-market institutions remain nascent. That combination of high distributed energy resource reliance and thin formal infrastructure is where many emerging markets are heading.

Mee Panyar is a nonprofit that supports solar training, community energy and energy access initiatives in Myanmar with the goal of strengthening the local energy ecosystem. It focuses on the conditions that allow solar energy to develop as a viable, locally rooted market including skills, coordination and institutional capacity. The programme works with TVET institutions in Myanmar to build their capacity to teach distributed renewable energy, covering pedagogy, programme design and the institutional structures that make long-term skilling viable. They engage closely with employers across the renewable energy sector to understand what they actually need and to connect trained workers to job opportunities. They design and deliver their own training programmes, including hands-on solar courses, that put their methodologies into practice and produce skilled technicians who go on to work across the sector.

Mee Panyar treats sustained engagement with the private sector (engineering firms, manufacturers, distributors, service providers) as the connective tissue between how workers are trained and how the sector plans for them.

Training opportunities are structured around market realities:

Access: flexible and evening scheduling for working learners, stipends so participation does not cost income, targeted outreach and dedicated cohorts to reach women, and partnerships with civil society organisations to reach communities.

Job readiness: curricula codesigned with employers, employability skills built in, and active job-matching, CV coaching and company introductions.

Mee Panyar is currently working towards clear, progressive credentialing pathways that make skills legible and transferable across the market, developed with industry associations and towards regulatory recognition. It is currently designing and testing a private sector-centred workforce planning methodology focused on solar PV and storage in Myanmar, to be adapted across other sectors and geographies.



OUTCOMES AND IMPACT

800+

technicians and
engineers trained

50+

companies
recruiting from the
alumni network

76%

earning in related
fields within 3
months

34%

female enrolment

Source: Submitted by Mee Panyar for inclusion in this Toolkit in 2026. Submissions have been edited.

Example: Learner-centred platform for energy training in Viet Nam

The **Lifelong Learning Platform**, developed by Vietnam Sustainability Social Enterprise (VSSE), a nonprofit, is a learner-centred digital training tool designed to close the green skills gap and support a just energy transition in Viet Nam and across Southeast Asia.

The platform offers short, high-quality online courses (maximum 60 minutes) developed by international-standard experts. Core content focuses on energy management systems, energy action planning, climate adaptation,

Courses combine solid theoretical foundations with practical case studies from Viet Nam and the region, enabling immediate workplace application. The platform strongly emphasises inclusivity, targeting diverse groups including women, youth, informal workers and workers transitioning from traditional sectors.

Beyond knowledge delivery, the platform builds a lifelong learning community and fosters regional collaboration, contributing to the development of a Regional Green Job Passport

OUTCOMES AND IMPACT

- **Strong learner focus:** Course design is based on deep insights into learners' behaviours and real needs, enabling participants to integrate knowledge directly into their daily work.
- **Promotion of innovation and digital transformation:** The platform recognises digital training formats, supports green training start-ups, and can be easily integrated into existing TVET and academic programmes.
- **Integration of technical and leadership skills:** Programmes combine specialised technical training (e.g. energy management, energy action plans) with soft skills and leadership development, especially through initiatives such as Women in Energy Viet Nam (WEVN), She4Future and dedicated leadership courses for women.
- **High regional scalability:** The model is easy to replicate, supports peer-to-peer exchange across countries and contributes to building regional green labour mechanisms

green leadership and cross-sectoral professional skills (finance, policy and project management).

and a shared ASEAN green workforce database.

Source: Submitted by VSSE for inclusion in this Toolkit in 2026. Submissions have been edited.

RECOMMENDATION:

Embed clean energy into TVET and other academic and training pathways.

Governments can accelerate skills development by resourcing efforts to integrate clean energy content into existing curricula on energy, engineering, architecture, construction, electrical, business, and heating, ventilation, air conditioning and refrigeration (HVAC/R), as well as others. These integrated programmes ideally include information on why clean energy is needed and market trends and policies that promote it to prepare learners for informed participation in the clean energy economy.

Some of the skills required for clean energy careers are already being taught in several programmes noted earlier, but a focus on content connecting their relevance to clean energy technologies is needed. For instance, electricians have many of the skills required to install and maintain solar and storage, and can benefit from solar-specific training to help them transfer their skill set.

This same embedding approach applies to

the twin transition described in Pillar One: as digitisation and AI reshape how clean energy systems are planned, monitored and maintained, TVET and academic pathways should not treat “greenskills” and “digital skills” as separate tracks to be added on top of each other. A construction or HVAC/R curriculum being updated to include clean energy content is a natural point to also introduce the digital and data-handling skills increasingly bundled into these same roles – for example, using building management software alongside HVAC systems, or interpreting sensor and performance data on a solar installation. Embedding both together, in the same curriculum



Photo Credit: ASEAN Centre for Energy

update is more efficient than sequencing two separate reforms and better reflects how these jobs actually function in practice.

Example: ASEAN and SEAMO harmonise green skilling efforts across the region

Since 2020, the [ASEAN TVET Council](#) has coordinated concrete steps as a part of its Work Plan to integrate green and other future skills into traditional TVET platforms. Another key initiative is promotion of mutual recognition and skills throughout the region.

Established in Brunei Darussalam in 1990, [Southeast Asian Ministers of Education Organization Regional Centre for Vocational and Technical Education and Training](#) (SEAMEO VOTECTH) aims to assist member countries in addressing common issues in technical vocational education and training through professional development, research,

consultancy and information dissemination. In 2024–2025, it conducted four training workshops on Greening TVET in collaboration with the Education University of Hong Kong, with more than 100 TVET practitioners across Brunei, Indonesia and Timor-Leste. [Participants were tasked with creating individual action plans](#) aimed at greening their TVET institutions.

Southeast Asian governments and their partners can take advantage of SEAMO VOTECTH's valuable forum for cross region collaboration and information sharing, including through the SEA-VET.net platform.



Photo Credit: ASEAN Centre for Energy

RECOMMENDATION:

Foster employer engagement in career awareness, skills development, job quality and equity efforts.

Industry groups and individual employers are valuable advisers, partners and sources of capital insofar as their talent acquisition and other priorities intersect with clean energy goals. It is critical to include employer perspectives and stakeholders in all stages of workforce development policy and implementation from career awareness through curriculum development, to equity and job quality

frameworks. Industry involvement can be encouraged with policy levers or incentives, or by providing a clear return on investment. For instance, technical experts working for solar developers could participate in curriculum development with a local college to help educate their company's future talent pipeline in accordance with their work practices.

Example: Indonesian Accelerator fosters public-private partnerships to develop green talent

Indonesia's transition to a green economy – guided by the Indonesia Green Workforce Development Roadmap – is reshaping skills needs, job roles and workforce strategies across industries. Companies are at the forefront of this transformation, driving investment in new jobs, reskilling existing workers, adopting innovative hiring approaches, and building partnerships with training providers to secure the talent they need. Recognising the pivotal role of the private sector, the Indonesia Jobs and Skills Accelerator – a collaboration between the World Economic Forum and the Ministry of National Development Planning with the support of McKinsey & Company – brings together public and private stakeholders to strengthen the country's green talent pipeline.

The Accelerator pursues three objectives:

1. Reinforce competitiveness through a robust talent pipeline for green growth.
2. Ensure inclusive access to green skills and jobs pathways and support improving workforce participation for women, people with disabilities and informal workers.
3. Support equitable outcomes for workers and communities by anticipating and addressing transition-related social risks.

The Accelerator's work begins with a systems analysis that combines quantitative and qualitative assessments of Indonesia's green workforce ecosystem. This includes evaluating the policy environment, incentive structures, institutional arrangements and skills ecosystem to identify barriers and opportunities for developing green talent and expanding equitable access to green jobs. The findings inform a prioritised action plan that sets out high-impact interventions, coordinated by the Accelerator's public and private sector cochair, to mobilise cross-sector collaboration and drive implementation.

Source: Submitted by World Economic Forum for inclusion in this Toolkit in 2026. Submissions have been edited.



Photo Credit: ASEAN Centre for Energy

Summary: Workforce Ecosystems Pillar

Multistakeholder consortia are key infrastructure: Regional bodies (such as the ASEAN Secretariat and ACE) and national platforms (such as SSG, which trained 606 000 people in 2025) show how connecting workers, employers and training providers accelerates workforce development and helps standardise skills across borders.

Targeted outreach removes barriers for underrepresented groups: Programmes for youth (Malaysia's Youth Climate Leaders), women (Indonesia's WiME mentorship programme pairing 21 mentees with senior mentors) and informal-sector workers use flexible scheduling, stipends and dedicated cohorts to overcome cost, time and awareness barriers to clean energy careers.

Standards-based training enables worker portability: Regional mechanisms – AQRF, the Mutual Recognition of Skills initiative, and the sector-specific AEMAS, already recognised across all ten member states – provide a foundation for harmonising clean energy credentials across SEA. Training aligned with these standards is illustrated by Myanmar's Mee Panyar programme (800+ technicians trained, 76% employed within three months) and Viet Nam's VSSE learner-centred digital platform.

Embedding clean energy into existing TVET and academic curricula: Inclusion of clean energy skills in existing pathways helps more learners (e.g. electricians transitioning to solar work) gain relevant skills faster, as seen with SEAMEO VOCTECH's Greening TVET workshops across Brunei, Indonesia and Timor-Leste.

Employer engagement throughout the whole pipeline is essential: Private sector involvement in curriculum design, hiring and equity frameworks – exemplified by Indonesia's World Economic Forum-backed Jobs and Skills Accelerator – helps align training with real labour market needs and supports inclusive, equitable outcomes for women, people with disabilities and informal workers.



Pillar Three: Just Transitions

Incorporating inclusivity mandates as part of the clean energy transition is intrinsic to its success, not least to ensure that both new and existing workers are equipped with [skills for the clean energy sector](#). Moreover, systematically encouraging labour participation across gender, disability, indigenous and other minorities' groups, [clean energy transitions can unlock broader economic and social benefits](#), ensuring that no one is left behind. It offers an opportunity to tap into a large fraction of the population that may not be a part of the existing labour force through the development and inclusion of policy-first implementation frameworks dedicated to Gender Equality, Disability and Social Inclusion (GEDSI). From a livelihoods perspective, clean energy transitions also require rehabilitation in careers – through reskilling and/or streamlining entry into a different sector – for workers in the fossil-related sectors. Many SEA countries have embedded just transition provisions in their climate policies, but implementation remains challenging. This is a reflection of the global limits in implementation – for example, women make up close to 40% of the global labour force, according to [ILO data](#), yet account for only 22% of the [conventional energy workforce](#) and 32% of the [renewable energy workforce](#) globally.

There are efforts within SEA and globally to highlight effective practices to support former fossil fuel workers and other vulnerable people by leveraging clean energy job opportunities. A deeper, and wider, analysis of barriers and recommendations in support of greater inclusion of women in clean energy has been codeveloped alongside this report and can be accessed on the CEM website to complement the following.

What is a just transition? A perspective from Viet Nam

The CEM team asked VSSE to share its perspectives on just transitions.

What does the concept of a “just transition” mean to VSSE?

At VSSE, just transition means no one is left behind in the process of transitioning to a clean energy economy. It is not only about gradually reducing fossil fuels but also about creating equal opportunities for all workers, especially women, youth, informal workers and those transitioning from traditional energy sectors, to access quality green jobs and meaningful participation in the green economy.

Cultural diversity in Southeast Asia is a key factor that needs to be emphasised in the energy transition. With 11 member countries having diversity in culture and levels of socio economic development, any strategy must be designed flexibly, culturally sensitive and respectful of local contexts. When the energy transition is built on the foundation of understanding and respect for cultural diversity, it will receive broader support from communities and deliver long-term sustainable effectiveness.

RECOMMENDATION:

Position clean energy jobs as one of a suite of solutions for workers transitioning from fossil fuel sectors.

Coal and other fossil fuels play a significant role in the energy development of SEA, and countries such as Indonesia and Viet Nam have significant employment in these sectors. The spectre of up to 3.2 million fossil fuel jobs lost in ACE's carbon neutrality scenario can have a chilling effect on clean energy workforce development, setting

up a “winners and losers” paradigm. Effective messaging about the human impacts of clean energy and climate change coupled with robust, stakeholder-informed supports for impacted communities are needed to balance economic stability and sustainable development.

Southeast Asian countries are examining the potential of clean energy jobs to offset job losses resulting from decarbonisation efforts. This can help to turn an either-or discussion to a win-win, with former mining regions adopting sustainable lifeways that promote economic prosperity and health.

Aligning with this international trend is an effective workforce strategy, as according to the IEA, with targeted retraining, around two-thirds of oil and gas supply workers have the base skills needed to move into other energy sectors. For instance, gas workers can transfer safety and other skills to clean energy work in the hydrogen fuel sector. In Poland, EDF Renewables provides a free two-week pilot programme to retrain coal miners to service wind turbines.

That said, this vision is not always straightforward to achieve, with access to relevant reskilling programmes, the regional nature of many energy occupations, and long-time disinvestment in mining and other energy justice communities being just a few of the barriers to converting traditional energy workers to green economy champions. These challenges call for a more holistic approach than expecting to turn “brown jobs green”, and offering pathways other than clean energy depending on resources in and around the community.

Transitions from around the globe point to the importance of a decade-plus, four-pronged strategy for governments to usher in just transitions for fossil fuel-impacted regions:

1. (Re)Development of sustainable economic alternatives, including but not limited to clean

energy production and/or manufacturing, ecotourism, and sustainable agriculture. In an example from Romania, in Jiu Valley, an investment from the Just Transition Programme is funding a new factory on a former coal mine site to manufacture battery storage for renewable energy systems. This example is particularly impactful, as it repurposes former mining sites/infrastructure as part of a holistic solution.

2. Outreach and education about the climate impacts of fossil fuels and opportunities for communities to participate in the sustainable, circular economy.
3. Funding and other supports for transitioning communities. In an example of a multistakeholder approach involving RenewableUK, Offshore Energies UK, the Scottish government, trade unions and others, key regions such as Aberdeen and Cheshire in the United Kingdom were identified for offshore wind investment. The government invested GBP 1 million per region in training programmes, new courses and career guidance, including a [skills passport](#) – an online tool that helps workers map existing skills into renewable energy roles.
4. Participation of community stakeholders, in all phases of just transition policy-making and implementation, ensures solutions are not one-size-fits-all, and will gain buy-in with the targeted communities. Groups such as trade associations, labour groups, government or NGO social services programmes, education providers, and religious and other affinity groups are all stakeholders that can and should be engaged in developing solutions.

Example: Regional consultation forum model emerges as best practice for Indonesia and other coal regions

In Indonesia, the State Ministry of National Development Planning (Bappenas) is working with GIZ and support from the German [International Climate Initiative](#) (IKI) to develop transition plans in two coal regions. The project has been designed to work with key stakeholders in coal regions to plan for, and implement, regional just energy transition pathways away from coal and towards

a low-carbon energy system, with a dedicated focus on regional economic transformations.

As part of this effort, between July and November 2025, ten Regional Consultation Forums were convened – these are multistakeholder platforms established by governor decrees to guide a coal phase-out while promoting

sustainable economic alternatives and community well-being in Indonesia. In addition to agreements to make investments in green energy easier, stakeholders from three land-based economic sectors (palm oil, fishery and tourism) in East Kalimantan and South Sumatra reached a preliminary agreement that all

businesses in these sectors within the province comply with selected sustainability standards by 2045, boosting productivity through smallholder support. Local women's groups are also being trained to actively participate in the forums.

RECOMMENDATION:

Institutionalise platforms to support the inclusion of women, youth, informal workers, and disabled and neurodivergent and other underserved people.

A just transition includes protecting workers, supporting local communities, and ensuring equal access to quality jobs and other benefits of decarbonisation. Translating climate and equity goals into tangible actions takes transparent and inclusive planning, targeted supports for underserved learners and workers, place-based community engagement, and tracking

of clear accountability metrics. Effective programme design is grounded in the audiences to be impacted, with their voices included in planning. The following examples showcase platforms that have been created to support, share, celebrate and learn from such programme design.

EXAMPLES:

National: Women in Energy Viet Nam network

Women in Energy Viet Nam (WEVN) is the first dedicated forum connecting women professionals working in Viet Nam's energy sector across state-owned enterprises, private companies, organisations and universities.

The network focuses on empowering women through mentoring, networking, specialised workshops, leadership programmes and

advancing equal participation of women in renewable energy, energy efficiency and green transition. WEVN not only supports individual career development but also amplifies women's voices in shaping inclusive and sustainable energy policies in Viet Nam.

OUTCOMES AND IMPACT

Building a strong, supportive community:

WEVN has connected hundreds of women in the energy sector, creating a safe space to share challenges, experiences and career opportunities.

Emphasis on mentoring and leadership development:

Through mentoring programmes, networking events and hybrid workshops, the network helps women strengthen both technical expertise and leadership capabilities.

Strong regional replication potential:

WEVN serves as an excellent model of a women-led network that supports a just transition and women's empowerment in the energy sector, easily adaptable by other Southeast Asian countries.



Photo Credit: ASEAN Centre for Energy

Regional: ASEAN Women in Energy–Climate initiative

ACE's [ASEAN Women in Energy–Climate initiative](#) is a dedicated platform designed to amplify the voices, expertise, and leadership of women at the forefront of Southeast Asia's journey towards net zero. It provides a collaborative space where professionals, researchers and policy makers can access high-

quality data, share innovative technical solutions and advocate for gender-responsive climate action. Through this integrated approach, the initiative ensures that the region's shift towards low-carbon development is not only technically sound but also socially equitable.

Global: CEM Equality in Energy Transitions Initiative

The Equality in Energy Transitions Initiative aims to accelerate gender equality and diversity in clean energy transitions and close the gender gap by 2030 and is led jointly under the IEA and CEM. The Equality Initiative is a governmental network with currently 12 member countries, and works to advance gender equity through data collection, knowledge building and policies, networking and recognition programmes, and the [Equal by 30 Campaign](#), which asks organisations, companies and governments to endorse principles, then take

concrete action to accelerate the participation of women in the clean energy sector and close the gender gap.

Sources: [Fostering a just energy transition: A framework for policy design](#); [Southeast Asia Indicators Handbook for Just and Inclusive Transitions](#); [Clean Energy Ministerial](#)

RECOMMENDATION:

Prioritise job quality to ensure clean energy jobs support economic self-sufficiency, upward mobility, and overall welfare.

According to the [Organisation for Economic Cooperation and Development \(OECD\)](#) the concept of “job quality” includes fair wages, benefits and working conditions that enhance worker well-being, while also improving productivity and innovation. Quality jobs also reduce inequality, foster social cohesion, and prioritise health and safety, to the benefit of

both individuals and communities. Although SEA has varying drivers of wages and other worker benefits and rights, a combination of policy levers and incentives can facilitate a balance between people and profit. Research supports that people-centred labour practices make good business sense, a fact that can be leveraged for buy-in from private industry.

Example: Malaysia’s leadership in targeting quality and inclusive employment



The establishment of Malaysia’s Green Jobs Guideline in 2025 promoted collaboration among key agencies to [expand green skills training and certification](#), alongside broader [social inclusion](#) measures.

This includes fully subsidised universal healthcare, direct cash transfers for low-income households, and expanded cash aid and pension coverage with targeted support for informal sector workers. This leadership from Malaysia was also noteworthy throughout its ASEAN Presidency in 2025, culminating in an ASEAN-wide [Joint Statement on Actionable Plan for Green Jobs Towards a Sustainable and Inclusive ASEAN Workforce](#). This included commitments, among others, towards:

- Development of a comprehensive **ASEAN Framework and Action Plan for a Just and Inclusive Transition to Green Jobs**, taking into account the respective capacities and resources of member states.
- Establishment of an **ASEAN Green Jobs Centre of Excellence** to act as a hub for policy advice, research, benchmarking and implementation tools, as well as coordinate forums such as **the ASEAN Green Jobs Forum** to encourage continuous dialogue and promote partnerships among ASEAN member states, private sector actors, academia and civil society.
- Enhancement of **workforce capacities** by leveraging appropriate AI-driven and digital technologies for skills development, workforce planning and sustainable industry practices.

Summary: Just Transitions Pillar

Job quality is central to just transitions: Fair wages, benefits and safe working conditions in clean energy jobs aren't just about worker welfare – they also boost productivity and give industry a business case to buy in, especially given SEA's varied wage and labour structures.

Fossil fuel workers need a broader safety net, not just clean energy jobs: With up to 3.4 million fossil fuel jobs at risk in ACE's coal-phase-out scenario, effective transitions require a four-pronged strategy – new sustainable industries, public education, dedicated funding/retraining (e.g. the United Kingdom's GBP 1 million-per-region skills passport programme), and genuine community stakeholder participation.

Real-world models are already emerging: Indonesia's Regional Consultation Forums (bringing palm oil, fishery and tourism stakeholders together on sustainability standards) and Chile's National Strategy for a Socioecological Just Transition (phasing out coal by 2040 with diversification, reskilling and remediation) show that just transition frameworks can work when tailored locally.



Photo Credit: ASEAN Centre for Energy

Cultural context and multistakeholder collaboration are nonnegotiable: Viet Nam's VSSE frames just transition as ensuring no one – especially women, youth and informal workers – is left behind, and stresses that with 11 diverse ASEAN member countries, strategies must stay flexible and culturally sensitive to gain lasting community support.



Photo Credit: ASEAN Centre for Energy

APPENDIX:

References and resources for policies and implementation

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