Developing a Skilled Workforce for Indonesia’s Clean Energy Transition

Indonesia’s transition to renewable power generation, including geothermal energy, is expected to generate new employment. Market-responsive training, recognized competency certifications, and timely learning modules can provide the skills needed for green jobs in the energy sector.

Published: 09 June 2022

Introduction

Indonesia has committed to reduce greenhouse gas emissions by 29% by 2030 unconditionally and achieve net-zero emissions by 2060 under the United Nations Framework Convention on Climate Change Paris Climate Agreement. To reach these goals, the country will increase renewable sources in its energy mix. It currently generates renewable energy through hydro-electric power, geothermal plants and bioenergy, solar photovoltaic, and wind both on and off-grid.

The government estimates that the country has the largest global potential for geothermal power generation at 23.9 gigawatts (GW) and potential for hydropower of more than 94 GW. The country also has significant potential for other renewables, including ocean and tidal energy.
Transitioning to modern and diversified power generation methods presents opportunities and challenges for Indonesia. On the one hand, it will generate new jobs, especially in the areas where the new power plants will be established. By 2030, a significant increase in the demand for skilled workforce specific to renewable types of energy is expected. But on the other hand, the modernization of the electricity sector could exacerbate current problems in finding skilled workers. While there is no shortage in the number of workers, skills mismatch is a primary concern. With the anticipated growth in renewables, skills shortages will be heightened, as current training levels have yet to catch up with advances in technology.

A study by the Asian Development Bank (ADB) looks at the trends in the demand and supply of skills in the electricity sector. Skilled workers are crucial to the development of the sector, which is experiencing rapid changes due to technology and innovation. The study recommends multistakeholder initiatives that include training programs based on industry needs, competency certifications, and capacity development modules to address the skills mismatch.

### Decarbonizing the Power Sector

Indonesia’s electricity consumption is projected to triple to 77.3 gigawatts (GW) between 2010 and 2030 under a business-as-usual scenario. The government, together with the national electricity utility Perusahaan Negara Listrik (PLN), has improved the country’s electrification rate from 66% in 2009 to 99.2% in 2020 with a near 100% electrification target for 2026. To meet its electrification goals, the country has increasingly relied on coal-fired power, which accounted for 66.3% of total generation in 2020, followed by gas (16.8%), renewables (13.2%), and oil (3.7%).

In line with climate mitigation goals, the National Energy Policy 2014 targets an energy mix of 23% new and renewable energy, 22% gas, 55% coal, and 0.4% oil by 2025. Meanwhile, the National Electricity Plan aims at a long-term goal of 28% new and renewable energy, 25% gas, 47% coal, and 0.1% oil for electricity usage by 2030.[1]

At last year’s COP26 in Glasgow, Indonesia announced that it will work with ADB toward the early retirement of coal-fired power plants on an accelerated timeline and unlock new investments for sustainable, renewable energy under the Energy Transition Mechanism Southeast Asia Partnership.

The shift toward clean energy is expected to generate employment opportunities. A new paper from the International Monetary Fund found that more jobs are created for each unit of electricity generated from renewable sources than from fossil fuels. The International Renewable Energy Agency projects that about 1.3 million jobs could be available in Indonesia’s renewable energy sector by 2030, up from just over 100,000 in 2017, while a study from the Global Green Growth Institute expects new jobs to reach around 2.1 million–3.7 million by 2030.

### Table 1: Projected Full-Time Workforce Needs in Renewable Energy

<table>
<thead>
<tr>
<th>Type of energy</th>
<th>2030</th>
<th>2040</th>
<th>2060</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Skills Mismatch

Based on numbers of graduates and students, Indonesia is not expected to experience a shortage in workers for the electricity sector over the medium or long term, assuming the constant addition of electricity-related graduates every year, the same number of electricity-related programs offered in learning institutions, and the same number of students in each program.

However, graduates lack the skills to match the needs of the electricity sector, which requires a multidisciplinary workforce that continuously learns and adapts to new demands and technological developments. Core competencies and skills include project development, system design and planning, construction and implementation, testing and commissioning, and operation and maintenance. The industry also needs supporting skills, such as electricity supply planning, system level planning, and grid management, and information and communication technology.

This skills mismatch must be addressed as the use of renewable energy and more advanced technology grows.

Renewable energy engineering is offered by only 31 vocational schools where 1,193 students are enrolled as of March 2020. Renewable power and its integration to the existing grid require a workforce that can plan and manage grid operations and keep up with new technologies, such as energy storage and innovations in ancillary services. These skills are currently not widely available in Indonesia. The lack of local expertise has already caused operational problems in micro and mini-grid photovoltaic and hydro systems, leaving a number of projects installed through the State Electricity Corporation, Ministry of Energy and Mineral Resources, and donor projects stranded in various regions. [2]
Recommendations

Even if the electricity sector maintains its current energy mix, the country would still need to upgrade education and capacity development resources to ensure that renewable energy projects can be properly operated and maintained. If the country wants to keep up with global trends and innovations, it needs to ensure that training institutions and capacity development programs can produce a skilled labor force that a modern power sector would need over the coming years.

Strengthening the partnership among industry and public and private education institutions, including universities, polytechnic, and vocational schools, is essential. By working together, they should be able to cover a wide range of subject areas, such as power generation, distribution, and household installations. Education institutions can leverage on their fields of expertise and resources, so they can focus on specific skills needed by the sector. A regional advisory body established and supported by the government could conduct mapping and coordination to ensure that the institutions efficiently work together. It would also require strong involvement from the private sector and education institutions.

In the short- to medium-term, the ADB study recommends the following actions to address the growing demand for skilled workers in the electricity industry:

**Shift to employment-oriented and market-responsive training programs**

Track the performance of graduates in the market to evaluate the effectiveness of programs, adjust program offerings and curricula based on industry demand, and provide supplementary courses. Incorporate new technologies and green skills in new training programs.

**Strengthen government- and private-sector driven competency certifications**

Establish industry-focused competency certification accreditation agencies that will collaborate with the private sector to develop training programs and competency certification schemes. These agencies should also be accredited for internationally recognized certificates where applicable.

Formal and informal education sectors will work with the State Electricity Corporation to develop common occupational competency requirements. Schools will teach the skills and knowledge currently only taught within the State Electricity Corporation’s training centers, while such centers will upskill existing employees to adapt to new technologies.

**Create an electricity sector capacity development board**

The board will review existing electricity sector training and education curriculum and training materials for relevance and recommendations for any new technologies, industry best practices and standards, and new techniques. Their recommendations, along with inputs from stakeholders, will be utilized by educational institutions to improve and update their curriculum and training materials.
Establish an online platform for electricity sector capacity development

The online platform will display all electricity-related trainings, workshops, and certification programs and can be accessed by individuals looking for training activities. Anyone can search the single online database for the competency training and certification they need for the sector.

Develop massive online open courses

The online open courses can easily adapt to changing technologies and provide timely and relevant trainings to the electricity sector workforce. The standard format and procedures should allow the instructors to quickly provide new materials by focusing on the content rather than the format of the media. Instructors must come from the energy sector.

Develop training and capacity development modules

The modules will provide training and capacity building that meet the occupational skills standards accepted by the industry for formal education and mid-career capacity development. These materials can be used in the formal and informal sectors to give students and training participants the same level of competencies.


Resources


Sutarum Wiryono
Senior Project Officer (Education) Southeast Asia Department, Asian Development Bank

Sutarum Wiryono is a senior project officer for education at the ADB Indonesia Resident Mission. He plays key roles in preparing and implementing various education projects in Indonesia covering basic education, vocational education, and higher education. Prior to joining ADB in 2010, he served as an education consultant in various projects funded by development partners.

Rudi Hendrikus Louis Van Dael
Principal Portfolio Management Specialist, South Asia Department, Asian Development Bank

Rudi Van Dael is currently a Principal Portfolio Management Specialist based in the ADB Nepal Resident Mission. From 2010 until 2019, he worked as a social sector specialist in ADB on various education projects in Indonesia, Bangladesh, and Nepal. Complementing the project work, he was involved in studies on using human-centered design, entrepreneurship programs, skills for the electricity sector, minimum service standards in education, and subsidized employment programs. He has a diploma in computing science, a master’s in public administration, and a PhD in sociology.

Florian Kitt
Senior Energy Specialist, Southeast Asia Department, Asian Development Bank

Since 2017, Florian Kitt has served as senior energy specialist at ADB’s Indonesia Resident Mission where he coordinates ADB’s energy program. Prior to that, he led the OECD/IEA’s Southeast Asia Energy team in 2012–2016 and worked on fragile states, gender, climate change, and social development at the World Bank’s East Asia Pacific Region in 2007–2012. He holds an MA degree in International Relations from the University of Amsterdam.

**Asian Development Bank (ADB)**

The Asian Development Bank is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members—49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity
investments, guarantees, grants, and technical assistance.

Follow Asian Development Bank (ADB) on 

[Social Media Icons]