Date
19 december 2022

Our reference
TNO 2022 P12640
060.46622 | TNO 2022 P12640

Masterplan

Renewable Energy Training Centre (RETC)

Authors: Jasper Donker, Xander van Tilburg, Silvana Gamboa Palacios, and Milou Derks.

Executive Summary

Introduction
While most of the existing energy use in Indonesia is fossil-based, renewable energy technologies have become more attractive over the past years and clean energy is now the way forward. Indonesia has a vast renewable energy potential, however up to date, only a small portion is being used. Both industry and government have signalled that a lack of skilled and trained personnel is one of the main barriers towards scaling up renewable energy. A Renewable Energy Training Centre (RETC) for professionals is essential to kick-start the energy transition of Indonesia and to fully benefit from the job and business opportunities waiting around the corner.

Based on our analysis of barriers to and enablers for the Indonesian energy transition, and a range of interviews with national and international experts, we offer a business plan for an RETC in Indonesia and practical next steps to further its realisation. This master plan document is the output of a two-year collaborative effort between TNO and Indonesian stakeholders.

Vision and mission

The RETC proposed in this plan envisions to become a nationally and internationally recognized centre for high-quality executive education in support of the Indonesian energy transition. In addition, it will constitute a leading knowledge and networking hub for shared expertise on renewable energy that is recognized at a national and international level, enhancing knowledge transfer between international and domestic partners. Its mission is to provide technical know-how and expertise in the field of renewable energy to (further) develop professional competences and certify skilled workforce to lead the energy transition in Indonesia.

Design
The RETC offers Indonesian professionals state-of-the-art knowledge and skills on renewable energy and enable them to incorporate this in their actions and plans, to use it to increase their business profitability, and to increase their chances for high quality employment. It focuses on 5-month executive courses that bring the latest technical and engineering insights to non-engineering stakeholders, along the whole value chain of renewable energy manufacturing, development, installation, and operation.

The RETC targets three groups of professionals: business executives working in the private sector in areas such as finance, project development, SME industrial activities, and managers in hospitality, retail, and other service sectors; government officials tasked with energy and spatial planning, and those who can support clean energy procurement; and young professionals who have the potential to be or become influencers and community leaders.

The courses will allow the participants to answer high level questions related to why, what, and how in various degrees of detail. They offer a high level introduction to renewable energy and ***why*** it will be the growth engine for the coming decades in the energy sector. They offer training modules that dive deeper into the technology specifics showing ***what*** is actually going on in renewable energy projects from a technical perspective. They teach participants ***how*** renewable energy projects can be achieved, discussing barriers and enablers, regulation and policy, and an overview of project development and finance.

The RETC is designed to be financially independent, allowing it to focus on delivering high quality knowledge across the full spectrum of relevant technologies. For practical reasons it aims to be hosted by an existing organisation, thereby avoiding lead time and investments related to real estate and setting up administrative and operational structures. Its staff is limited to an executive director and a small number of (part time) administrative personnel; teaching is done be a roster of national and international experts. Participants are expected to pay for their courses and encouraged to (partly) attract funding from their employers (private sector and government), development cooperation, and philanthropic organisations and NGOs (youth and government).

Starting modestly with two programmes per year for three distinct target audiences (120 participants, 144 kUSD turnover), the RETC has the potential to grow in number of participants as well as the breadth and variety of courses offered. In addition, the model presented here is suitable to scale up and replicate across Indonesia, provided suitable host organisations can be found.

Next steps
In order to take this initiative forward and expedite the establishment of a renewable energy training centre, we offer the following recommendations for next steps:

- Identify a host organisation
- Attract start-up funding for the first year(s)
- Recruit an effective and well-connected executive director
- Establish a ‘friends of the RETC’ group
- Attract an all-star cast of experts and teachers
- Establish sponsorship relations and framework contracts.

Contact

If you are interested in this initiative do not hesitate to get in touch.

Jasper Donker, TNO
Email: jasper.donker@tno.nl
Tel.: (+31) 622-911-677

Date
19 december 2022

Our reference
TNO 2022 P12640
060.46622 | TNO 2022 P12640

Contents

1. Introduction

Accelerating renewable energy capacity comes with significant business and job opportunities for those who are prepared. A renewable energy training centre (RETC) offers a solution to one of the main obstacles to this acceleration Indonesia faces today: lack of renewable energy expertise and skills among industry professionals and government officials. This document makes the case for an RETC in Indonesia and offers a practical way forward to realising it. This masterplan is the output of a two-year collaborative effort between TNO and Indonesian stakeholders.

Clean energy is the way forward for power hungry Indonesia

Indonesia is among the 20 countries with the largest power demand today, on par with countries such as South Africa and Australia, but with a vastly larger population. To support population growth and ongoing development, power supply in Indonesia will need to double or even triple in the next 10 years. While most of the existing energy system is based on fossil fuels, over the past years renewable energy technologies have reached a tipping point and are now so attractive that clean energy is the way forward.

Renewable energy brings many opportunities. As a growth engine, it stimulates local businesses and creates large scale employment. As an emission reduction option, it keeps the Paris Agreement climate goals within reach. Especially relevant in the Indonesian archipelago, renewable energy is often also the most suitable choice for powering development in off-grid and remote areas.

Energy potential is there, but skills and knowledge need a push

Indonesia has a vast renewable energy potential, with an estimated total of 420 GW. To date however, only a small portion is being used, resulting in a 7% share of renewables in the Indonesian energy mix. This is in stark contrast with the domestic 23% target (for 2025) and the stated aim to put Indonesia on a path towards a zero-emission energy system in 2060.

Deployment of gigawatts of renewable energy capacity in the decades ahead does not only provide access to clean and affordable energy for all, and opportunities for attracting large amounts of clean investments, it also offers local business and employment opportunities. For the solar PV sector alone, stepping up deployment could result in millions of direct and indirect domestic job-years in for example project development, equipment, installation and operation & maintenance services[1]. The availability of well qualified personnel is essential to harness these opportunities in a way that a significant part of the value chain directly benefits the domestic economy.

[1] An ambitious 100 GW solar PV scenario could result in an additional 2.7 mln direct job years over a 10-year period. Donker, J. and van Tilburg (2019) – *Three Indonesian solar-power futures – solar PV and Ambitious climate policy.* Ambition to Action, Berlin.

However, both industry and government experts have signalled that a lack of skilled and trained personnel is one of the main barriers towards scaling up renewable energy. Their message is clear: without qualified personnel and access to knowledge and experience, Indonesia will not be able to fully benefit from the job and business opportunities waiting around the corner. In other words: knowledge and skills development need a push and the sooner bold action is taken, the higher these domestic benefits can be, and the more choices are available.

Training professionals to accelerate the transition

The Ministry of Energy and Mineral Resources (ESDM) realises that scaling up renewables is inevitable, and wants to prepare the Indonesian workforce so that it can absorb increased labour demand and capture the employment benefits. Against this background the ESDM directorate, responsible for human resource capacity development (BPSDM), has proposed to develop a training centre with a focus on renewable energy.

This renewable energy training centre (RETC) can provide training and certification for industry (e.g. operators, installation companies, etc.) as well as offer state-of-the-art knowledge that allows government officials and professionals, to incorporate the clean energy transition into their strategies and actions. In order to maximise the synergies between the government and businesses, the RETC will have strong links with ESDM and PLN (the state-owned electric utility company), involve national and international experts in its programmes, and act as a public service agency (BLU).

Collaborative effort

The development of this masterplan is a collaborative effort: the initiative originates with BPSDM, who signalled the need to prepare the workforce for the clean energy transition and approached the Netherlands Organisation for Applied Scientific Research (TNO) to research the possibilities and modalities for an RETC. The Jakarta-based consultancy Asia Management Consulting (AMC) has been involved from the start to provide expert input and conduct part of the market and stakeholder analysis. The Politeknik Negiri Bali (PNB) has been involved in exploring the practical modalities and considerations for selecting a host institution. The effort has been made possible with financial support from the Dutch Embassy through the Dutch Enterprise Agency (RVO). And it could not have been realised without the valuable input from the many Indonesian stakeholders who shared their knowledge and insights in the process of developing this masterplan.

Reading guide

This document is structured as follows: chapters 2 and 3 present the background and the value statement of the RETC, followed by suggestions on the scope and design in chapters 4 and 5. In Chapter 6, we discuss an implementation strategy and Chapter 7 presents conclusions and next steps.

2. Background

What is needed to accelerate the energy transition in Indonesia?

In the past two decades, the energy sector of Indonesia has been a fundamental enabler of growth with an increase in installed capacity from 40 GW in 2011 to over 70 GW in 2021, and there has been significant progress on household electricity access and affordability. Coal became increasingly important, both as an export commodity and as a driver of current and planned capacity, and has received generous government support. Renewable power generation capacity, on the other hand, has only developed slowly and to date, support has been limited[2]. For the decade(s) ahead, it is becoming increasingly clear that Indonesia will have to move from a coal-dominated energy sector to using clean energy as the growth engine.

Based on recent analyses and a range of interviews with stakeholders[3], accelerating the energy transition faces a number of barriers, including:

- **Policy risk**: lack of a credible long-term plan on phasing out fossil fuel and changes to renewables regulation make investors nervous and reluctant.
- **Offtake risk**: as a result of historically evolved interests, incentives, and mandates, PLN is hesitant to connect (variable) renewables.
- **Local content requirements**: limitations on the use of imported equipment and on foreign ownership of infrastructure drive up costs and stagnate investments.
- **Spatial planning**: space requirements (esp. for solar PV) can be large and land acquisition is a difficult and untransparent process; locations are not easy to secure and existing spatial plans do not include clean energy.
- **Limited financing options**: commercial banks are generally not willing to provide 'project finance' given the lack of a solid business plan or the ability to assess the feasibility of the project. Only investors with external collateral are able to attract capital.
- **Low awareness**: despite large cost reductions in the past years, households and businesses are not aware of the opportunities this offers. If they do, they may not know which steps to take to tap into those opportunities. Consumer demand for 'green' or 'sustainable' products and services is still low, resulting in limited 'demand pull' for clean energy.

Some barriers are relatively easy to address while others are more difficult to overcome and require concerted effort of all stakeholders: Government, PLN, and banks will have to move pro-actively, in coordination, and without delay, so that households and businesses can participate in the clean energy transition. For national and subnational governments in Indonesia this means signalling

[2] See van Tilburg and Fearnehough (2021) *The energy transition after COVID-19 – perspectives on green recovery and NDC ambition raising*, Ambition to Action, Berlin, February 2021.
[3] See Annex 1.

commitment to a zero emissions energy system and creating a predictable pathway with a realistic spatial and regulatory plan, and a clear ambition for clean energy sector development. For the state-owned electric utility PLN this means that they will need to demand the right mandates and targets to facilitate Indonesians to participate in the energy transition. For financial institutions it means they will have to clearly express what is needed to enable project finance of renewable energy and seek dialogue and expertise on technologies and business opportunities. Last, but not least, community leaders will need to create awareness and buy-in through programmes and demonstration projects, and businesses will need to focus on technology cooperation, skills development, standardising package deals and one-stop-shop-offers. In short, acceleration of the transition requires increased push (supply of technology) and pull (demand of clean energy).

Perhaps the most important ingredient for an accelerated transition is a change of mindset and narrative around clean energy. The current heavy reliance on fossil fuel production, use, and export is not a robust strategy for the future.

Two issues require special mention here because they are regularly mentioned but the interview respondents were adamant that these are *not structural barriers* and where they exist, they can be addressed with limited effort. First, at the current low levels of renewable energy, grid integration of intermittent power is possible with relatively simple supply forecasting and demand planning, without the need for expensive backup capacity. Second, an internal study conducted by Bappenas reveals that training infrastructure for installation (for example in BBPLKs and BLKs) is ready to be scaled up whenever demand increases. For engineers, work competency standards (SKTTK and SKKNI) have been updated to include solar PV, and although the number of assessors (LSPs) is limited, this is not a barrier to fast domestic employment growth.

How can Indonesia position itself to maximise benefits?

The research conducted in preparation of this master plan reveals a number of potential niches in which Indonesian businesses and workers can capture parts of the value chain. Experts interviewed agree that entering the market for technology manufacturing seems far-fetched, as parts and components can be imported from established suppliers in the highly competitive international market. Manufacturing of parts and components for supporting infrastructure on the other hand *can be done domestically* and would be well within the capabilities of local industry. Existing vocational training capacity for installation and construction *can be scaled up* as demand increases.

Most jobs in renewable energy involve relatively simple engineering and construction tasks for installers; skills for these can be developed ‘on the job’ or in established vocational training centres. However, some areas of expertise are currently less well covered and could benefit from additional training, for example in financial services and project development. The financial sector in Indonesia is well equipped to raise capital for renewable energy projects, but a lack of knowledge and

experience currently leads to high risk perception and low capital deployment. Separate, but closely related, there is a lack of project developers that can research, design, and implement renewable energy projects; currently this expertise is often attracted from abroad.

Experts interviewed in preparation for this master plan identify a number of other groups as potential early movers that will be able to drive demand: Public facilities such as schools, ministries, agencies, hospitals, etc., community initiatives and village owned enterprises (BUMDes), luxury houses and apartment buildings, hotels and restaurants, and large retail operations (e.g. shopping malls). In demand creation there can be a role for energy service companies (ESCOs) who offer 'one-stop-shop' solutions that plan, construct, finance, and possibly operate renewable energy installations.

Where skills and expertise are needed?

Based on the interviews and recent analysis by the Ambition to Action (A2A) project[4], there is a strong case for the RETC to focus on bringing the latest technical and engineering insights to non-engineering stakeholders, along the whole value chain of renewable energy manufacturing, development, installation, and operation.

By targeting non-engineering stakeholders and offering the latest insights and know-how on all stages of renewable energy projects, skills development and training can act as an enabler to accelerate the energy transition. Four areas of engagement that could correspond to target audiences include:

- **Streamlining government policy**: The Indonesian government will need signal commitment to the clean energy transition and create a predictable pathway with a realistic spatial and regulatory plan. It will need coordination between ministries and agencies and this requires a common understanding of the basics of renewable energy technology and development of projects.

- **Increasing capital availability**: Financial institutions in Indonesia need to make the energy transition their concern and become comfortable with providing capital to viable projects. This requires a sufficient understanding of various renewable technologies, their risk and return characteristics, and the government's energy transition policies and strategies.

- **Supporting domestic labour availability**: project developers who want to move into the field of renewable energy, architects who want to take a holistic approach to sustainability, and industrial small and medium enterprises (SMEs) who want information on how to convert existing manufacturing processes and workers' competencies towards renewable energy parts and components manufacturing, both electric and non-electric.

[4] Ambition to Action is a technical assistance project funded by the German government as part of the International Climate Initiative; the focus of the Indonesia component of project in the period 2018-2022 was on articulating the (co)benefits of scaling up renewable energy. See also www.ambitiontoaction.net

- **Demand creation**: It is realistic that as the energy transition progresses, the bulk of investments will no longer fall on PLN but gradually move further towards independent power producers, households, and businesses. Many of these new investors will use (part of) the power for their own consumption, so-called prosumers, and they may be persuaded to do so because of the multiple benefits involved: predictable low costs, increased resilience and reliability, a lower risk of power outages, and guaranteed sustainable energy for customers who want sustainable goods and services.

3. Value of the RETC

In order to put Indonesian businesses and workers in a position to capture benefits that an accelerated uptake of renewable energy could bring, there is a need to develop knowledge and skills in a number of fields. Interviews with experts and an inventory of existing educational programmes on offer shows that there is strong demand for accessible training of professionals, while increasing supply of educational options for students (i.e. young people who have not yet entered the workforce is) is less urgent. Against that background we focus on identifying the value an RETC could offer to professionals in the existing workforce. To avoid confusion, we will use the term participants rather than students when referring to those who enrol in the training. Based on this, and the four areas of engagement identified in the final section of the previous chapter, we arrive at the following value proposition for an RETC.

Value proposition

An RETC could offer participants state-of-the-art knowledge and skills on renewable energy and enable them to incorporate them in their actions and plans, in order to increase their business profitability and sustainability, in addition to their chances for high quality employment. The RETC would focus on bringing the latest technical and engineering insights to non-engineering stakeholders, along the whole value chain of renewable energy manufacturing, development, installation, and operation.

What are the needs of the participants?

Prospective participants are best served by knowledge and skills on renewable energy that they can directly relate to and connect to their own context; easily accessible without having to engage in time-consuming and expensive specialised vocational or academic programmes. Acquired knowledge and skills are most valuable if these are acknowledged (i.e. add gravitas to their resume) by a prestigious institution and certified, and come with the possibility to directly connect to experts and existing businesses already working in the field of renewable energy.

What does the RETC programme offer participants?

Following the RETC educational programme(s) aims to give participants a basic understanding of a range of renewable energy technologies and their role in the Indonesian energy transition through high-quality training, and allow them to:

- Identify business risks and opportunities
- Identify and implement cost reductions, assess investments
- Choose actions and prepare strategies (both in public and private sector)
- Prepare for high quality jobs along the domestic clean energy value chain.

Why support the RETC?

The RETC offers a solution to one of the main obstacles the Indonesia faces in accelerating its clean energy transition: lack of renewable energy expertise and skills among professionals in the public and private sector, and lack of awareness of the opportunities the transition offers to drive domestic development and growth.

Equipping Indonesian professionals with knowledge and skills contributes to:

- Increased resilience of the workforce.
- Increased chances of capturing parts of the renewable energy value chain to drive domestic development and growth.
- Increased demand for clean energy, which in turn drives the energy transition
- Improved strategies and policies, with greater buy-in for the energy transition

What makes the RETC stand out?

The RETC offers an approach complementary to programmes that currently run by universities, polytechnics, and vocational training in a number of ways. First, the courses are offered as **executive education** to professional participants who are looking to include – or transition to – a focus on renewable energy from their current position. Second, the courses will **bridge the gap** between business, public policy, and technology by offering engineering knowledge to those without a formal engineering training. Third, the RETC is positioned as a **networking hub** connecting (international) knowledge institutes and experts, established businesses in the clean energy sector, policy makers, and a generation of young professionals and thought leaders.

4. Scope & Design

Based on the value proposition and its underlying analysis, this chapter offers suggestions on the target audience, the scope of the training programme, and the way in which the trainings can be delivered. It should be viewed as an initial viable starting point, and not a definitive setup: there might be reasons for the scope and design to change in the future as the Indonesian energy transition progresses, as demand changes, and as the RETC learns from its experiences in delivering value to participants.

Who is the target audience?

The RETC initially focuses on three categories of participants:

- **Private sector professionals**. Business professionals with at least two years of work experience in sectors such as: 1) commercial banks and the broader financial services industry in Indonesia, who are looking to provide capital for investments in renewable energy, 2) project developers who would like to move to the field of renewable energy, 3) executives in industrial small and medium enterprises (SMEs) who would like to convert existing manufacturing processes and their workforce to suit the energy transition, and 4) managers in, for example, real estate, hospitality, retail, hospitals, etc., who would like to be able to identify and assess opportunities for cost savings and risk reduction through investments in renewable energy.

- **Government officials**. This category includes Indonesian public sector officials who would like to broaden their understanding of the energy transition, and learn where renewable energy is a relevant consideration for their actions and plans, including the development of enabling regulatory and policy frameworks for the acceleration of the energy transition. This can be for the supply side, where government streamlining enables renewable energy projects, and on the demand side, acting as a front-runner in creating demand, and thereby leading by example.

- **Young leaders and community influencers**. Civil society at large and local communities in particular, are essential to make the energy transition a success. This is especially the case in Indonesia, with 1,300 different ethnic groups, over 11,000 inhabited islands, and a highly decentralized system of governance. Young leaders and influencers with an interest in sustainability and greening the economy are ideally positioned as future change-agents

Which technologies are included?

The RETC programme will need to cover both technology-neutral and technology-specific knowledge and skills. The initial programme is designed to include an overview of the engineering specifics of six categories of renewable energy technologies relevant in the Indonesian context:

- **Solar photovoltaics (PV)**: arguably the most promising technology for accelerating the energy transition in Indonesia is solar PV, both in terms of affordable and scalable power generation, as well as for capturing business and employment opportunities.
- **Geothermal energy**: located on the 'ring of fire', Indonesia has around 40% of the world's geothermal resources and is ideally positioned to expand geothermal capacity to provide baseload. There is considerable knowledge on geothermal energy in Indonesia but investments have lagged behind.
- **Small and medium hydropower**: Indonesia has a long history of using hydropower in small and medium configurations, but barriers persist and the potential for expansion is considerable – both for on-grid and off-grid applications.
- **Energy conservation**: although energy conservation (i.e. energy efficiency) is not renewable energy per se, it is an important component of the energy transition and therefore indispensable to include. Using a systems approach energy conservation and renewable energy go hand-in-hand when identifying cost reductions and risk mitigation.
- **Battery technology and smart grids**: energy storage systems are an integral part of almost all renewable energy based systems because of the intermittent nature of most sources. In combination with energy storage, smart grid architecture is expected to become an important part of renewable energy systems.
- **Niche technologies:** In the Indonesian context, some technologies are expected to play only a marginal role in the energy transition. For example, only in a few locations wind and wave energy is economically viable. It is nevertheless important to know how to identify where opportunities do (and do not) occur.
- **Emerging technologies**: several technologies have seen large improvements in the past years, but are not (yet) commercially available on a large scale. Due to its potential and relevance for the medium to long term, the programme will cover green hydrogen and carbon capture and storage (CCS).

What is the geographical scope?

The energy transition is a national affair and includes the transformation of existing supply from fossil-based energy to renewable energy, as well as offering clean alternatives to meeting future on- and off-grid demand. As a consequence, the RETC should be able to equip its participants with knowledge and skills to work in the on-grid economic heartlands of Java, Bali, and Sumatra; the off-grid remote areas in Eastern Indonesia; and everything in between. As such, the RETC is not focused specifically on energy access or off-grid aspects.

The physical location of the RETC is only relevant insofar as it can offer the appropriate educational infrastructure. In practice, this means that the location of a host organisation (see chapter 6 below) will be leading. Similarly, participants are expected to come from all regions in Indonesia; with the expectation that – at least initially – the majority of participants will come from (new) urban, economic, and tourism centres, as well as regional and provincial capitals.

Which training modules are offered?

The 13 courses offered are organised in three blocks and will allow the participants to answer questions related to why, what, and how. The first three training modules offer a high level introduction to renewable energy and ***why*** it will be the growth engine for the coming decades in the energy sector. Next, there will be six training modules that dive deeper into the technology specifics; offering the participants insights into the history and technical aspects of the most relevant technologies for the Indonesian context. These modules show ***what*** is actually going on in renewable energy projects from a technical perspective, and will be presented in a way that is accessible for participants without a formal training in engineering. The final four training modules present consideration on ***how*** renewable energy projects can be achieved, discussing barriers and enablers, regulation and policy, and an overview of project development and finance (optionally including inspiring speakers who discuss their practical experiences).

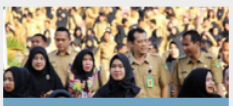
	TARGET AUDIENCE		
	 **Private sector** Hospitality managers, financiers, and project developers	 **Young leaders** Professionals, civil society, and influencers	 **Public sector** National and subnational government, BUMDes
TRAINING MODULES			
Energy and climate conceptual intro	✓	✓	✓
Basics and trends	✓	✓	✓
Multiple benefits	✓	✓	✓
Solar PV	✓	✓	✓
Small and medium hydropower	✓	✓	✓
Geothermal energy	✓	✓	✓
Energy conservation	✓	✓	✓
Battery technology and smart grids	✓	✓	✓
Emerging and niche technologies	✓	✓	✓
Barriers and enablers	✓	✓	✓
Regulation and policy	✓	○	✓
Project development and finance	✓	✓	✓
Inspiring speakers	○	✓	○

Figure 1: Training modules per target audience

The suggested training modules will allow participants to obtain the following knowledge and skills:

- Insights on recent (global and local) developments in the field of renewable energy (economic, technical and regulatory)
- Identify business risks and opportunities in the renewable energy sector
- Assess investments in renewable energy technology
- Make choices and develop strategies (both in public and private sector)
- Prepare for high quality jobs along the domestic clean energy value chain

How will the RETC deliver value?

The main value of the RETC is in offering courses consisting of 13 training modules of each cover 3 teachings sessions and one working session (seminar). In total, the courses will offer 132 contact hours in a five 5 month time-span and courses are offered twice a year. For participants who cannot afford to spend, on average, 6 hours per week on the training course it is possible to follow a subset of the modules (i.e. one or two of the three blocks offered).

In addition to the course material, the RETC offers participants great networking opportunities within their peer group, with (international) experts and teaching staff, and with sector practitioners from different parts of the renewable energy value chain. For each of the three blocks there will be a full day of face-to-face training in which participants are able to meet each other and with the teaching staff. Possibly extended with a field trip.

Lastly, the participants will be taught how to access the latest literature and data sources, and will be exposed to practical applications through case studies and contacts with (international) professionals working in the sector.

The RETC aims to become a prestigious knowledge hub in the field of renewable energy, with highly qualified staff and delivering the latest global insights and knowledge in the sector. Graduates will be provided with an acknowledged certification that will allow them to better position themselves in the energy sector and job market.

Education level and certification

At minimum, a certificate of attendance can be used to signal that the participants have been exposed to and engaged in the full programme of courses. Whether participants can also receive a more qualitative certificate to indicate they have acquire a required level of knowledge and skills, depends on whether the host organisation has testing and certification infrastructure in place. It should be the ambition of the RETC to offer both types of certification.

A certificate that is linked to an (Indonesian or international) certification scheme can help the RETC to attract participants, provides status/prestige and international benchmarking opportunities. However, certification itself should not be a goal in

itself and efforts should focus first on providing high-quality courses and trainers. The foreseen entry level of the RETC is: academic bachelor or equivalent, or 5 years professional working experience. The blue box in Figure 2 shows how this corresponds to various Indonesian qualification standards.

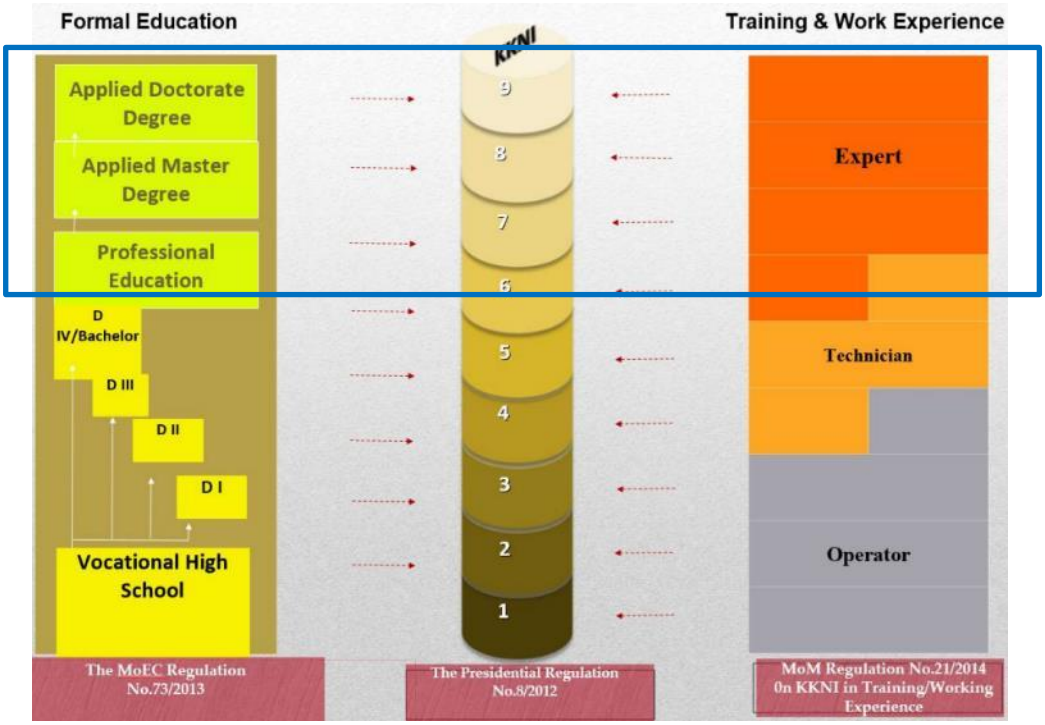


Figure 2: Indonesian qualification framework (source: World Bank, 2020)

5. Business model

In the previous chapters we have introduced the background against which the energy transition in Indonesia is accelerating (Chapter 2), the RETC value proposition (Chapter 3) and the prospective customer segments and training modules (Chapter 4). This chapter presents suggestions for the other elements that make up the business model; the key activities and key resources needed to deliver the proposition, channels and customer relations to link the value proposition to the customer segments, key partners, and the cost structure and the revenue streams.

Following from the value proposition and target audience, a number of practical choices were made to shape the design of the RETC:

- It offers courses on renewable energy technologies and targeted at participants who have an academic bachelor's degree (or equivalent), but not necessarily a formal engineering background.
- Its courses are intended for participants who can undertake them next to their normal occupation. In the first phase, the RETC offers two courses per year and most of the teaching is done remotely.
- Its courses are paid for by participants, who are encouraged to (partly) attract funding from their employers (private sector and government), development cooperation, and philanthropic organisations and NGOs (youth and government).
- It is independent but hosted by an existing organisation, thereby avoiding lead time and investments related to real estate and setting up administrative and operational structures.
- Its staff is limited to an executive director and a small number of (part time) administrative personnel. Teaching staff is attracted from the host organisation and external Indonesian and international experts; none of the staff are exclusively employed by the RETC.

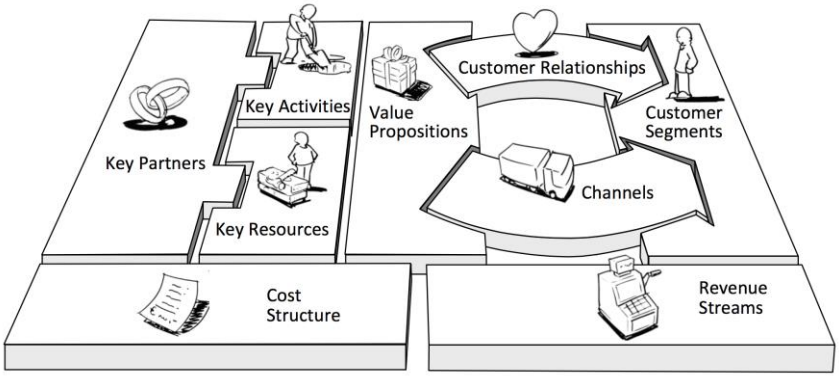


Figure 3: Business model canvas (Strategyzer, 2020)

Value proposition and customer segments

As mentioned in Chapter 3, the RETC offers Indonesian professionals state-of-the-art knowledge and skills on renewable energy and enable them to incorporate this in their actions and plans, to use it to increase their business profitability, and to increase their chances for high quality employment. It focuses on bringing the latest technical and engineering insights to non-engineering stakeholders, along the whole value chain of renewable energy manufacturing, development, installation, and operation.

Based on the defined scope (Chapter 4), the RETC targets three groups of professionals: business executives working in the private sector in areas such as finance, project development, SME industrial activities, and managers in hospitality, retail, and other service sectors; government officials tasked with energy and spatial planning, and those who can support clean energy procurement; and young professionals who have the potential to be or become influencers and community leaders.

Cost structure and revenue streams

Considering a host organisation that can offer facilities and organise materials effectively, the costs comprise of: course equipment and materials, staff expenses for course preparation, teaching and follow-up interactions with participants, use of classroom facilities, administrative fees, and promotional activities. As Figure 4 shows, personnel fees for external and in-house experts make up the largest share of the costs.

In line with international standards for executive-style courses of similar scope and intensity, we have calculated a course fee of 1,200 USD including materials and administration.

Based on the assumption that in the first phase of the RETC the courses will be taught twice per year to three groups of students (i.e. two courses for each target audience), we arrive at a turnover of approximately 144,000 USD per year, which includes a profit/buffer margin of 12%.

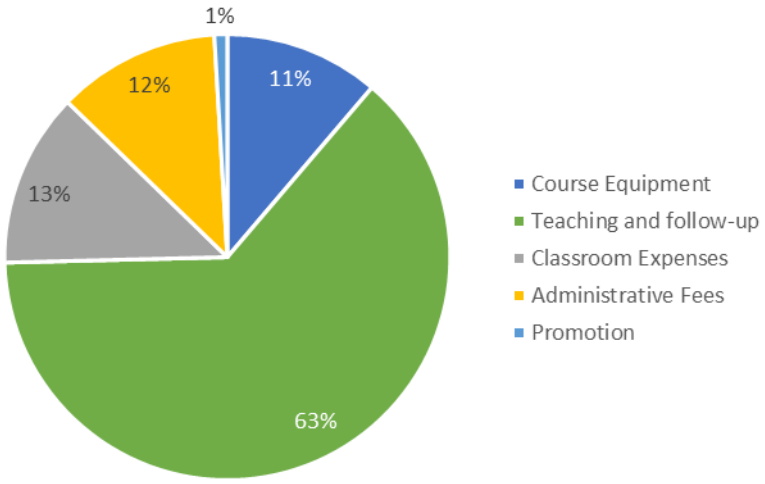


Figure 4: RETC cost breakdown

While for private sector participants it is reasonable to expect that they will be able to finance such costs, available budgets for government officials and young leaders may or may not be sufficient. For government officials, we could explore if course fees could be covered by international development partners (i.e. donors) as part of their capacity building programmes. For young leaders, we could explore if there is an interest to 'sponsor' participants through donations by philanthropic organisations or Indonesian corporate social responsibility programmes, with the aim of raising awareness and educating the next generation of professionals and leaders.

Key activities and resources

The RETC focuses on delivering renewable energy training and the most important assets and resources to establish this include:

- A core team of staff comprising an executive director and a secretariat
- A flexible roster/team of external experts offering content for and delivery of the courses
- Teaching materials and curriculum
- Operational materials for the secretariat – or access to services provided by the host organisation.

Since the focus is on executive education rather than vocational teaching, there is no need for laboratory setups and demonstration projects; it would however be interesting and valuable to have access to existing setups through a partner or host and consider these field trips part of the curricula.

Channels and customer relations

In its first years, it is expected that the RETC can provide training services to around 120 participants per year. Most of these participants will be recruited/attracted through direct contacts with employers and/or referral through capacity building programmes and sponsorships. By implication, direct and targeted outreach to attract participants will be more effective and efficient than advertising a more general public.

Interaction with participants will have to take place mainly through the secretariat, while the executive director can focus on forming and maintaining relationships with knowledge providers (e.g. teachers) and repeat customers such as sponsorship programmes and organisations who repeatedly send staff to be trained and can be offered a framework contract.

This means that the outreach and commercial budget can stay relatively limited, but is also means that there is an important role for the executive director and figure head of the RETC to carry out relationship building and stakeholder management tasks.

Key partners

The network of suppliers and partners that bring in external resources and activities will be key to ensure the quality and timeliness of the programme. The RETC will have to establish warm contacts with three types of partners.

First, there is the group of partners that offer **knowledge and experience from the field.** Private sector actors active in the renewable energy field Indonesia can offer (guest) lecturers and case studies, as well as potential internships for those who aspire to find employment or complement their theoretical knowledge with practical experience.

The sector associations can play a coordinating role here. Examples of potential partners include: the Indonesian Renewable Energy Society (METI/IRES), the Indonesian Electric Manufacturers Association (APPI), specialised associations such as the Indonesian Solar Module Association (APAMSI) and more general business associations such as the Indonesian Chamber of Commerce (KADIN). Among the most prominent developers of renewable energy projects are the Indonesian state-owned electricity company (PLN) and the state-owned infrastructure development bank (PT SMI).

There is also a wealth of knowledge in internationally supported renewable energy programmes, such as those supported and run by the Asian Development Bank (ADB), the German Corporation for International Cooperation (GIZ), the Global Green Growth Institute, or the ASEAN Centre for Renewable Energy (ACE).

Since financing is an important aspect of speeding up renewable energy implementation, the RETC could benefit from links with national finance

organisations (e.g. OJK, BKM) and international financial organisations (e.g. WB, AFD, ADB), and Indonesian front-runner commercial banks (e.g. Bank Mandiri).

A second group of potential partners will be able to **ensure quality and lend credibility** to the RETC by offering high quality knowledge and certification. For example technical universities (e.g. ITB, UI, ITS, and USU) and the Ministries of Energy and Mineral Resources (ESDM), of Labour (Kemnaker), of Development Planning (Bappenas), and of Education and Culture.

A third group of potential partners can offer support by **sponsoring participants**. This group of partners will have to be explored in further detail, and their ability to contribute is dependent on their current programs regarding (youth) empowerment, support on climate change and energy transition, and capacity building. This group of partners could include bilateral (government to government) partners through embassies, philanthropies, but also private sector organisations who contribute through their corporate social responsibility efforts.

6. Implementation strategy

Turning this master plan into action is relatively straightforward. The main preparatory step that is still missing, is to identify a host organisation. Together with the host organisation the next step will be to recruit an executive director and form a secretariat, followed by detailing the curriculum and assembling a roster/team of lecturing experts with whom the teaching material can be established in preparation of the first round of courses. Depending on the ease with which a host organisation and executive director are identified, it would take up to (but not necessarily more than) half a year to prepare for the kick-off of the first semester of courses.

Two phases

In the spirit of starting small to gain experience and traction before scaling up, it is prudent to identify the first two years – or 4 semesters – as phase one. In this first phase, the programme consists of the courses identified in Chapter 4. In the second phase, starting in year 3 of operation, and depending on demand and experience, the programme can be expanded to include a larger volume of students or more specialised courses.

Organisational setup

As mentioned in Chapter 4, the ideal starting point for the RETC would be to remain independent but sharing facilities with an existing organisation, which has to be willing to partner up with the RETC. The most likely candidate for such a host organisation is an existing educational institute or research and development (R&D) facility. The chances of getting the RETC up to speed smoothly are greatly increased if the host organisation has teaching facilities, and an administrative structure that can be used, in addition to some experience in pursuing independent initiatives such as the training centre.

We suggest a ‘lean’ approach to governance of the RETC where:

- The executive director is hired by, and reports to, the host organisation.
- Instead of setting up a supervisory board, the host organisation establishes bilateral agreements with potential funders and donors (and possibly Ministries) about the strategy and general direction of the RETC. Agreements cover issues around regular operational updates and involvement in key decisions such as hiring of the executive director and approving the curriculum.
- Instead of setting up an advisory committee, the RETC solicits regular (paid) expert reviews and ‘knowledge audits’ and establishes an informal ‘Friends of the RETC’ group. This group of stakeholders can regularly give feedback and input, and are actively updated on news and developments about the RETC while playing a significant role in networking and outreach.

This way the RETC avoids inefficient legal and formal structures: there is no supervisory board but still accountability and an opportunity to 'steer'; there is no advisory committee but still a mechanism for review and feedback.

Suitable host organisation

A suitable hosting organisation would have a profile that includes: commitment to accelerating the energy transition by hosting an ambitious RETC; educational excellence and a track record in setting up and running training programmes; a state of the art knowledge position in the energy sector; and strong domestic and international networking capabilities.

Although the RETC is specifically aimed at professionals and not 'traditional' students, it is conceivable that an existing university or polytechnic that typically serves full-time students makes for a suitable host. Alternatively, the host organisation can be a (large) corporation, state-owned enterprise, or foundation; as long as the independence of the training centre is guaranteed and the host's activities are not at odds with accelerating the energy transition. In case the host organisation is a (semi) public organisation, it should have or be able to acquire BLU status – which is a necessary predicate issued by the government that allows a public service entity to offer services to professionals and industry.

Although not considered as the first choice, it is possible that a commercial or not-for-profit organisation acts as a host for the RETC. It could be an attractive proposition for organisations in terms of networking ability, corporate social responsibility and access to newly trained talent. It is important to stress that the RETC should be positioned as an independent centre and transparently run. This is crucial to maintain a good reputation both towards participants and other stakeholders.

Expecting that participants will come from all over the archipelago and that courses are predominantly followed online, it is necessary that the host organisation has an excellent IT infrastructure, but not mandatory to have physical (classroom) teaching facilities.

Tasks of the hosting organisation include:
- Provide secretariat
- Provide educational facilities and run programme(s)
- Hire executive director
- Accountability towards key stakeholders and potential funders (other than participants).

Executive director

The executive director will play an important role and is key to the success of the RETC and its ability to move beyond the initial stage. He or she has the following

profile: commitment to accelerating the energy transition by leading an ambitious RETC; MSc or MA education with excellent communication skills, leadership capabilities, and entrepreneurial qualities. The executive director is able to comfortably liaise with national stakeholders (e.g. business leaders and echelon 2 government staff) and international stakeholders (e.g. potential funders and teaching staff, as well as experts and business leaders).

Tasks
- Day-to-day management, leading the secretariat
- Outreach to increase visibility and attract students
- Establish and update curriculum and strategy
- Identify and attract teachers; Identify and approach collaboration partners
- Network and liaise with stakeholders, (potential) donors, and 'friends of the RETC'.

Teaching staff

The RETC, in the first phase, offers a programme with 13 different courses. For each of these courses, an expert teacher from academia, the public sector, or the private sector will need to be recruited. The executive director, with assistance from the secretariat, is tasked with identifying and recruiting a roster of teaching experts that covers all topics and provides reasonably adequate backup in case of unforeseen absences.

Since the classes are taught online, the physical location of the experts is not a determining factor to their suitability. Although the target audience is Indonesian, the use of English is encouraged – both because it facilitates interaction with international experts and because practically all course material will be written in English (due to the internationalised nature of the sector).

Teaching experts are committing to teaching as a part-time task, and are compensated for preparing and delivering courses, as well as expenses made for access to a virtual classroom from which lessons can be taught.

Tasks
- Co-create course plan: identify goal and content topics, how the topics will be taught, which teaching materials and case studies will be provided, and how participants will be evaluated.
- Prepare materials: courses will be online and therefore audio-visual preparation is required (i.e. slides and reading material).
- Teaching availability: each course will require teachers to prepare and implement 3 lessons of 3 hours each in predetermined time slots, and facilitate one 2 hour seminar.
- Feedback availability: each course will offer students opportunities to interact with teaching staff and engage in a form of evaluation to assess whether they have absorbed the contents to 'pass' the course.

7. Conclusions and recommendations

Accelerating the energy transition in Indonesia is inevitable, and while most of the existing energy is fossil-based, renewable energy technologies have become more attractive over the past years and clean energy is now the way forward. Indonesia has a vast renewable energy potential, however up to date, only a small portion is being used. Both industry and government have signalled that a lack of skilled and trained personnel is one of the main barriers towards scaling up renewable energy. A Renewable Energy Training Centre (RETC) for professionals is essential to kick-start the energy transition of Indonesia and to fully benefit from the job and business opportunities waiting around the corner.

Based on interviews, we arrive at the conclusion that there is demand for executive education on renewable energy to (young) professionals. By presenting them with Indonesia-specific knowledge on why, what, and how renewable energy can offer business opportunities and prepare for high quality employment, an RETC can help Indonesians capture the multi benefits that an accelerated energy transition brings.

This master plan offers a starting point for the establishment of an RETC based on a number of pragmatic considerations that allow it to kick off within half a year after a host organisation has been identified and partnerships have been established. Starting modestly with two programmes per year for three distinct target audiences, the RETC has the potential to grow in number of participants as well as the breadth and variety of courses offered. In addition, the model presented here is suitable to scale up and replicate across Indonesia, provided suitable host organisations can be found.

In order to take this initiative forward and expedite the establishment of a renewable energy training centre, we offer the following recommendations for next steps (more or less in order of priority):

- **Identify a host organisation**. One of the five top engineering universities in Indonesia or the Ministry of Energy and Mineral Resources (ESDM) would likely be a fit and present a starting point for the search. Alternatively, under the right circumstances, a private corporation or NGO could also be considered as a host for the RETC as long as it is able to guarantee a sufficient degree of independence to the RETC.
- **Attract start-up funding for the first year(s).** While the business model is designed to make the RETC financially independent of the host organisation or structural subsidies or donations, in the first few years, expenses will precede income. Because obtaining commercial funding to set up the RETC could be difficult, the more obvious route would be to attract funding from the Indonesian government, a non-profit organisation or philanthropy with an interest in furthering capacity building on clean energy, or a bilateral agreement with a development partner country.
- **Recruit an effective and well-connected executive director.** Especially in the initial stages of setting up the RETC, attracting partnerships, and

positioning the RETC as the premier option for renewable energy executive education, the right choice of executive director will be crucial to the RETC's success.

- **Establish a 'Friends of the RETC' group** to seed networking opportunities with all types of stakeholders. This group can also be invaluable as a sounding board providing feedback during the early stages of establishing the RETC.
- **Attract an all-star cast of experts and teachers**. The success of the RETC critically depends on the quality of the courses, and the extent to which experts are able to transfer their knowledge, critical thinking, and motivating enthusiasm to the RETC course participants.
- **Establish sponsorship relations and framework contracts** to secure the first batches of applicants/participants. In order for the RETC to gain traction and build momentum, and have some certainty on number of applicants and turnover, it will be important to establish 'repeat customers' who commit to supporting a steady stream of participants for at least a number of semesters.

Annex A – Stakeholders

Table 1. Overview of stakeholders interviewed or consulted for the Masterplan

Organisations
ACE (Bali Chief Engineer Association)
AESI (Indonesia Solar Energy Association)
APAMSI
API-INAGA
APROBI (Indonesia Biofuel Producer Association)
Asian Development Bank
Bappenas - various directorates
BCA (Private Bank)
BRI (State- owned Bank)
Eco Bali
Eco Mantra
ESDM
GBCI (Green Building Council Indonesia)
Hivos
HyET Solar / AMPOWR
IESR (Institute for Essential Service Reform)
MENTARI Indonesia
METI
MKI (The Indonesian Electrical Power Society)
Nuffic Neso Indonesia
PEM - Akamigas
Pertamina NRE
Positive Impact Forever
PPSDM KEBTKE
PT EST
PT PJBI
RESCO
SRE (Society of Renewable Energy Indonesia)
VENA Energy
YRE (Rumah Energi)