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The Implications of Green Employment: Making a Just Transition in ASEAN

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Abstract: The transition to an ecologically sustainable economy is and will create significant changes in the world of work. These changes will include the creation of new green jobs and new industries, minor to major changes in existing jobs and the phase-out of some jobs in carbon-intensive activities. A just transition ensures that while working towards a more ecologically sound economy, countries also plan for positive outcomes for those communities and people negatively affected by our global efforts to decarbonise. Identifying and implementing a country-specific policy mix for a just transition is an emerging challenge for nations. This paper constructs a policy framework for supporting the greening of employment and a just transition. The resulting policy framework is then used to assess policy readiness for promoting green jobs and a just transition across the Association of Southeast Asian Nations (ASEAN). The assessment highlights the current state of policy for supporting green jobs, green skills and just transition planning, as well as the significant challenges in identifying and implementing policy settings to support green jobs and a just transition.



Citation: Sharpe, S.A.; Martinez-Fernandez, C.M. The Implications of Green Employment: Making a Just Transition in ASEAN. *Sustainability* **2021**, *13*, 7389. <https://doi.org/10.3390/su13137389>

Academic Editors: Kirsten Svenja Wiebe and Marek Harsdorff

Received: 30 March 2021
Accepted: 24 June 2021
Published: 1 July 2021

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Keywords: just transition; policy; green jobs

1. Introduction

The transition to an ecologically sustainable economy is and will create significant changes in the world of work. These changes will include: the creation of new green jobs and new industries; minor to major changes in existing jobs and occupations with the addition of new skills and practices; as well as the phase-out of some jobs and occupations associated with carbon-intensive activities. Whilst positive changes to employment and economies are welcomed and anticipated, this is not the case for neutral or especially negative impacts on employment and jobs. These negative impacts can create fear and resistance, slowing the green transition. Further, these changes to employment and their consequences are not shared evenly across geographies or sectors, with concentrations of people and communities advantaged and disadvantaged by the green transition due to the carbon intensity of existing industrial activities.

A just transition (JT) ensures that while working towards a more ecologically sound economy, we also plan for positive outcomes for those communities and people negatively affected by our global efforts to decarbonise. This means that for people in jobs and occupations that reduce or are phased out, there are pathways mapped to other viable and decent employment, and that social protection is available to these people on this journey. The International Labor Organisation's (ILO) 2015 Guidelines for a just transition towards environmentally sustainable economies and societies for all [1] (p. 6) highlights that the greening of economies and work will require "a country-specific mix of macroeconomic, industrial, sectoral and labour policies that create an enabling environment for sustainable enterprises to prosper and create decent work opportunities by mobilising and directing public and private investment towards environmentally sustainable activities" [1] (p. 6).

Identifying and implementing this country-specific policy mix for sustainable enterprises and decent work is an emerging challenge for nations. In practice, many countries are grappling with the employment dimensions of climate action; whereas emission reduction trajectories are being mapped for countries through their Nationally Defined Contributions (NDCs) and associated development planning processes and policies, these are not accompanied by similar plans and policies for green and decent work [2]. These plans and policies are at the centre of planning for a just transition. Evidence suggests that implementing strategies for decarbonisation will not necessarily bring about work, or work that is decent—by this, we mean work that meets the ILO decent work standard, work that is fairly remunerated, safe, free of discrimination, and with freedom of association [3]. There are also no guarantees that the transition will be ‘just’ [4]. The decent work agenda has not been reduced in importance in the face of the sustainability challenge but has always been integral to it [5]. A sustainable society must be “socially just, environmentally friendly, and economically efficient” with governance to ensure decent lives for all [5] (p. 294).

Nowhere is this challenge more evident than in the countries of the Association of Southeast Asian Nations (ASEAN). ASEAN membership includes the following country members—Brunei Darussalam, Cambodia, Indonesia, Lao People’s Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Viet Nam. ASEAN includes a diverse mix of countries—ranging from low and high income, a number with large populations, all experiencing significant impacts from climate change, environmental degradation and biodiversity loss, and all with ambitions for sustainable development, and each with varying policy mixes to support and implement these ambitions. The COVID-19 pandemic has led to the contraction of many economies across Asia after years, in some cases decades, of growth [6]. The recent Asia-Pacific Employment and Social Outlook estimates that the COVID-19 pandemic and related economic disruptions have resulted in the loss of some 81 million jobs in 2020 (compared with pre-COVID-19 levels), with the consequence of an additional 22–25 million people forced into extreme poverty, living on less than USD 1.90 per day [6]. Needless to say, already vulnerable population groups, such as women and young people, have been more severely impacted.

Greening economies and employment are a high priority in ASEAN as evidenced by the ASEAN Economic Community Blueprint and the ASEAN Declaration on Promoting Green Jobs for Equity and Inclusive Growth adopted at the ASEAN Summit in 2018. ASEAN is actively promoting green employment in clean energy, energy efficiency and green buildings and urban planning, as well as developing policy to support sustainable production and consumption systems such as circular economy.

Despite these commitments, the growth of green jobs and the supportive policy ecosystem that enables future growth are not fully developed. Many ASEAN member states (AMS) have made inroads into defining and counting green jobs within their economies and building the skills and capacities of policy makers. All AMS have green economy strategies integrated to some degree into their development plans, and most have explicit strategies in place to implement the green economy in priority sectors—with agriculture, tourism, the built environment, energy and environmental services (water, wastewater, waste) identified as priority sectors in countries. These sector strategies usually include investments and incentives from governments at various levels. The more comprehensive strategies combine these incentives and mechanisms with support for research and development activities, innovation support and public procurement, to provide more holistic policy support.

However, each AMS is working at a different pace, and with a differing focus. The consequence is that gaps exist in knowledge and data sources for greening employment including understanding the country and sectoral level supply and demand drivers for green jobs, the resultant impacts on labour standards and occupational health and safety, as well as the implications for education structures, particularly TVET systems [7]. Additionally, understanding and planning for the impact of green jobs and greening on their workforces is an issue; specifically, what the labour market and skills and training development

implications of green jobs will be, how best to respond to these, and whether these skill profiles match workers and occupations transitioning from carbon-intensive sectors. The economic and fiscal constraints imposed by the ongoing COVID-19 pandemic—which is still an ongoing focus for many ASEAN countries with infection rates and vaccine rollouts proceeding at varying paces across the region—are additional challenges.

The dilemma for many ASEAN member states is how to achieve sustainable development—with green jobs, a just transition, and development that addresses ongoing issues of poverty and inequality—in a way that clearly leverages limited public investment in the post-COVID period. The ability for the region to create development pathways through regional knowledge sharing and coordination, and south–south cooperation is seen as essential. The aim of this paper is to contribute to this knowledge sharing by providing a framework to assess the current situation and highlight areas for further research and collaboration.

This paper constructs a policy framework for a just transition and greening employment, combining the nine key policy areas identified in the ILO Guidelines for a Just Transition, and categorising each into the three broad areas of policies that promote green jobs established from previous policy analysis [8]: (i) employment implications of greening, (ii) developing skills and labour market policies for greening, and (iii) institutional arrangements.

The resulting policy framework is then used to assess the policy readiness of the current policy mix for greening employment and supporting a just transition across ASEAN. The assessment draws upon a questionnaire completed by ASEAN member countries to map their existing policy settings. The assessment highlights the current situation of ASEAN countries, considering the employment, skills and training needs of their climate action strategies. Climate action strategies refer both to mitigation and adaptation activities. The paper also highlights the significant challenges in identifying and implementing policy settings to support a just transition. These findings provide an agenda for further research and capacity building, and also highlight the role of country-level collaboration and networking in addressing these challenges. The work seeks to take up the challenge set by Jenkins et al. to “explicitly link conceptual and empirical scholarship to a wider political context” [2] (p. 141).

The rest of the paper is structured in five sections. The next section provides an overview of the JT concept and how this is being translated into policy, including identifying the range of policy areas and mechanisms that impact on a just transition, how coordination and coherence also impacts this policy mix, and how a policy framework for a just transition can be assembled and used for assessment. The third section provides an overview of the method used. The fourth section provides a summary of results for the policy readiness assessment in ASEAN and presents a detailed case study of the policy mix for greening employment and JT being implemented in the Philippines. The fifth section discusses the implications of this assessment for policy readiness for a just transition in ASEAN and highlights research gaps and future research questions.

2. Historical and Conceptual Evolution of the Just Transition Concept

The concept of a Just Transition gained global prominence with the “Solidarity and Just Transition Silesia Declaration” at the 2018 COP24 meeting in Poland. The Silesia Declaration commits signatories to acknowledge the impacts that climate change and climate policies have on various workers, sectors and communities, and to provide safeguards and sustainable employment outcomes for affected workers and communities as part of the overall implementation of policies and actions to address climate change. The Declaration was signed by 45 Governments, led by Poland.

The concept of a JT has a longer history, emerging some thirty years ago in the US as a way to conceptualise and respond to the environment versus jobs narrative that was arising, with negative employment impacts from the introduction of environmental legislation in the US preventing air and water pollution, which was significantly impacting and/or

closing down some industries operating in the US [2,9]. The adoption of the JT linked with climate change strengthened through the first decade of this century as global union organisations promoted the term. In the period after the 2008 financial crisis with the ambition for a green-focused recovery, emphasis moved more to focus explicitly on green growth [10]. The ILO's adoption of the 2015 Guidelines for a just transition towards environmentally sustainable economies and societies for all [1] and the inclusion of the need for a just transition in the Paris Agreement preamble, "... Taking into account the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities ..." [11] effectively mainstreamed the concept in policy dialogues [2,10].

Subsequently, the concept of a just transition has been included in supra- (EU Green Deal and Just Transition funding mechanism) [12], national (Spain, Canada) [13–15] and sub-national green strategies (Scotland, Colorado and Utah in the US [14,16]).

With the mainstreaming of the JT concept, several key studies identified the scale of employment impacts globally. The ILO World Employment and Social Outlook: Greening with Jobs [3] estimated that decarbonisation would generate up to 24 million green jobs by 2030, the majority in Asia. At the same time, some 6 million jobs are expected to be lost, particularly in carbon-intensive industries, resulting in a net gain of 18 million jobs. The report also highlighted that the geographies and workforces of where jobs are made or lost do not align, and therefore, additional measures to manage and alleviate the negative employment impacts of decarbonisation are needed to ensure a just and equitable transition.

The dimensions of these employment impacts broadly fall into two categories:

1. Employment changes due to decarbonisation of economic activities to meet commitments for the Paris Agreement (i.e., to keep global warming to less than 2 degrees above pre-industrial levels, with the preferable limit of 1.5 degrees of warming). Employment changes will be both positive and negative—as certain industries reduce carbon-intensive activities, for example, in the fossil fuel energy generation sector; and as other industries grow in response, for example renewable energy, energy efficiency and resource efficient manufacturing.
2. Employment changes due to climate impacts including the economic and employment disruptions associated with extreme weather events (storms, floods, etc.) and other physical impacts of climate change, for example, sea level rise (inundation of low-lying urban areas, workplaces and agricultural assets), increased ocean temperature/acidification (changes in fish stocks, etc.).

For most of the workforce, greening will change their work by only a small amount. For other occupations, greening will change their work significantly, new occupations will be created, and other occupations will diminish or be phased out. Social protection is a critical enabler of a just transition because it facilitates decarbonisation by ensuring the provision of essential guarantees against social risks affecting income and health for workers [17].

There are varied theoretical bases for a JT, drawing on fields including sustainability transitions [18–20], climate and environmental justice [21,22], development theories [9,18,23] and labour studies [5]. To date, much of the focus of the just transition literature has been on energy system transition [9,13,15,22,24], and specifically, the phase-out of coal in the energy system [15,16,25,26].

Some authors have sought to broaden the focus of JT beyond climate policy to other environmental issues including plastic and chemical pollution, the creation and disposal of toxic substances, and biodiversity and eco-systems [10,27]. Other authors envisage broader parameters for JT [9,18], as encompassing the just and equitable socioeconomic transformations is required to meet both the 2030 Sustainable Development Goals and the Paris Agreement.

In ASEAN, the positioning of a JT within a development context is critical as the focus on quality employment (decent work), social protection systems and poverty reduction

must be alongside reducing carbon emissions and protecting and restoring eco-systems. The dominant historical patterns and models of development have been carbon-intensive, and included persistent inequality, environmental degradation and failures in many other areas of human rights such as decent work, anti-discrimination and forced and child labour. There is a need to create new development pathways that are also net zero carbon and environmentally restorative.

Each of these conceptualisations of a JT includes actors, or coalitions of actors, driving the process at all levels of jurisdictions—local, regional, national and international. Agency, power and the underlying socio-political regime—“the policy-related action and engagement by a wide range of actors within and outside the formal political system” [18] (p. 677)—all contribute to the momentum of transitions and their direction, just or otherwise. Swilling et al. [18] identify four elements of the socio-political regime—power dynamics, paradigm commitments, state organisations and policy programmes. The last element, policy programmes, refers to the policies that are debated and adopted by policy actors within a given context. Policy and policy mix are only one element of this regime, but they can also reflect power dynamics and paradigm commitments [18]. Policy mechanisms and policy mix are the focus of this paper. A focus on policy mix also responds to the questions of policy makers as how to plan for and manage a just transition.

2.1. Policy Elements for a Just Transition

There is no question that environmental sustainability and employment are closely linked. As many as 1.2 billion jobs globally rely directly on the effective management and sustainability of the environment [3]. The transition to a green economy, addressing the challenges of climate change, environmental degradation and resource limits, will require a decoupling of economic growth from greenhouse gas production and resource use.

Policy is necessary both to ensure the maximum potential green jobs are created and that the labour force is skilled and ready to take up this employment. However, policy must also ensure that workers who are in industries negatively affected by greening are provided with support and opportunities for skills development and training so they can effectively transition to new employment. In a practical sense, a JT policy mix includes a set of principles, processes and practices that produce plans, policies, investments and measures designed to move the world towards a future where jobs are green and decent, there are net zero carbon emissions, and poverty has been eradicated [28]. There is significant scope for policies in the world of work to advance environmental sustainability, and vice versa for environmental sustainability to enhance decent work condition. These issues are especially pertinent in Asia [7].

The policy mix for a just transition is broad, including both measures to produce green jobs in traditional and emerging sectors, but also measures to reduce the impacts of job losses and industry phase-outs on workers and communities [29]. This encompasses many policy fields including development and employment policy, energy policy, industry policy, training and skills development, as well as sectoral-level policies and policies at different jurisdictional levels. The broad array means that in addition to policy mix, policy coherence and coordination are also critical issues in the successful implementation of policies for promoting green jobs. For analysis purposes, three broad areas are helpful in distinguishing green jobs policies [30]:

- Policy assessing and responding to the employment implications of greening;
- Policy directed at developing skills and labour market policies for greening;
- Policy aimed at creating and enhancing institutional arrangements to support greening and just transition.

Policies influencing the greening of employment include national development policies, and, increasingly, how these development policies encompass the green agenda of individual nations (including how they will meet Paris Agreement targets through the NDCs), and then, how the impacts of this national development agenda manifest in labour markets. It is important to know how the employment implications of green economic poli-

cies and NDCs—essentially climate action and climate change—will map to employment, and the employment of specific groups of people, including women, young people, and people working in specific geographical areas.

Other key policy areas affecting demand for green jobs include policies for mitigating and adapting to climate change, energy policy, and industry policies—particularly in target sectors for green jobs such as agriculture, forestry and fishing, manufacturing, construction and the built environment, transport and waste. Environmental policies such as standards and carbon emissions pricing create an enabling environment for the accelerated development of mitigation technologies [31]. Other strategies and plans, such as public investments in infrastructure, procurement, and research and development support, all play a role in creating demand for green products, services and organisations and thereby, green jobs.

The government's role of encouraging private sector activities in the green economy is also critical [3]. This includes specific policy support for subsidies and access to finance for greening production and employment, support for commercialisation and green entrepreneurship, the creation and enforcement of a supportive regulatory system for environmental sustainability using public procurement to stimulate demand and markets for new 'green' environmental goods and services, and the creation of new, green markets—such as through payments for ecosystem services.

Policies and mechanisms influence the supply side of green skills such as skills development policies and the institutions that provide and assess these skills such as Vocational and Technical Training organisations [32]. For green skills to adequately diffuse through the work force, an understanding of what green skills are, and how they are different/additional to the skills that are already in the workforce, helps to define the re-skilling and re-training needs of the green economy. As the greening of the economy will impact most occupations and professions to some degree, understanding how and where these skills can be learnt on-the-job, and how these skills can be recognised and assessed, is vital.

The availability of social protection for workers and communities who are affected by the physical impacts of climate change or adverse effects from green policies is essential. A comprehensive social protection system includes measures that enhance the adaptive capacity of individuals and communities to absorb and respond to shocks [17]. Measures include affordable health care, unemployment protection and facilitated early retirement for workers of advanced age at risk of losing their jobs due to phase-outs of carbon-intensive industries. Social protection measures also need to extend to workers who lose working hours or their jobs due to climate-related impacts such as extreme weather events. Examples of relevant measures are unemployment benefits and employment guarantee schemes that engage workers in the rebuilding of their communities after natural disasters associated with climate change [17]. Cash transfer schemes that are flexible and rapidly scalable to expand coverage to affected groups can also be effective measures to cushion populations against climate-related impacts.

The creation of just transition plans for sectors and geographies that are highly impacted by decarbonisation will ensure that workers and communities negatively impacted by greening in the economy will not be left behind and will have pathways to transition to new employment.

Just transition planning is a new skill set for policy makers [7]. To date, in high-, medium- and low-income countries, these plans, and how to create and implement them, are emerging policy issues. For this reason, the assessment discussed in this paper is a readiness assessment, an initial snapshot of the state of play in ASEAN.

The phase-out of coal and coal-fired electricity generation provides the most advanced example. Coal phase-out has the advantage of employment occurring in readily identifiable regions and communities, so identifying the impacts can take place quickly. Less obvious is the transition pathways for these communities to new employment and livelihoods, especially when obvious low carbon industrial activities such as renewable energy do

not readily match to the region as it transitions away from coal. Even then these matches involve significant planning, dialogue and investments over a sustained period of time are required to build up the economic diversity and other opportunities needed for the transition of these workers and communities. For sectors where employment impacts are not so clearly evident—such as in the garment or construction sectors—just transition planning becomes even more complex.

As the employment implications of the green economy are far-reaching and involve many public institutions, how policy is coordinated across government and the economy is integral to the success of these green policy frameworks. Therefore, part of the policy mix also needs to consider how policies are coordinated and coherent.

The ILO Guidelines for a just transition towards environmentally sustainable economies and societies for all [1] highlight nine key policy areas for a Just Transition:

1. Macroeconomic and growth policies;
2. Industrial and sectoral policies;
3. Enterprise policies;
4. Skills development;
5. Occupational safety and health;
6. Social protection;
7. Active labour market policies;
8. Labour rights;
9. Social dialogue and tripartism.

Table 1 shows a policy readiness framework for promoting green jobs and a just transition. This framework was developed by combining the nine key policy areas identified in the Guidelines for a Just Transition, and categorising each into the three broad areas of policy outcomes: (i) assessing and responding to employment implications of greening; (ii) developing skill and labour market policies for greening; and (iii) creating and enhancing institutional arrangements to support greening and just transition. This latter classification was drawn more broadly from the literature on green jobs and just transition, and specifically, the emerging discussions on the policy mix for supporting both. Successful implementation of a policy supporting green jobs and just transition would require not only individual policy elements but also coherence and coordination between each of these elements. As the planning of green jobs and just transition and their related policy mixes are emerging, especially in ASEAN, as a first step, and to assess readiness, this assessment identifies activities in each of the elements, rather than coordination and coherence between these elements. This would need to be the subject of further investigations.

Further, different policy mix elements also contribute to the achievement of other policy outcomes: for example, social protection systems contribute to the achievement of all three categories, and training and vocational education systems are also institutional arrangements that contribute to supporting greening and just transition.

2.2. Assessing Policy Readiness for Just Transition

Policy readiness is a multi-level construct, but essentially is an analogy for the ability of a policy system to signal and implement change. Here, the change that is the focus is the transition to a green economy, but more specifically, to the task of managing the employment implications of this transition by promoting green jobs and a just transition.

Measuring readiness involves a systematic assessment of an organisation's, or in this case, a policy system's, ability to undertake transformational change. This readiness assessment method has been used in a variety of other contexts—such as technology and finance assessments [33]. The assessment examines the current policy composition—with the presence of elements of the policy framework as outlined in Table 1 signifying levels of readiness. This framework also identifies gaps where new procedures, processes and policies are needed. In assessing readiness, we are looking to identify the elements of the green jobs and just transition policy framework, highlight where they are sufficient

(containing all the sub-elements listed in the table), and identify where there are gaps as a first step in assessing policy readiness.

Table 1. Policies readiness assessment for promoting green jobs and a just transition policy framework.

Category	Policy Mix Elements	Data Collection Sources
Policies assessing and responding to employment implications of greening	National development framework	
	- Green agenda established in National Development Framework	National Development plans and Questionnaire
	- Climate change impact and assessment plans	
	- Links to International Agreements such as the Paris Agreement and Nationally Defined Contributions	
	- Specific macroeconomic policies	
	- Specific fiscal, monetary and trade policies	National Development plans and Questionnaire
	- Fossil fuel pricing, fuel or carbon taxes, energy subsidy reform	
	Public investment leveraged for green jobs	
	- Infrastructure investments—climate and green job issues included	National development plans, Policies for public procurement policies, innovation support and Questionnaire
	- Policies for green public procurement	
- Policies for green eco-innovation/R&D support		
Industrial and Sector policies		
- Target sectors for green jobs/JT identified, scoped, sectoral strategies developed involving social dialogue processes	Green Jobs studies and Questionnaire	
- Sector specific policies, e.g., Energy, Waste, Industry, Agriculture, Built Environment	Sector policies	
Enterprise policies		
- Information, assistance and financial incentives for greening in enterprises	Green economy plans and strategies and questionnaire	
- Green Entrepreneurship support, including support for women and young entrepreneurs		
- Business resilience programs to support enterprises in implementing adaptation especially MSME and SMEs		
Policies developing skills and labour market interventions for greening	Skills development	
	- Green skills consensus	Questionnaire and skills studies
	- Identification of skills needs, including for target groups such as women and young people	
	- Assessment of adequacy and availability of green skills training, plans for enhancements	
	- Integration of on-the-job training/skill acquisition into formal training and accreditation systems	
	Active labour market policies	
	- Green jobs and green skills labour market information available, by demographics and geography	Green jobs studies/Questionnaire
- Just transition plans and social dialogue in impacted industries/hotspots		
- Re-training and transition programmes for affected workers		
- Labour market policies linked to infrastructure and industry development policies		
Creating and enhancing institutional arrangements to support greening and just transition	Occupational Safety and Health	
	- OHS risks associated with climate change and resource scarcity assessed	ILO Conventions and questionnaire
	- Convention 155 on OSH in force	
	Social protection	
	- Unemployment protection	ILO Conventions and Recommendations on Social Protection, and Questionnaire
	- Social protection mechanisms that contribute to offsetting the impacts of climate change and the challenges of the transition on livelihoods, incomes and jobs.	
	s-cutting elements	
	- Inclusion of labour rights and standards into green job and just transition policies	ILO Conventions and Questionnaire
	- Social dialogue processes informing the development and implementation of greening policies	
	- Convention 144 on social dialogue in force	
- Measures to achieve policy coordination and coherence		

Source: Framework developed by authors.

3. Methods

In order to collect information on the available policies in each AMS to assess against the green jobs and just transition policy framework in Figure 1, a detailed questionnaire was completed by each country. This questionnaire sought details on each of the elements listed above. The questionnaire is available in the Supplementary Materials corresponding to this article.

The questionnaire was part of a wider programme of action research with partners including the ASEAN secretariat, AMS and the ILO Regional Office of Asia and the Pacific Regional Office. AMS were involved in a series of activities to build knowledge and capacity about green jobs and JT concepts. The first analysis of the questionnaire was presented, discussed and validated at the first ASEAN Green Jobs Forum in October 2020.

The questionnaire responses and additional document analysis were assessed for each AMS to develop a narrative analysis for each country. This narrative analysis describes the specific evolution and context for the employment implications of greening. This narrative analysis was organised into four sections:

- Green economy agenda, plans and strategies;
- Green jobs and green skills policy support and integration;
- Private sector activities, initiatives and support;
- Coordination.

In addition to the narrative analysis, there is a summary table for each country. This table provides a colour-coded summary of the findings, shown in Figure 1.

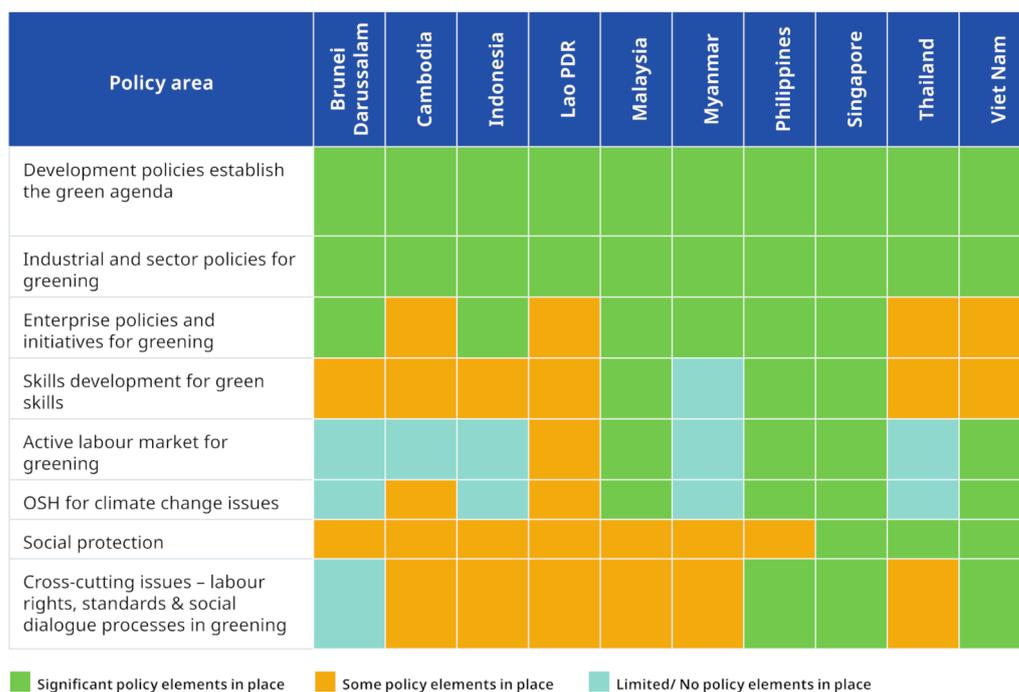


Figure 1. Summary policy readiness assessment in ASEAN member states.

4. Drivers of Green and Just Transition in ASEAN

4.1. Decarbonisation Impacts

All AMS are signatories to the Paris Agreement, and have made commitments, or Nationally Determined Contributions, to meeting the Agreement. ASEAN countries face the dilemma of reducing greenhouse gas emissions while, at the same time, expanding energy supply to meet the needs of their rapidly developing economies, with the region expected to see high growth in energy demand—100% increase in total energy consumption

in ASEAN between 2015 and 2030 [34]. For this reason, the energy transition in Asia will have different dynamics, employment implications and requirements for a just transition.

Carbon emissions have been growing across ASEAN for the past few decades. In 2015, the ASEAN region accounted for 8.6% of global population, 5.6% of global GDP, and 4.5% of Greenhouse Gas Emissions (GHG) for all emission sources except land use [34]. The largest source of emissions is from land use, land use change and forestry, particularly arising from land clearing—in this regard, the ASEAN region also differs from other global regions. Vegetation and soils remove and store carbon from the atmosphere and are referred to as carbon sinks in the terrestrial ecosystem. Any changes or alterations to vegetation or soils release this stored carbon into the atmosphere. Activities aimed at reducing emissions include sustainable land management, planting and rehabilitation of forests that can conserve or increase forest carbon stocks, whereas deforestation, degradation and poor forest management reduce these carbon stocks.

The second highest source of emissions is the energy sector, with the remaining emissions found in non-energy sectors including construction and building, manufacturing and services. Emissions reductions will ultimately be required from all sectors, but land-use and forestry and energy are the primary focus in emission reduction activities, because their impact on overall GHG levels.

Employment impacts from greening will impact all sectors, although they are likely to be concentrated in sectors associated with electricity and heat generation, transport, buildings, agriculture, and forestry [35]. Table 2 provides an overview of the global net job creation estimated from transitioning to low-carbon societies at the global level. These estimates are generated from current carbon intensity trajectories. The energy transition will see significant new employment in the ASEAN region, as well as employment in sustainable agriculture, fisheries and forestry and green construction. The agricultural, forestry and fishing sectors have significant potential for green job creation in ASEAN because of the size of the agricultural workforce in AMS [36]. Further opportunities also exist in waste management and wastewater management and mining and quarrying activities associated with increased demand for metals for electric vehicles and other electrical equipment.

Table 2. Net green job estimates by 2030 by region.

Global Region	Net Job Estimates
Americas	+3 million
Asia-Pacific	+14 million
Europe	+2 million
Middle East	−300,000
Africa	−350,000

Source: [3].

The sectors set to experience the strongest decline in jobs are expected to be [3]:

- Mining for coal, oil, gas and petroleum (although this will be offset by increased demand for metals such as copper, nickel, iron, and non-ferrous and metal ores) as demand increases for these materials for electric vehicles and other electrical machinery.
- Electricity generation from fossil fuels (400,000 job losses); although, this will be more than offset by the 2.5 million expected job growth in renewable energy.
- Sectors linked to fossil fuels such as the automotive sector—the production of electrical vehicles is expected to employ less people with less assembly requirements and longer life cycles.

A just transition requires both social protection for the workers negatively affected by decarbonisation, as well as investment in their communities to sustain and ensure future livelihoods. Specific measures needed include income security and job transition

measures for workers, as well as skill development measures for workers to take up new opportunities for green jobs [37].

Women's participation in green jobs also needs to be of ongoing focus. Gender inequalities in labour markets emerge from the different roles and identities given to individuals depending on whether they are male or female, whether they are assigned particular roles, or segregated into particular occupations or sectors [38]. These existing patterns of gender inequalities in accessing employment, training activities and gaining workplace experience will affect women's access to green jobs in the same way they already impact access to existing jobs. Greening of jobs and economies offers both the opportunity to address these barriers to gender equality in work, but also bring a range of activities that women already fulfil into the realm of decent work [38,39]. These activities include women's existing role in green jobs such as forest stewards, farmers, entrepreneurs in ecotourism and waste management. This will require active policy engagement to create the conditions and structures necessary for gender equality in green jobs, including providing support for and redistribution of unpaid care work [40].

4.2. Employment Disruptions from the Physical Impacts of Climate Change

The physical impacts of climate change are also a significant driver of employment change in ASEAN. Climate change is already impacting the world of work. The increasing frequency and intensity of natural disasters is one example of this. According to the World Risk Report, four ASEAN countries are among the top 20 countries most affected by disaster risks [41]. This vulnerability arises from natural hazards as well as poor economic and social situations. Both the incidence and cost of damages from extreme weather events in ASEAN have increased significantly between 1980 and 2017 [36].

As a result of each of these weather events, jobs and productivity are lost. Estimates suggest an average loss of 536 working life-years per 100,000 people of working age in the Asia-Pacific region between 2008 and 2015 as a result of climate change, including extreme weather events and other forms of environmental degradation [3]. Working life-years lost is a measure of the total working time lost as a result of disasters that takes into account casualties, injuries and infrastructure and capital loss. The loss of working life-years in the Asia-Pacific region is the highest across the globe, with Africa the next affected region at 376 working life-years.

Increasing temperatures and predicted changes in rainfall will impact agriculture and agricultural employment, even with adaptations. Rising temperatures will also increase the incidence of heat stress and related health risks for workers. Heat stress will lead to decreased worker productivity, especially in workplaces where temperatures will rise above 38 degrees. The ASEAN region is highly vulnerable to heat stress. ILO analysis suggests that 2 per cent of the total number of working hours in 1995 was lost to heat stress, and by 2030, this will have increased to 3.1%, on average, across the region [42]. This is the equivalent of 62 million full-time jobs.

4.3. Green Jobs and Just Transition Policy Readiness across ASEAN

The policy readiness assessment drew on responses from AMS to an extensive questionnaire. Results from this questionnaire, along with other document analysis, were then used to develop the country narratives and summary assessment tables (see Figure 1). The country-level narratives provide more detailed information on the specific sequence of policies and interventions pursued by each of the ASEAN member states—see [7] for full text versions. These narratives provide the historical and contextual background for understanding the process and progress of each AMS in finding policy settings to support greening of employment and the needs for a just transition.

The summary assessment of these results (Figure 1) is presented in a colour-coded way, with green representing significant elements of the framework element in place, suggesting readiness for activities to promote green jobs and just transition; and orange representing minimal or inadequate policies in place, suggesting a need for additional policies (which

in many cases are identified/in development). The final colour code, grey, represents no policy elements identifiable to date from the questionnaire and document analysis, suggesting these as areas for targeted policy work and interventions. The colour-coded assessment was arrived at through a process of allocation using a coding technique: a green code where all policy elements in Table 1 were identified, an orange code where some policy elements could be identified, and a grey code where none were identified. The assessment was focused on identifying the presence of policy elements rather than the quality, adequacy or effectiveness of these elements. This policy assessment is the first (known) of its kind in ASEAN and therefore, is experimental, rather than comprehensive. Further iterative research processes are necessary to fill gaps and ascertain the usefulness for the policy readiness assessment in directing future activities. The policy assessment shows that all ASEAN member states have a relevant policy base from which to build, and that, across the region, as different countries have progress in different areas, this opens the opportunity for sharing of knowledge, examples and peer learning from within the ASEAN region.

4.3.1. Greening Employment

Most AMS have some conceptual definitions of green jobs, JT and green skills, and in many cases, these are developed from the ILO definition of green jobs. The ILO definition of green jobs includes work that meets decent work standards and contributes to the improvement of the environment through reducing the consumption of energy and raw materials, limiting greenhouse gas emissions, minimizing waste and pollution, protecting and restoring ecosystems and enabling enterprises and communities to adapt to climate change [3].

How this definition is operationalized differs across jurisdictions and organisations, and with varying degrees of policy relevance. A number of ASEAN member states have completed significant green jobs studies that provided estimates of how many green jobs exist in their jurisdictions and could be expected to be created under various policy scenarios and in varying sectors. The questionnaire found that for policy-making purposes, the specific statistical definition of green jobs was less of a focus for policy making than the overall understanding of how greening was impacting on labour markets.

The delineation of green and non-green is more important when developing specific sector strategies, JT planning for negative employment impacts of greening and when considering the skills need and re-skilling task associated with green economies. Definitions and categorisation of green jobs consider the concept of greening as existing on a spectrum—with some jobs categorised as ‘core green’ (such as renewable energy installers, recycling officers) and others as ‘indirectly’ green (construction workers on green buildings, workers in factories with cleaner production). It is also important to consider non-green jobs and identify those jobs that can and will transition and those that will be phased out. The questionnaire showed that for most ASEAN countries, this nuanced categorisation of green jobs is not available, and this is hampering understanding of JT needs and the identification of tension or hotspot areas for JT.

The gender and age dimensions of greening are also under-explored. People who are socially, economically, culturally and institutionally marginalised are especially vulnerable to the impacts of climate change. This includes low income, low skilled workers, and workers in informal employment [3]. Women also have less access to resources to adapt to climate change and may face additional barriers or discrimination in participating in opportunities from the green economy. Gender-responsive policies for green jobs and skills are necessary to ensure women have equal access to these jobs.

4.3.2. Developing Green Skills and Labour Market Policies

Identifying what tasks in a green job are different from a non-green job and how to develop the skills associated with the green task highlights in what sectors/occupations/demographics re-training needs will be greatest. This was identified as a specific gap in

ASEAN. The so-called skill-distance [43], the extent of re-training required to transition from one (non-green) job to another (green) job, also signals how re-training and re-skilling can occur [8]. When the distance is short, on-the-job training can be used to build these skills.

Enhancing the capacities of people through the acquisition of green skills is critical to the broad promotion and creation of green jobs within the economy. Many AMS have active programs and policies to green their TVET systems and develop and integrate standards for green education and training within curriculum and competency frameworks.

Many AMS have explicit strategies in place to implement green economy in priority sectors—with agriculture, tourism services, the built environment, energy and environmental services (water, wastewater, waste) identified as priority sectors in countries. These sector strategies usually include investments and incentives from government at various levels. The more comprehensive strategies combine these incentives with research and development activities, innovation support and public procurement.

The questionnaire results and subsequent validation at the inaugural ASEAN Green Jobs Forum also highlighted the critical need to mobilise investment—both public and private—for green infrastructure, as well as to support the research, development and commercialisation of green products, processes and services. However, the experience of other countries such as Mongolia shows that access to finance alone does not necessarily translate into green jobs [44]. Additional measures, including guidelines, checklists and capacity building, are required to ensure that investments in green or sustainable infrastructure or projects are also translated into decent and green work.

Across all AMS, a range of incentives to create private sector demand and awareness for green jobs exist. These range from subsidies, tax exemptions, preferential investment treatment, public procurement activities to various forms of regulation. There are some examples where these activities have been in place for a number of years, enough time to allow for evaluation of results, but for most incentives, they are relatively new, so there is not clarity and evidence of efficacy yet. In many cases, there is the assumption that these incentives will lead to the creation of green jobs, but this is untested, or at least the number of types of green jobs that are created. Activities that systematically evaluate the employment impacts of these incentives and interventions include assessing the number of, and types of, jobs generated and analysing whether these match expectations for public expenditure.

4.3.3. Institutional Arrangements Supporting Green Jobs and Just Transition

The institutional arrangements for greening of employment and a just transition will be an area of significant institutional evolution. New institutional arrangements are needed to support policy coherence and coordination for a just transition, because the institutions that currently manage socioeconomic development, employment, industrial activities and natural resource management were not created to manage our current development and ecological challenges. Mapping and managing the needs for and pathways to this institutional change requires an ongoing focus by the academic and policy communities. The questionnaire and results discussed in this paper only addressed three aspects of these arrangements: implications of greening on occupational health and safety measures, social protection systems and coordination mechanisms for climate change and macroeconomic growth policies.

The implications of greening for Occupational Health and Safety (OSH) and the role of social protection in achieving a Just Transition are emerging and critical issues. Climate change is one of the most significant drivers of change in the workplace; it will also become a significant source of workplace harm. Environmental risks resulting from climate change including air, water and soil pollution; heat and increasing temperatures; erosion; sea-level rise and risks from rapid onset events, such as extreme weather events (forest fires, severe storms, floods) will be a major driver of change in the world of work [3]. Climate change will alter the intensity and frequency of these events, and lead to cascading effects. This

means that whereas in the past, these impacts were not seen as workplace risks, now and into the future, they will be.

Social protection is identified as a critical enabler of a just transition and is one of the elements identified in the policy assessment framework for promoting green jobs used in this report. The methods of assessment used in this report—ratification of ILO convention 102 and assessment of elements of social protection systems—highlight that there are gaps in the knowledge and mechanisms for social protection systems across many AMS (Singapore is a notable exception) and the adequacy and need that greening and climate change will place on these systems. The implications of greening and just transition on social protection, and particularly, the modes and forms of this protection, need to be the focus for further analysis and discussion across ASEAN.

A range of institutional mechanisms were identified across AMS for coordinating policy frameworks for promoting green jobs and just transition. These typically consisted of inter-ministerial groups and related senior-officer groups. The Philippines has a highly developed range of institutions to support the implementation of the Philippine Green Jobs Act and Climate Change Plan, including the creation of a Climate Change Commission. The emerging nature of these institutions means that we do not have a good understanding of how coordination is successfully managed, and what the critical ingredients are in the establishment and maintenance of these mechanisms.

Mechanisms for coordination and coherence of policy for promoting green jobs and just transition are common requirements for all AMS, and therefore, provide another area that is highly relevant for knowledge sharing and cooperation at the regional level. As all AMS manage the health, social and economic disruptions from the COVID-19 pandemic, ways and means for AMS to work together and develop best practice mechanisms in developing green jobs will provide an effective investment of public and private resources for sustainable development.

4.3.4. Philippines Case Study

The above analysis shows the significant progress that many AMS have made in combining development plans with increased environmental and social sustainability, especially in employment-related issues. The Philippines has made significant steps in linking employment and climate change policies; to provide more detail on how the framework and assessment can help map existing policy mechanisms and identify gaps and future priorities for further policy development, this section presents an overview of the Philippines as a case study.

The Philippines enacted the Philippines Green Jobs Act (2016) (PGJA) [45] and is the first AMS to provide legislative support for the promotion of green jobs and JT. The PGLA represents the first piece of social legislation in the Philippines specifically designed to generate, sustain and incentivise green jobs. The law has the following principles:

- Affirm labour as a primary socioeconomic force in promoting sustainable development.
- Afford full protection to labour, local and overseas, organised and unorganised.
- Promote full and productive employment and equality of employment opportunities for all.
- Promote the rights of the people to a balanced and healthful ecology in accordance with the rhythm and harmony of nature.

The PGJA includes a range of fiscal and non-fiscal activities to transition workers to a low-carbon economy and makes provisions for a just transition. The PGJA defines green jobs as employment that contributes to preserving or restoring the quality of the environment, as well as being jobs that are decent, productive, respect the rights of workers, deliver a fair income, provide security in the workplace and social protection for families and promote social dialogue. The PGJA incorporates several aspects of the policy framework developed in this paper—including elements of macroeconomic policies,

skills development, active labour market policies, labour rights and incorporating social dialogue processes.

Under the Green Jobs Act (2016) [45], policy coordination and coherence develop through the Climate Change Commission, which, in consultation with seven national government agencies including the Department of Labour and Employment, is mandated to develop standards for assessment and certification of green jobs in the country. The Climate Change Commission (CCC) is an inter-agency committee of 21 national government agencies mentioned within the Law, with the CCC and the Department of Labour and Employment co-chairing the committee. These agencies have mandates ranging from labour and employment, climate change mitigation and adaptation, environmental policy and regulation, national development planning, trade, finance, agriculture, education, tourism, science and technology, public works, transportation to interior and local government.

The PGJA does not explicitly identify which agency should take the lead role in coordinating its implementation including monitoring and reporting of achievements. Specific departments have mandates in specific areas; for example, the Department of Labour and Employment has a mandate to draft the Implementing Rules and Regulations, the Development of the Green Jobs Human Resource Development Plan, the maintenance of a database of green careers, professionals and skills, as well as a register of emerging business enterprises which generate and sustain green jobs (coordinated with the Philippine Statistics Authority and Technical Education and Skills development Authority (TESDA) and the Professional Regulation Authority), providing support to the CCC in the development of standards for the assessment and certification of green goods and services and green technologies and practices [7].

Part of the PGJA specifies a National Green Jobs Human Resource Development Plan to enable and sustain the transition to the green economy and the creation of green jobs. This plan will also act as a Just Transition Plan and is guided by the four pillars of decent work—employment creation and facilitation, social protection, social dialogue and rights at work [7]. The Plan commits the Technical Education Skills Development Authority to create required training regulations with a view to providing skills training, assessments and certification programs to address demand for skilled human resources in the green economy. Such activities are to be focused particularly on sectors that are going through structural transformation as a result of climate change and the transition to a greener economy.

In terms of labour market mechanisms that are available to workers affected by these structural changes, the Philippines is developing a system of unemployment insurance. There is a short-term emergency employment program to support workers displaced as a result of natural disasters and emergency situations linked to climate change.

The PGJA specifically focuses on incentivising green jobs rather than regulating them, encouraging all businesses and the public sector to create and sustain green jobs [7]. Participation in the assessment and certification of green jobs for the purpose of accessing the fiscal and non-fiscal incentives offered in the law is voluntary, although compliance with minimum national labour and environmental regulations is mandatory. Incentives to qualifying individuals and businesses include: (i) a special tax deduction from taxable income on expenses incurred by the individual or business on skills training and research and development for green jobs, (ii) exemptions from customs duties and taxes for the import of capital equipment that is used directly in the promotion, generation and sustenance of green jobs.

Overall, the PGJA provides an overarching structure for the employment implications of climate change and greening to be investigated and managed in the Philippines. The Act is now more than four years old and coordinating and connecting institutions between various government agencies, authorities and other public and private actors are becoming embedded. Although the PGJA was legislated in 2016, the implications of the Act, and also the details of implementation including coordinating mechanisms, have only emerged in the period since and are still novel and evolving. The development of JT plans specifically

in the context of upcoming energy and transportation system decarbonisation with phase-out of coal mining and electrification of the jeepney fleet will test the ability of the PGJA to plan for JT in the Philippines.

Further research is required to investigate and report on the progress and effectiveness of the PGJA. The PGJA model, especially in the identification and structuring of green technical and vocational education, is seen as a leading policy in the region, with other ASEAN jurisdictions looking to understand and adapt the model for their contexts.

5. Discussion and Conclusions

The previous section highlights how closely related employment and climate change drivers are in ASEAN. Although, this relationship has specific and unique characteristics. ASEAN will need to decarbonise but also rapidly meet expanding energy demand, move to low carbon industrial activities and increased natural resource stewardship, as well as also developing economies, decent employment and livelihoods, all whilst managing the already evident impacts of climate change and the COVID-19 pandemic. This is no small challenge.

New policy models and combinations of policy mix will be required. This paper set out to identify what the policy elements are needed and what is already in place to support greening of employment and a just transition in ASEAN. A JT ensures that while working towards a more ecologically sound economy, we also plan for positive outcomes for those communities and people negatively affected by our global efforts to decarbonise. We also realise that these impacts will not be equally shared by all workers, with concentrations of impact on workers and communities concentrating in carbon-intensive industries; or shared across all geographies, with impacts again geographically concentrated. This unequal distribution means that JT ‘hotspots’ and tensions will exist, and that the policy mix to address JT will need to be specific to these contexts.

This paper presented a ‘green jobs and just transition policy readiness framework’—developed through integration of ILO Guidelines for a just transition towards environmentally sustainable economies and societies for all [1], and more recent conceptualisations of JT in the scholarly literature including emerging links between Sustainability Transitions and Development State theories. These conceptualisations of JT as needing to provide sustainable development—decent work, social protection and equality, at the same time as decarbonisation and environmental restoration—are especially relevant in ASEAN. A number of AMS are engaging in balancing the development and poverty alleviation needs of their economies and populations with sustainable natural resource management, and this is a difficult dilemma.

Each of the ASEAN member states have made progress in many of these policy areas—countries including Singapore, Malaysia, the Philippines and Viet Nam show a high policy readiness for green jobs and JT. As the case study of the Philippines showed, countries are developing very specific policy mechanisms and institutions to manage the transition process. However, across most AMS, these policy systems are emerging, and have yet to really address the challenges of JT in specific hotspots, as well as develop the coherence and coordination mechanisms that will allow for the mainstreaming of (decent and) green jobs and JT.

Past research highlights that it is in the implementation of policy to manage the employment outcomes of low-carbon transition—both positive and negative—that test policy impact. Ambitious policies for enhancing environmental quality that enable us to achieve the Paris Agreement, the Sustainable Development Goals, whilst remaining within planetary boundaries are possible—if well managed [46].

A limitation of this paper is that it has focused explicitly on one dimension of greening—the mapping and managing of employment implications of greening—and has specifically conceptualised a just transition within these employment impacts. Other authors have taken a broader approach, encompassing transition within wider biodiversity

and ecological systems. This work does not sit apart from these authors, rather as a specific, more detailed sub-set, with a clear focus on policy avenues.

A further limitation is that the assessment and subsequent discussion presented in this paper may underestimate the enormity of the challenge ahead of ASEAN, and globally in planning for and managing a just transition. Radical policy shifts will be required [31], and these policy shifts may not come from traditional economic thinking and models [47].

Future research priorities will need to further address these implementation and mainstreaming issues. This paper only examined the existing policy programmes and mechanisms in place using the policy framework—further work will need to investigate the power and institutional dynamics that also contribute to the socio-political regime [18]. The policy work going into specific definitions of green jobs and skills, the creation of just transition plans, and other ways of mapping and understanding the linkages between employment and environment could be interpreted as ‘niches’ in the Sustainability Transitions literature. Using this interpretation, and examining how these niches have emerged, how they challenge the existing regime and provide direction for a sustainable and just transition would allow us to also apply ideas of strategic niche management [48,49]—and not only analyse and interpret niches *ex post*, but also be able to investigate and advise on how they may be better managed in the future.

Supplementary Materials: The following are available online at <https://www.mdpi.com/article/10.3390/su13137389/s1>, Supplement S1: Green Jobs, Policy and Issues questionnaire.

Author Contributions: Conceptualization, S.A.S. and C.M.M.-F.; methodology, S.A.S., writing—original draft preparation, S.A.S.; writing—review and editing S.A.S. and C.M.M.-F. All authors have read and agreed to the published version of the manuscript.

Funding: This research received funding from the ILO Regional Office of Asia and the Pacific.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: The authors would like to acknowledge the Steering Committee of the ASEAN/ILO Regional Study on Green Jobs Policy Readiness in ASEAN and the ASEAN/ILO Green Jobs Forum Organizing Committee for insightful comments in the development of this work. We would also like to thank two anonymous reviewers and the editors of this Special Issue for helpful comments on an earlier draft of this paper.

Conflicts of Interest: The authors declare no conflict of interest.

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