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Greening the Philippine Employment Projections Model: New Estimates and Policy Options

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Abstract

Climate change causes a vast magnitude of impacts that cut across boundaries and spill over time. It results to various, interrelated effects on important aspects in the society. Direct and indirect effects of climate change touch on, for instance, health (e.g., Watts et al. 2015) and on labor (e.g., Kjellstrom et al. 2009; International Labor Organization, 2018). Unfortunately, developing countries, which are least contributors to climate change, are more exposed to environmental risks. According to the Global Climate Risk Index 2017, the Philippines, is in the top ten countries greatly affected by extreme weather events over the last two decades. In response to these challenges and risks, the country has been actively participating in international efforts to address this global concern. Locally, various policies have been enacted in order to create a progressive landscape for environmental protection, and disaster risk mitigation and response. Adding to these mitigation responses is the *Green Jobs Act of 2016*, which aims to encourage the creation and nurturing of green jobs along with the country's transition towards a more environmentally sustainable economy.

This study supports the implementation of this policy by providing new employment demand projections in the green and conventional sectors of the economy. Specifically, the Green Philippine Employment Projections Model (Green PEPM) generates forecasts on employment demand in green industries, using various scenarios based on national development and environmental targets. The model provides a sectoral-level analysis on the potential economic and employment gains and losses coming from the growth of the green and conventional sectors. The results of the model is expected to feed into the development of the country's Human Resource Development (HRD) Plan, which is an important feature of the 2016 *Green Jobs Act*.

Projection results show that greening the economy creates benefits. More jobs can be created, and other existing jobs can be transformed as industries shift to environmentally-friendly and sustainable technologies and products. However, depending on the country's development targets, greening may also lead to employment contraction in certain industries. Thus, to what extent the country should go green remains an open question, which the government can explore to come up with appropriate responses. Aside from employment projections, this study provides some policy options that may address some of these threats in the labor market, and those which may support the promotion of green jobs in the country.

Keywords: green jobs, environment, labor market, disaster risk mitigation, climate change

Notice: The work has been undertaken in collaboration with the ILO providing technical advice and support through its Green Jobs Programme.

The ILO and its Green Jobs Programme is spearheading a global Just Transition agenda through the Climate Action for Jobs Initiative. The Paris Agreement on Climate Change, adopted in 2015, acknowledges the imperatives of a just transition and the creation of decent jobs in a response to climate change. In the same year, ILO constituents adopted guidelines for a just transition towards environmentally sustainable economies and societies for all.

Table of Contents

List of Tables

List of Figures

Greening the Philippine Employment Projections Model: New Estimates and Policy Options

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1. Introduction

Climate change has several, profound, and interrelated effects on the society. The most notable of these impacts may be observed, for instance, in agriculture production, as climate change affects farm household incomes and the availability of food sources for the general consumer population. This, in turn, has direct implications on household welfare. In addition, there are many other important aspects where the direct and indirect effects of climate change may be felt, including on health (e.g., Watts et al. 2015) and on labor (e.g., Kjellstrom et al. 2009; ILO 2018). Developing countries, despite contributing the least to climate change, have higher risks of experiencing greater weather variability, which may amplify inequality (Bathiany et al. 2018). The Philippines, because of its geography and current stage of development, is continually being exposed to these risks (Llanto 2017).

Addressing the causes of climate change through different mitigation efforts, however, remains to be a challenging balancing and coordination task at the national, regional, and global fronts. By and large, this difficulty in coordination may be attributed to the fact that climate change recognizes no spatial or political boundaries and affects different facets of human life. Greenhouse gas emissions may be produced locally, but its impacts are not necessarily confined in its production space. While the problem may stem from pollution and the environment, the effects of climate change permeate different aspects of how everyday lives are organized. Further, much of the evidence available in the literature is global in scope. Local evidence on the costs and benefits of climate change, and of potential mitigating and adaptive actions may be needed to strengthen the case for more localized interventions.

At the international scene, several landmark agreements have been ratified to address climate change, including the 1991 Kyoto Protocol and the 2015 Paris Agreement. At the local level, the Philippines, through the Climate Change Commission, has anchored its National Framework on Climate Change on adaptation. Mitigation strategies, on other hand, are considered for its development potentials, and to further the adaptation capabilities of communities. One of such mitigation strategies is to facilitate the transition of the economy towards using more environmentally friendly production technologies or producing more environmental goods and

[1] This research had been conducted in 2017 to 2018, and only recently cleared for public release. The affiliations of the authors when the research was conducted are as follows: Fellow I, Supervising Research Specialist, Fellow II, and immediate past President of the Philippine Institute for Development Studies (PIDS), respectively. The authors are grateful for the thoughtful discussions with participants at the ILO-UNFCC Global Forum on Just Transition held in Geneva, Switzerland on 6-7 December 2017, and at the PIDS brownbag seminar series. This study has benefitted from the generous financial support from the International Labor Organization (ILO). The views and opinions expressed in this report are by the authors. No part of this report may be misconstrued as the official position of the PIDS, or the ILO. The able assistance of Zhandra Tam and Katha Ma-i Estopace are highly appreciated. All remaining errors are by the authors. Email corresponding author: mabrigo@pids.gov.ph

services. How such strategies may benefit the Philippine economy, however, remains an open question.

This report aims to address this gap in the local literature by providing new estimates on the potential impacts on employment demand of transitioning towards a more environmentally sustainable economy. More specifically, we expand and update the Philippine Employment Projections Model [PEPM] (Hilal et al. 2013) to distinguish between the green and conventional production sectors of the economy. Our results highlight the existing knowledge gaps with regards our understanding of the green economy. While expansion of the green sector may induce greater employment in general, aggressive promotion of sectoral greening may result in a significant number of potential job losses, especially in sectors where workers in the green sector are more productive.

The results of this study may be particularly relevant in developing a Human Resource Development (HRD) roadmap for the greening of the Philippine economy. Recently, the government introduced the Green Jobs Act of 2016 (RA 10771) to promote and incentivize the creation of green jobs. To this end, the Green Jobs Act mandates the formulation of a National Green Jobs HRD Plan in order to facilitate the transition of the country into a green economy, to generate more employment opportunities in general and of green jobs in particular, and to promote social justice and workers' welfare.

The rest of this report is organized as follows. In the next section, we provide an overview of the recent macroeconomic trends in the country. This is followed by a stock-taking of the salient national laws, plans, and international commitments of the Philippines that are relevant to the greening of the economy. In Section 4, we present the technical details of the Green PEPM. We compare and contrast the features of the Green PEPM with the earlier PEPM upon which it was based. In Section 5, we characterize the green economy in our baseline. The next section then introduces the projection scenarios that we employed in our simulations. In Sections 7 and 8, we present the results of our simulations in the business-as-usual (BAU) and in the alternative scenarios, respectively. Finally, in the last section, we conclude the report by drawing insights from the simulations results, and by offering some policy options that are relevant to the rational promotion of greening the economy.

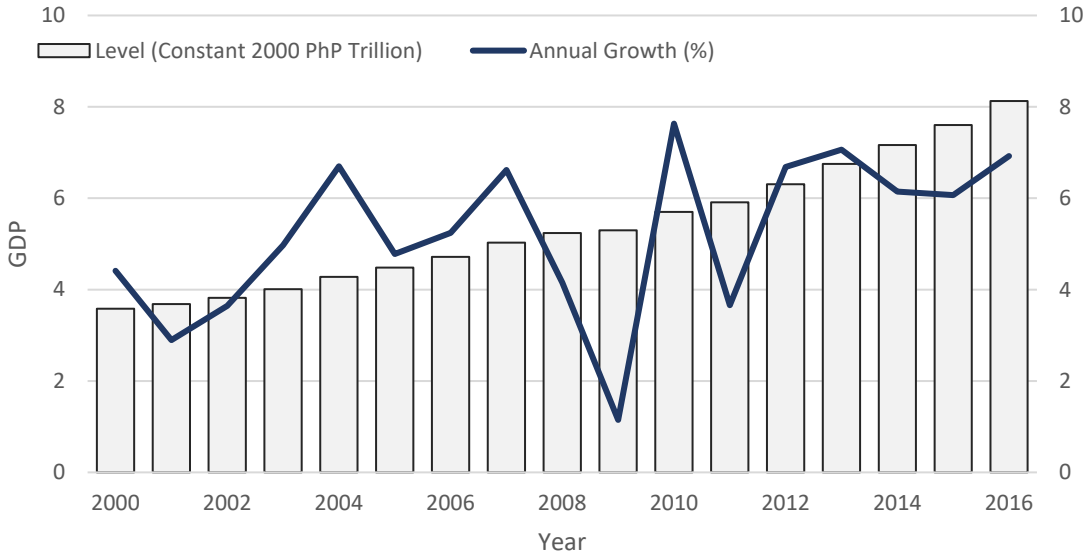
2. Macro-economic Trends and Prospects

2.1. Production and Expenditure

The Philippines has benefitted from a robust economic growth over the last decade, averaging at about 5.5 percent year-on-year (see Figure 1). Even with the global slow-down during the 2008-2009 Financial Crisis, the country was still able to post a modest 1.1 percent annual growth. In a span of less than two decades, the country was able to more than double its Gross Domestic Product (GDP) from 3.6 PHP trillion in 2000 to 8.1 PHP trillion (in 2000 constant prices) in 2016. Compared to its neighboring countries, the Philippines is one of the fastest growing in the ASEAN+3 (i.e. ASEAN countries including China, Japan and South Korea) region in recent years

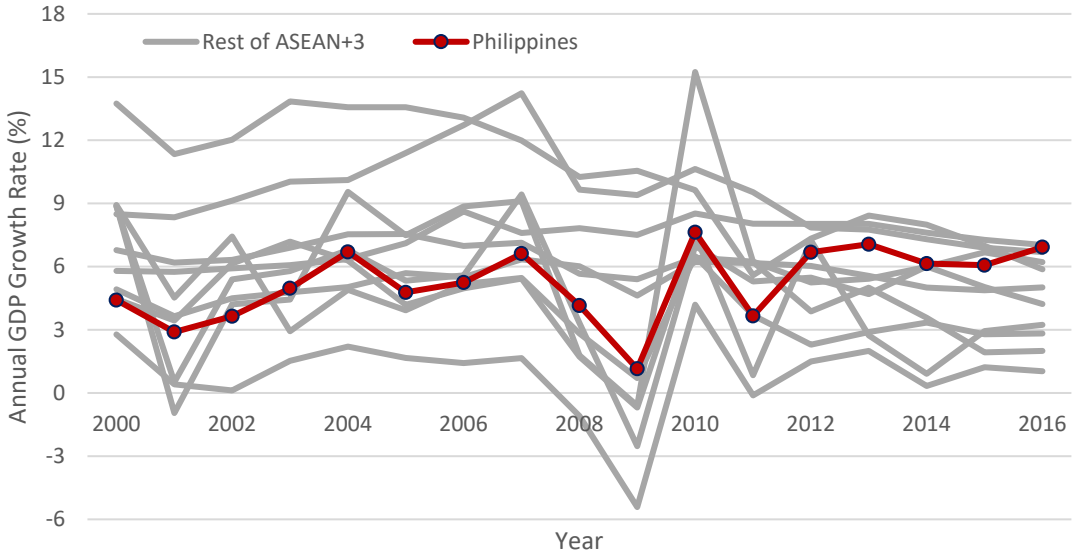
(see Figure 2). And the country is expected to maintain this performance in the short-term as shown by the economic projections of several multilateral agencies (see Table 1).

Figure 1. Gross Domestic Product (GDP): Philippines, 1998-2016



Source: National Accounts, Philippine Statistics Authority (PSA).

Figure 2. Annual GDP growth: ASEAN+3, 2000-2016



Source: World Development Indicators, The World Bank.

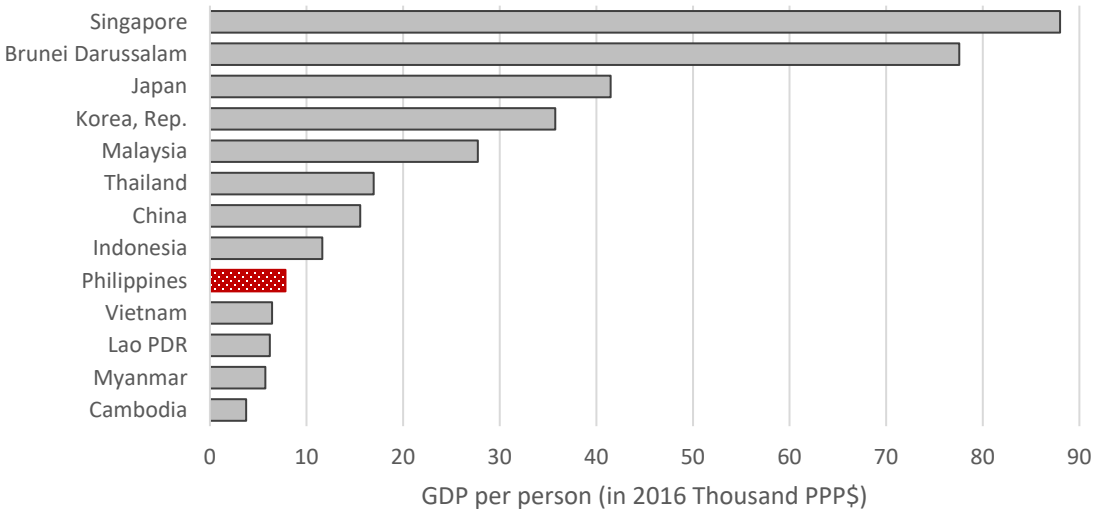
Table 1. GDP growth historical trend and forecasts: ASEAN+3, 2000-2019

	Actual (%)				2018 Forecast (%)			2019 Forecast		
	2000-2010	2010-2015	2015-2016	2016-2017	ADB	IMF	WB	ADB	IMF	WB
Brunei Darussalam	1.4	-0.1	-2.5	1.3	2.0	2.3	n.a.	2.0	5.1	n.a.
Cambodia	8.0	7.2	7.0	6.8	7.0	7.0	6.9	7.0	6.8	6.7
Indonesia	5.2	5.5	5.0	5.1	5.2	5.1	5.2	5.3	5.1	5.3
Lao PDR	7.1	7.8	7.0	6.9	6.6	6.8	6.6	6.9	7.0	6.9
Malaysia	4.6	5.3	4.2	5.9	5.0	4.7	5.4	4.8	4.6	5.1
Myanmar	12.0	7.3	5.9	6.4	6.6	6.4	6.7	7.0	6.8	6.9
Philippines	4.8	5.9	6.9	6.7	6.4	6.5	6.7	6.7	6.6	6.7
Singapore	5.8	4.1	2.0	3.6	3.1	2.9	n.a.	2.9	2.5	n.a.
Thailand	4.6	2.9	3.2	3.9	4.5	4.6	4.1	4.3	3.9	3.8
Vietnam	6.6	5.9	6.2	6.8	6.9	6.6	6.8	6.8	6.5	6.6
China	10.6	7.9	6.7	6.9	6.6	6.6	6.5	6.3	6.2	6.3
Japan	0.6	1.0	1.0	1.7	n.a.	1.1	1.0	n.a.	0.9	0.8
Korea, Rep.	4.4	3.0	2.8	3.1	2.9	2.8	n.a.	2.8	2.6	n.a.

Source: Historical trend are from the World Bank World Development Indicators. Forecasts are from Asian Development Bank's [ADB] (2018) *Asia Development Outlook*, International Monetary Fund's [IMF] (2018) *World Economic Outlook*, and the World Bank's [WB] (2018) *Global Economic Prospects*.

Despite the country's stellar economic performance in the past decade, it continues to lag in absolute terms relative to its neighbors. In 2016, the Philippines' GDP per capita stood at 7,819 PPP$, which is roughly just two-thirds of Indonesia's and half of Thailand's per capita GDP (see Figure 3).

Figure 3. GDP per person: ASEAN+3, 2016



Source: World Development Indicators, The World Bank.

When disaggregated by industrial origin, the country is mainly driven by services, which accounts for more than half of the country's GDP since 1998 (see Figure 4). In 2016, the gross value-added (GVA) from the services sector totaled PHP 4.7 trillion, representing 57 percent of the whole economy. The industry sector, on other hand, contributes about third of the economy, although its share is recently being diluted by the growth in the services sector. Agriculture, which used to dominate the economy in the early years after the second World War, constitutes less than ten percent of the aggregate economy. In terms of growth, the services and industry sectors have been growing on average by 6 percent annually over the past decade, while the agriculture sector has been lagging with its average annual growth of just 1.6 percent. Indeed, over the past decade, the agriculture sector had experienced several contractions: first, during the global crisis in 2008-2009 that led to depression in demand, and, again, more recently, in 2016 as a result of weather shocks, including typhoons and droughts.

Focusing on agriculture, crop production comprises more than half (56%) of the sector's total GVA, of which about two fifths is from rice production. Other large subsectors in crop production include banana (15% of crop production by GVA), coconut (12%), and corn (9 %). Livestock, poultry and fishing all trail behind crop production in terms of output, but still significantly contributes about a tenth each to the agriculture sector's total GVA.

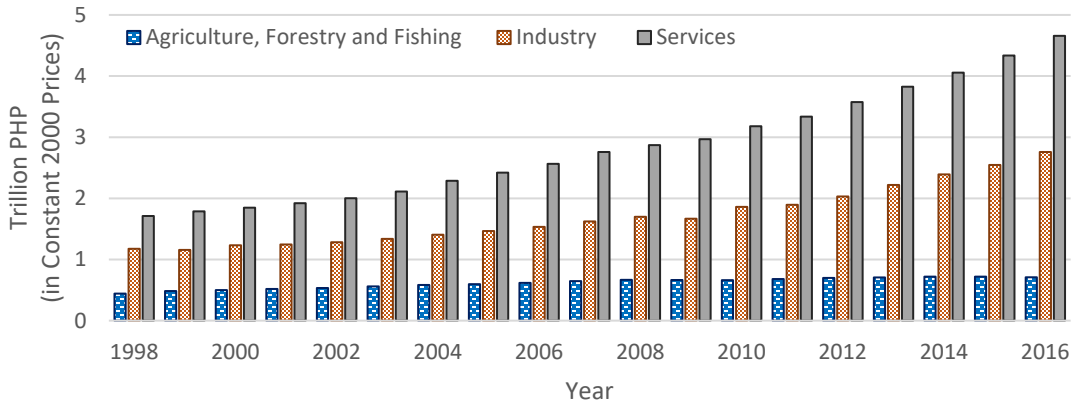
Manufacturing contributes 54 percent of the industry sector's production in 2016, down by about ten percentage points from a decade before. This loss in market share by manufacturing is because of the recent boom in construction, which has gained more than ten percentage points in terms of industry share, up from 23 percent in 2006 to 35 percent in 2016. Within manufacturing, the largest subsectors include manufacturing of food (26% of industry GVA), of chemical and chemical products (7%), and radio, television and communication equipment (5%). The utilities subsector, on the other hand, comprise about a tenth of industry GVA, while mining contributes another 2 to 3 percent.

The largest major sector, services, is dominated by wholesale and retail trade, which together comprise about a third of the services sector's total GVA. Other large contributor subsectors in services include real estate (24% of services GVA), finance (14%), education (7%), and transportation (5%).

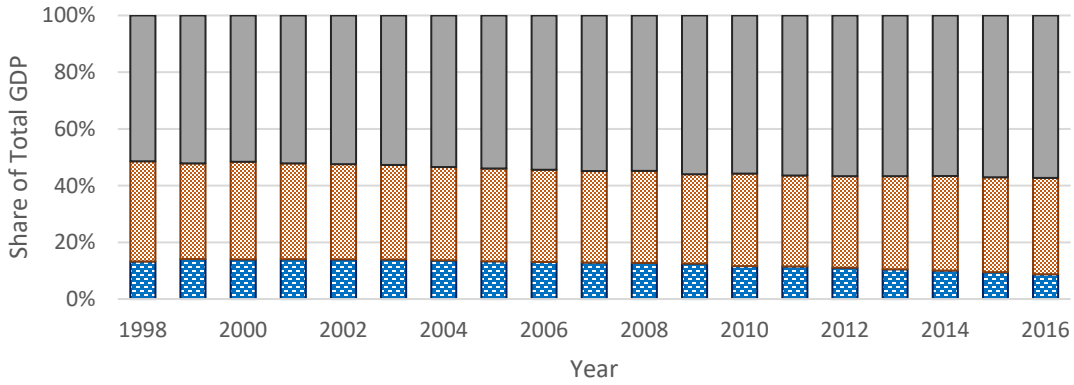
In terms of expenditure, the country is fueled largely by private sector consumption, which constitutes about 70 percent of the country's gross domestic expenditures (see Figure 5). Over the past decade, private sector consumption has been growing on average of 5 percent annually, although it was growing rather sluggishly in the earlier years towards the 2008-2009 global crisis, at which it had recorded the slowest growth. Considering its growth in the last half-decade, private sector consumption marked an annual average growth of 6.1 percent, registering an aggregate contribution of 5.6 PHP trillion in 2016 to the economy. Capital formation also contributes a significant portion to the economy at about a fifth of GDP, although it remains relatively small compared to other countries in the region (Hilal et al. 2013). Government consumption, meanwhile, contributes about a tenth of the country's GDP.

Figure 4. GDP by industrial origin: Philippines, 1998-2016

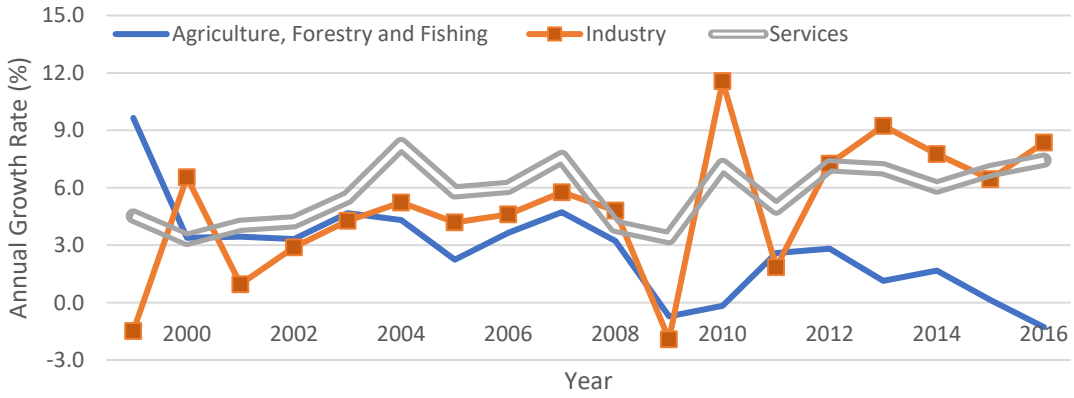
A. Levels (Trillion PHP in constant 2000 prices)



B. Share of total GDP



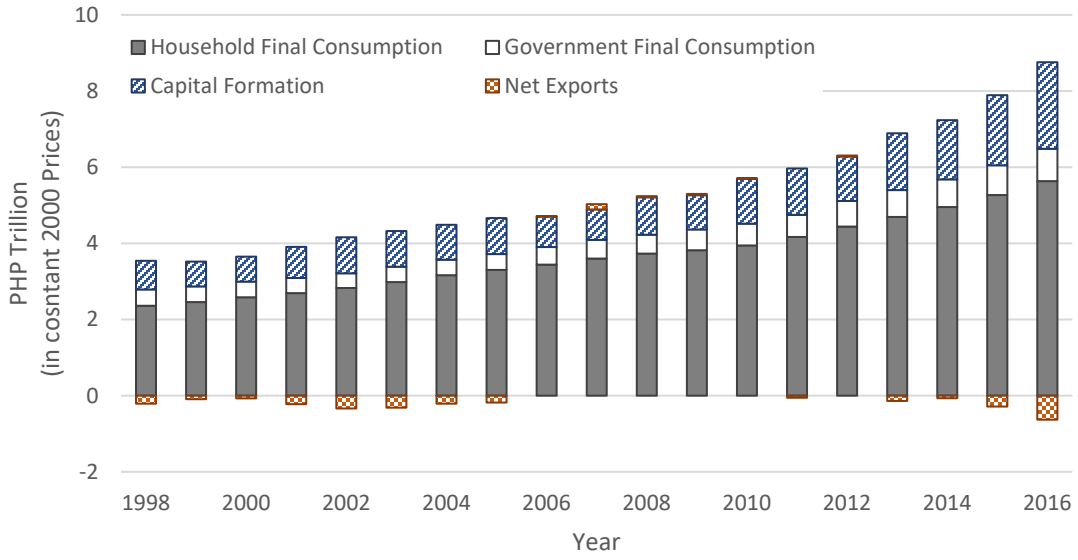
C. Annual growth rate (%)



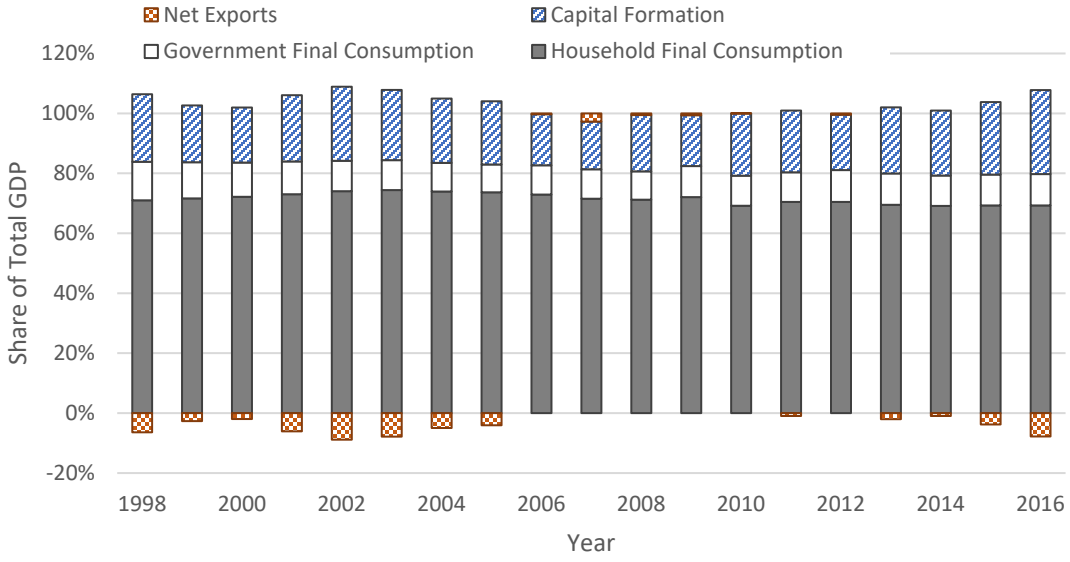
Source: National Accounts, Philippine Statistics Authority (PSA).

Figure 5. GDP by expenditure share

A. Levels (Trillion PHP in constant 2000 prices)



B. Share of Total GDP



Source: National Accounts, Philippine Statistics Authority (PSA).

Lastly, the country has been a net importer of goods and services over the last half-decade, although the country's net export position has fluctuated between –0.63 PHP trillion and 0.14 PHP trillion since 1998. In terms of specific goods, much of the country's exports of goods are electronics, but its share has been declining. From a high of about three fourths of all exported goods in 2006, the share of electronics declined by about 15 percentage points to 58 percent in 2016. Goods imports, on the other hand, are also dominated by electronics (34%), followed by transport equipment (12%).

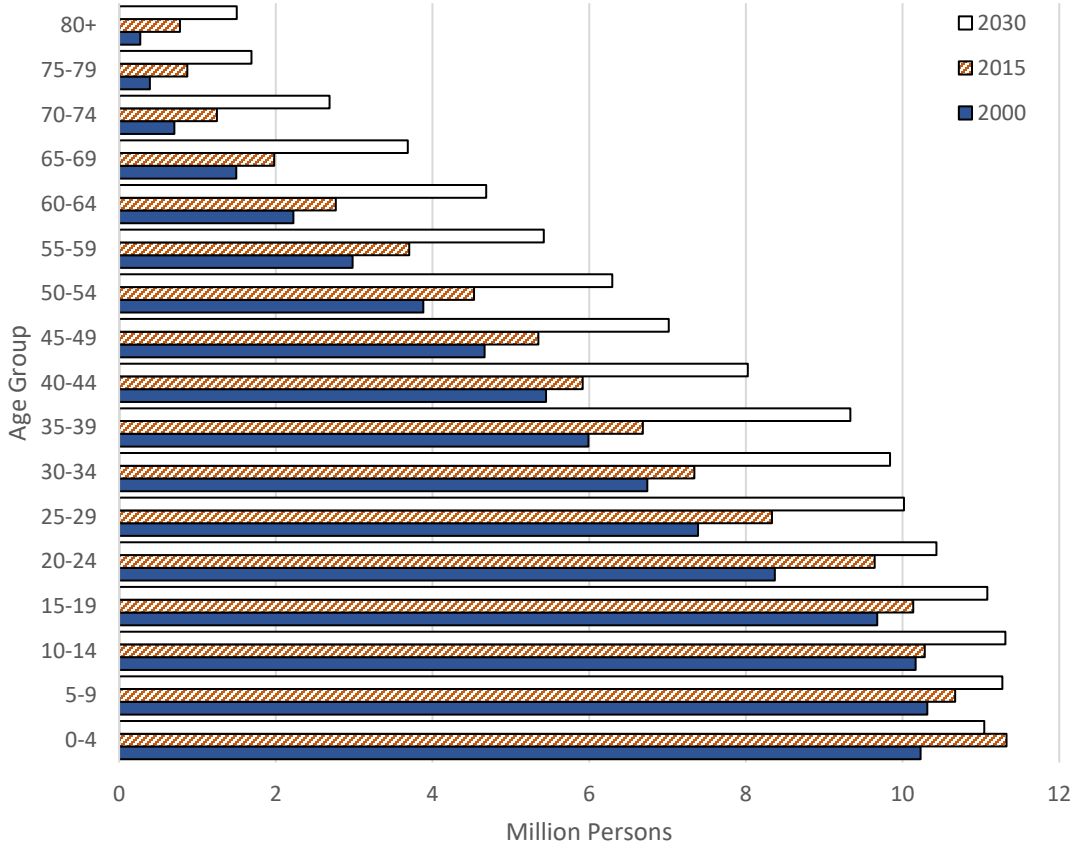
2.2. Population and Employment

2.2.1. Population

The Philippines may be considered as a relatively young population with the characteristic wide-based population pyramid (see Figure 6). In 2000, about a third of its population were children aged 0 to 14 years old, while the elderly comprised of about 3 percent of the population. With the decline in average fertility over the last half century, the country's population has been increasingly concentrated towards the most productive ages, which has resulted in demographic dividends that contributes about 0.5 to 1.0 percentage point growth in per capita income in the last two decades (Mason et al. 2017).

Sustaining the demographic dividends into the future, however, remains a challenge. As the country transitions into an ageing and eventually an aged society, the population that once had sustained the demographic dividend may increasingly become a burden if no corrective policy actions are set in place. By 2030, for instance, about 7.6 percent of the population will be accounted for by those aged 65 years and above. That is more than twice its share in 2000. In absolute terms, the elderly population is expected to grow to about 10 million in 2030 from only 3 million in 2000 and 5 million in 2015.

Figure 6. Population age distribution: Philippines, 2000-2030



Source: Philippine Statistics Authority (PSA).

Part of the challenge to sustain the demographic dividend is in raising the human capital of the population. Compared with other countries in the region, the Philippines lags in many of the usual indicators of human capital, including average years of schooling, gross enrollment ratio, life expectancy at birth, and infant mortality rate (see Table 2). To a large extent, these measures of human capital are directly linked with the resources available to the population, such as income, where the country also lags. Persistent inequality also contributes to the slow improvements in these measures. Government programs implemented in recent years, including the conditional cash transfers for the poor and the expanded socialized health insurance coverage, are expected to lessen if not fully close this gap in human capital investments in the medium- to longer term.

Table 2. Human capital indicators: ASEAN+3, 2016

	Per Capita GDP (PPP$)	Income Inequality (Gini Coefficient)	Average Years of Schooling	Secondary-level Gross Enrolment Ratio (%)	Life Expectancy at Birth (Years)	Infant Mortality Rate (per 1,000 live births)
Singapore	88,003	40	11	108	83	2
Brunei Darussalam	77,571	…	9	96	77	9
Japan	41,476	30	13	102	84	2
Korea, Rep.	35,751	31	13	99	82	3
Malaysia	27,736	42	10	78	75	7
Thailand	16,946	43	8	129	75	11
China	15,559	52	8	94	76	9
Indonesia	11,632	46	8	85	69	22
Philippines	7,819	46	8	88	69	22
Vietnam	6,435	41	8	…	76	17
Lao PDR	6,196	28	5	62	66	49
Myanmar	5,732	39	4	51	66	40
Cambodia	3,744	37	4	…	68	26

Note: … – not available
Source: World Development Indicators, World Bank.

2.2.2. Employment

Table 3 presents some key labor statistics in the Philippines over the past two decades. It shows that although labor force participation rates (LFPR) have remained above 60 percent of the working-age population since 1995, a clear downward trend can be observed over the past two decades. In 1995, the country's LFPR averaged at about 65.6 percent, dropping by 0.8 percentage points to 64.8 percent in 2005, then declining further by 1.3 percentage points to 63.5 percent in 2016. At the same time, however, employment rate has been increasing. From 91.6 percent in 1995, employment rate has increased by three percentage points to 94.6 percent in 2016. Together, these trends in the labor force participation and the employment rates cancel out each other resulting in a somewhat stable employment-to-population ratio of around 58 to 60 percent over the past two decades.

Despite the increasing trend in the employment rate, under-employment has remained relatively high at about one in every five workers, fluctuating between 18 to 22 percent over the past two decades. The share of wage earners, on the other hand, has been increasing. From a low 45.7 percent of all employed in 1995, wage earners constituted about half of all workers in 2000, reached 54.5 percent in 2010, then finally breached the 60 percent mark in 2016.

Table 3. Selected labor force statistics: Philippines, 1995-2016

	1995	2000	2005	2010	2015	2016
Population 15 years old and over ('000)	42,770	48,076	54,799	60,717	64,936	68,311
Labor Force Participation Rate (%)	65.6	64.3	64.8	64.1	63.7	63.5
Employment Rate (%)	91.6	89.9	92.6	92.7	93.7	94.6
Under-employment Rate (%)	19.8	19.9	21.2	18.7	18.5	18.3
Share of wage earners (%)	[a]45.7	50.7	50.5	54.5	59.3	61.2

Source: Philippine Statistics Authority. a/ Corresponds to April and July rounds only.

In 2016, about 23 million workers are employed in services, representing about 56 percent of all those employed during the year (see Figure 7). But this dominance of the services sector with regards employment is only a recent phenomenon. In 1980s to the early 1990s, agriculture had been the primary employer sector in the country, but its share has been declining through the years. By 1998, the gap in employment in agriculture and in the services sector had started to widen with each sector employing about 10 million and 12 million workers, respectively. The employment in agriculture has since grown although very lethargically, reaching its peak at about 12 million workers in the mid-2000s, before settling to around 11 million more recently.

During the same period, the industry sector comprised about 15 percent of the total employed, growing at an average of 2.6 percent annually. Until 2013, employment in industry had not been able to breach the six million worker's mark. With the resurgence of the industry, specifically of manufacturing, however, the sector was able to generate an additional one million employment positions in less than half a decade, surpassing the seven million workers mark in 2016. Within the manufacturing sector, the largest contributors of employment are the food (28%), textiles (18%) and electronics (16%) subsectors.

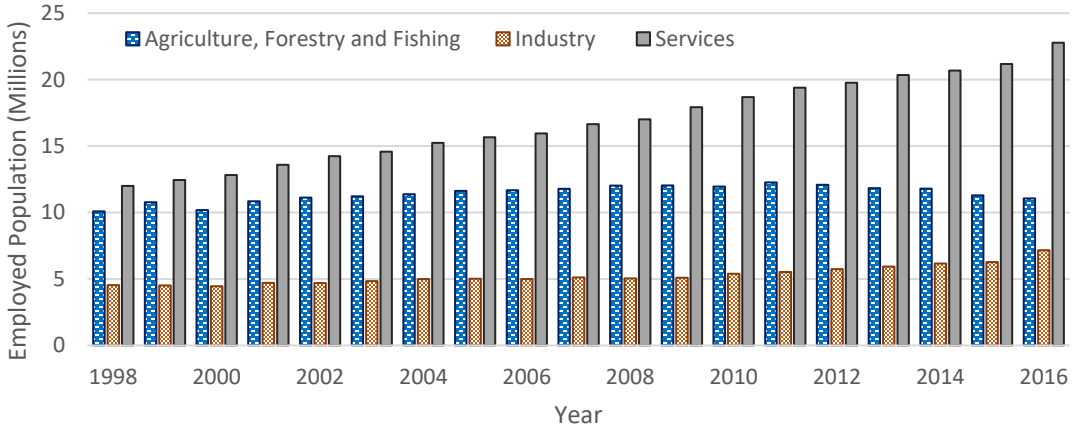
3. Policy Environment

In 2016, the Philippines enacted Republic Act (RA) 10771 or the Philippine Green Jobs Act of 2016. It provides a framework for government to identify, develop, certify, sustain, and incentivize "green jobs" to support the country's transition into a greener economy. Some of its most salient provisions include the formulation of a National Green Jobs Human Resource Development Plan, and the creation of an incentives system to encourage business enterprises to generate and sustain green jobs.

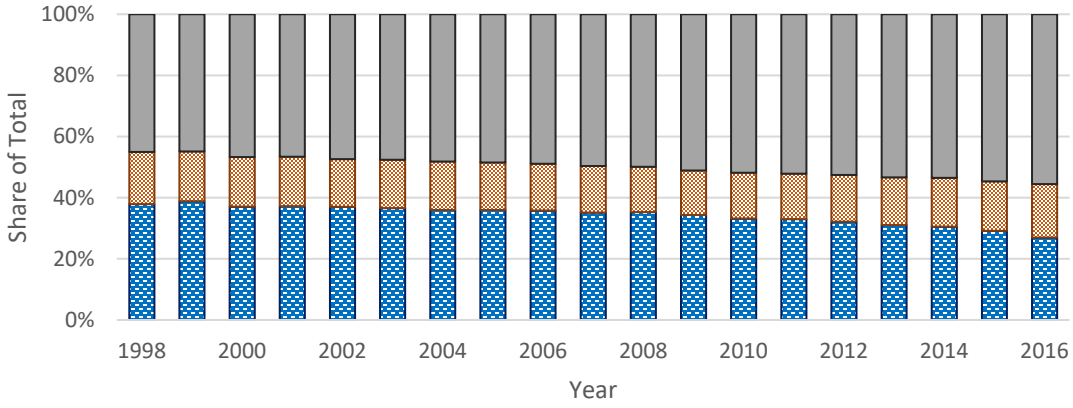
Section 4.c of RA 10771 defines green jobs as "employment that contributes to preserving or restoring the quality of the environment" with the qualification that they are also "decent jobs that are productive, respect the rights of workers, deliver a fair income, provide security in the workplace and social protection for families, and promote social dialogue." It follows closely the definition proposed by the joint Green Jobs Initiative by the United Nations Environment Program (UNEP), the International Labour Organization (ILO), the International Organization of Employers (IOE) and the International Trade Union Confederation (ITUC) (Renner et al. 2008).

Figure 7. Employment by sector: Philippines, 1998-2016

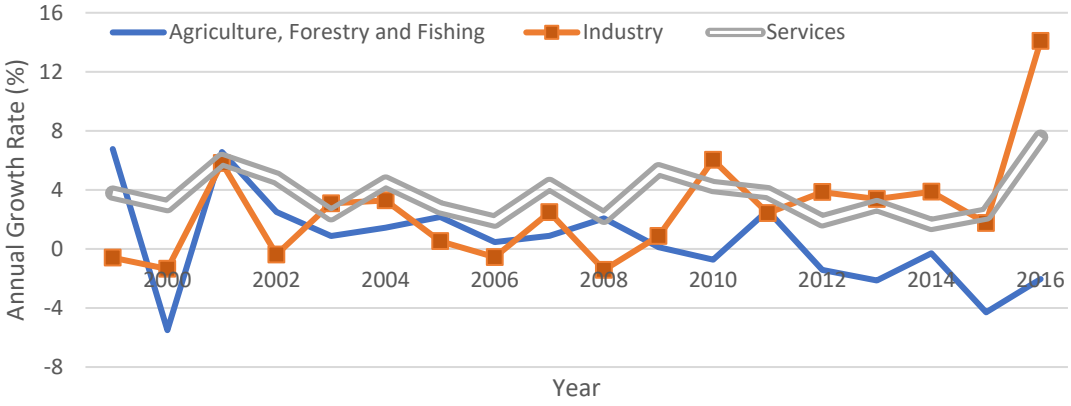
A. Levels (million persons)



B. Share of total employment



C. Annual growth rate (%)



Source: Philippine Statistics Authority (PSA).

The Philippine concept of green jobs is very general that it can be in any sector, i.e. agriculture, industry or services, and in any employment position that "protect ecosystems and biodiversity, reduce energy, materials and water consumption through high efficiency strategies, decarbonize the economy, and minimize or altogether avoid generation of all forms of waste and pollution (Section 4(c), RA 10771)." Thus, it may include employment in both traditionally green sectors, i.e., those that produce green goods and services such as in renewable energy and in waste and materials recovery, and in otherwise brown sectors but uses green products and processes in its production.

In this section, we enumerate some of the more prominent national legislations and plans, and international commitments of the Philippines that are relevant to fostering green jobs in the economy. Our aim is not to exhaustively identify existing instruments, but instead to provide a flavor of the legal and policy framework available in the Philippines to support its green jobs initiatives. We include only major instruments that we believe have important implications on decent work and environmental quality, such as those relating to agriculture, energy, environmental quality and management, labor and employment, and natural resources. This reflects the very broad nature of what could potentially constitute green jobs as defined by the Green Jobs Act in the absence of an operational definition.

Prior to RA 10771, the country has no legal concept pertaining to green jobs, although there had been a number of attempts within government for a definition (e.g. Cruz 2009) or for its inclusion in development planning (e.g. DOLE 2011; NEDA 2011). Despite the green jobs legal framework being new, the Philippines has a long history of fostering policies, programs and other initiatives that encourage the creation and upkeep of green jobs in the economy. Table 4 lists some of the more salient policy directives, and conveniently summarizes how these directives fit into the green jobs framework. It includes national laws and programs that encourage the efficient use of resources, and national and sectoral plans aimed at promoting jobs that support environmental sustainability. Together, these national policies, programs, plans and other related initiatives feed into the Philippines' international commitments to promote decent work and to safeguard the environment.

Table 4. Significant national laws and plans, and international commitments related to green jobs

	Relevance to Green Jobs			Covered Policies		
	Green Products*	Green Processes	Decent Jobs	Standards	Upskilling	Incentives
A. National Laws and Issuances**						
Agriculture						
Agriculture and Fisheries Modernization Act of 1997 (RA 8435)		X		X	X	X
Philippine Fisheries Code of 1998 (RA 8550)		X		X	X	X
Organic Agriculture Act of 2010 (RA 10068)	X			X	X	X
Energy						
Biofuels Act of 2006 (RA 9367)	X	X		X	X	X
Renewable Energy Act of 2008 (RA 9513)	X	X		X	X	X
Environment, Standards						
Prevention and Control of Marine Pollution (PD 600)		X		X		
National Pollution Control Decree of 1976 (PD 984)		X		X		
Motor Vehicle Pollution (PD 1181)		X		X		
Toxic Substances and Hazardous and Nuclear Wastes Control Act (RA 6969)		X		X		
Philippine Clean Air Act of 1999 (RA 8749)		X		X	X	X
Philippine Clean Water Act of 2004 (RA 9275)		X		X	X	X
Ecological Solid Waste Management Act of 2000 (RA 9003)	X	X		X	X	X
Philippine Green Building Code****	X	X		X		
Environment, Management						
Philippine Environmental Policy (PD 1151)		X		X		
Philippine Environmental Code (PD1152)		X		X	X	X
Environmental Impact Assessment System (PD 1586)		X		X		
Climate Change Act of 2009 (RA 9729)		X			X	
Climate Change Expenditure Tagging (various JMC)***		X		X		
Labor and Employment						
Labor Code of the Philippines (PD 442)			X	X	X	X

Notes: *Green products include both goods and services. **PD – Presidential Decree; RA – Republic Act; JMC – Joint Memorandum Circular. ***Includes Department of Budget and Management (DBM) – Climate Change Commission (CCC) JMC 2015-01, and DBM-CCC-Department of the Interior and Local Government (DILG) JMC 2015-01. **** Referral Code of the National Building Code (PD 1096). *****CCC – Climate Change Commission; NEDA – National Economic and Development Authority; DOLE – Department of Labor and Employment; DTI – Department of Trade and Industry; BOI – Board of Investments.

Table 4. Significant National Laws and Plans, and International Commitments related to Green Jobs *(cont'd)*

	Relevance to Green Jobs			Covered Policies		
	Green Products*	Green Processes	Decent Jobs	Standards	Upskilling	Incentives
A. National Laws and Issuances** (continued)						
Natural Resource						
Revised Forestry Code of the Philippines (PD 705)		X		X	X	X
People's Small-scale Mining Act of 1991 (RA 7076)		X	X	X		
National Protected Areas System Act of 1992 (RA 7586)	X	X		X		
Philippine Mining Act of 1995 (RA 7942)		X	X	X	X	X
B. National Plans and Frameworks***						
CCC National Framework Strategy on Climate Change 2010-2022	X	X	X			
CCC National Climate Change Action Plan 2011-2028	X	X	X			
NEDA Philippine Development Plan 2017-2022	X	X	X			
DOLE Labor and Employment Plan 2011-2016	X	X	X			
DA Agriculture and Fisheries Modernization Plan 2011-2017	X	X	X			
DTI-BOI Industry Roadmaps	X	X				
DTI-BOI Investment Priorities Plan 2017	X	X				
DOE Philippine Energy Plan 2016-2030	X	X				
DOE Power Development Plan 2016-2040	X	X				
C. International Commitments						
Kyoto Protocol						
Paris Agreement on Climate Change						
2030 Agenda for Sustainable Development						
Sendai Framework for Disaster Risk Reduction 2015-2030						
Manila Declaration on Green Industry in Asia						
Manila Declaration on Health and Environment						
Various United Nations and affiliated Conventions						

Notes: *Green products include both goods and services. **PD – Presidential Decree; RA – Republic Act; JMC – Joint Memorandum Circular. ***Includes Department of Budget and Management (DBM) – Climate Change Commission (CCC) JMC 2015-01, and DBM-CCC-Department of the Interior and Local Government (DILG) JMC 2015-01. **** Referral Code of the National Building Code (PD 1096). *****CCC – Climate Change Commission; NEDA – National Economic and Development Authority; DOLE – Department of Labor and Employment; DTI – Department of Trade and Industry; BOI – Board of Investments.

3.1. National Laws

The Philippines has an articulate body of laws regarding decent work and environmental protection that spans more than four decades. As noted by Ofreneo (2010, 2015), many of the existing policies

and programs are actually the result of earlier discussions in the 1970s. On decent work, for instance, Presidential Decree (PD) 442 or the Labor Code of the Philippines, which was first enacted in 1972 and later successively amended, provides a compendium of standards regarding labor and employment, including minimum wage determination, working conditions and safety standards, social protection benefits, and self-organization and collective bargaining, among others. On environmental protection, the 1977 Philippine Environmental Policy (PD 1151), and, later, the 1978 Environmental Impact Statement System (PD 1586) requires any project or activity, whether by government or by the private sector, that may have significant impact on the environment to submit Environmental Impact Statements (EIS). EIS outlines possible environmental consequences of a project, and provides measures of how these consequences, if any, may be prevented or mitigated.

A number of important environmental laws that are still relevant today were enacted in the 1970s. The subject of the laws ranges from the more general environment policy (PD 1152) to more specific issues like forests (PD 705) and sector-specific pollution (PDs 600, 984, and 1181), and touches on topics such as zoning and resource uses, environmental quality, pollution standards and abatement, and resource conservation, among others.

Subsequent national laws and other issuances are, to some degree, refinements of these earlier pronouncements. For instance, the National Integrated Protected Areas System Act of 1992 (RA 7586), which rationalizes the management of national protected areas, may be seen as an enhancement of sections pertaining to environmental protection and management in the Philippine Forestry Code (PD 1152). The Toxic Substance and Hazardous and Nuclear Wastes Control Act of 1990 (RA 6969), Philippine Clean Air Act of 1999 (RA 8749), Ecological Solid Waste Management Act of 2000 (RA 9003) and Philippine Clean Water Act of 2004 (RA 9275) provide relevant updates and substantial sophistication to the earlier decrees on environmental quality, and pollution control and abatement.

Although it appears at first glance that these earlier national laws are tangential to employment generation per se, such legislation are relevant to the creation and maintenance of green jobs in the economy to the extent the laws encourage efficient use of natural resources, and greater investments in green industries. These laws are able to influence the market for green jobs by: (a) setting environmental quality standards and prohibited acts, and defining corresponding penalties for violations; (b) promoting the continuous upgrading of skills through research and training, including the mainstreaming and transferring of technology; and (c) establishing systems of compensation and/or incentives to specific sectors. These elements are neither mutually exclusive nor exhaustive, but, at the very least, indicative of how national policies influence the labor market.

For instance, the Agriculture and Fisheries Modernization Act of 1997 (RA 8435) and the Philippine Fisheries Code of 1998 (RA 8550), respectively mandate adherence to food and non-food agricultural and fisheries product standards, and to a code of practice for aquaculture. The Philippine Green Building Code, a referral code to the 1977 National Building Code (PD 1096), provides a framework of standards to improve the efficiency of building performance. The People's Small-scale Mining Act of 1992 (RA 7076) and the Philippine Mining Act of 1995 (RA 7942) both include provisions that require those involved in mining operations to observe rules and regulations on environmental protection and conservation, including those on cutting trees,

processing minerals, and abating pollution. Legal provisions on compensations and/or incentives are essential aspects of the Biofuels Act of 2006 (RA 9367), the Renewable Energy Act of 2008 (RA 9513) and the Organic Agriculture Act of 2010 (RA 10068), which provide both fiscal and non-fiscal incentives to businesses identified by the respective laws. Continuous upskilling through research and training are also underscored in each of these laws by mandating support to research and development programs either through the creation of a new public entity, or by identifying existing government offices as lead agencies.

In addition to the laws already identified, the government has also promulgated national policies that are largely administrative in nature, and deals with harmonizing efforts within the government. The Climate Change Act of 2009 (RA 9729) created the Climate Change Commission (CCC), which is mandated to coordinate, monitor and evaluate the government's program and action plans related to climate change. It is tasked to formulate a Framework Strategy on Climate Change, which would be the basis for the country's program on climate change planning, research and development, extension and monitoring. In 2009, CCC issued joint memoranda with the Department of Budget and Management (DBM) and with the Department of the Interior and Local Government (DILG) enjoining government offices to identify expenditures related to climate change in their annual budgets with the aim of mainstreaming climate change adaptation and mitigation in public sector planning.

The Green Jobs Act complements these earlier laws by sharpening the country's policy focus on promoting green jobs by collecting policy ideas from disparate sectors into just one document. Firstly, it promotes training for green jobs, for instance, by mandating the Department of Education (DepEd) and the Commission on Higher Education (CHED) to develop and implement curricula that would support the skills and knowledge requirements of a green economy. It tasks the Technical Education and Skills Development Authority (TESDA) and the Professional Regulations Committee (PRC) to develop training regulations and qualifications framework, respectively, to facilitate the certification of skilled and professional green manpower. Secondly, RA 10771 provides incentives to business enterprises to generate and sustain green jobs, including (a) income tax deduction equivalent to fifty percent of the total costs incurred for skills training and research development, and (b) tax- and duty-free importation of capital goods used in the promotion of green jobs by the enterprise. These benefits are on top of the existing incentives that some green enterprises already enjoy from existing laws. Finally, the Green Jobs Act mandates various government offices, including DOLE, the Department of Trade and Industry (DTI), and the Department of Tourism (DOT), among others, to promote green jobs in their respective sectors.

3.2. National Plans

The buzzword "green jobs" is a recent innovation in Philippine national development and strategic plans, although the same concept has already been present, albeit couched in different language, in earlier national plans. For instance, the promotion of ecologically-sound farming and production systems, e.g., through organic fertilizers and integrated pest management techniques, has been mentioned in Philippine Development Plans (PDP) even before the turn of the millennium (e.g. NEDA 1990). National plans are important with regard to green jobs as these plans outline the government's future targets and provide specific strategies and actions to achieve these targets.

In the recent Philippine Development Plan (NEDA 2017), the government's economic strategy blueprint until 2022, the government has interspersed actions that promote the country's transition into a greener economy in its sectoral plans. This includes, for instance, (a) mainstreaming of green growth principles in public planning (governance, Chapter 5), (b) incentivizing green manufacturing to encourage the shift towards more efficient technologies, and fully implementing the Green Jobs Act to promote green growth and innovation (industry and services, Chapter 9), (c) promoting green spaces in urban areas (urban planning, Chapter 20), (d) strictly implementing the Green Building Code (infrastructure, Chapter 19), (e) preparing faculty, facilities and curriculum related to knowledge and skills requirement of a green economy (education and training, Chapter 10), and (f) promoting sustainable consumption and production, and expanding sustainable resource-based enterprises (environment, Chapter 20). These plans and aspirations in the PDP are then echoed in other sectoral development plans, such as the Labor and Employment Plan by the Department of Labor and Employment (DOLE), and the Agriculture and Fisheries Modernization Plan by the Department of Agriculture (DA).

In terms of plans related to climate change adaptation and mitigation, the CCC National Framework Strategy on Climate Change (NFSCC) 2010-2022 lists key response areas to facilitate the country's transition to low greenhouse gas emissions. Although not originally envisioned in the NFSCC, these priority areas may be drivers of green jobs at the same time. These priority areas include (a) energy efficiency and conservation, (b) renewable energy, (d) environmentally sustainable transportation, (e) sustainable infrastructure, and (f) waste management. The CCC National Climate Change Action Plan 2011-2028, which fills-in concrete government actions to realize the NFSCC, identifies creating green jobs and sustainable livelihood as one of its strategic focus.

The Department of Energy (DOE) also takes part in the process of creating environmentally-sustainable economy. In its Philippine Energy Plan (PEP) 2016-2030, the DOE outlines its development strategies and vision for the energy sector through sectoral roadmaps including one for the renewable energy (RE) sector. This roadmap supports the implementation of the National Renewable Energy Plan (NREP) to achieve the overall target of doubling RE installed capacity by 2030. It further commits to establishing an RE landscape by fast-tracking the implementation of RE projects, continuous review of NREP and implementation of the Green Energy Option, and conduct of R&D activities. Other major goals of the roadmap include creation of conducive business environment and reliable and efficient infrastructure. Aside from PEP 2016-2030, DOE's Power Development Plan 2016-2040 envisions the development of a Renewable Energy Market in support to the implementation of Renewable Portfolio Standards (RPS). The creation of such market is expected to facilitate trading of Green Certificates as a mechanism for compliance to RPS. Both national energy plans are directed towards advancement of a sustainable energy sector and realization low-carbon future for the country.

To a large extent, the priority sectors that have been identified in the PDP and the NFSCC are included as preferred activities for investment in the government's Investment Priorities Plan (IPP) 2017 through the Board of Investments (BOI), which is administratively attached to the Department of Trade and Investment (DTI). Inclusion in the DTI-BOI IPP preferred areas of investment qualifies registered enterprises to fiscal and non-fiscal incentives enumerated in the 1987 Omnibus Investments Code (Executive Order 226, series of 1987). Some of the green

industries listed as preferred area of investment in the 2017 IPP include (a) charging/refueling stations for alternative energy vehicles, (b) industrial waste treatment, (c) environment or climate-change related projects, including green ship recycling and materials recovery facility, and (d) energy, including renewable energy, power generation from waste heat and other wastes, and the establishment of battery energy storage systems.

Potentially, all sectors that have been identified in the above national plans may be drivers of green jobs inasmuch as green technology and green intermediate products are used in their production processes. Although not originally intended to be green, the sectoral plans may be made greener as exemplified, for instance, by suggestions for "greening" the 2014 DTI-BOI Industry Roadmaps (Guterrer 2015). The Industry Roadmap outlines the country's comprehensive industrial strategy, and includes industrial roadmaps for traditionally green industries biodiesel and electronic vehicle manufacturing, and for more brown industries, like pulp and paper, and copper industries.

3.3. International Commitments

The national policies, programs, plans and other related initiatives that have been so far identified form part of the country's commitments to the international community. The Philippines has ratified a number of international conventions to promote decent work and to safeguard the environment, including 37 ILO Conventions, e.g. on forced labor and on social security, the 2030 Agenda for Sustainable Development, and the 1997 Kyoto Protocol, among many others. Recently, in March 2017, the Philippines has acceded to the 2015 Paris Agreement on Climate Change (PACC). This allows the country to access the Green Climate Fund, a financial mechanism under the United Nations Framework Convention on Climate Change to assist developing countries in their climate change adaptation and mitigation strategies.

As part of the country's commitment under the 2015 PACC, the government has put forward its Intended Nationally Determined Contribution (INDC) of lowering greenhouse gas emissions (in CO2-equivalent) by seventy percent in 2030 relative to the country's business-as-usual scenario in 2000-2030. The reduction will come from climate change mitigation measures in the energy, transport, waste, forestry and industry sectors. The Philippines' commitment, however, is conditional on financial resources that will be made available to the country. Relative to its Asia and the Pacific neighbors, the country's INDC commitment is "at the least ambitious end of what would be a fair contribution" (Amponin and Evans 2016, p.4).

In addition to the abovementioned international commitments, the Philippines is also a party to other voluntary, non-binding international agreements. For instance, the 2009 Manila Declaration on Green Industry in Asia encourages Asian countries to set appropriate institutional, regulatory and policy framework that fosters transition to resource-efficient and low-carbon industries. The Philippines also supported the adoption of the Sendai Framework for Disaster Risk Reduction 2015-2030, the successor instrument to the Hyogo Framework for Action 2005-2015, which provides a global blueprint for disaster risk reduction efforts. More recently, the country hosted the *Asia-Pacific Regional Forum on Health and Environment*, during which participating countries, including the Philippines, committed to the 2016 Manila Declaration on Health and Environment. Along with addressing health issues, countries shall also act on improving air

quality, reducing adverse per capita environmental impact of cities through actions such as the adoption of sustainable urban design principles and sound environmental management.

3.4. Implications on Green Jobs

The Philippines' legal and policy environment is replete with enabling policies, programs and plans that could respond to the 2016 Green Jobs Act's mandate of identifying, creating and sustaining green jobs to support the country's transition into a greener economy. It is important to emphasize that many of the national policies and plans that have been mentioned here do not directly or solely deal with the creation of green jobs. Nonetheless, the identified national laws are very relevant to the extent that these legislations encourage the efficient use of natural resources, and greater investments in green industries. Development plans, on the other hand, has been demonstrated to be pliable to "greening", even those that pertain to traditionally brown sectors (e.g. Guterrer 2015).

These policy instruments are expected to impact the Philippine labor market. As the country transitions into a greener economy, new employment positions may need to be created, and previous jobs might be substituted or transformed to fill the demand in emerging green industries or in traditionally brown industries but using green processes. As new technologies are developed, some employment positions might become obsolete and must therefore be replaced (Renner et al. 2008; Cruz 2009). The extent of these gains and losses remains to be the primary question that needs an empirical evaluation. In any case, the legal provisions for continuous skills upgrading is an important safety net feature to ensure that workers are up to task during the transition.

The policies and commitments that have been identified here are in no way exhaustive. It instead provides a broad-stroke sampling of the legal and policy framework available in the Philippines that could potentially influence, either directly or indirectly, the labor market for green jobs. That these frameworks are available does not mean, however, that they are perfect. While these national instruments provide a comprehensive framework to tackle the issues that they were created for, a number of observers (e.g. Israel 2010; Israel and Asirot 2002) note that many of these national laws and policies have not been fully observed or implemented. Limitations and blind-spots in the country's national laws, plans and international commitments – and their implementation – exist, and have been discussed extensively elsewhere (e.g. Amponin and Evans 2016; Ofreneo 2015). But, as shown by the legal history of the Philippines, these policy instruments are never final, and always subject to further refinements and elaborations.

4. Green Philippine Employment Projection Model

The Philippine Institute for Development Studies (PIDS) was commissioned by the International Labor Organization (ILO) to expand the existing Philippine Employment Projections Model (EPM) that was originally developed to forecast labor imbalances in the country (cf. Hilal et al. 2013). The model extension aims to incorporate production and employment in green industries into the Philippine EPM with the end view of providing forecasts that may be used in the formulation of the National Green Jobs Human Resource Development Plan.[2] This endeavor is

[2] As mandated in the Philippine Green Jobs Act of 2016 (Republic Act 10771).

part of ILO's pilot application of its "Just Transition" guidelines to aid the Philippines as the economy transitions toward a more sustainable, low-carbon, climate-resilient environment.

The development of the Green Philippine EPM (Green PEPM) began in May 2017 with a review of the original Philippine EPM and of related policy documents that may be used to formulate forecast scenarios for the Green PEPM. In June 2017, an inception meeting with representatives from key sectors, including government offices, employers' organizations, and workers' associations, was organized to present the initial plans for the development of the Green PEPM, as well as to solicit their feedback. During the inception meeting, the parent sectors that would be used in the Green PEPM were agreed upon, taking into consideration the priority sectors that had been identified in the "2017-2022 Philippine Development Plan" (PDP) by the National Economic and Development Authority [NEDA] (NEDA, 2017), and in the "Trabaho, Negosyo, Kabuhayan" initiative of the Department of Labor and Employment (DOLE) and the Department of Trade and Industry (DTI). The identified sectors also coincide with priority sectors identified in the recent green jobs mapping in the Philippines undertaken by ILO (2014). The sectoral disaggregation that we used in this report are listed in Annex A, with the corresponding Green PEPM codes used in the simulation results, also presented in the Annex.

An initial version of the Green PEPM was presented in a two-day workshop in November 2017 that was participated by representatives from various government agencies. The workshop aimed to provide a review of the Philippine EPM and to introduce the Green PEPM to future potential users. During the event, potential users were acquainted with the modelling framework, data inputs, and estimation techniques employed in the model. The Green PEPM was subsequently updated based on the discussions during the workshop. In January 2018, initial projection results from the Green PEPM were presented in a workshop attended by key stakeholders. The validation workshop provided a venue for stakeholders to provide suggestions, clarify assumptions, and identify limitations of the Green PEPM.

4.1. Model Description

As mentioned in the previous section, the Green PEPM builds on the earlier Philippine EPMs. As such, it largely uses the same data inputs, modeling framework, and estimation strategy.[3] More specifically, the Green PEPM uses National Accounts data from the Philippine Statistics Authority (PSA), including (i) the 2000 and 2006 input-output (IO) tables, and (ii) 1998-2016 estimates of Gross Domestic Product and its components. Detailed product-level imports and exports from the United Nations Commodity Trade (UN ComTrade) Statistics database (comtrade.un.org) were also used. Employment statistics were calculated from the October rounds of the quarterly Labor Force Survey by PSA. The Green PEPM, like its predecessor Philippine EPMs, leverages on the inter-industry linkages captured in IO tables, which allows it to explicitly account for the contribution of different industries to the overall economy.

The input data were harmonized to ensure internal consistency and for comparability across data sources and years. Concordance tables were created to convert the 1994 and the 1998 Philippine Standard Industrial Classification (PSIC) systems to the 30 Green PEPM parent sectors. Separate

[3] See Hilal et al. (2013) for details of the Philippine EPM.

concordance tables were also created to translate the industrial classification systems adopted in the 240-sector 2000 and 2006 IO tables. Further, UN ComTrade Harmonized System product codes were converted to the International Standard Industrial Classification codes using product concordance from the World Bank's World Integrated Trade Solution database (wits.worldbank.org), which is then matched to the Green PEPM parent sectors. Finally, following the procedures used in the previous Philippine EPMs, missing values were interpolated by combining information from the IO tables and detailed components of the National Accounts. The IO table was updated to the model base year using bi-proportional matrix adjustment, or more commonly known as the RAS method.

The main difference between the Green PEPM and the original Philippine EPM is the explicit identification of green sectors in the former. This is done by disaggregating parent sectors[4] into conventional and green sub-sectors using information from the PSA Annual Survey of Philippine Business and Industries (ASPBI). Details of this procedure are discussed in the next subsection. Such expansion is a necessary and natural extension to the original Philippine EPM since the green and conventional industries may use different inputs and have distinct production structures.

In addition to explicitly modelling green industries, the Green PEPM departs from the Philippine EPM at other various junctures. First, the original Philippine EPM is based on a Leontief "demand-side" model (cf. Leontief 1936), while the Green PEPM uses the Ghosh "supply-side" model (cf. Ghosh 1958). In the Leontief model, changes in gross output are driven by changes in final demand (or consumption), while in the Ghosh model the changes are driven by changes in gross value-added (or income). Necessarily, the two models rely on distinct assumptions, although under certain conditions the two models are equivalent (Guerra and Sancho 2012; Manresa and Sancho 2013).[5]

The use of the Ghosh model may be preferred based on at least two accounts. On the more practical side, using the Ghosh Green PEPM only requires the forecasting of gross value-added by sector to calculate gross output. In the Leontief Philippine EPM, on the other hand, each of the components of final demand, i.e., final demand by domestic consumers, net imports, fixed capital formation, etc., need to be projected separately. Although aggregate consumption has been documented to be generally smoother than aggregate income (e.g., Campbell and Deaton 1989), the same cannot be claimed for the rest of the final demand components. Thus, forecasting sectoral gross value-added may be easier than projecting overall sectoral final demand. In terms of government planning, economic targets are often provided in terms of growth in sectoral gross value-added rather than in final demand. This makes it easier to set forecast assumptions for the Green PEPM.

The second point of departure between the Green PEPM and the original Philippine EPM is in how sectoral forecasts are derived. In the latter, autoregressive distributed lag level-equations for each of the final demand components by sector are estimated using historical data. These models are then used to generate baseline sectoral final demand forecasts for the Philippine EPMs. These baseline forecasts are then adjusted to ensure aggregate consistency with exogenous economy-wide growth targets. In the Green PEPM, all gross value-added forecasts are set using growth rates

[4] See Annex 1 for the list of 30 parent sectors used in the Green PEPM, and its 2009 PSIC counterpart.

[5] Both models have been separately criticized, defended, and extended in the last eight decades. See, for instance, Georgescu-Roegen (1950), Rose and Miernyk (1989), Mesnard (2009), Oosterhaven (1996), and Dietzenbacher (1997) for excellent discussions of issues and extensions.

that are externally provided by users. This may be preferred since sectoral targets by government agencies are often provided in growth rates rather than in levels. Further, econometric modelling of growth rates may be preferred to modelling of levels when the Green PEPM is extended.[6]

Finally, the level of disaggregation in the two models are different. In the current specification of the Green PEPM, employment demand forecasts are provided only for the parent sectors, and its green and conventional subsectors. This is conditioned by limitations on the availability of data to allow more refined estimation for the Green PEPM. In the original Philippine EPM, on the other hand, more detailed sectoral employment demand estimates by occupation class, region, and educational attainment are possible.

4.2. Baseline expanded IO table

Expanding the IO table is a necessary and natural extension of the Philippine EPM to be able to project output and employment demand in green industries. This step is necessary because green industries are typically not reported as part of the broad classification of industries in IO tables, including in the Philippines. It is a natural extension as the share of the green sector in overall production is expected to increase in the future. While output from the green and conventional industries may be the same, e.g. electricity, the production technology used to arrive at the final output may be very different, e.g. using coal in the conventional sector, while using solar energy in the green sector. Thus, policies that promotes specific production processes may have different implications on employment, incomes, and the environment.

The expansion of the baseline IO table takes off from the procedures provided in the original Philippine EPM. The 240-sector 2006 IO table (PSA 2013) was collapsed, based on the 2009 Philippine Standard Industrial Classification (PSIC) by 3-digit code, to match the 30 parent sectors in the Green PEPM.[7] This was then updated to the base year 2016 using bi-proportional matrix updating, or the RAS method, following the procedures outlined in the original Philippine EPM. The 30-sector base IO table was then expanded to disaggregate the parent sectors into conventional and green subsectors, whenever possible, using information from the 2014 ASPBI. Because of data limitations, we used second-best proxies to identify the production boundaries between the green and conventional sub-sectors in order to expand the base IO table. We limit the disaggregation to eighteen parent sectors of the Green PEPM that have been identified to have large potentials for greening.

We loosely followed the guidelines provided in the United Nations System of Environmental and Economic Accounting [UN SEEA] (UN et al. 2014) to identify the operational production boundaries between the green and the conventional subsectors.[8] A green industry firm may be further classified based either on the good or service it produces, i.e., "green by product", or on its production process, i.e., "green by process", following the ILO (2013) guidelines on the statistical definition of employment in the environmental sector. In the former case, environmental goods

[6] Aggregate income (and aggregate consumption) often exhibit unit root, which makes econometric modelling more complicated. See Nelson and Plosser (1982) for a discussion.

[7] See Annex A.1 for a concordance between the 2009 PSIC and the Green PEPM parent sectors.

[8] In the UN SEEA, green industries perform either (i) environmental protection activities, i.e., the prevention, reduction and elimination of pollution and other forms of environmental degradation, or (ii) resource management activities, i.e., preserving and maintaining the stock of natural resources.

and services are produced mainly for the consumption *outside* the producing unit, while in the latter case, environmental goods and services are used *inside* the production.

For some green-by-product industries, firms may be directly identified and reclassified as green based on their industrial classification. The forestry (2009 PSIC Division 04), specifically silviculture, and the waste management and remediation sectors (2009 PSIC Divisions 37, 38 and 39) produces green output and hence, are wholly classified as green-by-product industries. Using firm's PSIC, all forms of mass transportation, except for air transportation,[9] also identified as green subsectors, in terms of produced outputs.

For others in the green-by-product industries, specifically for organic agriculture and for renewable energy generation sectors, classification of firms cannot be directly inferred from the available information in the 2014 ASPBI. For the agriculture sector, particularly growing of non-perennial and perennial crops, we used labor intensity as proxy for organic farming based on casual observations in the literature (e.g. Mendoza 2004; Reganold and Wachtner 2016). More specifically, we assigned the upper ten percentile of firms by labor-intensity in each of the three-digit PSIC-equivalent of the Green PEPM perennial and non-perennial crops production sectors (Green PEPM Sectors 1 and 2, respectively) as part of the green industry. For the energy sector (Green PEPM Sector 23), renewable energy-producing firms were identified by cross-referencing registered addresses in the 2014 ASPBI with the locations of renewable energy power plants in the Department of Energy (DOE) database.

For the green establishments-by-process, we sorted firms in each (three-digit) PSIC group by resource-use efficiency, calculated as the ratio of total output to expenses for a predefined basket of inputs, including transportation, electricity, water and fuel. The upper ten percentile of firms by resource-use efficiency were assigned as part of the green subsectors in each of the Green PEPM parent sectors.[10] This assignment of establishments as green-by-process is regardless whether a firm has already been identified as green-by-product. Annex A.2 provides a short summary of the green production boundaries that we presented here.

Based on the above production boundaries, the rows and columns of the inter-industry matrix of the base year IO table were expanded. The columns of the IO table, representing production inputs, were first expanded by calculating the share of sectoral input s_{ijk} in parent sector j and subsector i that comes from some source k as follows:

$$s_{gjk} = \begin{cases} 0 & if\ \lambda_{gj} = 0 \\ \dfrac{1}{1 + \theta_{jk}\dfrac{1-\lambda_{gj}}{\lambda_{gj}}} & if\ 0 < \lambda_{gj} < 1 \\ 1 & if\ \lambda_{gj} = 1 \end{cases};$$

[9] Air transportation uses significantly more energy per passenger-distance relative to other modes of transformation. See, for instance, Azar et al. (2003).

[10] Excluding parent sectors with no disaggregation as identified. A potential weakness of using the distribution of firms by resource-use efficiency as proxy for defining the green production boundaries is that this may be confounded by scale efficiency, i.e., larger firms may be more efficient in using resources because of scale production rather than as a pro-active strategy to minimize carbon footprint. While there may be some overlap between scale and resource-use efficiency, the ideal scenario is to use purely resource-use efficiency or some other indicator that could signify the production of environmental goods or services by firms.

$$\theta_{jk} = \left(\frac{\sum_t I_{gt}}{I_{gk}}\right)\left(\frac{I_{ck}}{\sum_t I_{ct}}\right);$$
$$s_{gk} + s_{ck} = 1;$$
$$0 \leq s_{ik}, \lambda_g \leq 1;\ \theta_k, I_{gk}, I_{ck} \geq 0,$$

where I_{it} refers to the total input from parent sector s. The parameter λ_{gj} is the share of the green subsector in the total inputs of parent sector j. The index θ_{jk} captures differences in the intensity of use of inputs between the green and conventional subsectors. The index i takes on a value of either g (for the green sub-sector) or c (for the conventional sub-sector). The input source k could refer to any of the Green PEPM sector as intermediate inputs, or to primary inputs or gross value-added. The parameters λ_{gj} and θ_{jk} were estimated from the 2014 ASPBI.

We calculated θ_{jk} for primary inputs of each Green PEPM parent sector, as well as for intermediate inputs coming from the following sectors: (i) manufacturing coke and refined petroleum products, (ii) manufacturing of chemical and pharmaceutical products (used for crop production only), (iii) electricity, gas, steam and air-conditioning supply, (iv) water supply, (v) transportation and storage. For intermediate inputs from other sectors, we assume a value of $\theta_{jk} = 1$, i.e. the resource-use intensity in the green and conventional sectors are the same.

After expanding the columns, we then allocated sub-sectoral outputs to its uses, i.e., as intermediate consumption in each of the sectors and as final demand. As a simplifying assumption, we took goods and services produced by the green and the conventional subsectors to be homogeneous to consumers despite the intrinsic differences in production processes. This assumption allows us to split the rows proportionally using λ_{gk}, with the notion that the technology used in production is inconsequential to consumers, and the IO table property that total sectoral input equals total sectoral output.[11]

Once the baseline IO table has been disaggregated, it is then again balanced using the RAS method. The resulting balanced expanded IO table is then used to calculate the Goshian allocation coefficients that are used to calculate gross sectoral demand throughout the projection horizon.

4.3. Baseline employment and labor productivity

In addition to the baseline IO table, total employment and labor productivity in each of the Green PEPM parent sectors must be disaggregated by green and conventional subsector as may be needed. Calculating total employment by subsector was done in two steps. First, aggregate employment in each of the parent sectors were calculated from the quarterly LFS at the base year. This is then split using the employment shares of the green and conventional subsectors, respectively, that were estimated from the 2014 ASPBI using the production boundaries discussed in the previous section. The ASPBI provides establishment-based estimates of employment,

[11] We provide alternative assumptions about the IO matrix in order to assess the sensitivity of our results to the base IO matrix. More specifically, we looked at the case where (1) the green sector only uses inputs produced by other green sectors, and (2) all inputs by the green sector are locally sourced, i.e. all imports are by the conventional sector. The results are presented in Annexes B and C. In general, the results are qualitatively the same compared to our base IO matrix.

however only for firms in the formal sector. LFS, on the other hand, provides household-based estimates of employment in both the formal and informal sectors. Note that by assumption, the forestry, and the waste management and remediation sectors are considered wholly as comprising of only the green subsectors. Also, we do not provide disaggregated estimates for twelve (12) Green PEPM parent sectors that have no green subsectors (see Annex A.2).

Baseline sub-sectoral output-per-worker ratios,[12] ψ_{ik0}, are calculated from baseline employment, l_{ik0}, and total output, q_{ik0}, as

$$\psi_{ji0} = \frac{q_{ji0}}{l_{ji0}}.$$

5. Philippine Green Sector

The Philippine EPM expansion procedure outlined in the previous section allows us to characterize the country's green and conventional sectors at baseline. Table 5 shows the contribution of the green sector to the country's economy and employment. In 2016, the Philippine green sector contributed about PHP 2.7 trillion to the economy, or nearly a fifth (18.8%) of the country's GDP. This is similar to the share estimated by Frankhauser et al. (2017) for the Philippines using an alternative expenditure-side approach. Majority of the green sector's GVA comes from the services sector (73%), followed by the industry sector (25%). The contribution of green agriculture, with an aggregate share of only 2 percent in 2016, pales in comparison to the other two major economic sectors.

[12] In this report, we use output-per-worker and labor productivity interchangeably. See Rogers (1998) for a discussion.

Table 5. Conventional and green sectors: Philippines, 2016

	Gross Value-Added (Current PhP Trillions)			Gross Output (Current PhP Trillions)			Employed (Million Workers)			Output per worker (Current PhP Millions)		
	Total	Green	Others	Total	Green	Others	Total	Green	Others	Total	Green	Others
Agriculture	**1.5**	**0.1**	**1.4**	**2.7**	**0.1**	**2.6**	**11.2**	**1.3**	**9.9**	**0.2**	**0.1**	**0.3**
Non-perennial crops	0.4	a	0.4	0.7	a	0.7	3.0	0.4	2.6	0.2	0.1	0.3
Perennial crops	0.4	a	0.4	0.5	a	0.5	2.1	0.1	2.0	0.2	0.1	0.2
Animal production	0.4	a	0.4	1.1	a	1.0	4.7	0.5	4.2	0.2	0.1	0.2
Forestry	a	a	…	0.1	0.1	…	0.1	0.1	…	0.5	0.5	…
Fishing	0.2	a	0.2	0.4	a	0.4	1.3	0.1	1.1	0.3	0.1	0.3
Industry	**4.6**	**0.7**	**4.0**	**14.1**	**1.2**	**12.9**	**7.3**	**1.4**	**5.9**	**1.9**	**0.9**	**2.2**
Coal	a	…	a	a	…	a	a	…	a	2.7	…	2.7
Petroleum and natural gas	a	…	a	0.4	…	0.4	0.1	…	0.1	2.7	…	2.7
Metallic ore	a	…	a	0.2	…	0.2	0.1	…	0.1	2.7	…	2.7
Non-metallic ore	a	…	a	0.0	…	a	a	…	0.0	2.8	…	2.8
Food, beverages and tobacco	1.5	0.2	1.4	3.9	0.5	3.4	1.0	0.1	0.9	4.1	6.3	3.9
Textiles, wearing apparel, and leather	0.1	a	0.1	0.3	0.1	0.3	0.6	0.1	0.5	0.5	0.8	0.5
Wood products, except furniture	a	a	a	0.3	a	0.3	0.3	a	0.3	1.1	0.9	1.1
Paper products, and other recorded materials	0.1	a	a	0.2	a	0.1	0.1	a	0.1	1.2	1.7	1.1
Coke and refined petroleum products	0.1	…	0.1	0.8	…	0.8	a	…	a	102.5	…	102.5
Chemical and pharmaceutical products	0.4	…	0.4	0.7	…	0.7	0.1	…	0.1	10.3	…	10.3
Non-metallic minerals and products	0.1	…	0.1	0.3	…	0.3	0.2	…	0.2	1.4	…	1.4
Metal products, except machinery	0.1	…	0.1	0.4	…	0.4	0.3	…	0.3	1.5	…	1.5
Electronics, electrical and optical products	0.4	…	0.4	3.7	…	3.7	0.5	…	0.5	6.7	…	6.7
Machinery and equipment, N.E.C.	a	…	a	0.2	…	0.2	a	…	a	6.7	…	6.7
Transport equipment	0.1	…	0.1	0.3	…	0.3	0.1	…	0.1	2.5	…	2.5

Note: a – less than 0.05 trillion; … – no disaggregation

Source: Authors' calculations.

Table 5. Conventional and Green Sectors: Philippines, 2016 (cont'd)

	Gross Value-Added (Current PhP Trillions)			Gross Output (Current PhP Trillions)			Employed (Million Workers)			Output per worker (Current PhP Millions)		
	Total	Green	Others	Total	Green	Others	Total	Green	Others	Total	Green	Others
Industry *(continued)*												
Furniture	a	a	a	0.1	a	0.1	0.1	a	0.1	0.7	1.1	0.7
Manufacturing, N.E.C.	a	…	a	0.2	…	0.2	a	…	a	6.7	…	6.7
Electricity, gas, and steam	0.4	a	0.4	0.6	a	0.5	0.1	a	0.1	5.7	6.1	5.7
Water supply	0.1	a	0.1	0.1	a	0.1	a	a	a	1.7	0.8	1.8
Waste management and remediation	a	a	…	a	a	…	a	a	…	0.6	0.6	…
Construction	1.1	0.4	0.6	1.5	0.5	1.0	3.5	1.2	2.3	0.4	0.4	0.4
Services	**8.4**	**2.0**	**6.4**	**12.0**	**3.3**	**8.7**	**22.5**	**4.3**	**18.2**	**0.5**	**0.8**	**0.5**
Wholesale and retail trade	2.7	0.6	2.1	4.8	1.4	3.4	8.1	1.1	7.0	0.6	1.3	0.5
Transportation and storage	0.6	0.1	0.4	1.3	0.3	1.0	3.1	1.4	1.7	0.4	0.2	0.6
Accommodation and food services	0.3	a	0.2	0.3	a	0.2	1.7	0.2	1.6	0.2	0.3	0.2
Services, N.E.C.	4.9	1.2	3.6	5.6	1.5	4.0	9.6	1.6	8.0	0.6	1.0	0.5
Whole economy	**29.0**	**5.5**	**23.5**	**57.6**	**9.3**	**48.3**	**81.9**	**13.9**	**68.0**	**171.4**	**23.9**	**170.3**

Note: a – less than 0.05 trillion; … – no disaggregation

Source: Authors' calculations.

In terms of gross output, the green sector contributed 16.2 percent of the country's total PHP 28.8 trillion output, of which 70.9 percent came from the services sector. Industry comes as far second with a share of 26.1 percent, and the agriculture sector lags behind with just 2.6 percent share of the green sector output. While the services sector dominated the green economy in terms of gross output, the conventional counterpart was largely led by the industry sector, comprising more than half (53.4%) of the conventional sector's gross output of PHP 24.1 trillion. In terms of intensity, the services sector is the greenest with 27.6 percent of its gross output produced by its green subsector, while the industry and agriculture sectors are far second and third with 8.6 percent and 5.1 percent green-content, respectively.

Majority of the employment in 2016 came from the conventional sector with 34 million jobs. More than half of this are in the services sector (53.6%), while the rest are in agriculture (29.1%), and in industry (17.3%). Employment in the green sector, on the other hand, reached 6.9 million in the same year. Similar to the conventional sector, much of these employment positions in the green sector are in services (61.5%), although the rest are split more or less evenly between the agriculture (18.2%) and the industry (20.2%) sectors.

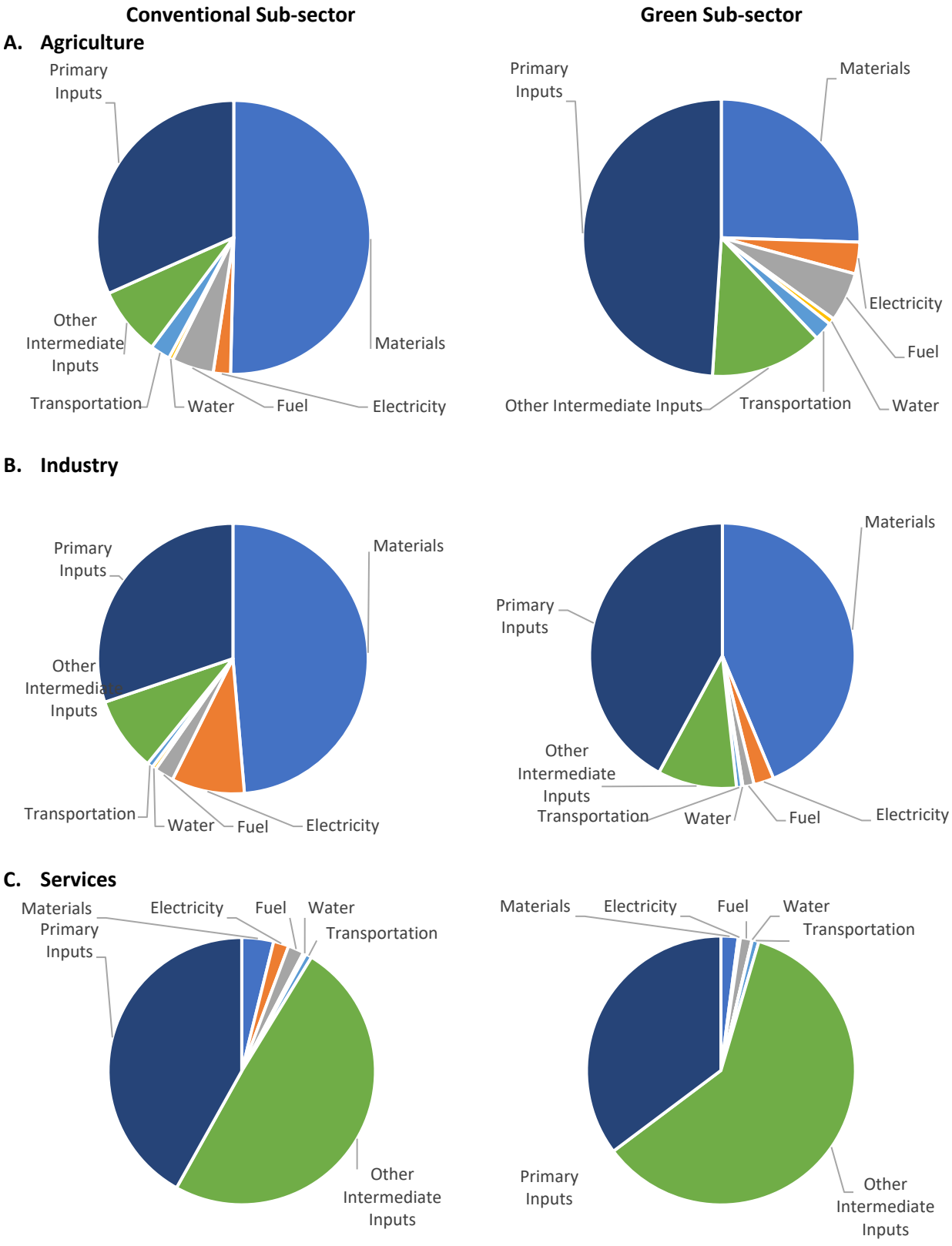
Combining gross output and employment, we can see that the productivity in the green and in the conventional sectors are more or less the same, wherein a worker in each sector produced on average about PHP 0.7 million-worth of output in 2016. However, once we examine each sector, we can see important differences within and across sectors of the economy. For instance, workers in the industry sector as a whole are more productive (PHP 1.9 million/worker) than those in services (PHP 0.5 million/worker) or in agriculture (PHP 0.2 million/worker). In industry and agriculture, workers in the conventional sector are more productive than their counterparts in the green sector. But in services, the reverse is true: green sector workers are more productive on average than workers in the corresponding conventional sector. However, going into more detailed sectors, e.g. transportation and storage, this observation does not necessarily hold.

5.1. Production

Conventional and green production are intrinsically different. This is highlighted in Figure 8, which shows the distribution of different inputs in the production processes of the green and conventional sub-sectors in agriculture, industry and services sectors.[13] In conventional agriculture, for instance, production inputs, e.g. seedlings, fertilizers, pesticides, etc., constitute half of all production inputs. The contribution of primary inputs, i.e., labor, land and other physical capital, is only secondary at 32 percent of the total production costs. This is in stark contrast to agricultural production in the green sub-sector where primary inputs comprise almost half of all inputs, and only a quarter goes to materials for production. Interestingly, the share of energy (i.e., fuel, electricity and transportation) and water is similar in the conventional (10%) and in the green (12%) subsectors.

[13] Note, however, that the figures also reflect the assumptions that were imposed to identify the production boundaries between the green and conventional sub-sectors.

Figure 8. Expenditures shares by sector: Philippines, 2016



Source: Authors' calculations.

In industry and in services, on other hand, the difference in the green and conventional subsectors are very evident in the share of energy and water resources in the total production costs. In conventional industrial production, energy and water comprise about 12 percent of all production inputs, compared to only five percent in the green industry sub-sector. The gap in shares is closer in services, where conventional production requires about 5 percent in energy and water, compared to only two percent of the same input in the green sub-sector.

The intensity of greening in terms of share in sectoral gross output is evidently heterogeneous across different sectors of the economy (Figure 9). Excluding waste management and remediation and forestry, which we assumed to be wholly green-by-product, and the other sectors which we did not disaggregate (see Annex A.2), the greenest sectors by gross output share among Green PEPM sectors are construction (32%), wholesale and retail trade (30%), other services sector (27%), and transportation and storage (24%). Accommodation and food services activities, which completes the services sector, are ranked much lower with only 7.9 percent green content. Ahead of it are manufacturing subsectors: paper products and printing (21.3%), textiles (16.6%), food and beverages (13.5%), and furniture (13.1%). The agriculture subsectors trail behind in terms of green subsector contribution in the overall sectoral gross output.

5.2. Employment

In terms of employment, about 7 million Filipinos or roughly 17 percent of all employed in 2016 are working in the green sector. A large majority of them are employed in services (4.3 million). Green industry and green agriculture are far second and third, employing 1.6 million and 1.3 million people, respectively.

In terms of sub-sectoral shares, the greenest sectors by employment (Figure 10) are transportation and storage (45%) and construction (33%). The least green, on the other hand, include manufacturing wood products, except furniture (4%), production of perennial crops and (4%), electricity generation (7%).[14]

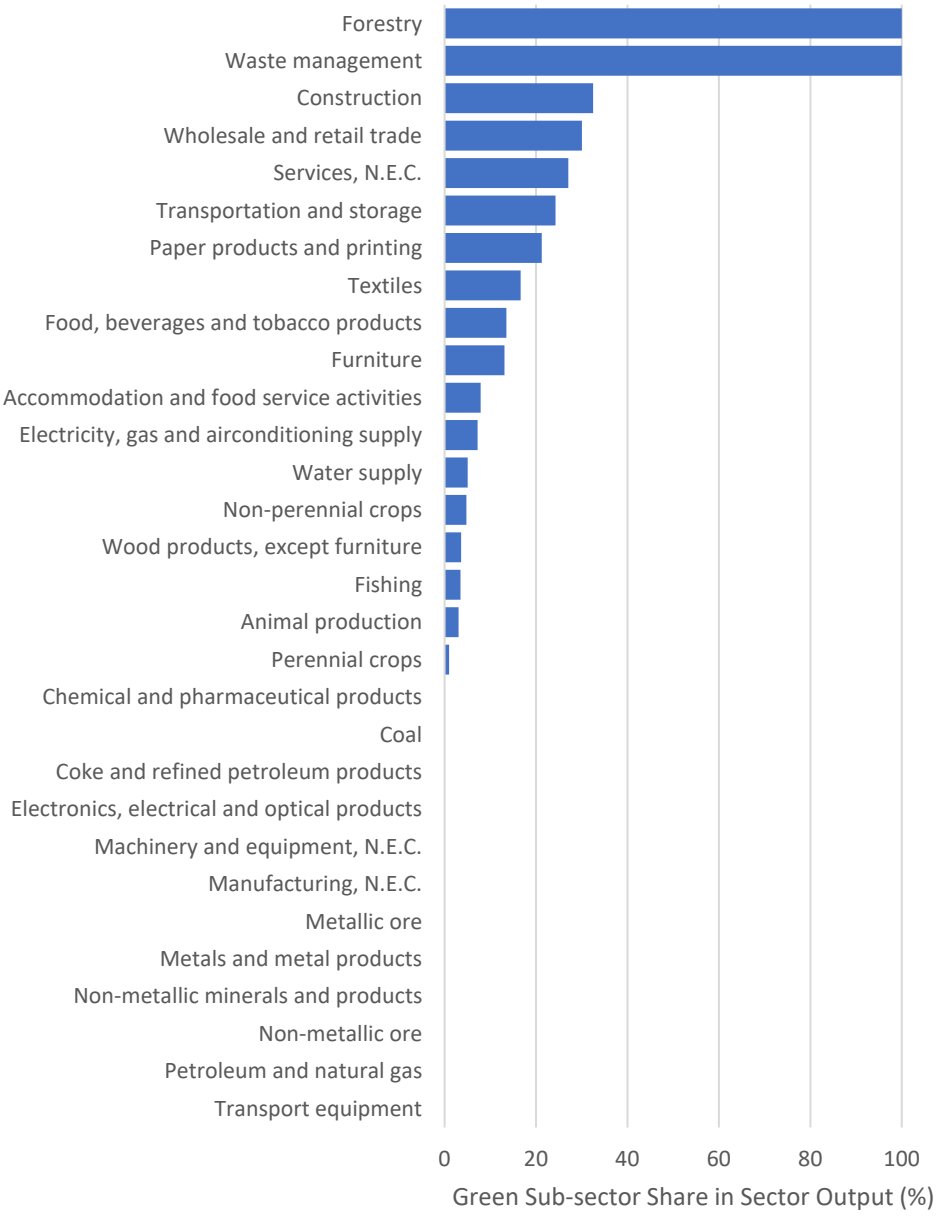
Comparing Figures 9 and 10, it is evident that an increase in the share of the green subsector in sectoral GVA does not perfectly correlate with the same increase in green subsector share in sectoral employment. This observation may be attributed to differences in the labor productivity of workers in the green and conventional subsectors. In Figure 11, we present the ratio of output per worker in the green subsector relative to that in conventional subsector to measure the divergence in labor productivities within GPEPM parent sectors. A value greater (less) than one indicates that the green subsector produces more (less) output per worker relative to the conventional subsector. This has important implications in the subsequent employment demand projections since subsectors with higher output-per-worker will generally require less number of workers to produce the same amount of output given all else being equal.

Workers in the green subsectors of agriculture are less productive than those employed in conventional agriculture. This resounds with earlier studies that found that organic agriculture is likely to be more labor-intensive, implying that less people is needed to work in conventional

[14] Excluding sectors that are not disaggregated.

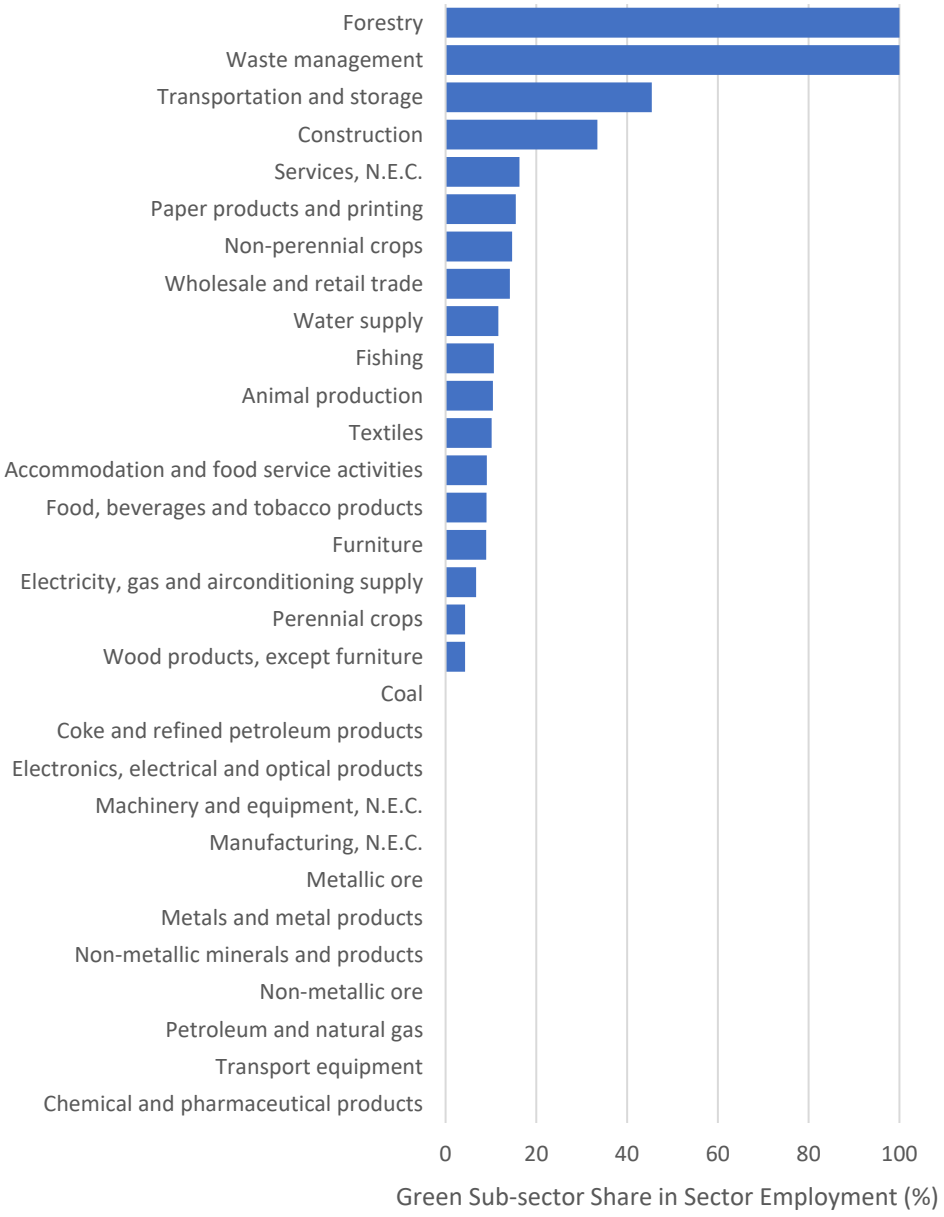
agriculture to produce the same level of output (Mendoza, 2004; Patil, S., et al., 2012). An average worker employed in the production of green perennial crops, for instance, produces only the equivalent of 23 percent of the output of an average worker employed in its counterpart conventional subsector. This rate is followed closely by workers in the green subsectors of animal production (27%), non-perennial crops production (29%), and fishing (30%).

Figure 9. Share of green subsector in parent sector gross output: Philippines, 2016



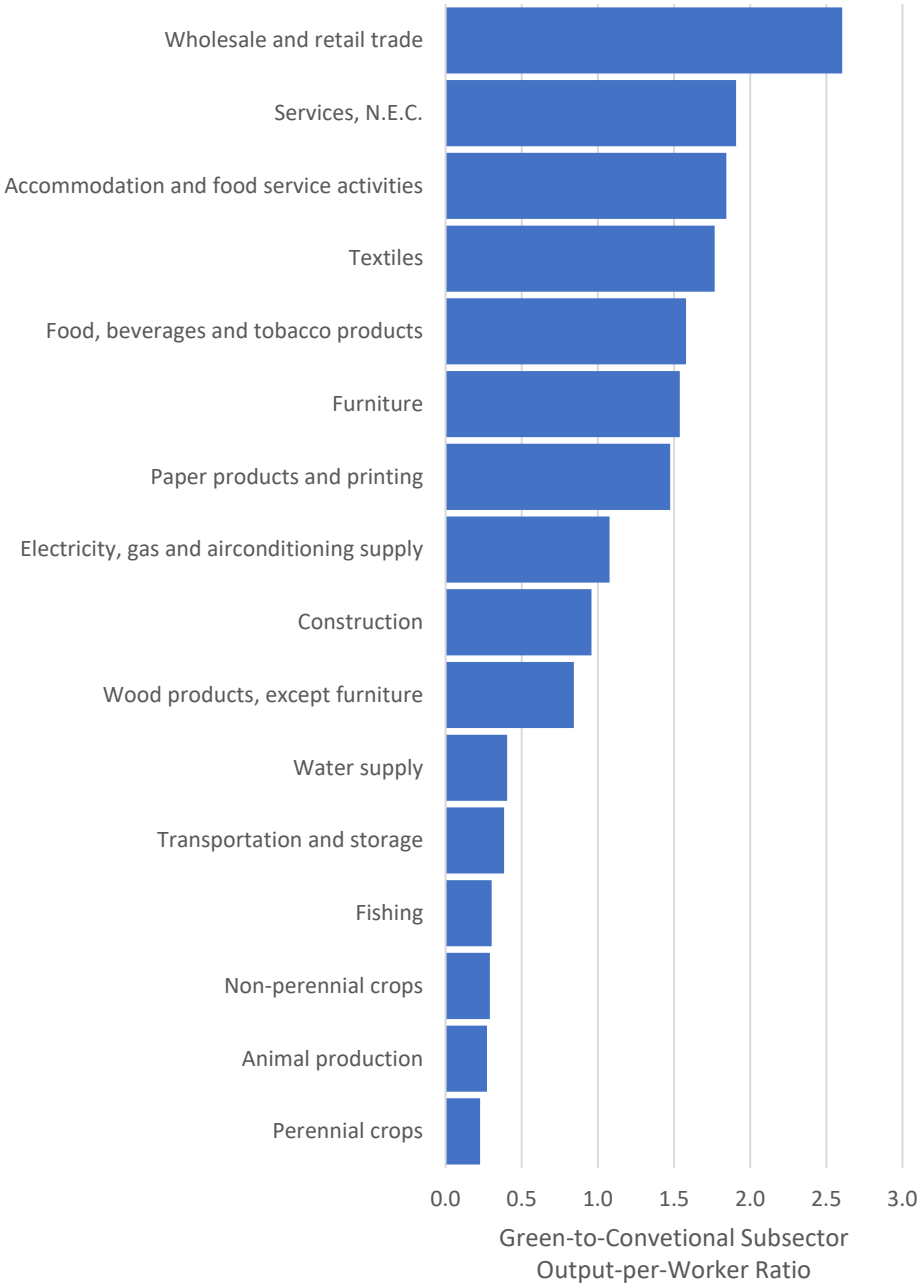
Note: The figure is scaled such that 1.0 = 100 percent.
Source: Authors' calculations.

Figure 10. Share of green subsector in parent sector employment: Philippines, 2016



Note: The figure is scaled such that 1.0 = 100 percent.
Source: Authors' calculations.

Figure 11. Output-per-worker ratio: Philippines, 2016



Source: Authors' calculations.

Aside from those in the agriculture sector, other GPEPM sectors where the output-per-worker ratio is less than one, i.e., the conventional subsector is more productive, include construction (96%), production of wood products, except furniture (84%), water supply (40%), and transportation and storage (38%).

Sectors where the conventional subsector is more productive, i.e., those with ratios greater than one, include wholesale and retail trade (2.6), other services (1.9), and manufacturing of textile products (1.8), of food, beverages and tobacco products (1.6), furniture (1.5), and paper products (1.5). Workers in conventional energy production, i.e., non-renewables, are also more productive than workers in the renewable energy sector by about eight percent. On aggregate, about half (54%) of all employed in 2016 are engaged in industries where the green subsector produces more output per worker. Excluding agriculture, however, the rate jumps to 75 percent.

6. Projection Mechanics and Scenarios

This section describes the estimation process and scenarios used for projections of employment demand. Projections scenarios are primarily based on national targets specified in the Philippine Development Plan 2017-2022 and the NDC for energy generation. Further development of these scenarios was done based on consultation with the Tripartite Committee and the ILO.

6.1. Model Mechanics

The Green PEPM is composed of two main estimation blocks, i.e., (1) the data processing, and (2) the projection blocks. In the data processing block, the different input databases used in the model are harmonized and updated to the model base year. The end products of this block include a consistent time-series of sectoral gross-value added, and the base year expanded IO table. In the projection block, the sectoral gross value-added are projected based on user-specified growth assumptions. Sectoral gross outputs are then calculated as

$$q_t = \left(1 - A_g\right)^{-1} y_t,$$

where q_t is the vector of sectoral gross output at year t; y_t is the vector of sectoral gross value-added; A_g is the Ghoshian supply coefficients matrix calculated from the base year IO table; and 1 is a conformable identity matrix.[15]

[15] The above formulation is similar to its Leontief model counterpart, but instead of using the Leontief technical coefficients, we use the Goshian supply coefficients. In the Leontief model, the technical coefficients are assumed fixed, and yields new industrial total inputs required by an economy in response to changes in final demands. In the Ghosh model, on the other hand, the supply coefficients are assumed fixed, and yields new industrial outputs as a result of changes in gross value-added. See Guerra and Sancho (2012), and Manresa and Sancho (2013) for discussions. For some applications of the Ghosh model to environmental accounting, see Leung and Pooley (2001), Zhang (2010), and Yan et al. (2016).

The calculated sectoral gross outputs are then converted into labor-demand equivalents using projected labor productivity rates. Sectoral labor productivity growth rates are assumed to linearly approach a long-run target from its historical average at baseline. The demand for workers are calculated as the ratio between the projected sectoral gross output and the projected sectoral labor productivity.

It must be emphasized that the labor demand estimate reflects employment demand *in* the green and conventional subsectors and should not be misconstrued as demand for green and non-green jobs. Green jobs refer to employment positions that may be present even in the conventional sectors as defined in the previous section. Furthermore, employment positions in the green sector are not automatically or necessarily green jobs.

6.2. Projection Scenarios

We demonstrate the use of the Green PEPM by specifying three scenarios: a baseline scenario, and three alternative scenarios. The alternative scenarios are calibrated to allow us to assess how different government targets may impact the greening of the country's economic output, and of the labor sector.

For the baseline business-as-usual (BAU) scenario, we assume that the country's GDP follows the growth trajectory forecasted by independent sources. More specifically, we take the median of the growth forecasts by the Economist Intelligence Unit [EIU] (www.eiu.com) and by the US Department of Agriculture Economic Research Service [USDA-ERS] (www.ers.usda.gov). In this scenario, we assume that the growth rates of gross value-added among parent sectors are proportional to their historical average up to a set minimum growth rate. This means that if a parent sector grows m-times as fast as another parent sector on average in the historical period, the ratio will remain constant throughout the projection period unless the growth rate falls below the threshold. All parent sectors are assumed to grow by at least two percent per annum. In this scenario, the green and conventional subsectors grow at the same rate.

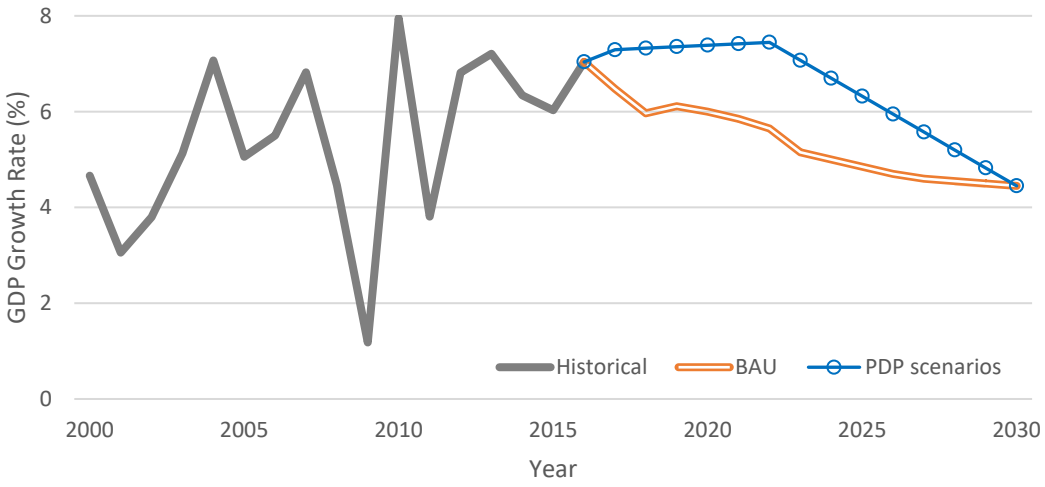
As alternative scenarios, we simulate the potential employment impacts of achieving the country's sectoral targets. Three sub-scenarios are specified. In all sub-scenarios, we assume that the PDP sectoral growth targets for 2017-2022 are achieved. Starting 2022, overall growth linearly converges to the 2030 BAU growth rate of 4.45 percent. Except for electricity generation (Green PEPM Sector 23), all parent sectors grow proportionally to the 2022 growth rates. For electricity generation, we use the implied growth targets set in the 2016-2040 Power Development Plan by the DOE (2017).

In 2016, the Philippines has a total installed power system capacity of 21GW, of which about a third (7 GW) are from renewable sources. By 2040, the DOE projects that the demand for energy will require a capacity of about 65 GW, or an additional 44GW for the next two decades. In the baseline PDP scenario, all the additional energy capacity is assumed to be wholly supplied through the expansion of the non-renewable power generation sector. In an alternative PDP scenario, i.e., the PDP+ scenario, the country is able to grow its non-renewable energy capacity to 15MW by 2030 following its proposed nationally determined contribution (NDC) to the Paris Agreement (Andres 2017). The gap is fulfilled by the growth of the non-renewable energy sector.

We also assessed the potential employment demand impacts of achieving a more aggressive greening trajectory among industries. More specifically, in the third alternative scenario, i.e., the PDP++ scenario, we assumed that the GVA in the green subsectors will grow twice as fast relative to their conventional subsector counterpart across all industries in the country.

Figure 12 shows the historical and projected aggregate growth trajectory of the country. In the BAU scenario, the country will continue to grow between 5.7-6.5 percent until 2022, then eventually tapering to 4.1 percent by 2030. In the PDP, PDP+, and PDP++ scenarios, the country grows relatively faster than the BAU scenario at about 7.4 percent per year until 2022. Thereafter, the country's GDP growth in the PDP-based scenarios linearly approaches the BAU scenario growth rate in 2030.

Figure 12. GDP growth historical trend and forecast assumption: Philippines, 2000-2030



Source: Authors' calculations.

Sectoral growth assumptions in the PDP-based scenarios are summarized in Table 6. Except for the energy generation sector, we used the midpoint of the specified growth range in the 2017-2022 PDP as the GPEPM sectoral growth until 2022. In these alternative scenarios, the industry sector will continue to grow faster at 8.5 percent annually compared to either the agriculture (2.9%) or the services sector (7.5%). It is noteworthy that in the 2017-2022 PDP, the agriculture sector is targeted to grow by 2.5-3.5 percent per year, or about 1-2 percentage points higher than its average performance in the past decade.

In all four scenarios, we assume that the growth in labor productivity in the conventional and the green subsector within each parent sector is the same, although the baseline levels may be different. Specifically, we assume that sectoral labor productivity growth linearly approaches a long-run growth rate of 2 percent per annum by 2040 from its 2001-2016 average. Table 7 presents the historical and assumed sectoral labor productivity growth rates from 2001 to 2030. Between 2001 and 2016, labor productivity has been growing fastest in mining (23.7% per annum),

manufacturing of coke and refined petroleum products (17.6%) and of chemical and pharmaceutical products (14.3%), forestry (12.6%), waste management and remediation (11.1%). On the other hand, labor productivity growth has been slowest in accommodation and food services activities (–0.4%), manufacturing of textiles and textile products (0.1%), construction (1.7%), and wholesale and retail trade (1.8%). Taking off from a standard theory that aggregate labor productivity converges in the long run (Baumol 1986) although not necessarily across sectors (Bernard and Jones 1996a, 1996b), we assume that labor productivity growth in all sectors will converge to 2 percent per year by 2040. This assumption allows more dynamic sectors to continue growing although at a decreasing rate thereby resulting in some catch-up among more sluggish sectors, but still capturing long-run differences in sectoral labor productivity.

Table 6. Sectoral growth forecast assumptions per PDP Scenario: Philippines, 2017-2022

	PDP Growth Target (%)	Green PEPM Growth (%) Forecast Assumption		
		PDP	PDP+	PDP++
Gross Domestic Product	7.0 - 8.0	7.4	7.4	7.4
Gross Value Added by Sector				
Agriculture	2.5 - 3.5	2.9	2.9	2.9
Crops	2.0 - 3.0	2.5	2.5	2.5
Livestock	3.0 - 4.0	3.5	3.5	3.5
Poultry	3.0 - 4.0	3.5	3.5	3.5
Forestry	2.0 - 3.0	2.5	2.5	2.5
Fisheries	1.0 - 5.0	3.0	3.0	3.0
Industry	8.1 - 9.1	8.5	8.5	8.5
Renewable Energy	n.a.	0.0	5.9	8.3
Non-renewable Energy	n.a.	6.0	5.3	4.1
Industry, N.E.C.	n.a.	8.8	8.8	8.8
Services	6.9 - 7.9	7.5	7.5	7.5

Source: Authors' calculations.

Table 7. Gross output-per-worker historical average and forecast assumption: Philippines, 2001-2030

	2001-2016 Historical Average	Forecast Assumption		
		2020	2025	2030
Agriculture	7.4	6.7	5.5	4.4
Forestry	12.6	11.2	8.9	6.6
Fishing	3.9	3.6	3.2	2.8
Mining	23.7	20.9	16.2	11.4
Food, beverages and tobacco products	5.3	4.9	4.1	3.4
Textiles	0.1	0.3	0.7	1.2
Wood products, except furniture	9.5	8.5	6.9	5.3
Paper products and printing	7.6	6.8	5.6	4.4
Coke and refined petroleum products	17.6	15.6	12.2	8.8
Chemical and pharmaceutical products	14.3	12.7	10.0	7.3
Non-metallic minerals and products	3.1	2.9	2.7	2.5
Metals and metal products	5.5	5.1	4.3	3.5
Electronics, electrical and optical products	2.4	2.3	2.3	2.2
Transport equipment	4.0	3.8	3.3	2.9
Furniture	5.3	4.9	4.1	3.4
Electricity, gas and air-conditioning supply	5.0	4.6	4.0	3.3
Water supply	5.8	5.3	4.5	3.6
Waste management and remediation	11.1	10.0	8.0	6.0
Construction	1.7	1.7	1.8	1.8
Wholesale and retail trade	1.8	1.8	1.8	1.9
Transportation and storage	3.8	3.6	3.2	2.8
Accommodation and food service activities	-0.4	-0.1	0.4	0.9
Services, N.E.C.	2.5	2.4	2.3	2.2

Source: Authors' calculations.

7. Baseline Results: Business-as-Usual Scenario

In this section, we present employment demand projections from the business-as-usual (BAU) scenario. The expansion or contraction of labor demand in these projections are affected by the forward and backward inter-relationships among sectors in the economy as captured by the baseline input-output table, and the relative growth rates of sectoral GVA and of labor productivity. These projections serve as baseline estimates to which we compare alternative scenarios in the succeeding section.

7.1. Economy-wide outlook

7.1.1. Production

Table 8 presents the country's projected GDP by industrial origin until 2030 following the BAU scenario. By 2030, the country would have more than doubled its 2016 GDP of 8.1 PHP trillion (in 2000 prices)[16] to 16.7 PHP trillion. With our assumption that the relative growth rates among sectors remaining the same over the projection horizon, services will continue to dominate the economy (9.8 PHP trillion), followed by industry (5.7 PHP trillion), then agriculture (1.2 PHP trillion). Much of the growth will come from industry and services, which would more than double over the 14-year horizon with annual growth rates hitting upwards of 5 percent on average. Agriculture, on the other hand, will only grow by 2.6 percent year-on-year.

Table 8. Gross value-added (trillion PHP in 2000 prices) by sector: Philippines, 2016-2030

	Conventional Sub-sector (PHP Trillion)				Green Sub-sector (PHP Trillion)				All Sub-sectors (PHP Trillion)			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
Agriculture	0.8	0.9	1.0	1.1	a	a	a	0.1	0.8	0.9	1.1	1.2
Industry	2.2	2.8	3.7	4.7	0.4	0.5	0.7	1.0	2.6	3.3	4.4	5.7
Services	3.6	4.6	6.0	7.5	1.1	1.4	1.9	2.3	4.7	6.1	7.9	9.8
Total	6.6	8.3	10.7	13.3	1.5	2.0	2.6	3.4	8.1	10.3	13.4	16.7

Note: a – less than 0.05 trillion
Source: Authors' calculations.

In the BAU scenario where we assume that GVA growth rates are constant over subsectors of GPEPM parent sectors, the green sector will continue to comprise about a fifth of overall production over the next one and a half decade. By 2030, the green sector is projected to total 3.4 PHP trillion. Services will continue to contribute the largest in terms of green sector GVA, with primary inputs totaling 2.3 PHP trillion by 2030. Green industry comes at second (1.0 PHP trillion), and green agriculture a far third (0.1 PHP trillion).

7.1.2. Labor demand

Employment demand will grow by 2.2 percent on average between 2016 and 2030 under the BAU scenario. Much of the growth will come from the services sector, which is projected to account for 35.1 million workers by 2030 (see Table 9). Over the same period, employment demand in the agriculture sector is projected to decline from the baseline 11.2 million in 2016 to 9.0 million by 2030. This may be seen as a continuation of the recent trend in the decline in the number of workers employed in agriculture. More generally, this is because labor productivity in the sector is projected to grow faster than its gross output. With the projected decline in the demand for labor in agriculture, coupled with the resurgence of the industry sector, specifically of manufacturing, the demand for workers in the industry sector will surpass that in agriculture by 2025.

[16] All PhP projections are in 2000 constant prices.

Table 9. Employment demand (millions) by sector: Philippines, 2016-2030

	Conventional Sub-sector (Millions)				Green Sub-sector (Millions)				All Sub-sectors (Millions)			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
Agriculture	9.9	9.2	8.5	8.1	1.3	1.1	1.0	0.9	11.2	10.3	9.5	9.0
Industry	5.9	6.6	7.6	8.8	1.4	1.8	2.3	2.9	7.3	8.4	10.0	11.7
Services	18.2	21.6	25.5	28.8	4.3	4.9	5.7	6.3	22.5	26.5	31.2	35.1
Total	34.0	37.3	41.6	45.7	6.9	7.8	9.0	10.1	41.0	45.2	50.6	55.9

Source: Authors' calculations.

In the BAU scenario, employment demand in the green subsectors will continue to play a secondary role in the labor market, requiring only about one worker in every five workers demanded until 2030. Towards the end of our projection horizon, employment demand in the green sector is expected to reach 10.1 million workers. Majority of these workers would be required in services (62%), followed by industry (29%), and the rest in agriculture (9%).

7.2. Industry-level results

7.2.1. Agriculture

The agriculture sector is projected to contribute 1.2 PHP trillion to the country's GDP in 2030 from the 2016 baseline of only 0.8 PHP trillion (see Table 10, Panel A). The sector will continue to be dominated by crop production (59%) and animal production (29%). In the BAU scenario, the economic potentials from expanding forestry and fishing will remain to be underutilized, leaving much room for growth. Over the next decade, the green agriculture sector, including organic farming, is expected to constitute just less than five percent of agriculture's aggregate output.

In terms of employment demand, the agriculture sector will see a continuation of the decline in the number of workers demanded under the BAU scenario. Because of labor productivity growing faster than output, the demand for workers will decline in crop production from the 2016 figure of 5.1 million workers to just 4.0 million in 2030 (see Table 10, Panel B). The animal production sector is also expected to incur job losses of more than one million workers. From employing 4.7 million workers in 2016, the animal production sector is expected to demand only 3.6 million workers by 2030.

With BAU, the green agriculture sector will continue to demand just one of every ten agricultural workers in the medium-term. More than a three-quarters of them will be required in crop production (44%) and in animal production (35%). The number of workers demanded in the forestry and fishing sectors is not expected to change much with the two sectors' combined employment requirement hovering around 200 thousand until 2030.

Table 10. Agriculture sector gross value-added and employment: Philippines, 2016-2030

	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
A. Gross Value Added (Trillion PhP in Constant 2000 prices)												
Crop production	0.4	0.5	0.6	0.7	a	a	a	a	0.5	0.5	0.6	0.7
Animal production	0.2	0.3	0.3	0.3	a	a	a	a	0.3	0.3	0.3	0.3
Forestry	a	a	a	a	a	a	a	a	a	a	a	a
Fishing	0.1	0.1	0.1	0.1	a	a	a	a	0.1	0.1	0.1	0.1
B. Employment (Millions)												
Crop production	4.6	4.2	3.8	3.6	0.5	0.5	0.4	0.4	5.1	4.7	4.3	4.0
Animal production	4.2	3.8	3.5	3.3	0.5	0.4	0.4	0.3	4.7	4.2	3.8	3.6
Forestry	a	a	a	a	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Fishing	1.1	1.1	1.2	1.2	0.1	0.1	0.1	0.1	1.3	1.3	1.3	1.3

Note: a – less than 0.05

Source: Authors' calculations.

7.2.2. Industry

If current trends in the industry sector continue in the medium-term, the sector is expected to contribute 5.7 PHP trillion to the country's GDP in 2030, or more than double its contribution in 2016 of 2.6 PHP trillion (see Table 11, Panel A). Much of this growth will come from two sectors, namely, manufacturing (59%) and construction (32%), both of which is expected to post annual growth rates above five percent until 2030. The contribution from the green industry subsector will total 1.0 PHP trillion in 2030 from only 0.4 PHP trillion in 2016, or about 15 to 20 percent of the industry sectors total GVA. The contribution of the green industry in 2030 will be dominated by construction (76%) and manufacturing (19%).

Over the same period, employment demand in the industry sector is expected to grow by 3.5 percent annually. By 2030, 11.7 million workers will be needed to work in the industry sector from only 7.3 million workers in 2016 (see Table 11, Panel B). If the domestic construction boom continues, this sub-sector will require 7.5 million workers by 2030, which will then comprise almost two-thirds of the total number of workers demanded in the industry sector. Manufacturing, which employs almost the same number as construction's 3.5 million workers in 2016, will be another import source of employment by 2030. If current trends continue, the manufacturing sector is expected to demand about 4.0 million workers annually by the end of our projection horizon.

Focusing on the green industry sector, its employment requirement will reach 2.9 million workers, that is, about one in five industry workers, in 2030. This number is about double the 1.4 million worker it employs in 2016. A large majority of this will be required in green construction (91%), which is expected to employ 2.7 million workers in 2030 from only 1.2 million workers in the baseline 2016. The green-subsectors of manufacturing and utilities pose large potentials for expansion with their combined employment demand totaling only about 0.2 to 0.3 million workers annually over the next decade.

Table 11. Industry sector gross value-added and employment: Philippines, 2016-2030

	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
Green PEPM Sector	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
A. Gross Value Added (Trillion PhP in Constant 2000 prices)												
Mining	0.1	0.1	0.1	0.1	…	…	…	…	0.1	0.1	0.1	0.1
Manufacturing	1.6	1.9	2.5	3.1	0.1	0.1	0.2	0.2	1.7	2.1	2.7	3.3
Utilities	0.2	0.3	0.3	0.4	a	a	a	a	0.3	0.3	0.4	0.4
Construction	0.4	0.5	0.8	1.1	0.2	0.4	0.5	0.7	0.6	0.9	1.3	1.8
B. Employment (Millions)												
Mining	0.2	0.1	0.1	0.1	…	…	…	…	0.2	0.1	0.1	0.1
Manufacturing	3.2	3.3	3.5	3.8	0.2	0.2	0.2	0.2	3.4	3.5	3.8	4.0
Utilities	0.1	0.1	0.1	0.1	a	a	a	a	0.2	0.2	0.2	0.2
Construction	2.3	3.0	3.9	4.9	1.2	1.5	2.1	2.7	3.5	4.5	6.0	7.5

Note: a – less than 0.05; … – no disaggregation

Source: Authors' calculations.

7.2.3. Services

The services sector is expected to dominate the economy over the next decade under the BAU scenario. From its 4.7 PHP trillion GVA in 2016, the sector is projected to contribute 9.8 PHP trillion in 2030 (see Table 12, Panel A). Almost 40 percent of the services sector's GVA will come from just three subsectors, namely, wholesale and retail trade (32%), transportation and storage (5%), and hotel and restaurant services (3%). Its green sub-sector will continue to contribute about a quarter of the services sector's total GVA, although the rates differ across subsectors. Most notably, the hotel and restaurant services have great potentials for greening, with only eight percent of its GVA coming from the green sub-sector over the next decade under the BAU scenario.

The services sector will continue to demand the greatest number of workers among the three major sectors of the economy throughout the projection period. Over the next decade, the services sector will need an additional 12.6 million workers, or a total of 35.1 million in 2030, from its 2016 figure of 22.5 million (see Table 12, Panel B). More than half of the demand for workers in the sector will come from the combined labor requirements in wholesale and retail trade (37%), transportation and storage (11%), and hotel and restaurant services (10%).

Employment demand in the green services sector will grow by 2.8 percent annually on average between 2016 and 2030. By the end of the projection period, green services will require about 6.3 million workers compared to 4.3 million in 2016, or an additional two million workers over the decade. Much of these positions will be in wholesale and retail trade (1.8 million workers) and in transportation and storage (1.7 million workers), which together already comprise 56 percent of the employment demand in green services by 2030. Overall, about one in every five workers demanded in the services sector will be in green firms towards the end of our projection horizon.

Table 12. Services sector gross value-added and employment: Philippines, 2016-2030

	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
A. Gross Value Added (Trillion PhP in Constant 2000 prices)												
Wholesale and retail trade	1.2	1.5	2.0	2.4	0.3	0.4	0.5	0.7	1.5	1.9	2.5	3.1
Transportation and storage	0.2	0.3	0.3	0.4	0.1	0.1	0.1	0.1	0.3	0.4	0.5	0.5
Hotels and restaurants	0.1	0.2	0.2	0.3	a	a	a	a	0.2	0.2	0.3	0.3
Services, N.E.C.	2.0	2.6	3.5	4.4	0.7	0.9	1.2	1.5	2.7	3.6	4.7	5.9
B. Employment (Millions)												
Wholesale and retail trade	7.0	8.3	9.8	11.1	1.1	1.4	1.6	1.8	8.1	9.6	11.4	13.0
Transportation and storage	1.7	1.8	1.9	2.1	1.4	1.5	1.6	1.7	3.1	3.3	3.6	3.8
Hotels and restaurants	1.6	2.0	2.6	3.1	0.2	0.2	0.3	0.3	1.7	2.2	2.9	3.5
Services, N.E.C.	8.0	9.5	11.1	12.5	1.6	1.8	2.2	2.4	9.6	11.3	13.3	14.9

Note: a – less than 0.05

Source: Authors' calculations.

8. PDP-based Scenarios

The preceding section presents the results of the baseline BAU scenario, which essentially captures the potential contribution of an expanding economy and increasing labor productivity on labor demand. In this section, we then show the impact of three alternative growth trajectories for the Philippines. Like in the BAU scenario, we keep the inter-relationship across sectors the same as in the 2016 baseline as captured through the Goshian supply coefficients. Also, we used the same sectoral labor productivity trajectories used in the BAU scenario. Any deviations relative to the BAU scenario may thus be attributed to differences in growth patterns used in each of the scenarios.

In the PDP scenario, except in electricity generation, all green and conventional subsectors within GPEPM parent sectors grow at the same rate. In electricity generation, all new demand is supplied by the non-renewable power generation sector. This scenario is designed to capture the potential employment demand impact of reaching the government's PDP growth targets in the medium term while keeping its baseline non-renewable energy capacity constant. In contrast, in the PDP+ scenario, we follow the country's proposed NDC for energy generation by assuming that the renewable energy sector is able to meet its target of doubling its capacity until 2030. All unmet electricity demand in this scenario are supplied by the non-renewable energy sector. This scenario is intended to capture the impact of changing the country's energy mix towards greater use of electricity from renewable sources. Finally, in the PDP++ scenario all green subsectors are set to grow twice as fast as their conventional subsector counterpart. This last scenario is meant to capture the potential impact of a more aggressive promotion of greening across all sectors of the economy.

8.1. Economy-wide outlook

8.1.1. Production

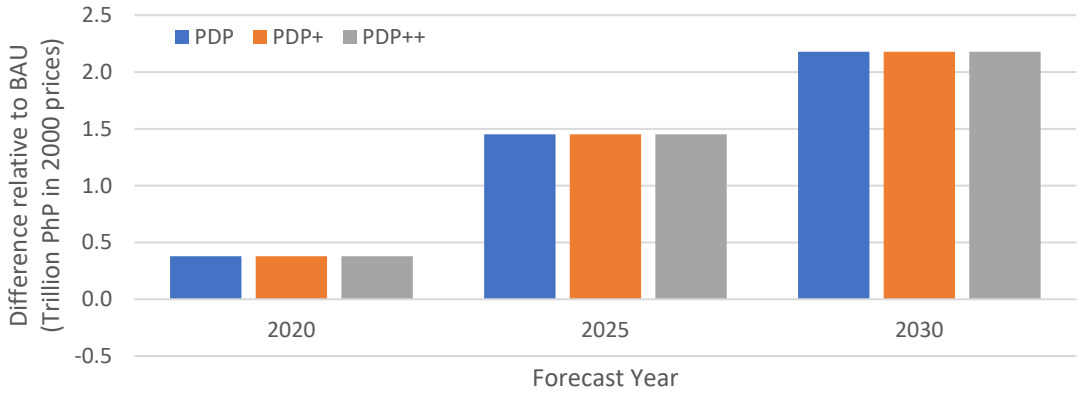
Figure 13 shows the projected GDPs under the three alternative PDP-based scenarios relative to BAU. It must be noted that at the aggregate the difference relative to BAU should be the same (see Panel A) since the whole economy is growing at the same rate across the different scenarios. The difference lies in the pattern of growth across sectors.

In the PDP and PDP+ scenarios, the conventional and green sectors are expected to expand by PHP 1.9 trillion and PHP 0.2 trillion, respectively, relative to the BAU results in 2030 (see Panels B and C). The impact of changing energy mixes on GVA appears minimal when the PDP and PDP+ results are compared. To some extent, this may be explained by the relative share of power generation in the country's GDP, which stands at about only three percent at baseline. Furthermore, even with the doubling of the output of renewable energy sector in the PDP+ scenario, the non-renewable power generation still needs to grow by about five percent annually to meet the differentials in projected electricity demand. This rate is only slightly lower than the six percent projected growth of the non-renewable energy sector in the PDP scenario where no new renewable energy capacity is deployed until 2030.

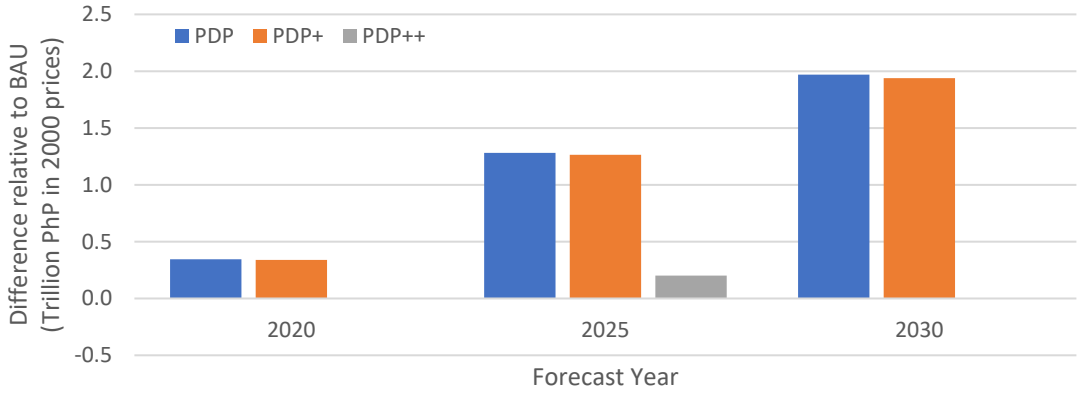
It is very evident that with the more aggressive greening in the PDP++ scenario the green sector could surpass the BAU estimates by as much as 2.2 PHP trillion in 2030. Under the PDP++ scenario, the green sector is expected to grow by 1.6 times of the BAU estimates in 2030. However, this entails that the conventional sector will contract by about 650 PHP million in 2030 relative to the projected GVA under BAU.

Figure 13. Difference in gross value-added (trillion PHP in 2000 prices): Philippines, 2020-2030

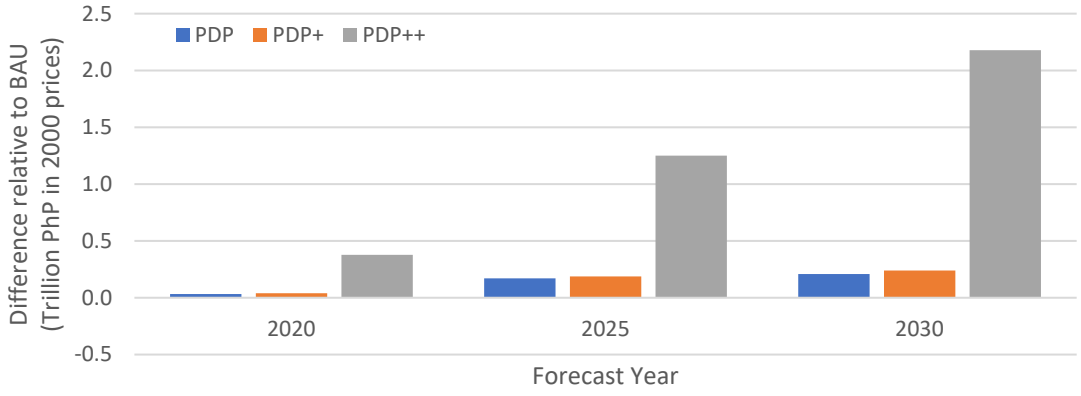
A. All Sectors



B. Conventional Sectors



C. Green Sectors



Source: Authors' calculations.

8.1.2. Labor market

Because of differences in the projected sectoral GVA across the scenarios, demand for labor is also expected to differ. Figure 14 presents the change in employment demand relative to BAU under the different scenarios. Overall, the aggregate demand for workers is expected to increase relative to BAU in all the PDP-based scenarios, although the levels vary.

In the PDP and PDP+ scenarios, the conventional and green sector are expected to require additional 4.1 million and 0.7 million workers, respectively, relative to the BAU scenario in 2030. In both scenarios, labor demand is expected to grow by 2.8 percent annually, compared to the BAU scenario of only 2.2 percent. Again, there appears to be minimal difference in labor demand with the change in energy mixes when the PDP and PDP+ results are contrasted. The impact of more aggressive greening on employment demand in the PDP++ scenario, however, is relatively modest when compared to the other two PDP-based scenarios. On the aggregate, the PDP++ scenario requires an additional 3.6 million workers relative to BAU in 2030. The expansion is expected to come from the green sector where an additional 4.2 million workers will be needed towards the end of the projection horizon. But because of the contraction in the conventional sector's output, about 600 thousand job positions will no longer be required. This qualitative result is robust to alternative specifications of the baseline IO matrix (see Annexes B and C for discussion).

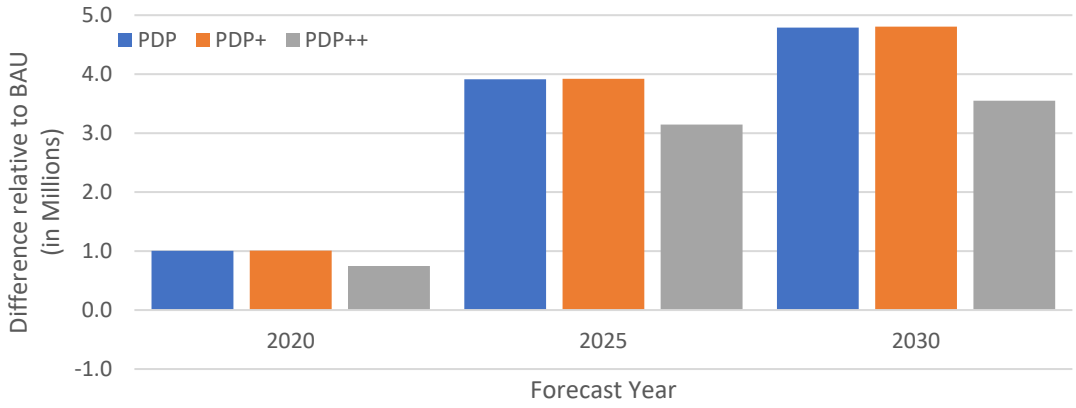
When disaggregated by major economic sector, much of the additional employment demand will come from the services sector, followed by industry, then only by agriculture (see Figure 15). Depending on the scenario, the employment demand in services could surpass the BAU demand in 2030 by 1.6 to 3.0 million workers. The labor demand impact of moving from BAU to reaching the country's PDP targets on industry and on agriculture are less variable at 1.3 million, and 0.5 to 0.7 million workers, respectively.

The results suggest that moving from a lower growth trajectory, i.e., the BAU scenario, to a high-growth path, i.e., the PDP-based scenarios, leads to an unambiguous increase in demand for workers at the aggregate. That is, expanding the country's economy is expected to result to greater opportunity for workers. This result appears robust regardless of the projected energy mixes employed in the economy, i.e., PDP and PDP+ scenario, or the relative growth of the green and conventional subsectors, i.e., PDP and PDP++ scenarios. In this sense, promoting the greening of industries by expanding production in the different sectors of the economy may be beneficial to employment demand growth.

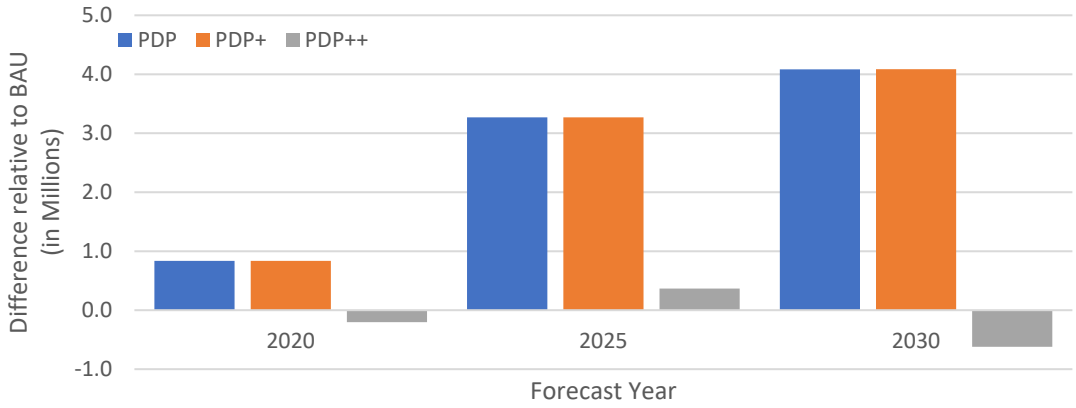
However, given the same aggregate growth trajectory, does an across-the-board promotion of greening strategies across all sectors lead to greater employment demand? That is, is all-out greening beneficial for employment? We explore this question by comparing the results in the PDP and the PDP++ scenarios. Since the aggregate growth, technology used, and sectoral labor productivity trajectories are the same in both scenarios, then the variation in the employment demands in the PDP and PDP++ scenarios may be attributed to the differences in the growth trajectories of the green and conventional subsectors only.

Figure 14. Difference in employment (millions): Philippines, 2020-2030

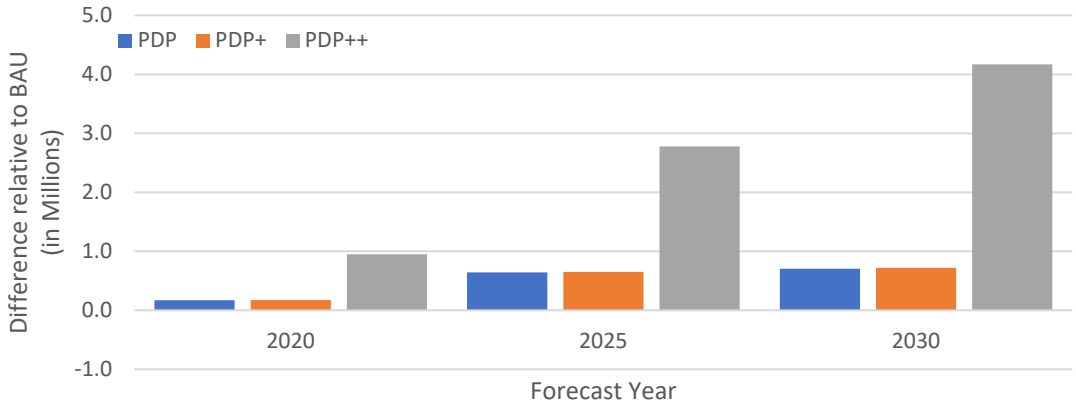
A. All Sectors



B. Conventional Sectors

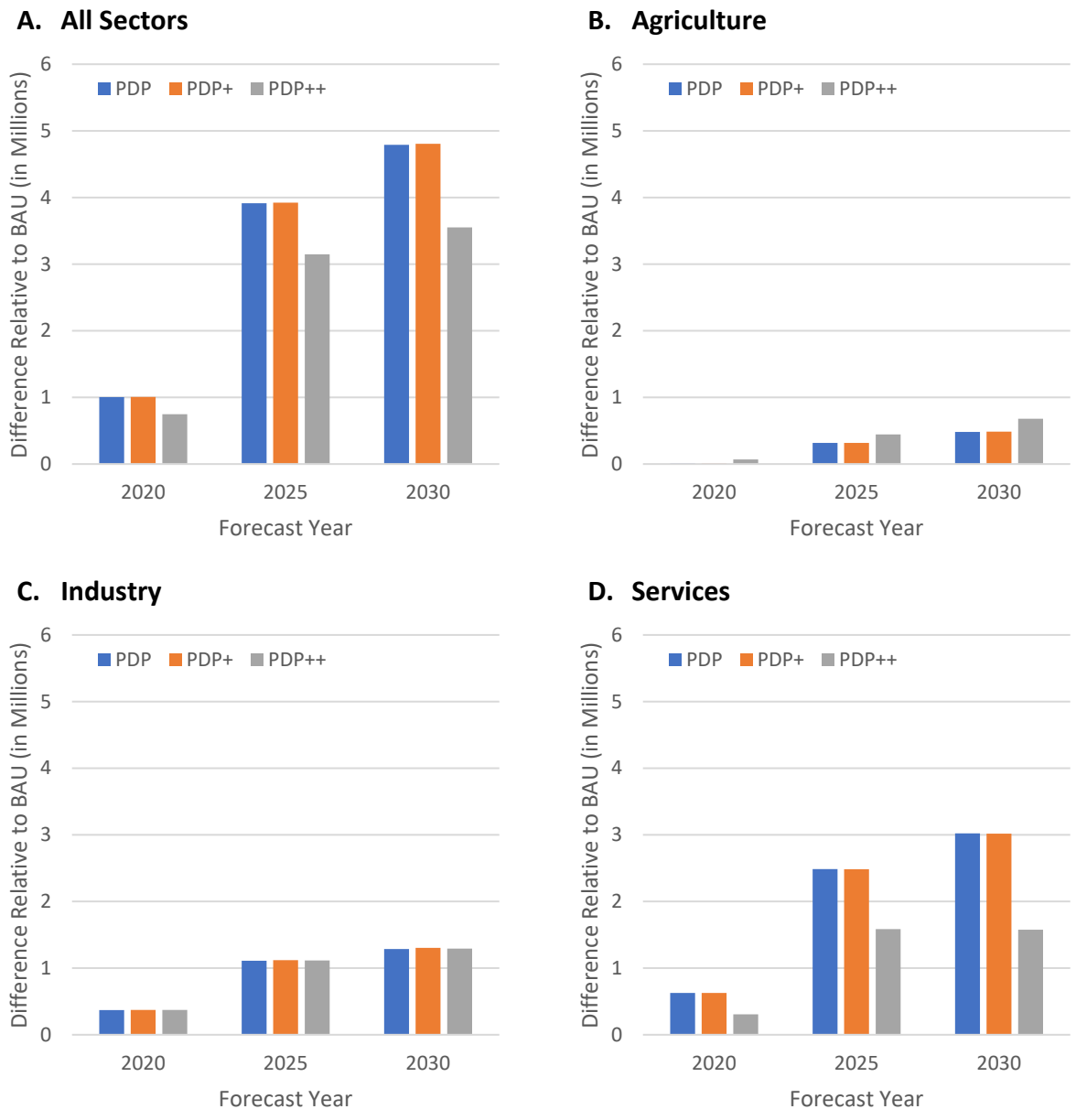


C. Green Sectors



Source: Authors' calculations.

Figure 15. Difference in employment (millions) by sector: Philippines, 2020-2030



Source: Authors' calculations.

Table 13 presents the difference between the projected employment demands in the PDP and PDP++ scenarios. On aggregate, the results suggest that promoting an aggressive across-the-board greening strategy may increase the demand for workers in the green sector by as much as 3.5 million workers in 2030. About a two-thirds of this will be in the services sector (2.1 million workers), then followed by industry (1.1 million workers) and agriculture (0.3 million workers). However, employment demand in the conventional sector is expected to decline by as much as 4.7 million workers. A great majority of this loss in employment positions is expected to come from

services (77%). Industry is a far second, losing about 1.0 million workers (21%). The impact on agriculture, on the other hand, is expected to be relatively minimal at less than a hundred thousand employment positions lost because of aggressive promotion of sectoral greening.

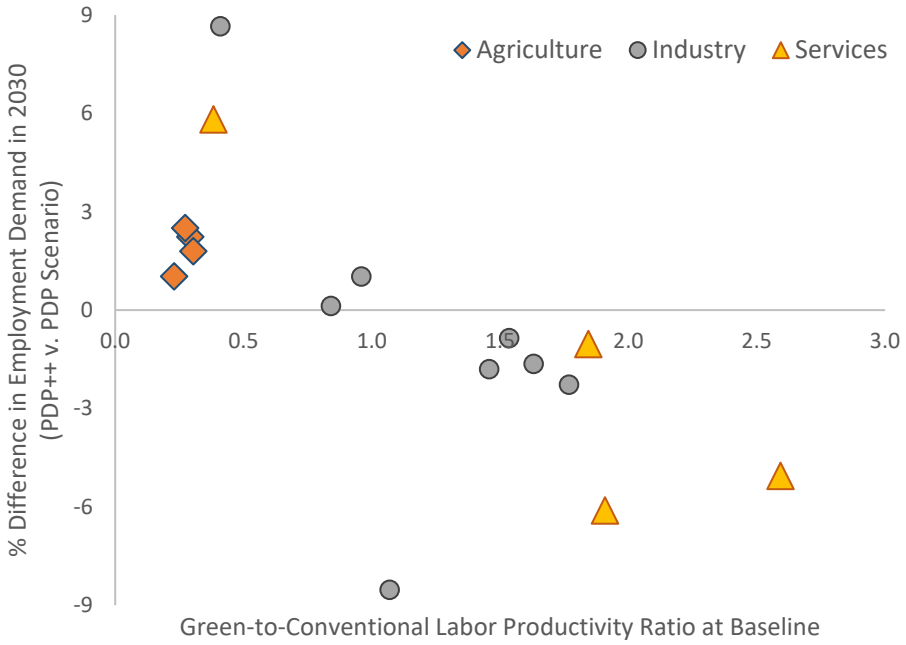
Table 13. Projected change in employment (millions): PDP v PDP++, 2020-2030

	Conventional Subsector			Green Subsector			All Subsectors		
	2020	2025	2030	2020	2025	2030	2020	2025	2030
A. Level (Million Workers)									
Agriculture	a	a	-0.1	0.1	0.2	0.3	0.1	0.1	0.2
Industry	-0.2	-0.6	-1.0	0.2	0.6	1.1	a	a	a
Services	-0.8	-2.2	-3.6	0.5	1.3	2.1	-0.3	-0.9	-1.4
Total	-1.0	-2.9	-4.7	0.8	2.1	3.5	-0.3	-0.8	-1.2
B. Percent (%) of PDP Projection									
Agriculture	-0.2	-0.6	-0.9	7.4	17.1	27.6	0.6	1.3	2.1
Industry	-3.0	-7.0	-10.3	11.7	25.9	36.7	a	a	0.1
Services	-3.7	-8.2	-11.5	9.6	21.6	30.6	-1.2	-2.7	-3.8
Total	-2.7	-6.5	-9.4	9.8	22.2	32.0	-0.6	-1.4	-2.0

Note: a – less than 0.05; Estimates are calculated by subtracting the projected employment demand in the PDP scenario from estimates in the PDP++ scenario.
Source: Authors' calculations.

Which sectors' labor demand will be affected most by greening? To provide some insights on this question, we plot the relative difference in the PDP and PDP++ sectoral employment demand projection against the ratio of the labor productivity in the green relative to the conventional sector (see Figure 16). As may be noted, there is a clear negative relationship between the two variables. Specifically, those sectors where the green subsector produces more output per worker relative to the conventional subsector, i.e., the ratio is greater than one, are expected to experience greater drop in employment demand. In sectors where workers in the green subsector is less productive than those in the conventional subsector, e.g., in crop and animal production, promoting the greening of the sector is projected to increase demand for workers in those sectors.

Figure 16. Labor productivity and projected employment demand impact of greening



Source: Authors' calculations.

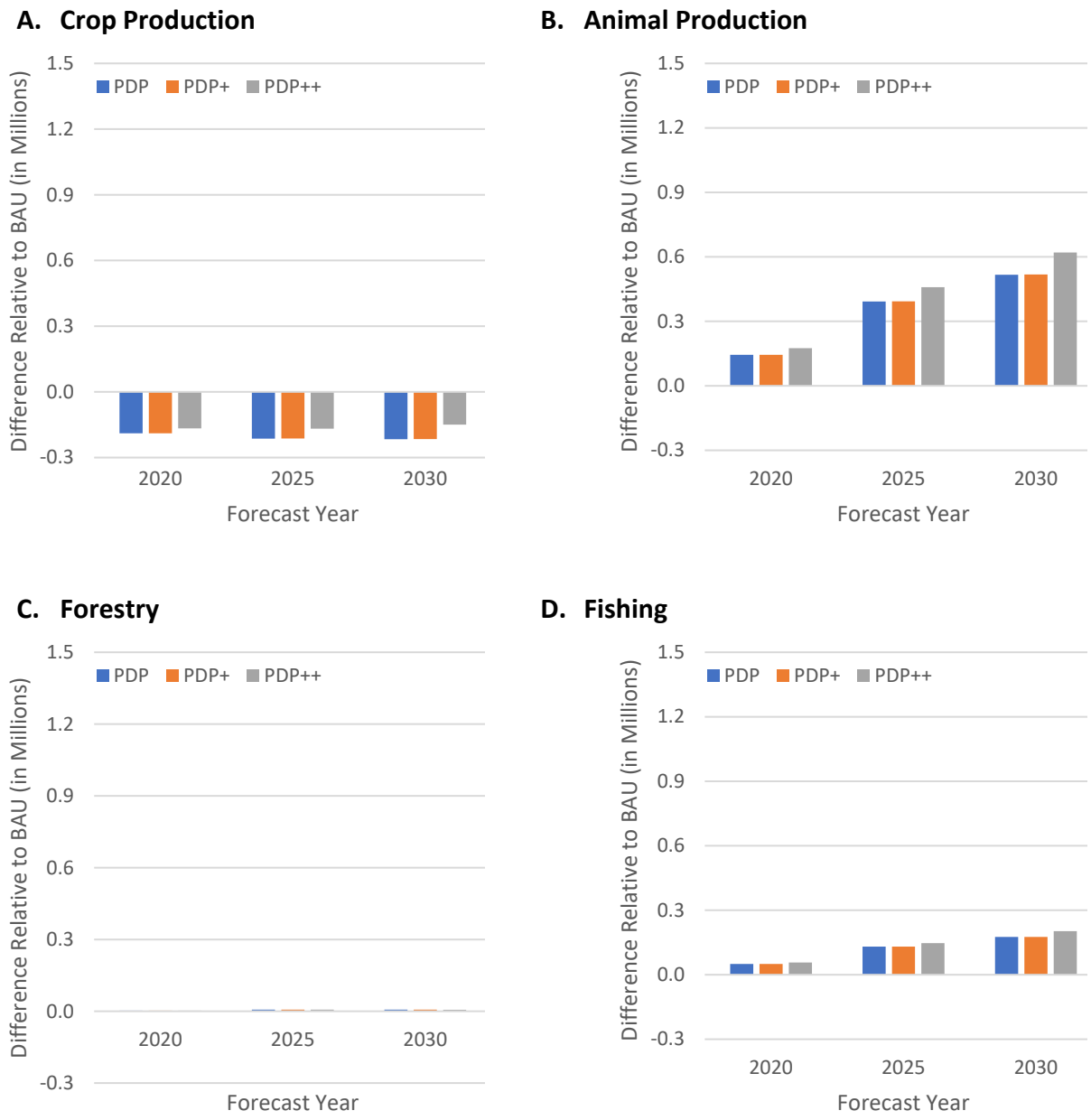
8.2. Industry-level results

8.2.1. Agriculture

Attaining the PDP growth targets is expected to increase aggregate labor demand in the agriculture sector by 0.5 to 0.7 million workers relative to the BAU scenario in 2030. When disaggregated further (see Figure 17), however, we see that employment demand in crop production is expected to decline by 0.1 to 0.2 million workers by 2030 depending on the scenario. This drop on projected employment demand is a direct consequence of the projected GVA growth rates in the crop production sector: the 2.5 percent GVA growth in the PDP-based scenario is slightly lower than the 2.9 percent growth projected under BAU. The decline in employment demand in crop production under the PDP-based scenarios may be mitigated by promoting green production technologies, including organic farming, which traditionally employs more workers given the same level of output. Indeed, promoting greening of the crop production sector may slash the drop in projected labor demand by as much as half, or 0.1 million employment positions.

A similar remark may also be applied to animal production and fishing. For animal production, the PDP-based targets may raise the demand for workers by as much as 0.5 to 0.6 million in 2030. In fishing, on the other hand, the demand for workers are higher by about 0.2 million workers. In both subsectors, the increase in labor demand is highest under the PDP++ scenarios.

Figure 17. Difference in employment (millions) in agriculture subsectors: Philippines, 2020-2030



Source: Authors' calculations.

8.2.2. Industry

The labor demand in the industry sector is also expected to increase as a result of the faster growth trajectory in the PDP-based scenario. By 2030, employment demand in industry expected to be greater than that in BAU by 1.3 million workers. Much of this growth in employment demand will come from manufacturing, which will require an additional 1.3 million workers annually relative to BAU in 2030 depending on the scenario (see Figure 18). Labor demand in the utilities sector is also expected to be higher by as much as 39 percent relative to the BAU scenario, although in absolute terms totals only to about 0.1 million additional workers by 2030. Demand for workers in the construction sector is also expected to be higher relative to BAU in the short-term by as much as 0.2 million workers, although the PDP-based projections are lower by as much as 0.1 million workers in the longer term.

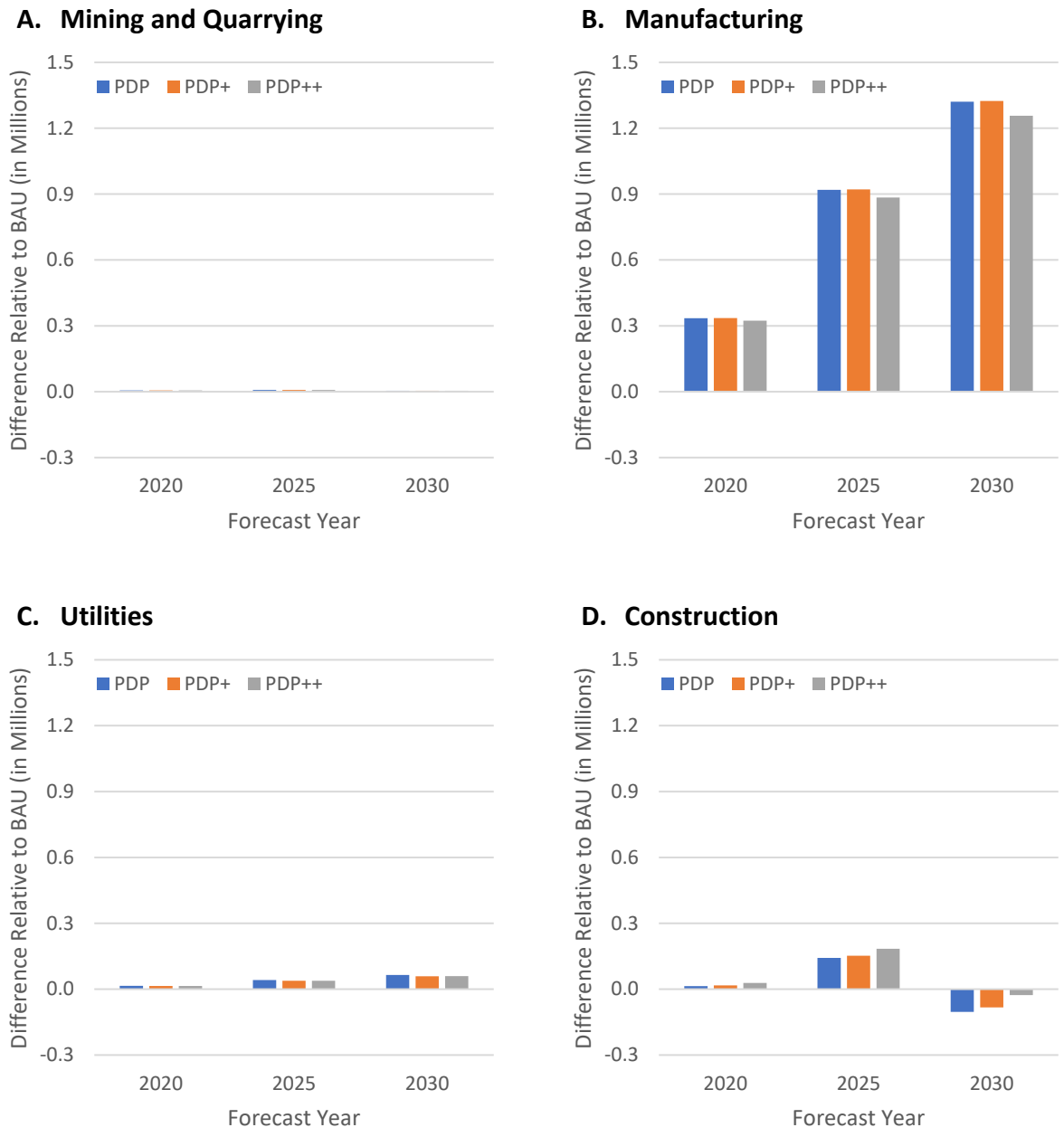
Active promotion of greening, i.e., the PDP++ scenario, in the construction sector may mitigate the loss in employment positions in the longer term. In manufacturing, however, similar strategies may be sub-optimal, resulting in the loss of about 0.1 million employment positions annually relative to the PDP and the PDP+ scenarios towards the end of our projection period.

8.2.3. Services

The greatest increase in employment demand as a result of reaching the PDP targets may be observed in the services sector. On aggregate, an additional 1.6 to 3.0 million workers are expected to be generated on top of the BAU projections in 2030 (see Figure 19). Much of the additional employment demand will come from two subsectors, namely, wholesale and retail trade, which would require 0.5 to 1.2 million workers more relative to BAU, and transportation, which would need an additional 0.8 to 1.1 million workers, depending on the scenario. Labor demand in the hotel and restaurant services is also expected to expand by about 0.2 to 0.3 million workers relative to BAU. Except for the residual category, all subsectors of services are expected to have higher demand for workers in the PDP-based scenarios when compared to BAU.

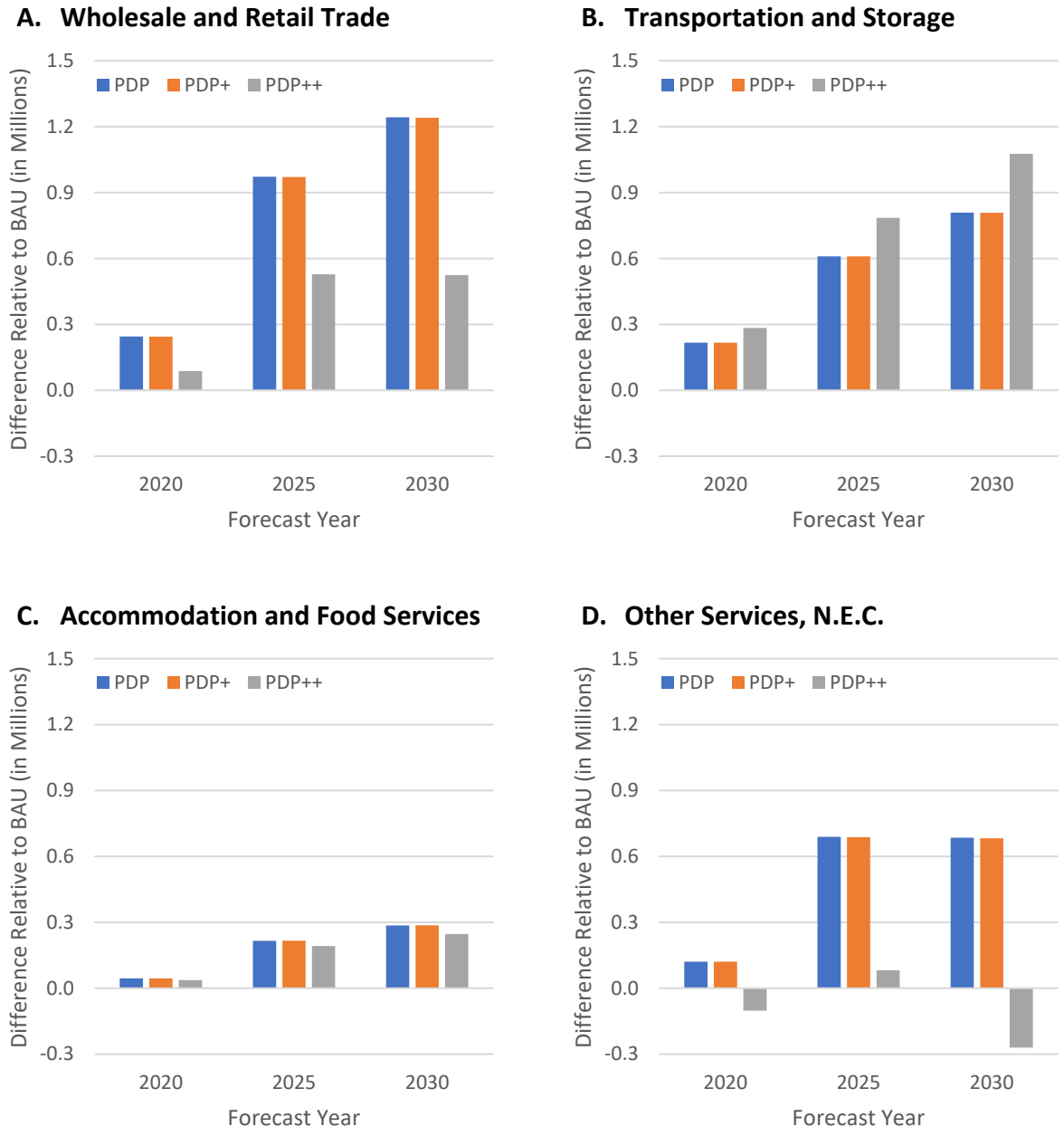
Comparing the projections in the PDP and PDP++ scenarios, greening the services sector is expected to raise the demand for workers in transportation (0.3 million workers) and in hotel and restaurant services (less than 0.1 million workers) in the medium-term. A similar strategy in wholesale and retail trade, however, may lead to a contraction in labor demand by as much as 0.7 million employment positions. The effect on the residual category is more pronounced with aggressive greening of the sector resulting in an estimated one million employment positions lost in 2030.

Figure 18. Difference in employment (millions) in industry subsectors: Philippines, 2020-2030



Source: Authors' calculations.

Figure 19. Difference in employment (millions) in services subsectors: Philippines, 2020-2030



Source: Authors' calculations.

9. Summary and Policy Options

Climate change has important and non-trivial effects that is expected to impact how everyday lives are organized. Every contribution to address its source, and to mitigate its negative impacts therefore matter. In the Philippines, the government, through the Climate Change Commission, has anchored its National Framework on Climate Change until 2022 on adaptation. Mitigation strategies are considered for its development potentials, and to further the adaptation capabilities

of communities. One of such mitigation strategies is the promotion of employment in sectors that produce environmental goods and services, or in firms that use environment-friendly technologies. In this study, we aim to assess how such strategies may actually impact future employment demand.

As may be expected, promoting the growth of the green sector has great potentials to expand the labor market. Indeed, as we have shown in our results, attaining the country's medium-term economic growth targets has the potential of increasing employment by as much as 6.4 to 8.6 percent of the baseline BAU scenario in 2030. In absolute terms, depending on the scenario, our projections point to 3.6 million to 4.8 million additional employment positions on top of the baseline BAU scenario of 56 million workers needed in 2030. Regardless whether the growth is mainly driven by the green sector or the conventional sector, expansion of the economic base unambiguously leads to greater employment. This is the type of sectoral greening that promotes employment.

However, such strategy is confounded by the growth of the economy. A more appropriate thought experiment could be as follows: *Given the same potential aggregate growth, does aggressively promoting the growth of the green industry – to the detriment of the more established conventional sectors – promote greater labor demand?* The answer is not as clear-cut. We have shown that greening have positive employment effects in sectors where the output per worker in the green subsector is less compared to the conventional sector. On the other hand, promoting greening in sectors where the green subsector produces more output per worker leads to a contraction in employment. This is not unexpected since sectors with higher labor productivity will generally require less number of workers to produce the same amount of output given all else being equal.

The contraction in employment in these productive sectors may not necessarily indicate a net welfare loss to society. First, those that are able to be employed in these highly productive sectors are expected to earn higher wages. Second, those who would have been displaced by greening may be directed to other sectors that need them. This of course is easier said than done; and is highly dependent on the success of existing government policies, plans and actions, and the contribution of the private sector. Third, the loss in employment may be seen as a social cost that needs to be paid in order to mitigate the negative impacts of climate change by promoting green production and processes. At the frontier, society may need to decide whether the loss in employment is an acceptable trade-off for a better environment. What society lose in employment may or may not be a fair bargain to improvements in planetary health.

This leads us to the question of whether public resources should be used to promote employment in the green sector, or more specifically of green jobs such as through tax incentives provided under the Green Jobs Act of 2016. Again, the answer may not be as straightforward. To the extent that promoting employment in the green sector or of green jobs has spillover effects on other employment, say through averted employment loss from climate change (ILO, 2018), then government interventions may be warranted. However, absent these spillovers such government interference is difficult to justify especially with the casual observation that green firms are likely to be the more productive ones. Instead of a blanket tax incentive to promote green jobs, a more rational and pointed approach would be to address the causes of why firms do not invest in greener

technologies or choose to produce green outputs. This may include, for instance, limited access to credit markets, or uncertainties surrounding production technology.

Overall, these results highlight some of the challenges faced by the labor market with greening the economy. As the country transitions, some employment positions may be rendered obsolete and thus are no longer required. Others might be transformed to use greener technologies, instead of conventional ones. Some might not be existing today and will only be created when the need arises. Still, there might be some current employment positions that remain the same. Identifying which employment positions belong to what category remains to be the question that needs further probing. While this study provides some insights where the critical sectors with regard to employment generation and losses may be in the future, limitations in the available data and the design of the study greatly constrains its ability to forecast the demand for specific employment positions. Other more appropriate research designs may need to be employed if such details are to be identified.

Institutionalizing and strengthening existing social protection programs are necessary to ensure a just transition to a greener economy. The government plays an important role in this regard.

First, continuous education and training must be an integral part of any social protection program on the future of work. In an ever-evolving and highly dynamic globalized labor market, re-orientation of education to train the population to be more adaptable with emerging technologies, as well as to promote socio-emotional skills, may be needed to equip future workers with the demands of more flexible work arrangements (c.f. Rieckmann 2012; Acosta et al. 2017). Retooling and upskilling of workers through training and education programs are crucial requisites to maximize the potential gains from promoting green jobs and minimize possible losses that may result from employment contraction in some sectors.

Second, the government is in a unique position to smoothen the potential negative impacts from the inevitable structural changes that transitioning to a greener economy would entail. More specifically, with the changes in the structure of the labor market, including the potential loss in some work positions, the government may aid in facilitating the transition of workers through jobs within and across industries and occupations through its various employment facilitation services, including those by DOLE and the local governments. In this regard, further strengthening of the governments' labor market surveillance and information systems may be crucial to allow more responsive evidence-based decisions on the part of both government and households.

Third, pension and unemployment insurance programs may need to be revisited not just in relation to the greening of the economy, but with other related developing issues as well. With the projected displacement of workers, either temporarily or more permanently, pension and unemployment insurance programs provide an important safeguard for families from falling into poverty. However, the current pay-as-you-go system may pose a heavy burden on future worker-contributors especially in light of our slowly ageing population. A parallel fully-funded pension and worker's compensation system may need to be set in place as a guarantee for future workers who will be faced not just with the challenges of an evolving labor market, but also the cost of financing the consumption of a growing elderly population.

This study is limited in a number of directions. For instance, we are able to provide employment demand projections at the sectoral level. A more useful endeavor could be to drill down into more specific industry-occupation-level analysis. Further, limitations in the available of data only allows us to measure employment in the green sector, and not necessarily of green jobs. In any case, this study opens future research on the topic. While we show the employment potentials of greening the economy, this is but one of the many pieces of a larger puzzle. We have already highlighted some of the other salient questions that begs answering. What challenges do firms face that prevents them from investing in green technology or in producing green outputs? What are the other costs and benefits of promoting the transition to a greener economy? Which employment positions will be created, replaced, upgraded or retained? What are the required qualifications for these enduring and emerging employment positions? How should safety net programs evolve with the future of work? Addressing these knowledge gaps may provide greater insights on the greening of the economy and the future of work in the country.

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11. Annexes

Annex A.1. Green Philippine employment projection model parent sectors

Green PEPM Parent Sector	Sector Code	3-digit PSIC 2009
I. Agriculture Sector		
Growing of Non-perennial crops	1	011
Growing of Perennial crops	2	012-013
Animal production	3	014-017
Forestry	4	021-024
Fishing	5	031-032
II. Industry Sector		
Mining of Coal	6	051-052
Extraction of Petroleum and natural gas	7	061-062
Mining of Metallic ore	8	071-072
Mining of Non-metallic ore	9	081-099
Manufacturing of Food, beverages and tobacco products	10	101-139
Manufacturing of Textiles, wearing apparel, and leather and related products	11	141-152
Manufacturing of Wood products, except furniture	12	161-162
Manufacturing of Paper products, printing and reproduction of recorded materials	13	170-182
Manufacturing of Coke and refined petroleum products	14	191-199
Manufacturing of Chemical and pharmaceutical products	15	201-210
Manufacturing of Non-metallic minerals and products	16	221-239
Manufacturing of Metals and metal products, except machinery and equipment	17	241-259
Manufacturing of Electronics, electrical and optical products	18	261-279
Manufacturing of Machinery and equipment, not elsewhere classified	19	281-282
Manufacturing of Transport equipment	20	291-309
Manufacturing of Furniture	21	310
Manufacturing not elsewhere classified	22	321-332
Electricity, gas, steam and air conditioning supply	23	351-353
Water supply	24	360
Sewerage, waste management and remediation activities	25	370-390
Construction	26	410-439
III. Services Sector		
Wholesale and retail trade; repair of motor vehicles and motorcycles	27	451-479
Transportation and storage	28	491-532
Accommodation and food service activities	29	551-563
Services not elsewhere classified	30	581-990

Annex A.2. Green PEPM sub-sectors production boundary

Green PEPM Parent Sector	Sector Code	Green Subsector		Note
		Product	Process	
Growing of Non-perennial crops	1	Yes	Yes	(1)
Growing of Perennial crops	2	Yes	Yes	(1)
Animal production	3		Yes	(2)
Forestry	4	Yes		(3)
Fishing	5		Yes	(2)
Mining of Coal	6			(4)
Extraction of Petroleum and natural gas	7			(4)
Mining of Metallic ore	8			(4)
Mining of Non-metallic ore	9			(4)
Manufacturing of Food, beverages and tobacco products	10		Yes	(2)
Manufacturing of Textiles, wearing apparel, and leather and related products	11		Yes	(2)
Manufacturing of Wood products, except furniture	12		Yes	(2)
Manufacturing of Paper products, printing and reproduction of recorded materials	13		Yes	(2)
Manufacturing of Coke and refined petroleum products	14			(4)
Manufacturing of Chemical and pharmaceutical products	15			(4)
Manufacturing of Non-metallic minerals and products	16			(4)
Manufacturing of Metals and metal products, except machinery and equipment	17			(4)
Manufacturing of Electronics, electrical and optical products	18			(4)
Manufacturing of Machinery and equipment, not elsewhere classified	19			(4)
Manufacturing of Transport equipment	20			(4)
Manufacturing of Furniture	21		Yes	(2)
Manufacturing not elsewhere classified	22			(4)
Electricity, gas, steam and air conditioning supply	23	Yes	Yes	(5)
Water supply	24		Yes	(2)
Sewerage, waste management and remediation activities	25	Yes		(3)
Construction	26		Yes	(2)
Wholesale and retail trade; repair of motor vehicles and motorcycles	27		Yes	(2)
Transportation and storage	28	Yes	Yes	(6)
Accommodation and food service activities	29		Yes	(2)
Services not elsewhere classified	30		Yes	(2)

Notes: (1) For the agriculture sector, particularly growing of perennial and non-perennial crops, organic agriculture is proxied by labor intensity based on observations from the literature. More specifically, we tagged establishments in the growing of non-perennial and perennial crops sectors as part of the green sector by-product if an establishment is among the upper ten percentile of firms by employment-per-output. In addition, we also tagged establishments as green-by-process if they are in the upper ten percentile of firms by resource-use efficiency, defined as output per expended resources, including chemicals, transportation, electricity, water and fuel. Percentiles of labor intensity and resource-use efficiency are calculated in each three-digit PSIC. (2) Establishments in the upper ten percentile of firms by resource-use efficiency in each three-digit PSIC are tagged as green-by-process. Similar to (1), resource-use efficiency is defined as output per resources used, but only including transportation, electricity, water and fuel as reference inputs. (3) The sector produces green output are therefore wholly classified as green-by-output. This includes forestry (GPEPM Sector 4) and sewerage, waste management and remediation activities (GPEPM Sector 25). (4) The parent sector is classified wholly as conventional. No green subsector is specified. (5) The renewable energy sector is proxied by the registered location of renewable energy power plants. See (2) for description of identifying green-by-process establishments. (6) Mass transportation, excluding air transportation, are classified as green-by-product. See (2) for identifying green-by-process establishments.

ANNEX B. Sensitivity to input-output matrix assumptions

The projections we presented are based on specific assumptions about the production boundaries between the green and conventional sectors, and how these sectors interact within the economy. Much of these assumptions have to be made because of the limitations in the available data that would have otherwise allow the direct estimation of the inter-industry relationships. For instance, as a simplifying assumption, we take the goods and services produced by either the green or the conventional sector to be homogeneous to consumers. This allows us to directly disaggregate the inflow of goods and services into all other sectors and agents in the economy based on the overall share of a green or conventional subsector in its GPEPM parent sector.

This assumption may be justifiable in some industries, say in energy sector, where goods and services produced by the green and the conventional subsectors are lumped together, say by the distributor, thus would be indistinguishable to consumers. However, in other industries, this may not be a very tenable assumption. Take organic agriculture for instance. Because of the production technology it employs, organic farming would most likely rely on other green sectors for inputs, such as organic fertilizer, sustainable construction, and materials recovery. Furthermore, organic agriculture may not be as reliant on imports for intermediate inputs unlike its conventional counterpart, which more likely employs imported chemical fertilizers and fuels. These differences would reflect in the input-output matrix that we employ in the projections.

Table B.1. Projected change in employment (millions): PDP v. PDP++, 2020-2030

	Conventional Subsector			Green Subsector			All Subsectors		
	2020	2025	2030	2020	2025	2030	2020	2025	2030
A. Base IO matrix									
Agriculture	0.0	0.0	-0.1	0.1	0.2	0.3	0.1	0.1	0.2
Industry	-0.2	-0.6	-1.0	0.2	0.6	1.1	0.0	0.0	0.0
Services	-0.8	-2.2	-3.6	0.5	1.3	2.1	-0.3	-0.9	-1.4
Total	-1.0	-2.9	-4.7	0.8	2.1	3.5	-0.3	-0.8	-1.2
B. Only Green inputs in Green sector									
Agriculture	-0.1	-0.2	-0.3	0.1	0.2	0.4	a	0.1	0.1
Industry	-0.3	-0.7	-1.2	0.2	0.6	1.1	a	-0.1	-0.1
Services	-0.9	-2.6	-4.2	0.6	1.7	2.7	-0.3	-0.9	-1.5
Total	-1.3	-3.5	-5.7	0.9	2.6	4.2	-0.3	-1.0	-1.5
C. Only Green inputs in Green sector + No imports in Green sector									
Agriculture	-0.1	-0.2	-0.3	0.1	0.2	0.3	a	a	0.1
Industry	-0.3	-0.8	-1.3	0.2	0.6	1.1	a	-0.1	-0.2
Services	-1.0	-2.7	-4.3	0.6	1.6	2.6	-0.4	-1.1	-1.7
Total	-1.3	-3.6	-5.9	0.9	2.5	4.0	-0.4	-1.2	-1.9

a – less than 0.05

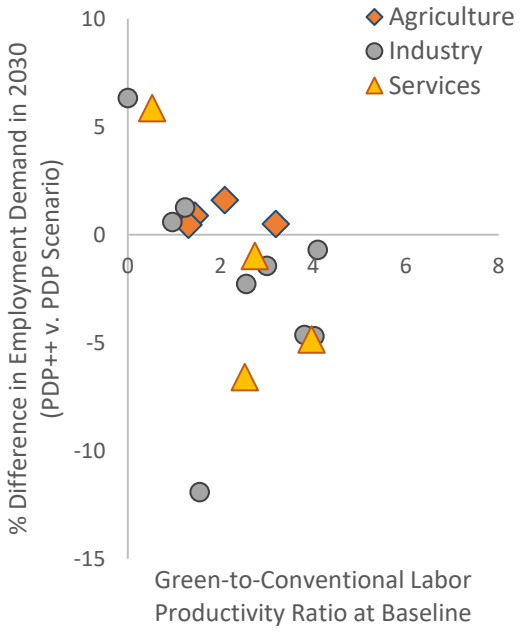
In order to assess the sensitivity of our estimates to assumptions on the sectoral inter-linkages in the economy, we re-estimated the employment demand projections in the PDP and the PDP++ scenarios using alternative input-output (IO) matrix assumptions. In Panel A of Table B.1, we present the same estimated difference in the PDP++ and PDP scenarios. These estimates are based on our baseline IO matrix. In Panel B, we assumed that all inputs in the green sector are sourced only from other green sectors. The conventional sector may source its inputs from either green or conventional sector. In Panel C, in addition to the assumption imposed on Panel B, we further assumed that the green sector has zero imports, i.e., all imports are made by the conventional sector. Note that we deliberately impose extreme assumptions in Panels B and C in order to provide a bound on our projection estimates. The expectation is that with these alternative constraints on the inter-industry linkages, the growth in GVA in the green sector will result in greater green output compared to using the reference IO matrix.

Overall, the qualitative results appear robust to alternative assumptions about the inter-industry linkages in the economy, although the magnitudes vary widely. Regardless of the IO matrix assumption, our projections point to a net job loss from having more aggressive across-the-board growth in the green sector relative to the conventional sector. The largest increase in net job losses may be seen in Panel C, where we assumed that all inputs are sourced from the green sector only, and that green sector has zero imports. Although there is a marked increase in projected net jobs created in the green sector under this assumption, i.e., from 3.5 million jobs in the reference case to 4.0 million jobs in this alternative in 2030, the drop in employment demand in the conventional sector is also much larger, i.e., from 4.7 million jobs in the reference case to 5.9 million jobs in the alternative scenario by 2030, thus resulting to the bigger decline in net job creation. Similar results are observed with the assumption that green all inputs come from other green sector only, the although the estimated levels appear relatively muted. In Panel B, we see the effect of aggressive greening to be larger than in our reference case (Panel A), however the difference is not as large in Panel C.

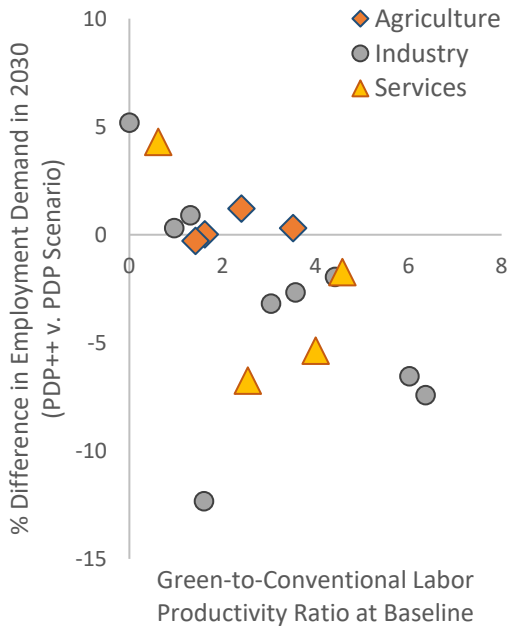
These results are not surprising since workers in many green subsectors, most notably in industry and in services, produces more output per worker relative to those in the conventional subsector. With the more aggressive growth in the green sector output, less workers are required as compared to when the same is produced in the conventional subsector. Indeed, as shown in Figure B.1, sectors with higher green-to-conventional output per worker ratio are at greater risk of experiencing net job losses.

Figure B.1. Output per worker ratio and projected employment demand impact of greening

A. Only green inputs in green sector



B. Only green inputs + No imports in green sector



Annex C. Simple employment multiplier

In the analysis we presented, the projected employment demands in the PDP (high growth) and the PDP+ (high growth with NDC on energy) scenarios are not very different from each other. This result is robust to the assumptions about the inter-industry linkages as discussed in Annex B.[17] Moreover, raising the GVA growth of the renewable energy sector to twice that of the non-renewable energy sector have relatively limited impact on overall employment demand. In Table C.1, we present the results of this alternative scenario using different IO matrix assumptions, and show that the additional employment demand from switching energy mix relative to the reference PDP scenario are all below 0.1 million in 2030, or roughly an additional 0.2 percent at best.

These results may be due to a number of reasons. First, the gross output and direct employment in the energy sector are both small. At baseline, this sector constitutes only about two percent of overall gross output, and 0.3 percent of all employment in the country. Further, the renewable energy sector contributes only 7.2 percent of the sectoral gross output, and employs only 6.7 percent of those who worked in the energy sector. Thus, even assuming a faster growth in the green energy sector, because it is coming from a low base, have limited impact on gross output, and therefore employment. Second, the employment multipliers for the green and conventional subsectors in energy is about the same, at least using the base IO table (See Table C.2). This entails that switching from conventional to green energy may have no impact on the *number* of workers, although the *skills* requirement may be different. Finally, the energy sector, whether the conventional or the green subsector, has one of the smallest employment multipliers in the economy, again, at least when using the reference IO matrix. However, replacing the inter-industry assumptions with those that intentionally favor the green industry result in still modest expansion in net job creation (see Table C.1, Panels B and C).

Table C.1. Projected change in employment (thousands): PDP v. alternative PDP+, 2020-2030

	Conventional Subsector			Green Subsector			All Subsectors		
	2020	2025	2030	2020	2025	2030	2020	2025	2030
A. Base IO matrix									
Agriculture	0.5	1.3	2.3	a	a	a	0.5	1.3	2.3
Industry	-0.3	1.0	4.3	2.8	7.4	13.7	2.5	8.3	18.0
Services	-0.8	-2.5	-5.2	0.1	0.2	0.4	-0.7	-2.2	-4.7
Total	-0.6	-0.2	1.4	2.9	7.6	14.2	2.3	7.4	15.6
B. Only Green inputs in Green sector									
Agriculture	-0.2	-0.2	0.1	6.0	11.9	17.4	5.8	11.7	17.5
Industry	-3.0	-5.3	-6.1	3.0	7.8	14.4	a	2.5	8.3
Services	-1.2	-3.1	-5.7	5.9	13.8	22.9	4.7	10.7	17.1
Total	-4.4	-8.6	-11.7	14.9	33.5	54.7	10.5	24.9	42.9
C. Only Green inputs in Green sector + No imports in Green sector									
Agriculture	-0.3	-0.4	-0.2	5.9	11.7	17.2	5.6	11.4	17.0
Industry	-3.3	-5.8	-6.8	2.9	7.6	14.0	-0.3	1.8	7.2
Services	-1.3	-3.4	-6.1	5.7	13.5	22.3	4.4	10.1	16.2
Total	-4.9	-9.6	-13.1	14.5	32.8	53.5	9.7	23.2	40.4

a – less than 0.05

[17] These results are not presented here for economy in space, but are available from the authors.

Table C.2. Simple employment multiplier at baseline (in workers per PHP million sectoral GVA)

Green PEPM Sectors	Green Sector			Conventional Sector		
	Base IO table	Only green inputs in green sector	Only green inputs + no imports in green sector	Base IO table	Only green inputs in green sector	Only green inputs + no imports in green sector
Non-perennial crops	26.7	33.8	33.4	9.9	9.5	9.5
Perennial crops	34.5	41.6	41.5	9.2	9.1	9.2
Animal production	29.1	43.0	42.6	9.9	9.3	9.3
Forestry	8.1	9.1	9.2	…	…	…
Fishing	18.8	23.4	23.5	6.6	6.4	6.4
Coal	…	…	…	5.9	7.1	7.4
Petroleum and natural gas	…	…	…	9.1	13.3	14.2
Metallic ore	…	…	…	4.3	5.1	5.3
Non-metallic ore	…	…	…	6.2	7.5	7.8
Food, beverages and tobacco products	1.8	5.9	5.7	1.8	1.5	1.5
Textiles and related products	5.5	8.8	7.6	7.1	6.6	6.7
Wood products, except furniture	4.3	8.4	8.3	4.0	3.7	3.7
Paper and related products	8.3	9.8	8.0	8.7	12.5	15.9
Coke and refined petroleum products	…	…	…	6.4	9.8	10.5
Chemical and pharmaceutical products	…	…	…	7.5	13.1	14.0
Non-metallic minerals and products	…	…	…	5.5	6.5	6.7
Metal products, except machinery	…	…	…	6.8	8.5	8.8
Electronics, electrical and optical products	…	…	…	1.2	1.5	1.6
Machinery and equipment, n.e.c.	…	…	…	1.0	1.4	1.5
Transport equipment	…	…	…	0.9	0.9	0.9
Furniture	3.9	6.2	5.9	4.7	4.7	4.9
Manufacturing, n.e.c.	…	…	…	1.2	1.7	1.8
Electricity, gas, steam and air conditioning supply	2.8	10.3	11.1	2.8	2.9	2.9
Water supply	5.9	19.8	20.2	4.4	4.2	4.3
Sewerage, waste management and remediation	7.3	9.9	10.3	…	…	…
Construction	4.1	4.1	4.1	4.0	4.0	4.0
Wholesale and retail trade	3.3	5.0	5.2	5.6	5.3	5.3
Transportation and storage	9.2	11.0	10.8	4.4	4.2	4.3
Accommodation and food service activities	7.6	9.8	8.3	12.3	11.9	12.0
Services not elsewhere classified	3.3	5.0	5.2	5.0	4.7	4.8

ANNEX D. Projected gross value-added (in constant 2000 PHP trillion) by projection scenario and sector: Philippines, 2016-2030

Table D.1. Business-as-Usual Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	0.23	0.27	0.31	0.34	0.01	0.02	0.02	0.02	0.24	0.28	0.33	0.36
2	0.21	0.25	0.29	0.32	a	a	a	a	0.21	0.25	0.29	0.32
3	0.24	0.26	0.29	0.32	0.01	0.02	0.02	0.02	0.25	0.28	0.31	0.34
4	…	…	…	…	a	a	a	a	a	a	a	a
5	0.10	0.11	0.12	0.14	0.01	0.01	0.01	0.01	0.11	0.12	0.13	0.14
6	0.01	0.01	0.02	0.02	…	…	…	…	0.01	0.01	0.02	0.02
7	0.02	0.02	0.02	0.02	…	…	…	…	0.02	0.02	0.02	0.02
8	0.03	0.03	0.04	0.04	…	…	…	…	0.03	0.03	0.04	0.04
9	0.02	0.02	0.03	0.05	…	…	…	…	0.02	0.02	0.03	0.05
10	0.78	0.98	1.23	1.47	0.09	0.11	0.13	0.16	0.87	1.08	1.36	1.63
11	0.07	0.07	0.08	0.09	0.01	0.01	0.01	0.01	0.08	0.08	0.09	0.10
12	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02
13	0.02	0.03	0.04	0.05	0.01	0.01	0.01	0.01	0.03	0.04	0.05	0.06
14	0.07	0.07	0.08	0.09	…	…	…	…	0.07	0.07	0.08	0.09
15	0.21	0.33	0.55	0.88	…	…	…	…	0.21	0.33	0.55	0.88
16	0.06	0.07	0.08	0.10	…	…	…	…	0.06	0.07	0.08	0.10
17	0.05	0.06	0.07	0.07	…	…	…	…	0.05	0.06	0.07	0.07
18	0.20	0.22	0.24	0.27	…	…	…	…	0.20	0.22	0.24	0.27
19	0.02	0.02	0.02	0.03	…	…	…	…	0.02	0.02	0.02	0.03
20	0.03	0.03	0.04	0.04	…	…	…	…	0.03	0.03	0.04	0.04
21	0.01	0.01	0.01	0.02	a	a	a	a	0.01	0.01	0.02	0.02
22	0.02	0.02	0.03	0.03	…	…	…	…	0.02	0.02	0.03	0.03
23	0.20	0.23	0.26	0.28	0.02	0.03	0.03	0.03	0.22	0.25	0.29	0.32
24	0.04	0.05	0.06	0.07	0.00	0.00	0.00	0.00	0.04	0.05	0.06	0.07
25	…	…	…	…	0.00	0.00	0.00	0.01	a	a	a	0.01
26	0.36	0.52	0.77	1.09	0.25	0.35	0.52	0.74	0.61	0.87	1.29	1.83
27	1.17	1.50	1.95	2.42	0.33	0.42	0.55	0.68	1.50	1.93	2.50	3.10
28	0.24	0.29	0.35	0.40	0.07	0.09	0.11	0.12	0.31	0.38	0.45	0.52
29	0.14	0.18	0.23	0.29	0.01	0.02	0.02	0.02	0.15	0.19	0.25	0.31
30	2.04	2.65	3.49	4.39	0.70	0.91	1.20	1.51	2.74	3.56	4.69	5.90

… – not available; a – less than 0.005

ANNEX D. Projected gross value-added (in constant 2000 PHP trillion) by projection scenario and sector: Philippines, 2016-2030 (continued)

Table D.2. PDP (High-growth) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	0.23	0.25	0.29	0.33	0.01	0.01	0.02	0.02	0.24	0.27	0.30	0.34
2	0.21	0.23	0.26	0.30	a	a	a	a	0.21	0.24	0.27	0.30
3	0.24	0.27	0.32	0.38	0.01	0.02	0.02	0.02	0.25	0.29	0.34	0.41
4	…	…	…	…	a	a	a	a	0.00	0.00	0.00	0.00
5	0.10	0.12	0.13	0.16	0.01	0.01	0.01	0.01	0.11	0.12	0.14	0.16
6	0.01	0.01	0.02	0.02	…	…	…	…	0.01	0.01	0.02	0.02
7	0.02	0.02	0.03	0.04	…	…	…	…	0.02	0.02	0.03	0.04
8	0.03	0.04	0.06	0.07	…	…	…	…	0.03	0.04	0.06	0.07
9	0.02	0.02	0.03	0.05	…	…	…	…	0.02	0.02	0.03	0.05
10	0.78	1.10	1.62	2.18	0.09	0.12	0.18	0.24	0.87	1.22	1.80	2.41
11	0.07	0.09	0.14	0.19	0.01	0.01	0.02	0.03	0.08	0.11	0.16	0.22
12	0.01	0.02	0.03	0.04	a	a	a	a	0.01	0.02	0.03	0.04
13	0.02	0.03	0.05	0.07	0.01	0.01	0.01	0.02	0.03	0.04	0.07	0.09
14	0.07	0.09	0.14	0.19	…	…	…	…	0.07	0.09	0.14	0.19
15	0.21	0.29	0.43	0.58	…	…	…	…	0.21	0.29	0.43	0.58
16	0.06	0.09	0.13	0.17	…	…	…	…	0.06	0.09	0.13	0.17
17	0.05	0.07	0.10	0.14	…	…	…	…	0.05	0.07	0.10	0.14
18	0.20	0.28	0.42	0.56	…	…	…	…	0.20	0.28	0.42	0.56
19	0.02	0.03	0.04	0.06	…	…	…	…	0.02	0.03	0.04	0.06
20	0.03	0.04	0.06	0.08	…	…	…	…	0.03	0.04	0.06	0.08
21	0.01	0.02	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04
22	0.02	0.03	0.05	0.06	…	…	…	…	0.02	0.03	0.05	0.06
23	0.20	0.25	0.34	0.46	0.02	0.02	0.02	0.02	0.22	0.28	0.36	0.48
24	0.04	0.05	0.08	0.11	a	a	a	0.01	0.04	0.06	0.08	0.11
25	…	…	…	…	0.00	0.00	0.01	0.01	a	a	0.01	0.01
26	0.36	0.50	0.75	1.00	0.25	0.34	0.51	0.68	0.61	0.85	1.26	1.69
27	1.17	1.54	2.10	2.63	0.33	0.43	0.59	0.74	1.50	1.97	2.70	3.37
28	0.24	0.31	0.43	0.54	0.07	0.10	0.13	0.16	0.31	0.41	0.56	0.70
29	0.14	0.18	0.25	0.31	0.01	0.02	0.02	0.03	0.15	0.20	0.27	0.34
30	2.04	2.67	3.66	4.57	0.70	0.92	1.26	1.57	2.74	3.59	4.92	6.14

… – not available; a – less than 0.005

ANNEX D. Projected gross value-added (in constant 2000 PHP trillion) by projection scenario and sector: Philippines, 2016-2030 (continued)

Table D.3. PDP+ (High-growth + Energy NDC) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	0.23	0.25	0.29	0.33	0.01	0.01	0.02	0.02	0.24	0.27	0.30	0.34
2	0.21	0.23	0.26	0.30	a	a	a	a	0.21	0.24	0.27	0.30
3	0.24	0.27	0.32	0.38	0.01	0.02	0.02	0.02	0.25	0.29	0.34	0.41
4	…	…	…	…	a	a	a	a	a	a	a	a
5	0.10	0.12	0.13	0.16	0.01	0.01	0.01	0.01	0.11	0.12	0.14	0.16
6	0.01	0.01	0.02	0.02	…	…	…	…	0.01	0.01	0.02	0.02
7	0.02	0.02	0.03	0.04	…	…	…	…	0.02	0.02	0.03	0.04
8	0.03	0.04	0.06	0.08	…	…	…	…	0.03	0.04	0.06	0.08
9	0.02	0.02	0.03	0.05	…	…	…	…	0.02	0.02	0.03	0.05
10	0.78	1.10	1.63	2.19	0.09	0.12	0.18	0.24	0.87	1.22	1.81	2.42
11	0.07	0.10	0.14	0.19	0.01	0.01	0.02	0.03	0.08	0.11	0.16	0.22
12	0.01	0.02	0.03	0.04	a	a	a	a	0.01	0.02	0.03	0.04
13	0.02	0.03	0.05	0.07	0.01	0.01	0.01	0.02	0.03	0.04	0.07	0.09
14	0.07	0.09	0.14	0.19	…	…	…	…	0.07	0.09	0.14	0.19
15	0.21	0.29	0.43	0.58	…	…	…	…	0.21	0.29	0.43	0.58
16	0.06	0.09	0.13	0.17	…	…	…	…	0.06	0.09	0.13	0.17
17	0.05	0.07	0.10	0.14	…	…	…	…	0.05	0.07	0.10	0.14
18	0.20	0.28	0.42	0.56	…	…	…	…	0.20	0.28	0.42	0.56
19	0.02	0.03	0.04	0.06	…	…	…	…	0.02	0.03	0.04	0.06
20	0.03	0.04	0.06	0.08	…	…	…	…	0.03	0.04	0.06	0.08
21	0.01	0.02	0.02	0.03	a	a	a	a	0.01	0.02	0.03	0.04
22	0.02	0.03	0.05	0.06	…	…	…	…	0.02	0.03	0.05	0.06
23	0.20	0.25	0.31	0.40	0.02	0.03	0.04	0.05	0.22	0.27	0.35	0.45
24	0.04	0.05	0.08	0.11	a	a	0.00	0.01	0.04	0.06	0.08	0.11
25	…	…	…	…	a	a	0.01	0.01	a	a	0.01	0.01
26	0.36	0.50	0.75	1.01	0.25	0.35	0.51	0.69	0.61	0.85	1.26	1.69
27	1.17	1.54	2.10	2.63	0.33	0.43	0.59	0.74	1.50	1.97	2.70	3.37
28	0.24	0.31	0.43	0.54	0.07	0.10	0.13	0.16	0.31	0.41	0.56	0.70
29	0.14	0.18	0.25	0.31	0.01	0.02	0.02	0.03	0.15	0.20	0.27	0.34
30	2.04	2.67	3.66	4.57	0.70	0.92	1.26	1.57	2.74	3.59	4.92	6.14

… – not available; a – less than 0.005

ANNEX D. Projected gross value-added (in constant 2000 PHP trillion) by projection scenario and sector: Philippines, 2016-2030 (continued)

Table D.4. PDP++ (High-growth + Aggressive Greening) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	0.23	0.25	0.28	0.32	0.01	0.02	0.02	0.03	0.24	0.27	0.30	0.34
2	0.21	0.23	0.26	0.30	a	a	a	a	0.21	0.24	0.27	0.30
3	0.24	0.27	0.32	0.37	0.01	0.02	0.03	0.04	0.25	0.29	0.34	0.41
4	…	…	…	…	a	a	a	a	a	a	a	a
5	0.10	0.11	0.13	0.15	0.01	0.01	0.01	0.01	0.11	0.12	0.14	0.16
6	0.01	0.01	0.02	0.02	…	…	…	…	0.01	0.01	0.02	0.02
7	0.02	0.02	0.03	0.04	…	…	…	…	0.02	0.02	0.03	0.04
8	0.03	0.04	0.05	0.07	a	a	a	0.01	0.03	0.04	0.06	0.08
9	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.05
10	0.78	1.06	1.51	1.94	0.09	0.15	0.30	0.50	0.87	1.22	1.81	2.43
11	0.07	0.09	0.13	0.16	0.01	0.02	0.03	0.05	0.08	0.11	0.16	0.22
12	0.01	0.02	0.02	0.03	a	a	a	0.01	0.01	0.02	0.03	0.04
13	0.02	0.03	0.04	0.06	0.01	0.01	0.02	0.03	0.03	0.04	0.07	0.09
14	0.07	0.09	0.13	0.18	a	a	0.01	0.01	0.07	0.09	0.14	0.19
15	0.14	0.19	0.25	0.31	0.06	0.11	0.18	0.28	0.21	0.29	0.43	0.58
16	0.05	0.07	0.10	0.12	0.01	0.02	0.03	0.05	0.06	0.09	0.13	0.17
17	0.04	0.06	0.08	0.10	0.01	0.01	0.02	0.04	0.05	0.07	0.10	0.14
18	0.14	0.18	0.23	0.29	0.07	0.11	0.19	0.28	0.20	0.28	0.42	0.57
19	0.02	0.02	0.03	0.04	a	0.01	0.01	0.02	0.02	0.03	0.04	0.06
20	0.01	0.01	0.02	0.02	0.02	0.03	0.04	0.06	0.03	0.04	0.06	0.08
21	0.01	0.02	0.02	0.03	a	a	a	0.01	0.01	0.02	0.03	0.04
22	0.02	0.02	0.03	0.04	a	0.01	0.01	0.02	0.02	0.03	0.05	0.06
23	0.20	0.24	0.29	0.36	0.02	0.03	0.05	0.07	0.22	0.27	0.34	0.43
24	0.04	0.05	0.08	0.10	a	a	0.01	0.01	0.04	0.06	0.08	0.11
25	…	…	…	…	a	a	0.01	0.01	a	a	0.01	0.01
26	0.36	0.46	0.60	0.73	0.25	0.39	0.66	0.97	0.61	0.85	1.26	1.70
27	1.17	1.46	1.87	2.22	0.33	0.51	0.82	1.15	1.50	1.97	2.70	3.37
28	0.24	0.30	0.38	0.45	0.07	0.11	0.18	0.25	0.31	0.41	0.56	0.70
29	0.14	0.18	0.24	0.29	0.01	0.02	0.03	0.05	0.15	0.20	0.27	0.34
30	2.04	2.53	3.21	3.79	0.70	1.06	1.70	2.35	2.74	3.59	4.92	6.14

… – not available; a – less than 0.005

ANNEX E. Projected gross output (PHP trillion in 2000 constant prices) by projection scenario and sector: Philippines, 2016-2030

Table E.1. Business-as-Usual Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	0.37	0.45	0.56	0.67	0.02	0.02	0.03	0.03	0.39	0.47	0.58	0.71
2	0.27	0.32	0.39	0.45	a	a	a	a	0.27	0.32	0.39	0.45
3	0.58	0.70	0.85	1.02	0.02	0.02	0.02	0.03	0.60	0.72	0.87	1.05
4	…	…	…	…	0.03	0.04	0.05	0.06	0.03	0.04	0.05	0.06
5	0.21	0.25	0.30	0.35	0.01	0.01	0.01	0.01	0.22	0.26	0.31	0.37
6	0.02	0.03	0.04	0.05	…	…	…	…	0.02	0.03	0.04	0.05
7	0.22	0.29	0.40	0.54	…	…	…	…	0.22	0.29	0.40	0.54
8	0.09	0.12	0.15	0.18	…	…	…	…	0.09	0.12	0.15	0.18
9	0.02	0.02	0.04	0.05	…	…	…	…	0.02	0.02	0.04	0.05
10	1.89	2.34	2.95	3.59	0.30	0.38	0.48	0.58	2.19	2.72	3.42	4.17
11	0.14	0.17	0.20	0.24	0.03	0.03	0.04	0.05	0.17	0.20	0.24	0.29
12	0.17	0.22	0.30	0.39	0.01	0.01	0.01	0.01	0.18	0.23	0.31	0.40
13	0.07	0.09	0.12	0.16	0.02	0.03	0.03	0.04	0.09	0.12	0.16	0.20
14	0.47	0.61	0.81	1.08	…	…	…	…	0.47	0.61	0.81	1.08
15	0.37	0.55	0.88	1.35	…	…	…	…	0.37	0.55	0.88	1.35
16	0.15	0.19	0.25	0.31	…	…	…	…	0.15	0.19	0.25	0.31
17	0.22	0.27	0.34	0.42	…	…	…	…	0.22	0.27	0.34	0.42
18	2.05	2.50	3.13	3.83	…	…	…	…	2.05	2.50	3.13	3.83
19	0.09	0.11	0.13	0.17	…	…	…	…	0.09	0.11	0.13	0.17
20	0.17	0.21	0.27	0.33	…	…	…	…	0.17	0.21	0.27	0.33
21	0.05	0.06	0.07	0.09	0.01	0.01	0.01	0.01	0.05	0.07	0.09	0.11
22	0.10	0.12	0.15	0.19	…	…	…	…	0.10	0.12	0.15	0.19
23	0.31	0.36	0.42	0.48	0.02	0.03	0.03	0.03	0.33	0.39	0.45	0.51
24	0.04	0.05	0.06	0.07	a	a	a	a	0.04	0.05	0.07	0.08
25	…	…	…	…	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.02
26	0.59	0.80	1.14	1.56	0.28	0.40	0.58	0.82	0.87	1.20	1.72	2.37
27	1.90	2.43	3.15	3.91	0.81	1.03	1.34	1.67	2.71	3.46	4.49	5.58
28	0.56	0.70	0.89	1.08	0.18	0.22	0.28	0.35	0.74	0.92	1.17	1.43
29	0.14	0.18	0.23	0.29	0.03	0.03	0.04	0.05	0.17	0.21	0.28	0.34
30	2.27	2.95	3.88	4.89	0.84	1.09	1.44	1.81	3.12	4.04	5.33	6.70

… – not available; a – less than 0.005

ANNEX E. Projected gross output (PHP trillion in 2000 constant prices) by projection scenario and sector: Philippines, 2016-2030 (continued)

Table E.2. PDP (High-growth) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	0.37	0.43	0.53	0.64	0.02	0.02	0.03	0.03	0.39	0.45	0.56	0.67
2	0.27	0.31	0.36	0.43	a	a	a	a	0.27	0.31	0.37	0.43
3	0.58	0.72	0.94	1.17	0.02	0.02	0.03	0.03	0.60	0.74	0.96	1.20
4	…	…	…	…	0.03	0.04	0.05	0.07	0.03	0.04	0.05	0.07
5	0.21	0.26	0.33	0.40	0.01	0.01	0.01	0.01	0.22	0.27	0.34	0.42
6	0.02	0.03	0.04	0.05	…	…	…	…	0.02	0.03	0.04	0.05
7	0.22	0.29	0.42	0.55	…	…	…	…	0.22	0.29	0.42	0.55
8	0.09	0.13	0.18	0.23	…	…	…	…	0.09	0.13	0.18	0.23
9	0.02	0.02	0.04	0.05	…	…	…	…	0.02	0.02	0.04	0.05
10	1.89	2.49	3.47	4.50	0.30	0.40	0.54	0.70	2.19	2.88	4.02	5.20
11	0.14	0.20	0.29	0.38	0.03	0.04	0.06	0.08	0.17	0.24	0.35	0.46
12	0.17	0.23	0.33	0.42	0.01	0.01	0.01	0.02	0.18	0.24	0.34	0.44
13	0.07	0.10	0.14	0.19	0.02	0.03	0.04	0.05	0.09	0.13	0.18	0.24
14	0.47	0.65	0.93	1.22	…	…	…	…	0.47	0.65	0.93	1.22
15	0.37	0.51	0.75	0.99	…	…	…	…	0.37	0.51	0.75	0.99
16	0.15	0.21	0.30	0.40	…	…	…	…	0.15	0.21	0.30	0.40
17	0.22	0.30	0.42	0.56	…	…	…	…	0.22	0.30	0.42	0.56
18	2.05	2.75	3.89	5.05	…	…	…	…	2.05	2.75	3.89	5.05
19	0.09	0.12	0.17	0.23	…	…	…	…	0.09	0.12	0.17	0.23
20	0.17	0.23	0.32	0.41	…	…	…	…	0.17	0.23	0.32	0.41
21	0.05	0.06	0.09	0.12	0.01	0.01	0.01	0.02	0.05	0.07	0.11	0.14
22	0.10	0.13	0.19	0.24	…	…	…	…	0.10	0.13	0.19	0.24
23	0.31	0.39	0.53	0.70	0.02	0.02	0.02	0.03	0.33	0.42	0.55	0.73
24	0.04	0.06	0.08	0.11	a	a	a	0.01	0.04	0.06	0.09	0.12
25	…	…	…	…	0.01	0.01	0.02	0.03	0.01	0.01	0.02	0.03
26	0.59	0.81	1.18	1.57	0.28	0.39	0.58	0.78	0.87	1.20	1.76	2.34
27	1.90	2.49	3.41	4.28	0.81	1.06	1.46	1.83	2.71	3.55	4.87	6.12
28	0.56	0.75	1.04	1.32	0.18	0.24	0.33	0.42	0.74	0.98	1.37	1.74
29	0.14	0.18	0.25	0.31	0.03	0.03	0.05	0.06	0.17	0.22	0.30	0.37
30	2.27	2.98	4.09	5.11	0.84	1.11	1.52	1.90	3.12	4.09	5.60	7.01

… – not available; a – less than 0.005

ANNEX E. Projected gross output (PHP trillion in 2000 constant prices) by projection scenario and sector: Philippines, 2016-2030 (continued)

Table E.3. PDP+ (High-growth + Energy NDC) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	0.37	0.43	0.53	0.64	0.02	0.02	0.03	0.03	0.39	0.45	0.56	0.67
2	0.27	0.31	0.36	0.43	a	a	a	a	0.27	0.31	0.37	0.43
3	0.58	0.72	0.94	1.17	0.02	0.02	0.03	0.03	0.60	0.74	0.96	1.20
4	…	…	…	…	0.03	0.04	0.05	0.07	0.03	0.04	0.05	0.07
5	0.21	0.26	0.33	0.40	0.01	0.01	0.01	0.01	0.22	0.27	0.34	0.42
6	0.02	0.03	0.04	0.05	…	…	…	…	0.02	0.03	0.04	0.05
7	0.22	0.29	0.42	0.55	…	…	…	…	0.22	0.29	0.42	0.55
8	0.09	0.12	0.18	0.23	…	…	…	…	0.09	0.12	0.18	0.23
9	0.02	0.02	0.04	0.05	…	…	…	…	0.02	0.02	0.04	0.05
10	1.89	2.49	3.48	4.51	0.30	0.40	0.54	0.70	2.19	2.88	4.02	5.21
11	0.14	0.20	0.29	0.38	0.03	0.04	0.06	0.08	0.17	0.24	0.35	0.46
12	0.17	0.23	0.33	0.42	0.01	0.01	0.01	0.02	0.18	0.24	0.34	0.44
13	0.07	0.10	0.14	0.19	0.02	0.03	0.04	0.05	0.09	0.13	0.18	0.24
14	0.47	0.65	0.93	1.22	…	…	…	…	0.47	0.65	0.93	1.22
15	0.37	0.51	0.75	0.99	…	…	…	…	0.37	0.51	0.75	0.99
16	0.15	0.21	0.30	0.40	…	…	…	…	0.15	0.21	0.30	0.40
17	0.22	0.30	0.42	0.56	…	…	…	…	0.22	0.30	0.42	0.56
18	2.05	2.75	3.89	5.04	…	…	…	…	2.05	2.75	3.89	5.04
19	0.09	0.12	0.17	0.23	…	…	…	…	0.09	0.12	0.17	0.23
20	0.17	0.23	0.32	0.41	…	…	…	…	0.17	0.23	0.32	0.41
21	0.05	0.06	0.09	0.12	0.01	0.01	0.01	0.02	0.05	0.07	0.11	0.14
22	0.10	0.13	0.19	0.24	…	…	…	…	0.10	0.13	0.19	0.24
23	0.31	0.38	0.50	0.64	0.02	0.03	0.04	0.05	0.33	0.41	0.54	0.70
24	0.04	0.06	0.08	0.11	a	a	a	0.01	0.04	0.06	0.09	0.12
25	…	…	…	…	0.01	0.01	0.02	0.03	0.01	0.01	0.02	0.03
26	0.59	0.81	1.18	1.57	0.28	0.39	0.58	0.78	0.87	1.20	1.76	2.35
27	1.90	2.49	3.41	4.28	0.81	1.06	1.46	1.83	2.71	3.55	4.87	6.12
28	0.56	0.75	1.04	1.32	0.18	0.24	0.33	0.42	0.74	0.98	1.37	1.74
29	0.14	0.18	0.25	0.31	0.03	0.03	0.05	0.06	0.17	0.22	0.30	0.37
30	2.27	2.98	4.09	5.11	0.84	1.11	1.52	1.90	3.12	4.09	5.60	7.01

… – not available; a – less than 0.005

ANNEX E. Projected gross output (PHP trillion in 2000 constant prices) by projection scenario and sector: Philippines, 2016-2030 (continued)

Table E.4. PDP++ (High-growth + Aggressive Greening) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	0.37	0.43	0.53	0.63	0.02	0.02	0.03	0.04	0.39	0.45	0.56	0.67
2	0.27	0.31	0.36	0.42	a	a	a	0.01	0.27	0.31	0.37	0.43
3	0.58	0.72	0.93	1.15	0.02	0.02	0.03	0.04	0.60	0.74	0.96	1.20
4	…	…	…	…	0.03	0.04	0.05	0.07	0.03	0.04	0.05	0.07
5	0.21	0.26	0.33	0.40	0.01	0.01	0.01	0.02	0.22	0.27	0.34	0.42
6	0.02	0.03	0.04	0.05	…	…	…	…	0.02	0.03	0.04	0.05
7	0.22	0.29	0.42	0.55	…	…	…	…	0.22	0.29	0.42	0.55
8	0.09	0.12	0.18	0.23	…	…	…	…	0.09	0.12	0.18	0.23
9	0.02	0.02	0.04	0.05	…	…	…	…	0.02	0.02	0.04	0.05
10	1.89	2.46	3.36	4.26	0.30	0.43	0.67	0.96	2.19	2.89	4.03	5.22
11	0.14	0.19	0.28	0.36	0.03	0.04	0.07	0.10	0.17	0.24	0.35	0.46
12	0.17	0.23	0.32	0.42	0.01	0.01	0.01	0.02	0.18	0.24	0.34	0.44
13	0.07	0.10	0.14	0.17	0.02	0.03	0.05	0.06	0.09	0.13	0.18	0.24
14	0.47	0.65	0.93	1.22	…	…	…	…	0.47	0.65	0.93	1.22
15	0.37	0.51	0.75	0.99	…	…	…	…	0.37	0.51	0.75	0.99
16	0.15	0.21	0.30	0.40	…	…	…	…	0.15	0.21	0.30	0.40
17	0.22	0.30	0.42	0.56	…	…	…	…	0.22	0.30	0.42	0.56
18	2.05	2.75	3.88	5.03	…	…	…	…	2.05	2.75	3.88	5.03
19	0.09	0.12	0.17	0.22	…	…	…	…	0.09	0.12	0.17	0.22
20	0.17	0.23	0.32	0.41	…	…	…	…	0.17	0.23	0.32	0.41
21	0.05	0.06	0.09	0.12	0.01	0.01	0.02	0.02	0.05	0.07	0.11	0.14
22	0.10	0.13	0.19	0.24	…	…	…	…	0.10	0.13	0.19	0.24
23	0.31	0.37	0.48	0.59	0.02	0.03	0.05	0.07	0.33	0.41	0.53	0.67
24	0.04	0.06	0.08	0.11	a	a	0.01	0.01	0.04	0.06	0.09	0.12
25	…	…	…	…	0.01	0.01	0.02	0.03	0.01	0.01	0.02	0.03
26	0.59	0.76	1.03	1.29	0.28	0.44	0.73	1.06	0.87	1.20	1.77	2.35
27	1.90	2.41	3.18	3.87	0.81	1.14	1.69	2.24	2.71	3.55	4.87	6.11
28	0.56	0.73	0.99	1.23	0.18	0.25	0.38	0.51	0.74	0.98	1.37	1.74
29	0.14	0.18	0.24	0.29	0.03	0.04	0.06	0.09	0.17	0.22	0.30	0.38
30	2.27	2.83	3.64	4.33	0.84	1.25	1.96	2.68	3.12	4.09	5.60	7.01

… – not available; a – less than 0.005

ANNEX F. Projected employment (in million workers)
by projection scenario and sector: Philippines, 2016-2030

Table F.1. Business-as-Usual Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.37	2.19	2.10	0.44	0.40	0.36	0.33	3.00	2.77	2.55	2.43
2	2.02	1.84	1.65	1.52	0.09	0.08	0.07	0.06	2.11	1.92	1.72	1.58
3	4.19	3.81	3.47	3.30	0.49	0.42	0.36	0.32	4.68	4.23	3.83	3.62
4	…	…	…	…	0.11	0.09	0.07	0.06	0.11	0.09	0.07	0.06
5	1.13	1.14	1.16	1.19	0.13	0.13	0.13	0.13	1.26	1.27	1.29	1.32
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
7	0.14	0.08	0.05	0.04	…	…	…	…	0.14	0.08	0.05	0.04
8	0.06	0.03	0.02	0.01	…	…	…	…	0.06	0.03	0.02	0.01
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.89	0.90	0.91	0.09	0.09	0.09	0.09	0.96	0.97	0.99	1.00
11	0.55	0.63	0.74	0.84	0.06	0.07	0.09	0.10	0.61	0.70	0.82	0.94
12	0.29	0.26	0.24	0.23	0.01	0.01	0.01	0.01	0.30	0.27	0.25	0.24
13	0.11	0.11	0.11	0.11	0.02	0.02	0.02	0.02	0.14	0.13	0.13	0.13
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.06	0.05	0.06	…	…	…	…	0.06	0.06	0.05	0.06
16	0.20	0.22	0.25	0.27	…	…	…	…	0.20	0.22	0.25	0.27
17	0.26	0.26	0.26	0.27	…	…	…	…	0.26	0.26	0.26	0.27
18	0.55	0.61	0.68	0.74	…	…	…	…	0.55	0.61	0.68	0.74
19	0.02	0.03	0.03	0.03	…	…	…	…	0.02	0.03	0.03	0.03
20	0.12	0.13	0.14	0.15	…	…	…	…	0.12	0.13	0.14	0.15
21	0.12	0.12	0.13	0.13	0.01	0.01	0.01	0.01	0.13	0.13	0.14	0.15
22	0.03	0.03	0.03	0.04	…	…	…	…	0.03	0.03	0.03	0.04
23	0.10	0.09	0.09	0.08	0.01	0.01	0.01	0.01	0.10	0.10	0.09	0.09
24	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.04
25	…	…	…	…	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
26	2.33	2.98	3.88	4.86	1.17	1.55	2.08	2.66	3.50	4.53	5.96	7.52
27	6.95	8.29	9.82	11.12	1.15	1.36	1.61	1.83	8.10	9.65	11.43	12.95
28	1.69	1.82	1.95	2.06	1.41	1.51	1.63	1.73	3.09	3.33	3.58	3.79
29	1.57	2.04	2.63	3.15	0.16	0.20	0.26	0.30	1.72	2.24	2.88	3.45
30	8.04	9.47	11.11	12.51	1.56	1.84	2.16	2.43	9.60	11.31	13.27	14.94

… – not available; a – less than 0.005

ANNEX F. Projected employment (in million workers)
by projection scenario and sector: Philippines, 2016-2030 (continued)

Table F.2. PDP (High-growth) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.28	2.09	1.98	0.44	0.39	0.35	0.32	3.00	2.67	2.44	2.30
2	2.02	1.75	1.55	1.43	0.09	0.08	0.07	0.06	2.11	1.83	1.62	1.49
3	4.19	3.94	3.82	3.76	0.49	0.44	0.40	0.38	4.68	4.37	4.22	4.14
4	…	…	…	…	0.11	0.09	0.08	0.07	0.11	0.09	0.08	0.07
5	1.13	1.18	1.28	1.35	0.13	0.14	0.14	0.15	1.26	1.32	1.42	1.50
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
7	0.14	0.09	0.05	0.04	…	…	…	…	0.14	0.09	0.05	0.04
8	0.06	0.04	0.02	0.02	…	…	…	…	0.06	0.04	0.02	0.02
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.94	1.06	1.14	0.09	0.09	0.10	0.11	0.96	1.03	1.16	1.25
11	0.55	0.75	1.06	1.33	0.06	0.08	0.12	0.15	0.61	0.83	1.18	1.48
12	0.29	0.27	0.26	0.25	0.01	0.01	0.01	0.01	0.30	0.28	0.27	0.26
13	0.11	0.12	0.13	0.13	0.02	0.02	0.02	0.02	0.14	0.14	0.15	0.15
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.05	0.05	0.04	…	…	…	…	0.06	0.05	0.05	0.04
16	0.20	0.24	0.30	0.35	…	…	…	…	0.20	0.24	0.30	0.35
17	0.26	0.28	0.32	0.35	…	…	…	…	0.26	0.28	0.32	0.35
18	0.55	0.67	0.84	0.98	…	…	…	…	0.55	0.67	0.84	0.98
19	0.02	0.03	0.04	0.04	…	…	…	…	0.02	0.03	0.04	0.04
20	0.12	0.14	0.16	0.18	…	…	…	…	0.12	0.14	0.16	0.18
21	0.12	0.13	0.15	0.17	0.01	0.01	0.02	0.02	0.13	0.15	0.17	0.18
22	0.03	0.03	0.04	0.05	…	…	…	…	0.03	0.03	0.04	0.05
23	0.10	0.10	0.11	0.12	0.01	0.01	0.00	0.00	0.10	0.11	0.12	0.13
24	0.04	0.04	0.05	0.06	0.01	0.01	0.01	0.01	0.04	0.05	0.06	0.06
25	…	…	…	…	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
26	2.33	3.01	4.03	4.89	1.17	1.53	2.07	2.52	3.50	4.54	6.10	7.41
27	6.95	8.49	10.65	12.18	1.15	1.40	1.76	2.01	8.10	9.89	12.40	14.19
28	1.69	1.93	2.28	2.50	1.41	1.61	1.90	2.09	3.09	3.55	4.19	4.60
29	1.57	2.08	2.82	3.39	0.16	0.21	0.28	0.34	1.72	2.28	3.10	3.74
30	8.04	9.57	11.69	13.08	1.56	1.86	2.27	2.55	9.60	11.43	13.96	15.62

… – not available; a – less than 0.005

ANNEX F. Projected employment (in million workers)
by projection scenario and sector: Philippines, 2016-2030 (continued)

Table F.3. PDP+ (High-growth + Energy NDC) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.28	2.09	1.98	0.44	0.39	0.35	0.32	3.00	2.67	2.44	2.30
2	2.02	1.75	1.55	1.43	0.09	0.08	0.07	0.06	2.11	1.83	1.62	1.50
3	4.19	3.94	3.82	3.76	0.49	0.44	0.40	0.38	4.68	4.37	4.22	4.14
4	…	…	…	…	0.11	0.09	0.08	0.07	0.11	0.09	0.08	0.07
5	1.13	1.18	1.28	1.35	0.13	0.14	0.14	0.15	1.26	1.32	1.42	1.50
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
7	0.14	0.09	0.05	0.04	…	…	…	…	0.14	0.09	0.05	0.04
8	0.06	0.04	0.02	0.02	…	…	…	…	0.06	0.04	0.02	0.02
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.94	1.06	1.14	0.09	0.09	0.10	0.11	0.96	1.03	a	a
11	0.55	0.75	1.06	1.33	0.06	0.08	0.12	0.15	0.61	0.83	1.18	1.48
12	0.29	0.27	0.26	0.25	0.01	0.01	0.01	0.01	0.30	0.28	0.27	0.26
13	0.11	0.12	0.13	0.13	0.02	0.02	0.02	0.02	0.14	0.14	0.15	0.15
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.05	0.05	0.04	…	…	…	…	0.06	0.05	0.05	0.04
16	0.20	0.24	0.30	0.35	…	…	…	…	0.20	0.24	0.30	0.35
17	0.26	0.28	0.32	0.35	…	…	…	…	0.26	0.28	0.32	0.35
18	0.55	0.67	0.84	0.98	…	…	…	…	0.55	0.67	0.84	0.98
19	0.02	0.03	0.04	0.04	…	…	…	…	0.02	0.03	0.04	0.04
20	0.12	0.14	0.16	0.18	…	…	…	…	0.12	0.14	0.16	0.18
21	0.12	0.13	0.15	0.17	0.01	0.01	0.02	0.02	0.13	0.15	0.17	0.18
22	0.03	0.03	0.04	0.05	…	…	…	…	0.03	0.03	0.04	0.05
23	0.10	0.10	0.11	0.11	0.01	0.01	0.01	0.01	0.10	0.11	0.11	0.12
24	0.04	0.04	0.05	0.06	0.01	0.01	0.01	0.01	0.04	0.05	0.06	0.06
25	…	…	…	…	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
26	2.33	3.01	4.04	4.90	1.17	1.53	2.07	2.53	3.50	4.54	6.11	7.43
27	6.95	8.49	10.65	12.18	1.15	1.40	1.76	2.01	8.10	9.89	12.40	14.19
28	1.69	1.93	2.28	2.50	1.41	1.61	1.90	2.09	3.09	3.55	4.19	4.60
29	1.57	2.08	2.82	3.39	0.16	0.21	0.28	0.34	1.72	2.28	3.10	3.74
30	8.04	9.57	11.68	13.08	1.56	1.86	2.27	2.55	9.60	11.43	13.96	15.62

… – not available; a – less than 0.005

ANNEX F. Projected employment (in million workers)
by projection scenario and sector: Philippines, 2016-2030 (continued)

Table F.4. PDP++ (High-growth + Aggressive Greening) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.28	2.08	1.96	0.44	0.41	0.39	0.39	3.00	2.69	2.48	2.35
2	2.02	1.75	1.55	1.43	0.09	0.08	0.08	0.08	2.11	1.84	1.63	1.51
3	4.19	3.92	3.79	3.72	0.49	0.48	0.49	0.52	4.68	4.40	4.29	4.24
4	…	…	…	…	0.11	0.09	0.08	0.07	0.11	0.09	0.08	0.07
5	1.13	1.18	1.27	1.34	0.13	0.15	0.16	0.19	1.26	1.33	1.43	1.52
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
7	0.14	0.09	0.05	0.04	…	…	…	…	0.14	0.09	0.05	0.04
8	0.06	0.04	0.02	0.02	…	…	…	…	0.06	0.04	0.02	0.02
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.93	1.02	1.08	0.09	0.10	0.13	0.15	0.96	1.03	1.15	1.23
11	0.55	0.74	1.01	1.25	0.06	0.09	0.15	0.20	0.61	0.83	1.16	1.45
12	0.29	0.27	0.26	0.25	0.01	0.01	0.01	0.01	0.30	0.28	0.27	0.27
13	0.11	0.12	0.12	0.12	0.02	0.02	0.03	0.03	0.14	0.14	0.15	0.15
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.05	0.05	0.04	…	…	…	…	0.06	0.05	0.05	0.04
16	0.20	0.24	0.30	0.35	…	…	…	…	0.20	0.24	0.30	0.35
17	0.26	0.28	0.32	0.35	…	…	…	…	0.26	0.28	0.32	0.35
18	0.55	0.67	0.84	0.98	…	…	…	…	0.55	0.67	0.84	0.98
19	0.02	0.03	0.04	0.04	…	…	…	…	0.02	0.03	0.04	0.04
20	0.12	0.14	0.16	0.18	…	…	…	…	0.12	0.14	0.16	0.18
21	0.12	0.13	0.15	0.16	0.01	0.01	0.02	0.02	0.13	0.15	0.17	0.18
22	0.03	0.03	0.04	0.05	…	…	…	…	0.03	0.03	0.04	0.05
23	0.10	0.10	0.10	0.11	0.01	0.01	0.01	0.01	0.10	0.11	0.11	0.12
24	0.04	0.04	0.05	0.05	0.01	0.01	0.01	0.02	0.04	0.05	0.06	0.07
25	…	…	…	…	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
26	2.33	2.84	3.53	4.04	1.17	1.71	2.61	3.45	3.50	4.55	6.14	7.49
27	6.95	8.24	9.93	11.02	1.15	1.50	2.03	2.46	8.10	9.74	11.96	13.48
28	1.69	1.89	2.17	2.34	1.41	1.72	2.19	2.53	3.09	3.61	4.36	4.87
29	1.57	2.03	2.68	3.15	0.16	0.24	0.39	0.55	1.72	2.28	3.07	3.70
30	8.04	9.10	10.41	11.07	1.56	2.11	2.94	3.60	9.60	11.21	13.35	14.67

… – not available; a – less than 0.005

ANNEX G. Projected employment [in million workers] (only Green inputs in Green sector) by projection scenario and sector: Philippines, 2016-2030

Table G.1. Business-as-Usual Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.31	2.05	1.87	0.44	0.44	0.46	0.50	3.00	2.75	2.51	2.36
2	2.02	1.82	1.60	1.44	0.09	0.09	0.09	0.10	2.11	1.91	1.69	1.53
3	4.19	3.76	3.36	3.14	0.49	0.47	0.47	0.48	4.68	4.23	3.83	3.62
4	…	…	…	…	0.11	0.09	0.07	0.06	0.11	0.09	0.07	0.06
5	1.13	1.12	1.13	1.14	0.13	0.14	0.16	0.18	1.26	1.27	1.29	1.32
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
7	0.14	0.08	0.05	0.04	…	…	…	…	0.14	0.08	0.05	0.04
8	0.06	0.03	0.02	0.01	…	…	…	…	0.06	0.03	0.02	0.01
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.88	0.88	0.88	0.09	0.09	0.10	0.11	0.96	0.97	0.98	0.99
11	0.55	0.62	0.71	0.79	0.06	0.08	0.10	0.12	0.61	0.70	0.81	0.91
12	0.29	0.26	0.24	0.23	0.01	0.01	0.01	0.01	0.30	0.27	0.25	0.24
13	0.11	0.11	0.10	0.10	0.02	0.02	0.02	0.02	0.14	0.13	0.13	0.12
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.06	0.05	0.06	…	…	…	…	0.06	0.06	0.05	0.06
16	0.20	0.22	0.24	0.27	…	…	…	…	0.20	0.22	0.24	0.27
17	0.26	0.26	0.26	0.26	…	…	…	…	0.26	0.26	0.26	0.26
18	0.55	0.61	0.68	0.74	…	…	…	…	0.55	0.61	0.68	0.74
19	0.02	0.03	0.03	0.03	…	…	…	…	0.02	0.03	0.03	0.03
20	0.12	0.13	0.14	0.15	…	…	…	…	0.12	0.13	0.14	0.15
21	0.12	0.12	0.12	0.13	0.01	0.01	0.01	0.01	0.13	0.13	0.14	0.14
22	0.03	0.03	0.03	0.04	…	…	…	…	0.03	0.03	0.03	0.04
23	0.10	0.09	0.09	0.08	0.01	0.01	0.01	0.01	0.10	0.10	0.09	0.09
24	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.04
25	…	…	…	…	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
26	2.33	2.98	3.87	4.84	1.17	1.55	2.08	2.66	3.50	4.52	5.95	7.50
27	6.95	8.29	9.81	11.09	1.15	1.37	1.65	1.91	8.10	9.66	11.46	13.00
28	1.69	1.81	1.93	2.03	1.41	1.52	1.65	1.77	3.09	3.33	3.58	3.80
29	1.57	2.04	2.63	3.15	0.16	0.20	0.27	0.33	1.72	2.24	2.90	3.48
30	8.04	9.48	11.13	12.52	1.56	1.84	2.17	2.46	9.60	11.32	13.29	14.98

… – not available; a – less than 0.005

ANNEX G. Projected employment [in million workers] (only Green inputs in Green sector) by projection scenario and sector: Philippines, 2016-2030 (continued)

Table G.2. PDP (High-growth) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.21	1.95	1.79	0.44	0.44	0.45	0.46	3.00	2.65	2.40	2.24
2	2.02	1.72	1.49	1.35	0.09	0.09	0.09	0.09	2.11	1.81	1.58	1.45
3	4.19	3.89	3.73	3.65	0.49	0.48	0.49	0.49	4.68	4.37	4.22	4.14
4	…	…	…	…	0.11	0.09	0.08	0.07	0.11	0.09	0.08	0.07
5	1.13	1.17	1.25	1.31	0.13	0.15	0.17	0.19	1.26	1.32	1.42	1.50
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
7	0.14	0.09	0.05	0.04	…	…	…	…	0.14	0.09	0.05	0.04
8	0.06	0.04	0.02	0.02	…	…	…	…	0.06	0.04	0.02	0.02
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.94	1.05	1.13	0.09	0.09	0.11	0.12	0.96	1.03	1.16	1.25
11	0.55	0.75	1.07	1.35	0.06	0.08	0.12	0.15	0.61	0.84	1.18	1.49
12	0.29	0.27	0.26	0.25	0.01	0.01	0.01	0.01	0.30	0.28	0.27	0.26
13	0.11	0.12	0.13	0.13	0.02	0.02	0.02	0.02	0.14	0.14	0.15	0.15
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.05	0.05	0.04	…	…	…	…	0.06	0.05	0.05	0.04
16	0.20	0.24	0.30	0.34	…	…	…	…	0.20	0.24	0.30	0.34
17	0.26	0.28	0.32	0.35	…	…	…	…	0.26	0.28	0.32	0.35
18	0.55	0.67	0.84	0.98	…	…	…	…	0.55	0.67	0.84	0.98
19	0.02	0.03	0.04	0.04	…	…	…	…	0.02	0.03	0.04	0.04
20	0.12	0.14	0.16	0.18	…	…	…	…	0.12	0.14	0.16	0.18
21	0.12	0.13	0.15	0.17	0.01	0.01	0.02	0.02	0.13	0.15	0.17	0.18
22	0.03	0.03	0.04	0.05	…	…	…	…	0.03	0.03	0.04	0.05
23	0.10	0.10	0.11	0.12	0.01	0.01	0.01	0.01	0.10	0.11	0.12	0.13
24	0.04	0.04	0.05	0.06	0.01	0.01	0.01	0.01	0.04	0.05	0.06	0.06
25	…	…	…	…	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
26	2.33	3.01	4.03	4.88	1.17	1.53	2.07	2.52	3.50	4.54	6.09	7.40
27	6.95	8.49	10.63	12.14	1.15	1.41	1.79	2.07	8.10	9.90	12.42	14.21
28	1.69	1.93	2.27	2.49	1.41	1.62	1.92	2.12	3.09	3.55	4.19	4.61
29	1.57	2.08	2.82	3.39	0.16	0.21	0.29	0.36	1.72	2.29	3.11	3.75
30	8.04	9.57	11.67	13.05	1.56	1.87	2.29	2.57	9.60	11.43	13.96	15.62

… – not available; a – less than 0.005

ANNEX G. Projected employment [in million workers] (only Green inputs in Green sector) by projection scenario and sector: Philippines, 2016-2030 (continued)

Table G.3. PDP+ (High-growth + energy NDC) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.21	1.95	1.79	0.44	0.44	0.45	0.46	3.00	2.65	2.40	2.25
2	2.02	1.72	1.49	1.35	0.09	0.09	0.09	0.10	2.11	1.81	1.58	1.45
3	4.19	3.89	3.73	3.65	0.49	0.48	0.50	0.50	4.68	4.38	4.23	4.15
4	…	…	…	…	0.11	0.09	0.08	0.07	0.11	0.09	0.08	0.07
5	1.13	1.17	1.25	1.31	0.13	0.15	0.17	0.19	1.26	1.32	1.42	1.50
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
7	0.14	0.09	0.05	0.04	…	…	…	…	0.14	0.09	0.05	0.04
8	0.06	0.04	0.02	0.02	…	…	…	…	0.06	0.04	0.02	0.02
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.94	1.05	1.13	0.09	0.10	0.11	0.12	0.96	1.03	1.16	1.25
11	0.55	0.75	1.07	1.35	0.06	0.08	0.12	0.15	0.61	0.84	1.18	1.49
12	0.29	0.27	0.26	0.25	0.01	0.01	0.01	0.01	0.30	0.28	0.27	0.26
13	0.11	0.12	0.13	0.13	0.02	0.02	0.02	0.02	0.14	0.14	0.15	0.15
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.05	0.05	0.04	…	…	…	…	0.06	0.05	0.05	0.04
16	0.20	0.24	0.30	0.34	…	…	…	…	0.20	0.24	0.30	0.34
17	0.26	0.28	0.32	0.35	…	…	…	…	0.26	0.28	0.32	0.35
18	0.55	0.67	0.84	0.97	…	…	…	…	0.55	0.67	0.84	0.97
19	0.02	0.03	0.04	0.04	…	…	…	…	0.02	0.03	0.04	0.04
20	0.12	0.14	0.16	0.18	…	…	…	…	0.12	0.14	0.16	0.18
21	0.12	0.13	0.15	0.17	0.01	0.01	0.02	0.02	0.13	0.15	0.17	0.18
22	0.03	0.03	0.04	0.05	…	…	…	…	0.03	0.03	0.04	0.05
23	0.10	0.10	0.11	0.11	0.01	0.01	0.01	0.01	0.10	0.11	0.11	0.12
24	0.04	0.04	0.05	0.06	0.01	0.01	0.01	0.01	0.04	0.05	0.06	0.06
25	…	…	…	…	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
26	2.33	3.01	4.03	4.89	1.17	1.53	2.07	2.53	3.50	4.54	6.10	7.42
27	6.95	8.49	10.63	12.13	1.15	1.41	1.79	2.08	8.10	9.90	12.42	14.21
28	1.69	1.93	2.27	2.49	1.41	1.62	1.93	2.13	3.09	3.55	4.20	4.62
29	1.57	2.08	2.82	3.39	0.16	0.21	0.29	0.36	1.72	2.29	3.11	3.76
30	8.04	9.57	11.67	13.05	1.56	1.87	2.29	2.57	9.60	11.44	13.96	15.62

… – not available; a – less than 0.005

ANNEX G. Projected employment [in million workers] (only Green inputs in Green sector) by projection scenario and sector: Philippines, 2016-2030 (continued)

Table G.4. PDP++ (High-growth + Aggressive Greening) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.20	1.92	1.74	0.44	0.46	0.51	0.54	3.00	2.66	2.42	2.28
2	2.02	1.72	1.48	1.34	0.09	0.10	0.11	0.12	2.11	1.81	1.59	1.46
3	4.19	3.85	3.64	3.51	0.49	0.53	0.61	0.67	4.68	4.38	4.25	4.18
4	…	…	…	…	0.11	0.10	0.10	0.09	0.11	0.10	0.10	0.09
5	1.13	1.16	1.21	1.26	0.13	0.16	0.21	0.25	1.26	1.32	1.42	1.50
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
7	0.14	0.08	0.05	0.04	…	…	…	…	0.14	0.08	0.05	0.04
8	0.06	0.04	0.02	0.02	…	…	…	…	0.06	0.04	0.02	0.02
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.92	1.00	1.05	0.09	0.11	0.14	0.17	0.96	1.03	1.14	1.22
11	0.55	0.73	1.00	1.21	0.06	0.09	0.15	0.21	0.61	0.82	1.15	1.42
12	0.29	0.27	0.26	0.25	0.01	0.01	0.01	0.01	0.30	0.28	0.27	0.26
13	0.11	0.11	0.12	0.12	0.02	0.02	0.03	0.03	0.14	0.14	0.14	0.15
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.05	0.05	0.04	…	…	…	…	0.06	0.05	0.05	0.04
16	0.20	0.24	0.29	0.34	…	…	…	…	0.20	0.24	0.29	0.34
17	0.26	0.28	0.31	0.34	…	…	…	…	0.26	0.28	0.31	0.34
18	0.55	0.66	0.82	0.94	…	…	…	…	0.55	0.66	0.82	0.94
19	0.02	0.03	0.04	0.04	…	…	…	…	0.02	0.03	0.04	0.04
20	0.12	0.14	0.16	0.18	…	…	…	…	0.12	0.14	0.16	0.18
21	0.12	0.13	0.15	0.16	0.01	0.01	0.02	0.02	0.13	0.15	0.17	0.18
22	0.03	0.03	0.04	0.05	…	…	…	…	0.03	0.03	0.04	0.05
23	0.10	0.10	0.10	0.10	0.01	0.01	0.01	0.01	0.10	0.10	0.11	0.11
24	0.04	0.04	0.05	0.05	0.01	0.01	0.01	0.01	0.04	0.05	0.06	0.06
25	…	…	…	…	0.03	0.03	0.02	0.02	0.03	0.03	0.02	0.02
26	2.33	2.83	3.49	3.97	1.17	1.72	2.62	3.47	3.50	4.55	6.12	7.45
27	6.95	8.16	9.70	10.64	1.15	1.59	2.29	2.88	8.10	9.75	11.99	13.52
28	1.69	1.87	2.10	2.23	1.41	1.75	2.26	2.65	3.09	3.62	4.37	4.88
29	1.57	2.03	2.68	3.15	0.16	0.25	0.41	0.57	1.72	2.28	3.08	3.72
30	8.04	9.05	10.27	10.85	1.56	2.14	3.03	3.74	9.60	11.19	13.30	14.59

ANNEX H. Projected employment [in million workers]
(only Green inputs in Green sector + no imports in Green sector)
by projection scenario and sector: Philippines, 2016-2030

Table H.1. Business-as-Usual Scenario

Green PEPM	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
Sector Code	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.30	2.03	1.84	0.44	0.44	0.46	0.50	3.00	2.75	2.49	2.34
2	2.02	1.82	1.60	1.43	0.09	0.09	0.09	0.10	2.11	1.91	1.69	1.53
3	4.19	3.75	3.34	3.10	0.49	0.47	0.47	0.49	4.68	4.22	3.81	3.60
4	…	…	…	…	0.11	0.09	0.07	0.06	0.11	0.09	0.07	0.06
5	1.13	1.12	1.12	1.13	0.13	0.15	0.16	0.18	1.26	1.27	1.28	1.31
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
7	0.14	0.08	0.05	0.04	…	…	…	…	0.14	0.08	0.05	0.04
8	0.06	0.03	0.02	0.01	…	…	…	…	0.06	0.03	0.02	0.01
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.88	0.88	0.88	0.09	0.09	0.10	0.11	0.96	0.97	0.98	0.99
11	0.55	0.61	0.69	0.76	0.06	0.08	0.10	0.12	0.61	0.69	0.79	0.88
12	0.29	0.26	0.24	0.23	0.01	0.01	0.01	0.01	0.30	0.27	0.25	0.24
13	0.11	0.11	0.10	0.10	0.02	0.02	0.02	0.02	0.14	0.13	0.12	0.12
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.06	0.05	0.06	…	…	…	…	0.06	0.06	0.05	0.06
16	0.20	0.22	0.24	0.26	…	…	…	…	0.20	0.22	0.24	0.26
17	0.26	0.26	0.26	0.26	…	…	…	…	0.26	0.26	0.26	0.26
18	0.55	0.61	0.67	0.74	…	…	…	…	0.55	0.61	0.67	0.74
19	0.02	0.03	0.03	0.03	…	…	…	…	0.02	0.03	0.03	0.03
20	0.12	0.13	0.14	0.14	…	…	…	…	0.12	0.13	0.14	0.14
21	0.12	0.12	0.12	0.13	0.01	0.01	0.01	0.02	0.13	0.13	0.14	0.14
22	0.03	0.03	0.03	0.03	…	…	…	…	0.03	0.03	0.03	0.03
23	0.10	0.09	0.09	0.08	0.01	0.01	0.01	0.01	0.10	0.10	0.09	0.09
24	0.04	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.04
25	…	…	…	…	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
26	2.33	2.98	3.87	4.83	1.17	1.54	2.08	2.66	3.50	4.52	5.94	7.49
27	6.95	8.28	9.80	11.07	1.15	1.37	1.65	1.91	8.10	9.66	11.45	12.98
28	1.69	1.81	1.92	2.01	1.41	1.52	1.65	1.78	3.09	3.33	3.57	3.79
29	1.57	2.04	2.63	3.15	0.16	0.21	0.27	0.34	1.72	2.24	2.90	3.49
30	8.04	9.48	11.13	12.52	1.56	1.84	2.17	2.46	9.60	11.32	13.29	14.98

… – not available; a – less than 0.005

ANNEX H. Projected employment [in million workers]
(only Green inputs in Green sector + no imports in Green sector)
by projection scenario and sector: Philippines, 2016-2030 (continued)

Table H.2. PDP (High-growth) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.20	1.93	1.76	0.44	0.44	0.45	0.46	3.00	2.64	2.38	2.22
2	2.02	1.72	1.48	1.35	0.09	0.09	0.09	0.10	2.11	1.81	1.58	1.44
3	4.19	3.89	3.72	3.64	0.49	0.48	0.49	0.50	4.68	4.37	4.21	4.13
4	…	…	…	…	0.11	0.09	0.08	0.07	0.11	0.09	0.08	0.07
5	1.13	1.17	1.24	1.30	0.13	0.15	0.17	0.19	1.26	1.32	1.41	1.49
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	0.00	0.00
7	0.14	0.09	0.05	0.04	…	…	…	…	0.14	0.09	0.05	0.04
8	0.06	0.04	0.02	0.02	…	…	…	…	0.06	0.04	0.02	0.02
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.94	1.05	1.13	0.09	0.09	0.11	0.12	0.96	1.03	1.16	1.25
11	0.55	0.75	1.07	1.36	0.06	0.08	0.12	0.14	0.61	0.84	1.19	1.50
12	0.29	0.27	0.26	0.25	0.01	0.01	0.01	0.01	0.30	0.28	0.27	0.26
13	0.11	0.12	0.13	0.13	0.02	0.02	0.02	0.02	0.14	0.14	0.15	0.16
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	0.00	0.00
15	0.06	0.05	0.05	0.04	…	…	…	…	0.06	0.05	0.05	0.04
16	0.20	0.24	0.30	0.34	…	…	…	…	0.20	0.24	0.30	0.34
17	0.26	0.28	0.32	0.35	…	…	…	…	0.26	0.28	0.32	0.35
18	0.55	0.67	0.84	0.98	…	…	…	…	0.55	0.67	0.84	0.98
19	0.02	0.03	0.04	0.04	…	…	…	…	0.02	0.03	0.04	0.04
20	0.12	0.14	0.16	0.18	…	…	…	…	0.12	0.14	0.16	0.18
21	0.12	0.13	0.16	0.17	0.01	0.01	0.02	0.02	0.13	0.15	0.17	0.19
22	0.03	0.03	0.04	0.05	…	…	…	…	0.03	0.03	0.04	0.05
23	0.10	0.10	0.11	0.12	0.01	0.01	0.01	0.01	0.10	0.11	0.12	0.13
24	0.04	0.04	0.05	0.06	0.01	0.01	0.01	0.01	0.04	0.05	0.06	0.06
25	…	…	…	…	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
26	2.33	3.01	4.03	4.88	1.17	1.53	2.07	2.52	3.50	4.54	6.09	7.40
27	6.95	8.49	10.62	12.13	1.15	1.41	1.79	2.07	8.10	9.90	12.41	14.20
28	1.69	1.93	2.27	2.48	1.41	1.62	1.93	2.13	3.09	3.55	4.19	4.61
29	1.57	2.08	2.82	3.39	0.16	0.21	0.29	0.36	1.72	2.29	3.11	3.76
30	8.04	9.57	11.67	13.05	1.56	1.87	2.29	2.57	9.60	11.43	13.96	15.62

… – not available; a – less than 0.005

ANNEX H. Projected employment [in million workers]
(only Green inputs in Green sector + no imports in Green sector)
by projection scenario and sector: Philippines, 2016-2030 (continued)

Table H.3. PDP+ (High-growth + energy NDC) Scenario

Green PEPM	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
Sector Code	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.20	1.93	1.77	0.44	0.44	0.46	0.46	3.00	2.64	2.38	2.23
2	2.02	1.72	1.48	1.35	0.09	0.09	0.09	0.10	2.11	1.81	1.58	1.44
3	4.19	3.89	3.72	3.64	0.49	0.49	0.50	0.51	4.68	4.37	4.22	4.14
4	…	…	…	…	0.11	0.09	0.08	0.07	0.11	0.09	0.08	0.07
5	1.13	1.17	1.24	1.30	0.13	0.15	0.17	0.19	1.26	1.32	1.42	1.49
6	0.01	0.01	0.00	0.00	…	…	…	…	0.01	0.01	a	a
7	0.14	0.09	0.05	0.04	…	…	…	…	0.14	0.09	0.05	0.04
8	0.06	0.04	0.02	0.02	…	…	…	…	0.06	0.04	0.02	0.02
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	0.00	0.00
10	0.87	0.94	1.05	1.14	0.09	0.09	0.11	0.12	0.96	1.03	1.16	1.25
11	0.55	0.75	1.07	1.36	0.06	0.08	0.12	0.14	0.61	0.84	1.19	1.51
12	0.29	0.27	0.26	0.25	0.01	0.01	0.01	0.01	0.30	0.28	0.27	0.26
13	0.11	0.12	0.13	0.13	0.02	0.02	0.02	0.02	0.14	0.14	0.15	0.16
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.05	0.05	0.04	…	…	…	…	0.06	0.05	0.05	0.04
16	0.20	0.24	0.30	0.34	…	…	…	…	0.20	0.24	0.30	0.34
17	0.26	0.28	0.32	0.35	…	…	…	…	0.26	0.28	0.32	0.35
18	0.55	0.67	0.84	0.97	…	…	…	…	0.55	0.67	0.84	0.97
19	0.02	0.03	0.04	0.04	…	…	…	…	0.02	0.03	0.04	0.04
20	0.12	0.14	0.16	0.18	…	…	…	…	0.12	0.14	0.16	0.18
21	0.12	0.13	0.16	0.17	0.01	0.01	0.02	0.02	0.13	0.15	0.17	0.19
22	0.03	0.03	0.04	0.05	…	…	…	…	0.03	0.03	0.04	0.05
23	0.10	0.10	0.11	0.11	0.01	0.01	0.01	0.01	0.10	0.11	0.11	0.12
24	0.04	0.04	0.05	0.06	0.01	0.01	0.01	0.01	0.04	0.05	0.06	0.06
25	…	…	…	…	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02
26	2.33	3.01	4.03	4.88	1.17	1.53	2.07	2.53	3.50	4.54	6.10	7.42
27	6.95	8.48	10.62	12.12	1.15	1.41	1.79	2.08	8.10	9.90	12.42	14.20
28	1.69	1.93	2.27	2.48	1.41	1.62	1.93	2.14	3.09	3.55	4.20	4.62
29	1.57	2.08	2.82	3.39	0.16	0.21	0.29	0.37	1.72	2.29	3.11	3.76
30	8.04	9.57	11.67	13.05	1.56	1.87	2.29	2.58	9.60	11.44	13.96	15.62

… – not available; a – less than 0.005

ANNEX H. Projected employment [in million workers]
(only Green inputs in Green sector + no imports in Green sector)
by projection scenario and sector: Philippines, 2016-2030 (continued)

Table H.4. PDP++ (High-growth + Aggressive Greening) Scenario

Green PEPM Sector Code	Conventional Sub-sector				Green Sub-sector				All Sub-sectors			
	2016	2020	2025	2030	2016	2020	2025	2030	2016	2020	2025	2030
1	2.56	2.19	1.90	1.72	0.44	0.46	0.50	0.53	3.00	2.65	2.40	2.25
2	2.02	1.71	1.47	1.33	0.09	0.10	0.11	0.11	2.11	1.81	1.58	1.45
3	4.19	3.84	3.61	3.47	0.49	0.53	0.60	0.66	4.68	4.37	4.21	4.13
4	…	…	…	…	0.11	0.10	0.10	0.09	0.11	0.10	0.10	0.09
5	1.13	1.15	1.21	1.24	0.13	0.16	0.21	0.24	1.26	1.32	1.41	1.49
6	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
7	0.14	0.08	0.05	0.04	…	…	…	…	0.14	0.08	0.05	0.04
8	0.06	0.04	0.02	0.01	…	…	…	…	0.06	0.04	0.02	0.01
9	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
10	0.87	0.92	1.00	1.04	0.09	0.11	0.14	0.17	0.96	1.02	1.14	1.21
11	0.55	0.73	0.99	1.21	0.06	0.09	0.14	0.20	0.61	0.82	1.14	1.40
12	0.29	0.27	0.26	0.25	0.01	0.01	0.01	0.01	0.30	0.28	0.27	0.26
13	0.11	0.11	0.12	0.11	0.02	0.02	0.03	0.03	0.14	0.14	0.14	0.14
14	0.01	0.01	a	a	…	…	…	…	0.01	0.01	a	a
15	0.06	0.05	0.05	0.04	…	…	…	…	0.06	0.05	0.05	0.04
16	0.20	0.24	0.29	0.34	…	…	…	…	0.20	0.24	0.29	0.34
17	0.26	0.28	0.31	0.33	…	…	…	…	0.26	0.28	0.31	0.33
18	0.55	0.66	0.81	0.93	…	…	…	…	0.55	0.66	0.81	0.93
19	0.02	0.03	0.04	0.04	…	…	…	…	0.02	0.03	0.04	0.04
20	0.12	0.14	0.16	0.17	…	…	…	…	0.12	0.14	0.16	0.17
21	0.12	0.13	0.15	0.16	0.01	0.01	0.02	0.02	0.13	0.15	0.17	0.18
22	0.03	0.03	0.04	0.04	…	…	…	…	0.03	0.03	0.04	0.04
23	0.10	0.10	0.10	0.10	0.01	0.01	0.01	0.01	0.10	0.10	0.11	0.11
24	0.04	0.04	0.05	0.05	0.01	0.01	0.01	0.01	0.04	0.05	0.06	0.06
25	…	…	…	…	0.03	0.03	0.02	0.02	0.03	0.03	0.02	0.02
26	2.33	2.82	3.48	3.95	1.17	1.72	2.62	3.47	3.50	4.54	6.10	7.42
27	6.95	8.15	9.67	10.59	1.15	1.58	2.27	2.85	8.10	9.73	11.94	13.44
28	1.69	1.86	2.09	2.20	1.41	1.74	2.24	2.61	3.09	3.60	4.32	4.81
29	1.57	2.03	2.68	3.15	0.16	0.24	0.39	0.55	1.72	2.27	3.07	3.69
30	8.04	9.05	10.27	10.84	1.56	2.13	3.02	3.72	9.60	11.19	13.29	14.57