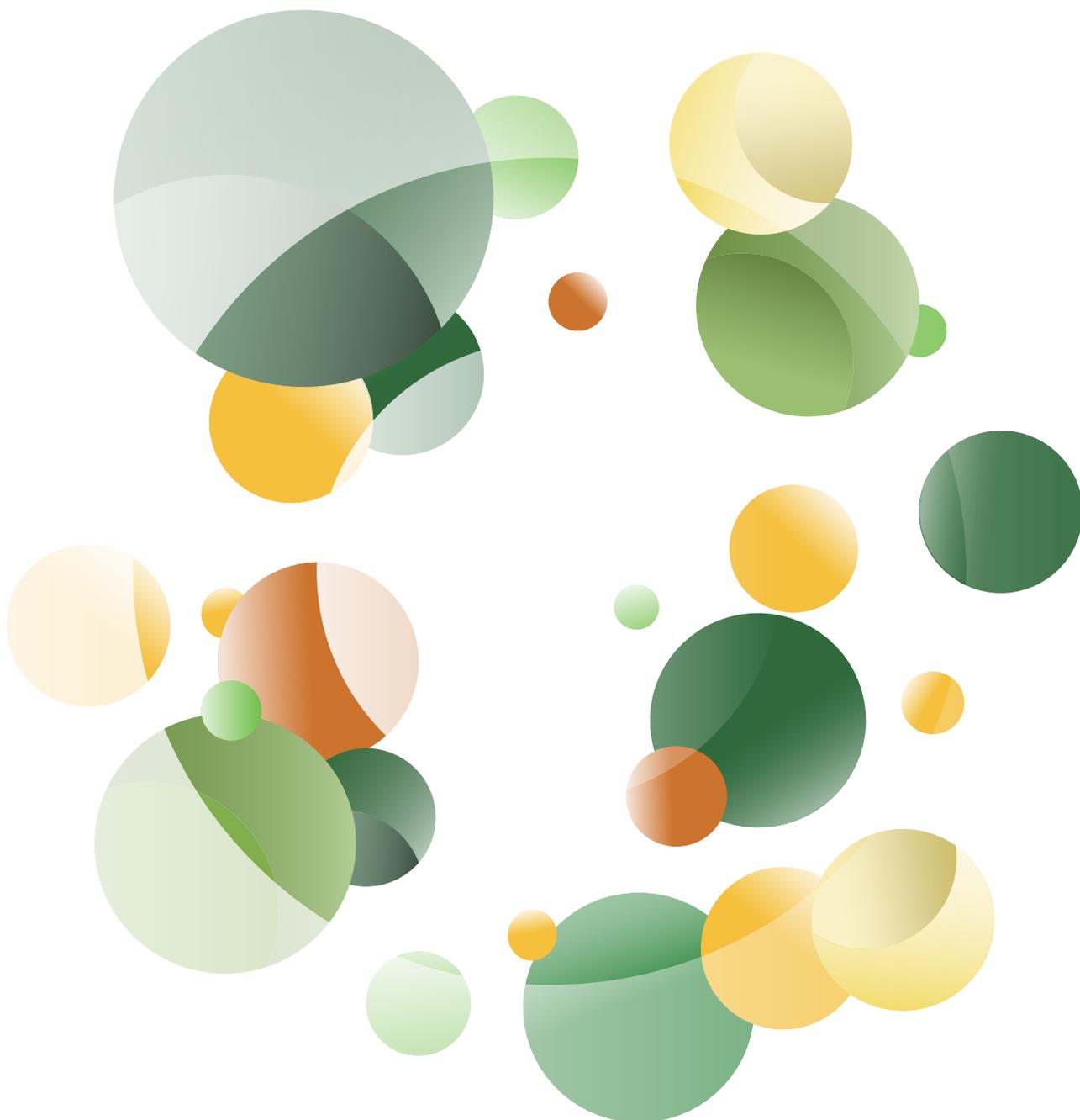


Eco-innovation and Sustainable Consumption and Production in Vietnam



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Table of Contents

Foreword	5
Executive Summary	6
Chapter 1. Introduction	7
1.1 Background and Process of the ASEI Research.....	7
1.2 Objectives, Methodology and Structure of the Study.....	9
Chapter 2. ASEM Eco-innovation Index of Vietnam	11
2.1 Rational of ASEI indicators and Sustainable Development Goals	11
2.2 ASEM Eco-innovation Index of Vietnam.....	22
Chapter 3. National Policies, Strategies and Instruments for Sustainable Consumption and Production	26
3.1 National Strategies and Plans	26
3.2 Legislations.....	32
3.3 Economic Instruments.....	34
Chapter 4. Sustainable Production by Enterprises	38
4.1 Implementation of Cleaner Production Strategy.....	38
4.2 Sustainable Production Projects with International Support	39
4.2.1 Promoting Eco/Sustainable Industrial Zones.....	39
4.2.2 SWITCH - Asia Program.....	40
4.3 Enhancing Sustainable Production through Enterprises Ranking/Reporting.....	42
Chapter 5. Sustainable Consumption by Consumers	44
5.1 Eco-labelling and Market.....	44
5.2 Consumption Pattern Change.....	45
5.3 Sustainable Consumption Activities by NGOs.....	47
Chapter 6. Opportunities and Challenges of SCP in Vietnam	50
6.1 Opportunities for Promoting SCP in Vietnam.....	50
6.2 Challenges for SCP in Vietnam.....	52
6.3 Recommendations for SCP in Vietnam.....	55
References	57

Tables

Table 2.1 ASEI indicators	12
Table 2.2 51 ASEM member countries.....	13
Table 2.3 Millennium Development Goals and Sustainable Development Goals.....	15
Table 2.4 ASEI indicators and SDGs	19
Table 2.5 SCP targets and eco-innovation sectors.....	21
Table 2.6 ASEI 2016 of Vietnam	23
Table 3.1 SCP targets in related strategies and plans	29
Table 3.2 List of projects for cleaner production implementation strategy	30
Table 3.3 List of projects for SCP implementation by the Action Program (period 2015-2020).....	31
Table 3.4 Tax rate for different resources	34
Table 3.5 Fee rate of COD and TSS.....	36
Table 3.6 Coefficient K for fee calculation of wastewater containing heavy metals.....	36
Table 4.1 CP implementation in Vietnam.....	38
Table 5.1 Targets for public transportation in Hanoi	46
Table 6.1 List of regulations for SCP.....	51

Figures

Figure 2.1 SDGs.....	16
Figure 2.2 The process of eco-innovation activities and SDGs	17
Figure 2.3 Links among the goal 12 (SCP) and other goals	21
Figure 2.4 ASEI 2016 of Vietnam	24
Figure 2.5 Mapping supply and demand-side instruments for eco-innovation in 17 Asian countries.....	24
Figure 2.6 Supply and demand policies for eco-innovation in Japan, Republic of Korea and Vietnam.....	25
Figure 6.1 By 2035, more than half of Vietnamese will have entered global middle class	53

Abbreviation

ASEM	The Asia-Europe Meeting
ASEI	ASEM Eco-innovation Index
ASEIC	ASEM SMEs Eco-innovation Center
CP	Cleaner Production
DOIT	Department of Industry and Trade
JPOI	Johannesburg Plan of Implementation
MARD	Ministry of Agriculture and Rural Development
MDG	Millennium Development Goal
MIC	Ministry of Information and Communication
MOC	Ministry of Construction
MOET	Ministry of Education and Training
MOF	Ministry of Finance
MOIT	Ministry of Industry and Trade
MONRE	Ministry of Natural Resources and Environment
MOT	Ministry of Transport
MPI	Ministry of Planning and Investment
MOST	Ministry of Science and Technology
RECP	Resource Efficiency and Cleaner Production
SCP	Sustainable Consumption and Production
SDG	Sustainable Development Goal
SME	Small and Medium Enterprise
SPIN	Sustainable Product Innovation
UNCED	United Nations Conference on Environment and Development
UNIDO	United Nations Industrial Development Organization
VBCSD	Vietnam Business Council for Sustainable Development
VNCPC	Vietnam Cleaner Production Center

Foreword

‘Sustainability’ is a keyword penetrating common agenda and the goal of the global community. The 17 Sustainable Development Goals (SDGs) were adopted in the UN General Assembly in 2015, stressing further participation, cooperation and stricter responsibilities in sustainable development worldwide. As the global agenda is adopted, countries are putting national efforts to find ways for implementation through enhanced actions.

For industry, sustainability is no longer just one of options but becoming more a requisite. Eco-innovation is any form of innovation aiming at significant and demonstrable progress towards the global goal of sustainable development in business sector, through reducing impacts on the environment. Eco-innovation is especially linked to “Ensuring Sustainable Consumption and Production Patterns (SDG 12)”, and it is an important goal to achieve in Vietnam as the industry is growing in a fast pace. Sustainable Consumption and Production (SCP) promotes increasing welfare from economic activities by reducing resource and energy use along the whole lifecycle, while increasing quality of life for all.

To improve knowledge and tackle issues to pursue SDGs and find opportunities in SCPs through eco-innovation, Hanns-Seidel Foundation (HSF) Office of Vietnam and ASEM SMEs Eco-Innovation Center (ASEIC) is publishing “Eco-innovation and Sustainable Consumption and Production in Vietnam” report as collaborative efforts of experts in the field from Korea and Vietnam. The research was conceptualized by a one-day workshop on SDGs indicators in June 2016, Hanoi, focusing on “Achieving and Monitoring Sustainable Consumption and Production (SDG 12) through Eco-innovation in Viet Nam”.

The publishers hope that the report will give insight of Vietnam’s eco-innovation development status based on the indepth eco-innovation index analysis, and give opportunity to capture qualitative aspects on the current policy and practices. Finally, the report is expected to enlighten Vietnam to be sustainable in their production and consumption patterns at the national level to move a step forward to a sustainable future.

Hanns Seidel Foundation Office of Vietnam
ASEM SMEs Eco-Innovation Center

Executive Summary

Under the paradigm of sustainable development, the concept of eco-innovation was put forward. Eco-innovation was perceived as one of the critical processes and objectives for reaching worldwide Sustainable Development Goals (SDGs) in the global society. Sustainable Consumption and Production (SCP) is an overarching objective and an essential requirement for sustainable development. Goal 12 of 17 SDGs emphasizes SCP which enables sustainable and efficient management of resources on all the stages of the supply-chain of goods and services.

The report focused on eco-innovation and SCP of Vietnam, which belongs to lingers that slowly catch up to eco-innovation approaches compared to other Asian countries. In this report, the scores of Vietnam's ASEM Eco-innovation Index (ASEI) are analyzed and the Vietnamese policy context and trends on eco-innovation are identified through document analysis. As a result, this research includes contextual and academic background of eco-innovation and 2030 Agenda for sustainable development and SCP, national policy strategies and instruments for SCP, sustainable production activities by enterprises, and sustainable consumption by citizens in Vietnam. It also offers comprehensive discussion of institutional framework and performances of SCP in the field of eco-innovation while presenting opportunities and challenges for stabilizing eco-innovation in Vietnam. Finally this report gives some recommendations for development of SCP in Vietnam such as improving capacity for SCP, enforcing regulatory power of eco-innovation policy instruments, and improving eco-innovation technology for SCP. Therefore, the report will provide decision-makers with significant data on the status and policies and future prospects of eco-innovation and SCP in Vietnam. It could also contribute to facilitating communication on eco-innovation within Vietnam as well as in the global society.

Chapter 1. Introduction

1.1 Background and Process of the ASEI Research

The global society accepted sustainable development as a vision for present and future generations at the United Nations Conference on Environment and Development (UNCED), which was held in Rio de Janeiro in 1992. Sustainable development is defined as “a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations (World Commission on Environment and Development, 1987)”. According to Principle 11 of Rio’s Declaration on Environment and Development, which was agreed upon by 108 states, states shall enact effective environmental legislation to achieve sustainable development and a higher quality of life for all people (UNCED, 1992). Agenda 21 acknowledged that business and industry play a crucial role in reducing impacts on resource use and the environment through more efficient production processes, preventive strategies, and cleaner production technologies and procedures.

In this context, eco-innovation emerged as an important pathway towards sustainable development in the business sector. OECD’s report (OECD, 2011) clearly states eco-innovation’s important role in pursuing green growth policy agendas at the national level. Eco-innovation can be a key catalyst for promoting and implementing green growth because it promotes all forms of innovation that reduce environmental impacts and strengthen resilience to environmental pressures. As one effort toward sustainable development, eco-innovation leads the transition to a green economy. A green economy is a method to realize sustainable development at national, regional, and global levels in ways that resonate with and diffuse the implementation of Agenda 21 (UNEP, 2011b).

Under the paradigm of sustainable development, the concept of eco-innovation was put forward. It received attention in Europe and was perceived as one of the critical processes and objectives for reaching worldwide sustainable development goals (Kemp and Arundel, 1998; Rennings, 2000). Eco-innovation is defined as any form of innovation aiming at a significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of resources including both intended

and unintended environmental effects from innovation as well as not only environmental technology but processes, systems and services (EIO, 2012a). As a result, a framework for measuring eco-innovation has begun to receive attention (Cheng and Shiu, 2012). Triebswetter and Wackerbauer (2008) addressed the concept by introducing an advanced version of eco-innovation framework and index.

Arundel and Kemp (2009) also suggested how eco-innovation can be quantitatively measured. Recently, the EU Eco-Innovation Observatory (EIO) designed an eco-innovation index based on a previous index also from EIO (2012b) by adding indices for material flow innovation and social innovation to product innovation, process innovation, marketing innovation, and organizational innovation. Meanwhile, the Organization for Economic Co-operation and Development (OECD) and Eurostat (2012) measured eco-innovation with four group factors such as cost, knowledge, market, and institutional factor. In addition, Horbach (2008) developed a new framework for eco-innovation measurement with demand, supply, and institutional policy.

In this context, ASEM SMEs (Small and Medium-sized Enterprises) Eco-innovation Center (ASEIC), which was established in 2011 in the Republic of Korea, developed an appropriate index –ASEM Eco-innovation Index (ASEI) - that can measure a degree of eco-innovation of ASEM (Asia-Europe Meeting) member countries. The total population of ASEM member nations constitutes 60.3% of the world's population. Total Gross Domestic Product (GDP) of these countries is up to 55.0% of world's GDP and their amount of trade accounts for 63.2% of world's trade amount (OECD, 2009). Moreover, ASEM nations play an important role as a cooperating channel for Asia-Europe countries in making major decisions for international issues. Unlike the Asia-Pacific Economic Cooperation (APEC) union, which heavily depends on economic cooperation, the ASEM nations also aim for comprehensive collaboration that takes into account political, economic, social and cultural factors.

Therefore, various cooperative projects have been promoted within ASEM (Jo et al., 2015). ASEM member countries need to actively participate in and respond to the emerging new paradigm of low carbon green growth to prevent further environmental risks and to find new opportunities. ASEIC has conducted ASEI research since 2012 to develop, measure, and analyze eco-innovation index. As ASEI has been modifying annually, the national case studies on eco-innovation in ASEM countries are contributing to the understanding the scores of ASEI.

1.2 Objectives, Methodology and Structure of the Study

This report highlights eco-innovation and sustainable consumption and production. It aims at understanding eco-innovation and sustainable consumption and production in the context of Vietnam. Therefore it attempts to identify performances by the major actors including governments, business and civil society and to analyze their roles and relationship among them to shift towards sustainable consumption and production patterns.

To achieve the objectives of this study, Vietnam's ASEI is analyzed as well as relevant legal texts, policy documents and research articles on sustainable consumption and production (SCP) in Vietnam. Through document analysis Vietnamese policy context and trends on eco-innovation are identified, such as keywords or core concepts of eco-innovation and specific sectors, special programme and so on.

This report is structured with six Chapters. **Chapter 1 and 2** include contextual and academic background of eco-innovation, sustainable development goals to 2030 (SDGs) and SCP with more focus on the ASEI of Vietnam from two scientific articles (Jang et al., 2015; Jo et al., 2015). **Chapter 3** describes national policy strategies and instruments for SCP in Vietnam. The role of the government is crucial for implementing and diffusing eco-innovation at the national level. Governments can develop a national system that enables producing eco-friendly goods and services. Governments can establish and implement policy instruments for eco-innovation, such as environmental regulations, financial schemes, and programs for supporting R&D and fostering eco-markets (Jang et al., 2015). At this chapter various policy instruments for eco-innovation will be described. Specific sectors or policy programme which Vietnamese government has invested intensively are introduced. **Chapter 4** includes sustainable production activities by enterprises in Vietnam. Business and industry play a crucial role in reducing impacts on resource use and the environment through more efficient production processes, preventive strategies, and cleaner production technologies and procedures. The concrete activities and strategies of business and industry will be introduced. In particular, the process of establishing and implementing the Sustainable Product Innovation Project (SPIN) supported by the European Commission will be introduced. **Chapter 5** introduces sustainable consumption by citizens in Vietnam. Citizens as consumers have demands on eco-products. Consumers' behavior contributes to building green markets. NGOs set the environmental issues at the society and collaborate with other actors to create sustainable life. Therefore awareness of citizens to eco-products and activities of NGOs will be described in building the green markets in Vietnam.

Finally, **Chapter 6** includes comprehensive discussion of conditions of Vietnam's eco-innovation with categories of eco-innovation, and opportunities and challenges for stabilizing eco-innovation in Vietnam.

Chapter 2. ASEM Eco-innovation Index of Vietnam

2.1 Rational of ASEI indicators and Sustainable Development Goals

2.1.1 ASEM Eco-innovation Index (ASEI)

Based on existing studies, ASEIC found 20 indicators that could affect the eco-innovation status of a nation and grouped them into four factors using the same weight technique by analytic hierarchy process (AHP). Drawing upon previous studies, measurement of eco-innovation was re-conceptualized. Among factors for measuring eco-innovation at the national level, **capacity, supporting environment, activity for eco-innovation of the nation, and the national performance in terms of eco-innovation achievement** were selected as criteria. These criteria are applied to an input-output model representing interdependence between a chain of eco-innovation activities. They are the groupings of major indicators that contain the key concepts and issues for eco-innovation like the table 2.1.

'Eco-innovation Capacity' includes five indicators triggering eco-innovation in a country, personnel concerned, social components, innovation abilities and capacity presented in existing research; 1.1 Country's Economic Competitiveness, 1.2 Country's General Innovation Capacity, 1.3 Green Technology R&D Institution Capacity, 1.4 Green Technology possessed/acquired Firms and 1.5 Awareness of Sustainability Management.

'Eco-innovation Supporting Environment' includes four indicators representing government's institutional support and enabling environment for eco-innovation, company responses toward regulations and supports; 2.1 Government's R&D expenditure in Green Industry, 2.2 Implementation of Environmental Regulations, 2.3 Maturity of Investment Setting for Green Technology Industry and 2.4 Investment Scale of Green Technology SMEs.

'Eco-innovation Activity' includes five indicators representing degree of development and implementation of eco-innovation in corporates and usage of eco-resources in overall economy; 3.1 Commercialization Level of Green Technology, 3.2 Firms' Participation on Environmental Management System, 3.3 Economic Influence of Leading Environmentally Responsive Firms, 3.4 Green Patents and 3.5 Activeness of Renewable Energy Utilization.

‘Eco-innovation Performance’ includes six indicators representing outcomes of eco-innovation activities in economic, social and environmental area; 4.1 Level of Environmental Impact on Society, 4.2 CO₂ Emission Intensity, 4.3 Country’s Energy Sustainability Level, 4.4 Water Consumption Intensity, 4.5 Jobs in Green Technology Industry and 4.6 Green Industry Market Size. Twelve Indicators were eventually selected for ASEI 2016 depending on data availability: three indicators (Indicator 1.1, 1.2 and 1.5) for “Capacity”, one indicator (Indicator 2.2) for “Supporting Environment”, three indicators (Indicator 3.2, 3.4 and 3.5) for “Activity” and five indicators (Indicator 4.1, 4.2, 4.3, 4.4 and 4.6) for “Performance”. When 51 nations were examined, their complete data only covered 12 indicators of the original 20 indicators.

Table 2.1 ASEI indicators

Category	Indicator	Contents
Eco-innovation Capacity	1.1 Country’s Economic Competitiveness	Composite Index by World Economic Forum (2015)
	1.2 Country’s General Innovation Capacity	Composite Index by INSEAD (2015)
	1.2 Green Technology R&D Institution Capacity	Number of green technology R&D institutions, centers and university
	1.3 Green Technology possessed/ acquired Firms	Number of green technology possessed firms
	1.5 Awareness of Sustainability Management	Number of participating enterprise (2015)
Eco-innovation Supporting Environment	2.1 Government’s R&D expenditure in Green Industry	Size of expenditure
	2.2 Implementation of Environmental Regulations	Composite Index World Economic Forum (2015)
	2.3 Maturity of Investment Setting for Green Technology Industry	Value of investment towards green technology firms
	2.4 Investment Scale of Green Technology SMEs	Number of venture capitals & deals made towards green technology SMEs
Eco-innovation Activity	3.1 Commercialization Level of Green Technology	Number of companies with green technology widely commercialized
	3.2 Firms’ Participation on Environmental Management System	Number of participating enterprise (2014)
	3.3 Economic Influence of Leading Environmentally Responsive Firms	Amount of annual sales
	3.4 Green Patents	Number of patent (2014)

	3.5 Activeness of Renewable Energy Utilization	Measures the contribution of renewable to total primary energy supply (2015)
Eco-innovation Performance	4.1 Level of Environmental Impact on Society	Level of Environmental Impact on Society (2015)
	4.2 CO₂ Emission Intensity	Amount of Carbon dioxide generated (2015)
	4.3 Country's Energy Sustainability Level	Composite Index by World Energy Council (2015)
	4.4 Water Consumption Intensity	Water withdrawal for each 1,000 USD of GDP in cubic meter (2014)
	4.5 Jobs in Green Technology Industry	Number of employees
	4.6 Green Industry Market Size	Green Industry total sales (2011)

[Note] Bold letters represent measured indicators

ASEI indicators were developed for three years from 2012 to 2014, and were annually measured in ASEM member countries since 2014. In 2016, all of 51 ASEM member countries were examined (Table 2.2).

Table 2.2 51 ASEM member countries

Region	Europe (31)	Asia (20)
Name of countries	Romania, Bulgaria, Estonia, Slovakia, Russian Federation, Lithuania, Latvia, Poland, Hungary, Croatia, Luxembourg, Norway, Switzerland, Denmark, Sweden, Austria, Netherlands, Ireland, Finland, Belgium, Germany, France, United Kingdom, Italy, Spain, Cyprus, Slovenia, Greece, Portugal, Malta, Czech Republic	Vietnam, Lao PDR, India, Pakistan, Cambodia, Bangladesh, Myanmar, Mongolia, Philippines, Brunei Darussalam, China, Thailand, Indonesia, Malaysia, Kazakhstan, Australia, Singapore, New Zealand, Japan, Republic of Korea

2.1.2 Sustainable Development Goals (SDGs)

After the Rio's Declaration on Environment and Development, the 2002 World Summit on Sustainable Development advanced the mainstreaming of the three dimensions of sustainable development in development policies at all levels through the adoption of the Johannesburg Plan of Implementation (JPOI). At the Rio+20 Conference in 2012, the international community decided to launch a process to develop a set of Sustainable Development Goals (SDGs), which were to build upon the Millennium Development Goals and converge with the post-2015 development

agenda. On 25 September 2015, the United Nations General Assembly formally adopted the universal, integrated and transformative 2030 Agenda for Sustainable Development, along with a set of 17 Sustainable Development Goals and 169 associated targets.

The world leaders adopted the United Nations Millennium Declaration at the Millennium Summit in New York in 2000. They set out a series of eight time-bound targets – with a deadline of 2015 – that have become known as the Millennium Development Goals (MDGs). MDG targets include the goals of ending hunger and poverty, achieving universal primary education, promoting gender equality, reducing child mortality, improving maternal health, combating HIV/AIDS and malaria, ensuring environmental sustainability and developing a global partnership for development (Table 2.3).

SDGs address the multiple interlinked global challenges of eradicating poverty, ensuring environmental sustainability, achieving economic equity, ensuring gender equality, tackling climate change, building resilience, managing equitable distribution of natural resources, realizing human rights, and reducing inequality between and within populations. SDGs share similarity with MDGs. However there are some key differences between MDGs and SDGs. SDGs are more expansive with a clear acknowledgement that includes the multiple targets compared to MDGs. Environmental dimensions and their interconnection with different problems are even more emphasized in the SDGs than in the MDGs (Stevens and Kanie, 2016).

The SDGs might have an integrative approach that includes Earth's life-support system and poverty reduction (Griggs et al., 2013). The shift from MDGs to SDGs indicates the expansion of the spaces where development should happen (Willis, 2016). Most of target countries of MDGs are the Global South. MDGs are focused on basic service delivery and absolute poverty as a baseline. On the other hand SDGs are more inclusive in an understanding of where sustainable development should take place (Willis, 2016). Achievement of SDGs requires efforts from the Global North and South. The levels of targets are identified with the basis of an understanding of the values at the individual contexts. Within SDGs the target countries are both developed and developing countries. In addition SDGs were initiated through open and transparent communication process among multiple sectors and stakeholders, while MDGs were formed by internal UN actors (Stevens and Kanie, 2016). SDGs are the shared goals through deliberative discussion at the global society. Therefore the process of forming SDGs indicates a phenomenon of global governance (Figure 2.1).

Table 2.3 Millennium Development Goals and Sustainable Development Goals

<p>Millennium Development Goals (8)</p>	<ol style="list-style-type: none"> 1. Eradicate extreme poverty and hunger 2. Achieve universal primary education 3. Promote gender equality and empower women 4. Reduce child mortality 5. Improve maternal health 6. Combat HIV/AIDS, malaria and other diseases 7. Ensure environmental sustainability 8. Develop a global partnership for development
<p>Sustainable Development Goals (17)</p>	<ol style="list-style-type: none"> 1. End poverty in all its forms everywhere 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture 3. Ensure healthy lives and promote well-being for all at all ages 4. Ensure inclusive and equitable education and promote lifelong learning opportunities for all 5. Achieve gender equality and empower all women and girls 6. Ensure availability and sustainable management of water and sanitation for all 7. Ensure access to affordable, reliable, sustainable and modern energy for all 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation 10. Reduce inequality within and among countries 11. Make cities and human settlements inclusive, safe, resilient and sustainable 12. Ensure sustainable consumption and production patterns 13. Take urgent action to combat climate change and its impacts 14. Conserve and sustainable use the oceans, seas and marine resources for sustainable development 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

Figure 2.1 SDGs



Source: <https://sustainabledevelopment.un.org/intergovernmental>

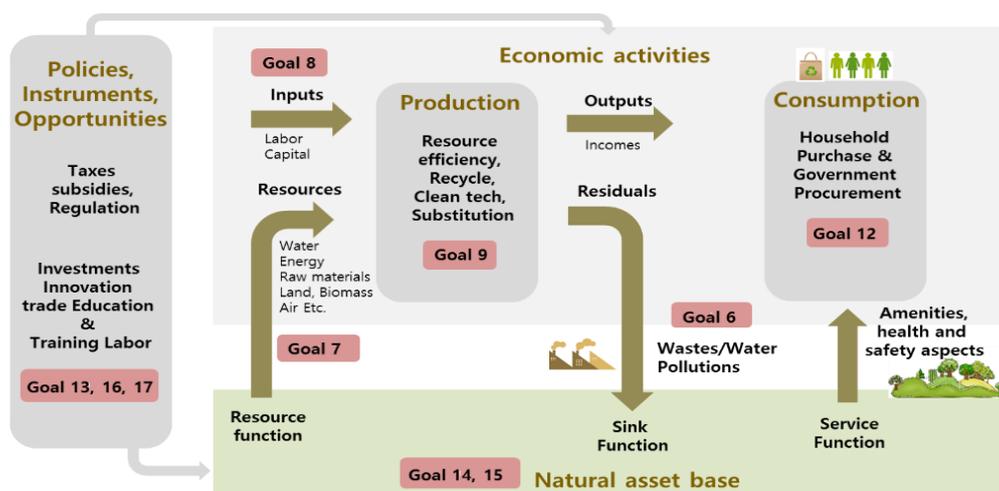
In principle, eco-innovation is logically deeply related to SDGs. Contextually eco-innovation emerged as an important pathway towards sustainable development. Eco-innovation can be a key catalyst for promoting and implementing green growth because it promotes all forms of innovation that reduce environmental impacts and strengthen resilience to environmental pressures. As one effort towards sustainable development, eco-innovation leads the transition to a green economy. A green economy is a method to realize sustainable development at national, regional, and global levels in ways that resonate with and diffuse the implementation of Agenda 21 (UNEP, 2011b).

The process of eco-innovation can be visualized as the Figure 2.2. Eco-innovation phenomena can be described with SDGs. As the Figure 2.2 indicates, eco-innovation includes several sectors. Referring to the study on eco-innovation policies by Jang et al. (2015) and the UNEP report on green economy (UNEP, 2011b), eco-innovation sectors can be classified into natural resource management (including water, raw materials, energy etc.), waste management, renewable energy, purchase or procurement, clean technology, climate change and so on. SDGs include all the sectors. Use of natural resources including water, raw materials, and land is related to Goal 7 Affordable and Clean Energy, Goal 14 Life below Water and Goal 15 Life on Land.

In the process of production, development and implementation of green technology and waste management can contribute to achieving Goal 9 Industry, Innovation and Infrastructure. Governmental policy instruments promote eco-innovation activities (Jang et al., 2015). As the Chapter 3 Policy instruments for supporting eco-innovation include regulations, taxes and subsidies for climate change mitigation and adaptation (Goal 13), green technology and industry (Goal 9), renewable energy (Goal 7) and green procurement (Goal 12). Therefore input-output model of eco-innovation can contribute to achieving SDGs. Above all, establishing sustainable consumption and production patterns (Goal 12) is the common aim of eco-innovation (Jang et al., 2015). Concerning Goal 17 Partnership for the Goals, many countries cooperate each other for eco-innovation.

In particular European countries initiated various eco-innovation tools that fostered regional programs, including an Environmental Technology Action Plan (ETAP), Eco-Innovation Action Plan (EcoAP), Accelerating Eco-innovation Policies (ECOPOL), and the Competitiveness and Innovation Framework Program (CIP) (Jang et al., 2015). The European Union made the issue of sustainable consumption and production a priority in its regional cooperation strategy from 2007 to 2013. In 2008, the European Commission launched the SWITCH-Asia program to promote sustainable products, processes, services, and consumption patterns in Asia. More than 90 grant-funded projects have been initiated in 18 Asian countries (SWITCH-ASIA, 2017).

Figure 2.2 The process of eco-innovation activities and SDGs



ASEI consists of four categories - eco-innovation capacity, eco-innovation supporting environment, eco-innovation activity and eco-innovation performance which

measure the current status of a nation in achieving sustainable development (Jo et al., 2015). ASEI includes 20 indicators, and they are logically related to SDGs. Seven indicators among all ASEI indicators are created for measuring capacity, supporting environment, activity and performance of green technology and green industry; Indicator 1.3 Green Technology R&D Institution Capacity, Indicator 1.4 Green Technology possessed/acquired Enterprises, Indicator 2.1 Government's R&D expenditure in Green Industry, Indicator 2.3 Maturity of Investment Setting for Green Technology Industry, Indicator 2.4 Investment Scale of Green Technology SMEs, Indicator 3.1 Commercialization Level of Green Technology and Indicator 4.5 Jobs in Green Technology Industry.

Eco-innovation is closely related to the development and use of environmental or green technologies as well as the concepts of eco-efficiency and green industry (Sarkar, 2013). Green technology which reduces environmental burdens can facilitate sustainable and resilient infrastructure development at the society and enterprise level. It creates and develops new and more sustainable industries by preventing or reducing negative impacts or optimizing the use of natural resources. Therefore green technology and green industry which ASEI focuses can contribute to building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation (Goal 9 Industry and infrastructure). Consequently green technology and green industry facilitates sustainable production process through increasing material efficiency and enables sustainable consumption through creating eco-markets (Goal 12 Sustainable Consumption and Production).

Eco-innovation is used in conjunction with eco-efficiency (Jo et al., 2015). The category of eco-innovation performances of ASEI is measured focusing on resource use efficiency including Indicator 4.2 CO₂ Emission Intensity, Indicator 4.3 Nation's Energy sustainability level, and Indicator 4.4 Water Consumption Intensity. Therefore these indicators are related to Goal 13 Climate Action, Goal 7 Clean Energy and Goal 6 Clean Water.

Eco-innovation pursues green growth to prevent further environmental risks and to find new opportunities (OECD, 2011). The category of eco-innovation capacity of ASEI includes nation's economic competitiveness (Indicator 1.1) and general innovation capacity (Indicator 1.2). Economic competitiveness and innovation capacity can indicate possibility for promoting sustained, inclusive and sustainable economic growth (Goal 8). Jobs in green technology industry (Indicator 4.5) and green industry market size (Indicator 4.6) as indicators of eco-innovation performance present the status of employment related to the Goal 8 Good jobs and economic growth.

Table 2.4 ASEI indicators and SDGs

Category	Indicator	SDGs
	1.1 Nation's Economic Competitiveness	G. 8 Good jobs and economic growth G.12 Responsible consumption and production
	1.2. Nation's General Innovation Capacity	G. 8 Good jobs and economic growth G.12 Responsible consumption and production
	1.3. Green Technology R&D Institution Capacity	G. 9 Industry and infrastructure
	1.4. Green Technology possessed/acquired Enterprises	G. 9 Industry and infrastructure
	1.5. Awareness of Sustainability Management	G.12 Responsible consumption and production
2. Eco-Innovation Supporting Environment	2.1. Government's R&D expenditure in Green Industry	G. 9 Industry and infrastructure G.12 Responsible consumption and production
	2.2. Implementation of Environmental Regulations	G. 16 Peace, justice and strong institutions
	2.3. Maturity of Investment Setting for Green Technology Industry	G. 9 Industry and infrastructure
	2.4. Investment Scale of Green Technology SMEs	G. 9 Industry and infrastructure
3. Eco-Innovation Activities	3.1. Commercialization Level of Green Technology	G.12 Responsible consumption and production
	3.2. Enterprises' Participation on Environmental Management System	G.12 Responsible consumption and production
	3.3. Economic Influence of Leading Environmentally Responsive Enterprises	G. 9 Industry and infrastructure
	3.4. Green Patents	G.12 Responsible consumption and production
	3.5. Activeness of Renewable Energy Utilization	G. 7 Clean energy
4. Eco-Innovation Performances	4.1. Level of Environmental Impact on Society	G. 3 Good health G.12 Responsible consumption and production
	4.2. CO ₂ Emission Intensity	G. 13 Climate action
	4.3. Nation's Energy sustainability level	G. 7 Clean energy
	4.4. Water Consumption Intensity	G. 6 Clean water
	4.5. Jobs in Green Technology Industry	G. 8 Good jobs and economic growth G. 9 Industry and infrastructure
	4.6. Green Industry Market Size	G. 8 Good jobs and economic growth G. 9 Industry and infrastructure

[Note] Indicators in the blue cells were measured in ASEI 2015 and ASEI 2016.

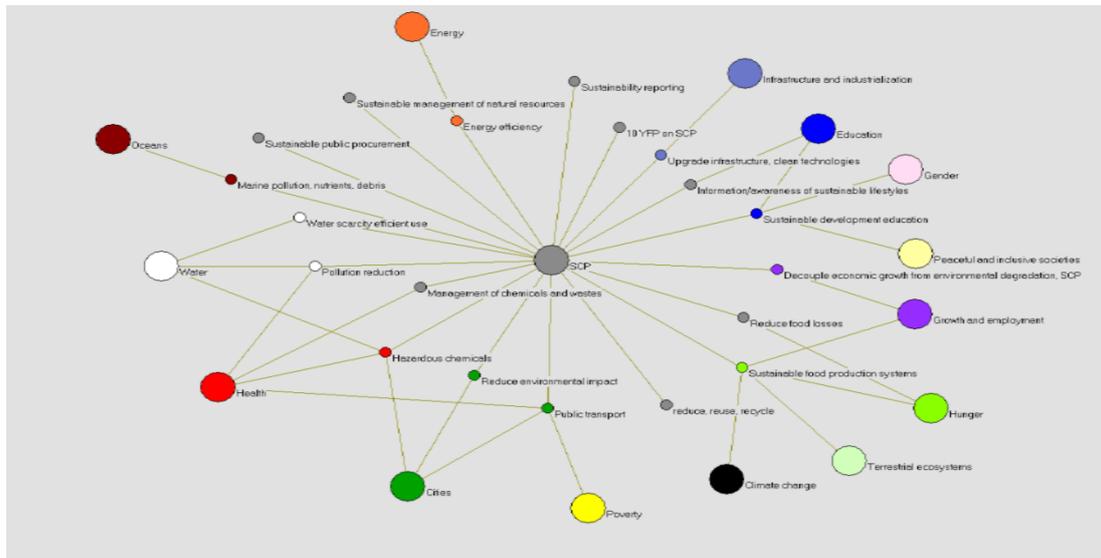
2.1.3 Sustainable Consumption and Production (SCP)

In principle, ASEI is logically deeply related to SDGs, because eco-innovation is a means to achieve sustainable development. Sustainable consumption and production (SCP) is an overarching objective and an essential requirement for sustainable development, as recognized in the JPOI of the World Summit on Sustainable Development in 2002. According to JPOI, fundamental changes in the way societies produce and consume are indispensable for achieving global sustainable development. JPOI emphasizes that various groups including governments, relevant international organizations and the private sector should play an active role in changing unsustainable consumption and production patterns. The Marrakech Process was launched in 2003 responding to JPOI call. It is a global process to support the implementation of projects and strategies on SCP and elaboration of a 10-Year Framework of Programmes (10YFP) (UNEP, 2011a)

In particular goal 12 emphasizes ‘sustainable consumption and production’. As defined by the Oslo Symposium in 1994, sustainable consumption and production (SCP) is about *“the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of further generations (United Nations, 2016)”*. Through a life-cycle perspective, SCP enables the sustainable and efficient management of resources on all the stages of the supply-chain of goods and services, e.g. reuse or recycling of valuable resources within waste streams (UNEP, 2011a; 10). Sustainable patterns of consumption and production are essential to the achievement of a green economy.

According to JPIO 2002, fundamental changes in the way societies produce and consume are indispensable for achieving global sustainable development. SCP belongs to the core of the SDG network including inequality, poverty and education (Le Blanc, 2015). SCP ranks the top of the linkages among the SDG goals. SCP links with other 14 SDG goals like Figure 1.3.

Figure 2.3 Links among the goal 12 (SCP) and other goals



Source: Le Blanc (2015: 7)

Goal 12 SCP includes ten targets as following (Table 2.5). The targets include the multiple eco-innovation sectors such as waste management (Target 12.4 and 12.5) and natural resource management (Target 12.2). Green procurement (Target 12.7) and green technology (Target 12.a) as key practices of eco-innovation (Jang et al., 2015) support the sustainable patterns of consumption and production. Therefore ASEI indicators of natural resource management and green technology and industry explain the status and capability for sustainable consumption and production at the national level.

Table 2.5 SCP targets and eco-innovation sectors

Target	Sector
Target 12.1 implement the 10-Year Framework of Programmes on sustainable consumption and production (10YFP), all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries	All
Target 12.2 by 2030 achieve sustainable management and efficient use of natural resources	Natural resource management
Target 12.3 by 2030 halve per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains including post-harvest losses	Food security
Target 12.4 by 2020 achieve environmentally sound management of chemicals and all wastes throughout their life cycle in accordance with agreed international frameworks and significantly reduce their release to air, water and soil to minimize their adverse impacts on human health and the environment	Natural resource management Waste management

Target 12.5 by 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse	Waste management
Target 12.6 encourage companies, especially large and trans-national companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	All
Target 12.7 promote public procurement practices that are sustainable in accordance with national policies and priorities	Procurement
Target 12.8 by 2030 ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	All
Target 12.a support developing countries to strengthen their scientific and technological capacities to move towards more sustainable patterns of consumption and production	Green technology
Target 12.c rationalize inefficient fossil fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities	All

2.2 ASEM Eco-innovation Index of Vietnam

This report focuses on eco-innovation in Vietnam (Table 2.6 and Figure 2.4). In measuring ASEI 2016 (Park et al., 2016), Vietnam ranks in the 45th place among 51 ASEM countries for Eco-innovation Index. Vietnam was in the 2nd place among the first stage of economic development group including Lao PDR, Vietnam, Bangladesh, India, Cambodia, Myanmar and Pakistan which was classified by the World Economic Forum (WEF).

In detail, eco-innovation capacity of Vietnam is ranked at the 34th highest among all of the countries, and 2nd place within the same economic development group countries. This capacity category includes Country's Economic Competitiveness (1.1), Country's General Innovation Capacity (1.2) and Awareness of Sustainability Management (1.5). In eco-innovation supporting environment category, Vietnam was placed at the 47th and 4th ranking among the ASEM and the same economic group countries, respectively. The Implementation of Environmental Regulations (2.2) belongs to this category. Vietnam ranks in the 38th place among ASEM member countries for eco-innovation activities. This category includes three indicators: Firms' Participation on Environmental Management System (3.2), Green Patents (3.4), and Activeness of Renewable Energy Utilization (3.5). Vietnam ranks the 3rd among the countries that belong to the first stage of economic development. Vietnam ranks in

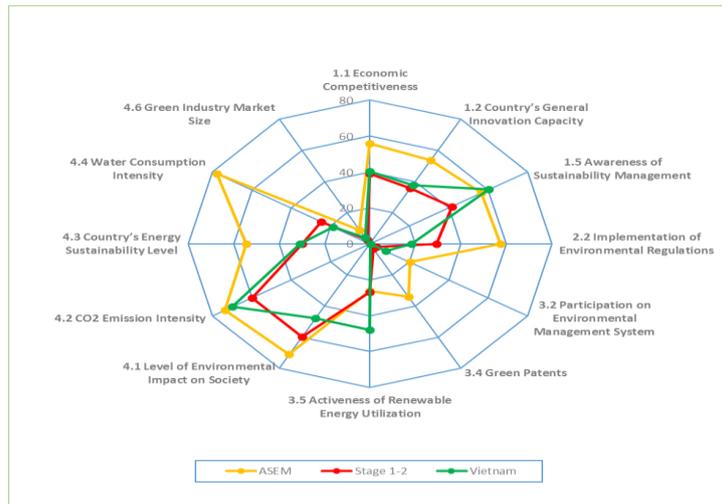
the 44th and 1st place among the ASEM and the same economic countries in eco-innovation performance, respectively. This category includes Level of Environmental Impact on Society (4.1), CO₂ Emission Intensity (4.2), Country's Energy Sustainability Level (4.3), Water Consumption Intensity (4.4) and Green Industry Market Size (4.6). Vietnam tops the CO₂ Emission Intensity (4.2) among all ASEM countries, while ranking the lowest in Water Consumption Intensity (4.4).

Table 2.6 ASEI 2016 of Vietnam

Category and Indicator	Score
Eco-Innovation Capacity	46.04
Economic Competitiveness	40.16
Country's General Innovation Capacity	37.64
Awareness of Sustainability Management	60.31
Eco-Innovation Supporting Environment	18.21
Implementation of Environmental Regulations	18.21
Eco-Innovation Activities	18.77
Firms' Participation on Environmental Management System	8.18
Green Patents	0.20
Activeness of Renewable Energy Utilization	47.93
Eco-Innovation Performance	34.24
Level of Environmental Impact on Society	47.78
CO ₂ Emission Intensity	70.00
Country's Energy Sustainability Level	30.67
Water Consumption Intensity	18.82
Green Industry Market Size	3.93
ASEI 2016 Total	29.31

Source: Park et al. (2016: 9)

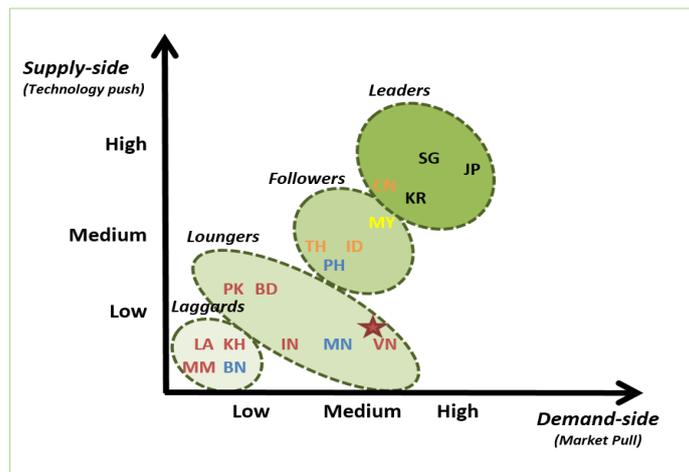
Figure 2.4 ASEI 2016 of Vietnam



Source: Park et al. (2016: 9)

Jang et al. (2015) compared eco-innovation policies in 17 Asian countries focusing the balance between the technology push (supply side) and the market pull (demand side) in policy instruments for eco-innovation. The selected Asian countries were mapped into four categories: leaders, followers, loungers, and laggards. Vietnam belongs to loungers that slowly catch up to eco-innovation approaches, compared to other countries (Figure 2.5).

Figure 2.5 Mapping supply- and demand-side instruments for eco-innovation in 17 Asian countries



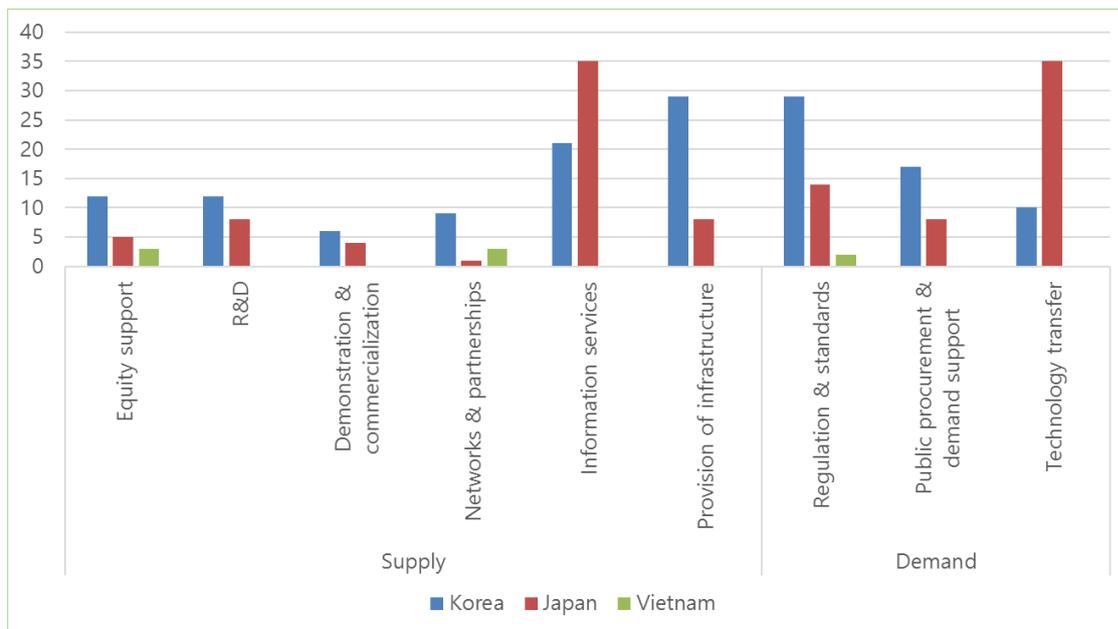
[Note] Bangladesh: BD; Brunei Darussalam: BN; Cambodia: KH; China: CN; India: IN; Indonesia: ID; Japan: JP; Republic of Korea: KR; Lao PDR: LA; Malaysia: MY; Mongolia: MN; Myanmar: MM; Pakistan: PK; Philippines: PH; Singapore: SG; Thailand: TH; Vietnam: VN.

The color used for the name of the country indicates its economic development stage: red: stage 1; blue: stage 1–2; orange: stage 2; yellow: stage 1–2; black: stage 3.

Source: Jang et al. (2015)

Balance between eco-innovation policies in supply and demand side is slightly weighted to supply side (Figure 2.6) in Vietnam (ASEIC, 2015). In the sub-sector, regulation and standards in demand side are established in line with related supporting program. Vietnam government has established the largest supporting programs and actions for R&D and provision of infrastructure in the supply side. In order to upgrade added value through innovation, Vietnam government has established foundation and infrastructure of R&D and transfer high technologies from overseas. The equity and management supporting eco-innovation and network/partnership have been operating in supply side and eco-labelling and standards for energy efficiency have been established in demand side.

Figure 2.6 Supply and demand policies for eco-innovation in Japan, Republic of Korea and Vietnam



* Investigation period: 2000-2015

Source: ASEIC (2015)

Chapter 3. National Policies, Strategies and Instruments for Sustainable Consumption and Production

3.1 National Strategies and Plans

Vietnam's Socio-Economic Development Strategy for the Period of 2011-2020 (2011):

The strategy has been adopted by the Vietnam Communist Party XI Congress in 2011 with objective for the country to be a modern oriented industrial one by 2020. There are some SCP-related targets, such as: 100% of new business and manufacture facilities will apply clean technology and more than 80% of existing business and manufacture facilities meet environmental standards; 95% of regular solid waste, 85% of toxic waste and 100% of health waste will be solved in line with standards. To achieve these targets, the strategy emphasized that socio-economic development should always be accompanied with environmental protection; the SCP should be carried out and step by step to implement “clean energy”, “clean production”, and “clean consumption”.

Vietnam Sustainable Development Strategy for 2011-2020 (Decision 432/QD-TTg dated 12/04/2012)

The SCP has been emphasized in the viewpoints and the objectives of the strategy as a way to exploit economically and effectively manage natural resources, particularly non-renewable resources; step by step to implement environmentally-friendly lifestyle and SCP; to gradually carry out green growth and low-carbon economic development.

For implementation of SCP, the strategy provides directions of sustainable production as to intensify mass application of cleaner production for resource efficiency and to reduce emissions and pollution. With regards to sustainable consumption, the strategy includes developing a civilized, harmonious and environmentally-friendly consumption culture; to implement eco-label and green shopping; to develop an eco-product market and community-based initiatives for SCP; to apply policies to correct unreasonable consumption behavior.

National Strategy on Environmental Protection to 2020, vision to 2030 (Decision 1216/QD-TTg, dated 05/9/2012)

Objectives of the strategy are to fundamentally control and restrict increases in environmental pollution and continue improving the quality of the environment and

to create lower waste and low-carbon green economy by 2020.

Among others, SCP related strategic tasks include: (i) No new environmental pollution sources are allowed to emerge; (ii) The number of existing environmental pollution sources must be reduced; (iii) Environmental issues of industrial parks, river basins, craft villages, rural hygiene and sanitation must be primarily addressed; (iv) Chemical, radiation and nuclear safety must be secured and; (v) Percentage of urban areas, industrial parks and export-processing zones having central wastewater treatment systems installed, and meeting environmental requirements. A number of SCP-related targets of the strategy are presented in Table 2.1.

National Strategy on Climate Change (Decision 2139/QĐ-TTg, dated 05/12/2011)

Vietnam is one of the most seriously affected countries by climate change in the world. The strategy set objectives to adapt to impacts of climate change and cutting down greenhouse gas (GHG) emissions so as to achieve low-carbon economy and green growth. With regards to SCP, the defined tasks is to reduce GHG emissions through the following approaches: (i) To develop new and renewable energies including hydropower, wind energy, solar energy, tidal energy, geothermal energy, biofuel, and universal energy; (ii) To promote energy efficiency by restructuring the economy through narrowing energy-intensive industries and developing energy-efficient ones; to promote energy efficiency in all sectors; to popularize cleaner production; to develop means of public transport in urban areas while controlling the growth of individual means of transport; (iii) To change methods of agricultural cultivation, use water, fertilizers and cattle-feed properly, manage and treat wastes from husbandry activities; develop and use biogas as fuels, reduce and reject out-of-date energy-intensive agricultural machinery and; (iv) To promote waste minimization, reuse and recycling.

National Strategy on Green Growth (Decision 1393/QĐ-TTg dated 25/9/2012)

The Strategy on Green Growth has been issued with overall objective to promote green growth as a means to achieve a low carbon economy and to enrich natural capital. There are three areas for achieving this objectives, including: (i) Reduce the intensity of GHG emissions and promote the use of clean and renewable energy; (ii) Greening production: promoting “clean industrialization” via reviewing and adjusting existing sectoral master plans to ensure economic and efficient use of natural resources; encouraging the development of green industry and green agriculture; enhancing investment in natural capital and; (iii) Greening lifestyle and promoting sustainable consumption: implementing rapid and sustainable urbanization while maintaining the living in harmony with nature in rural areas and

establishing sustainable consumption behaviours within the context of global integration.

Strategy for Clean Technology Use to 2020, vision 2030 (Decision 2612/QD-TTg dated 30/12/2013)

In Vietnam most of technologies used in production industries are obsolete, resource- and energy-intensive, discharging wastes and causing pollution to environment. Recognizing this issue, Prime Minister has approved this Strategy with overall objective to use clean and environmentally friendly technologies, increasing energy and resource efficiency with low carbon in industries to promote green growth, mitigate climate change and improve community life. Specific objectives include: (i) To 2020, 100% new projects of focused industrial sectors (fertilizers, pesticides; steel; mineral exploitation and processing; thermal power; paper; cement and; sugar production) should comply with clean technology standard; 60-70% of existing industries should have developed roadmap of technology innovation; (ii) To 2030, all industries should apply standards for clean technologies.

To achieve these objectives, the Strategy set out five tasks to be implemented: (i) Develop standards for clean technologies, especially for those energy-intensive and polluting industries; (ii) Promote technology innovation towards clean technology; (iii) Research, transfer, apply, pilot clean technologies for focused industries (mentioned above) and further for other sectors such as chemical, metallurgy, construction materials, etc.; (iv) Complete policy and legislations system for clean technologies, phasing out obsolete technologies for focused industries and; (v) Propaganda and dissemination of clean technologies, standards, policies for clean technologies. Specifically, the Strategy determined three projects to be implemented by 2020: (i) Completing legislations, standards and roadmaps for clean technologies application; (ii) Support for clean technology in focused industries and; (iii) Innovation toward clean technologies.

National Energy Development Strategy to 2020, with 2050 vision (Decision 1855/QD-TTg dated 27/12/2007)

Vietnam is facing fast growth of energy consumption so the strategy overall objectives to assure national energy security, of which one very important target is to boost the development of new and renewable energies, bio-energy and nuclear power. Specifically, the proportion of new and renewable energies to reach 3% of the total amount of commercial primary energy by 2010; about 5% by 2020 and 11% by 2050.

Table 3.1 SCP targets in related strategies and plans

No	Objectives	Target to 2020	Documents
1	Percentage of newly established production and business units meeting environmental requirements	100%	NSEP
2	Percentage of established production and business units meeting environmental requirements	80%	NSGG
3	Percentage of existing production and business units causing environmental pollution	Reduced by 50% from the 2010 rate	NSEP
4	Level of production and use of non-biodegradable material-based bags and packing	Reduced by 30% from the 2010	NSEP
5	Percentage of industrial parks and clusters, and EPZs having central wastewater treatment facilities installed meeting environmental requirements	95%	NSEP
6	Rate of municipal solid waste collection	90%	SDSV, NSEP NSCC
7	Rate of municipal solid waste recycling	85%	NSISWM
8	Rate of industrial solid waste which is collected and processed meeting environmental requirements	90% non-hazardous; 70% hazardous	NSISWM NAPSCP
9	Average level of GHGs emissions reduced	Reduced by 10-20% from the 2010 (<i>Reduced by 1-2% per year by 2030 and 2050</i>)	NSGG
10	Percentage of production facilities application of cleaner production technologies	50%	NSGG, CPSI NAPSCP
11	Percentage of contribution rate of the green industry and waste recycling in GDP	42-45%	NAPSCP

[Note] NSEP: National Strategy for Environmental Protection; NSGG: National Strategy on Green Growth; NSISWM: National Strategy on Solid Waste Management; NAPSCP: National Action Plan for Production and Sustainable Consumption; SDSV: Sustainable Development Strategy for Vietnam in the period 2011 – 2020; NSCC: National Strategy on Climate Change; NSRE: National Strategy for Renewable Energy Development; CPSI: Cleaner Production Strategies in the Industry; NSED: National Strategy for Energy Development.

Strategic orientations are to enhance survey and planning of new and renewable energies sources; to encourage enterprises to apply new and renewable energy; to support investment in programs on survey and research into new and renewable energies, and trial production of new and renewable energy.

Strategy on Cleaner Production in Industry to 2020 (Decision 1419/QĐ-TTg dated 07/9/2009)

An overall objective of the strategy is to make cleaner production (CP) to be applied widely in industries thus increasing resource efficiency, reducing emission and minimizing pollution. Specific objectives have been defined as: (i) Industries are

aware of benefits from CP; (ii) Industries apply CP in practice and achieve resources and energy efficiency; (iii) Increase number of CP staffs in Department of Industry and Trade (DOIT) in provinces.

To achieve these objectives, the strategy set out the following tasks: (i) To increase the awareness on CP in industries at different levels, sectors, localities and communities; (ii) To complete the mechanism, policies and legal system to promote CP implementation in industries; (iii) To enhance capability of management agencies, consultancy organizations and industries in CP application and; (iv) To develop the network of CP supporting agencies. The strategy has also defined five projects to be implemented as in table 3.2.

Table 3.2 List of projects for cleaner production implementation strategy

No	Projects	Time frame	Implementing agency
1	To enhance cleaner production awareness and cleaner production capability in industrial sector	2010 – 2020	MOIT in cooperation with MONRE, MIC and other ministries
2	To develop and operate the database and the web-page on cleaner production in industry	2009 – 2020	MOIT in cooperation with MONRE and other ministries
3	To support techniques on cleaner production in industrial producers	2009 – 2020	MOIT in cooperation with MONRE and other ministries
4	To complete the network of organizations supporting cleaner production in industries	2009 – 2015	MOIT in cooperation with Provinces and cities
5	To complete financial mechanisms and policies to promote cleaner production in industries	2009 – 2012	MOF in cooperation with MOIT and other ministries

Source: Decision no. 1419/QĐ-TTg on Strategy on Cleaner Production in Industry (2009).

[Note] MOIT: Ministry of Industry and Trade; MONRE: Ministry of Natural Resources and Environment; MIC: Ministry of Information and Communication, MOF: Ministry of Finance.

National Action Program on Sustainable Consumption and Production (Decision 76/QĐ-TTg dated 11/01/2016)

By adopting this Action Program on SCP, the government recognized the importance of SCP in promoting fast and efficient economic development; contributing to environmental protection, poverty reduction and restructure of the economy. It has been identified that SCP must be applied in all stages of product lifecycle; encouraging technological innovation, improving equipment and management system, and changing consumer behavior during purchasing, using and disposing of products.

Overall program objectives are to gradually change production and consumption patterns toward improving the resources and energy efficiency; reduce, reuse and

recycle waste at all the stages of product life cycle. Specific objectives include: (i) Improving policy and mechanism to implement SCP; (ii) Reducing waste in distribution activities; (iii) Gradually increasing the percentage of sustainable products in the total key export products volume; (iv) Providing sufficient information to consumers about sustainable products, and sustainable production and consumption practices; (v) increasing percentages of sustainable products in the public purchasing; (vi) improving legal framework and guidance about implementation of sustainable public procurement (Table 2.1).

There are six groups of tasks to be implanted as following: (i) Develop and improve legal framework and policies to implement SCP; (ii) Promote production and economic restructure toward sustainability; (iii) Develop greening distribution system and supply chain of sustainable products; (iv) Improve market access and promote key export products towards sustainability; (v) Change consumption behavior towards sustainability and boost sustainable lifestyles and; (vi) Implement waste reduce, recycle and reuse activities.

Furthermore, the Action Program has set out nine projects to be implemented in 2016-2020 as in the Table 3.3.

Table 3.3 List of projects for SCP implementation by the Action Program (period 2015-2020)

No	Projects	Objectives	Implementing agency
1	Develop and improve legal framework and policies to implement SCP	- Create a legal framework to encourage the participation of individuals, organizations and enterprises to invest in and implement SCP activities	MOIT; MONRE in cooperation with MOF, MPI
2	Raise awareness and implementing capacity of SCP to all stakeholders	-Raise awareness and implementation capacity of community, officials, enterprises and related stakeholders about SCP	MONRE, MOET in cooperation with MOF, MPI, MIC, provinces, cities
3	Ecological Innovation	- Apply innovation at all stages of product life cycle in order to improve resources and energy efficiency, to increase competitive capacity of enterprises and to ensure environmental protection and sustainable development - Restructure industrial parks and industrial clusters toward ecological industry	MOIT in cooperation with MPI, MARD, MOC, MOT
4	Develop sustainable products production	-Promote the production and supply of sustainable products to meet sustainable consumption demand	MOIT in cooperation with MONRE, MOF, other ministries
5	Develop sustainable distribution systems	-Greening distribution system and develop sustainable products distribution channels	MOIT in cooperation with province, cities

No	Projects	Objectives	Implementing agency
6	Develop sustainable supply chain	-Ensure sustainable supply of products from farm to table and encourage enterprises in all stages of supply chain employing sustainable practices	MOIT and MARD in cooperation with other stakeholders
7	Promote sustainable exports and improve sustainable export competitiveness capacity to enterprises in key export products	-Improve competitive capacity of export enterprises and market access to participate to global sustainable supply chain for key sustainable export products of Vietnam - Restructure export sector towards more sustainability.	MOIT in cooperation with MARD, MOF, MONRE, MOST.
8	Green public procurement	-Increase proportion of sustainable products procurement in public procurement from state administrative authorities and enterprises in order to promote sustainable products consumption.	MOF in cooperation with MOIT, MPI, other ministries and provinces/cities.
9	Waste Reduce, Recycle and Reuse Program (3R)	Promote sustainable waste management	MONRE in cooperation with provinces, cities.

Source: Decision 76/QĐ-TTg on National Action Program on SCP, 2016.

[Note] MARD: Ministry of Agriculture and Rural Development; MOC: Ministry of Construction; MOET: Ministry of Education and Training; MOF: Ministry of Finance; MOIT: Ministry of Industry and Trade; MONRE: Ministry of Natural Resources and Environment; MOST: Ministry of Science and Technology; MOT: Ministry of Transport; MIC: Ministry of Information and Communication, MPI: Ministry of Planning and Investment.

3.2 Legislations

Law on Environmental Protection (Law No 55/2014/QH13)

The Law on Environmental Protection (LEP) has been issued in 1993, revised in 2005 and 2014. The LEP has addressed all issues related to environmental protection including pollution prevention and control, remedy of degraded area and conservation of biodiversity. The LEP regulated that environmental protection is responsibility and obligation for all agencies, organizations, households and individuals.

With regards to SCP, the LEP emphasizes that environmental protection must be performed on the basis of resources efficiency and waste minimization. The state policy is to ensure resources efficiency, develop green and renewable energy; strengthen waste reduce, reuse and recycle; promote application of technological advances with high and eco-friendly technologies; develop eco-friendly enterprises and products; reduce GHG emission to promote green growth. Agencies, organizations, households or individuals shall manufacture and consume eco-friendly products and services.

The LEP has a special Chapter on environmental protection in production, trading and service which regulates environmental requirements in economic zones, industrial parks, craft villages, and industries. According to this Chapter, manufacturing and business establishments are obliged to treat all kind of wastes (including wastewater, gas emissions, solid waste and hazardous waste) to meet environmental standards before discharging into the environment. The law has also regulated waste management with regulation on waste separation and 3Rs (Reduce, Reuse and Recycle) in a special Chapter. Industries are obliged to apply 3Rs as well as collecting and treating of discarded products (extended producers responsibilities – EPR).

Law on Economical and Efficient Energy Use (Law No 50/2010/QH12)

The Law on Economical and Efficient Energy Use (LEEU) was adopted in 2010 and provided regulations on energy efficiency which cover all areas of the economy, specifically the industry, transportation, agriculture, service and households. The Law has defined measures to promote economical and efficient use of energy, including scientific and technological development as well as the development of education and consultancy services within the energy sector. According to the Law, industries are obliged to develop and implement annual plans on economical and efficient use of energy; to apply standards, technical regulations and norms on energy use; to advance production management processes; to use substitute energies with higher efficiency in production lines; to make the optimal use of lighting, ventilation and cooling systems; to operate, upgrade and maintain devices and equipment of production lines for preventing energy loss. Big energy-consuming industries must conduct energy audit on 3-year basis with purpose to review and improve the energy efficiency.

Law on Water Resources (Law No 17/2012/QH13)

The Law on Water Resources (LWR) was issued firstly in 1998 and revised in 2012, provides regulations on management, protection, exploitation and use of water resources and prevention, control, and treatment of harmful effects caused by water.

With regards to SCP, the LWR requires that water resources must be exploited and be used in an economical, safe and effective manner, ensuring integrated, multi-purpose, fair and reasonable use, with harmony of benefits and equality in interests and obligations among organizations and individuals. According to the LWR, organizations and individuals must use water for proper and rational purposes; replace and remove obsolete water-intensive equipment; improve water use efficiency in processes; apply advanced techniques and technologies in water exploitation and use; increase the use of recycled water and water reuse; store

rainwater; apply crop structures and seasons-suitable to water source conditions; improve farming technologies and techniques in agricultural production.

Law on Mineral (Law No 60/2010/QH12)

The Law on Minerals adopted in 2010, provides regulations for geological surveys and protection of unexploited minerals, mineral exploration and mining. The policy of rational and economical utilization of mineral has been addressed in the Law. Specifically, mineral strategy and plan must promote rational and economical utilization of minerals to meet present needs while taking into account scientific and technological development and mineral demand in the future. However, the Law does not provide detailed regulations of responsibilities on efficient use of minerals.

3.3 Economic Instruments

Natural Resources Tax

With purpose to promote resources efficiency as well as to create revenue, the Law on Natural Resources Tax (Law on Royalties - Law No 45/2009/QH12) has been adopted in 2009, with regulation on tax of following resources: metallic minerals; non-metallic minerals; crude oil; natural gas, coal gas; natural forest products other than animals; natural aquatic products, including marine animals and plants; natural water, including surface water and groundwater and natural swallow's nests. The tax payers are resources-exploiting companies. The tax is imposed based on the exploited resource quantity. The market selling prices of natural resources with tax rates are specified in Table 3.4.

Table3.4 Tax rate for different resources

No	Group of Natural Resource	Tax rate (%)
I	Metal Mineral	5-25
II	Non-metal mineral	3-30
III	Crude oil	6-40
IV	Natural gas, coal gas	1-30
V	Natural forest products	1-35
VI	Natural fishery products	1-10
VII	Natural water	3-10
VIII	Natural swallow's nests	10-20
IX	Other	1-20

Source: Law on Natural Resources Tax, Law No 45/2009/QH12 (2009).

Environmental Protection Tax

The Law on Environmental Protection Tax (Law 57/2010/QH12) has been adopted in 2010, effective from 2012, which regulates organizations, households and individuals producing or importing certain products are liable to pay environmental protection tax. The purpose is to raise public awareness of environmental protection, to reduce consumption of environmentally harmful products and to create revenues.

According to the Law, the following eight groups of products are taxable objects: (i) petrol, oil and grease, including: petrol, except ethanol; jet fuel; diesel oil; kerosene; fuel oil; lubricant; and grease; (ii) coal, including: lignite; anthracite coal; fat coal; and other coals; (iii) HCFC solution; (iv) taxable plastic bags; (v) herbicides restricted from use; (vi) termiticides restricted from use; (vii) forest product preservatives restricted from use; and (viii) storehouse disinfectants restricted from use.

Specific tax rates have been provided by the Law as follows:

- Petrol, oil and grease: 300-4,000 VND/litter.
- Coal: 10,000-50,000 VND/ton.
- HCFC solution: 1,000-5,000 VND/kg
- Taxable plastic bags: 30,000-50,000 VND/kg.
- Herbicides restricted from use: 500-2,000 VND/kg.
- Termiticides restricted from use: 1,000-3,000 VND/kg.
- Forest product preservatives restricted from use: 1,000-3,000 VND/kg
- Storehouse disinfectants restricted from use: 1,000-3,000 VND/kg.

Environmental Protection Fee on Wastewater

According to the Decree 25/2013/ND-CP dated 29/3/2013, the Environmental Protection Fee on Wastewater (EPFW) is to be levied on domestic/household and industrial wastewater and the fee-payers are households and industries respectively. For domestic wastewater, the fee rate should not exceed 10% of selling price of clean water supply, and total fee is based on total consumed clean water volume by the household.

With regards to industrial wastewater, the fee is calculated based on the quantity of discharged pollutants as follows:

(i) In case wastewater not containing heavy metals: $F = f + C$

of which: F means the payable charge; f means the fixed charge as prescribed by the Ministry of Finance (MOF) and the MONRE but not exceeding 2,500,000 VND per year; C means the altering charge, calculated based on total wastewater volume discharged, with concentration of two pollutants substances, chemical oxygen demand (COD) and total suspended solid (TSS). The fee rates are presented in Table 3.5.

(ii) For waste water containing heavy metals: $F = (f \times K) + C$

of which: K means coefficient to calculate charge under wastewater volume containing heavy metals of production and processing establishments according to the list of production fields and sectors that have waste water containing heavy metal promulgated by the MONRE. K was defined in Table 3.6.

Table 3.5 Fee rate of COD and TSS

No	Pollution substance calculated charge	The minimum level (dong/kg)	The maximum level (dong/kg)
1	Chemical oxygen demand (COD)	1,000	3,000
2	Total suspended solids (TSS)	1,200	3,200

Source: Decree 25/2013/ND-CP on environmental protection fee on wastewater (2013)

Table 3.6 Coefficient K for fee calculation of wastewater containing heavy metals

No	Waste water volume containing heavy metals (m ³ / day and night)	Coefficient K
1	Under 30 m ³	2
2	Between 30 m ³ and 100 m ³	6
3	Between over 100 m ³ and 150 m ³	9
4	Between over 150 m ³ and 200 m ³	12
5	Between over 200 m ³ and 250 m ³	15
6	Between over 250 m ³ and 300 m ³	18
7	Over 300 m ³	21

Source: Decree 25/2013/ND-CP on environmental protection fee on wastewater (2013)

Environmental Protection Fee on Mineral Exploitation

According to the Decree 12/2016/ND-CP dated 19/02/2016, the environmental protection fee on mineral exploitation has the purpose to reduce impacts to environment in the process of mineral exploitation. Mineral-exploiting companies have to pay fee, which is calculated based on the volume of waste generated, exploited mineral quantity and used mining technology as follows:

$$F = [(Q1 \times f1) + (Q2 \times f2)] \times K$$

Of which, F is fee amount (VND); Q1 is volume of waste (soils, stone etc.) generated (m³); Q2 is exploited mineral quantity (ton or m³); f1 is fee rate for waste - 200 VND/m³; f2 is fee rate for mineral (VND/ton or VND/m³); K is mining technology factor (if open mining: K = 1.05; underground mining: K = 1). The fee rate f2 has been stipulated by the Decree and vary: (i) for metallic mineral: from 10.000-270.000 VND/ton (around 0.5-12USD/ton); for non-metallic minerals: 1,000-70,000 VND/ton or m³.

Deposit-Refund System in Mineral Exploitation

According to Decree 19/2015/ND-CP dated 14/2/2015, the deposit-refund system in mineral exploitation has the purpose to enforce mining companies to restore the environment at the mining sites after the ending of mining activities. Mining companies have to develop a program of environmental restoration with detailed budget estimation. After having appraised this program by environmental agency, mining company has to deposit the estimated amount of budget into the environmental protection fund. After finishing the mining and restoring activities and then being confirmed by environmental agency, the deposit amount will be refunded to the company.

Vietnam Environmental Protection Fund

Based on the Vietnam Environmental Protection Fund (VEPF)-Decision 78/2014/QĐ-TTg dated 26/12/2014, the VEPF was firstly established in 2005. It is a non-profit organization with the tasks to provide soft loan, sponsor, and interest-rate support for environmental protection programs, projects, activities, missions and climate change responses. The fund also receives the deposition for environmental rehabilitation in mineral exploitation and security deposit from organizations and individuals importing recyclable materials. The VEPF is chaired by the Ministry of Natural Resources and Environment (MONRE) Vice Minister and has the capital allocated by state budget, up to 1,000 billion VND (around 45 million USD) in 2017. Besides that, the fund receives additional capital that derives from fee of selling and transferring certified emission reductions (CERs) from CDM projects, sponsorship, supports, volunteer contributions, and trust investment of domestic and foreign authorizations.

Chapter 4. Sustainable Production by Enterprises

Business sector plays a significant role in reducing impacts on resource use and the environment. Many scholars examined the capability of a firm in eco-innovation (Brunner Meier and Cohen, 2003; Chen et al., 2006; Pujari 2006). Eco-innovation actions practiced by the enterprises enhance the development of green environment. Their actions are indispensable for promoting sustainable development worldwide (Sarkar et al., 2006). This chapter introduces sustainable production by enterprises in Vietnam in terms of implementation of Clean Production (CP) strategy, internationally supported projects and some public information activities.

4.1 Implementation of Cleaner Production Strategy

As described above, CP has been promoted by Vietnam Government through the Strategy on CP in industry in 2009 with detailed goals, targets and tasks to be performed. In 2015 a survey of 9,012 enterprises in different sectors (mining, food and beverage, light industries, chemical, construction materials, steel, and recycling) and 63 DOITs has been conducted by the Ministry of Industry and Trade (MOIT) and the results are presented in Table 3.1.

Table 4.1 CP implementation in Vietnam

Targets of the CP Strategy	Targets		Status 2010	Status 2015
	2010-2015	2016-2020		
Percentage of industries have knowledge on CP	50%	90%	28%	55%
Percentage of industries applied CP and reduced energy and material per products unit	25%	50%	11%	24%
Rate of energy and material reduction per products unit	5-8%	8-13%	diversified	Material, chemicals: 1-92%; Water: 1-99%; Coal: 2-98%; DO: 1-70%; Electricity: 1-68%; Biomass fuel: 3-61%; FO: 7-43%; Petrol: 5-34%; Gas: 3-30%
Percentage of big and medium enterprises to have CP unit		90%	-	-
Percentage of DOIT with capable full-time staffs on CP	70%	90%	18%	73%

Source: Vietnam Cleaner Production Centre – VNCPC

(2016) *Cleaner Production nationwide in Vietnam*; <http://www.sxsh.vn/vi-VN/Home/tongquansanxuatsachhon-14/2011/San-xuat-sach-hon-tren-toan-quoc-874.aspx> Note: DO: Diesel Oil; FO: Fuel Oil.

The results showed that percentage of industries which have knowledge on CP has been almost doubled from 2010 and reached to 55% in 2015. Among responded enterprises, 92% has understood that CP can bring both environmental and economic benefits, while 8% knows only environmental benefits. 32% of the responded that industries have applied CP and 24% of them confirms the benefit by reducing energy and materials per production unit. With regards to the percentages of reduction in energy and material consumption, it is very diversified from 0-99% in all areas; 34% of industries confirms that the CP application helps them to reduce at least 5% reduction of energy and material while for 66% there is less than 5% or no clear reduction. The survey also identifies that 73% of the DOITs has capable staffs on CP, of which 25% of DOITs has CP staffs who had been trained and involved in CP implementation (VNCPC, 2016).

4.2 Sustainable Production Projects with International Support

Through the years, Vietnam has received supports from international communities in environmental protection including SCP. The supports have been realized through various projects, implemented in different provinces/cities nationwide with purpose to strengthen capacity by raising awareness and knowledge for SCP. A big number of sustainable production projects have been implemented by the Vietnam Cleaner Production Center (VNCPC) as described below.

4.2.1 Promoting Eco/Sustainable Industrial Zones

Project *“Implementation of Eco-Industrial Park Initiatives for Sustainable Industrial Zones in Vietnam”* (2015-2017) is funded by United Nations Industrial Development Organization (UNIDO) and has objective to strengthen capacity on resource efficiency and cleaner production (RECP). Targeted enterprises come from three industrial parks including Khanh Phu (Ninh Binh province), Hoa Khanh (Da Nang) and Tra Noc 1 & 2 (Can Tho). 62 selected companies are receiving full RECP assessment and at least 45 of them achieved significant reduction of material and energy use. At least 200 company staffs are trained for RECP. Data on the existing material, water and energy losses are collected and evaluated for other companies within the three industrial zones that are not selected for full RECP assessment (VNCPC, 2015).

In another project, *“Overview of Development, Implementation and Management Experiences of Eco-industrial Parks in Vietnam”* supported by UNIDO, the VNCPC has conducted a review of national policies on development planning, implementation and management of eco-industrial parks (EIP) in Vietnam and practices at IP Thang

Long (TLIP - Hanoi) and IP Vietnam – Singapore (VSIP - Binh Duong). Besides making policy recommendations, the review also showed that both TLIP and VSIP are examples of sustainable IP with strong commitment on social and environmental responsibilities. The VSIP, for example, has received ISO 14001 \ Certification, Green Technology Award from Vietnam Association for Conservation of Nature and Environment (VACNE), OHSAS 18001 certification, and created the VSIP Charity Fund, and established the Vietnam Singapore Technical Institute (VSTS) to enhance the technical expertise for the Vietnamese workforce in the area (VNCPC, 2013).

4.2.2 SWITCH - Asia Program

The European Union made the issue of SCP as a priority in its regional cooperation strategy from 2007-2013. In 2008, the European Commission launched the SWITCH-Asia program to promote sustainable products, processes, services, and consumption patterns in Asia. As of 2015, a total of 86 grant-funded projects have been initiated in 16 Asian countries (SWITCH - Asia) (Jang et al., 2015). In Vietnam, there are several projects implemented under this program as described below.

The Sustainable Product Innovation Project (SPIN)

The SPIN project was implemented in the period 2010-2014 in three countries of Vietnam, Laos and Cambodia (Jang et al., 2015). Implementation agencies are Vietnam Cleaner Production Centre (VNCPC), UN Environment Programme (UNEP), Asian Institute of Technology in Vietnam (AITVN), Laos National Chamber of Commerce and Industry (LNCCI) and Cambodia Cleaner Production Office (CCPO).

Overall objective of the project is to promote potential innovation in the industry and increase social and environmental quality of the products produced in these three countries. Specifically, at least 500 enterprises in five industrial sectors (food processing, textile, footwear, handicraft and furniture) would develop and produce more sustainable and advanced products for the domestic, regional and European markets.

After four years of implementation, SPIN Toolkits have been used in five industry sectors, focusing on marketing and policy issues. Besides that, SPIN also includes three Toolkit versions with the final version *Do-It-Yourself* for free application for enterprises. With regards to capacity building, the project in coordination with AITVN has trained about 100 lecturers on innovation of sustainable products and managed Master and Ph.D exchange programmes. 500 companies of Vietnam, Laos and Cambodia with 2,000 products have been redesigned towards higher sustainability. As a result, SMEs know how to make sustainable products for the

domestic market and export. It is supposed that domestic demand for these products will increase through widespread propaganda.

In Vietnam, 170 enterprises have been supported for: (i) technology introduction and transfer; (ii) product innovation; (iii) strategic consultation; and (iv) training on CP application. Around 1,000 products have been developed by the end of 2013 and many of them have been realized (VNCPC, 2013).

Project “Establishing a Sustainable Pangasius (catfish) Supply Chain in Vietnam” (SUPA project)

Establishing a Sustainable Pangasius (catfish) Supply Chain in Vietnam (SUPA) project is implemented in 2013-2017 with overall objectives of catfish farming by 2020. Processing and exporting catfish in Vietnam will become environmentally, economically and socially sustainable. Specific objectives includes: (i) By the end of the project at least 70% of the targeted mid- to large-scaled catfish farming and processing SMEs, and 30% of feed producers and small independent production SMEs are actively engaged in RECP; (ii) At least 50% of targeted processing SMEs provide sustainable products compliant with Aquaculture Stewardship Council (ASC) standards¹ to the EU and other markets.

Since 2013, the project has established a training center in Can Tho University (CTU) and a 3-ha model farm for research, experiment and technology transfer. The purpose of building the model farm is to practice sustainable catfish farming with decreasing production costs, increasing economic benefits, and reducing environmental pollution, and then transferring to catfish farms. After conducting internal training for project’s staffs, the survey and RECP assessment have been implemented for 60 farms.

The project has also documented reports and leaflets on catfish market potential in Europe, its supply chain situation and perspectives in Vietnam for sharing information with farmers and enterprises. Besides that, consultations and trainings on sustainable certifications such as ASC, Global GAP and sustainable farming techniques have been conducted for interested enterprises.

During 2015-2016, the project started and completed operation of the model farm, developed advanced RECP options and transferred production by SMEs. RECP assessments of processing SMEs have also been conducted and 14 SMEs were

¹ The Aquaculture Stewardship Council (ASC) is an independent not-for-profit organisation founded in 2010 by WWF and IDH (Dutch Sustainable Trade Initiative). ASC aims to be the world's leading certification and labelling programme for responsibly farmed seafood. The ASC's primary role is to manage the global standards for responsible aquaculture, which were developed by the WWF Aquaculture Dialogues; <http://www.asc-aqua.org/index.cfm?act=tekst.item&iid=2&lng=1>.

selected for further technical support with staff training on RECP and in-depth consultation. Besides that VNCPC jointly with WWF Vietnam carried out quick assessment for total 50 farms of pangasius production and hatcheries. Until now 140 SMEs are engaged in the project with 5 billion VND and saved 28.5 % water use reduction, 28% waste water discharge reduction, 18.6% reduction of electricity use and 2000 tonnes of GHG reduction per year per SME (VNCPC, 2015).

4.3 Enhancing Sustainable Production through Enterprises Ranking/Reporting

Ranking Enterprises for Sustainable Development by the Vietnam Business Council for Sustainable Development (VBCSD)

In order to promote CP and environmental protection by enterprises, the Vietnam Chamber of Commerce and Industry (VCCI) has established the Vietnam Business Council for Sustainable Development (VBCSD). In April 2016, the VBCSD initiated assessment and ranking of enterprises for inducing enterprises' efforts toward sustainable development. A set with 4 criteria and 151 indicators have been developed, of which are 14 indicators in a general criterium and 137 indicators in three criteria on economic, social and environmental aspects.

In November 2016, the assessment results have been finalized and the list of top 100 enterprises for sustainable development has been published for the first time. There are famous enterprises that belong to the list such as Vinamilk, Bảo Việt, Thái Bình shoe company, Vingroup, SaigonTourist etc.(Anh, 2016). This ranking will help raise awareness and promote activities toward sustainable development, of which SCP plays a vital role. VBCSD's plan is to present the ranking annually from now on.

Reporting on Sustainable Development by Enterprises on Stock-Exchange

According to the Circular 155/2015/TT-BTC dated 06/10/2015 issued by the MOF, all the enterprises on stock-exchange must publish the Annual Report of their activities. In this report, besides business information, there should also be sustainable development activities such as environmental and social responsibilities. Specifically, companies have to report their resource use (water and energy) in compliance with environmental law and assess their environmental responsibilities (Box 3.1).

Although this is a new regulation, which became effective since 01/01/2016, many enterprises in Vietnam have developed their sustainable reports even before the issuing of the circular, such as Bảo Việt group (BVH), Vinamilk (VNM), Hau Giang Pharmaceutical company(DHG), Hoàng Anh Gia Lai Agriculture company (HNG), Việt Nam Beervargae company etc. Especially, Bao Viet Group sustainable report has been audited by the PricewaterhouseCoopers (PwC) Việt Nam (Hong, 2016).

Box 3.1. Environmental and Social Contents in the Annual Report of Enterprises on Stock-Exchange

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6. Report related impact of the Company on the environment and society

6.1. Management of raw materials:

- a) The total amount of raw materials used for the manufacture and packaging of the products as well as services of the organization during the year.
- b) The percentage of materials recycled to produce products and services of the organization.

6.2. Energy consumption:

- a) Energy consumption - directly and indirectly.
- b) Energy savings through initiatives for efficiently using energy.
- c) The report on energy saving initiatives (providing products and services to save energy or use renewable energy); report on the results of these initiatives.

6.3. Water consumption (water consumption of business activities in the year)

- a) Water supply and amount of water used.
- b) Percentage and total volume of water recycled and reused.

6.4. Compliance with the law on environmental protection:

- a) Number of times the company is fined for failing to comply with laws and regulations on environment.
- b) The total amount to be fined for failing to comply with laws and regulations on the environment.

6.5. Policies related to employees

- a) A number of employees and average wages of workers.
- b) Labor policies to ensure health, safety and welfare of workers.
- c) Training employees
 - The average number of training hours per year, according to the staffs and classified staffs.
 - The skills development and continuous learning programs to support workers employment and career development.

6.6. Report on responsibility for local community.

The community investments and other community development activities, including financial assistance to community service.

6.7. Green capital market activities under the guidance of the SSC.

Note: As for Section 6 of Part II of this Appendix, the company may set up a separate Sustainability Development Report, in which the items 6.1, 6.2 and 6.3 are not mandatory for companies operating in sector of finance, banking, securities and insurance.

Assessment by the Company

6. Assessment Report related to environmental and social responsibility of company

- a. Review concerning the environmental indicators (water consumption, energy, emissions etc.).
- b. Review concerning the problems of workers
- c. Review concerning corporate responsibility towards the local community

Source: MOF, Circular 155/2015/TT-BTC dated 06/10/2015

Chapter 5. Sustainable Consumption by Consumers

5.1 Eco-labelling and Market

Vietnam Green Label

The Vietnam Green Label was established in 2009 by the MONRE Ministers Decision 253/QD-BTNMT dated 05/03/2009, with the purpose to enhance sustainable use of natural resources and environmental protection by encouraging SCP. The targets are that the program will be applied nationwide from 2011 and 10% of export products and 50% of domestic products will be green-labeled by 2020.

Until 2015, criteria/standards for green labeling of nine groups of products have been developed, specifically: packaging; detergents; lighting; ink; battery; coating paints; office equipment and construction materials. However, the number of labeled products are still limited, until 2015 there are only four groups of products that have been recognized and certified as green, including: (i) fluorescent lamps (Dien Quang company); (ii) coating paints (Jotun company); (iii) printers (Fuji Xerox company); and (iv) washing detergent (Procter & Gamble company).

The reasons for this are the limited budget for program implementation, no specific incentive mechanisms, low interests and awareness as well as low capacity of enterprises (Ha, 2016).

Energy Efficiency Labeling

Energy efficiency labeling started firstly since 2006 by voluntary enterprises and after that it became compulsory since 2013 according to the Decision 51/2011/QD-TTg. Until 2014, MOIT has granted energy efficiency labels to 6,125 types of products including 13 types of equipment, 473 types of TV, 749 types of lighting products, 1,585 types of fans, 863 types of air conditioning, etc. (Linh H. and H. Yen, 2016).

Besides, from 2015, products have to comply with the minimum energy performance standards (MEPS) requirements following the Decision 78/2013/QD-TTg. According to this, those products which have higher energy consumption than the MEPS have to be phased out from production and distribution.

The program has raised awareness by people for energy efficiency, for example most of households have changed incandescent lamps into energy saving lamps, such as compact florescent lamps (CFL) and LED. According to Huyen *et al.* (2015) total

incandescent lamps in Vietnam are about 33.45 million bulbs in 2015, while there were 34.5 million bulbs nationwide with average 2.3 bulbs/household in 2012. The number of incandescent lamps is reduced by 1.05 million bulbs from 2012 to 2015. At the same time, the number of CFL has increased from 3.67 bulbs/household to 4.3 bulbs/household and the LED increased from 1.15 bulbs/household to 2.17 bulbs/household during three years (Huyen and Thong, 2015).

Public Green Procurement

At present, the only green procurement policy in Vietnam is for energy efficient products, regulated by the Decision 68/2011/QĐ-TTg dated 12/12/2011. According to this, all state agencies will have to procure energy efficiency labeled products for electrical equipment. Target equipment includes lamps, air-conditioners, printers, fan, photocopy machines, TV and so on.

5.2 Consumption Pattern Change

Consumption Change to Organic/Clean/Safe Food

Vietnam is now seriously facing food safety issue as the number of cancer and other related diseases have increased quickly recently. Since April 2016, the Government has initiated the campaign “say no to dirty food”, with broadcast programs twice a day on national TV. The program informs those “dirty/contaminated” or “causing pollution” foods and enhance production of organic foods.

With improved income and through this campaign, there is increasing number of households especially in cities, interested in consuming organic foods, and promoting sustainable organic farming practices. According to the Organic Company in Da Lat, which runs a grocery shop in Ho Chi Minh city, organic food consumption has increased 30% annually despite of the higher price. Another company, *Organica*, has just started operating the 3rd grocery shop in Ho Chi Minh City and it will invest in its farms for product diversification, price reduction and collaboration with others to expand the production scale. Besides that, the company also is planning to get its products labeled by international organizations in order to get the customers’ trust (Huy and Uyen, 2016).

Promoting Public Transport and Cleaner Fuel

With fast population growth, rapid industrialization and urbanization, Vietnam is facing air pollution, traffic jams and many problems in urban areas. One of the reasons is fast growth of private vehicles including motorbikes and cars. Recognizing this problem, the government has developed strategies/plans to promote public transport in Hanoi and Ho Chi Minh City.

According to Hanoi Transportation Master Plan to 2030, Vision to 2050 approved by the Decision 519/QD-TTg dated 31/03/2016, the public transport will cover 30-35% of total demand in 2020, 50-55% in 2030 and 65-70% after 2030 in the inner part of the city (Table 5.1). To achieve these targets, the city will construct: (i) 8 inner city tram/underground lines with total distance of about 319km; (ii) 3 monorail lines with total length of 44 km to support tram lines; and (iii) 8 bus rapid transit (BRT) lines with total length of 185km.

Table 5.1 Targets for public transportation in Hanoi

	Period	Tram/underground/ monorail	Bus	Total
Inner city of Hanoi	2020	10 – 15%	20%	30 – 35%
	2030	25 – 30%	25%	50 – 55%
	After 2030	35 – 40%	30%	65 – 70%
Outer Hanoi	2020		15%	15%
	2030	15%	25%	40%
	After 2030	20%	30%	50%

Source: Hanoi Transportation Master Plan to 2030, vision to 2050 (Decision 519/QD-TTg dated 31/03/2016)

For Ho Chi Minh City, the transportation master plan to 2020 has been revised by the Decision 568/QD-TTg dated 8/4/2013. According to this revision, the city will develop public and mass transportation means such as BRT, trams etc. The targets are the public transport to meet 20% - 25% demand by 2020; 35-45% by 2030 and 50-60% after 2030. In achieving these targets, the city will construct: (i) 8 trams/underground/monorail lines with total length of 173km; (ii) 3 monorail lines with total length of 57 km and; (iii) 6 BRT lines with total length of 95km.

At the time being projects started construction in both Hanoi and Ho Chi Minh City such as sky trains, tram and underground trains. Till February 2017, the first sky train line will complete its construction and the first BRT line will start operation in Hanoi while underground train lines are under construction in Ho Chi Minh City.

There are also initiatives for enhancing cleaner fuels in public transport. In Ho Chi

Minh City a number of buses have been replaced with those, which are operated by CNG gas. In March 2016, SAMCO company has delivered 23 CNG-drive buses to the transportation cooperative 19/5 and the buses increased to 53 in total (PVGas, 2016).

Green building

Vietnam has recognized the importance of green buildings in sustainable development and there have been some changes in this consumption pattern. Until 2015, there are five green building certification systems operating in Vietnam including: (i) Green building tool developed by Vietnam Construction Association; (ii) EDGE – system for assessment of resource efficiency in building by the International Finance Corporation (IFC); (iii) LOTUS – by the Vietnam Green Building Council; (iv) LEED – by the American Green Building Council and; (v) Green Mark – by the Singaporean Green Building Association.

Vietnam Green Building Council (VGBC) was established in 2007 as a member of the World GBC and has been recognized by the Ministry of Construction since 2009. The Council has developed the system of green building assessment for Vietnam including: (i) LOTUS tool for non-residential building; (ii) LOTUS tool for residential building and; (iii) LOTUS tool for building in use. Until 2015, there are 40 buildings that have been certified by the five assessment systems and 20 buildings are still under evaluation (Sayyed and Diep, 2015).

5.3 Sustainable Consumption Activities by NGOs

Promoting usage of environmentally biodegradable bags to replace nylon bags

There are lots of initiatives at community level in provinces/cities nationwide to promote shifting away from using nylon bags. In 9/2013, after eight months of piloting, the super-market chain Big C has introduced the self-degradable bags for customers to replace nylon bags in the whole system in Vietnam. Through the years, Big C has also appealed its customers to limit to use nylon bags but to reuse cotton bags for many times. The self-degradable bags have been certified by the MONRE in 11/2012 and will be fully degraded in five years after disposal (Hung L., 2013). This activity of phasing out nylon bags in supermarkets has also been implemented by other big super-market chains such as Metro Cash and Carry, Lotte Mart etc. (Tran P., 2013).

In 2009, Cu Lao Cham, an island located offshore of Quang Nam province in Central Vietnam has implemented “no nylon bag” campaign. It was initiated by the Tan Hiep Commune people committee by raising awareness, promoting replacement measures, and appealing people to use bags responsibly to environment and voluntarily not to use nylon bags in the island. After three years of implementation, assessment in 2012 has shown that there is a significant reduction of nylon bags usage. Besides that, this image has helped the island to attract tourism, the number of tourists increased to 106,000 people in 2012 compared to 32,000/year before 2009 (Duong and Trinh, 2013).

There have been recorded similar activities on reducing or phasing out usage of nylon bags in different communities. In Hoi An City, this activity has been initiated by the Ha Trung cluster, Cam Nam ward. All households, restaurants and shops in this cluster have signed commitment and agreement for not using nylon bags (Hoi An TV and Radio, 2016). In Hai Phong City, the Woman Union of Hong Bang District has initiated campaign of not using nylon bags since 2011. The Union appealed women to adopt commitment and agreement for not using nylon bags when doing daily shopping (Chau, 2014). Similar initiative has been implemented in Tan Binh district, Ho Chi Minh City (Hoi An TV and Radio, 2013).

Green Consumption Campaign

Green consumption campaign has been promoted by the Ho Chi Minh City with participation of Sai Gon Liberation Newspaper, Department of Industry and Trade (DOIT) and Association of Trading Cooperatives (Saigon Coopmart). The campaign focuses on appealing people to buy green products or products which are produced by companies with good environmental performance. The campaign is implemented in June annually since 2009. In 2015, the Coopmart organized “green consumption month 2015”, which includes following activities: (i) Provide more than 50% discounts to more than 2,500 products of good-environment-performance enterprises; (ii) Provide free environmental bags to frequent customers; (iii) Green nutrient program with 20% discounts for food products and; (iv) green home appliances program with 30-50% discounts for kitchen and electrical appliances (Thanh, 2015).

Energy Efficiency and GHG reduction

Earth Hour is a global campaign on energy efficiency and promotes GHG reduction. The campaign appeals for turning off the electricity light in 1 hour. Vietnam first

joined this campaign in 2009 with six cities participating including Hanoi, Ho Chi Minh City, Hue, Hoi An, Nha Trang and Can Tho, engaging thousands of individuals, organizations and institutions. The campaign is led by the WWF and MOIT with an event attracted over 3,000 people including the Leader of Hanoi City, Minister of MOIT and a Deputy Prime Minister. In 2016, many activities took place during March in every province and city within the country especially in Hanoi, Da Nang, Can Tho and Ho Chi Minh City. The message “Saving energy in response to climate change” was communicated and transmitted to the young community in various forms, such as cycling fans, parades, handouts of flyers, posters and advocating for commitment.

Other projects/initiatives

The *GetGreen Vietnam* is a project under SWITCH-Asia program funded by the EU in the period 2012-2015, implemented in 6 provinces/cities including Hanoi, Ho Chi Minh, Quang Ninh, Da Nang, Nha Trang and Can Tho. The objective is to promote sustainable consumption through establishing hundreds of clubs and a network of 1,000 Change Agents to disseminate sustainable lifestyle in the community. Till 2015, 1099 Change Agents from 52 consumers groups have been trained on consumption of electricity, water, paper etc. and thus changing their behaviors. The project also conducted co-creation to link producers/service providers with consumers in order to create more sustainable products and services. 16 enterprises have operated for sustainability and/or creating sustainable livelihoods for underprivileged groups (VNCPC, 2015).

Besides above mentioned initiatives, there are many other activities to promote sustainable consumption, implemented by different groups/individuals. For examples, *C4E (Cycling for Environment)* is a group that cycle to raise people’s awareness on environmental protection (<https://c4ehcm.wordpress.com/2010/02/12/what-is-c4e/>). *Di chung (Go Together)* is an internet service that everyone can share a taxi with others, thus to save money and also reduce emission (www.dichungtaxi.com). *Song Xanh (Live Green)* is an enterprise which promotes a life that is sustainable, harmonizing with nature through providing training, networking solutions, green branding, sustainable consulting and marketing for green products/service (www.songxanh.vn).

Chapter 6. Opportunities and Challenges of SCP in Vietnam

Based on the contents of Chapter 2, 3 and 4, in this Chapter 5, the conditions of SCP in Vietnam are interpreted using three (Capacity, Supporting Environment and Activity) of the four categories of ASEI, except Performance. Vietnam is being transited from the basic stage based on capacity and supporting environment to advance stage of eco-innovation based on activities. This chapter includes comprehensive discussion of institutional framework and performances for SCP in the field of eco-innovation. Opportunities and challenges are presented for stabilizing the future development of SCP in Vietnam. Finally strategies for improving SCP in Vietnam are recommended.

6.1 Opportunities for Promoting SCP in Vietnam

In terms of Capacity for SCP, Vietnam has recognized the importance, and has been committed to SCP implementation and receiving international supports for SCP.

Eco-innovation Capacity means the current abilities and potentials each country has in innovation of product, process, marketing, structure and society (ASEIC, 2014: 43). ASEI measures the capacity of green technology R&D institutions, green technology possessed/acquired enterprises and awareness of sustainability management. Vietnam government has emphasized increasing awareness of sustainability management in the national strategies and action programs (Chapter 2). Strategy of Cleaner Production in Industry to 2020 requires a task to increase awareness on cleaner production in the industrial sector. National Action Program on Sustainable Consumption and Production initiated projects for raising awareness of SCP to all stakeholders.

Vietnam has committed to international community to implement the agenda to achieve SDGs to 2030. Vietnam will cut 8% GHG emission compared with business-as-usual scenario by 2030. To achieve this, SCP has been emphasized as a key measure. Local governments and citizens have conducted activities for raising awareness of sustainable consumption such as campaigns (Chapter 4). Vietnam has been receiving supports from international community to promote SCP. International organizations such as European Commission and UNIDO funded projects for strengthening capacity by raising awareness and knowledge for SCP at the local level (Chapter 3). Therefore SCP is regarded as an issue of bilateral and multilateral cooperation between Vietnam and other countries.

As Supporting Environment for SCP, Vietnam has developed an institutional framework on SCP with policy direction, regulations and action programs.

Supporting Environment plays a role as a catalyst for maximizing the capacity of eco-innovation. Supporting Environment is measured by Implementation of Environmental Regulation, Indicator 2.2 of ASEI. Vietnam government has several regulations regarding SCP with different types, e.g. Laws, Decrees and Decisions (Chapter 2 and Chapter 3). Since 1993 the regulations on sustainable use of natural resources including minerals and water have been issued and implemented (Table 6.1). Since 2007 the number of related regulations has increased. In particular several regulations impose taxes in using natural resources and for environmental protection. The regulations require a duty of responsible and sustainable use of natural resources by enterprises and householders. Therefore Vietnam has already established legal framework for supporting various activities for SCP. At the transition from the basic to the advanced stage of eco-innovation (Jo et al., 2015), it is important for Vietnam to put efforts in practicing to activate the innovation work based on the developed regulations for achieving SCP.

Table 6.1 List of regulations for SCP

Title of regulations	Issued year	Contents
Law on Environmental Protection (Law No 55/2014/QH13)	1993, revised in 2005, 2014	Resources efficiency; green and renewable energy; waste reduce, reuse and recycle; eco-friendly technologies and products; reduction of GHG emission
Law on Water Resources (Law No 17/2012/QH13)	1998, revised in 2012	Sustainable use of water resources
Decision 1855/QD-TTg	2007	National Energy Development Strategy to 2020, with 2050 vision
Decision 1419/QD-TTg	2009	Strategy on Cleaner Production in Industry to 2020
Law on Natural Resources Tax (Law on Royalties - Law No 45/2009/QH12)	2009	Tax imposed based on the exploited natural resource quantity
Decision 253/QD-BTNMT	2009	Vietnam Green Label
Law on Economical and Efficient Energy Use (Law No 50/2010/QH12)	2010	Energy efficiency
Law on Mineral (Law No 60/2010/QH12)	2010	Sustainable use of minerals
Law on Environmental Protection Tax (Law 57/2010/QH12)	2010	Environmental protection tax (petrol, oil, coal etc.)
Decision 2139/QD-TTg	2011	National Strategy on Climate Change
Decision 51/2011/QD-TTg	2011	Energy Efficiency Labeling
Decision 1393/QD-TTg	2012	National Strategy on Green Growth

Decision 1216/QD-TTg	2012	National Strategy on Environmental Protection to 2020, vision to 2030
Decree 25/2013/ND-CP	2013	Environmental Protection Fee on Wastewater
Decision 78/2013/QD-TTg	2013	Minimum energy performance standards
Decision 78/2014/QD-TTg	2014	Vietnam Environmental Protection Fund
Decree 19/2015/ND-CP	2015	Deposit-Refund System in Mineral Exploitation
Decision 76/QD-TTg	2016	National Action Program on Sustainable Consumption and Production
Decree 12/2016/ND-CP	2016	Environmental Protection Fee on Mineral Exploitation

A number of Activities for SCP have been implemented in different areas from production to consumption.

Eco-innovation Activity means the actual action of corporates for advancing eco-innovation (ASEIC, 2014: 50) and is measured focusing on corporates with green technology, environmental management certifications and green patents through ASEI. Through the SPIN project within the SWITCH-Asia Program, 170 enterprises developed 1,000 innovative products by 2013 (Chapter 3). Vietnam introduced environmental labels such as Vietnam Green Label and Energy Efficiency Label and environmental certification such as LOTUS (Chapter 4). The labels and certification contribute to building green markets and sustainable consumption in Vietnam. Central and local governments have initiated plans and campaigns for sustainable consumption and production including organic foods, cleaner fuels in public transportation and green building. Private actors including NGOs executed green consumption campaigns such as use of environmental bags, cycling fans for building a sustainable life style.

6.2 Challenges for SCP in Vietnam

Population growth and unsustainable development paradigm is a big challenge for Vietnam in realizing the SCP.

Vietnam ranks 14th position of most populated nations in the world with 96 million inhabitants in 2016. The population is increasing and forecasted to reach 100 million by 2020. With economic growth, the middle-class population will continue to grow and will reach more than 50% in 2035 (Figure 6.1). Increased population requires the higher demand for resources. Reduced poverty and improved income will lead to a lifestyle with higher material consumption, which is still unsustainable.

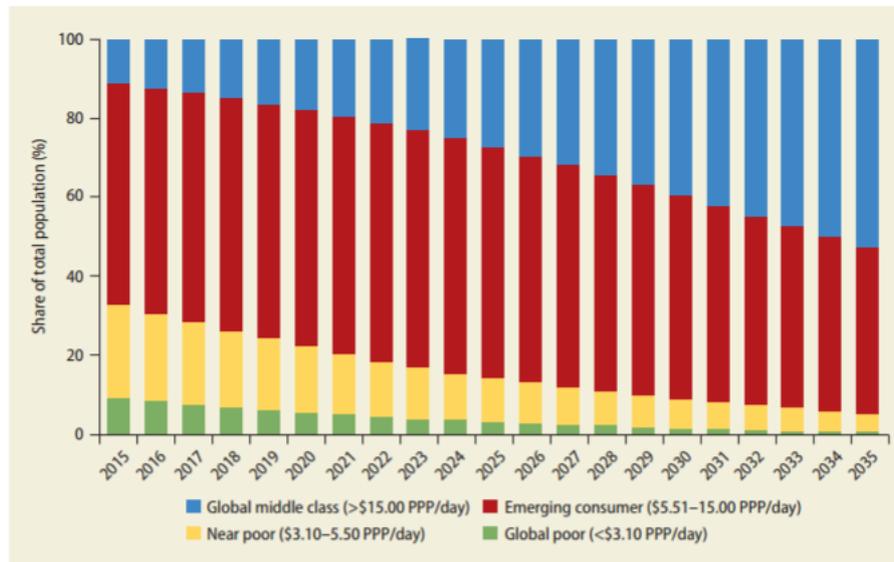


Figure 6.1 By 2035, more than half of Vietnamese will have entered global middle class

Source: World Bank and MPI, Vietnam 2035 Report, 2016

Vietnam achieved remarkable economic growth in the past 30 years. However, economic growth paradigm has been unsustainable, which is mainly based on foreign direct investment (FDI) capital, low labor cost and exploitation of natural resources. In addition, rapid urbanization with inadequate infrastructure has led to environmental pollution and decrease of environmental quality.

Although having established the institutional framework for SCP in Vietnam is incomplete: there are still limitations of implementing legislations and economic instruments are not efficient.

Vietnam has recognized importance of SCP and developed a number of guidelines and policy orientations for SCP, however, there are still limitations of implementing legislations. The concept, principle and contents of SCP have been highlighted in a number of national strategies and programs. Especially, the National Action Program on SCP has been issued with nine projects to be implemented. However, there are still lacking legal regulations on responsibilities of organizations and individuals in implementation of SCP. For example, there are no specific regulations for measures and responsibilities to promote efficiency in mineral/material use in production process. The policy on sustainable production has been emphasized, but sustainable consumption policy has not been addressed adequately. There are a number of legal documents related to enhancing sustainable production and responsibilities of organizations/industries. However, regulations on responsibilities of citizen, organizations for sustainable consumption are not in place, such as public

transport, reducing packaging waste, saving energy and so on. Regulations on sustainable procurement are yet to be developed; Vietnamese policy makers have not paid adequate attention to sustainable public procurement, while other Asian countries such as Malaysia, China, Thailand, Japan and Republic of Korea initiated green public procurement system (Jang et al., 2015).

Several economic instruments have been introduced, however, their effectiveness is still not as high as required. Although taxes, fees, deposit-refund and environment protection fund have been established, environmental pollution and degradation have still been increasing in Vietnam. One of the key reasons is that the law enforcement is not efficient with many violations by industries. The fee and tax rate in economic instruments are still lower than the pollution treatment cost. Companies still prefer to pay fees than to invest in treatment system for reducing pollution.

Performance of SCP in Vietnam is still weak and it faces many constraints in production, distribution, consumption and disposal processes.

In Vietnam, the SCP has not yet been addressed by a comprehensive Life Cycle Approach (LCA). SCP activities have been implemented mainly in the production section while there are not much attention on products distribution, consumption and disposal. Moreover, in the production section, there still lacks coordination/cooperation/ networking between enterprises to promote reduction, reuse and recycle of wastes.

SCP has been recognized by government but is still limited by enterprises and communities, so the top-down approach is dominated. Most of enterprises in Vietnam are small and medium enterprises (SMEs), which still use obsolete production technologies. These enterprises lack of knowledge, financial and human resources to promote resource efficiency in their production processes. Consumers started to have interest in environment-friendly products and services. However, supply of environment-friendly products and services is still limited to mainly food and home appliances such as organic agricultural products and labeled energy-efficient electrical products. Besides that, market organization and product logistics/distribution have not been activated adequately; there have been poor distribution channels/models of environment- friendly products. Connection between sustainable production and sustainable supply is weak. Prices of environment-friendly products are still high and their information is not well disseminated to consumers.

Implementation of sustainable import/export is still limited. Efforts in restricting imports of obsolete, energy- and resource-intensive technologies/equipment and promoting environment-friendly technologies and products have not been sufficient.

In terms of final disposal after consumption process, implementation of waste reduce, reuse and recycle are still very limited. Waste reduction and reuse have not been promoted widely, most of solid waste are still landfilled in unhygienic dumping sites; recycling has been carried out mainly in craft villages causing environmental pollution.

6.3 Recommendations for SCP in Vietnam

Improving capacity for SCP

Vietnamese government paid attention to eco-innovation in their policies and strategies. At the current stage of Vietnam, the awareness of eco-innovation by the private sector including the society, market and consumers becomes the basis of actualizing eco-innovation. The Vietnam's score of Indicator 1.5 Awareness of Sustainable Management of ASEI has increased from 37.95 in 2014 to 60.31 in 2016 (Park et al., 2016: 265). This result indicates the positive trend of eco-innovation awareness in Vietnam. As well the Vietnam's scores of Indicator 1.2 Country's General Innovation Capacity of ASEI has increased from 32.43 in 2014 to 37.64 in 2016 (Park et al., 2016: 263). This result indicates indirect potentials of eco-innovation in Vietnam. Currently training workshops and campaigns are needed for increasing eco-innovation awareness to national policies related to eco-innovation as well as the eco-innovation practices for companies and consumers.

Besides promoting awareness, Vietnam has to continue improving and completing the institutional framework on SCP. Legal regulations should be strengthened with more specific focus on resource efficiency and sustainable consumption. Responsibilities of enterprises, organizations, households and individuals should be clearly regulated to promote SCP. Sustainable procurement policy shall be developed and the effectiveness of economic instruments should be improved.

Enforcing regulatory power of eco-innovation policy instruments

Vietnam established institutional framework for eco-innovation including legislations, taxes and incentives. The developed instruments faced limitation to achieve policy objectives due to unclarity of responsibility by actors and the

ineffective number of economic instruments. It is necessary to review the current policy instruments and to enforce regulatory power of them. The process of collecting opinions of stakeholders is required for enhancing the effectiveness of the institutional framework for eco-innovation.

Besides, the country should bring into play the nine projects, defined by the SCP Action Program (Prime Minister Decision 76/QD-TTg), which can help realization of SCP nationwide. Furthermore, the bottom-up approach shall be promoted in compliance with market economy principles: SCP initiatives shall be enhanced and realized by SMEs, NGOs and communities with promoted networking/collaboration between entities and communities.

Improving technology for SCP

For reducing impacts on the environment or achieving a more efficient and responsible use of resources, technology development is necessary. For improving technology for SCP, appropriate technology development approach can be developed, considering the pattern of consumption and production and environment of natural resource uses in Vietnam, e.g. introduction of low-cost polyethylene tube biodigesters on small scale farmers (An et al., 1997). Not only national budget but also international investments support Vietnam's eco-innovation. It can be helpful for Vietnam to come up with a way to accept and expand the eco-innovation technologies transferred by other countries.

In the years to come, it is very important for Vietnam to promote technological eco-innovation not only to improve its productivity and competitiveness but also to reduce environmental pollution and to realize the commitment of reducing GHG emission by 8% by 2030 (compared to BAU). Vietnam has issued the *Strategy for Clean Technology Use* with vision to 2030, and now it is the time to successfully implement the Strategy.

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