

Elaborating the International Discussion on Resource Efficiency (ENTIRE): Part I: Resource Efficiency Policies in Various Countries Annex Report

prepared for IFAD with funding from BMBF

prepared by

Uwe R. Fritsche

Scientific Director, IINAS

Ignacio Gavilan

Research Fellows, IINAS

Punjanit Leagnavar

IINAS Associate

Darmstadt, London, Paris, March 2013

Scientific Director:

Uwe R. Fritsche uf@iinas.org

Administrative Director:

Thomas Stetz ts@iinas.org

Office:

Heidelberger Str. 129 ½
D-64285 Darmstadt, Germany
ph +49 (6151) 850-6077
fax +49 (6151) 850-6080
info@iinas.org

Scientific Advisory Board:

Joseph Alcamo, Chief Scientist, UNEP
Suani Coelho, CENBIO (BR)
Teresa Pinto Correia, ICAAM (PT)
Maria Curt, UPM (ES)
Marina Fischer-Kowalski, IFF (AT)
Bundit Fungtammasan, JGSEE-KMUTT (TH)
Alan Hecht, EPA (US)
Eva Heiskanen, NCRC (FI)
Alois Heißenhuber, TU München (DE)
Edgar Hertwich, NTNU (NO)
Jorge Hilbert, INTA (AR)
Tetsunari Iada, ISEP (JP)
Thomas B. Johansson, Lund Univ. (SE)
Lev Nedorezov, INENKO RAS (RU)
Martina Schäfer, ZTG TU Berlin (DE)
Udo Simonis, WZB (DE)
Ralph Sims, Massey University (NZ)
Leena Srivastara, TERI (IN)
Helen Watson, UKZN (ZA)
Sir Robert Watson, Tyndall Centre (UK)

Bank Account:

Volksbank eG Darmstadt
IBAN DE54508900000055548609
BIC GENODEF1VBD

Company Register:

HRB 90827 District Court Darmstadt

VAT ID:

DE 282876833

www.iinas.org

Note on this Report

This report is an Annex to part I of the collaborative ENTIRE project of Clausthal University of Technology (CUT), the German Federal Institute for Geosciences (BGR) and the International Institute for Sustainability Analysis and Strategy (IINAS), commissioned by the German Federal Ministries for Research and Education (BMBF), Environment (BMU) and Economy (BMW).i).

All views expressed here are those of the authors.

Acknowledgments

The following resource persons from various governments and institutions helped contribute to this study:

Sylvain Chevassus, SCP Policy Officer, The Council of European Municipalities and Regions, France

Stefanos Fotiou, Senior Regional Coordinator on Resource Efficiency, UNEP

Janet Salem, Program Officer, SWITCH project, UNEP

Mapula Tshangela, Director for Sustainable Development & Green Economy at Department of Environmental Affairs, South Africa

Li Xia , Deputy Director / Senior Researcher, Division for Policy Research, China-ASEAN Environmental Cooperation Center, Ministry of Environmental Protection of China

Table of Content

List of Tables.....	iii
Acronyms.....	iv
Executive Summary.....	v
1 Introduction	1
2 Europe	2
2.1 France	2
2.2 Italy	11
2.3 Poland	17
3 Asia – Pacific.....	26
3.1 China	26
3.2 India	35
3.3 Indonesia	42
3.4 Thailand	50
3.5 Vietnam	56
4 Africa	63
4.1 South Africa	63
5 Latin America	70
5.1 Brazil	78
6 North America	87
6.1 Canada	87
6.2 United States	94
References and Sources	101
Annex A: Comparative chart on definitions and indicators for resource efficiency	109
Annex B: Comparative chart on resource efficiency policies by sector	110
Annex C: Poland resource efficiency indicators	111

List of Tables

Table 1	Focal Areas and Sectors for a Green Economy in France	4
Table 2	Italy Environmental Action Strategy for Sustainable Development Priority Action Areas	12
Table 3	Examples of actions under the National Reform Programme – linked with the ‘Resource Efficient Europe’ flagship initiative	18
Table 4	Indicators used in China’s Circular Economy Promotion Law.....	27
Table 5	Chinese Resource efficiency related indicators and respective sources.....	28
Table 6	Resource Efficiency Topics Mentioned in India’s 11th Five Year Plan	36
Table 7	Indonesia resource efficiency indicators and their sources	43
Table 8	Thailand resource efficiency indicators and sources.....	50
Table 9	Selected indicators within South Africa’s NSSD	65
Table 10	Environment Canada Sustainable Development Indicators (short list).....	88
Table 11	Examples of State Tax Incentives for Recycling Businesses.....	98

Acronyms

ABD	African Development Bank
BMBF	Bundesministerium für Bildung und Forschung (German Federal Ministry for Education and Research)
BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (German Federal Ministry for Environment, Nature Protection and Nuclear Safety)
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (German Federal Ministry for Economic Cooperation and Development)
DE	Domestic extraction
DMC	Domestic material consumption
DMI	Direct material input
GDP	Gross Domestic Product
EC	European Commission
EEA	European Environment Agency
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GIZ	Deutsche Gesellschaft für international Zusammenarbeit
IEA	International Energy Agency
IIED	International Institute for Environment and Development
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
ISO	International Standardization Organization
MDG	Millennium Development Goals
NRC	Natural Resources Canada
OECD	Organisation for Economic Co-operation and Development
PTB	Physical trade balance
REEEP	Renewable Energy & Energy Efficiency Partnership
REN21	Renewable Energy Policy Network for the 21st century
SEI	Stockholm Environment Institute)
SFM	Sustainable Forest Management
TERI	The Energy and Resources Institute
TMR	Total Material Requirement
UN	United Nations
UNCTAD	United Nation Conference on Trade and Development
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
WB	The World Bank
WTO	World Trade Organization

Executive Summary

This study aims to provide a scoping of resource efficiency policies and practices in various countries. It provides a stocktaking of policies in different sectors as well as the overall framework policies and indicators that guide policy implementation.

Some conclusions that can be drawn from this study are:

- Many countries have existing framework policies and national action plans that include resource efficiency concepts; however, few studies have been conducted on their effectiveness or implementation.
- Out of the countries scoped in this paper, none had a definition of “resource efficiency” but instead practiced resource efficiency under other umbrella terminologies such as sustainable consumption and production (SCP), green economy, or sustainable development.
- The most prevalent policy on resource efficiency is energy efficiency, as most countries have drafted national action plans and instruments to encourage energy conservation and efficiency.
- Many countries have indicators that can be used for measuring resource efficiency, although most of them do not correlate with an existing policy or target.

1 Introduction

This Annex report to Part I of the ENTIRE collaborative research project (sponsored by BMBF) presents results of the survey carried out by IINAS for selected countries on resource efficiency policies and instruments, and respective metrics.

The countries covered are:

Europe:

France, Italy, Poland

Asia:

China, India, Thailand, Vietnam

Africa:

South Africa

South America:

Brazil

North America:

Canada and the USA

The country results are presented in a common format, and summary tables provide respective overviews for each country.

2 Europe

2.1 France

2.1.1 The Overall Scope of the Resource Efficiency Policies within the Country

France's domestic material consumption level rests below the European Union average, with its share of total DMC equal to 11%. Trends indicate that the country is on a relatively stable resource efficiency path. For example, material productivity increased some 26% in the past decade; while material consumption per capita has remained relatively stable (Ministry of Ecology, Sustainable Development and Energy, France 2010). Progressive policies and frameworks towards resource efficiency have been outlined under umbrella concepts such as a green economy and sustainable consumption and production and embedded as such in national frameworks. Sector-wise, energy efficiency is promoted as the most important strategic goal in terms of resource efficiency, and other sectors such as agriculture and waste reduction have been also prioritized. Resource efficiency is seen as a means to support greater economic growth and innovation in the country.

2.1.2 Definition of RE (indicators/metrics)

In France the concept of resource efficiency is defined under agendas such as the green economy, sustainable development and sustainable consumption and production. This means that the definition of resource efficiency, itself, has yet to be precisely defined.

Metrics of resource efficiency

The institutional body that monitors consumption patterns and data in France is the Observation and Statistical Service (MEDDTL statistical service), who publishes notes on material consumption every year. These analyses include material flow indicators on total material requirement (TMR) and total material consumption (TMC). As well, the Ministry of Sustainable Development, Transport and Housing begun national-level activities aimed at macro-level economic assessments of material flow accounts. These calculations are based on methodological guidelines as defined in 2001 by Eurostat; and in 2008 by the OECD. The country has also been active in the field of indicator development. Each year France publishes 10 indicators of sustainable development, which describes how the country aims to confront its environmental and resource challenges.

To monitor the framework law Grenelle Environment (discussed in further detail below), the Ministry of Ecology, Sustainable Development and Energy (Ministère de l'Écologie, du Développement durable et de l'Énergie) has developed headline indicators for sustainable development including those related to resource efficiency as well as social and economic indicators. The Ministry has defined different challenges that are supported by indicators. Among those relevant to this study are:

- *Challenge: Sustainable Consumption and Production* – indicators used by the French government to confront this challenge are: material productivity, household and industrial waste, material recycling rates, municipal solid waste per capita, and utilized agricultural area for organic farming.
- *Challenge: Climate and Energy* – indicators used are: energy consumption per capita and energy intensity, emissions of greenhouse gas emissions by sector, energy consumption of residential and tertiary sectors
- *Challenge: Conservation and sustainable management of biodiversity and natural resources* – water pollution rates, fish catches over 2009 thresholds, quantity of pesticides used in agriculture

Monitoring reports of the indicators have been published and made available to the public. In the first report to the Parliament, in October 2011, the Inter-ministerial Committee for Sustainable Development reported current statistical data on the indicators, key agents involved, and targeted strategies to achieve goals laid out the in Grenelle law (Inter-ministerial Committee for Sustainable Development France, 2011).

2.1.3 Policies towards RE (goals, targets, integration, institutional settings)

Frameworks

France's overarching *Law that programmes the implementation of the Grenelle Environment* (Grenelle de l'Environment) (Law No. 2009-967 of 3 August 2009) is the umbrella framework policy for sustainable resource use. This framework law governs the management of resources, paving the way for sustainable resource use, for a ten-year period. Outlined in the framework are objectives to mainstream cross-cutting sector-based policies, specifically those dealing with energy/ energy efficiency, transportation, urban planning, biodiversity, water management, agriculture and waste management. The general objectives are (EEA 2011a):

- Ensuring a new model of sustainable development which respects the environment, and combines lowering of energy, water and natural resource consumption;
- Ensuring sustainable growth without compromising the needs of future generations.

This framework law is tied with the understanding that economic growth needs to be decoupled with natural resource use, and it is within this vein that the French government has defined and outlined 18 focal areas that will be strategic to achieving the country's green economy objectives (Table 1). Climate change is affirmed as the number one priority for the achievement of a green economy. Therefore, in the French strategic goals, the concept of a green economy encompasses not only natural resource consumption and resource efficiency, but also energy efficiency and GHG reductions in various sectors.

Table 1 Focal Areas and Sectors for a Green Economy in France

Sectors that need to be further developed in order to achieve GHG reductions
<ul style="list-style-type: none"> • Biomass energy • Biofuels (biodiesel/ bioethanol) • Hydropower • Wind power • Solar energy • Geothermal energy • Carbon capture and storage
Sectors that need to increase energy efficiency for climate mitigation
<ul style="list-style-type: none"> • Buildings • Green transport/ vehicles • Shipping/ logistics • Smart grids, energy storage/ batteries
Sectors targeted to achieve sustainable natural resource consumption and consumption of raw materials
<ul style="list-style-type: none"> • Recycling/ waste management • Chemicals • Biomass • Water management • Data collection technologies • Industry/ manufacturing

Source: Commissariat Général Au Développement Durable, March 2010

Complementing this national framework for sustainable resource use, is an approved National Strategy for Sustainable Development 2003-2008 (NSSD),

which sets out objectives for a green and lower resource economy which has quantifiable metrics and objectives in different areas/ sectors. This national strategy includes resource efficiency under the overarching umbrella of the green economy concept; likewise, it also includes social and human dimensions (EEA 2011a). The strategy states the justification for addressing sustainable consumption and production.

“Unsustainable patterns of production and consumption and the overexploitation of natural resources have an impact on the balance of ecosystems, biodiversity and human development. International competition and environmental problems imply that we have to search for solutions for a reduced utilization of used resources and also to make our production systems socially more responsible. Consumers also have a major role to play by demanding producers to provide comprehensive information describing the advantages and disadvantages of consumed goods and services.” (NSSD 2003).

Quantitative targets for resource efficiency and SCP, as supported by the Grenelle de l’Environment law, have been outlined across various sector-based policies. The national government has developed indicators in an effort to monitor and meet these targets. An annual monitoring and evaluation program will be put into place. These sector-specific targets are given below:

Quantitative targets for **buildings**:

- 38% reduction of energy consumption in existing buildings by 2020
- 400,000 homes refurbished per year from 2013
- 800,000 of the most energy intensive social housing units refurbished by 2020
- New buildings to be low energy (BBC) by 2012 and energy positive (BEPOS) by 2020
- Refurbishment of all state and public buildings by the end of 2012

Quantitative targets for **transport**:

- 20% reduction of GHGs in the transport sector by 2020
- 25% increase of share of non-road and non-air freight by 2012
- 10% of petrol and diesel consumption is biofuels by 2020
- 10% of the transport sector is from renewable energy
- Reduce average emissions of new vehicles to 95 g of CO₂/km by 2020
- Double the share of non-road freight going to and coming from ports by 2020

Quantitative targets for agriculture and forestry:

- 6% of the agricultural surface being farmed organically by 2012 and 20% by 2020
- 30% of farms are energy efficient farms by 2012
- 15% organic products in public restaurants in 2010 (BIO 2012)
- 20% of hospitals, schools, canteens etc. use organic products by 2012
- 50% of farms applying for environmental certification
- Reduce by half the use of phyto-pharmaceutical products and biocides within 10 years
- Reduce dependence on imported raw materials being used for making animal feed
- 100% of the purchases of wood by the state are from sustainable forests (eco-certified) by 2010

Quantitative targets for waste reduction:

- 7% reduction of household waste by 2014
- 35% of household waste and similar materials are recycled by 2012 and 45% by 2015
- 75% of household packaging is recycled by 2012
- 75% of industrial waste is recycled by 2012
- 15% reduction of waste incinerated and stored by 2012 (based on 2008)
- Disseminate local plans and programs for the prevention of waste
- Reduce the municipal solid waste generation with 5kg per year per inhabitant during 5 years

Quantitative targets for biomaterials:

- 50% reduction of paper use by 2012

The national institution that has the responsibility to support policies towards resource efficiency is namely the Ministry of Ecology, Energy, Sustainable Development and Sea (MEEDDM). This ministry, which serves to monitor and develop sustainable development frameworks, was created in 2007, and has integrated several administrations over the areas of energy, sea, mobility, land-use planning, and environment. Positioned within MEEDDM is the Commissariat general au développement durable, the directorate which specifically promotes sustainable development and resource efficiency policies. Its objectives are to work at the inter-ministerial level to inform decision makers, through research and analysis, on these topics.

As well under the direction of the MEEDDM, the Environment and Energy Management Agency (ADEME), serves as a public agency whose mission is to promote sustainable development. For resource efficiency policies aimed at supporting down-cycling of materials, ADEME's Board of Directors approved the

appointment of regional delegations of engineers in the field of waste management to implement the initiative. These delegations supported the down-cycling of products at the end of their life cycle by bridging household consumers to manufacturers and distributors (ADEME 2012). The agency works in with the private sector and serves to also provide advice to business in addressing resource efficiency.

Agriculture

The French government has a key objective to reduce consumption of non-environmentally friendly materials in agriculture. This goes hand in hand with policies that currently aim at developing the foundation for more sustainable agriculture. Two policies that concentrate on promoting the reduction of fertilizers and pesticides in agricultural production are: the Ecophyto Plan 2018 (2008-2018), and the Organic Agriculture Plan (2008-2012). The targets for Ecophyto are to reduce consumption by 50% within the ten year implementation time period. For the Organic Agriculture Plan it is to increase the overall area of organic farms by a factor of three (EEA 2011a).

Ecolabeling

The French government began its label for organic products in the mid-1980s. With this label, farmers, local producers, and artisans can obtain the certification if they prove that their components contain at least 95% of organic components. It follows the EU label regulations as well. The L'Agence Bio is the French organization that is responsible for implementing it.

Energy efficiency

ADEME is the agency tasked with promoting policies in energy efficiency. In 2004, France developed a Climate Plan (and has subsequently revised it in 2006 and 2009). This plan includes policies and actions that aim to reduce GHG emissions 21.8% compared to 2005 levels. One key component of the national plan is related to energy efficiency improvements.

The National Law (2005) No. 2005-781 (also known as the "POPE" law), sets targets for demand-side management, and aims to achieve an energy intensity reduction of -2%/year by 2015 and -2.5%/year by 2030 (Environment and Energy Management Agency 2008).

The National Energy Efficiency Action Plan (2008) was developed by the French national government and creates performance targets for various sectors, products and defines different energy savings programs. Demand-side management policies are emphasized (i.e. residential, transport, industry) and it also lays out practical implementation actions for meeting targets. It sets two targets for energy efficiency:

- Support an international objective of halving the world's greenhouse gas emissions by 2050, which means dividing the emissions of developed countries by 4 or 5;
- Reduce final energy intensity by 2% per year by 2015 (relationship between energy consumption and economic growth) and by 2.5% by 2030.

The country has proposed many policy instruments to reach energy efficiency goals such as regulatory instruments, fiscal and monetary incentives, awareness raising methods, and voluntary agreements with the private sector.

Minerals/Metals

The Strategic Metals Plan was laid out in 2010 in an effort to analyze the strategic metals that are necessary for the French economy and possible vulnerabilities the country might have if there is scarcity. The Committee for Strategic Metals was commissioned in 2011 to continue efforts in this field and monitor the needs of industry. One of the avenues that is being explored is the recycling of metals downstream into other products; the committee is also looking to increase the research in this field. Efforts have already been made to push this agenda with public-private partnerships with the private sector.

For example, in 2012, the French chemical company Rhodia announced its plans to recycle the rare earth minerals: neodymium, praseodymium, dysprosium and terbium.

These are strategic metals which are found in magnets but can also be recycled and used in different types of batteries (Waste Management World 2011).

Waste

The Grenelle Environment sets the priorities for the reduction of waste and increased recycling and recovery. The plan covers the following targets for the country:

- 7% reduction in the production of household and similar waste per capita over the next five years;
- i. 35% in 2012 and 45% in 2015 improved recycling rates for household waste and 75% for corporate waste and packaging;
- lower quantities leaving the incineration and storage after waste treatment

The plan outlines various interventions that help to meet the objectives. The first intervention is related information and awareness raising for citizens and communities. It also includes the introduction of incentive pricing for household

waste reduction. Another intervention is dedicated to recycling plans, expanding the extended producer responsibility, and developing regulation for categorizing recycled materials. The third intervention is the recovery of organic waste (which, in France, represents 50% of household waste). Other interventions are related to the amount of waste that is incinerated and initiatives at recycling construction materials.

2.1.4 Specific Instruments (if any) or Suggested Other Approaches

Awareness instruments

France has implemented a program for environmental labeling that intends to serve as greater awareness building concerning the environmental footprint of products. This is found in the Grenelle de l'Environnement article 228 of Law no. 2010-788. To this end, the environmental impacts of products, including information on the consumption of resources and value chains, will be given to consumers. The methodology for labeling has been developed through a multi-stakeholder approach, and includes sector-based guidelines by various products (food, textiles, houseware, etc.).

Economic instruments

France has developed economic incentives for end-users wishing to invest in energy efficiency activities. This structure is below, reflected in percent of total price to be covered with tax credits: (World Energy 2009).

- roof & wall thermal insulation (25%)
- double glazing (15%)
- condensing boilers (15%)
- solar & wind water heating (50%)
- heat pumps (50%)
- geothermal pumps (40%)
- VAT reduction on labor costs from 5,5%

Regulatory instruments

Some regulatory instruments exist particularly for standards to encourage energy efficiency in different products and buildings.

2.1.5 Key Contacts

Ministry of Ecology, Energy, Sustainable Development and Sea
Environment and Energy Management Agency

National Agency for Water and Aquatic Environments (ONEMA)

- Sylvain Chevassus Tel: 33 (0)1 40 81 83 65
Email: sylvain.chevassus@developpement-durable.gouv.fr
- Fabienne Allag-d'huisme Tel: +33 1 40 81 72 14
Email: Fabienne.Allag-dhuisme@developpement-durable.gouv.fr
- Fanny Lendi Ramirez Tel: +33 1 40 81 37 17
Email: Fanny.lendi-ramire@developpement-durable.gouv.fr

2.2 Italy

2.2.1 The overall scope of the resource efficiency policies within the country

At roughly 15 tons per capita, domestic material consumption (per capita) in Italy is well below the EU average of 27 tons. This can be equated to the dominant economic sectors of the country as the services industry is approximately 73.3% of the total GDP. The country has defined some framework policies that relate to resource efficiency, and has a dedicated statistical agency to defining indicators.

2.2.2 Definition of RE (indicators/metrics)

The definition of resource efficiency has not been defined; however, resource efficiency terminologies and concepts have been integrated with those for sustainable development, material flows, and decoupling. Decoupling goals were previously outlined in the Environmental Action Strategy for Sustainable Development; these goals are accompanied by indicators and metrics, including those related to partial decoupling (per capita units) and absolute decoupling (EEA 2011b). The Italian Government has previously defined short and medium term objectives to reduce total material requirement by 25% by 2010, 75% by 2030 and 90% by 2050.

The agency tasked with maintaining data and statistics on resource efficiency is the Italian Institute of Statistics (ISTAT). The agency has previously published research on material flows for the country and uses the indicators below to define the country's current situation. Although targets for each have not been explicit in legislation, it has outlined the following as national indicators:

- Domestic extraction (DE);
- Direct material input (DMI);
- Domestic material consumption (DMC);
- Physical trade balance (PTB); and,
- Total Material Requirement (TMR) (linked to Gross Domestic Product (GDP) as an indicator for dematerialization).

Separate indicators for the use of natural resources, with the overall goal of resourcing resource use, have also been proposed by the Italian government. These are, in addition to the aforementioned indicators (EEA 2011b):

- Material input per unit service (MIPS);
- % recovered waste and materials (urban waste, hazardous/ dangerous waste, etc.);
- % recovered energy from waste

- Percentage difference between withdrawal and use
- Consumption per GDP unit
- Consumption per capita
- Percentage of covered demands with waste water
- Total production, per capita production, production/ GDP unit
- Ratio of dangerous waste compared to total waste
- Separately collected fractions per capita

2.2.3 Policies towards RE (goals, targets, integration, institutional settings)

Frameworks

The driver for resource efficiency is the national framework, Environmental Action Strategy for Sustainable Development (EASSD). This piece of legislation was approved in 2002 through an inter-ministerial delegation/ committee called the Committee for Economic Planning (CIPE). It has listed specific objectives and themes for environmental protection, and resource efficiency falls within two themes - one related to sustainable valorization of nature, and exploitation of resources and waste generation (Table 2). Sustainable consumption and production were nested within these two broader themes. At time of writing it is currently undergoing its implementation phase (Committee for Economic Planning 2002).

Table 2 Italy Environmental Action Strategy for Sustainable Development Priority Action Areas

- Climate change and ozone
- Protection and sustainable valorization of the environment, including biodiversity
- Improved environmental quality in urban areas
- Exploitation of resources
- Waste generation/ waste management

Source: CIPE 2011

The Italian Ministry for the Environment, Land and Sea (IMELS) has also developed national frameworks for sustainable production. In 2008, working groups published a document which aimed to contribute to the national dialogue on sustainable use of natural resources and plans of action for the country. This document, the *Contribution for the drafting of a National Strategy for Sustainable Production and Consumption* presents an overall framework for

resource efficiency and SCP. It is currently undergoing a consultation process and will be linked to the European Council approved EU Strategy for Sustainable Development (IMELS 2008).

Energy efficiency

Energy efficiency is a strategic priority within the country, and national policies directed at reducing energy consumption and increasing energy efficiency within various sectors (e.g. buildings, household, transport, biofuels, appliances, lighting) have been approved. Out of all of the policies that can be attributed as resource efficiency policies, energy efficiency and the energy sector as a whole has been promoted as a number one priority. Some of the national policies and targets directed at energy efficiency are mentioned below:

- IMELS has drafted the Italian National Energy Efficiency Action Plan (2007), in an effort to demonstrate how the country aims to achieve the 9.6% target of energy savings in 2007; this was then re-drafted in 2010, in conjunction with the Ministry of Agriculture, Food and Forestry following EU Directive 2009/28/CE to achieve a 17% national target for renewables
- The Extraordinary Plan for Energy Saving and Efficiency (Italian Law No.99/2009) envisages key interventions including those related to effective governance to increase cooperation on energy efficiency, measures for promoting sustainable construction, and provisions for stimulating the supply of sustainable and efficient energy services
- The Italian Finance Act (2007), “Industria 2015”, which was developed by the Ministry of Economic Development, offers private sector financial support to companies integrating energy efficiency actions.

Public procurement

Resource efficiency actions and priorities are also positioned within framework policies for public procurement. The Italian government has stated that environmental considerations and the purchasing of sustainable materials shall be made a key objective in the procurement process. These ideas have been outlined in the Italian National Action Plan on Green Public Procurement, which has been conducted through an inter-ministerial and multi-stakeholder process. The Green Public Procurement Committee, the group delegated to implement the policy, is comprised of a working group and an advisory board with representation from various groups including private sector unions, trade and academia (IMELS 2008).

The sustainable public procurement process encourages the use of core environmental criteria and indicators during the bidding process. These criteria have been formally defined by the Italian Ministry of the Environment and serve to increase the amount of goods and purchases that meet a high environmental standard, including standards for resource efficiency. There are criteria that have been made for various products including: paper, construction, food, and energy efficiency. The ministry has developed a target of 30% of all public procurement to meet environmental performance criteria by 2010; this target will be based off the Euro equivalent of total public purchases/ total public purchases for each product category as an indicator. Institutionally, the monitoring of this progress will be undergone by the Italian National Institute for Environmental Protection and Research (ISPRA).

Waste

The Italian policy, Legislative Decree 152/2006, outlines targets for waste recovery and separately collected fractions (SCF). Statistics on recovery show that Italy was recovering 30.6%. Using this indicator, the government developed a future recovery target of 65% by 2012 (EEA 2011). Indicators that will be used as metrics to measure this progress include:

- SCF per capita;
- Number of single fractions from SCF;
- Amount of total material recovered;
- Amount of total material recovered per each single fraction; and,
- Mass concentration of waste sent to recovery.

In response to the EU2020 strategy, the country has implemented a Control System for Tracing Waste (SISTRI). This waste management system is linked to databases around the country and provides decision makers the latest information on the waste situation in order to make informed decisions. It is perceived as being a technologically progressive approach to waste management (EC DG ENV 2011).

Water

The water protection and conservation laws in Italy are grounded in the principles approved in the Consolidated Law of 1933, Law 319 of 1976, regarding water quality and use. The country has since developed several foundation laws that manage water bodies, such as the Law 183/89, which broadens the scope of water management to include the larger basin. Italy follows the EU Water Framework Directive which has an objective of achieving healthy water bodies by 2015. Institutionally, the Italian District Basin Authorities have authority for managing water resources. Italy has translated

this directive by implementing a water fee system to encourage water efficiency; currently, this is just applied to surface water (UNEPFI 2009).

2.2.4 Specific Instruments (if any) or suggested other approaches

Awareness instruments

Additional instruments include awareness raising instruments, such as the Label of the National Association of Biological Architecture for recycled materials in construction.

Economic instruments

Policy instruments aimed at promoting resource efficiency are generally related to economic instruments and awareness instruments. In terms of energy efficiency, two examples of economic instruments to encourage the efficient use of energy and the refurbishment towards more efficient consumption are:

- Italian Finance Act (2007), *Industria 2015* – this policy promotes resource efficiency through the provision of public tenders and co-financing for energy efficiency projects. These public incentives are approximately 200 million €.
- Budget Law (2007) – a policy that provides tax reduction for household and commercial markets for energy efficiency measures. Some of these reductions include those for construction in high efficiency buildings, and refurbishment of residential properties. This law was extended to 2010 and constituted a 55% tax reduction (of total amount of expenditures used for energy efficiency activities).
- A consumer tax on plastic bags.

The country has also implemented several instruments which are directly related to sustainability overall, these include: green certificates (tradable); consumer tax cuts for purchases of green vehicles, tax breaks for solar panel installation, and retrofitting of buildings that reduce SO₂ emissions (EC DG ENV 2011).

Regulatory instruments

The country also has introduced a white certificate scheme for energy efficiency savings in 2005. These set mandatory regulations on electricity distributors who implement energy efficiency projects. It defines that at minimum 50% of the energy savings must be achieved through energy savings of electricity and/or gas, and up to 50% through changes in fuel economy (EEA 2011b).

2.2.5 Key actors, contacts, and organizations

Italian Institute of Statistics

Committee for Economic Planning

Italian Ministry for the Environment, Land and Sea

Italian Ministry for Economic Development

Italian National Institute for Environmental Protection and Research

Regulatory Authority for Electricity and Gas

Italian National Agency for New Technologies, Energy and Sustainable Economic Development

2.3 Poland

2.3.1 The overall scope of the resource efficiency policies within the country

The sustainable management and protection of resources will be a pivotal challenge as Poland continues to grow economically. Currently the country is ranked as one of the most energy and material intensive economies in the European Union. Overall, the country has many existing frameworks and policies that although do not explicitly mention resource efficiency, are along the same lines. Many of these policies respond to EU Directives and on course to mainstreaming EU2020 strategy into framework policies. Priority areas and objectives for priority resources include (EEA 2011c):

- Nature and biodiversity – protection of biodiversity
- Forestry – supporting sustainable forestry practices
- Soil – protection for sustainable soil conservation
- Water resources – sustainable management and use (including consumption and efficiency)
- Geological resources – “rational management and use of mineral deposits”
- Energy resources and climate –energy savings and efficiency
- Waste – decoupling of waste generation from economic growth

2.3.2 Definition of RE (indicators/metrics)

Currently there is no definition of resource efficiency that has been outlined in a national framework or piece of legislation. That being said, the concepts of resource efficiency are integrated within the themes of sustainable natural resource management and sustainable growth.

The Central Statistical Office of Poland publishes indicators related to the environment and resources. Several of these indicators have been included in the ‘Report on the state of environment in Poland 2008’. Below is a list of several indicators that the office has outlined (Central Statistical Office Poland 2012)¹.

- Devastated and degraded land requiring reclamation and management (in thousand hectares);

¹ The rest of the indicators can be found in Annex A.

- Water withdrawal for needs of the national economy and population (hm³);
- Waste (excluding municipal waste) generated during the year (million t)
- Amount of waste recovered;
- Municipal waste collected (million t), and amount treated in incineration and composting plants;
- Consumption in households of water and electricity, including in rural areas;
- Forested area (million ha and % of total);
- Removals of timber (m³);
- Sea fish catch and fresh water fish catch (thousand t);

2.3.3 Policies towards RE (goals, targets, integration, institutional settings)

Frameworks

The Polish Government has recognized the importance of defining resource efficiency goals and targets, and has begun to delineate the country's key priorities. The Ministry of Economy, responding to the EU 2020 and resource efficiency flagship themes, has drafted a *National Reform Programme*.

This framework document includes targets related to the EU2020 strategy, with a description on how the national government is intending to meet the targets. The government has described the following actions to be done in the short-term (Table 3).

Table 3 Examples of actions under the National Reform Programme – linked with the 'Resource Efficient Europe' flagship initiative

Actions in the National Reform Program		Action to be delivered in 2011	
Type	Entity Responsible	Type	Entity Responsible
Actions in the area of adjustment to climate changes	Ministry of Environment	Analysis of the demand for raw materials in industrial development	Ministry of Economy
Actions for sustainable management of agricultural resources	Ministry of Agriculture and Rural Development	Act amending the act on keeping the Gminas clean and orderly and other acts	Ministry of Environment
Better efficiency in the use of natural	Ministry of Environment	Act on wastes	Ministry of Environment

Actions in the National Reform Program		Action to be delivered in 2011	
resources, in particular raw materials			
Water management system reform	Ministry of Environment	Preparation of the Preliminary Flood Risk Assessment as a preliminary study for the flood risk management plans	Ministry of Environment
Effective use of resources, including recycling of secondary raw materials, and energy recovery, including measures reducing material and energy consumption in the production processes	Ministry of Environment	Elaborating the assumptions for a systemic project to build regional cooperation networks for Corporate Social Responsibility (CSR)	Ministry of Economy

Source: Republic of Poland (2011)

In this framework document, resource efficiency will be accentuated in sections dealing with industry, innovation and infrastructure development. This is done, again, in conjunction with initiatives to streamline resource efficiency policies across various sectors and legislative authorities. These sector strategies include:

- Innovation and efficiency of the economy strategy
- Energy security and environment strategy
- Transport development strategy
- Sustainable development of rural areas, agriculture, and fishery strategy.

The strategies within the National Reform Program are streamlined across other various framework policies, such as (i) the *Long-Term National Development Strategy 'Poland*

2030: *Third wave of modernity*', (ii) the *National Spatial Development Concept*, and (iii) and the *National Spatial Development Plan*. These are the umbrella development policies that will guide the country's new development reforms.

The Ministry of Economy is also working on elaborating two key framework strategies – the *Enterprise Development Programme* and the *National Programme for the Development of a Low Emission Economy* - that will include objectives on improving the efficient use of raw materials. These two policies are towards their way to being approved; in the meantime, the Council of Ministers has already adopted the supporting documents: “Assumptions for the National Programme for Low-Emission Economy Development” in August, 2011, and a three year plan on sustainable procurement called the *National Action Plan on Sustainable Public Procurement 2010-2012*.

Larger, macro-economy frameworks that include elements of resource efficiency are also being adopted by the Polish government. *The National Environmental Policy 2009-2012* and the *2016 Outlook* includes a strategic course towards environmental policies and efficient, sustainable resource use. Resource efficiency themes were included in the policy's outlook for the management of water, climate, and geological minerals. As well, the Council of Ministers listed targets/ commitments for resource recovery, and explicitly stated that Poland will “uphold the current tendency towards decoupling the quantities of waste generated from the national economic growth (less waste per product unit, reduced packaging, longer product life cycles, etc.” (Council of Ministers Republic of Poland 2008). In addition, the policy outlines several targets for achieving this decoupling, including:

- By 2014, achieve the minimum of a 60% recovery and 55% recycling levels of packing waste;
- By 2010, achieve at least 25% recovery of biodegradable waste, and in 2013, achieve a 50% recovery of the waste;
- By 2012, collect 25% of waste batteries and accumulators, and by 2016, collect 45%;
- Increase energy recovery from municipal waste that is environmentally safe;
- Support implementation of new technology for recover and recycle waste materials using Environmental Funds;
- Reduce the water consumption, material intensity and waste generation in the production sector by 50% between 1990 and 2010 (BIO Intelligence Service, 2012).

Energy efficiency

The government of Poland has set out ambitious plans for renewable energy and energy efficient technologies. The country has a target to “Achieving continued economic growth without an increase in energy use and reducing the energy intensity of the Polish economy” (EEA 2011c). There are many legislative frameworks that encourage the uptake of energy efficiency and renewables and set objectives for the country to move forward in a low-carbon way; some of these policies include: the Directive 2002/91/EC, Council of Minister’s Energy Policy of Poland until 2030, the National Energy Efficiency Plan (2007), the National Action Plan for Renewables, and the framework document entitled “Poland 2030: Development Challenges” set forth by the Prime Minister’s Board of Strategic Advisors. This last policy scopes out and defines the key ten challenges that the country needs to address in the medium term, with energy security identified as a key challenge and priority area.

To further the aims of energy efficiency, the country has drafted a bill on energy efficiency which provides objectives related to energy savings, including carving out objectives for the public sector and developing a certification system as a market incentive for energy efficiency. This market incentive enables enterprises to reduce energy consumption by providing them with investments in modern technologies (National Reports Poland, 2012a). In the buildings sector, the government introduced the *Energy Performance Certificate (EPC)* in 2009, which rates the energy efficiency of buildings for home buyers and residents. The certification program is a response to the EC Directive on the energy performance of buildings.

Fisheries

Efficient management and use of fisheries is an important issue for the country, particularly in the Baltic Sea region; laws and regulations are developed in the Ministry of Agriculture and Rural Development, Department of Fisheries. The country is currently developing a *Strategy for the development of agriculture and fisheries* and the *Maritime Policy of the Republic of Poland until 2020*. These policies will reflect the EU Integrated maritime policy of the European Union; as a result the Polish government is defining the key objectives towards meeting the sustainable management of fish resources in the country.

The Polish Eel Management Plan is an example of an existing fisheries policy that the government was developed in an attempt to recover and restock the silver eel population. The program takes the following measures to do so: limiting catches from commercial and recreational fisheries, increasing restocking of eels, and facilitating fish migration (EEA 2011c).

Minerals/Materials

Poland has a dedicated national strategy and program on integrated product policies which are developed by the Ministry of Economy. These policies work to encourage producers and consumers to be aware and make decisions on products based on all phases of a products' life-cycle. Many national policies explicitly refer to IPP, including: the *Strategy of Implementation of Integrated Product Policies*, *Strategy of Changing Production and Consumption Patterns to Favor the Implementation of Sustainable Development Principles* and the *Executive Programme for Implementation of an Integrated Product Policy* which defines and creates a framework for IPP.

Public procurement

Poland has issued regulation on public procurement that includes environmental criteria and parameters for public institutions. In 2004, the Public Procurement Law set evaluation criteria for purchases in which environmental impacts are included. This evaluation criterion looks at not only the direct environmental impacts of products but also takes into account life-cycle impacts (ETC-SCP 2009).

Waste

There are several important waste reduction and regulatory legislation on waste that have been passed in Poland, many of which govern the safe disposal of specific hazardous waste, or the governance of waste management. Some laws specifically touch material recycling such as: (i) J. of L. of 2008 No 223, item 1464 on waste electric and electronic equipment, (ii) J. of L. of 2007 No. 90, item 607 on economic operators' obligations in the scope of managing certain types of waste and on the product and deposit charges, (iii) J. of L. No. 109, item 752 on annual levels of recovery and recycling of packaging waste and post-consumption waste, and (iv) J. of L. No. 63, item 638 on packaging and packaging waste (ETC-SCP 2009).

In 2010 the Polish government developed the National Waste Management Plan to achieve specific goals in waste management. The plan consists of tasks that are necessary to ensure environmental protection and also complies with the National Environmental Policy. Objectives within the policy include increasing the recycling rates of waste oil, extending the performance of recovery and recycling facilities for types of dangerous waste, increasing recovery rates of packaging and increasing overall recycling levels (National Reports Poland 2012b).

The activities captured in the policy are (ETC-SCP 2009):

- continuation of research on new technologies contributing to avoidance and minimization of waste generation and reduction of its adverse environmental impact;
- supporting implementation of low-waste production technologies and those which provide for utilization of all possible components of the raw materials applied;
- promotion of implementation of environmental management system;
- intensification of environmental education promoting minimization of waste and carrying out effective information and education campaign in this scope;
- application of economic instruments;
- supporting economically and environmentally effective technologies of waste recovery and disposal, including technologies which provide for recovery of energy contained in waste, through its thermal and biochemical treatment processes.

The National Waste Management Plan also defines targets for the recovery of waste and materials: 50% recovery of paper and cardboard packaging by 2010 and at least 60% in 2014; and 15% recovery of wooden packaging by 2010 and at least 15% in 2014 (ETC-SCP 2009).

The National Environmental Policy in force also addresses the issue of eco-friendly products. Regarding eco-labeling in Poland, the EU Eco-label and national eco-label are in place. In order to ensure the cohesion of integrated product policy, one main governmental body – The Ministry of Economy – is responsible for integrated product policy in Poland. The country has also started an Environmental Awards campaign for sustainable products. The objective of this program is to raise awareness on resource efficient products and also encourage producers to improve their products.

Water

Sustainable water management is one of the country's major environmental challenges because of already existing water shortages. The government is currently in the process of developing the National Strategy for Management of Water Resources 2030 as a framework for water management in the medium term. The strategy is currently undergoing a review process. The scope of the implementation plan for the State Water Policy 2030 includes (National Water Management Authority Poland 2011):

- Targeted activities related to the implementation of the reform of water management in Poland as a tool for achieving the objectives of the State Water Policy 2016;
- Targeted sectoral activities related to interventions that have significant impact on the improvement of water resources;
- Action in relation to the conservation of water resources (for example, actions in improving water quality in rivers).

The country also has numerous regulations on the maintenance and improvement of water quality. One area that is highly regulated by the Polish National Water Management Authority is the mitigation of nitrogen/ nitrates from agricultural sources. This is in compliance with the EU Directive on Nitrates. In response to this Directive there are several pieces of legislation that have requirements for municipalities aimed at reducing the outflow of nitrogen from agricultural sources. One of them is *Polish Law OJ 2003 No. 4, item 44* concerning the regulation of these flows; others include the *Polish Act of 26 July 2000* on fertilizers and fertilization, regulation from the Minister of Agriculture and Rural Development on specific methods of fertilizer application, and extension programs and trainings for farmers on sustainable fertilizer use (mentioned in the *Journal of Laws No. 60, item. 616*).

2.3.4 Specific Instruments (if any) or suggested other approaches

Awareness instruments

The government has also been active in awareness instruments for the promotion of resource efficiency practices. One of these is environmental education programs for promoting the 3Rs. A private sector initiative that began at the Warsaw Stock Exchange, aims to raise awareness on sustainable and socially-responsible businesses to investors. In November, 2009, the Stock Exchange launched the *Respect Index*, which lists exceptional companies that adhere to values of Corporate Social Responsibility. Its list includes those companies who demonstrate: responsibility, ecology, sustainability, participation, environment, community and transparency.

Economic instruments

In terms of economic instruments, Poland has leveraged environmental funds in the form of grants for new technology in waste collection, recycling and recovery of materials. The government has also enacted a regulation that imposes product and deposit fees on manufacturers and importers as to encourage the recovery and recycling of packaging and waste. The product charges have been imposed on several types of commodities including:

packaging, electrical equipment, batteries, lubricating oils and tires. This system aims to reduce environmentally harmful waste while also increasing recycling incentives (National Reports Poland 2012b). Other economic instruments to encourage waste reduction exist, such as charges for landfill waste and charges for plastic bags, paid by consumer (ETC-SCP 2009).

Regulation instruments

Some regulation instruments also are present including regulations on the protection of natural resources such as nitrogen fertilizers in river bodies, and licenses/caps on fishing.

2.3.5 Key actors, contacts, and organizations

Ministry of Economy

3 Asia – Pacific

3.1 China

3.1.1 The overall scope of the resource efficiency policies within the country

The rapid economic transition in China over the past two decades has led to a transformation of the country's consumption patterns. Per capital material use and material intensity is estimated to be approximately 13.7 tons per US\$, and this is only expected to increase (UNEP 2012e). As one of the world's largest economies, the country is struggling with exponential economic growth while maintaining the conservation of natural resources. As China continues to increase the size of its domestic economy, it has also within the last decade become increasingly aware of the need to temper this by encouraging support policies that set the foundation for sustainable resource use. In this regard, the country has made significant strides towards greater resource efficiency. As a result of targeted framework legislation and interventions, China has displayed progress in the fields of energy efficiency and material reduction. Currently, about 20-34% of raw materials for steel, metals and paper pulp originate from renewable resources; and 20% of raw materials for cement originate from solid waste. The utilization of industrial solid waste is 69%.

Although it seems as though the country is moving in a more sustainable direction, it still has a long way to go in order to achieve its goal of an efficient and prosperous circular economy. Many critics claim that even though China has developed national frameworks, the implementation and governance level still remains a critical challenge.

3.1.2 Definition of RE (indicators/metrics)

Resource efficiency is defined in China under concepts such as the circular economy, 'ecological civilization', and the 3Rs. A range of indicators for resource efficiency and SCP have also been developed in Chinese policies according to the Ministry of Environmental Protection. These indicators include (Xia 2012):

- Material flow
- Material intensity
- Energy intensity (amount required per unit of economic output)
- Water use intensity
- Land use intensity (rural land use intensity, urban land use intensity, managed land use intensity)

- Pollutant related indicator sets (air, water, solid waste, etc.)
- Resource and environment performance index (REPI) (discussed below).

In China's Circular Economy Law (discussed later in the report), several indicators have been defined for measuring the country's progress in achieving efficiency goals. These are illustrated in the table below.

Table 4 Indicators used in China's Circular Economy Promotion Law

Input indicators	Output indicators
Direct Material Input (DMI) Total Material Requirement (TMR)	Domestic Processed Output (DPO)
Consumption indicators	Balance indicators
Domestic Material Consumption (DMC) Total Material Consumption (TMC)	Physical Trade Balance (PTB) Net addition to Stock (NAS)

Source: Modak (2010)

The Resource and Environment Performance Index (REPI) was developed by the Chinese Academy of Science in the early 2000s in response to trends that indicated that the country was moving in the direction of a resource-intensive driven development. This index combines data on industrial resource-use and pollution, and measures them against GDP to create national and regional measures of 'economically relative environmental performance'. It ranks China's economy through the scope of resource efficiency. The higher REPI score indicates that the country has low resource-pollution efficiency relative to other countries with similar economic output (Xia 2012). In 2003, the REPI was a cause for alarm as China was ranked 54th out of 59 countries and since then the country has continued to make strides to improve its ranking. The REPI is a national tool that the country has stated it will use in the future to track, and identify priority objectives for developing a more resource efficient and cleaner economy.

Proposed resource efficiency indicators are illustrated in the chart below, along with their respective sources (including agencies and/or policies).

Table 5 Chinese Resource efficiency related indicators and respective sources

Indicator	Source
Reduction of water consumption per unit of industrial water added (%)	11 th Five Year Plan
Efficient utilization coefficient of agricultural irrigation water	11 th Five Year Plan
Coal consumption for energy generation	National Environmental Performance Assessment (EPA) Report
Land use by type of land use	State of the Environment Report
Water and soil erosion - area affected (km ²)	State of the Environment Report
Grassland productivity and pasture deterioration (in tons)	State of the Environment Report
Volume of municipal/industrial waste	National Environmental Performance Assessment (EPA) Report
Change in industrial solid waste production (%)	State of the Environment Report
Percentage of solid wastes being comprehensively utilized (%)	State Environmental Protection Administration
Hazardous waste disposal rate (%)	State Environmental Protection Administration
Reduction of total major pollutants emission volume (%)	11 th Five Year Plan
Reduction rate of total volume of wastewater and total load of COD discharge (%)	State Environmental Protection Administration
Water quality of fresh water and drinking water sources	State Environmental Protection Administration

Source: UNEP (2008c)

3.1.3 Policies towards RE (goals, targets, integration, institutional settings)

Frameworks

Recognizing the need to confront the challenges of unsustainable consumption patterns, the national government has embedded concepts of resource efficiency into the framework Five-Year Plans for Social and Economic Development (FYPs). These framework plans are formulated by the National Development and Reform Commission (NDRC) and are later approved by the National People's Congress. They serve as a foundation for national-level public policies.

Adoption of the 11th Five Year Plan illustrated that China was committed to decoupling resource use with economic growth. In this plan the country laid out a commitment to building a "Resource Efficient and Environment Friendly Society" (Xi 2012). Embedded within the plan was a three pillar framework to

increase energy efficiency and reduce pollution. *Industrial restructuring* was one pillar outlined in the plan. The State Council of China detailed targets in the Action Plan for Energy Conservation, which phases out production capacity for 12 industrial sectors. Another pillar was building *pollution treatment* capacity for wastewater treatment facilities. A target was set out for increasing urban sewage treatment by 45 million tons, and recycling 6.8 million tons of recycled water. The last pillar was related to *institutional capacity* for environmental management. In this pillar, the government included measures that strengthened government oversight for environmental impact assessments (EIA), especially for heavy polluting industrial sectors. It also covered a monitoring system for pollution reduction and an accountability system (UNEP 2012e).

Resource efficiency and sustainable consumption and production policies are integrated into the plan, which includes sectoral specific goals and objectives. The government has outlined the 12th FYP for the years 2011-2015; this includes seven key priority industries that the country intends to focus on to develop which are: clean energy, clean vehicles, energy conservation, environmental protection, biotechnology, minerals, information technology and high-tech manufacturing (UNEP 2012e).

This framework broadly directs the policy initiatives of the Chinese government to focus on issues such as sustainable development, climate mitigation, agriculture, social development and environmental conservation/protection. Highlighted in the plan are the country's carbon reduction initiatives, which aim to reduce total carbon intensity and energy intensity. Below, some of the 12th FYP policy initiatives specifically directed towards resource efficiency/SCP are given (Lommen 2011):

- Increase the proportion of non-fossil fuel by 3.1%
- Reduce annual SO₂ and COD emissions by 8%
- Reduce annual NO_x and ammonia nitrogen emissions by 10%
- Reduce water consumption per unit of industry value added by 30%
- Reduce carbon intensity by 17%
- Reduce energy intensity 17% by 2015 from 2005 levels

Through the Five-Year Plan framework, several policy programs/legal documents have been developed, such as the State Council's Opinions on Speeding up the Development of the Circular Economy, the Outline of the National Medium and Long-term Plan for the Development of Science and Technology, Circular Economy Promotion Law (discussed below), the Technical

and Policy Outline for Comprehensive Utilization of Resources, and the State Council's Decision on Speeding up the Cultivation and Development of Strategic Emerging Industries. All of these legal documents and initiatives were strategic guidelines for the improvement of a resource-efficiency economy.

The Circular Economy Promotion Law, developed in 2009, is a hallmark national framework for the country's thinking and objectives for resource efficiency. It was globally, the first national framework law that pinpointed decoupling as a strategic goal for economic and social development. This concept approaches the ideas of resource efficiency through cleaner, more environmental production and integrates it into the economic system. There is a system of actions in which actors pursue different objectives in a circular economy (BIO 2012):

- *Individual firm level* - managers integrate higher efficiency methods through incorporating the 3Rs of Cleaner Production
- *Industry level* - reuse and recycle resources so that resources will circulate fully in the local production system
- *Regional level* - integrating efficient production and consumption systems on a regional scale. This involves looking at material flows in a region and developing systems that increase efficiency measures such as the development of municipal by-product collection, storage, processing, and distribution systems.

Although the government has pursued the goals of a circular economy through pilot projects, policy reform and some activities, proponents argue that the law is too broad, without concrete policies or implementation/regulation approaches. Also, the Circular Economy Law, itself, does not have measurable and quantitative targets to be met (BIO et al. 2010). Several barriers have also been identified that will impact the sustainability and impact of the law. Some of these hurdles include: regime changes in industry, lack of funding, lack of information and awareness, and lack of effective enforcement at a local level (Geng 2009; Xue et al. 2010). The government is currently pursuing the draft of the Circular Economy Development Plan that will intently attempt to remove these barriers and outline priority measures to achieve its successful practical implementation. Here, the development of methodologies, indicators and benchmarks for achievement will be critical.

Sector specific activities that are nested within the Circular Economy Law includes those dedicated to improving agricultural efficiency, which the government recognizes as crucial to retaining a competitive agricultural sector. Farmers/producers are encouraged to increase water efficiency on farms by

adopting measures such as improved plant breeding, planting and irrigation technologies.

Ecolabeling

The Environmental Protection Administration has developed an eco-labeling program entitled the China Environmental Labeling Program. This initiative began in the early 2000s as an informational campaign to raise awareness about the environmental standards of various products. It assists industry to move towards greater resource efficiency and the production of green products. Technical criteria for the certification have been defined for different product categories; with the agency expecting to increase the amount of products certified. There are currently over 73 types of products that have been classified (SEPA Environmental Certification Center 2012).

Energy efficiency

Energy efficiency has been made a priority for the Chinese government, and policies dedicated to improving energy consumption patterns are regulated by the Ministry of Housing, Urban and Rural Development and the Ministry of Environmental Protection. Recent energy efficiency strides are as follows:

- National Green Building Innovation Awards (2004-2007)
- Notice on Enforcement of Building Energy Standards for New Residential Buildings (2005)
- Green Building Technology Guidance (2005)
- Guidance on Building Energy Efficiency Evaluations and Labeling (2006)
- Guidance on Energy Audits for Governmental Buildings and Large-scale Public Buildings (2007)
- Green Building Evaluation Labeling (2008)
- Management and Technical Guidance for Energy-efficient Campuses in Universities and Colleges (2008)
- Civil Building Energy Conservation Ordinance (2008).

China has also developed the Program of Action for Sustainable Development in China in the Early 21st Century (2005), which was implemented by NDRC. This framework law also defined objectives which included (NDRC 2005):

- Growing capacities for sustainable development
- Marked progress in economic restructuring
- Significant improvement in the ecological environment
- Markedly increased efficiency in utilization of resources

- Sustainable path of development characterized by rising productivity, prosperous livelihood and a well-preserved environment

Manufacturing

Another framework policy that aims at encouraging resource efficiency is the China Cleaner Production Promotion Law. This policy, which began in the early 1990s, was developed to combat the country's environmental problems associated with manufacturing and industry. It promotes the goals of resource efficient production through supporting initiatives with industry at various levels – the individual firm/company, inter-firm, and regional. Some of the initiatives that are carried out in this law include cleaner production auditing, and encouraging companies reach sustainable production practices through voluntary agreements and also through compliance with local and national standards (Andres-Speed, 2009). However, finance remains an issue for the effective implementation of cleaner production. Public finance and investment is directed towards end-of-pipe treatment technologies, while the industry is expected to invest directly in cleaner production and resource efficient technologies. This constraint leaves industry with a financial burden since businesses in China operate on a short financial turnover period.

3.1.4 Specific Instruments (if any) or suggested other approaches

Economic instruments

Traditionally, the Chinese government has addressed environmental problems through command and control approaches. This goes as well for instruments related to resource efficiency and sustainable production. Regulatory instruments are often economic instruments, which at times can serve to either provide incentives for resource efficiency or set regulation.

Natural resource pricing and environmental fees have been in place in China for over 20 years. In sectors such as garbage disposal/waste and pollution control, the government has enforced fee policies to reduce externalities. Currently the government is focusing on widening its fee policies to target other entities and/or increasing existing fees.

Taxation is another economic instrument that the Chinese government has used to support its resource efficiency goals. A consumption tax, for example, was introduced in 2009 for fuel; and consumption taxes on large vehicles, disposable wooden chopsticks and timber floor panels have been in place since 2006. Some other commodities that have a consumption tax include: plastic bags and mineral resources (gold, petroleum, coal). Taxes to encourage greater investment in recycling facilities and treatment centers for pollution have also been implemented, and the government is looking into their expansion.

Trade policies have also been implemented in the country, mainly targeting the import and export tariffs of various commodities. In order to meet the objectives outlined in the 11th Five Year Planning Period, the Chinese government has imposed higher export tariffs on 142 energy intensive and pollution heavy products, at the same time removing export rebates for the same products. This is complemented by export tariffs that will be increased by 5-10% on 80 iron and steel products. By the end of 2007, exports of these products were reduced as much as 40%.

Public financing has been another instrument that the government has developed. Following the 11th Five Year Plan, the country set up a special fiscal fund for initiatives aimed at energy conservation and the reduction of pollution. The Chinese government also has developed pilot projects, namely under the circular economy umbrella. Three themes can sum up these types of pilots:

- Comprehensive utilization of resources, industrialization of remanufacturing, and recycling system of renewable resources (Xia 2012)
- *Comprehensive utilization of resources*: From 2006 to 2010, about 1 billion tons of fly ash, 1.1 billion tons of coal, and 500 million tons of smelting slag have been comprehensively down cycled;
- *Industrialization of remanufacturing*: In 2008, 14 enterprises were chosen as pilot programs for remanufacturing automobile parts. As well, in 2009, 33 enterprises and 2 industrial clusters were launched as pilot projects for remanufacturing;
- *Recycling system of renewable resources*: 90 pilot cities and 11 distribution markets have been identified as pilot programs for recycling. Since 2009, 110 end-of-life vehicle recycling and dismantling enterprises have been selected for pilot projects. These have undergone retrofitting and upgrading, in an effort to improve the level of resource utilization.

Regulatory instruments

Green procurement initiatives began in 2006 with a Ministry of Finance endorsed policy, Opinions on the Implementation of the Governmental Procurement of Environmentally Labeled Products. This legislation required public organizations to procure products and services from companies who had an environmental and energy-saving label from the List of Environmentally Labeled Products for Governmental Procurement. Standards for energy efficiency in buildings and products have also been defined.

3.1.5 Key actors, contacts, and organizations

Li Xia, Deputy Director / Senior Researcher

Division for Policy Research

China-ASEAN Environmental Cooperation Center

Ministry of Environmental Protection of China

Tel: [+86-10-84665956](tel:+86-10-84665956) [+86-10-84615268](tel:+86-10-84615268)

Email: li.xia@mep.gov.cn; li.xia@chinaaseanenv.org

Address: Room 521, Building A, No.1 Yuhuanlu Chaoyang District, Beijing
100029, P.R. China

3.2 India

3.2.1 The overall scope of the resource efficiency policies within the country

As the second most populous country in the world, with a burgeoning middle class, India is predicted to experience consumption patterns that are likely to increase in the medium and long term. Considering that it retains 18% of the total world population, on 2.4% of the total habitable land mass, India will most likely continue to face challenges of growth and sustainable resource use (World Bank 2011). Development challenges are at the forefront of the country's economic and social policies. These seek to reduce large income gaps and resolve issues of basic sanitary and health needs. Although the country has many policies that are directed towards sustainable resource use and efficiency, there still remains a problem of implementation at the local and district level.

3.2.2 Definition of RE (indicators/metrics)

The Indian government has yet to define 'resource efficiency' in official policies or regulations. However, the concept of resource efficiency is integrated into other overarching themes such as sustainable consumption and production and sustainable resource management. In terms of indicators, the country has not defined indicators towards resource efficiency, although many targets are proposed in various policies and strategies. In the 11th Five Year Plan – "green cover" is used as an indicator of the status of the productivity of forests, for example.

3.2.3 Policies towards RE (goals, targets, integration, institutional settings)

Frameworks

The umbrella development framework policy in India is the country's National Five-Year Plans. These plans are the overarching laws that frame India's economic direction for each five year period. India's National Planning Commission is the regulatory institution which develops the plans; and they are directed towards all levels of government – national, state, and district. The country is currently in the implementation of its 11th Five-Year Plan (2007-2012), and has already published a draft of the 12th Five-Year-Plan.

The 11th Plan discusses India's strategy for the environment and the need for the country to have more decentralized governance approach to environmental problems, giving more authority to state governments and local authorities (National Planning Commission 2007). It emphasizes certain sectors such as the improvement of agriculture, climate change, water resources and land use. Although the plan does not explicitly outline direct goals for the resource

efficiency, per se, it goes to state that “degradation of natural resources reduces the well-being of people, and the poor and women, who suffer the most” (UNEP 2012a). As well, it does have several resource efficiency objectives, some of which are stated below (Table 6).

Table 6 Resource Efficiency Topics Mentioned in India's 11th Five Year Plan

- A key target that was directed towards energy efficiency is a target to increase energy efficiency by 20% by 2016-2017.
- Approaches for Participatory Forest Management and Joint Forest Management
- Developing a Watershed Management Programme which aims at more equitable sharing of water resources in rural communities
- A policy target of 33% forest and tree cover by 2012
- A strategy in which the government would impose higher annual taxes on personal transport, which in turn would be used as a fund for the development of public transport
- The development of a river action program that would aim to maintain minimum flows, which are threatened by withdrawal of water to for use in agriculture and industry
- Concerns in agriculture over the degradation of soils, decline in groundwater tables, and disparities between irrigated and rain-fed areas
- Waste recycle, reuse, resource recovery, adoption of advanced technological measures for effective and economical disposal will have to be followed vigorously.
- Compulsory production of compost from solid waste and application of this organic manure
in agriculture and horticulture to improve soil fertility
- A mechanism/certification system for internationally sustainable forest management

Source: National Planning Commission of India (2007)

Agriculture

According to the Indian Agricultural Products Export Development Agency, certified organic farming only accounts for 1% of overall agriculture production in the country. Although the country has a national organic agriculture program, it is faced with contradictory policies in which fertilizers and pesticides have been historically, highly subsidized. The National Organic Programme was developed through the National Steering Committee for Organic Products (NSCOP) within the Indian Ministry of Commerce. The program objectives are to:

- Provide certification programs for organic agriculture and products as per the approved criteria;
- Develop policies for the certification and development of organic products;
- Produce the National Standards for Organic Products (NSOP);
- Develop a National Accreditation Policy and Programme (NAPP);
- Accredite certification programs to be operated by Inspection and Certification Agencies;
- Facilitate certification of organic products in conformity to the NSOPs;
- Develop regulations for the use of the National Organic Certification Mark;
- Encourage the development of organic farming and organic processing.

Several Indian states have introduced programs supporting organic agriculture and there is currently financial support programs and subsidies that provide funds to organic farmers. However, the program has limited funding and can only apply in only certain farming schemes (Embassy of India 2001).

The Indian government has also pursued efficiency improvements in sustainable rice. The Directorate of Rice Research, located within the Ministry of Agriculture, has been collaborating on an agriculture-food initiative aimed at improved rice production. The policy involves the development of the production of different varieties of rice and technologies that will enable the country to increase rice production through SCP methods. This initiative also involves the All India Coordinated Rice Improvement Project. Indicators are currently being developed.

Energy efficiency

In 2008, the country developed the National Action Plan on Climate Change (NAPCC) as a turnkey policy framework to guide the country's actions on climate change and GHG reductions. The interventions highlighted in the plan seek to

mitigate climate change through the promotion of energy efficiency and increasing renewable energy capacity. Some of the core National Missions under the NAPCC are:

- National Solar Mission – with a target of increasing solar power capacity to 20 GW
- National Mission for Enhanced Energy Efficiency – which aims to conserve energy (10 GW by 2012) through retrofitting and improvements in manufacturing, industry and buildings
- National Mission on Sustainable Habitat – which promotes energy efficiency in more sustainable urban planning
- National Mission for Sustainable Agriculture – which addresses climate smart agriculture
- National Mission on Strategic Knowledge for Climate Change – whose goal is to increase scientific research related on mitigation and adaptation for the country.

The National Mission for Enhanced Energy Efficiency, which is housed in the Ministry of Power, is responsible for meeting the objectives in the national plan. It has outlined several activities including: tradable energy permits for energy conservation, standards and labeling for energy efficient appliances, public procurement of energy efficient products, and financing of energy efficiency projects.

The Energy Conservation Act (2001) is another policy that works on energy efficiency measures in the country and also reducing the energy intensity of the Indian economy. Through its mandate, it developed the Bureau of Energy Efficiency which assists in implementing those policies and strategies. Some of the interventions that the Bureau has are regulatory functions such as (Bureau of Energy Efficiency India, 2012):

- Develop minimum energy performance standards and labeling for appliances
- Develop specific energy conservation building codes
- Develop specific energy consumption norms
- Certify energy managers and energy auditors
- Accredite energy auditors

Public procurement

In India public procurement is estimated to be around US \$300 billion. This figure is anticipated to increase further at a rate of 10% annually (UNEP 2012a). Green public procurement laws have been decentralized in India. Local

municipalities, government departments, and ministries have already developed green procurement policies with some of them related to resource efficiency. Currently, though, there is not a marked national strategy or approach. One policy rests within the National Action Plan on Climate Change, where the government has created an amendment made to apply mandates on purchasing energy efficient products for all public agencies (Confederation of Indian Industry 2011).

In the Indian region of Andhra Pradesh, government officials are currently forming multi-stakeholder groups, along with the support of GIZ, to begin to develop and define appropriate indicators and methodology for estimating the environmental cost adjusted Gross State Domestic Product. This step is one towards greater resource efficiency, where as the state will be able to target critical areas of intervention and have baseline data for which to develop resource efficiency targets (GIZ 2010).

Waste

Indian E-Waste rules (for the Management and Handling of E-Waste) were launched in 2011. This policy restricts hazardous materials in electrical and electronic equipment. There is an extended producer's responsibility that is included in the regulation. It details the responsibilities of dismantlers and recyclers, who are also, registered with state control boards. The policy applies to all levels of the supply chain, from producer to seller to the end consumer (UNEP 2012e).

Water

Water law in India is a characterized by a myriad of acts, regulations, and policies; many of which have existed since the colonial period. In general, water regulation and law is largely state based and governed. The National Water Policy (2002) is the country's comprehensive policy on the management of water resources (adopted from the 1987 Water Policy). It is overseen by the Ministry of Water Resources. There are some clauses in the policy concerning effective water conservation practice. For example the policy states that: "Watershed management through extensive soil conservation, catchment-area treatment, preservation of forests and increasing the forest cover and the construction of check-dams should be promoted. Efforts shall be to conserve the water in the catchment" (Ministry of Water Resources India 2002). The Ministry has just released a draft 2012 Water Policy which includes new themes such as climate change adaptation, restructuring the governance structures in water management and the sustainability of water resources. It also highlights water efficiency use and approaches for the country to achieve greater efficiency, some clauses are (Ministry of Water Resources India 2012):

- Recycle and reuse of water, including return flows, should be the general norm.
- Developing a system to evolve benchmarks for water use for different purposes (i.e. water footprints), and water auditing should be developed to promote and incentivize efficient use of water.
- The project appraisal and environment impact assessment for water uses, particularly for industrial projects, should, inter-alia, include the analysis of the water footprints for the use.
- Water saving in irrigation use is of paramount importance. Methods like aligning cropping pattern with natural resource endowments, micro-irrigation (drip, sprinkler, etc.), automated irrigation operation, evaporation-transpiration reduction, etc., should be encouraged and incentivized.

The government has also been involved in programs that support the sustainable use of water in agriculture. On the national framework level, the 11th Five Year Plan states the importance of water conservation in the sector, particularly emphasizing the role of both rain-fed irrigation in agriculture, and water recycling in the industrial sector. The government also approved a 'Micro Irrigation' program to help spread the network of water-saving implements such as sprinkler and drip irrigation throughout the country (National Planning Commission 2007).

3.2.4 Specific Instruments (if any) or suggested other approaches

Awareness instruments

Awareness instruments are used to some extent in India. One specific approach is using consumer awareness campaigns such as informational labeling on organic agriculture.

Economic instruments

Among the economic instruments that the country implements are those for energy efficiency practices. Tradable energy credits and energy savings certificates are examples of some of the schemes under this sector.

Regulatory instruments

Standards are readily used as a regulatory instrument in India. For example, standards for energy efficiency in buildings are used along with standards in organic agriculture.

3.2.5 Key actors, contacts, and organizations

Ministry of Agriculture

India's Planning Commission

Ministry of Environment and Forests

Mr. Samit Dattagupta

Under Secretary

Ministry of Environment and Forests

New Delhi

Tel: 91-011-24361797

Email: samit.datta@nic.in

Sustainable Development Division

Email: icdivision919@gmail.com

Ms. Riva Ganguli Das

Director, Ministry of External Affairs - user@mea.gov.in

dirune@mea.nic.in

3.3 Indonesia

3.3.1 The overall scope of the resource efficiency policies within the country

Indonesian leaders have expressed the need to grow the economy in more sustainable and efficient ways. In his speech at the Global Ministerial Environment Forum in 2010, H.E. Susilo Bambang Yudhoyono, President of the Republic of Indonesia, declared:

"The global financial crisis has shown that the current model of development was not in line with global needs and needed redesigning to promote sustainable livelihood. Achieving progress in that regard required changing the pattern of production and consumption so that it was based on the sustainable development principle; establishing more ambitious targets to combat biodiversity loss; reorienting development to accommodate the green economy paradigm; adopting a unified concept of global environmental management"(...)

The country has also recently signed the Manila Declaration on Green Industry in which government officials have expressed their determination for a resource efficient and low carbon economy, and to establish policies and frameworks that support the country's shift.

Although the country has expressed interest in moving towards greater resource efficiency, the implementation of policies and regulation remain a difficult challenge for Indonesia. A study commissioned by UNIDO, ranked Indonesia as the country with the lowest resource efficiency in the Asia region². To a large extent, this has to do with the economy being heavily dependent on extraction and harvesting of natural resources. As the 4th populous country in the world, and with a rising middle class, the country will continue to face additional pressures of consumption. The extent to which Indonesia can respond to these challenges will affect whether or not it meets the intentions of sustainable development with targeted action.

² This study ranked Japan as the most resource efficient country in the region, with 2,400 USD of value generated per ton of resource consumption. Juxtaposed with that is Indonesia, with the lowest resource efficiency of 140 USD per ton.
http://www.worldresourcesforum.org/files/Resource%20efficiency%20in%20Asia_final_0.pdf

3.3.2 Definition of RE (indicators/metrics)

The Ministry of National Development Planning (BAPPENAS) is the agency gathering statistics for the country and is involved in indicator development. However, these indicators are not necessarily used in national strategies for frameworks nor are they all made publically available (UNEP 2008).

The Government of Indonesia has stated however, that the Human Development Indicators can serve as indicators for provincial and district-level government, and in effect measure progress on development goals, including those related to resource efficiency (UNDP 2010). These include:

- the environmental footprint of consumption,
- environmental performance index,
- carbon dioxide emissions per capita,
- change in forest area,
- fresh water withdrawals, and
- forest area (% of total land area).

A study commissioned by UNEP has identified the following set of indicators for monitoring sustainable consumption and production in Indonesia. These are indicators that the country has included in various studies, reports, etc, or have been chosen by the statistical agency of the country; however, it has not placed as part of a national strategy or policy.

Table 7 Indonesia resource efficiency indicators and their sources

Indicator	Source
Development and Conservation of Water Resources	Statistics Indonesia: Statistical Information on Socio-Economic and Environmental Issues
Fishery Production Growth (Tonnes) - Fish / Freshwater Fish	BAPPENAS National Development Indicators
Development of the Using of Fertilizer on Food Plants Program	BAPPENAS National Development Indicators
Paddy Production: Yield Rate (Ha/Qt)	Statistics Indonesia: Statistical Information on Socio-Economic and Environmental Issues
Number of Establishments by Province: Mining and Quarrying	Statistics Indonesia: Statistical Information on Socio-Economic and Environmental Issues
Consumption of Primary Energy by Fuel	BAPPENAS National Development Indicators
Manufacturing: Consumption of Electricity, LPG and Natural Gas	Socio-Economic Indicators

3.3.3 Policies towards RE (goals, targets, integration, institutional settings)

Frameworks

The Ministry of National Development Planning (BAPPENAS) is also the ministry in charge of policies concerning development. As framework policies for sustainable development, Indonesia has enacted both a strategic Long-term Development Plan (Law No 17/2007) which is implemented from 2005-2025 and a Medium Term Development Plan (RPJMN from 2010-2014), which aims to achieve a “green and ever-lasting Indonesia”. The Medium Term Development Plan contains specific policies on how to mainstream environmental management and resource use. Some of these policies include: reforms such as subsidies for electricity and fuel industries to reduce GHGs, policy instruments for renewable energy promotion, and incentives for industry and private sector to enact environmentally-friendly production methods (UNEP 2012c). The National Development Planning Agency (NDPA, within BAPPENAS) is the institution responsible for developing these strategic plans.

The RPJMN has included 11 different areas that have been defined as development priorities for the country. These include, among others, food security, energy, natural disaster management and poverty reduction. The plan also includes a set of environmental targets, which reflect some national resource efficiency targets:

- The reduction of pollution from wastewater and emissions in 680 industrial and service activities by 2010;
- 20% annual reduction of forest fire hotspot areas; and
- 50% overall reduction in pollution by 2014.

Indonesia has developed recent frameworks that support the Long Term National Development Plan (RPJPN) and Medium Term National Development Plan (RPJMN). In May, 2011, the President recently released the *Master Plan for the Acceleration and Expansion of Indonesia’s Economic Development* (MP3EI from 2011-2025). This national strategy is focused on the country’s economic growth, and outlays a path to transforming the country into one of the world’s top ten economies by 2025. It will be implemented and monitored by a Committee chaired directly by the President.

The strategy aims to achieve an economic growth of 7-9% per year and is focused on three goals (Coordinating Ministry for Economic Affairs 2011):

1. Increase value added production and expand value chains for industrial production processes, and increase the efficiency of the distribution network. In addition increase the capability of the industry to access and

utilize natural resources and human resources. These increases can be attained by the creation of economic activities within regions as well as among regional centers of economic growth.

2. Encourage efficiency in production and improve marketing efforts to further integrate domestic markets in order to push for competitiveness and strengthen the national economy.
3. To strengthen national innovation in the areas of production, process, and marketing with a focus on the overall strengthening of sustainable global competitiveness towards an innovation-driven economy.

Although the strategy is largely focused on economic competitiveness through utilization and exploitation of resources (certain commodities such as palm, rubber and forestry are emphasized), it also mentions the importance of sustainable growth and sustainable resource management³. Several guiding principles have been outlined for various resources and their use efficiency, including the principles listed below:

Clean water: Provision of clean water should include the preservation of water resources in order to maintain its sustainability; reforestation strategies will continue and enhance to sustain water catchment areas;

Forests: Local governments will be required to allocate forest area as a percentage of the total area; log cutting production will be restricted to Production Forest Development (both through community plantation forestry and industrial plantation forest development), while the utilization of natural forests will be directed to the potential use of non-timber forestry;

Mining: Implementation of good mining practices will be implemented to minimize environmental damage;

Fisheries: The government will provide an education to fishermen to ensure the use of better fishing methods for the sustainability of fisheries.

The framework mentions that the national government will be addressing the targets of the strategy by focusing on incentive-based reforms and creating a set

³ In the report almost none of the commodity based strategies specifically mention resource efficiency improvements, except for timber. http://www.ekon.go.id/media/filemanager/2011/05/27/p/d/pdf_mp3ei.pdf

of regulations that provide these incentives for industry. These incentives that have been identified include tariffs, taxes, import duties, labor regulations, licensing and permits, land procurements, etc. (Coordinating Ministry for Economic Affairs 2011).

Agriculture

In 2001 the Ministry of Agriculture, Indonesia has established a program entitled, Go Organic 2010 which aims to reduce the total amount of chemical fertilizers in the country and position the country into becoming one of the main organic food producers in the world. The program has issued decrees and rules that regulate the organic sector such as the development of standards and guidelines. The policy describes phases of intervention (Sucihatiningsih, Soesilowati 2011):

- Socialization (2001);
- Follow-up socialization of the regulation (2002);
- Follow-up regulation and technical assistance (2003);
- Follow-up technical assistance and certification (2004);
- Follow-up certification and promotion (2005);
- Industrialization and trade (2006-2010).

The department also created the entity, Competent Authority of Organic Agriculture (OKPO), which is in charge of implementing a variety of projects and programs in organic agriculture. The OKPO currently is involved in an accreditation program for certification, and currently has accredited seven different types of organic certification bodies (Willer et al. 2011).

Energy efficiency

Energy policies are developed by the National Energy Council—DEN (Dewan Energy Nasional), which is comprised of ministers, government officials, and stakeholders from industry, academia, NGOs, and civil society. Likewise, the Ministry of Energy and Mineral Resources and regional governments hold the responsibility for implementing energy efficiency and energy conservation programs (Asia Pacific Energy Research Centre 2010).

Indonesia has committed to reducing national emissions by reducing the economy's carbon intensity by 26%, and up to 41% by 2020. One effort to do this was through the fiscal stimulus, where in the government launched funds to support energy-savings investments - this is about 7% of the total stimulus package of 6.3 billion US\$ (UNEP 2012a). In 2007, the country passed the *National Action Plan Addressing Climate Change (2007)* which gives guidance to different government bodies and institutions on how to mainstream climate change into their strategic plans.

Both climate change adaptation and reducing energy intensity (through conservation and increased efficiency) is outlined as main objectives in the plan. To coordinate climate interventions across ministries, the National Council for Climate Change was created shortly after in 2008. This is comprised of 17 of the country's ministers and is led and chaired by the President (Bakrie et al. 2007). The Ministry of Environment also has sponsored regulations on energy efficiency including the Decree No. 31/2009 which includes some provisions for eco-labeling and environmentally friendly technologies. At time of writing, a new energy efficiency label scheme is currently being developed for electrical appliances and lighting. The country currently has energy performance standards for some electrical appliances and began this program, the Standar Nasional Indonesia label in 1999 (United Nations Environment Programme 2012e).

Some additional policies that have been developed in Indonesia concerning energy efficiency include:

- The 2005 National Energy Conservation Master Plan (*Rencana Induk Konservasi Energi Nasional* (RIKEN) – this regulation states that Indonesia's target is to decrease energy intensity by 1% per year until 2025. It identified reductions in various sectors including: a 15% to 30% in the industrial sector; 25% in the commercial building sector, and 10-30% in the residential sector.
- The 2006 National Energy Management Blueprint – a roadmap which describes the energy saving potential of the country, and how that can be realized through energy efficiency and conservation (EE&C) measures (Ministry of Energy and Mineral Resources Indonesia, 2005).
- The National Energy Policy (2006) – this policy states that the country will try to achieve an energy elasticity of less than 1 in 2025⁴.

Manufacturing

Indonesia is active in cleaner production activities and in 2003 adopted the country's National Policy on Cleaner Production. The definition of cleaner production has been defined as "... the continuous application of an integrated

⁴ Energy elasticity is defined here as the rate of change of total primary energy supply, over the rate of change of GDP.

preventive environmental strategy applied to processes, products, and services to increase eco-efficiency and reduce risks for humans and the environment” (Indonesia Cleaner Production Center 2005). In 2004, the country established the Indonesian Cleaner Production Center. The national policy supports and encourages companies to implement the cleaner production principles of the 5Rs (rethink, reduce, reuse, recycle, recover). The center promotes cleaner production, acts as a facilitator for national dialogue, undertakes training, and serves as a technical body for cleaner production (Asia Pacific Energy Research Centre 2010).

Waste

With regard to waste reduction, the government has developed some national policies that are supported by local and provincial level initiatives. In 2006, Indonesia released its Strategy for Solid Waste Management which promotes the 3R approach to waste management. This strategy sets a target of reducing solid waste by 20% by 2014 (ICCSR 2010). In addition, the country’s Waste Management Law has regulated that open dumping practices are to be prohibited by 2013, in an effort to curb unsustainable dumping and encourage recycling. This law also outlines several interventions in the piloting of 3R concepts in various projects. These projects are currently ongoing.

There are some local level resource efficiency policies concerning waste reduction that have been initiated in Indonesian provinces. The city of Surabaya has introduced some policy measures that aim to increase recycling of compost at the city level. It organized a system of waste collectors and community educators for awareness raising activities. 16 composting centers have been established throughout the city and it became a successful initiative. Later Surabaya enacted a city law, No.1/2006, which regulates solid waste management and encourages composting; it has also included these initiatives into the city’s midterm development plans (2006-2010, see UNEP 2012a). The city has successfully seen the positive change in the management of waste, as 20% of transported waste has been avoided.

Water

The Indonesian Law on Water Resources (2004) is a national regulation that regulates the use of water resources. It addresses both the utilization of water resources in an efficient manner and also addresses water pollution and water quality. The clauses explicitly refer to water efficiency and conservation. Some examples are (Law on Water Resources – Indonesia 2011):

- Exploitation of the water resources shall be carried out in an integrated and fair manner,

either between the sectors, between the regions or among the community groups by encouraging the cooperation scheme.

- Water resources conservation shall mean the effort to maintain the existence as well as the sustainability of the circumstance, nature, and function of the water resources so it will continue to be available in a sufficient quantity and quality to meet the needs of living beings, either at the present time or in the future.

To support water conservation efforts, the President launched the National Partnership Movement to Save Water in 2005. This partnership focuses on the sustainability of water resources and the equitable distribution and efficient use of them. It has six strategies, which include: conservation in water consumption, clean water access, efficient and effective management of water demand, and sustainable utilization of water resources (Bakrie et al. 2007).

3.3.4 Specific Instruments (if any) or suggested other approaches

Awareness instruments

The eco-labeling program in energy efficiency, organic label program and waste reduction education programs are examples of some public awareness strategies that the government has enforced.

Economic instruments

There are some examples of economic instruments such as subsidies, used by Indonesia to promote resource efficiency. The Indonesian Go Organic program has subsidies for farmers to utilize organic fertilizers; as well, the government also provides subsidies to local governments for the development of 3R facilities.

3.3.5 Key actors, contacts, and organizations

Ms. Sulistyowati

Director of Basel Convention Regional Center – Indonesia, Ministry of Environment

Jl. DI. Panjaitan Kav. 24, Kebun Nanas, Jakarta 13410, Indonesia

Telephone / Facsimile : 62-21-85904938

E-mail : listy_78@yahoo.com

3.4 Thailand

3.4.1 The overall scope of the resource efficiency policies within the country

As the country has experienced marked times of economic boom and expansion, it has also impacted the integrity of resources such as forests, biodiversity, marine and oceanic biomes, and water resources. Recognizing this, the Thai government has taken considerable progressive steps in identifying and prioritizing sustainable natural resource use as it relates to economic growth.

3.4.2 Definition of RE (indicators/metrics)

Resource efficiency is defined within the terminology of “sufficiency economy”. This concept is emphasized in the country’s National Economic and Social Development Plan; and conceptually was developed by the current King Bhumibol Adulyadej after the 90s Asian Economic Crisis. The philosophy promotes economic development using the ‘middle path’ concepts in Buddhism as a guide, and moderation as an objective. Within the sufficiency economy approach, there are objectives for social, economic and environmental aspects. In the environmental approach natural resource management and resource use are developed “efficiency and carefully to create sustainable benefits to develop the nation’s stability progressively”.

The Thai government has already defined a comprehensive system of indicators and a monitoring and evaluation approach to resource efficiency indicators (Table 8).

Table 8 Thailand resource efficiency indicators and sources

Indicators	Source
Efficiency of renewable resource usage	Sustainable Consumption Indicators (Draft)
Proportion between the uses of non-renewable resource to total resource use	Sustainable Consumption Indicators (Draft)
Number of marine capture fishery establishments, fishing boats and fishermen during peak season by coastal zone	National Statistical Office Thailand
Domestic consumption of principal minerals by kind of mineral	National Statistical Office Thailand
Amount and variety of environmentally friendly goods and services in the market	Sustainable Consumption Indicators (Draft)
Energy intensity to the gross domestic production values	Sustainable Consumption Indicators (Draft)

Proportion of the use of renewable energy to total energy usage	National Statistical Office Thailand
Loss of forest area	Thailand National Environmental Performance Assessment (EPA) Report
Generation of municipal solid waste (tonnes / day)	Thailand National Environmental Performance Assessment (EPA) Report
Recycling in the manufacturing sector	Sustainable Consumption Indicators (Draft)
Recycled products in the market	Sustainable Consumption Indicators (Draft)
Amount of treated wastewater	Thailand National Environmental Performance Assessment (EPA) Report
The population's behavior towards materialism (lower values/volume of imported luxurious goods)	Sustainable Consumption Indicators (Draft)
Curriculums containing sustainable consumption concept at every educational level throughout the country	Sustainable Consumption Indicators (Draft)
Dissemination of information on consumption of goods and services through media and advertising	Sustainable Consumption Indicators (Draft)
Every sector, agency, and department conducts the green procurement system	Sustainable Consumption Indicators (Draft)

Source: UNEP (2008)

3.4.3 Policies towards RE (goals, targets, integration, institutional settings)

Frameworks

Key agencies which set the agenda for resource efficiency priorities are the Ministry of Natural Resources and the Environment and the Ministry of Industry. Although these ministries focus on sectoral framework plans, the Office of National Economic and Social Development Board (NESDB) is the agency responsible for developing national SCP and resource efficiency policies across ministries and institutions. Within this role, it develops SCP indicators, benchmarks, and M&E approaches. The office outlines the medium-term umbrella framework, National Economic and Social Development Plan (NESDP), which aims to address sustainable development goals and strategic agendas for the country.

In Thailand's 10th NESDP (2007-2011), the country outlined five strategic objectives related to a 'sufficiency economy' which stressed the importance of furthering economic development based on the sustainable use of resources,

and the reduction of unsustainable consumption and production. To leverage these objectives, the plan summarizes instruments that can be pursued during the implementation of the medium term strategy. These include economic instruments such as taxes and subsidies (NESDB 2007).

SCP specific goals that are highlighted in the NESDP are (UNEP 2012e):

- 33% of the total land area should be forest;
- 85% of natural water bodies (including river basins and watersheds) should meet a water quality rating of fair to good;
- Reduce the rate of CO₂ emissions per person by 5% from 2003 levels;
- CO₂ emissions to be no higher than 3.5 tons per person annually;
- Waste production in urban areas should be no higher than 1 kg per person daily; and
- 80% of all hazardous waste from communities and industries should be properly disposed.

The 11th NESDP (2012-2016) states that the vision of the medium-term strategy will be to create a “happy society with equity, fairness and resilience” (UNEP 2012b). The framework plan continues to promote SCP related concepts, and lists the improvement of environmental quality to be one of the seven key priority areas. The plan lists SCP in a broader context such as (UNEP 2012b):

- Conserve and restore the environment and natural resources;
- Enhance agricultural productivity through eco-friendly techniques;
- Shift the development paradigm and consumption behavior towards an environmentally friendly society; and
- Improve ecological efficiency of the production and service sectors.

Agriculture

The agricultural sector is a critical commodity in Thailand; because of this the Thai government has developed in recent years, policies aimed at improving the agricultural basis, not just in terms of increased yield efficiency, but also encouraging organic and climate smart agriculture. Several policies include the encouragement of sustainable practices:

- *Master Plan for Agricultural Development*: a framework plan focusing on sustainable agricultural improvements, including the use of less chemical fertilizers than conventional farming, and the increase use of organic modes of agriculture such as organic fertilizers and farming;

- *National Strategic Plan for Organic Agriculture Development*: a national strategy that encourages organic farming and reducing chemical use in agriculture;
- *Good Agricultural Practices (GAP)*: the government adopted the GAP scheme in 2004 which uses indicators to measure and label food products with good agricultural and environmental practices.

Energy efficiency

The Thai government has been very active in supporting climate mitigation goals, with the country outlining carbon reduction targets and renewable energy targets. In the 10th NESDP (2007-2011) it states that “Thailand needs to improve energy efficiency and develop renewable energy, taking into account environmental impacts and national energy security.” In this same vein, policies directed at energy efficiency have been promoted in various sectors. In the buildings and construction sector, the National Housing Authority (NHA) is the agency responsible for overseeing construction of settlements and building codes and regulations. The institution sought to increase the energy performance of buildings through the Building Energy Code law, which sets requirements on energy performance of air conditioning units/systems and efficient lighting. The Thai government has since introduced several new codes directed at improving energy efficiency during all phases of development – during the design of new buildings, the construction, and the implementation/operation (Kofiworola, Gheewala 2008).

In the energy sector itself, the Thai government has been promoting several energy conservation and energy efficiency policies measures. Institutionally, it is the Ministry of Energy that is responsible for policies directed at the energy sector. Progressively, the Ministry introduced the Energy Conservation Promotion Act in 1992 which set targets for energy savings in various sectors. Since then, the implementation of this act has been separated into year cycles with of these phases outlining goals to be met (MONRE, 2011):

- Phase I (1995-1999) – reduction of energy consumption
- Phase II (2000-2004) – reduction of energy consumption
- Phase III (2005-2011) – reduce energy intensity from 1.4:1 to 1:1 by 2017

The manufacturing and commercial industry sector has also set laws and standards for energy efficiency and overall SCP goals. The country’s 10th NESDP targets the manufacturing sector and encourages the industry as a whole to adopt better SCP practices. In this medium-term strategy, specific SCP and resource efficiency objectives are:

- Promoting cleaner production concepts to SMEs;

- Market creation and awareness raising for environmentally friendly products through mechanisms such as sustainable public procurement, labels and green supply chains; and,
- Public awareness raising campaigns about sustainable lifestyles.

For energy efficiency priorities, the Minimum Energy Performance Standards policy outlines an energy performance labeling scheme and standards for various types of products (with another 16 under way); these include: air conditioner systems, refrigerators, motor engines, ballasts, fluorescent lamps, and compact fluorescent lamps. A voluntary labeling program also exists that is targeted towards the energy performance of consumer appliances.

Public procurement

The Thai government purchases an estimated amount equivalent to 11-17% of the total GDP, making it the country's largest consumer. Strides have been taken to promote green public procurement because of this. The Green Public Procurement Policy, which was developed in 2008, pushes public entities to purchase sustainable products. This later evolved into a policy that outlined that all government agencies develop a 'green products purchase program' by the year 2011 (Ho et al. 2010).

Waste

Waste management and the 3R's have been promoted by the national government and ministries over the past decade. Waste is considered a growing concern for the country as a burgeoning middle class and population growth is expected to rise. Total municipal waste has increased 10% on an annual basis (UNDP, 2009). Because of this trend, Thai authorities have set targets in the 10th NESDP for waste reduction and management; these are (NESDB 2007):

- 30% of total national waste is recycled/reused;
- 80% of all toxic waste from industry and households are managed;
- The development of a toxic waste return system for used products.

3.4.4 Specific Instruments (if any) or suggested other approaches

Awareness instruments

Awareness instruments are also implemented in the country. One policy example that was discussed was campaigns towards sustainable consumption.

Regulatory instruments

Thailand has engaged in several regulatory approaches that work on implementing standards to improve energy efficiency. The Building Energy Code law and the Minimum Energy Performance Standards are two examples which

were discussed previously in this section. As well, the Green Public Procurement Policy regulates that government procurement include green purchasing.

3.4.5 Key actors, contacts, and organizations

Ministry of Natural Resources and the Environment

Ministry of Industry

Office of National Economic and Social Development Board

3.5 Vietnam

3.5.1 The overall scope of the resource efficiency policies within the country

The past decade has marked significant economic growth for Vietnam, with GDP growth averaging 7.2% between the years of 2001-2010 (Hai et al. 2011).

Industrialization policies and reforms have shifted the country from one reliant primarily on the agricultural, forestry and fisheries sectors, to one exporting more services and manufacturing. However, as the country continues to grow, there are increasing signs of improved resource efficiency. Indicators such as the state of natural resources indicate that the country is decoupling its natural resource consumption, and consuming less (World Bank 2011).

Overall resource efficiency concepts are relatively new in Vietnam compared to neighboring countries such as China and Thailand. However, the government is currently in the process of developing national framework approaches and goals towards sustainable consumption and production. These approaches are to be integrated in the country's National Action Plan on SCP which will cover the period 2011-2020. The details of this are to be further elaborated in the discussion below.

3.5.2 Definition of RE (indicators/metrics)

There is no current definition of resource efficiency in the country, however the country addresses the themes of resource efficiency in several different umbrella concepts, the main one being sustainable consumption and production.

The General Statistics Office of Vietnam, under the Ministry of Planning and Investment, is the agency tasked with collecting statistics and indicators for the country. The National Statistical Indicator System is the mechanism that helps in the evaluation and monitoring of specific frameworks and policies. Although specific frameworks do not mention specific indicators for monitoring resource efficiency, the General Statistics office does have some resource efficiency related indicators that it reports on an annual basis (General Statistics Office of Vietnam 2005):

- Gross output of product per ha of cultivated land and aquaculture water surface
- Production of fishery caught by province
- Land use by province
- Water level and water flow of some main rivers
- Irrigated agricultural area

- Average monthly consumption level (amount, amount of money) of some main goods per person
- Amount of harmful substances in water surface
- Rate of industrial establishments dispose waste in accordance with defined standards.
- Rate of disposed solid waste

3.5.3 Policies towards RE (goals, targets, integration, institutional settings)

Frameworks

The *National Action Plan for Sustainable Consumption and Production* will be Vietnam's first framework and hallmark legislation on resource efficiency/SCP. It is currently being developed by the Ministry of Natural Resources and the Environment, and will include two priority objectives: (1) to reduce overall material and energy intensity within systems of production and consumption, and (2) to optimize production and consumption systems for the sustainable and continuous improvement in the quality of life (UNEP 2011b). The plan, once approved will include targets in four areas:

- The development of environmentally sound products, services and technologies
- Awareness raising and education for sustainable/green products
- The development of a green procurement system
- Mechanisms that provide information on products (eco-labeling, rating systems, etc.)

The government of Vietnam, Ministry of Planning and Investment, defines development strategies in both the *Ten- Year Socio-Economic Development Plan* and the *Five-Year Socio-Economic Development Plan*. The 2011-2020 Ten-Year Socio-Economic Development Plan is a strategy that focuses on macro-economic stability and sets the foundation to move the country towards a modern industrial economy, and lays out the foundation for structural reforms. It outlines "breakthrough areas": human resources/skills development (in modern industry and innovation), improving market institutions, and infrastructure development. The strategy does highlight approaches towards sustainable development through a three pillar approach of development:

- (1) ensure high and sustained growth through improved efficiency;
- (2) increase social development and improve the material and spiritual lives of the people; and
- (3) protect natural resources and the environment (CPV 2011).

The 5-Year Socio-Economic Development Plan echoes the objectives defined in the 10-year plan – high economic growth for the country. Although it does not explicitly mention resource efficiency, it does define several targets that are relevant to the topic (Ministry of Planning and Investment 2006):

- By 2010 achieve a 42-43% increase forest coverage;
- All new production facilities apply clean technology or have pollution control facilities by 2010;
- Ensure waste treatment;
- 50% of industry apply environmental standards, with some achieving ISO 14001 certificates;
- All industrial and export zones have centralized wastewater treatment systems by 2010, of that: 90% of solid waste is collected and treated, and 80% for hazardous waste and 100% for medical waste.

Agriculture/ Forestry

The Ministry of Agriculture and Rural Development is the agency that has jurisdiction of agricultural policies and rural development issues. The Five-Year Socio-Economic Development Plan outlines agriculture as a key sector for developing a rural economy. It mentions the development of sustainable agriculture and states that that higher efficiency in food production should be the overall goal in rice production areas. It states that areas which are experiencing lower productivity of rice should shift to other types of crop cultivation that has higher efficiency and crop returns (UNEP 2012e).

Sustainable forest management has been integrated in several policies in Vietnam. The most recent strategy, Forest Development Strategy 2006 – 2020 makes reference to sustainable forest management “Activities of forestry production must be based on a foundation of sustainable management, through planning forest protection and development and aiming at continuous improvement of forest quality”. Some resource efficiency objectives in the strategy include: objectives to maintain the volume of fuelwood harvest, complying with forest certification standards (in export markets which have sustainability indicators in the standard), and commercial uses of forests in sustainable concessions or leases.

Ecolabeling

Although the government has not created a formal certification system for sustainable products, the Vietnam National Environment Administration is currently holding consultations on a certification scheme called the Vietnam Green Label.

Energy efficiency

Energy trends show that the country has increased its energy consumption by eight fold in the past two decades. This increase can be attributed to rising household electricity consumption (due to rising incomes) and also increased industrialization as the country moves from an agricultural based economy towards greater manufacturing (World Bank 2010). Current trends indicate that overall energy consumption will continue to increase. Energy efficiency has been acknowledged as the most cost-effective way to meet this rising demand.

The National Energy-Efficiency Program has been developed by the Ministry of Industry and Trade and it was signed into law for the period of 2005-2012. It is a comprehensive policy that outlines measures towards improved energy efficiency through targeted activities. For example, the program allocated direct funds (approximately 2 million US\$) to support energy efficiency projects; mostly energy efficient lighting manufacturers.

The program is comprised of six components:

- (i) state management on energy efficiency and conservation,
- (ii) education and information dissemination,
- (iii) high energy efficient equipment,
- (iv) energy efficiency in industrial enterprises,
- (v) energy efficiency in buildings, and
- (vi) energy efficiency in transportation.

Each component focuses on meeting a core set of objectives such as the development of standards for appliances (component 3) and conducting public awareness activities (component 2). Targets embedded in the program include an energy savings target of 3-5% of total national energy consumption from the years 2006–2010; and 5-8% savings in total national energy consumption during 2011–2015 (World Bank 2010).

The Ministry of Construction who is the agency responsible for buildings and construction has also been developing energy efficiency policies. It initiated a regulation in 2005 that regulates energy performances in buildings. This *Building Energy Code* sets performance standards for buildings and also lighting. Other energy efficiency policies include: the *Law on Energy Efficiency and Conservation*, which provides financial assistance to research and development in energy efficiency technologies; and another policy entitled the *Environmental Tax Law* issued in 2012. This law will levy a tax on fossil fuel products (including petrol, oil and coal) and products such as plastic bags, herbicides and chemicals. The law aims to encourage the production of lower carbon and energy efficient products (UNEP 2012e).

The country is also improving governance in the field of energy efficiency and created the Energy Efficiency and Conservation Office in the Ministry of Trade to coordinate government efforts in the sector.

Manufacturing/ Cleaner Production

The *Vietnam National Strategy on Cleaner Production* was issued in 2009 by the Ministry of Industry and Trade, and sets the plan for cleaner production in industry to move towards greater resource efficiency and environmentally friendly practices. This is paired with the National Cleaner Production Center which was created in the 1990s to assist companies in greater awareness of CP methods. The national strategy has identified targets to achieve by the year 2020 which are related to the application and awareness of cleaner production in Vietnam (UNEP 2012e):

- 90% of industries are aware of the benefits of cleaner production;
- 90% of provincial government departments involved in industry and trade can provide cleaner production advice to industry;
- 50% of industries apply cleaner production practices;
- 50% of production units should obtain ISO 14001 certification.

Transport

The Vietnamese government is in the process of developing policies that address sustainable mobility and public transport. These strategies are developed by the Ministry of Transport. The *Transport Sector Development Strategy to 2020* encourages the development of public transportation and mass transit systems, particularly in highly populated urban areas. In addition, the country is currently drafting the *National Strategy on Environmentally Sustainable Transport*. It contains a number of specific environmental targets to be achieved by 2020, including (Tien 2008):

- 30% in CO₂ emissions from vehicles as compared with 2005 levels;
- 10% of total fuels used by vehicles originate from clean fuels;
- 50% of commutes use public transport (applicable to big cities).

The government is also in the process of reviewing vehicle emission standards. Currently, the Ministry of Transport (MOT) has authorized the Vietnam Register, the organization overseeing standards development in vehicles, to create a roadmap for improved vehicle emissions standards.

Waste

The National Strategy of Integrated Solid Waste Management (to the year 2050) sets targets for the reduction of solid waste and states: *It is expected by 2050*

that all kinds of solid wastes will be collected, reused, recycled and treated completely by advanced technologies which are environmentally friendly, suitable to each locality and limiting the landfill waste to the minimal level. It lays out a plan for the improved integrated management of solid waste, and also includes specific targets for 2025 (not an exhaustive list) (Socialist Republic of Vietnam 2009):

- 100% of the total solid wastes from households in urban area will be collected and treated in an environmentally manner, of which 90% will be recycled, reused, recovered energy or produced organic fertilizer;
- 90% of the total solid wastes of constructions sites from cities will be collected, of which 60% will be reused or recycled;
- 80% of cities, which have their own recycling facilities, shall carry out waste separation within households;
- 85% of the nylon bags used at supermarkets and commercial centers will be reduced compared to 2010 levels.

Water

Although Vietnam possesses abundant water resources, the overexploitation of water consumption and water quality is a sizable problem that the country faces. Currently, the management of water resources is lead by the National Water Resources Council and the Agency of Water Resources Management within the Ministry of Natural Resources and Environment (WEPA 2012). Implementation is left to the jurisdiction of the Provincial Peoples Committee, which is controlled to a large extent by the central government. Specific oversight of different aspects of water management is divided between the other ministries and agencies (FAO 2010). Some of the policies that address sustainable development in the water sector are (UNEP 2012e):

- *The 2006 National Strategy on Water Resources to 2020* - sets the framework for the protection of water quality, overuse and the sustainable development of water resources
- *Law on Water Resources* – this policy is currently being revised to increase frameworks on water sharing rights
- *National Target Program on Improvement of Efficiency for Water Resource Protection, Management and Multipurpose Use* - a policy that is currently in draft form which will include actions that mitigate water scarcity.

3.5.4 Specific Instruments (if any) or suggested other approaches

Economic instruments

The Vietnamese Ministry of Finance has developed the Macro-economic Reform Program which came into effect this year. This policy introduces an environmental tax law on various products that are considered environmentally unsafe and/or dangerous including hydrochloro-flouorocarbons (HCFC), various fuels (gasoline, diesel, and kerosene), coal, pesticides and plastic bags (Willenbockel 2011). The government considers that this tax will reduce the demand of these materials and products and the market will shift towards more sustainable consumption of alternative materials.

Another example of an economic instrument is the country's Climate Funds which are public funds for energy efficient lighting manufacturers.

Regulatory instrument

The Building Energy Code is an example of a regulatory instrument. This policy sets performance standards on buildings and lighting.

3.5.5 Key actors, contacts, and organizations

Mr. Hoang Duong Tung

Deputy Director General, Vietnam Environment Administration, Ministry of Natural Resources and Environment

Email: htung@vea.gov.vn

4 Africa

4.1 South Africa

4.1.1 The overall scope of the resource efficiency policies within the country

In 2008, the South African Minister of Finance delivered the following statement:

“We have an opportunity over the decade ahead to shift the structure of our economy towards greater energy efficiency, and more responsible use of our natural resources and relevant resource-based knowledge and expertise. Our economic growth over the next decade and beyond cannot be built on the same principles and technologies, the same energy systems and the same transport modes, that we are familiar with today...”

This represents the most explicit reference to resource efficiency by a senior politician in South Africa to date. Although the country has taken some action with regards to resource efficiency and SCP, to date there remains more to be done. South Africa lacks accounting methods for resource efficiency, such as an integrated material flow analysis linked to indicators. In the past couple years, although the country has been involved in global platforms and developing framework pieces of legislation, the focus of the government has been on decoupling energy and water, as opposed to materials consumption (UNEP 2012e).

4.1.2 Definition of RE (indicators/metrics)

An exact definition for resource efficiency has not been defined by the South African government. However, in several framework policies for sustainable consumption and production, and sustainable development, language included embodies that of resource efficiency. A further discussion on some of these policies is included below.

Indicators have been defined for resource efficiency within the South African National Strategy for Sustainable Development and Action Plan. These along with their respective targets are explained in further detail below.

4.1.3 Policies towards RE (goals, targets, integration, institutional settings)

Frameworks

The country's governance system is that of a constitutional democracy that has three layers of government, operating independently of each other (national, regional, local); policy analysts have asserted that this has resulted in lack of

coordination between government entities and intra-governmental communication. Regarding resource efficiency actions, the country has pursued many frameworks and policies that are sectoral based and implemented through one government body, opposed to inter-governmental coordination. This is perhaps the most difficult challenge for the country as it searches for sustainable solutions for resource use (UNEP 2012e).

South Africa's national constitution states that the state must ensure for the people and the country "...ecologically sustainable development and use of natural resources while promoting justifiable economic and social development" (Section 24 (b)). This constitutional foundation has provided the justification and basis for the country to pursue resource efficiency initiatives.

The South African government has been making strides towards sustainable consumption and production following its commitments to the Marrakesh Process and the Johannesburg Plan of Implementation in 2008. Later in the year the National Framework for Sustainable Development was finalized, and argued for a "dematerialization" and "decoupling" of economic growth. In it were the priority areas that had earlier been identified by the National Roundtable, which include (South Africa Ministry of Environment 2008):

- Enhancing systems for integrated planning and implementation;
- Sustaining ecosystems and using national resources efficiently;
- Economic development via investing in sustainable infrastructure;
- Creating sustainable human settlements; and
- Responding to emerging human development, economic and environmental challenges.

Currently the country is implementing its National Strategy for Sustainable Development and Action Plan (NSSD 1) which is active from 2011–2014. NSSD 1 has identified 113 interventions which can be monitored by the national authorities. The strategic priority areas are similar to those laid out in 2008, with two additional strategies that focus on moving towards a green economy and responding to climate change. Within the interventions that were defined, 20 indicators have been chosen to monitor progress and achievements. They were selected from already existing indicators (Table 9) including: Development Indicators, the Millennium Development Goals and the 12 government outcomes. The agencies concerned in implementing these acts are the Department of Environmental Affairs and the multi-ministerial National Committee on Sustainable Development (NCSD).

Table 9 Selected indicators within South Africa's NSSD

Strategic Priority	Headline Indicators	Benchmarks or Targets
Enhancing systems for integrated planning and implementation	<ul style="list-style-type: none"> Establish an effective National Committee on Sustainable Development (NCSD) 	<ul style="list-style-type: none"> Established by March 2012
	<ul style="list-style-type: none"> Number of government entities and private sector companies that report against sustainability indicators 	
	<ul style="list-style-type: none"> Number of community-based capacity building projects 	
Sustaining our ecosystems and using natural resources efficiently	<ul style="list-style-type: none"> Curtail water losses at water distribution systems to an average percentage reduction 	<ul style="list-style-type: none"> Savings from 30 to 15% by 2014
	<ul style="list-style-type: none"> Reduction (saving) of demand as determined in the reconciliation strategies for seven large water supply systems by 15% 	<ul style="list-style-type: none"> Assessment of water requirements and water monitoring systems implemented by 2014 Increase the number of Blue Flag beaches [to above 29 beaches] Rehabilitation of land affected by degradation [3.2 million ha by 2014] Percentage of coastline with partial protection [from 12 to 14% by 2014] Percentage of land mass protected (formal and informal) [from 6.1 to 9% by 2014]
Towards a green economy	<ul style="list-style-type: none"> Progress on the implementation of the nine green economy programs 	<ul style="list-style-type: none"> Impact on social (jobs), economic (industry development) and environmental (ecosystem) benefits by 2014
	<ul style="list-style-type: none"> Increase percentage (or amount) of financial resources streamlined and spent for green economy 	<ul style="list-style-type: none"> 2010/11 amount – Industrial Development Corporation: R11.7 billion, Development Bank of South Africa: R25

Strategic Priority	Headline Indicators	Benchmarks or Targets
	programs	billion, Private: >R100 billion, National Treasury: R800 million
	<ul style="list-style-type: none"> Number of patents, prototypes, and technology demonstrators added to the intellectual property (IP) portfolio annually from funded or co-funded research programs 	<ul style="list-style-type: none"> Five additions to the IP portfolio – patents, patent applications, licenses and trademarks by March 2014
	<ul style="list-style-type: none"> Share of GDP of the Environmental Goods and Services (EGS) Sector 	<ul style="list-style-type: none"> 3% of GDP by 2014
Building sustainable communities	<ul style="list-style-type: none"> Percentage of households with access to water, sanitation, refuse removal and electricity 	<ul style="list-style-type: none"> Respectively, 92 to 100%, 69 to 100%, 64 to 75%, 81 to 92% [by 2014]
	<ul style="list-style-type: none"> Upgrading of 400,000 households in well-located informal settlements with access to basic services and secure tenure 	<ul style="list-style-type: none"> Approximately 2,700 informal settlements are in good locations, i.e. located close to metropolitan areas and basic services, have high densities and, in 2008, housed approximately 1.2 million households
	<ul style="list-style-type: none"> Increase in the South African Human Development Index (HDI) 	<ul style="list-style-type: none"> Benchmark is 2010 HDI: 0.597
	<ul style="list-style-type: none"> GINI coefficient (reduce income inequality) 	<ul style="list-style-type: none"> Benchmark is 2008 GINI: 0.66
Responding effectively to climate change	<ul style="list-style-type: none"> Greenhouse gas emissions (metric ton CO2 equivalent) 	<ul style="list-style-type: none"> 34% reduction below a business-as-usual baseline by 2020 and 42% by 2025
	<ul style="list-style-type: none"> Percentage of power generation that is renewable 	<ul style="list-style-type: none"> 10,000 GWh by 2014

Strategic Priority	Headline Indicators	Benchmarks or Targets
	<ul style="list-style-type: none"> Climate change adaptation plans developed 	<ul style="list-style-type: none"> 12 sectors by 2012 (Biodiversity, Forestry, Water, Coastal Management, Agriculture, Health, Tourism, Land and Rural Development, Local Government, Fisheries, Human Settlements, Business/ Insurance)

Source: South Africa Department of Environmental Affairs (2011)

Likewise, elements of resource efficiency are illustrated in three other national action plans: the New Growth Path, Industrial Policy Action Plan, and the Draft New Development Plan.

The New Growth Plan, institutionally governed by the South Africa Economic Development Department, sets out a path for the country. The 4th Accord is related entirely to the Green Economy. Within the 4th Accord there are several commitments that touch on resource efficiency goals. These are: energy efficiency, waste recycling, re-use and recovery, and retrofitting. There are specific commitments that are made in the accord, one is that: the “government commits to finalize a Waste Innovation Programme that aims to promote reduced waste generation during production processes. Re-use will be promoted, as one waste stream can potentially be the raw material for a separate industrial process, leading to novel products” (Economic Development Department South Africa 2011).

The Industrial Action Plan (2012-2013) shows signs of increased promotion of resource efficiency priorities across industrial strategy, specifically in agro-industries. The action plan states the objective to encourage organic agriculture, and by the end of 2013, has outlined a target of developing the ‘South African Organic Food Standard’. It also details the action plan for supporting more water efficient use in the sugar sector, as it consumes one of the highest amounts of water relative to land under cultivation (Department of Trade and Industry South Africa 2011).

The New Development Plan 2030 was released in 2011 and details the country’s goals towards the achievement of greater economic development and social equity. The plan, developed by the National Planning Commission, mentions sustainable natural resource use, especially related to water, but does not detail

actions towards the achievement of greater efficiency (National Planning Commission South Africa 2011).

Energy efficiency

The Department of Minerals and Energy, Energy Efficiency Directorate has developed the National Strategy for Energy Efficiency in 2005, which was then revised in 2008. It sets a target improving energy efficiency in the country 12 percent by 2015. The strategy outlines specific reduction targets for sectors, and as well policy instruments to support them. Some of the policy instruments included are: awareness campaigns, regulatory mechanisms, and economic instruments.

Mining

The South African Department of Minerals and Energy has developed a sustainable strategy towards more resource efficient and sustainable mining. The sector is significant, with mining comprising 8.8% of the country's GDP (Bloomberg 2012). This strategy remains ongoing and the government is currently creating indicators to monitor progress and also under consultations with stakeholders to define the strategy and approaches (Department of Minerals and Energy, South Africa 2012).

Waste

South Africa has various waste policies that set the foundation for greater resource efficiency in households and within various sectors. The South African parliament adopted, in 2009, the National Integrated Waste Management Act which decrees that every local government will have to prepare an integrated waste management plan that specifies targets for recycling. This important move towards resource efficiency helps position the country into a post-disposal approach to managing solid waste (UNEP 2012d). Additionally, the Mineral and Petroleum Resources Development Act of 2002 and the National Cleaner Production Strategy are also initiatives that push forward the SCP agenda. Respectively, whereas one targets regulatory control in the mining sector, the other has established incentives for businesses (such as encouraging investments in businesses that are recycling enterprises).

4.1.4 Specific Instruments (if any) or suggested other approaches

Awareness instruments

The ecolabeling program and energy efficiency education programs are examples of some awareness mechanisms that the government has been implementing.

Economic instruments

Examples of economic instruments include funding/ grants for recycling businesses, such as in the National Cleaner Production Strategy.

Regulatory instruments

Regulation in the mining sector includes policies that regulate waste.

4.1.5 Key actors, contacts, and organizations

Responsible for implementing/ monitoring National Framework for Sustainable Development:

Ms Dorah Nteo

Ms Mapula Tshangela - Email: mtshangela@environment.gov.za

Ms Faith Phooko

Susanne Dittke:

Founder, EnviroSense CC

envirosense@xsinet.co.za

5 Latin America

Environmental protection and economic development are often presented as almost mutually exclusive objectives. Economic analyses conducted in Latin American countries frequently overlook the consequences associated with the depletion of natural resources. The quality of life for future generations depends on an environmentally conscious and long term development process being implemented today.

Policies oriented towards more sustainable development, and a more efficient use of natural resources will contribute significantly to this objective. In order to assess the region's progress towards increased sustainable development.

A more efficient, sustainable and inclusive use of resources requires the State assuming a leading role in regulation and control. It is also vital to have strong control from civil society promoting access to information and accountability.

The growth of any production sector without adequate controls regulating sustainability may damage not only the environment but also other productive sectors.

All stakeholders have a role to play in achieving sustainable development with economic growth and environmental protection. Civil society should play a "watchdog" role so that all stakeholders take responsibility and are subject to a process of accountability.

- **Civil society** has a key role in raising awareness and lobbying of stakeholders to design common strategies and to promote the implementation of environmental measures. Civil society groups (CSOs) need to ensure their involvement in institutional bodies, including those in charge of redesigning policies or incentives related to production, efficiency and sustainability. Civil society involvement should not be limited to the right to participate, but include technical contributions, shared experiences and expertise that could contribute to the preparation of better policies and strengthened institutions.

Transparency, accountability, participation, environmental perspective, ecology, climate change, social inclusion, family farming, decentralization, local development and trade impacts are all areas where civil society can contribute to the promotion of resource efficiency and sustainability. This can be done at local, national and regional levels, through their involvement in public-private projects, in the management of public initiative projects, by advising the private sector and by education and outreach campaigns to the general public.

CSOs can circulate cases that successfully combine economic growth and environmental protection in order to raise awareness and replicate successful experiences, as well as advising and mobilizing campaigns against negative cases, in the quest to promote more sustainable production practices. Civil society worldwide and in Latin America has had a significant impact on public opinion and consumer behavior in relation to environmental issues.

The most notable resource efficiency awareness campaigns driven by civil society in the region have been those of efficient use of potable water in households and efficient use of electricity both in households and offices. The assertions used in these campaigns were based on environmental considerations and the conservation of resources as well as economic considerations such as savings for the users.

Despite these efforts where governments, the private sector and the civil society participated, the issue of resource efficiency and sustainability is not yet a subject of public debate. There is also a lack of awareness of the possible impacts of non-industrial economic activities on resources, with the only exception to this being that of soybean crops. CSOs can help to address issues such as the impact of agriculture on land use, and the think act- consume outlook in terms of resource “efficiency” in their education and awareness raising campaigns.

CSOs may play a significant role, not only in exposing environmental rights violations suffered by local populations, socio-environmental abuses by corporations or negligence by the authorities, but also in providing evidence through the systematization of cases, practices and productive approaches that promote sustainability and efficiency. Facts of these cases may be used for public awareness and education campaigns.

In addition to using the ethical arguments of environmental sustainability in their public awareness and advocacy campaigns, CSOs must include an efficiency approach that integrates economic considerations in their awareness raising campaigns.

This will allow consumers and producers who are not aware of the environmental approach, to be more open to the subject and will strengthen the sustainability argument from a different perspective.

Academia. Research aimed at improving understanding of environmental aspects associated with economic activities is essential. It is necessary to have scientific knowledge to develop an adequate regulatory and monitoring framework, as shown by the cases of setting environmental standards for biofuels and salmon production in Chile. A more in depth analysis of the regional

climate patterns, the implications of trans boundary land uses, mapping and monitoring changes in land use and deforestation.

Improving environmental statistics is of great importance for the region in order to have a better understanding of the situation and the regional trends on resource sustainability and efficiency. There is a significant gap in environmental statistics related to water use, local atmospheric pollution, effluents, waste and land use change. There are also gaps in the charges applied to the natural capital and environmental services they provide, as well as in decontamination costs like compensation for damages. Academics and experts of the region may promote progress in these areas in alliance with other stakeholders from the public and private sectors, and the civil society.

Private Sector. It is worth highlighting the benefits associated with a more efficient and sustainable use of resources to achieve economic growth with environmental protection. Business chambers may play a leading role in the dialogue with corporations, by facilitating the dissemination and acceptance of measures promoted directly by the public sector.

CSOs may influence the business sector through public awareness and related campaigns, being key to collaborating with enterprises or producers who have included environmental sustainability in their business and corporate social responsibility strategies.

These collaborations may be specific contributions for joint public awareness campaigns to promote a more responsible and sustainable consumption. They may also be useful in the promotion of eco-friendly labels; joint advocacy actions before authorities to promote incentives for the most sustainable and efficient producers; and in the joint implementation of environmental projects on the ground - working directly with communities where business or producers carry out their activities.

National governments. The report urges that the State should adopt an active role towards sustainable development. Environmental policies and productive development need to be redesigned in order to include efficiency improvement as an objective, and to make sure that the benefits of a more efficient use of resources are not confined to the hands of few stakeholders.

Thus, efficiency goes together with benefit inclusion and distribution policies. These policies should also be defined from both national and regional strategic viewpoints, which also need to take into account the growing influence of environmental requirements as part of the conditions to access international markets.

The most effective policy instruments to improve efficiency are the implementation of incentives, information campaigns and publicizing of successful pilot projects. Some initiatives that appear to be successful in the case studies analyzed resorted to instruments such as the creation of watershed committees; the application of charges to water use; promoting energy efficiency; implementing cleaner production programs; sustainable consumption and production initiatives. These tools should be considered by stakeholders in the future, and thus it is essential that the civil society assesses their performance, to promote adaptations of these experiences and other good practices.

This type of benchmarking information should be considered by public stakeholders as part of the tools available to promote efficiency and sustainability.

Local governments. Sub-national or local governments should also ensure citizen and civil society participation in the definition of their strategic priorities by providing a clear structure and transparent system to encourage public participation. Local civil society advocates can provide valuable input, and can influence the existing decentralization and territorial planning efforts while at the same time promoting their own agendas. In some countries, like Uruguay, the decentralization laws provide for citizenship participation so there is a legal framework in which civil society can operate.

The challenge is to make this a reality in Mexico, and ensure that land use planning and local development policies become part of a perspective of efficiency and sustainability in the use of resources, especially regarding the impacts of land use. These aspects are not usually part of the traditional territorial planning agenda, nor are they among the priorities of local governments. Social and environmental NGOs can foster the inclusion of these issues on the agenda so that local development strategies integrate these dimensions in a proactive manner.

Impact of resource efficiency on public financing

Markets. With regard to the role of incentives and markets, the cases analysed reflect several situations where paying for the use of resources, such as charges for water use in Brazil, has had a positive impact on resource efficiency without necessarily facing political opposition. In some cases, external market requirements have led to improvements in the forms of production and have contributed to greater resource efficiency.

However, feasibility of implementation depends on the market and the particular characteristics of the industry.

Producers often have to adapt to the environmental requirements imposed by the external markets to avoid trade barriers. Such is the case of sugar cane producers in Brazil where sustainable practices have been adopted in order to adapt to international market demands.

By contrast, Argentina claims that tracing the origins of soya products is cost prohibitive and therefore if international buyers require tracing it to ensure it does not originate from recently deforested land, the Argentine producers could be excluded from the market.

CSOs have followed the issue of soya in Argentina and Latin America closely and although it is not possible to audit the vast areas that produce the crop, some monitoring facilities have been implemented in an effort to oversee some geographical areas and production plants, which may be used as a first step towards traceability. Once again public-private cooperation involving environmental organizations and academia could provide an alternative to cover the costs that cannot be paid by the business sector alone, and it would also ensure greater transparency and accountability.

In order to anticipate these situations, it is essential that the private and public sector have a broader vision of competitiveness, considering the production method and technology used, aside the price of raw materials.

In the case of biofuels, some markets demand certification of the surplus greenhouse gas emissions in the whole production cycle and its effect on deforestation. It is evident that the concerns and external pressure on bio-energy's sustainability are here to stay and that this issue is yet to receive the necessary attention in the region. Civil society could play a leading role in bringing this issue into the spotlight by calling for accountability and also by identifying private stakeholders that are promoting innovative practices.

Private stakeholders who are successfully using environmentally sustainable practices could therefore become allies in government advocacy and awareness strategies to promote changes in the consumption patterns of Latin American societies.

Civil society in Latin America has carried out several campaigns to raise awareness and expose the socio-environmental impacts of trade liberalization or treaties to protect investment. The trends addressed in this report analyzing primary dependent economies, increase in industry sectors with high pollution potential and external market pressure indicate that CSOs together with the academic world can play an important role. Working together the two groups can promote a better understanding of the impact of trade agreements and

investment protection mechanisms on the environmental policies of Latin American countries and their impacts on resource efficiency and sustainability.

Another issue on the agenda for civil society agenda has been the decent job agenda and the promotion of quality employment. Given the close relationship between the exporting productive pattern and the capacity to create quality jobs in Latin America, civil society could foster more in-depth analyses on the links between resource efficiency and employment.

This would include exploring whether greater resource efficiency may reduce unemployment, and evaluation of gender impacts.

There are certain lessons learned regarding resource efficiency that a report from ECLAC, *Project Document Collection – Energy Efficiency in Latin America 2010* briefly describes:

- Achieving concrete results in rational and efficient use requires institutions capable of designing, implementing and operating programmes on a stable, on-going basis.
- There continues to be a great potential for energy savings. 20%-25% of the energy consumption could be eliminated through measures that would rapidly pay for themselves
- Policy signals have been insufficient to induce energy-saving behaviours and actions
- Private funding must be more closely articulated with saving opportunities
- Cogeneration for industry and large tertiary-sector facilities has huge potential that has remained unexploited due to the lack of regulatory incentives
- National energy efficiency programmes require funding mechanisms designed specifically to address and coordinate the massive number of investment decisions required
- There is a scarcity of national/regional technical personnel dedicated to energy efficiency
- Supply side efficiency has been shown to work. Some sectors' deregulation created incentives for competition, resulting in drastic reductions in consumption in certain areas

The aforementioned study by ECLAC points out several general conclusions related to resource efficiency in Latin America (focused on energy):

- The situation of national efficiency programs, projects and initiatives varies widely from one country to another as result of numerous factors, including the size and forms of country's economic structure, population distribution, access to technology and information, regional integration, access to funding, cultural and social factors, priorities, etc.
- In a number of regions there's a lack of continuity in policies and programs specially if based on external funding
- There're clear difficulties in monitoring results. The absence of key indicators is a major shortcoming of national programs.

Resource Efficiency: Economics and Outlook for Latin America

Summary of the Report presented by UNEP and the Mercosur Economic Research Network "Resource Efficiency: Economics and Outlook for Latin America".

According to the report, the main challenges for an efficient use of resources in Latin America are:

- Public-private cooperation at local, sub-national and national levels.
- Territorial planning and effective implementation of land-use regulations.
- Promotion of regional cooperation strategies in areas such as climate change, environmental impact assessment in the primary sector, and water regulations
- Information access and availability. Generating and synthesizing reliable information on the use of resources and its economic and environmental implications.

Defining and implementing public policies focused on an efficient use of resources can play a significant role in boosting economic and social development in Latin America. A better efficiency in the use of resources would improve sustainability and competitiveness. It would also help reducing poverty and inequality, in line with the objectives of the UN Conference on Sustainable Development 2012 (Rio+20).

Achim Steiner, UN Under-Secretary General and UNEP Executive Director, has stressed "the urgency of forging a new development path that makes a fundamental break from the past—a break in favor of sharply rising resource efficiency that decouples GDP growth from environmental decline: such an approach offers not only economic gains, but ones that address both poverty and inequality and maintain the region's natural capital".

The study focused on three thematic areas based on their importance in Latin America (land use changes, energy and climate change, and water use) and six countries (Argentina, Brazil, Chile, Mexico, Paraguay and Uruguay), all of which were subject to an in-depth analysis. According to the report, the primarization of the economies of some of the Mercosur countries, as well as Chile and Mexico, has triggered a growing pressure on essential resources, especially on land and water. The lack of initiatives, policies and programs aimed at preventing environmental impacts caused by productive development, can discourage environmental improvement, resulting in negative economic consequences.

Public Policy Recommendations

Good policy making in Latin America requires “robustly measuring and minimizing environmental impacts of sectors ranging from agriculture, fisheries, livestock and manufacturing to the fate of agrochemicals and how natural resources are being managed in the first place”, Achim Steiner said. The report presents four possible scenarios in terms of sustainability and resource efficiency between 2010 and 2030. Three of these scenarios, “Efficiency without Sustainability”, “Status Quo: Neither Sustainability nor Efficiency”, and “Sustainability without Efficiency”, imply some advances, but do not represent significant improvements in resource efficiency in the long term. The fourth scenario, titled “Efficiency, Sustainability and Governance for Inclusion”, represents the most desirable situation, where efficiency improves along with sustainability. This scenario implies a virtuous circle where the use of resources improves along with the quality of public management, thus increasing sustainability and the participation of all actors involved. This scenario promotes a more inclusive development model aimed at inequality reduction, and it can contribute to a transition towards a green economy. In the framework of these four possible scenarios, the report includes a series of public policy recommendations at a national and regional level. It also highlights that resource efficiency increases savings and competitiveness and generates economic benefits, not only for productive sectors with an intensive use of resources, but also for society as a whole.

5.1 Brazil

Meeting the energy demand in a sustainable fashion with minimum damage to the environment represents a significant challenge to Brazil as a nation. This would require, on the one hand, **expanding the supply capacity of renewable sources** and, on the other, **restricting demand** by modifying the habits of society and increasing production, transportation and energy consumption efficiency through innovative technologies and improvements of traditional installations and equipment.

There are several solutions for attaining these objectives but they also involve several contradictions; therefore, a comparison of harm and benefits is needed, which is not always easy to quantify. Especially difficult is reconciling all of the above with a minimum cost to consumers.

Context

Since the 80s when the environment started to be a major issue. Concerns have never stopped increasing and various studies aimed to better characterization of specific problems in the search of solutions.

Awareness of the seriousness of damage has led to mobilization of public mainly against deforestation, inappropriate use of land and water resources, decline of biodiversity and above all the emission of Green House Gasses which became the background for the discussion of energy vs. environment.

In Brazil as some of the other forested countries, deforestation is a major concern. Discussions have not given much attention to the fact that harm to nature is a consequence of all human undertakings aimed at producing goods and services, especially energy. In a practical appreciation of large projects involving energy, three complex issues emerge:

- There are usually several options for attaining a certain target whose pros and cons should be compared
- Projects of public interest, even those with a wide scope, cause material and moral damage to specific groups not necessarily benefited from the project
- It is difficult to weigh and legally draw a line between the interests of the public and the individual

In Brazil, an analysis of opinions on various environmental problems points more to agreement than controversy.

On one hand there are essential controversies around specific issues. Highlights regarding the production of energy are those that refer to the merit of utilization of major hydro energy resources that involve changes in the course of rivers, the construction of reservoirs and the relocation of people. Also relevant are those regarding the worldwide disagreement on nuclear power, the one crop sugar cane and soy, the extensive cattle raising with its impacts on deforestation.

Clean Development Mechanism

Within the specific sphere of Climate Change conventions Brazil was the first nation to establish the entity included on the CDM, namely the Designated National Authority to coordinate actions on this sphere. The Inter Ministerial Commission of Global Climate Change was appointed with the objective of articulating government actions resulting from the United Nations Framework Convention on Climate Change. This Commission congregates all ministries under the presidency of the Minister of Science and Technology. Including among its attributions is the analysis of projects that result in a reduction of emissions and are eligible for the CDM.

The reduction of emissions attained by Brazilian projects in the first credit obtaining period until 2008 was 144 million tons of carbon dioxide, equal to 10% of the World total. Mainly responsible for these reductions were the electricity-generating sector (2/3), pig farming and garbage dumps (landfills) reducing respectively carbon dioxide and methane.

Building the Environment's institutional Framework for efficient management

The National Council of Environment (CONAMA) was created to carry out constitutional provisions concerning the environment, both as advisory and deliberative body, using the IBAMA as its executive branch. Regulations introduced by means of CONAMA resolutions were attributed the power of Law.

An environmental compensation was introduced for projects with significant environmental impact, which includes two controversial items: one stipulates only a minimum of 0.5% of the total cost of the project, leaving the entrepreneur at the mercy of the licensing authority's criteria as the true value of compensation; the second does not establish a link between the compensation and the measures adopted by the entrepreneur to mitigate the impacts of the project.

Water

Water and energy resources are plentiful in Brazil, but highly unevenly distributed. Hydropower represents 83% of the country's installed capacity, while new energy needs are expected to be met by thermal plants fuelled by natural gas. A recently completed natural gas pipeline from neighboring Bolivia was seen as a solution to future energy needs, but this contract is now likely to be renegotiated. Complicating the country's energy scenario is a partial privatization of the power sector, and a recent drive by President Lula and his administration to stabilize electricity tariffs.

As in other developing countries, Brazil is striving to respond to the challenges posed by rapidly growing urban populations. In Brazil's southeast, the cities of Rio and Sao Paulo strain under the weight of providing urban services to some of the largest urban slums – favelas - in Latin America. In the country's drought prone northeast, economic growth is concentrated along the coast, pushing those in the region's interior toward opportunities in the cities of Recife, Salvador, Fortaleza and Natal.

In Brazil an institutional framework was created to manage water, which is the National Water Agency. The former Geological Service created on the lines of the US Geological Survey included a Water Division where the first river flow measures were carried out in Brazil. Later this service changed until it became the National Department of Water and Electricity Power. Although the Code covers considerable ground the water issue in the federal administration remained in principle linked to hydroelectric power. Water for normal supply of urban centers was the responsibility of state and municipal administration.

In view of the growing awareness that water would become an scarce resource and looking for efficiencies on its use and management, the National Policy for Hydro Resources was introduced along with the creation of its own specialized structure under the Ministry of Environment, which encompassed the Secretariat of Hydro Resources and the National Council for Hydro Resources and the National Water Agency (ANA). This body proceeded to coordinate the already existing grid of hydroelectric stations.

In 2000 procedures for granting water rights were established. A register of users which made it possible to start charging for its use and look for efficiencies within the system.

Brazilian water utilities struggle to balance existing infrastructure with the changing demands presented by unplanned housing growth. As in other parts of the world, poor Brazilians lack urban services that more affluent Brazilians take

for granted. When it comes to water supply, *favela* dwellers often resort to the services of water vendors, paying water prices that are several times higher than those paid by inhabitants with formal water service.

To address these challenges several private organizations (e.g.: Watergy) seek to provide water utilities with a variety of efficiency tools. Watergy is a global program of the Alliance to Save Energy that provides water utility managers with the knowledge and tools to make their systems more efficient, improving water service, expanding water access, and saving considerable quantities of water, energy, and money. In the process, the strain on ground and surface water sources is reduced, as well as the environmental impacts associated with generating the energy needed to pump and treat water.

Early efforts in Brazil focused on individual utility partnerships. The longest standing of these partnerships was launched in 2001 with the water and wastewater utility of the state of Ceará in the country's arid northeast. The kick-off of this partnership coincided with a severe power crisis, due to a drought and the country's heavy reliance on hydropower electricity generation. Through Alliance assistance the Ceará utility – CAGECE - was able to meet state imposed power rationing goals set at reductions of 20% over normal usage. See the Watergy case study for [Fortaleza, Brazil](#). As a result of this partnership the Alliance and CAGECE emerged from the challenges of 2001 with a strong case to advance Water efficiency at the national level.

Today the Alliance's efforts in Brazil focus on taking the Watergy efficiency message to a larger national audience. To accomplish this, the Alliance created the ***Brazilian Association of Water and Energy (ABAE)***. ABAE is an independent Brazilian non-profit established in 2004 consisting of private sector equipment and service providers, federal, state and local government, existing water and energy focused associations and water utilities from across the country. As part of the effort to establish a strong local institution focused on Watergy efficiency, the Alliance is also developing innovative financing models to facilitate a commercially viable Watergy efficiency market tailored to the needs of the water and wastewater sectors.

Approach

With the establishment of ABAE, the Alliance has created an independent Brazilian organization driven by local objectives related to energy and water efficiency. Early support for ABAE was voiced by the Brazilian federal energy efficiency organization PROCEL. From this early declaration the Alliance guided a process to position ABAE as a catalyst for efficiency, joining forces with the private sector to tap its extensive knowledge of energy and water efficiency, and

moving the entire water sector towards improved service and lower costs. Today, equipment and service providers representing a variety of technologies and approaches are helping water utilities across the country address specific efficiency challenges. ABAE does this through technical seminars focused on efficiency topics, like metering and monitoring, pump and motor efficiency, system automation, and water loss reduction. Recent ABAE partnerships have brought in power utilities aimed at developing demand side management initiatives targeting the municipal water sector.

Running in parallel with ABAE work, the Alliance is demonstrating successful approaches for water utilities to take Watergy projects from project design and development through to financial closure with private partners. The Alliance has created partnerships with privately held water utilities in an effort to develop innovative models than can be adopted by other Brazilian utilities. Current activities include identifying viable projects and project developers and connecting them to energy service companies, financial institutions and government allies.

The effort to establish Watergy business models is now in the project identification phase, and will soon begin securing financing for these efforts. A variety of contacts with energy and water efficiency technology and service providers as well as energy service companies has led to increased opportunities for cooperation and new project identification. Four projects have been identified to date. Project approaches include peak shaving, motor exchange, pressure management, and application of variable speed drives.

In May 2005, the Alliance continued discussions on potential project funding with water utilities in the states of Espirito Santo and Pará, as well as the Federal District. Potential projects included small hydro applications within bulk water conveyance; pumping station reconfiguration designed to maximize efficiency; and variable speed drive implementation within existing pumping operations. The Alliance also initiated new discussions with Aguas do Amazonas, a privately-owned water utility serving the city of Manaus (state of Amazonas) and the municipal water utility of Ribeirao Preto (state of Minas Gerais). Potential projects include pumping system reconfiguration, pressure control and the opportunity to install variable speed drives at existing wells, along with well rehabilitation in Ribeirao Preto. BerlinWasser and their subsidiary Pigadi are supporting Alliance efforts in these new discussions.

Efficiency in Energy Production and Use

Over the medium term conservation is the most important source of future energy.

Since the first oil crisis in 1970 the Brazilian Government has taken measures and implemented programs to minimize energy loss. The federal's government energy conservation program instituted in 1981 was the first solid effort to promote energy efficiency. The practice of reviewing industrial and commercial businesses' energy accounts to identify potential ways of reducing energy losses began at that time.

The Brazilian Labeling Programme (PBE) coordinated by the National Institute of Metrology, Standards and Industrial Quality (INMETRO) began in 1984. It evaluates the functioning of energy consuming equipment and provides information to consumers, with labeling for a wide range of devices, including household appliances, electric motors, gas hot water heaters, motors, stoves and solar collectors. Since its inception the program has included close coordination and cooperation with both producers and providers of products.

When the oil crisis complicated things on the energy space the National Electrical Conservation Programme (PROCEL) was created. Overseen by the Ministry of Energy and Mines and coordinated by ELECTROBRAS set up a program for electrical conservation managed by the National Electrical Agency (ANEEL). This program channels a portion of electric utilities income (the wire charge) to energy efficiency measures, providing a significant budget for these purposes.

At the Federal level Law 10.295 (Energy Efficiency Act) was an important message signaling the importance of energy efficiency. Passed in October 2001, it deals with national policy for energy conservation and rational use, establishing maximum levels of specific energy consumption, machines and devices old in Brazil.

Enforcement is the responsibility of the Energy Indicators and the Efficiency Steering Committee. It is an important institutional achievement that should be appreciated and noted for the purpose of this study.

The nation's energy planning has begun to take account of such impacts. The National Energy Plan 2030 explicitly assumes impacts of between 4.0 G.W and 15.5 GW of saving in electrical generation as a result of energy efficiency programs. These savings are projected as a result of an expected 5% reduction in electrical demand due to autonomous technological progress and another 5% as a result of major energy-saving initiatives. Energy use in Brazil as a proportion of GDP has been increasing in the past decade while it is generally stable or declining in other countries.

Key Programs and Actors in Energy Efficiency

The Ministry of Mines and Energy through its Secretariat of Energy and Development Planning is responsible for defining and implementing Brazil's national energy efficiency policy, and managing two very interesting national programs on efficiency: **PROCEL** and **COMPET**.

National Electrical Energy Conservation Program (PROCEL) Administrative Directive no. 1877

Policy to combat waste in the production and use of electrical energy. Measures include: Consumption labeling to inform consumers, influence purchasing decisions and induce manufacturers to make efficient products; Energy diagnostics/ audits to assess energy use and efficiency; Supporting R&D of efficient technologies/products; Marketing to strengthen the PROCEL trademark; Replacing incandescent lamps in public lighting with mercury vapor and high pressure sodium vapor lamps that consume 75% less energy; Promoting efficient lighting and appliances in government and residential buildings; Measures to reduce losses in electrical system; Actions to reduce electricity demand during peak hours; Offering training courses, seminars, and conferences to industrial and commercial consumers, concession-holder staff and public organizations to combat energy waste. PROCEL also helps utilities obtain low-interest financing for major energy efficiency projects from a revolving loan fund within the electric sector.

PROCEL, together with State and local utilities and other partners have developed a range of lines of action to complement the realistic pricing of electricity. These are discussed under the following categories, summarizing their rationale and experience.

Technology Development: help develop new and improved electricity consuming products (more efficient motors and lamps) as well as supply side loss reduction technologies in a wide range of areas (improving power plant cooling system performance and a low-cost residential amp-hour meter).

Testing, Labeling and Standards: minimum efficiency levels for refrigerators, electromagnetic ballast for fluorescent lamps, major induction motors and window air conditioners.

Legislation: The Federal government, with encouragement from PROCEL, has taken several important steps to change this regulatory context, as, for instance, the incorporation of energy efficiency investments and expenses in the utilities' cost of services (i.e. tariffs).

Financing: the Brazilian Development Bank (BNDES) has recently developed a new program for small loans, which while not specifically dedicated to energy efficiency, is suitable for this kind of project; private financing is growing fairly rapidly.

Marketing and Information: PROCEL has sponsored a number of information projects in the motor systems area and has established a "stamp of approval" to the most efficient standard motors sold starting in 1995.

PROCEL has begun to recognize and provide annual awards to the most efficient products produced in Brazil in a variety of categories including refrigerators, air conditioners and motors. Also, PROCEL is recognizing outstanding companies who have improved efficiency in their plants and buildings.

Education and Training: PROCEL is implementing a new and expanded strategy for action in the area of education, designed to reach students from primary school to universities throughout the country, introducing energy efficiency education as part of environmental courses at all levels. PROCEL is also disseminating educational materials to architecture schools and to electrical engineering courses and sponsoring a number of courses for energy efficiency professionals.

National Program for the Rational Use of Natural Gas and Oil Products (CONPET)

Umbrella legislation for a variety of projects aimed at reducing losses and eliminating waste in energy production and use, encouraging the adoption of more energy efficient technologies and delays the need for new investment in electrical stations and oil refineries. The Program targets the transport, industrial and commercial/residential sectors, setting energy efficiency indexes, reviewing technical standards, demonstrating incentives to reduce fuel consumption, and increasing public awareness about energy efficiency.

The program is managed by PETROBRAS, which provides its technical, administrative and financial resources. The Petrobras Division of Energy Conservation and Renewable Energy acts as the program's Executive Committee. The Division is associated with the Director of Gas generated Energy at Petrobras who, by virtue of presidential decree is the CONPET Executive Secretary. Currently CONPET focuses on freight transport, passenger transportation and fuel issues as well as activities in the areas of education.

Lessons learned from the Brazilian approach

While Brazil has important mature programs in both alternative energy sources and efficiency, with a strong legal framework there is still great unexplored potential in both areas.

It is therefore essential to implement monitoring mechanisms and to note the lessons learned not only from the country's experience but from the international context as well.

The high degree of complementarity between the different energy sources that Brazil has available for generating electricity makes policies and programs designed to increase the use of these sources in the nation's electrical network all the more valuable.

Policies and programs to create incentives for the use of alternative sources and energy efficiency gain force and become effective in creating a virtuous circle of energy generation, economic development and environmental sustainability. Brazil's major energy efficiency programs (PROCEL – ELECTROBRAS and CONPET-PETROBRAS) have generated a series of lessons that point to the fact that concrete results in the efficient use of energy depend on institutions that can design, implement and operate programs in a stable, on-going fashion, independent of changes of government (as matters of State, not government agenda).

Key Lessons:

- Training, development of skills and energy assessment activities do not in any direct way guarantee that energy-saving opportunities will be used to full advantage of.
- The right environment needs to be created for implementing energy-saving recommendations and all hierarchical levels must be involved
- Energy efficiency measures cannot be limited to the energy sector but must be integrated with public policy in other sectors such as sanitation, housing and education
- Programme focus can not only be technological – needs to take market into account to change consumers' habits
- Continuity of campaigns is key to keep energy issues “top of mind”
- It is essential to understand the consumers' idiosyncrasies.

6 North America

6.1 Canada

6.1.1 The overall scope of the resource efficiency policies within the country

Canada has been making progress on resource efficiency initiatives and policies. Much of the policy interventions have been based on increasing awareness among consumers, using knowledge tools such as labeling and certification. On the regulatory side, the county has developed certain key framework strategies and roadmaps. Although sector-specific policies on resource efficiency might seem lacking for a developed country, Canada's decentralized governance system allows municipalities to intervene where federal policies might be lacking. This is the case for waste management (the promotion of the 3Rs, for example) and water efficiency and conservation.

6.1.2 Definition of RE (indicators/metrics)

Although the country does not have a specific definition of resource efficiency, the ideas and practice are embedded in definitions of sustainable development. Environment Canada has stated that:

“Sustainable development is about meeting the needs of today without compromising the needs of future generations. It is about improving standard of living by protecting human health, conserving the environment, *using resources efficiently* and advancing long-term economic competitiveness. It requires the integration of environmental, economic and social priorities into policies and programs and requires action at all levels - citizens, industry, and governments.” Environment Canada (2012a)

In an effort to measure the progress of the Federal Sustainable Development Strategy (discussed later), the government has produced a set of indicators that tracks the performance on key environmental issues. Although not all of them are measurements of resource efficiency, they present a reflection on the importance of certain resources in the country.

These indicators were prepared by Environment Canada and include measurements such as air and climate indicators, water indicators, and nature indicators (Table 10).

Table 10 *Environment Canada Sustainable Development Indicators (short list)*

Indicator type	Indicator
Air pollution	Ambient levels of fine particulate matter (PM _{2.5})
	Ambient levels of ground-level ozone (O ₃)
	Ambient levels of sulfur dioxide (SO ₂)
	Ambient levels of nitrogen dioxide (NO ₂)
	Ambient levels of volatile organic compounds (VOC)
Greenhouse Gas Emissions	Greenhouse Gas Emissions per Person and per Unit Gross Domestic Product
	Greenhouse Gas Emissions by Economic Sector
	Greenhouse Gas Emissions by Province and Territory
	Greenhouse Gas Emissions from Large Facilities
Water	Water Withdrawal and Consumption by Sector
	Residential water use (per capita)
Nature	Sustainable fish harvest (Number of major stocks harvested relative to approved levels)
	Sustainability of Timber Harvest (Wood supply deemed sustainable for harvest and total harvest) *
	Protected area (% of land area protected/ % of marine area protected)

* Wood supply is the estimated volume of timber that could be harvested without endangering the forest resource in the long term.

Source: Environment Canada (2012b)

6.1.3 Policies towards RE (goals, targets, integration, institutional settings)

Much of Canada's policies that involve resource efficiency regulation are implemented in a decentralized manner. Currently, there are no federal level policies on waste management and reduction, for example, because this is usually left up to the provincial governments and municipalities (Seguin 2012). Most of these municipalities practice some form of the 3R approach in resource efficiency, and have detailed policies and initiatives outlined.

Frameworks

Canada has enacted the Federal Sustainable Development Act in 2008 requires the Minister of Environment to develop a sustainable development strategy by 2010 and every three years after. The law has a requirement for federal agencies and departments to prepare specific sustainable development strategies to respond to the law. Each of these departmental strategies is presented to the House of Commons within one year after the strategy is defined at the House of Commons. *Planning for a Sustainable Future: a Federal Sustainable Development Strategy for Canada* is the most recent strategy framework, submitted on October 2010.

The Federal Sustainable Development Act, which was approved in 2010, has defined priorities for achieving sustainable development which include goals for greenhouse gas emissions, water quality, soil quality and nature conservation/ protection. The indicators and measures towards progress have been defined within the first progress report, released one year later in August, 2011. Environment Canada has defined these indicators along-side other government agencies, scientific institutions and civil society groups.

The country also has an inter-ministerial body called the Canadian Council of Ministers (CCME) of the Environment. This is comprised of 14 environment ministers from provincial, federal, and territorial jurisdictions who take decisions of critical environmental importance and guide national, broad strategy which is implemented in the jurisdiction of each territory. One key resource efficiency intervention the Council of Ministers approved was the federal Action Plan for Extended Producer Responsibility and the federal Strategy for Sustainable Packaging. Approved in 2009, these policies are directed towards the sustainable production of consumer products, in which the producer has the responsibility for a product that extends beyond the post-consumer stage of a single product's life-cycle. This approach shifts responsibility away from the municipalities and offers an incentive to producers to incorporate ecological designs and materials into their packaging. Within the policy, there is an initiative to develop sustainability indicators and metrics that can be used for packaging over a products life-cycle. As well, public-private partnership approaches are emphasized. One of the supporting activities included in the sustainable packing act are industry-government agreements that work with key industries to reduce packaging (CCME 2012a).

The strategy includes supportive policies that each territorial jurisdiction has to implement but the choices of what policy approaches are the most effective, is up for each territory to define. Some of the measures that the CCME proposes have been implemented, and these include: informational interventions such as

eco-labeling; restrictions on toxic substances; standards for recycled content; green procurement policies; environmental performance/voluntary standards; bans; product design guidelines; and educational tools.

The strategy has included performance indicators, which include (CCME 2012b):

- Kilograms per capita captured or recovered;
- Dollars per kilogram captured or recovered;
- Percent of waste captured, per cent of waste recovered; and
- Avoided greenhouse gas emissions.

Agriculture

Agriculture and forestry play a large part in Canada's economy. In 2010 the forest sector contributed 23.5 billion US\$, or 1.9 percent of the total GDP to the Canadian economy. In 2009, the government launched the Pulp and Paper Green Transformation Program to make the industry more sustainable and resource efficient. In the policy, Canadian pulp and paper industries that produced black liquor (a by-product of the chemical pulping process that can be used to generate forms of renewable energy) were eligible to access a 1 billion USD fund. This is one example of a waste-to-energy incentive that the government is currently working on (Natural Resources Canada 2009).

Ecolabeling

The Government of Canada developed the environmental standard and certification mark EcoLogo in 1988. This third party certification scheme provides consumers with quality assurance their products meet high quality environmental standards, including standards for resource efficient products. Standards are developed on a per product basis. The program associated with the certification, EcoLogo Program has been recognized by the International Organization for Standardization, and it continually develops rigorous standards for products using a life-cycle approach. Products such as paper and pulp, for example, have to show that they have demonstrated an efficient use of fiber through the use of recycled content, and that reduced amounts of energy have been used.

Energy efficiency

The Office of Energy Efficiency, positioned within Natural Resources Canada, is the national agency responsible for policies concerning energy efficiency. The ecoENERGY Efficiency program encompasses key sectors that the country is targeting for energy efficiency improvements. These are:

- ecoENERGY Efficiency for Vehicles - provides consumers and automotive industries with decision-making tools for vehicle efficiency

- *ecoENERGY Efficiency for Buildings* – provides tools for the improvement of the energy performance of buildings
- *ecoENERGY Efficiency for Housing* - provides incentives for the retrofitting and construction of residential housing
- *ecoENERGY Efficiency for Equipment Standards and Labelling* - promotes energy efficiency standards for various products, including ENERGystar
- *ecoENERGY Efficiency for Industry* – works to improve efficiency in the industrial sector
- *ecoENERGY Retrofit* – a residential homes program that provides homeowners with loans and grants to offset the costs of energy efficiency improvements and retrofits

Standards play an important role in the country's approach to managing and reducing energy intensity and efficiency. The Energy Efficiency Act and Regulations helps the country meet certain targets set out in the ecoENERGY program. Regulations and standards have been developed for many products (over 30 as of date). Provincial energy efficiency regulations have also been developed in different provinces including: British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario and Quebec (Office of Energy Efficiency Canada, 2012).

Minerals

The country's Green Mining Initiative aims to improve environmental performance in the mining sector. The initiative is under the leadership of Natural Resources Canada, but is a multi-stakeholder program. It aspires to create innovative leadership in resource efficiency in the mining sector with technological interventions and research. The agency is working on advancing research in "zero-discharge processes" whereby waste materials (such as metals and minerals) are recovered. Some of its pillars encompass resource efficiency goals (Natural Resources Canada 2010):

- *Footprint Reduction*: developing new mining and processing methods that will reduce water consumption and waste
- *Innovation in Waste Management*: developing sustainable waste management and treatment technologies

Public procurement

Public procurement is estimated to be worth about 5 billion US\$ in Canada. In 2006, the country developed its Policy on Green Procurement. Effectively, the law aims to embed environmental and sustainability considerations into procurement decision making. Both training on green procurement and tools

were developed to aid officials in the process. The 3Rs is one key environmental issue that is raised in the procurement process.

Transport

The government of Canada is currently planning to adopt automotive fuel efficiency standards as a response to the United States newly launched fuel efficiency standards set this August, 2012. This means that there will be regulations for manufacturers to improve the fuel efficiency in vehicles from 6.6 liters/100 km to 4.4 liters/100 km. The details of the regulation are still being developed by the Environment Ministry (The Globe and Mail 2012).

Water

Jurisdiction over water issues is broad, with 20 government departments and agencies which each have their own special role and responsibility over the governance of water management. As well, all levels of government implement water management interventions – from federal levels to provincial to territories. In some municipalities, water pricing is used as an economic instrument for water conservation. A study found that 43% of the Canadian population received a flat rate pricing structure (i.e. the charge is fixed), while another 12% were in a declining block (i.e. rates rise as a slower rate as more water is used) (Environment Canada 2012c).

6.1.4 Specific Instruments (if any) or suggested other approaches

Because the country regulates and implements policy in a decentralized manner, according to provinces, it is difficult to assess all of the specific policy instruments in each province. That being said, Canada is known for having a progressive stance on natural resource protection and some of its provinces might be taking further progressive steps towards resource efficiency.

Awareness instruments

One example of a national awareness policy instrument is Environment Canada's Environmental Choice Program EcoLogo.

Economic instruments

Economic instruments are used for promoting resource efficiency themes. Public funds, for example, in the form of grants are available. The Government of Canada has endowed the Federation of Canadian Municipalities (FCM) with \$550 million to establish the Green Municipal FundTM. The Fund supports partnerships and leveraging of both public and private-sector funding to reach higher standards of air, water and soil quality, and climate protection. Another example is the Pulp and Paper Green Transformation Program, which aims at greening the forestry sector.

Regulatory instruments

Extended Producer Responsibility and standards in the Canadian ecoEFFICENCY program are two examples of regulatory approaches.

6.1.5 Key actors, contacts, and organizations

Ms. Pamela Hay, Deputy Director Foreign Affairs and International Trade Canada
Environment and Sustainable Development Policy Division

111 Sussex Drive - Ottawa, Ontario, K1A 0G2 Canada

Phone: 613-996-4300

Email: Pamela.Hay@international.gc.ca

Ms. Jacinthe Seguine

Environment Canada – Waste Management Division

Jacinthe.seguine@ec.gc.ca

6.2 United States

6.2.1 Overall scope of the resource efficiency policies within the country

“Of all of the materials the US consumed in the past 100 years, more than half were consumed in the last 25 years” (USEPA 2009).

Overall the United States has a range of instruments and policy approaches that confront sustainable production and consumption. Although there is not a federal policy or framework that defines and targets measures of resource efficiency, the country is active in the field of waste management, promoting the education on sustainable consumption patterns, and energy efficiency. Material flow accounting, however, has yet to be facilitated at the national level. And in this sense, the country lacks data, indicators, and benchmarks for resource efficiency on an economy-wide scale. Internationally, per capita material consumption is more than 50% higher as compared to the European Union average. With an estimated 20 billion tons of materials disposed each year, the country is in need of a targeted approach on resource efficiency.

6.2.2 Definition of RE (indicators/metrics)

This United States Geological Survey is the agency responsible for maintaining datasets on material flows, and indicators for material use.

The US EPA has promoted a sustainable materials management approach, and has stated that “shifting to a materials management approach will refocus on the way our economy uses and manages materials and products” (USEPA 2012d). Materials management, according to the agency, focuses on:

1. Knowing and reducing the lifecycle impacts across the supply chain;
2. Using less material inputs (3Rs);
3. Using less toxic and more renewable materials;
4. Considering whether services can be substituted for products.

The agency released a framework report which has been endorsed on state and local levels entitled *Beyond RCRA: Waste and Materials Management in the Year 2020*, this is also referred to as the 2020 Vision. This was then later turned into a roadmap to accelerate resource efficiency and materials management for the country. The working group in charge of this roadmap created an analytical framework for assessing and prioritizing materials and products.

6.2.3 Policies towards RE (goals, targets, integration, institutional settings)

Institutionally, the United States has a decentralized policy making framework, in which the states and districts develop independent regulations on resource efficiency. These regulations sometimes are supported by larger federal frameworks or Executive Office directives. Most predominate in the country's resource efficiency initiatives are those related energy efficiency (federal regulations) and waste management (state and municipal jurisdiction).

Agriculture

There is a growing awareness in the US of sustainable agricultural production and resource efficiency in agriculture. Agriculture policies on a federal level are developed by the United States Department of Agriculture (USDA). USDA has a variety of conservation programs that include policies for resource efficiency in agriculture (such as enhancing soil health, and water efficiency practices). Many conservation programs include training and educational programs for private farmers to understand conservation practices. In 2008, the federal government passed the five year Food, Conservation and Energy Act (continuation of the 2002 US Farm Bill) which reserves funding for conservation practices on the farm (including efficiency practices) and also outlines regulatory requirements for farming. Some of the programs that are included in the bill that focus on efficiency and increasing the integrity of environmental resources are:

- *Conservation Stewardship Program* – a program that targets funding for conservation in priority areas and actions (such as water and energy conservation on the farm)
- *Environmental Quality Incentives Program* – whereby farmers/ ranchers can receive financial compensation for integrating sustainable agriculture practices.
- *National Organic Certification Cost Share Program* – a fund to cover the financial costs of organic certification. Producers can receive up to 75% of annual certification costs.
- *Rural Energy America Program* – provides cost-share energy audits and grants for energy efficiency improvements on farms

Ecolabeling

The United States Department of Agriculture, Agricultural Marketing Service, has a national organic labeling program that approves, through a third party certification body, organic products in the country. Standards for organic products were first approved in 1990, and have been further refined since then. The organic seal affirms that at least 95% of the content in the product is organic (USDA 2012).

Energy efficiency

Energy Policy Acts of 1992 and 2005 are federal policies that attempt to mitigate US energy challenges, with an overall objective to increase energy security in the country. The 2005 act focused heavily on providing economic incentives and instruments to industry and consumers for the delivery of energy efficient improvements and retrofiting. The Act created, for example, the Energy Efficient Commercial Buildings Tax Deduction, which provides a financial rebate for investing in energy efficient buildings.

The Energy Independence and Security Act (EISA) of 2007 is another example of a federal policy that aims at acquiring greater energy independence in the United States. The Act has many provisions for the promotion of alternative energy and provisions for energy efficiency. The policy defines key energy savings goals in standards for products, appliances and equipment (including lighting). It also dictates that the Environmental Protection Agency create a waste to energy (energy recovery) program, the first policy to enforce a program at the federal level on waste-to-energy. The US Department of Energy's Federal Energy Management Program (FEMP) is the federal program designed to help legislatures, municipal governments and states comply with federal energy regulations.

Manufacturing/ Cleaner Production

US EPA's Sustainable Materials Management Program is an initiative that aims to open dialogue and knowledge sharing about resource efficiency, through "providing sound science and information to the public, and establishing challenges to specific sectors to achieve shared goals" (USEPA 2012b).

Public procurement

The federal government is the largest individual consumer in the country, approximately consuming 7-8% of all goods and services. This does not include the additional 12-13% that state and local governments consume. The United States federal agencies participate in sustainable green public procurement. One of the government's programs is the US Green Buy Program, which is the US Department of Energy's Sustainable Acquisition Recognition Program (USEPA 2012c). This federal policy requires the department and contractors to purchase sustainable products which focus on four goals:

- Reduce or eliminate waste at the source;
- Promote the use of nontoxic or less toxic substances;
- Implement conservation techniques; and
- Reuse materials rather than put them into the waste stream.

Transport

The Corporate Average Fuel Economy (CAFE) is a federal regulation that was enacted in 1975. The objective of the policy is to reduce overall fuel consumption by encouraging fuel economy and efficiency in card and light trucks. This regulation is imposed on manufactures and compliance has been a divergent issue in the country. Since the 1970s the regulation has been through many revisions as the country continues to move towards greater fuel economy. In August 2012, the Executive Office issued new CAFÉ standards that will require auto manufactures to reach a new target of 54.5 mpg by 2025 (from 35.5 mpg). The US Environmental Protection Agency (EPA) is tasked with monitoring the progress and of vehicle fuel efficiency, while the National Highway Traffic Safety Administration (NHTSA) regulates the CAFE standards (NHTSA 2012).

Water

Water quality trading schemes are economic approaches whereby industries who pollute more (and subsequently face higher pollution control costs) can meet regulatory obligations by purchasing credits from another industry that has low pollution discharges (this system is based on total maximum daily load). This way the water quality in a specific area can be achieved and pollution in controlled. In the United States, these schemes are implemented on the state and local level.

Waste

The United States Resource Conservation and Recovery Act, which was signed into law in 1976, is a federal public law that designates regulations, goals and responses to the growing problem of municipal and industrial waste. One of its main goals is to reduce unsustainable use of materials and resources.

As the law has evolved over three decades, the focus of the law has periodically changed shape. Currently, the EPA incorporates waste reduction, recycling and resource conservation efforts as a response to the policy. The US EPA's Office of Resource Conservation and Recovery (ORCR) is the entity in charge of regulating the Act.

The United States currently has 25 states that use a tax incentive or credit to promote the development of recycling markets (Table 11). Most of this is related to credits which are given to businesses/SMEs to purchase recycling equipment, and range from 10-50% of total equipment purchases.

One state, Delaware, as an alternative to these programs, offers a fixed amount of 500 US\$ for every 100,000 US\$ spent on recycling equipment (USEPA 2012a).

Table 11 *Examples of State Tax Incentives for Recycling Businesses*

State	Incentive
Idaho	Recycling equipment income tax credit of up to 20 percent of equipment costs but not exceeding \$30,000 per year. Requires that 90 percent of the equipment's product be made from recyclables.
Louisiana	Recycling equipment income tax credit for 20 percent of recycling equipment costs, less any other credits that are claimed. Equipment must process 100 percent postconsumer or recovered materials or make a product that contains 50 percent postconsumer or recovered materials.
Montana	<p>Recycling equipment income tax credit of 25 percent for the first \$250,000 invested, 15 percent for the next \$250,000, and 5 percent on the next \$500,000.</p> <p>Reclaimable material income tax credit for taxpayers who purchase a product made from reclaimed materials. Tax credit is equal to 5 percent of the cost of the product.</p>
Oregon	<p>Three separate recycling tax credit programs with the credit taken against Oregon income tax. Credit can be taken from only one program.</p> <p>Reclaimed plastic tax credit of 50 percent of the plastic recycling capital investment taken at a rate of 10 percent per year for 5 years.</p> <p>Pollution control facility tax credit of 50 percent of the recycling equipment and facility capital cost taken at a rate of 5 percent per year for 10 years.</p> <p>Business energy tax credit of 35 percent of the recycling equipment capital investment taken over 5 years.</p>

Source: USEPA (2012a)

The United States also has policies that address lean manufacturing and cleaner production. The Green Suppliers Network (GSN) is a program that is implemented by a conglomerate of private sector industry, the US EPA, and the US Department of Commerce. The GSN's purpose is to work with the manufacturing sector (particularly large manufacturers) and engage them in addressing waste in their supply chains. This is done through low-cost technical reviews that use "lean and clean" methodologies and techniques in manufacturing. Some examples of companies that have undergone technical reviews include those in aerospace, automotive industries, and healthcare. A study commissioned by the European Commission Directorate General for Environment stated that this policy successfully yields economic benefits in the private sector, as it aims at improving companies' resource household while maintaining and improving profitability (EC DG EENV 2011).

Another private-public partnership called the Manufacturing Extension Partnership (MEP), is also working with SMEs to provide technical expertise in eliminating waste and materials in manufacturing processes. This PPP is implemented by the National Institute of Standards and Technology, an agency of the U.S. Department of Commerce. The MEP initiative E3: Economy, Energy, and Environment targets manufacturers and helps increase both energy efficiency and resource utilization. The financial resources are leveraged by a pool of E3 agencies and programs including the Department of Commerce, United States Department of Agriculture, US EPA, Department of Energy, and the Small Business Association (MEP 2012).

6.2.4 Specific Instruments (if any) or suggested other approaches

Awareness instruments

Many awareness programs are born through state policies, or municipal/ county level approaches. Consumer awareness concerning recycling, and sustainable lifestyles is implemented at this level. On the national level, one example of an awareness instrument is the government's organic agriculture label.

Economic instruments

Economic mechanisms are a readily used instrument in the country. It has developed various tax incentives (loan guarantees, credits, etc.) to encourage consumer spending in energy efficiency and retrofitting, and recycling enterprises; as well, subsidies for conservation agriculture and organic agriculture exist.

Regulatory instruments

The federal government and states have developed regulations to support resource efficiency, particularly those related to natural resource conservation.

Nutrient regulation and waste recycling regulation are just two types of these policies. Other forms of regulation include public procurement, and standards and codes in energy efficiency.

6.2.5 Key actors, contacts, and organizations

United States Environmental Protection Agency

United States Department of Agriculture

United States Department of Energy

References and Sources

- Andrews-Speed P 2009; China's ongoing energy efficiency drive: Origins, progress and prospects; in: *Energy Policy* vol. 37, pp. 1331-1344
- Asia Pacific Energy Research Centre 2010: Compendium of Energy Efficiency; Policies of APEC Economies <http://www.ieej.or.jp/aperc/CEEP/CEEP-all.pdf>
- Bakrie A, Witoelar R, Salim E 2007: *National Action Plan Addressing Climate Change*; Ministry of the Environment, Indonesia
- BIO (BIO Intelligence Service), IFF (Institute for Social Ecology), SERI (Sustainable Europe Research Institute) 2012: Assessment of resource efficiency indicators and targets. Annex Report; prepared for the European Commission, DG Environment; Brussels
- BIO (BIO Intelligence Service) et al. 2010: Preparatory Study for the Review of the Thematic Strategy on the Sustainable Use of Natural Resources; prepared for the European Commission DG Environment; Brussels
- Bloomberg 2012: South African GDP Growth Quickens as Mining Rebounds; Martinez A, Wild F; Bloomberg News, Aug 28, 2012
- Bureau of Energy Efficiency India 2012: <http://www.bee-india.nic.in>
- CCME (Canadian Council of Ministers) 2012a: Extended Producer Responsibility; http://www.ccme.ca/ourwork/waste.html?category_id=128 accessed August 21, 2012
- CCME (Canadian Council of Ministers) 2012b: Canada-Wide Action Plan For Extended Producer Responsibility http://www.ccme.ca/assets/pdf/epr_cap.pdf accessed August 21, 2012
- Central Statistical Office Poland 2012: Local Data Bank http://www.stat.gov.pl/bdlen/app/strona.html?p_name=indeks
- Commissariat Général Au Développement Durable 2010: <http://www.developpement-durable.gouv.fr/IMG/pdf/Ref.pdf> accessed 1 July 2012
- Committee for Economic Planning 2002: Environmental Action Strategy for Sustainable Development http://www.minambiente.it/index.php?id_sezione=396
- CPV (Communist Party of Vietnam) 2011: Vietnam's development goals, 2011 – 2020; Online Newspaper http://www.cpv.org.vn/cpv/Modules/News_English/News_Detail_E.aspx?CN_ID=396692&CO_ID=30113
- Confederation of Indian Industry 2011: Presentation on *Green Public Procurement Guidelines in India*; Energy Sector Management Assistance Program

- Coordinating Ministry for Economic Affairs 2011: Masterplan for Acceleration and Expansion of Indonesia Economic Development
http://www.ekon.go.id/media/filemanager/2011/05/27/p/d/pdf_mp3ei.pdf accessed August 27, 2012
- Council of Ministers Republic of Poland 2008: The National Environmental Policy for 2009-2012 and its 2016 Outlook
http://www.mos.gov.pl/g2/big/2009_07/2826c539c3015384e50adac8fe920b0b.pdf accessed July 2012
- Department of Minerals and Energy South Africa 2012: Sustainable Development through Mining Programme
- Department of Trade and Industry South Africa 2011: Industrial Policy Action Plan 2012-2013, 2014-2015
<http://www.info.gov.za/view/DownloadFileAction?id=162797>
- GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) 2010: Development cooperation and resource efficiency; Eschborn, Bonn
<http://www.giz.de/Themen/de/SID-8BD1D8E7-400F6CA4/dokumente/giz2012-en-resource-efficiency-in-development-cooperation.pdf>
- Economic Development Department South Africa 2011: New Growth Path: Accord 4 – Green Economy Accord
<http://www.info.gov.za/view/DownloadFileAction?id=159756>
- Embassy of India 2001: Questionnaire on Organic Agriculture in FAO Member Countries; Ministry of Agriculture
- Environment Canada 2012a: <http://www.ec.gc.ca/dd-sd/default.asp?lang=En&n=E19EE696-1> accessed August 23, 2012
- Environment Canada 2012b: <http://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=En&n=03603FB3-1> accessed August 23, 2012
- Environment Canada 2012c: Wise Water Use <http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=F25C70EC-1>
- EEA (European Environment Agency) 2011a: Survey of resource efficiency policies in EEA member and cooperating countries. Country Profile: France
<http://www.eea.europa.eu/resource-efficiency>
- EEA (European Environment Agency) 2011b: Survey of resource efficiency policies in EEA member and cooperating countries. Country Profile: Italy
<http://www.eea.europa.eu/resource-efficiency>
- EEA (European Environment Agency) 2011c: Survey of resource efficiency policies in EEA member and cooperating countries. Country Profile: Poland
<http://www.eea.europa.eu/resource-efficiency>

- EEA (European Environment Agency) 2011d: Resource efficiency in Europe: Policies and approaches in 31 EEA member and cooperating countries; EEA Report No 5/2011; Copenhagen
- Environment and Energy Management Agency of France 2008: Energy efficiency action plan for France; Paris
- Environment and Energy Management Agency of France 2012: Renewable energies and raw materials; online discussion <http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=96&m=3&catid=17575> accessed 5 July 2012
- EC (European Commission) 2011: Monitoring Member States' policy developments on resource-efficiency/environment in Europe 2020 - Italy Profile
- EC DG ENV (European Commission Directorate-General for the Environment) 2011: Economic Analysis of Resource Efficiency Policies; final report prepared by Hug V et al.; Brussels
- ETC-SCP (European Topic Centre on Sustainable Consumption and Production) 2009: Factsheet for Poland http://scp.eionet.europa.eu/facts/factsheets_waste/2009_edition/factsheet?country=PL accessed August 13, 2012
- EU SWITCH (European Union SWITCH-Asia Network Facility) 2011: Linking to Policy-Makers: Study on Scaling up Mechanisms Employed in Switch-Asia Projects
- FAO (Food and Agricultural Organization of the United Nations) 2010: AQUASTAT Database Vietnam, Version 2010; Rome http://www.fao.org/nr/water/aquastat/countries_regions/vietnam/index.stm
- Geng Y 2009: Circular economy policy of China: Role of policy research towards a shift from institution building to implementation: Presentation Chinese Academy of Sciences at UNEP
- General Statistics Office of Vietnam 2005: The National Statistical Indicator System http://www.gso.gov.vn/default_en.aspx?tabid=510&idmid=6&ItemID=3994
- The Globe and Mail 2012: Canada to copy Obama's fuel efficiency rules: Mccarthy S; published Thursday, Aug. 30 2012
- Hai N et al. 2011: *Study into the Economics of Low Carbon, Climate-Resilient Development in Vietnam – Scoping Phase*, Central Institute for Economic Management, Ha Noi, Vietnam
- Ho L, Dickinson N. Chan G 2010: Green procurement in the Asian public sector and the Hong Kong private sector; in: Natural Resources Forum vol. 34, pp. 24-38

- ICCSR (Indonesia Climate Change Sectoral Roadmap) 2010: *Waste Sector, Indonesia*
- Indonesia Cleaner Production Center 2005: Description on National Policy
<http://www.ppbn.or.id/en/index.php?option=content&task=view&id=25&Itemid=40>
- Interministerial Committee for Sustainable Development France 2011: Mise en oeuvre de la Strategie Nationale de Developpement Durable 2010-2013 - 1er rapport au Parlement; Paris http://www.developpement-durable.gouv.fr/IMG/pdf/Rapport_SNDD-2.pdf
- IMEELS (Italian Ministry for the Environment, Land and Sea) 2008:
http://www.dsa.minambiente.it/app/file/Documento_SCP_20.09.08.pdf
- Kofoworola O, Gheewala S 2008: Environmental life cycle assessment of a commercial building in Thailand; in: International Journal of Life Cycle Assessment vol. 13, pp. 498-511
- Law on Water Resources - Indonesia', 2/1 Law, Environment and Development Journal (2006), p.118 <http://www.lead-journal.org/content/06118.pdf>
- Lommen Y 2011: Toward Sustainable Growth in the People's Republic of China: the 12th Five-Year Plan; ADB Brief No. 7; Manila
- Manufacturing Extension Partnership 2012: E3 Economy, Energy and Environment program flyer <http://www.nist.gov/mep/upload/E3-version2-2.pdf>
- Ministry of Ecology, Sustainable Development and Energy France 2010: Les indicateurs de la stratégie nationale de développement durable 2010-2013; Paris
- Ministry of Energy and Mineral Resources 2005: Blueprint Pengelolaan Energi Nasional (PEN) 2006-2025, in accordance with Presidential Regulation No. 5/2006 regarding National Energy Policy
- Ministry of Planning and Investment Vietnam 2006: *The Five-Year Socio-Economic Development Plan 2006-2010*
- Ministry of Water Resources India 2002: National Water Policy
- Ministry of Water Resources India 2012: *Draft National Water Policy (2012) as Recommended by the National Water Board in its 14th Meeting Held on 7th June, 2012*
- Modak P 2010: Presentation on Decoupling of Environmental Degradation from Resource Use through Integrated Waste Management, Second Meeting of the Regional 3R Forum in Asia; Kuala Lumpur, Malaysia
http://www.uncrd.or.jp/env/3r_02/presentations/1-1PrasadModakDecouplingRevised.pdf

- Monre 2011: Thailand's Second National Communication under the United Nations Framework Convention on Climate Change; Ministry of Natural Resources and Environment, Bangkok
- National Development and Reform Commission of the People's Republic of China 2005: Program of Action for Sustainable Development in China in the Early 21st Century; News Release
http://en.ndrc.gov.cn/newsrelease/t20070205_115702.htm
- National Reports Poland 2012a: *10 year framework of Programmes on Sustainable Consumption and Production Patterns*
http://www.un.org/esa/dsd/dsd_aofw_ni/ni_pdfs/NationalReports/poland/scp.pdf
- National Reports Poland 2012b: *Information about initiatives for the implementation of the Sustainable Development Strategy in waste management*; contributed by the Ministry of the Environment of the Republic of Poland http://www.un.org/esa/dsd/dsd_aofw_ni/ni_pdfs/NationalReports/poland/waste_management.pdf
- NESDB, 2010. *Summary of the Direction of the Eleventh National Development Plan*, Office of the National Economic and Social Development Board, Bangkok, Thailand.
- NHTSA (National Highway Traffic Safety Administration) 2012: Corporate Average Fuel Economy (CAFE) <http://www.nhtsa.gov/fuel-economy>
- National Planning Commission of India 2007: Eleventh Five Year Plan 2007-12
<http://planningcommission.nic.in/plans/planrel/fiveyr/welcome.html>
- National Planning Commission South Africa 2011: National Development Plan 2030
<http://www.npconline.co.za/medialib/downloads/home/NPC%20National%20Development%20Plan%20Vision%202030%20lo-res.pdf>
- National Water Management Authority Poland 2011: State Water Policy 2030
<http://www.kzgw.gov.pl/pl/Projekt-Polityki-wodnej-panstwa-do-roku-2030.html>
- Natural Resources Canada 2009: Government of Canada Invests in the Forest Industry's Environmental Performance; The Media Room, October 9, 2009
- Natural Resources Canada 2010: Green Mining Initiative to Reduce Mining's Environmental Footprint; Brennan M
- Office of Energy Efficiency Canada 2012: *Energy Efficiency Regulations and Standards for Industry* <http://oee.nrcan.gc.ca/industrial/regulations-standards/13163>
- Republic of Poland 2011: National Reform Programme, Europe 2020
http://ec.europa.eu/europe2020/pdf/nrp/nrp_poland_en.pdf
- Seguin J 2012: personal telephone interview; August 24, 2012

- SEPA Environmental Certification Center 2012: <http://www.sepacec.com/>
- Socialist Republic of Vietnam 2009: Prime Minister, Decision on approving the National Strategy of Integrated Solid Waste Management up to 2025, vision towards 2050. No. 2149/QD-TTg
http://www.uncrd.or.jp/env/spc/docs/PM_NSISWM_Eng.pdf
- Socialist Republic of Vietnam 2007: Prime Minister. Vietnam Forestry Development Strategy 2006 - 2020 (unofficial translation)
http://www.theredddesk.org/sites/default/files/viet_nam_forestry_development_strategy_2.pdf
- South Africa Ministry of the Environment 2008: Green Economy Summit: Summit Report
- South Africa Department of Environmental Affairs 2011: National Strategy for Sustainable Development and Action Plan (2011 – 2014)
- Sucihatningsih D, Soesilowati E 2011: The Policy Effectiveness of “Go Organic 2010” (A Case Study on Implementation and Efficiency of the Production Factors of Organic Vegetable Cultivation in Semarang Regency); Economics Faculty Semarang State University <http://www.eaaere2012.org/FP/0052%20-%20Prajanti,%20Soesilowati.pdf>
- Tien T 2008: Draft National Strategy for Environmentally Sustainable Transport Development until 2020; presentation, Ministry of Natural Resources and Environment, Vietnam
- UNDP (United Nations Development Programme) 2009: Thailand Human Development Report 2009: Human Security, Today and Tomorrow; Bangkok
- UNEP (United Nations Environment Programme) 2010: BAPPENAS Minister: Human Development Index is needed to accelerate People’s welfare, press release March 31, 2010 <http://www.undp.or.id/press/view.asp?FileID=20100331-1&lang=en>
- UNEP (United Nations Environment Programme) 2011: Paving the way for sustainable consumption and production: The Marrakech Process Progress Report; Paris
- UNEP (United Nations Environment Programme) 2008: National SCP Indicators for Developing Countries
- UNEP (United Nations Environment Programme) 2012a: Global Outlook on Sustainable Consumption and Production Policies; Paris
- UNEP (United Nations Environment Programme) 2012b: Decoupling Natural Resource Use and Environmental Impacts from Economic Growth; Paris

- UNEP (United Nations Environment Programme) 2012c: Green Economy – Advisory Services, Indonesia
http://www.unep.org/greeneconomy/Portals/88/documents/advisory_services/countries/Indonesia%20final.pdf
- UNEP (United Nations Environment Programme) 2012d: *Sustainable Public Procurement Initiative Harnesses Power of Public Spending to Fast-track Green Economy Transition*, News Centre; June 20, 2012.
- UNEP (United Nations Environment Programme) 2012e: SWITCH-ASIA Policy Support Component Capacity Building and Policy Needs Assessment on Sustainable Consumption and Production
- UNEPFI (United Nations Environment Programme Finance Initiative) 2009 : Chief Liquidity Series Water-related materiality briefings for financial institutions; Issue 1, Agribusiness
- USDA (United States Department of Agriculture) 2012: National Organic Program <http://www.ams.usda.gov/AMSV1.0/nop>
- USDOE (United States Department of Energy) 2012: *Energy Efficiency and Conservation Block Grant* <http://www1.eere.energy.gov/wip/eeecbg.html>
- USDOE (United States Department of Energy) 2012a: State Incentives and Resource Database
http://www1.eere.energy.gov/manufacturing/states/state_activities/incentive_search.aspx
- USEPA (United States Environmental Protection Agency) 2009: Sustainable Materials Management: The Road Ahead; Washington DC
- USEPA (United States Environmental Protection Agency) 2012a:
<http://www.epa.gov/epawaste/consERVE/rrr/rmd/bizasst/tax-ince.htm>
- USEPA (United States Environmental Protection Agency) 2012b:
<http://www.epa.gov/wastes/consERVE/smm/index.htm>
- USEPA (United States Environmental Protection Agency) 2012c:
<http://www.epa.gov/wastes/consERVE/smm/web-academy/2012/jul12.htm>
- USEPA (United States Environmental Protection Agency) 2012d:
<http://www.epa.gov/osw/consERVE/smm/vision.htm>
- United States Interagency Workgroup on Industrial Ecology, Material and Energy Flows 1998: *Materials: A Report of the Interagency Workgroup on Industrial Ecology, Material and Energy Flows*; Washington DC
<http://www.umich.edu/~indecoll/materials.pdf>

- Waste Management World 2011: *Rare Earths to be recycled from magnets in France*. *Waste Management World*, 6 October 2011
[http://www.wastemanagementworld.com/index/display/article-display.articles.waste-managementworld.recycling.2011.10b.Rare Earths to be Recycled from Magnets in France.QP129867.dcmp=rss.page=1.html](http://www.wastemanagementworld.com/index/display/article-display.articles.waste-managementworld.recycling.2011.10b.Rare%20Earths%20to%20be%20Recycled%20from%20Magnets%20in%20France.QP129867.dcmp=rss.page=1.html)
- WEPA (Water Environment Partnership in Asia) 2012: State of water environmental issues: Vietnam <http://www.wepa-db.net/policies/state/vietnam/overview.htm>
- Willenbockel 2011 Environmental Tax Reform in Vietnam: An Ex-Ante General Equilibrium Assessment; University of Sussex, Institute of Development Studies
- Willer H, Kilcher L (eds.) 2011: *The World of Organic Agriculture. Statistics and Emerging Trends 2011*; IFOAM, FiBL; Bonn, Frick
- World Bank 2011: *Vietnam Development Report 2011: Natural Resources Management*, Joint Development Partner Report to the Vietnam Consultative Group Meeting, Hanoi, December 7-8, 2010
- World Bank 2010: Vietnam: Expanding Opportunities for Energy Efficiency; Asia Sustainable and Alternative Energy Program of the World Bank; Washington DC <http://siteresources.worldbank.org/EXTEAPASTAE/Resources/ASTAE-Vietnam-Expanding-OpportunitiesEE-Web.pdf>
- World Energy 2009: *Energy Efficiency: A Recipe for Success. Annex 2: Overview of energy efficiency policies measures: summary tables Synthesis of the 2009 survey draft*
http://www.worldenergy.org/documents/annex2wec_policies_annexes_tables_draft.pdf
- Xia L 2012: personal interview and survey; conducted August 17, 2012
- Xue B et al. 2010: Survey of officials' awareness on circular economy development in China: Based on municipal and county level; in: *Resources, Conservation and Recycling* vol. 54, pp. 1296-1302

Annex A:

Comparative chart on definitions and indicators for resource efficiency

Country	Definition of Resource Efficiency	Resource Efficiency Indicators
Canada	No current definition	Yes , there are indicators (sustainable development indicators) for various resources as developed by Environment Canada
China	No current definition. China defines resource efficiency through concepts such as 'circular economy' and the 3Rs	Yes , there indicators for various resources which are found in framework polices and different government agencies
France	No current definition at time of writing, however, policy makers are currently working on one	Yes , there are headline sustainable development indicators which are used to monitor progress towards the Grenelle Environment policy
India	No current definition	No . Although amount of "green cover" is used as an indicator for the status of the productivity of forests in the 11 th Five Year Plan
Indonesia	No current definition	Yes , different bureaus have developed indicators that could be used to measure resource efficiency
Italy	No current definition. Resource efficiency concepts are integrated with 'sustainable development' and 'decoupling'	Yes , indicators have been developed for material flow accounting and consumption
Poland	No current definition	Yes , the Central Statistical Office of Poland publishes indicators related to the environment and resources.
South Africa	No current definition	Yes , indicators for sustainable development have been developed in the National Strategy for Sustainable Development (NSSD)
Thailand	No current definition. Resource efficiency concepts are embedded within the themes of "sufficiency economy"	Yes , indicators have been defined in the draft sustainable consumption indicators report, and national statistics bureaus.
Vietnam	No current definition	Yes , the General Statistics office does have some resource efficiency related indicators that it reports on an annual basis
United States	No current definition	No . Although some indicators for solid waste could be defined by local municipalities

Annex B:

Comparative chart on resource efficiency policies by sector

	Frameworks	Agriculture/ Forestry	Eco-labeling	Energy Efficiency	Fisheries	Manufacturing/ Cleaner Production	Minerals/ Metals	Public Procurement	Transport	Waste	Water
Canada	Red	Red	Red	Red	Light	Light	Red	Red	Red	Light	Red
China	Red	Light	Red	Red	Light	Red	Light	Light	Light	Light	Light
France	Red	Red	Red	Red	Light	Light	Red	Light	Light	Red	Light
India	Red	Red	Light	Red	Light	Light	Light	Red	Light	Red	Red
Indonesia	Red	Red	Light	Red	Light	Red	Light	Light	Light	Red	Red
Italy	Red	Light	Light	Red	Light	Light	Light	Red	Light	Red	Red
Poland	Red	Light	Light	Red	Red	Light	Red	Red	Light	Red	Red
South Africa	Red	Light	Light	Red	Light	Light	Red	Light	Light	Red	Light
Thailand	Red	Red	Light	Red	Light	Light	Light	Red	Light	Red	Light
Vietnam	Red	Red	Red	Red	Light	Red	Light	Light	Red	Red	Red
United States	Red	Red	Red	Red	Light	Red	Light	Red	Red	Red	Red

Annex C: Poland resource efficiency indicators

- Consumption in urban area households (per capita) of:
 - water from water supply systems
 - electricity and
 - cooking/heating gas
- Reduction of industrial air pollutants (% of pollutants generated);
- Municipal waste landfilled (kg per capita per year);
- Municipal waste incinerated (kg per capita per year);
- Share of renewable energy sources (total electricity consumption - %).
- Production of biomass by type (in tonnes)
- Extraction of mineral resources (in thousand tonnes)
- Domestic material consumption (in thousand tones)
- Material productivity GDP/DMC (ratio)
- Primary energy supply by source (% share in total)
- Trends in energy consumption and economic growth (indexed to 1999 base year)
- Energy intensity of economies (kg of oil equivalent per 1000 Euro)
- Water abstraction by type of use (% share in total)
- Share of renewable energy sources in electricity generation (% share in total)
- Water abstraction per capita per year (m³/person)
- Generation of industrial waste (thousand tonnes)
- Waste generated by type (except for municipal waste) (million tonnes)
- Trends in industrial waste generation and economic growth (indexed to 1998 base year)
- Amount of municipal waste collected (million tons and kg/capita)
- Trends in municipal waste collection and private consumption (indexed to 1998 base year)
- Management of industrial waste by treatment method (% share in total)
- Collection of waste electric equipment (tonnes per year)
- Recycling rate of packaging waste (% recycling)