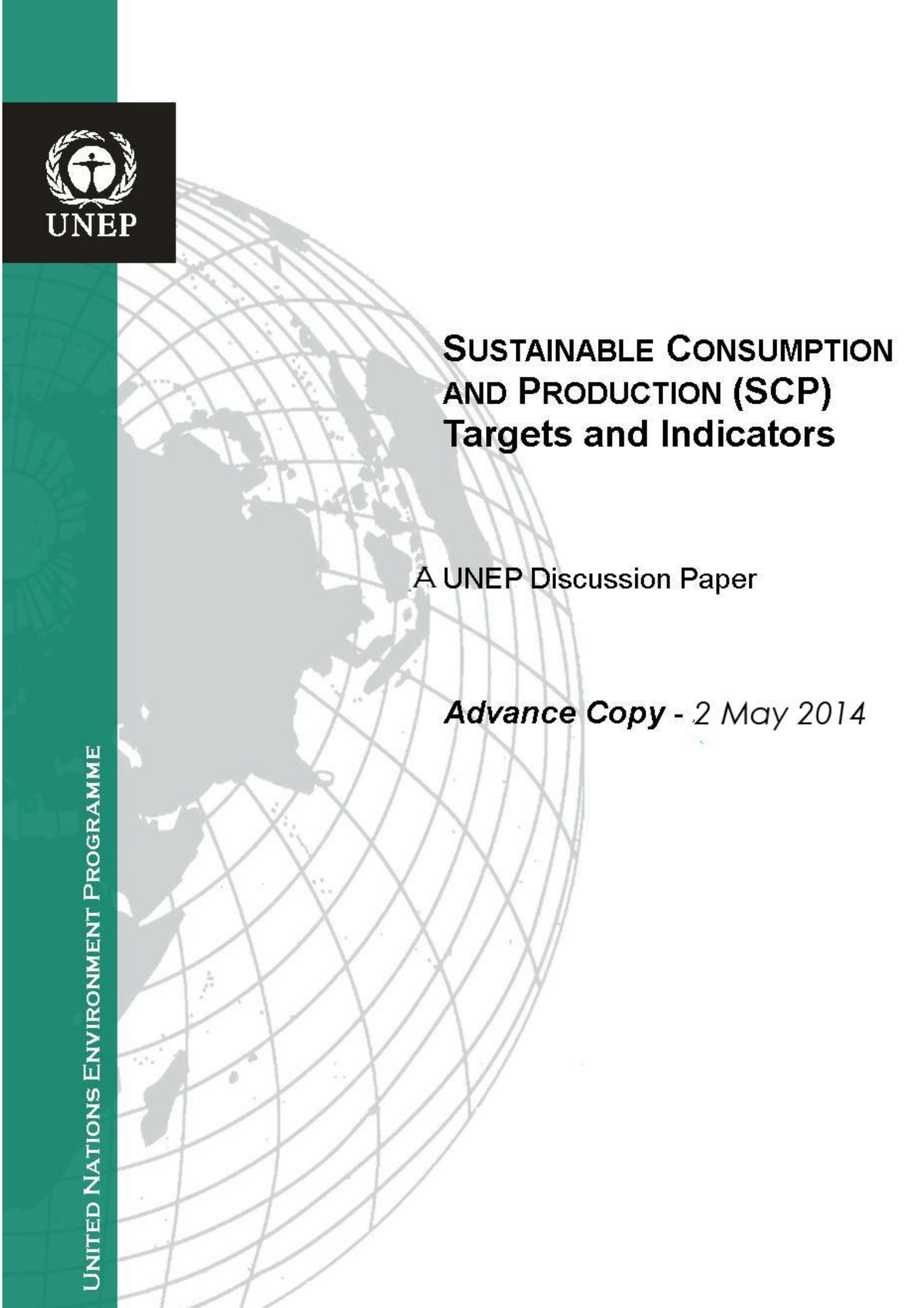

UNEP

Sustainable Consumption and Production (SCP) Targets and Indicators

A UNEP Discussion Paper

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United Nations Environment Programme

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Sustainable Consumption and Production (SCP) Targets & Indicators
April 2014

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SUSTAINABLE CONSUMPTION AND PRODUCTION (SCP) Targets and Indicators - A UNEP Discussion Paper

Advance Copy, 2nd May 2014

Table of Contents

List of Abbreviations

10YFP	10-Year Framework of Programmes
AQUASTAT	FAO's global information system of water and agriculture
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
CSIRO	Commonwealth Scientific and Industrial Research Organization
EDGAR	Emission Database for Global Atmospheric Research
EUROSTAT	European Statistical Office
HLP	High-Level Panel of Eminent Persons on the Post-2015 Development Agenda
IEA	International Energy Agency
IRP	International Resource Panel
JPOI	Johannesburg Plan of Implementation
MEA	Multilateral Environmental Agreements
NAMEA	National Accounting Matrix with Environmental Accounts
OWG	Open Working Group
RIO+20	United Nations Conference on Sustainable Development, Rio de Janeiro, June 2012
SAICM	Strategic Approach to International Chemicals Management
SCP	Sustainable Consumption and Production
SDG	Sustainable Development Goals
SNA	System of National Accounts
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

1. Executive Summary

"Fundamental changes in the way societies consume and produce are indispensable for achieving global sustainable development," states *The Future We Want*, the outcome document of the United Nations Conference on Sustainable Development (Rio+20). Over the past twenty years, sustainable consumption and production (SCP) has become a priority area for governments as the world transitions to more economically, environmentally, and socially sustainable patterns of development.

How SCP will be addressed in the Sustainable Development Goals (SDGs), and the post-2015 development agenda, have yet to be agreed by Member States, as options for goals and targets on the issue are currently under negotiation. Even more uncertain, at the time of publishing, is how SCP targets will be measured and which indicators of progress will be selected. The present advance copy of this paper reviews the various proposals for SCP targets and indicators made over the past year, and assesses their scientific basis to help build consensus on which targets and indicators might be useful in this specific context.

Member States are currently discussing whether the issue of SCP will appear in the SDGs as a stand-alone goal, or as a cross-cutting issue represented in targets across a number of goals. The Rio+20 Outcome Document and the 10 Year Framework Programmes on SCP (10YFP) address SCP primarily as a thematic area and outline its linkages to other sectors. The report of the High Level Panel (HLP) on the Post-2015 Development Agenda only considers SCP as a cross-cutting issue, and does not suggest it as a stand-alone goal. This "cross-cutting" approach of the HLP report is likewise followed by several other proposals for SDG sets (SDSN 2013, UNGC 2013).

At the same time, there may be several reasons to have a stand-alone SCP goal (as proposed in ASEF 2014, EEB 2014, Akenji & Bengtsson 2014). Many countries, especially in Asia and Europe, already have measurable SCP targets and indicators. Furthermore, several economic sectors such as mining, tourism or waste management, which are important from the SCP point of view, cannot be easily covered under other currently proposed goals. Thirdly, SCP is a fundamental issue to ensure long-term sustainability, which may not gain enough attention if it is only seen as an integrated, cross-sectoral principle.

In order to support countries in leapfrogging to SCP practices, however, the reports also suggest that technology transfer, capacity-building and stakeholder involvement are crucial, with specific reference to safeguarding traditional knowledge. While all three reports cited above address the production side of SCP, the HLP report also strongly highlights the need for progress on consumption side, by emphasizing sustainable lifestyles and the need for behavioural changes.

It is important that the future Sustainable Development Goals (SDGs) address both the consumption and production sides of the issue, while being relevant for both developed and developing countries. Given the past experience and policymaking on SCP, which has predominantly focused on promoting sustainable production, the objective of achieving sustainable consumption is relatively under-represented in the present paper. This is also the case in the "focus areas" of the SDGs have so far been developed in the course of discussions and negotiations in the Open Working Group (OWG) on SDGs. It is also important to note that, given the universal nature of the SDGs and the post-2015 development agenda, goals and targets related to SCP will need to be relevant to and allow flexibility to respond to country-specific situations. Thought will also have to be given to how to construct targets and indicators which effectively "incentivize" change in consumption and production patterns.

Based on the review of official documents, reports, and United Nations processes, through an extensive methodology that is detailed in the Annex of the present report, the following SCP targets and indicators have been identified as being among the most important for inclusion in the SDGs. Whether these targets and indicators are included under a stand-alone SCP goal, or are integrated under other issue-specific goals, it already appears crucial that the issue of sustainable consumption and production be placed at the core of the next global development agenda.

To assist member states and other stakeholders in considering these possible targets and indicators, they have been grouped under some of the focus areas defined by the OWG on SDGs, as reflected in the latest draft (17 April 2014) prepared by the co-chairs. A matrix summarizing them appears immediately below, and the rationale for proposing them is explored in more depth in the main body of the present paper.

The advance copy of this discussion paper will be finalized prior to the first meeting of the United Nations Environment Assembly (UNEA 1), in June 2014. It is intended that this advance copy will help to inform the ongoing negotiations in the OWG on SDGs, which already demonstrate a strong interest among member states in promoting a shift to sustainable consumption and production patterns.

Focus area	Target	Indicators
2. Sustainable agriculture, food security and nutrition	End hunger, ensure every adult and child receives adequate nutrition, with a focus on local and regional food security	Portion of population below minimum level of dietary energy consumption (%) % of children suffering from stunting, wasting, anaemia Average calorie intake of lowest decile/quintile by income % of locally and regionally grown food in diets
	Restore agricultural productivity of one third of severely degraded abandoned land by 2030	% of restored agricultural land % of degraded land regenerated and brought back into agricultural production Land affected by land degradation and desertification mapped as dryland
	Reduce excess nutrient release by increase nutrient use efficiency in agriculture to reduce losses (i.e. close gap between nutrient input and plant uptake)	kg of input N, P, K per kg of N, P, K in crop % wastewater treated with nutrient recovery (also linked to sanitation) % of animal waste recycled
	Reduce food loss along the food supply chain and waste at the consumption stage by 50 per cent by 2030	% of food lost prior to consumption: losses on the field, post-harvest, storage, manufacturing, processing and distribution stages. Percentage of food waste at the consumption stage
	Limit global cropland to 0.2 hectares per capita	Domestic extraction of biomass Biomass footprint of consumption Crop biomass, livestock fodder, feedstock for biofuels
6. Water and sanitation	Reduce overall water footprint per capita and per unit of GDP in developed nations by 25 per cent by 2030 and increase water use efficiency in developing nations by 25 per cent by 2030 over 2000 levels	Direct water use in production and consumption (for sectors including agriculture, mining, manufacturing and cities) Water footprint – direct and indirect water use of a consumer or producer across the whole supply chain Water footprint per capita (m^3; m^3/capita) Water footprint per unit of GDP – GDP/water footprint ($ per m^3)
	Provide universal access to safe drinking water to lower income households in developing countries by 2030	Proportion of population using an improved drinking water source (per cent)

	Reduce, year-on-year, the water footprint per unit of output in sectors which consume most fresh water taking account of global supply chains – heavy industry, power generation, paper and pulp, irrigation-based agriculture for food, fibre, tourism	Cubic metres of fresh water consumed per unit of output in: • Iron and steel making and other heavy industry • Power generation • Paper and pulp making • Agricultural water withdrawals
Focus Area 7. Energy	Universal access to energy from national/regional grids or more local supplies, with doubling the share of global energy generated from clean, sustainable resources by 2030	Proportion of renewable energy sources of total supply of primary energy (%) Primary energy/electricity production by type including the share of renewable energy Renewable energy share in electricity production (%) Total quantity of renewable energy generated from renewable sources as a percentage of total energy used (kWh sourced from renewable sources) No. of people with access to energy
	Energy consumption per capita to fall in the developed world by xx% by 2030, energy consumption per unit of GDP to fall by xx% by 2030 in the developing world	Energy consumption per capita Electricity generation per capita Total primary energy supply (TPES) (joule; joule/capita) Overall energy consumption per unit of GDP Average energy consumption per unit product
Focus Area 8. Economic Growth, Employment, Infrastructure	Decouple economic growth rates and progress in human well-being from escalating use of natural resources to achieve an average material intensity of consumption per capita of 10.5 tons in 2030 and 8 to 10 tons in 2050	Material extraction in each national economy Material footprint of each national economy, i.e. attribution of global material extraction to final consumption in each country Average national metabolic rates (material footprint per capita)
Focus area 9. Industrialization and Promoting Equality Among Nations	Improve overall material efficiency by 30% over 2000 levels in 2030 and double material efficiency of production and consumption by 2050	Material footprint per GDP for each national economy Domestic extraction of biomass per GDP in agriculture, forestry and fisheries Domestic extraction of ores and minerals per GDP in mining and quarrying Domestic extraction of coal, crude oil, natural gas per GDP in energy sector Sectoral material input per sectoral added value for main manufacturing sectors, construction and transport Material footprint of service sector
Focus area 10. Sustainable cities and human settlements	Promote resource efficient construction and building sector through 25% reduction in energy-related CO2 emissions, XX% increase in water efficiency in building operations and XX% decrease in the rate of raw material extraction for building and construction by 2030 through more efficient design and increase in use of recycled materials	CO2 eq emissions from buildings Building operations' water footprint Rate of construction related mineral extraction
Focus area 11. Sustainable Consumption and Production	Grow the end-of-life recycling rates of ferrous, non-ferrous and precious metals close to a 100% and of speciality metals to above 25% by 2050	Overall (aggregate) end-of-life metals recycling rate End-of-life recycling rates for ferrous, non-ferrous, precious and speciality metals Avoided energy use and avoided environmental impacts through recycling
	Decouple economic growth rates and progress in human well-being from escalating amounts of waste to achieve an average waste intensity of consumption per capita of 500 kg in 2030 and 450 kg in 2050	DMC (waste equivalent) Household and industrial waste, e-Waste

	To ensure, by 2020, that chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment[1]	Number of Parties to international multilateral environmental agreements on hazardous chemicals and waste such as the Basel, Rotterdam, Stockholm and Minamata conventions, the ILO Chemicals Conventions and the International Health Regulations; Number of countries with multi-sectoral and multi-stakeholder coordination mechanisms in place for a coordinated implementation of chemicals and wastes conventions and SAICM
	Reduced releases to air, water and soil of hazardous chemicals and wastes from anthropogenic sources by x% by 2030[2]	Data from pollutant release and transfer registers and other metrics of environmental releases Annual average levels of selected contaminants in air, water and soil Releases of chemicals and waste into water from industrial sources, agriculture, transport and wastewater and waste treatment plants Percentage of wastewater reused in industrial processes in total industrial water consumption
Focus area 12.Climate Change	Decarbonize the energy system and reduce the climate forcing of energy supply by 50% by 2050	Total energy and industry-related GHG emissions by gas and sector, expressed as production and demand-based emissions (tCO_2e) Greenhouse gas emissions (GHG) (tons; tons/capita) Carbon footprint per person Non-carbon energy share in energy and electricity GHG emissions from energy production and use (per capita & per unit of GDP)
Focus Area 13. Conservation and Sustainable Use of Marine Resources, Oceans and Seas	End overfishing, rebuild over-fished stocks by 2030	Number of stocks overexploited, fully and not fully exploited fish stock, fish catches Proportion of fish stocks within safe biological limits
Focus Area 14. Ecosystems and Biodiversity	Halt the expansion of global cropland into grasslands, savannahs and forests by 2020 below a global (net) cropland area of 1.640 Mha	Global (net) cropland area Conversion of land to agricultural and other uses, Rate of land-use change between land-use types Area of cropland per person
	Reduce global deforestation to zero by 2030, increase reforestation and afforestation rates by xx% per annum	Annual change in forest area Annual Deforestation of Land (ha)
Focus Area 15. Means of implementation/ Global partnership for sustainable development	By 2030, all public procurement follows sustainable development guidelines	Share of sustainable public procurement in all government procurement (percentage) Level of adoption of policies and frameworks for SPP at national and sub-national level

[1] Also relevant for Focus area 3. Human health and Population Dynamics
[2] Also relevant for Focus area 14. Ecosystems and Biodiversity

2. Introduction

The concept of sustainable consumption and production (SCP) arose out of an evolutionary definitional process that took place over several decades. According its most broadly accepted definition, SCP today refers to "the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations" (UNEP 2012; Norway Ministry of Environment 1994).[3] However, such an integrated, life cycle approach to defining SCP was preceded by a compartmentalized perspective that separated parts of the consumption and production cycles.

In the late 1960s and early 1970s, some of the first environmental legislation was enacted globally. At the time, these efforts were "generally characterized by being single-issue, reactive, site-specific and end-of-pipe" (UNEP 2012, p.18). These addressed either "sustainable consumption" or "cleaner production". The 1980s saw an increasing focus on cleaner production in environmental policymaking, also resulting from a greater emphasis on a systems perspective. In the 1990s, cleaner production was seen a way of increasing eco-efficiency, including waste minimization, while integrating the precautionary principle that was set out in the 1992 Rio Declaration on Environment and Development. Thereby, cleaner production came to mean the reduction of environmental damage at the point of generation rather than at the "end-of-pipe" stage, or the end of the production process.

Similarly and almost in parallel, policymaking has increased in the area of sustainable consumption and production while focusing on a more systemic approach. This concept saw a shift in focus from targeting single companies, adversarial stances and regulation, to advocating life cycle solutions, partnerships and voluntary initiatives, working in tandem with the private sector and other stakeholders. Consumer and civil-society empowerment have also played a significant role here.

Accompanying developments towards an integrated SCP concept were scientific findings pointing towards increasing levels of environmental damage, despite eco-efficiency improvements and the prevalence of life cycle analyses. This underscores the lack of coherence and integration between environmental, social and economic policies. Today's life cycle approach to SCP has the fundamental objective to limit environmental degradation that can result from economic growth while increasing the quality of life for all (UNEP 2012).

As the United Nations and its Member States craft a coherent sustainable development agenda to replace the Millennium Development Goals, SCP should be considered as an important goal for the world to reach. Furthermore, in order to proceed with the global implementation of SCP, it is crucial to develop targets and indicators for countries to monitor their progress. Such targets need to be grounded in global and national multi-stakeholder dialogues on promoting sustainable development and concrete policy actions, take into account market realities, and they need to be based on the best available science and data accessible for monitoring. **The purpose of this paper is to provide insights into the potential targets and indicators for SCP based on the published literature and international processes**.

The next sections provide an overview of available approaches for assessing the distance from and monitoring the progress towards achieving SCP patterns, with reference to decisions and processes such as those of Rio+20, the 10YFP, OWG on SDGs and multilateral environmental agreements (MEAs). Key linkages between SCP and other sustainable development priorities established through

[3] This definition was developed during the Oslo Symposium on Sustainable Consumption in 1994.

analytical as well as political processes are also highlighted. Methodological approaches to collect and prioritize the targets and indicators are then presented, followed by a review of the suggested targets and indicators. Finally, we provide brief conclusions and a summary of the targets and indicators available for measuring and implementing SCP.

3. SCP – an overarching sustainable development priority – definitions and key processes

3.1 Review of the conclusions on SCP in the Rio+20 outcome document

In the introduction of the outcome document of the 2012 United Nations Conference on Sustainable Development (Rio+20), *The Future We Want*, poverty eradication, the promotion of sustainable consumption and production (SCP), and the protection and management of natural resources are outlined as the *"overarching objectives of and essential requirements for sustainable development"* (UNGA Resolution 66/288, paragraph 4.). The role of the green economy in reducing unsustainable consumption and production practices is recognized (paragraphs 58 and 61), with its associated policies, for more sustainable management of natural resources, lower negative environmental impacts, increased resource efficiency and waste reduction (paragraph 60). To this end, the role of technology and technology transfer, as well as research and innovation of environmentally-sound technologies, are also emphasized (paragraph 72). Implementing these actions will generally require broad alliances of governments, civil society and the private sector (paragraphs 13, 46, 268).

As a framework for action and follow-up, the outcome document defines 26 thematic areas and cross-sectoral issues. This action framework commits to narrowing down implementation gaps, tackling new challenges, and exploiting new opportunities for action (paragraph 104).

SCP as a thematic area in "The Future We Want"

SCP is one of the 26 thematic areas in the outcome document's action framework. At Rio+20, Heads of State and Governments also adopted a 10-Year Framework of Programmes (10YFP) on Sustainable Consumption and Production Patterns for the 2012–2022 period. The 10YFP text was originally negotiated during the 18th and 19th sessions of the United Nations Commission on Sustainable Development (CSD) and builds to a large extent on the outcomes of the Marrakech Process on SCP, launched in 2003 based on the reference to the need for a 10YFP in the JPOI.[4]

The 10YFP aims for a fundamental transformation in the way societies produce and consume, and aims to ensure that economic development does not come at the expense of the carrying capacity of ecosystems (United Nations 2012, 10YFP, point 1.a). The objectives of the 10YFP can be listed as follows:

- Accelerate the shift towards SCP in all countries by supporting regional and national policies and initiatives.
- Increase resource efficiency and decouple economic growth from environmental degradation, creating decent jobs and economic opportunities, contributing to poverty eradication and shared prosperity.
- Support capacity-building and facilitate access to financial and technical assistance for developing countries, supporting the implementation of SCP activities at all levels.
- Serve as an information and knowledge-sharing platform on SCP to enable all stakeholders to exchange policies, tools, initiatives and best practices, enhancing cooperation.

To support these objectives, the initial programmes of the 10YFP focus on five target areas, including: consumer information; sustainable lifestyles and education; sustainable public procurement; sustainable buildings and construction; and sustainable tourism, including ecotourism (10YFP, point 8). A sixth programme on sustainable food systems has subsequently been approved by the Board of the 10YFP at its second formal meeting in March 2014.

[4] Source: http://esa.un.org/marrakechprocess/about.shtml

Sustainable consumption and production programmes included in the 10-Year Framework of Programmes are voluntary and should be developed and implemented in accordance with the following criteria:

- Contribute to meeting the goals and principles of the 10-year framework of programmes, as well as to the three dimensions of sustainable development;
- Respond to national and regional needs, priorities, and circumstances;
- Be based on life cycle approaches, including resource efficiency and sustainable use of resources, and related methodologies, including science-based and traditional knowledge-based approaches, cradle-to-cradle and the reduce-reuse-recycle (3R) concept, as appropriate;
- Be based on solid science and policy knowledge;
- Be transparent;
- Be consistent with international obligations, including, where applicable, the rules of the World Trade Organization;
- Encourage the involvement of all relevant stakeholders;
- Consider the use of a mix of efficient instruments such as education, training and data collection, as well as research activities in each programme, as appropriate;
- Have established clear objectives and measures of success;
- Promote synergies with work in similar areas, in order, inter alia, to promote co-benefits and opportunities to leverage resources towards mutual objectives and minimize duplication of ongoing efforts, including in other international forums;
- Be described in a simple common format, covering the programme criteria mentioned above and identifying lead actors.

UNEP currently serves as the Secretariat of the 10YFP, and a Board was appointed in 2013 to oversee its activities. In addition, governments were also requested to designate SCP national focal points. In line with the 10YFP, UNEP launched a Global SCP Clearinghouse in 2013 as an information platform for policymakers and other stakeholders [5]. A trust fund was established for collecting voluntary contributions from public and private sources in order to achieve the 10YFP objectives (10YFP, para. 6). Currently, the programmes are being developed through a five-step consultative process, with multi-stakeholder involvement. Each programme will be validated by the Secretariat and confirmed by the Board, and will provide an open platform for actions to promote the shift to SCP patterns.[6]

In the Rio+20 outcome document, SCP is not only listed as a thematic area, but also regarded as a cross-cutting issue, since many of the other themes identified linkages to this topic. These themes are related both to the *purpose* or *ends* of development, such as the health and well-being of the population, as well as the *means* of achieving them, through the use of natural resources in economic activities (as per the earlier proposed logic and terminology of Daly, 1973). An overview of the specific linkages across the Rio+20 document is presented in Appendix 7.2.

National responsibility in achieving SCP according to "The Future We Want" and the 10YFP
While developed countries are expected to take the lead in the adoption of SCP patterns, other countries are also anticipated to play a role (10YFP, para. 1.b). For instance, the Rio+20 outcome

5 Source: www.unep.org/resourceefficiency/Policy/SCPPoliciesandthe10YFP/The10YearFrameworkProgrammesonSCP.aspx
6 Source: http://www.unep.org/10yfp/Programmes/Whatarethe10YFPProgrammes/tabid/106264/language/en-US/Default.aspx

document suggests that developing countries should also promote appropriate incentives for the sustainable use of energy resources (paragraph 128), and outlines that the lack of sound life cycle based management of chemicals and waste in the least developed countries is problematic (paragraph 215). The importance of technology transfer is also emphasized in "The Future We Want" for closing gaps and reducing dependency between developed and developing countries (paragraphs 58.i and 73). Capacity-building to create more resource-efficient and inclusive economies is seen as important, suggesting that all relevant United Nations agencies and international organizations should support the transfer of sustainable practices in all sectors (paragraph 280). The need for more transparency was recognized and the importance of corporate sustainability reporting and its support and integration by industry, governments and the United Nations noted (paragraph 47).

Rio+20 recognized the importance of respecting national sovereignty and differences in national contexts, and thus viewed the move to SCP not as a specific set of required actions, but as a set of alternative policy options. The text says that each country should choose the solutions most appropriate to their conditions (paragraphs 58.b and 59); innovation and traditional knowledge, particularly in developing countries will be important aspects (10YFP, para. 3j and UNGA 66/288 paragraph 197); and the programmes of the 10YFP will take into consideration specific country circumstances, account for the different stages of development, capacities and needs across the countries, and support market development particularly for developing countries (10YFP para. 2.a – g).

3.2 Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda on SCP

The High-Level Panel of Eminent Persons on the Post-2015 Development Agenda (HLP) published its report "A New Global Partnership: Eradicate Poverty and Transform Economies through Sustainable Development" in June 2013. While the HLP acknowledged the achievements of the Millennium Development Goals (MDGs), it also stressed that the MDGs had failed to integrate the different dimensions of sustainability, especially due to its lack of emphasis on promoting SCP (United Nations HLP 2013, p.5).

For the post-2015 development agenda, five transformative changes are recommended by the HLP, and changes for SCP practices are outlined in three of these: put sustainable development at the core of the agenda (2); transform economies for jobs and inclusive growth (3); and forge a new Global Partnership for Development (United Nations HLP 2013 p.8–10). The HLP is convinced that one single, integrated agenda should define the post-2015 landscape. They suggest that in order to tackle environmental challenges, prosperity must be built and sustained, and the report further highlight that these objectives should be achieved via the implementation of SCP practices (United Nations HLP 2013 p.5, p.9). With a focus on poverty eradication, the HLP emphasizes that the poor directly depend on natural resources, for food, fuel, medicine, shelter and livelihoods, and the protection of the natural resource base (of social and economic development) as a prerequisite for improving their livelihoods (United Nations HLP 2013, p.7). Finally, in terms of implementation, the HLP suggests that, for achieving SCP, governments, businesses and individuals must all make transformative changes in food, water and energy consumption, as well as in travel and transportation practices (United Nations HLP 2013 p.8).

SCP as a cross-cutting issue in the HLP report

The HLP does not propose a stand-along goal on balancing SCP patterns, but instead considers it to be a cross-cutting issue along with other themes such as peace, equality, preventing climate change, sustainable cities, youth, and gender equality. It is proposed that SCP practices should be applied to

the basic life-enabling functions such as food, water and energy systems, as well as in other areas (United Nations HLP 2013 p.17). To do so, technology, technical and social innovations, policies, educational and awareness-raising activities are all seen as necessary tools. In addition, the roles and responsibilities of governments, the private sector, and consumers are all underlined as key actors in this transformation (United Nations HLP 2013, p.17).

Strong linkages to SCP can be identified within the following proposed goals:

- *Provide quality education and lifelong learning* (Goal 3): Education is recognized as a tool to increase awareness on the value of natural resources and the necessity of SCP practices (United Nations HLP 2013 p.37).
- *Ensure food security and good nutrition* (Goal 5): The report highlights that food security should encompass the entire food supply chain and should also include considerations for sustainable agricultural production and food consumption (United Nations HLP 2013 p.40).
- *Create jobs, sustainable livelihoods and equitable growth* (Goal 8): The report underlines that equitable growth cannot be realized without alteration of current consumption and production patterns (United Nations HLP 2013 p.46).
- *Manage natural resource assets sustainably* (Goal 9): Under this goal the following SCP relevant targets are suggested: publication and use of economic, social and environmental accounts in all governments and major companies; increased consideration of sustainability in government procurements; safeguarding ecosystems, species, and genetic diversity; reducing deforestation; and improving soil quality, reducing soil erosion, and combating desertification.

The annex of the HLP report also includes additional SCP issues that were raised during outreach efforts (United Nations HLP 2013, p.60–64). Examples include:

- Employment and inclusive growth theme: Global future studies and foresight are emphasized, and alternative paths such as delinking growth from natural resource extraction and consumption are also considered.
- Environment, natural resource management and climate change/challenges of urbanization themes: New goals are considered within planetary boundaries; polluters pay principle and patterns of consumption are addressed.

Countries' responsibility in achieving SCP, according to the HLP report
Compared to the Rio+20 outcome document, the HLP takes a strong standpoint in regard to the leading role of developed countries to promote a transformation to SCP (United Nations HLP 2013 p.3). As they are the largest per capita consumers, the HLP proposes that developed countries have to do more to promote SCP transformation through incentives and new mind-sets (United Nations HLP 2013 p.3, p.8). This can induce investment in green SCP practices, as well as the transfer of advanced technologies and solutions to developing countries (United Nations HLP 2013, pp. 9 and 10). For example the HLP stated that developed countries could demonstrate their commitment to SCP by accelerating progress towards clean energy (United Nations HLP 2013 p.14).

The report also calls for governments, especially in developing counties, to introduce green growth policy options and to mainstream social and environmental accounts into national accounting (United Nations HLP 2013, p.17). In addition, the role of the private sector and consumers in moving towards SCP practices is also emphasized. Businesses need to pursue technological transformation and should report on their social and environmental impacts, while consumers should become more environmentally-conscious in their consumption habits (United Nations HLP 2013, p.17).

While both the Rio+20 Outcome Document and the 10YFP discuss SCP as a thematic area and

outline the linkages to other sectors, the HLP report considers SCP as a cross-cutting issue only and does not propose a stand-alone goal on the issue. Other goal proposals, for example goal 9 on managing natural resources sustainably, can be seen as proxies for SCP goals. Both the 10YFP and the HLP report confirm that developed countries should take the lead in the transformation to SCP patterns, with the HLP placing a stronger emphasis on this aspect. [7] While all three documents address the production side, the HLP report more strongly highlights the consumption side, with regards to lifestyles and the need for behavioural changes.

3.3 Findings of OWG on SDGs to date on SCP, or relevant to achievement of SCP

SCP's inclusion in the Sustainable Development Goals (SDGs) was first discussed in the United Nations General Assembly's Open Working Group (OWG) session on SDGs on 8 January 2014. Member States, experts, and civil society came to New York with wide-ranging proposals and statements, many representing their views on the inclusion of SCP in the future goals, targets, and indicators of the new development agenda. Many delegations found consensus on the essential relationship between sustainable development and sustainable consumption and production, yet there was some divergence between developed and developing countries. Leaving SCP out of the Millennium Development Goals (MDGs), some Member States asserted, was one of the greatest shortcomings. The need to develop more sustainable methods of consumption and production has been described as essential for the achievement of all other development goals, and delegates stressed that they are foundational "enablers" of sustainable development.

Since then, Member States' SCP goal, target and indicator proposals have become more concrete as the meetings continue into the northern spring of 2014, working from the subsequent focus areas documents prepared by the Group's Co-Chairs. As of April 2014, SCP currently appears as its own focus area, with dedicated targets, and in various issues across other focus areas.

Proposals from a number of stakeholders emphasized that poverty eradication and sustainable growth, both central priorities for the post-2015 development agenda, would continue to be undermined by unsustainable consumption and production practices.

Member States have made broad statements that SCP indicators should, *inter alia*: measure implementation of the 10 Year Framework Programmes (10YFP) on SCP; emphasize decoupling resource use from economic growth at multiple levels; be designed with a scientific and evidence-based focus; and support means of implementation for developing countries. How the targets of the 10YFP will be reflected in the SDGs has also come up as an important issue for the design of targets and indicators on SCP. Governments have just now begun designing specific targets for inclusion in the SDGs, and are negotiating on these and existing targets.

SCP has been a complex and politically-sensitive issue since its inception. Member States have differing views on which aspects of SCP are the most important to focus on, which types of goals and targets should apply, and what indicators should measure. Most of this divergence is falling along developed–developing country lines, with developing country statements in the OWG calling upon developed countries to "take the lead" on SCP, and developed countries instead calling for "shared responsibility."

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7 Both the 10YFP and the HLP report suggest that technology transfer and capacity-building are crucial in supporting developing countries to leapfrog to SCP practices, however the 10YFP also recognizes the importance of safeguarding traditional knowledge in those countries. Stakeholder involvement is considered crucial in both the 10YFP and the HLP report, with the latter more strongly emphasizing the common responsibility of governments, businesses and individuals in the transformation towards SCP.

Interlinkages with Other Post-2015 Themes
While some countries have called for a stand-alone goal on SCP, with its own dedicated targets and indicators, others in the OWG have focused on ways to incorporate the objective into other issue areas and potential thematic goals. Interlinkages between issues has emerged as a central topic of conversation, with many Member States showing themselves eager to find better coherence among the three dimensions of sustainable development across the entire post-2015 development agenda.

The indicators of SCP are potentially a key place for countries to make these interlinkages, by focusing on areas to increase the sustainable consumption and production of: natural resources, water, biodiversity, energy, food and agriculture, forests, oceans and seas, health care, chemicals, waste, and transportation. Furthermore, SCP has been painted as an issue of central importance to creating solutions for the broader thematic areas of governance, climate change, inequality, cities, and population demographics.

Proposals under consideration, incorporating SCP into other potential goals, include:
- Increasing global share of renewable energy
- Reducing the share of overexploited fish stocks
- Restoring the agricultural productivity of degraded land
- Reducing per capita energy consumption
- Reducing wood waste at the producer and consumer levels
- Increasing sustainable public procurement
- Increasing formal and non-formal education for SCP
- Phasing out harmful environmental subsidies
- Prioritizing waste prevention and a cradle-to-cradle approach
- Strengthening institutions for the use and disposal of chemicals
- Increasing public transport systems
- Reducing deforestation
- Reducing greenhouse gas emissions

Interlinkages may also represent an opportunity to bridge the divide between developed and developing country circumstances. For example, one Member State called for differentiated targets and indicators that focus on different aspects of SCP for different countries: for developed states, targets could prioritize energy and resource efficiency and waste reduction; while for developing states, targets would help governments “leap-frog” to more environmentally sound, but competitive, practices.

Potential OWG priorities largely focus on two dimensions of SCP – decreasing the unsustainable consumption of natural resources, while increasing the sustainability of production and human behaviours at all levels. It is important to note that such proposals have been echoed across the twelve months of issue-themed discussion in the OWG, for countries do not see them as SCP proposals alone.

3.4 Relevant commitments in MEAs and other international or regional frameworks on SCP

Multilateral environmental agreements (MEAs) may be tracked back to the first United Nations Conference on the Human Environment in Stockholm in 1972, which marked the first occasion that state representatives convened to set the groundwork for international action on the environment (Gray 2000). Currently, there are over 500 MEAs, covering such diverse issues as loss of biological diversity, pollution of the atmosphere, ocean degradation and deforestation (Crossen 2003). Increasingly, the work in the international environmental field is focused on implementation, more than on the development of landmark agreements (UNEP 2012). Thus, interest is growing in

effective implementation of existing agreements, addressing gaps and promoting synergies among MEAs and with sectoral and development strategies (UNEP 2009).

From the large number of MEAs, we focus on those that could provide guidance on natural resource use, pollution from production and consumption and the need for decoupling economic growth from escalating resource use and environmental degradation and negative impacts on human health. The gap in waste management, a topic that was not sufficiently captured in the reviewed international documents and outcomes from OWG, 10FP and HLP and Rio+20 processes, is also addressed. Taking this into consideration the following MEAs are the focus of the paper:

- Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES), focused on biodiversity
- United Nations Framework Convention on Climate Change (UNFCCC), focused on climate change
- Stockholm Convention, focused on hazardous chemicals
- Basel Convention, focused on hazardous chemicals
- Rotterdam Convention, focused on hazardous chemicals
- Minamata Convention on Mercury

We also evaluate the following voluntary framework:

- Strategic Approach to International Chemicals Management (SAICM), focused on sound management of chemicals

Based on a review of these conventions (Table 1), challenges of linking MEAs with SCP targets and indicators are due to the fact that they provide objectives and priorities instead of outlining specific measurable targets supported by indicators. Specifically, of the MEA texts that were reviewed, only SAICM included specific indicators. All documents expressed objectives that are clear enough so that outcomes could be theoretically measured, though some of the objectives may be difficult to measure in practice (e.g., overexploitation of flora and fauna through international trade). Though no indicators were found in the reviewed MEA documents, it is understood that indicators can often be found in other related documents (e.g., implementation plans) that were not part of this review.

Finally, even though the reviewed MEAs do not list specific targets and indicators, most of them involve some level of reporting or information exchange[8] (e.g., on emissions, chemicals that have been banned by specific countries for import and use, best practices) that can be used to collect data for indicators focusing on these key areas.

Table 1. Relevant objectives of MEAs and voluntary frameworks for guiding target selection for SCP

MEA	Objective, goal or target relevant for SCP
CITES	To protect wild fauna and flora against overexploitation through international trade. To restrict export, import, re-export, as well as introduction from the sea of any specimen of a species that is, or may be, threatened with extinction, or which must be subject to regulation in order that trade in other species be brought under control.
UNFCCC	To achieve "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system...within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner" (p.4) Stabilizing GHG emissions at a level that would hold the increase in global average temperature below 2 °C above pre-industrial levels (UNFCCC (1992) Article 2, UNFCCC (2010) Article 1 Paragraph 4).
Stockholm Convention	Protect human health and the environment from persistent organic pollutants. Protect human health and the environment by taking the necessary measures to minimize or prevent releases

[8] However participation in these reporting efforts do not appear to be mandatory in all cases (e.g., Stockholm Convention).

	Eliminate production, import and export of a set of persistent organic pollutants (listed in Annex A of Stockholm Convention; with exemptions for environmentally-sound disposal or for permitted purposes). Minimize use of persistent organic pollutants listed in Annex B of the Convention. Reduce or eliminate releases from unintentional production.
Basel Convention	The overarching objective of the Convention is to protect human health and the environment against the adverse effects of hazardous wastes The reduction of hazardous waste generation and the promotion of environmentally-sound management of hazardous wastes, wherever the place of disposal. The restriction of transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally-sound management. A regulatory system applying to cases where transboundary movements are permissible.
Rotterdam Convention	Facilitate information exchange regarding certain hazardous chemicals to assist national decision-making processes on the import and export of certain hazardous chemicals. Dissemination of national decisions regarding the import and export of certain hazardous chemicals to Parties Elimination of exports of certain hazardous chemicals to countries that have decided to ban import.
Minamata Convention on Mercury	To protect the human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. The major highlights of the Convention include a ban on new mercury mines, the phase-out of existing ones, control measures on air emissions, and the international regulation of the informal sector for artisanal and small-scale gold mining.
SAICM	"The sound management of chemicals is essential if we are to achieve sustainable development, including the eradication of poverty and disease, the improvement of human health and the environment and the elevation and maintenance of the standard of living in countries at all levels of development;" (pp.7 and 14). There are also 46 relevant objectives organized according to the following framework: (a) Risk reduction; (b) knowledge and information; (c) Governance; (d) Capacity-building and technical cooperation; (e) Illegal international traffic.
Convention on Biological Diversity	Aichi Target 4 "By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits"

Sources: UNFCCC (1992) Article 2, UNFCCC (2010) Article 1 Paragraph 4

3.5 Past work on SCP and resource efficiency related indicators

Achieving SCP aims is about ensuring that goods and services can be produced and consumed while exerting minimal pressure and impact on the natural resource base and ecosystems. This is usually seen as being enabled through improving the eco-efficiency of industries and through encouraging sustainable consumption by governments, businesses and individual consumers. Measuring the performance of nations, economic sectors, cities, governments and households with regard to achieving SCP can have several focuses, which have all been represented to a varying degree in the available indicator approaches to date. Indicators for SCP may include socioeconomic and human development aspects, they may focus on the institutional and policy settings to achieve SCP, and they may focus on environmental outcomes such as the use of natural resources in production and consumption, or the amounts of waste and emissions that are generated through those processes. These SCP-related environmental outcomes are important not only in their own right, but because they directly support social well-being, particularly of the poor, who often have a very limited tolerance for the effects of resource degradation or depletion.

Most approaches agree that measuring natural resource use, waste and emissions must be an integral part of any SCP indicator set. Indicators for natural resource are best organized as satellite accounts to the System of National Accounts (SNA) that ensures complementarity with economic accounting and allows consideration of the performance industry by public authorities. SCP indicators thus generally need to comply with the System of Environmental-Economic Accounting (SEEA) to ensure complementarity across sectors. Measuring resource use efficiency covers several domains of natural resources use, including: (a) materials and waste, (b) energy and emissions, (c) water and (d) land. The most comprehensive study including all resource domains has been prepared for Asia and the Pacific (UNEP 2011) but there are many other studies that cover material

flows and resource productivity (e.g., Dittrich et al. 2012, West and Schandl 2013a, 2013b), energy and energy efficiency (IIASA 2012), and the efficiency of water use (UNEP 2011).

The concept of resource efficiency looks at the relationship between economic activity and resource use and measures resource use by unit of economic activity. Resource efficiency can be expressed as resource productivity (economic output per unit of resource use) or resource intensity (resource use per unit of economic output). Productivity and intensity are inverse measures. Measuring resource productivity allows for comparison of trends with other factor productivities whereas intensity focuses more on the environmental and resource use aspects of economic activities.

UNEP (2008) proposed a framework for SCP indicators that covers several aspects of SCP by employing a conceptual approach based on the five capitals model of sustainable development and their inter-relationships. The indicators framework suggests monitoring natural capital (natural resources and ecosystem services), human capital (health, knowledge and skills), social capital (institutions), manufactured capital (fixed assets) and financial capital (enabling other forms of capital to be owned and traded) and the relationships and dependencies among those different forms of capital. The framework looks at the performance of producers and consumers considering different dimensions of actors' behaviours including compliance, efficiency, connectivity, critical stock and resilience. It also considers the situation in developing countries more explicitly than other frameworks or indicator sets do. The conceptual framework presented goes beyond what other indicator approaches have suggested in terms of addressing the complexity of social, economic, and environmental perspectives and their linkages to the policy process which are viewed at the national and sectoral level (industry and households). The conceptual approach also has a well-defined relationship to natural capital and natural resources. Despite the strong conceptual framework the list of indicators presented has to be seen as illustrative as it lacks coherence across available data sets and would benefit from stronger linkages to the system of national accounts and the SEEA framework.

The notion of decoupling economic growth and human well-being from the escalating use of the natural resource base has been promoted as a guiding policy goal by the International Resource Panel (IRP) of UNEP (UNEP 2011). A 2011 IRP report distinguishes resource decoupling from impact decoupling where the former refers to the relationship between economic growth (economic activity) and the level of primary resource use (based on a pressure indicator approach) and the latter refers to the relationship between economic activity and the environmental impacts that occur in environmental systems (impact and state indicators). Such environmental impacts occur at all stages of the whole life cycle of natural resource use from primary resource extraction, to the transformation of primary resources into commodities, to the use phase of commodities and in the post-consumption phase. Environmental impacts may include natural resource depletion, climate change, biodiversity loss, soil erosion, waste problems, pollution, and human health risks. While resource decoupling is relatively easy to measure using existing data sets for pressure indicators impact decoupling requires additional analytical tools such as life cycle analysis and environmentally extended input-output analysis. The IRP report establishes a distinction between economic growth and human well-being which is usually not addressed in existing indicator systems which focus on economic activity, resource use and environmental impacts.

Another important distinction is made between "relative" and "absolute" decoupling of economic activity and natural resource use, waste and emissions. Relative decoupling results when economic activity expands more rapidly than do related environmental pressures or impacts, which results in an improved economic efficiency of natural resource use and a lower impact intensity. Many studies have demonstrated that relative decoupling seems to be a fairly common phenomenon. Absolute decoupling, i.e. an absolute reduction in the amounts of natural resources consumed, waste and

emissions even in the face of the growth in economic activity, very rarely occurs in practice. Absolute decoupling occurs when the causes and consequences of a problem are well understood, when something can be done to resolve the problem, and when there is willingness among key stakeholders and constituencies to overcome barriers to effective change and to act upon the problem through the wide-scale promotion of appropriate decoupling policies and technologies[9]. This has been the case for certain air pollutants where the relationship between pollution and environmental and health impacts were well established, filter technologies had been available, and policymakers and businesses were ready to implement the necessary technologies to respond to the concern and demand expressed by the general public.

It is important to mention that the relationship between economic activity (measured by gross domestic product – GDP) and human well-being is not straightforward, as outcomes for well-being can vary at similar levels of GDP. While it is difficult to measure human well-being directly and there are only very limited commonly agreed human well-being indicators[10] that are reported on a regular basis, recent results from multidimensional well-being indices at the national level suggest both subjective and objective measures of well-being as well as sub-indices of environmental sustainability do not correlate well with GDP as a measure of economic activity. For instance, in the case of the Canadian Index of Well-being (CIW) the growth rate of the national GDP for the last twenty years is consistently higher than any other social well-being or environmental sustainability measures[11]. There is a growing body of work on subjective measures for well-being including indicators for happiness which has, however, not reached the level of scientific agreement necessary for policy relevant indicators but may well do so in the years to come.

3.6 Information on available data sets and databases, and costs/efforts required for augmenting these

There are a number of global data sets for material use which increasingly agree in their information of usage of biomass, fossil fuels, ores and industrial minerals and construction minerals at the global level and country by country. The main data providers are the Vienna University of Business and Economics which operates a database covering the period 1980 to 2010 (available at www.materialflows.net) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Australia covering the period 1970 to 2008 for two world regions, namely Asia and the Pacific (at www. csiro.au/AsiaPacificResourceFlows) and Latin America and the Caribbean (at www.csiro.au/LatinAmericaCaribbeanResourceFlows). The Institute of Social Ecology in Vienna has, in addition, produced a 100 year time series of global material use (Krausmann et al. 2009).

A recent comparison of data sets in Fischer-Kowalski et al. (2012) found a high level of coherence between different data providers which speaks for the robustness and reliability of the available data for material use at national economy level. The high level of agreement among data from different data providers is a result of the methodological efforts and guidance that has been provided by the European Statistical Office (EUROSTAT) through a number of guidebooks that have oriented the generation of data sets in research institutes and statistical offices around the globe. The most advanced material flow data available for Europe is provided by EUROSTAT. There are two

[9] These decoupling policies and technologies are the focus of the "Decoupling in Practice (Decoupling 2)" report of UNEP International Resource Panel to be published in June 2014

[10] Such indicator is for example the human development index (HDI) measuring literacy, life expectancy and wealth; for details see http://hdr.undp.org/en/statistics/hdi

[11] https://uwaterloo.ca/canadian-index-wellbeing/sites/ca.canadian-index-wellbeing/files/uploads/files/CIW2012-HowAreCanadiansReallyDoing-23Oct2012_0.pdf

online data sets hosted by the UNEP and the CSIRO for Asia and the Pacific and for Latin America and the Caribbean (see above).

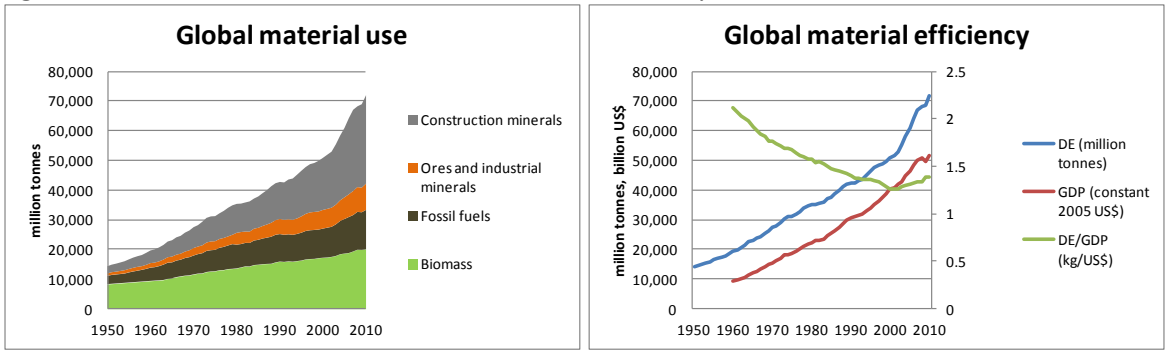
Another important data source is the EXIOBASE database (see at www.exiobase.eu), a global, and multi-regional environmentally extended input-output framework which includes environmental satellites for emissions and resource extractions by industry. The international input-output table provided by EXIOBASE can be used for the analysis of the environmental impacts associated with the final consumption of product groups in a country or a group of countries.

UNEP's International Resource Panel has commissioned an assessment study on global material flows and resource productivity with the aim to harmonize the currently available global data sets and to agree on one data set. From the available studies global material use is known to have grown from 14 billion tons in 1950 to over 70 billion tons in 2010 (see Figure 1a).

Analysing the data, it becomes clear that material efficiency at the country-level improved throughout the entire second half of the 20th century. There is a genuine trend observable in many countries of improvements in material efficiency as economies matured. The global trend in improving material efficiency reversed, however, at the beginning of the twenty-first century, driven by a large shift of economic activity from material efficient-economies such as Europe and Japan to much less resource-efficient economies such as China and India (Figure 1b).

It is important to note that the few examples of economies that have stabilized or reduced their material throughput on the back of vast improvements in material efficiency – examples include Japan and the United Kingdom –have largely outsourced their material intensive production to other countries. Their improvement in material efficiency and absolute material use is artificial and disappears once global resource extraction is attributed to final consumption in these countries by application of the material footprint approach (Wiedmann et al. 2013). By attributing global primary resource extraction to final consumption in countries, the material footprint study demonstrates that countries' use of nondomestic resources is, on average, about threefold larger than the physical quantity of traded goods. The study also shows that there is no level of income yet at which material use would stabilize at the national level.

Figure 1a and b. Global material use and material efficiency



Source: CSIRO Global Material Flow Database, World Bank World Development Indicators

The forthcoming global material flows and resource productivity assessment study of the UNEP International Resource Panel will result in a publicly available data source on material flows for all countries in the world covering four decades. These will be made available to government agencies, academics and the general public for further analysis of resource efficiency trends. The main obstacle for using this data for SCP indicators is the lack of sectoral detail which makes it difficult to assess progress of eco-efficiency of certain economic activities and industry sectors.

Detailed data on energy use are available from the International Energy Agency (IEA). Data are available for most countries in the world and include national data on primary energy carriers as well as sectoral detail for final energy use which allows the derivation of sectoral energy efficiencies.

Data on greenhouse gas emissions and air pollutants are available from the Emission Database for Global Atmospheric Research (EDGAR) and also from the IEA. Many countries hold sectoral emission accounts applying the National Accounting Matrix with Environmental Accounts (NAMEA) framework.

There is a lack of information and data for solid waste and a very low reliability of waste statistics in most countries in the world. Accounting for material flows at the national economy level may assist cross-checking potential waste amounts in the economy with statistical information of waste flows.

Data for water use are made available by the FAO information system on water and agriculture (AQUASTAT) which includes data on water withdrawals for agriculture, manufacturing and municipal water use and also informs about the main sources of water that is used in economic activities. The data availability, however, is patchy and there are no continuous time series for either national or sectoral water use available for most countries in the world. For land-use, both statistical data, for example from agricultural censuses, and satellite data are available but need to be harmonized.

While data on urban and industrial land-use are not universally available across all countries, recent and expected improvements in remote sensing and land-use classification systems should make it possible to come up with land-use related efficiency indicators.

4. SCP contributions to aspects of Sustainable Development and recommendations for targets and indicators

4.1 Illustrating key contributions of SCP to specific aspects of sustainable development

4.1.1 Low carbon economy through decoupling economic growth from increased resource use and pollution

In recent decades, the world has witnessed exceptional economic growth enabled by the dissemination of new technologies and large scale processes of industrialization and urbanization in many developing countries around the world. This has meant that millions of people have been lifted out of poverty, and poverty rates fell sharply from over 40 per cent in 1990 to about 20 per cent in 2008 (World Bank 2012). A large middle class of over one billion new consumers has emerged across developing countries (Myers and Kent 2003). This improvement in human well-being and economic growth, however, has come at a cost of a rapidly increasing demand for natural resources and rapid ecosystem degradation including land degradation and groundwater depletion and contamination. There is growing recognition that the natural resource base of economic growth and human well-being has to be managed more effectively and efficiently to secure future prosperity and well-being on this planet (UNEP 2014).

Concepts of sustainable consumption and production, resource efficiency and cleaner production gained prominence in the international policy community at the start of the twenty-first century because of increasing signs that resource supply systems were not keeping up with rising demand for natural resources. This has led to supply insecurity and rising and more volatile prices for many natural resources including energy carriers, food, metal ores, and animal feed (McKinsey Global Institute 2011). The current price volatility has long-term implications for global economic stability because it increases the risk margins for investments into supply infrastructure, which become a deterrent to investment in new supply. The short-term price fluctuations that are experienced today could therefore contribute to much higher long-term prices and increasing supply insecurity (The Royal Institute of International Affairs 2012).

The outlook for natural resources is increasingly becoming one of supply disruptions, price volatility, and environmental degradation and rising political tensions over resource access. Since public policy for managing global resource prices is practically nonexistent the only solution to the supply scarcity of critical resources is large improvements in the efficiency of natural resource use allowing for reduced resource inputs to production systems. Efficiency often refers to improving existing systems of provision such as for housing, mobility, energy and water and is an important but not sufficient condition for sustainable development. Dematerialization and decarbonization of consumption and production will also rely on systems innovation moving to new systems of provision in such areas where efficiency alone does not deliver the required environmental and social outcomes. Achieving these aims will also depend on changes in the behaviour and choices of consumers.

Large improvements in resource efficiency will be required to house, clothe, feed and transport 9.6 billion people by the middle of this century (United Nations DESA 2013). Under the ongoing “second wave of urbanization”, the global urban population is projected to reach 5 billion in 2030 and 6.25 billion in 2050. This urbanization process will significantly increase the demand for natural resources because cities in both developed and developing countries will need to invest on a massive scale in new urban infrastructure.[12] The science of industrial ecology shows that improvements in resource

[12] The resource implications of the second wave of urbanization is the subject of a forthcoming assessment report of UNEP International Resource Panel

efficiency of up to 80 per cent are possible in many sectors of the economy (Von Weizsäcker 2011). Such improvements can occur in the material intensive sectors of the economy such as the iron and steel and cement industry, they can occur in housing and transport as well as in the food provision sector, and can include more efficient use of energy and water. If well designed, new infrastructure in cities will have a long-lasting positive legacy for resource efficiency in the decades to come.

4.1.2 Improved productivity and competitiveness through resource efficiency and innovation

Using natural resources effectively and efficiently yields a double dividend of increased competitiveness and growing employment as well as important environmental benefits. Implementing industrial ecology principles of reducing, reusing and recycling of resources assists businesses, urban councils and households to save costs and increases the resilience of the economy in a volatile global economic context.

Economic growth in the twentieth century was enabled by relatively stable or overall declining global market prices for most natural resources including fuel, metals, and food (IMF 2011). While most natural resources were relatively abundant, and supply could be secured at low costs, manufacturing capital and skilled workforces were the main bottleneck to economic growth in many countries. Labour costs, in many industries, account for up to 70 per cent of input costs and, as a consequence, improving labour productivity has long been the most effective strategy to reducing overall production costs. Capital accounts for about one quarter of input costs and natural resources (energy and materials) in many industries amount to as little as 5 per cent of total input costs.

For most of the twentieth century it was economically rational to improve labour productivity at the cost of other factor productivities and to ignore material and energy productivity. Large structural shifts in the political economy of natural resources have occurred, however, that have deepened the inter-relationship between resource systems, and have shifted the pattern of global income and power. This has led to growing environmental threats such as climate change and water scarcity, a shift in consumption from West to East, and a tremendous increase in trade of primary resources (The Royal Institute of International Affairs 2012).

The enormous growth in economic activity and consumption in many developing countries, notably in China and other emerging economies, has changed the global economic context. The average price of primary materials has risen sharply since the beginning of the twenty-first century and average prices are now four times higher than long-term price levels of the last two decades of the twentieth century. The former World Bank economist Herman Daly put forward the notion of “full world economics” to describe a situation in which natural resources become the limiting factor for production and consumption (Daly 2005). In a full world, investing in resource efficiency has to become the main objective of business strategies and plans and needs to be a focus of government policy.

Accelerated natural resource consumption and a failure to grasp large opportunities for improving resource efficiency, due in part to prices that do not reflect the real social and environmental cost of inefficient resource use, have meant that many environmental impacts of resource use now have negative repercussions for economic activity. These include the depletion of natural resources, loss of soil fertility, constraints in water availability in many agricultural and urban areas, and climate change and impacts of climate change such as coastal and inland flooding, bushfires, extreme heat and unpredictable rainfall patterns and drought. The economic costs of climate impacts go well beyond the agricultural sector and have ripple effects across the whole economy including disruption of business activity and of the lives of people resulting in reduced labour productivity. Converging factors including tighter markets, rising prices, and a growing demand for those natural resources that are critical for current production systems could slow economic growth, damage the

welfare of citizens – particularly those on low incomes – strain public finances, and raise geo-political tensions (McKinsey Global Institute 2011).

Redirecting investments towards improving the resource productivity of primary industries, the manufacturing sector, and urban infrastructure, as well as identifying new investment for greening production systems, are becoming the main objectives of many national governments and a growing number of institutional and private investors. Investing in a green economy, incentivizing sustainable production and responsible consumption through overall economic incentives and reducing perverse subsidies for natural resources (such as fossil fuel subsidies) will support the new focus on resource productivity on which prosperity will be based in the future. Transformational policies such as an ecological budget and tax reform and "cap and trade" systems for emissions will probably be important elements of a new approach to economic policy based on resource efficiency and low carbon production and consumption.

Countries and companies that adopt public policies and business strategies that support sustainable consumption and production early will earn an additional benefit of increased productivity and competitiveness over the medium term. The global demand for natural resources is not going to ease any time soon. This will put further strain on supply systems further accentuating demand-supply mismatches which will be expressed in high market prices for fuel, metals and food. For some materials that are highly critical to modern economies, industrial practices, and infrastructure supply, security may not always be guaranteed and production will be interrupted, causing losses in business income and national income.

A report by McKinsey Global Institute (2011) has identified that three quarters of resource efficiency improvements would come from a small number of activities including improving the energy efficiency of buildings, promoting a modal split in transport favouring public transport, renewable energy, and greater eco-efficiency of heavy industries including iron and steel and cement. Delivering the required improvements in resource productivity will be a large and complex public policy agenda. It will require an improved knowledge base, enhanced capacity of government agencies to identify policy tools, implementation pathways and monitoring strategies, as well as a very large initiative around training and retraining workers especially in the material, energy and waste intensive sectors of the economy.

Improving resource efficiency of existing systems of provision and introducing new ways of provisioning the growing global population with buildings, transport, energy and water will require large investments in innovation systems in many countries. It has been argued that the next wave of innovation will be driven by resource efficiency and the introduction of new systems of provision, enabled through the pricing of waste and natural resources. This will need to be supported by clean technologies and ways of provisioning that do not rely on large throughputs of matter and energy. Today's modes of consumption and production will need to be fundamentally transformed to achieve and sustain human well-being and a high standard of living for all people on the globe while halting environmental degradation and climate change.

In the context of the SDGs there is an important concern about the growing inequality that would be further accentuated if investments in resource productivity do not occur. A large share of the global population lacks access to basic goods and services such as energy, water, food, sanitation and communication. High world market prices for natural resources that are fundamental for human development would further restrict life chances for people that are already excluded from high standards of living. This has become apparent for global food and fuel prices especially for low-income groups who spend a large fraction of their household income on food and mobility and for people who directly depend on non-market food and energy sources that are rapidly depleted or

restricted from common access. Using natural resources more effectively and efficiently will mean reduced waste and reduced cost and makes possible a better distributional equity of resource use.

4.1.3 SCP and poverty eradication

The Rio+20 Outcome document, "The Future We Want", recognizes poverty eradication, the promotion of sustainable consumption and production (SCP), and the protection and management of natural resources as the "overarching objectives of and essential requirements for sustainable development" (UNGA 2012, paragraph 4). For the eradication of poverty, the Outcome document advocates for sustained, inclusive and equitable economic growth (UNGA 2012 paragraphs 106, 107). In line with this, it recognizes the right of countries to development and to an adequate standard of living, as well as national sovereignty over their natural resources (UNGA 2012, paragraphs 8, 58.b and 59). Both the 10YFP and the HLP report outline that the promotion of fundamental transformation in the way societies produce and consume is critical to ensure that economic development remains within the carrying capacity of ecosystems (United Nations 2012, 10YFP point 1.a, United Nations HLP 2013 p.5, p.9).

While the eradication of poverty in developing countries may be associated with an increase in consumption, sustainable consumption and production practices help ensure that environmental degradation is limited (UNEP 2013). SCP in this context means that the growing volume of goods and services needed to lift people out of poverty are produced in ways radically more eco-efficient than at present, so that their aggregate resource consumption and ecosystem degradation is actually *lower* not only in relative but absolute terms. It also requires radical improvements in the efficiency of consumption, by the presently affluent – *living better by consuming less* – and by ensuring that those who are presently poor do not emulate the wasteful consumption habits and practices of today's well to do – *living better by consuming enough, but not more*. Living better by consuming less and thus contributing to environmental sustainability has been proposed by Jackson (2008) as a double dividend, but in the context of poverty the lower environmental impact part has to be a result of increased, but smarter consumption.

Several targeted pilot projects and case studies from around the world show the potential of a shift to SCP to contribute to poverty eradication, and prove the feasibility of such an integrated approach. Some striking environmental and socioeconomic co-benefits were identified in the food and energy sectors and appendix 1 summarizes four of these examples. Other examples of such projects have also been identified, in the water sector for example by promoting more efficient use of different water sources (e.g. rainwater), and the waste sector by introduction of recycling practices (Boers and Ben-Asher 1982; Smith 1972; UNEP 2013). Water and energy are cross-cutting commodities that affect the price of many goods and services and thus living standards, underlining the importance of investments in infrastructure for clean energy, energy efficiency, clean water and productive and sustainable agricultural systems.

Environmental factors both constrain and underpin social and economic progress. Governments' pursuit of inclusive green growth and related employment are important for ensuring that poverty reduction is sustainable, and that development contributes, or at least does not impinge on, the future productivity of water, energy and food systems (United Nations HLP 2013). Poverty is the main cause of hunger. Given that food is the largest part of the budget of low-income groups, food has to be not only sustainably produced, but also affordable. Small-scale and subsistence agricultural practices relying on low-input techniques can yield comparable returns than chemical-intensive farming, and they are often also better suited to the skills, knowledge and resource base of smaller farmers and can provide needed food supply for their households (Pimentel et al. 2005; Seufert et al. 2012). Such systems may also be more labour intensive – and in some cases this has the effect of creating more, decent jobs. Similarly the concepts of fair-trade and organic agriculture are good

examples of an SCP approach that can potentially increase the income of agricultural producers while also improving environmental impacts. In other sectors, the promotion of reuse, reduce and recycle policies can drive demand for the repair of goods creating new market opportunities for both labour and commodities that can address the socioeconomic needs of low-income populations.

The measurement of poverty has been a subject of significant research for several decades, resulting in a more nuanced perspective that views poverty as a multidimensional problem related not only to income but also the capabilities of people to satisfy their basic needs. Key targets and indicators suggested in the literature to directly monitor poverty focus on ending extreme poverty, reducing malnutrition, expanding employment and productivity, and raising living standards, among others. They also include, as examples of indirect targets, significantly increasing investment in clean energy and energy efficiency innovation, ensuring water infrastructure, access to clean water and sustainable agriculture and food production (UNEP 2013b; WWF 2014; Schoon et al. 2013; SDSN 2014; UNEP 2014).

4.1.4 SCP to maintain biodiversity, ecosystems and reduce chemical hazards

SCP contributes to biodiversity and ecosystem conservation through the management and use of natural resources in production processes, the treatment and emission or disposal of waste, and through the choices and impacts of consumption. The Rio+20 outcome document identifies SCP's linkages to biodiversity, oceans and seas, forests and mountain ecosystems. In all of these domains conservation and the sustainable use of resources as well as investment for ecosystem restoration are encouraged. The Rio+20 outcome document also recognizes the indirect contributions of SCP to maintaining biodiversity and ecosystems by ensuring food security and nutrition and sustainable agriculture, water management and access to sanitation, promoting energy efficiency, and ensuring sound chemicals and waste management.

While these linkages appear at first sight to be primarily environmental, they are directly connected with the social and economic aspects of sustainability. In the social domain biodiversity and ecosystem conservation are particularly important for addressing particularly deep rural poverty, where people directly and often exclusively rely on land and water resources to provide the basics of life. As seen historically in the case of, for example, some countries in East Africa, overuse of natural ecosystems can be a direct prelude to famine and conflict, as the ultimate price of unsustainability (Levy 1995). Conversely, conservation farming, integrated water resources management, agroforestry, selective logging and other similar land-use measures consistent with SCP can be not only a source of sustainable livelihoods, but also help maintain ecosystem integrity and contribute to biodiversity conservation.

In terms of specific impacts of SCP on biodiversity and ecosystems, over 60 per cent of the ecosystems and their services are already degraded, overexploited or lost due to increasing water and air pollution, land and forest degradation, waste generation and the improper use and disposal of harmful chemical substances (MEA 2005 in TST 2013). Specifically, in the reviewed documents the link between SCP and biodiversity is discussed by considering the impacts of unsustainable consumption and production patterns on biodiversity and ecosystems. These impacts occur through habitat loss, intensification and the expansion of agricultural production, unsustainable use of water resources and fisheries and improper waste and chemicals management. This includes the expansion of farming and industrial activities in natural and semi-natural areas (Schoon et al. 2013). Intensive agriculture is seen as a leading source of environmental degradation such as the loss of soil

fertility, nutrient pollution and exacerbating the effects of climate change (IRP 2014)[13]. Other SCP impacts relate to the overuse or degradation of water resources through effluents that affect both the services from aquatic ecosystems and biodiversity in general and the sustainability of fisheries resources (WWF 2014; Schoon et al. 2014). Considering the large and increasing part of humanity that relies on fisheries and other resources from freshwater ecosystems, SCP measures aimed at maintaining these resources would pay a significant dividend in terms of poverty reduction and social well-being.

Another type of linkage between SCP, biodiversity and ecosystems relates to the use and discharge of harmful chemicals (Stockholm Convention 2001; Minamata Convention 2013). MEAs reviewed in the present paper aim to eliminate the use of harmful substances and encourage the move towards producing and using chemicals in ways that help minimize significant effects on human health and the environment (Basel and Rotterdam Conventions, SAICM). The uncontrolled release of harmful chemicals continues to affect the atmosphere, water, soil, wildlife, ecosystems and global food chain, with associated impacts on human health. They also contaminate water resources through direct discharges to bodies of water or via deposition from the air.[14] Chemical hazards can also come at a significant cost to human health; UNEP's recent Cost of Inaction Report put the total cost of injury from pesticides in Sub-Saharan Africa higher than the total ODA spending excluding HIV AIDS (UNEP 2013c).

In order to ensure SCP contributes to biodiversity and ecosystem conservation, a safe operating space for production and consumption practices has to be defined to determine how much stress land and water ecosystems can endure during their use without irreversible damage. This approach will need to focus on limiting biodiversity loss, accumulation of harmful chemicals, disruption of water and nutrient cycles, and loss of fertile soil (IRP 2014; Basel and Rotterdam Conventions, SAICM). Moving towards such sustainable resource management will require monitoring systems that are able to systematically measure and assess the condition and change of natural resources. Changes in ecosystem conditions, expressed both in biophysical and where possible economic terms and aggregated at the national and international level can also indicate the scale of exploitation and the shifting burden of production and consumption from one country or region to another (Schoon et al. 2013).

In terms of specific responses, various sectoral management practices to improve biodiversity conservation, prevent the depletion of fisheries, reduce water and air pollution and limit solid waste disposal can be identified (IRP 2014; SDSN 2014; Pinter et al. 2014). New approaches to promoting more strategic and sustainable business models that harness synergies and avoid competition for scarce natural resources are also important (TEEB for Business, UNEP 2010). The identification of a safe operating space for biodiversity and ecosystems and the determination of management and production practices that make use of these assets must go hand in hand with the establishment of targets and indicators. It will also be necessary to strengthen monitoring systems that can track and help determine whether the SCP practices put in place are actually resulting in the reversal of unsustainable trends.

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[13] On the other hand, agriculture can also contribute to environmental solutions, e.g. by binding carbon in the soil, increase biodiversity through diverse habitats. The impacts of agriculture thus depend to a substantial degree on specific aspects of the activities and hence the resource management regime (IRP 2010).

[14] Waste generation is projected to increase dramatically in the next dozen years, from 1.3 billion tonnes per year today to 2.2 billion tonnes per year by 2025, with high increases in middle-income developing countries (TST, 2013). In developing countries, 50-70 percent of waste is organic, much of which could be used to produce energy and fertilizers (through methanization and composting) (TST 2013).

Suggested indicators and targets to protect habitats, limit land conversion and reduce the loss of natural or semi-natural forests include:

- targets for improved resource efficiency and productivity in agriculture, energy and other sectors relying on water, land, forests and fisheries and on waste management;
- targets on ensuring sound management of natural resources, improved legislation and effective inter-agency and transboundary measures to strengthen law enforcement ; and
- the use of integrated reporting standards to track the social and environmental externalities of businesses (UNEP 2013b; WWF 2014; Schoon et al. 2013; SDSN 2014; UNEP 2014; CITES, UNFCCC, Stockholm Convention, Basel Convention, Rotterdam Convention, SAICM).

4.1.5 Stand-alone goal on SCP and potential targets and indicators

The approach of the HLP report – which identified SCP as a cross-cutting issue – is followed by several other proposals for SDG sets. They take an integrated approach and link the transformation towards SCP patterns with inclusive economic growth under one or several goal areas (Kok et al. 2014, United Nations Task Team (TT) 2012, p. i, summary). However, empirical explorations have shown (ASEF 2014) that there are also good reasons to have a stand-alone SCP goal, as many countries (in Asia and Europe) already have measureable targets and indicators for natural resource consumption, resource efficiency, pollution and waste. Furthermore, several economic sectors such as mining or tourism, which are important from the SCP point of view, cannot be easily covered under other goals. The same applies to targets for waste reduction and management, an issue still not sufficiently tackled and increasingly at stake in light of urbanization patterns. The political rationale for a stand-alone goal is also important, considering that SCP is a fundamental issue, which may not get enough attention if it appears only as an integrated, cross-sectoral objective.

The original approach of the Rio+20 outcome document, which effectively recognized achieving SCP patterns as prerequisite for sustainable development, amounts to a stand-alone goal. This approach could capture all relevant aspects of the means of production and consumption across sectors, their linkages with natural resource use and management, including the overarching issue of waste, which can be seen as a final "product" of inefficient and unsustainable consumption and production. It is only through absolute decoupling that continued economic growth can be sustained in the context of current and future stresses of finite material and energy resources and a range of vital ecosystem services.

The process of decoupling is one of reducing the resource intensity and environmental impacts throughout the value chain and life cycle of goods and services, from design, through production, consumption and ultimate disposal or reuse or recycling. Decoupling involves reducing the resource intensity of production, as well as the externalities that may occur throughout the product life cycle. With regards to the latter, most countries in the OECD and a substantial number of developing countries have addressed pollution pressures by setting both environmental quality standards and effluent/emission limits (e.g. OECD 2002; Blackman 2010). A number of legally-binding conventions, some of which are covered in this paper, exist at regional and international levels to address these issues. However, although many countries have imposed regulations on natural resource use, targets are less developed. As an overarching objective of SCP, it may be desirable to treat decoupling as a central element of a stand-alone goal on SCP.

As a major actor in the quest for SCP and representing countries with high consumption per capita rates, the EU suggests following the thematic areas of the Rio+20 Outcome Document for the formulation of the post-2015 development agenda (EC COM2013/ 92). For the internal process, the European Commission defined five work areas, one of which is "*Drivers for inclusive and sustainable*

growth", which includes SCP. The NGO Major Group (EEB 2014) also suggests a stand-alone goal for SCP with the following sub-goals: targeting the effective implementation of the 10YFP and national action plans; adoption of social and environmental accounting and sustainable procurement practices by all governments and major corporations; and green budgeting approaches in government spending. A Task Force of NGOs on a post-2015 framework (Beyond 2015, 2013) suggested a priority area less directly related to SCP – for "*Living within environmental limits*" with goals for more sustainable natural resource management, such as maintained and restored biodiversity and ecosystem services, implementation of low carbon strategies, and universal access to safe and renewable and reliable energy.

The treatment of decoupling within a stand-alone goal would require the development of higher-level indicators for target setting and monitoring. One of the challenges in monitoring is that many resources follow a complex life cycle path from production to consumption, involving many actors along the way and making the allocation of responsibility for consumption a significant challenge, especially in the context of global value chains (Beyond 2015, 2013). Moreover, cross-border flows of environmental externalities associated with trade in goods and services are often not captured in country-based indicators. Notwithstanding, decoupling can potentially enhance more equitable patterns of resource use among nations by drawing on the concept of "metabolic rates" as a means of measuring and comparing the rates of resource consumption of different countries (Fischer-Kowalski et al. 2011).

A stand-alone goal for SCP could be constructed with a focus on targets and indicators on dematerialization and decarbonization of the economy while ensuring continuing economic and employment growth and increasing well-being. Dematerialization would be measured as a reduction in overall natural resource use per capita, while decarbonization would be measured as the carbon intensity of the energy system.

4.2 Achieving SCP within the Post 2015 Development Agenda – targets and indicators

Sustainable consumption and production goals occupy a middle ground between the natural resource base and environment and social well-being related goals and indicators. From a functional perspective, the development goals and indicators in the natural resource and environment domain are related to the *source*, *sink* and *life support* functions of the environment. "Source" refers to the provisioning of natural resources necessary for production and consumption, and includes assets such as water, soil, energy resources or agricultural products. "Sinks" refer to the ability of the environment to absorb and process the waste products of production and consumption. "Life support" functions include those ecosystem or planetary scale processes of the environment that are essential for healthy functioning within planetary boundaries.

While SCP targets and indicators to be agreed at the level of the United Nations General Assembly are expected to apply to United Nations Member States, given the principle of common but differentiated responsibilities, countries will probably require some degree of freedom to adjust targets to their own context. Further, at the sub-national level, SCP targets then have to be interpreted in the context of key actors whose active participation will be essential for successful implementation. These will include the various levels of government, the corporate and commercial sector, households, and many interest groups that represent sectoral, gender-based, religious, disciplinary, ethnic and other relevant stakeholder perspectives.

4.2.1 Approach and criteria to target and indicator selection

The selection of indicators for this paper is based on a three-step process. The first part of the process focused on identifying key targets and indicators relevant for SCP by the various post-2015 and SDG efforts to decouple socioeconomic development from resource depletion, agreements on reducing irreversible environmental impacts, and guidance from international bodies such as OWG. In a second step some targets and indicators were offered according to an SCP-focused conceptual framework, and were then reviewed. In the third step the scientific base and data availability for the selected targets and indicators was assessed. The summary of the criteria is listed in the Appendix 7.1.

Information sources

An overview of the literature on targets and indicators is presented in Table 2. Most of the literature takes a global perspective without distinguishing between the needs of developed and developing countries. They also tend to be centred on post-2015 and SDG priorities and monitoring, which are often discussed in the context of resource management and use of resources such as land, forests, fish and water. Approximately half of the reviewed literature focuses on decoupling with specific interests in issues such as material intensity, energy efficiency and efficiency in sectors. Only three of the analysed documents focus directly on SCP and connect goals and targets to SCP priorities. In most cases, the reviewed documents focus on indicators. Approximately half of them also list targets in conjunction with indicators, while some link targets and indicators to higher-level goals.

Table 2. Overview of the analysed documents to identify targets and indicators for SCP

Reference	Geographical Focus			Direct, indirect focus relevant for SCP				Major types of information		
	Global	Developed countries	Developing countries	Post-2015 SDGs	Decoupling	SCP	Resource use	Goals	Targets	Indicators
UNEP (2008)			X			X	X		X	X
SDSN (2014)	X			X		X		X	X	X
OECD (2002)		X			X					X
Watson et al. (2010)		X			X					X
WWF (2014)	X			X				X		
IRP, UNEP (2011)	X	X	X		X					X
UNEP (2014)*	X			X	X		X		X	X
UNEP (2013a)	X			X			X			
UNEP (2013b)	X			X	X		X		X	X
Schandl, Chiu (2013)			X		X	X	X			X
Schoon et al (2013)	X			X				X	X	X
Pinter et al. (2014)		X	X	X	X	X	X	X		
MEAs**	X						X	X		

*UNEP (2014 unpublished) – Illustrative targets for 3 UNEP Challenges

** MEAs included: CITES, UNFCCC, Stockholm Convention, Basel Convention, Rotterdam Convention, SAICM, Minamata Convention

Selection of targets and indicators

We identified 64 targets and 86 indicators from the reviewed literature. The collected targets and indicators were prioritized according to our conceptual framework presented in Figure 2. Our focus was on targets and indicators directly relevant to the provision of natural resources, improving efficiency, reducing the environmental footprint, and managing waste and chemicals (dashed red circle in Figure 2). However, based on the arguments presented in this paper there are other aspects related to SCP that could be considered when targets are identified. These include targets to support:

- Poverty reduction, for example by improving access of people to water, clean energy and food

- The maintenance and restoration of biodiversity, ecosystems by, for example, halting biodiversity loss in ecosystems that provide essential services to society, thus ensuring that areas of high importance for biodiversity and ecosystem services are managed sustainably, effectively and equitably
- Promoting equity
- Increasing economic prosperity as a result of greening the economy

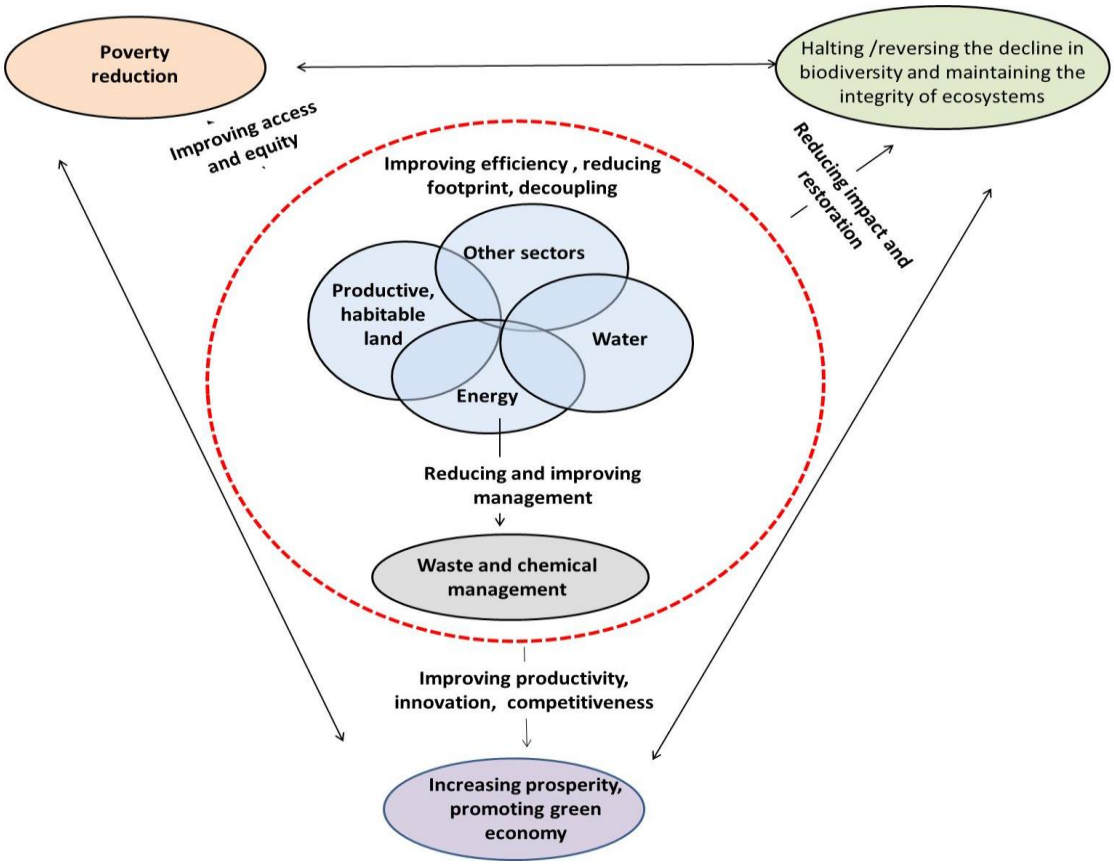

Figure 2. Conceptual framework guiding the indicator selection – the focus in this paper was limited to targets and indicators included in the dashed red circle

The targets and indicators considered based on our framework were then further assessed against the available evidence to check there were scientifically credible and verifiable findings to support their inclusion. To assess this dimension for the targets, we mostly relied on information cited in the reviewed documents and international agreements. Similarly we assessed the draft list of indicators against the availability of credible monitoring data. Again we relied mostly on the reviewed literature and their indication of possible data sources and, in some cases, we conducted additional reviews to indicate data sources. The outcome of this step is a shortened set of recommended targets and indicators.

Finally, we reflect on the process of compiling the targets and indicators and discuss issues confronted at each step of the applied methodological approach.

4.2.2 Targets and indicators grouped by OWG Focus Areas

Given the interconnected nature of the key sectors of the environment e.g. water, land, air and impacts of energy production and waste management the reviewed documents suggest the use of

integrated goals and targets across these natural resources. Such integrated goals and targets are suggested for their potential to support the development of SDGs that embody all three aspects of sustainable development – environmental, social and economic (UNEP 2013). The context of achieving SCP patterns and the focus of this paper's integrated targets could, for example, be on the sustainable use of natural resources such as land and water across all production and consumption activities while limiting GHG emissions and waste generation. Similarly, integrated targets can be defined from a poverty reduction point of view by making sure that SCP activities contribute to food, water and energy security for all people.

Natural resources are also key factors of production and their timely availability at affordable cost underpins the development of national economies on which a modern life and high material standard of living and human well-being are based. Energy, land, water, food and materials must be used more effectively and efficiently in production and consumption systems to maximize economic and development outcomes and reduce the environmental and social burden of resource use.

Finally, waste generation and pollution reduction is seen as a cross-cutting issue that can be linked to different sectors and targets such as pollution from agricultural production, food loss along the supply chain and food waste at the point of consumption, pollution caused by release of improperly treated wastewater and the treatment and management of consumers' and producers' waste during the life cycle of products. Furthermore, increased risks of exposure to toxic and hazardous chemicals and wastes predominantly affect the poor because of their occupations, poor living standards and lack of knowledge about the detrimental impacts of exposure to these chemicals and wastes (Barra et al. 2001). In the reviewed literature, targets and indicators on pollution and waste are often integrated with sectoral targets such as those on agriculture, water, and other key sectors. Similarly to the sectoral targets and indicators discussed earlier the literature include suggestions for targets related to implementation such as monitoring investments for recycling and water treatment, especially in urban areas.

The targets and the indicators focusing on key SCP aspects discussed above are grouped by the most relevant focus areas of the OWG on SDGs, set out in the co-chair's paper of 17 April 2014. In the Appendix, we provide a detailed overview of data available for the suggested indicators based on a number of global databases. Wherever the literature reviewed so far provides good indications of ambitious yet achievable quantitative targets these are indicated in the text which follows. Where data are less clear, and/or further literature review is required, the paper indicatives the qualitative nature of the target and leaves the quantitative level to be determined (XX%).

The targets presented focus on production systems and technologies and their potential for improved eco-efficiency of production. The also apply to urban infrastructure, buildings, transport and energy systems providing important services to communities, households and industry. They also cover the consumption of households and governments based on the understanding that the consumption patterns that are characteristic for high-income countries and high-income consumers in developing countries are unsustainable because they rely too heavily of finite natural resources and generate disproportionately large environmental impacts. Current consumption patterns are also unfair since the wealthy part of the world enjoys the material benefits of affluence while the poorest still suffer from inadequate access to food, water and energy to the detriment of their life chances (Jackson, 2006).

The case for improving the eco-efficiency of economic sectors and businesses is straightforward. Improved eco-efficiency can result in reduced impact on the environment and human well-being through reduced natural resource use and reduced costs through lower input costs for resources and lower taxes for emissions. Consumption is more difficult to address as it involves the need to

increase consumption in some parts of the world and of the poor in affluent societies to satisfy currently unmet needs, and to reduce overconsumption or the wrong kind of consumption in other parts.

There are few examples of successful consumption policies anywhere in the world. As one of the higher profile examples, taxes on high-fat food which is a significant contributor to obesity and other health problems produced very limited effect. This lead to the conclusion that changing consumption behaviour requires a more sophisticated suite of policy measures aimed at improving the poorest diets (Tiffin and Arnoult 2011). Hence the suggested targets do not focus on individual consumers but either on government consumption and public procurement and on aggregate indicators such as material, energy, and water and carbon footprint of consumption. The notion of footprint attributes global resource supply and emissions to final consumption of governments and households in a country, province or city. This is an effective focus for targets as it allows for sharing the burden of achieving those targets among many actors and stakeholders avoiding to single out a specific group of people.

Focus area 2. Sustainable agriculture, food security and nutrition

End hunger and improve nutrition for all through sustainable agriculture and improved food systems

In the reviewed literature, the focus is rather specific on different types of land-uses such as agriculture and related food production and security, as well as forestry and its relation to inhabited land in urban areas. From this broad understanding we focus on indicators that measure and evaluate impacts, efficiency and current practices in agriculture, forestry and timber production and in promoting sustainable cities. There are also additional targets related directly to reducing poverty and malnutrition such as ensuring access to clean water, sustainable energy and food, but these are presented in the next focus areas on sectors such as energy, water, etc.

Target: End hunger, ensure every adult and child receives adequate nutrition, with a focus on local and regional food security

Ensuring food provisioning globally and aiming to halve, between 1990 and 2015, the proportion of people who suffer from hunger and eradicate hunger by 2050 are the key parts of the United Nations Millennium Declaration (United Nations 2000) MDG 1 Target 1c. Furthermore, a total of 842 million people, or one in eight of the earth's population, are estimated to be suffering from chronic hunger, regularly not getting enough food to conduct an active life (FAO 2013 in Schoon et al. 2013). This indicator was suggested by Schoon et al. (2013) but it is also suggested in other recent reports such as WWF (2014) and SDNS (2014).

Suggested indicators and data sources:

Proportion of population below minimum level of dietary energy consumption per cent. (Available in the MDG database)

Other suggested indicators are listed below but without access to national level data in global databases:

Percentage of children suffering from stunting, wasting, anaemia,

Average calorie intake of lowest decile/quintile by income

Percentage of locally and regionally grown and consumed food

Target: Limit global cropland to 0.2 hectares per capita

A fast growing demand for food and non-food biomass will lead, under business as usual assumptions, to a further expansion of global cropland which will come at the cost of natural areas and drive further biodiversity loss. Changing dietary patterns in many developing countries to more

meat and dairy-based diet quotas augment this pressure together with increasing demand for biofuels. Cities and mining activities also encroach into agricultural land and large areas are suffering from degraded soils and lowered water availability. A more efficient use of biomass is necessary and achievable including reducing losses in food waste, a shift to a more vegetal diet especially in high meat consuming countries and reducing biofuel demand. A study by the International Resource Panel of UNEP (UNEP 2014) has identified 0.2 hectares of agricultural land per person as a safe operating space that secures human nutrition and mitigates further biodiversity loss.

Suggested indicators and data sources:
Domestic extraction of biomass
Biomass footprint of consumption
Crop biomass, livestock fodder, feedstock for biofuels
Data are available for all the listed indicators at the global scale[15]

Target: Restore agricultural productivity of one-third of severely degraded abandoned land by 2030

"Reduce salinization, combat desertification, reduce cropland expansion and prevent soil pollution and degradation" is the justification for this target from the FAO World Food Summit Plan of Action (FAO 1996), in paragraph 33g, cited in UNEP's Global Environmental Outlook 5 (Ozkaynak et al. 2012). Monitoring land degradation is also suggested in SDNS (2014), but UNEP (2013b) not only suggests the monitoring of degradation but also the impacts of restoration efforts. Thus the target presented in UNEP (2013b) is the basis for this target.
The indicators are based on FAO (1996), UNEP (2013b), WWF (2014), SDSN (2014), and UNEP (2013).

Suggested indicators and data sources:
Percentage of restored agricultural land
Percentage of degraded land regenerated and brought back into agricultural production
Land affected by land degradation and desertification mapped as drylands
Only data on land affected by land degradation and desertification mapped as drylands presented as a percentage and by total land area at the national level

Target: Reduce excess nutrient release by increasing the efficiency of nutrient usage in agriculture to reduce losses (i.e. close gap between nutrient input and plant uptake)

The indicator is suggested by Schoon et al. (2013); a similar indicator was listed in UNEP (2013b) phrased as "Increase per cent of nutrients (mainly nitrogen and phosphorus) from recycled origin (not synthetically fixed nor mined) in agriculture to 80 per cent". We therefore think such a target is justified because of the excessive life cycle losses of reactive nitrogen and phosphorus primarily from agriculture and livestock. Furthermore, from resource constraint perspective, phosphorus is a key nutrient with no substitute in agriculture and food production, and its main source (phosphate rock) is a non-renewable resource. Today's scientific understanding of regional and global nitrogen cycles is not yet robust enough to set quantitative planetary boundaries for nitrogen and phosphorus (SDSN 2014), but these boundaries may already be breached in some geographic locations.

Suggested indicators and data sources:
kg of input N, P, K per kg of N, P, K in crop

[15] For example: http://geodata.grid.unep.ch/results.php, http://faostat3.fao.org/faostat-gateway/go/to/home, http://data.worldbank.org/indicator

Percentage wastewater treated with nutrient recovery (also linked to sanitation) AND recovered nutrients applied to land
Percentage of animal waste recycled
The listed indicators are available in the reviewed databases and additional information on baselines can be based on the International Nitrogen Initiative (INI) and UNEP's work on reactive nitrogen in the environment[16]

Target: Reduce food loss along the food supply chain by 50 per cent by 2030

Most of the reviewed reports recognize the importance of reducing food waste and post-harvest losses that occur through inefficiencies as they are widespread in all countries – currently around 25 per cent of the total produced food is lost in the food supply chain, with regional differences ranging between 10 to 40 per cent (Parfitt, Barthel et al. 2010; Kummu et al. 2012). Losses take place in all phases of the food supply chain, including the field, postharvest stage, processing, distribution and consumption. The production of food that is ultimately lost or wasted translates into the over or unnecessary use of cropland, water and fertilizers. At the global level halving food supply chain losses by 2025 is viewed as a realistic target, corresponding to the EU's current commitment. Achieving this target would require for *all* regions to achieve the *lowest* loss or waste percentages of any region today, though significant regional differences would be expected to remain due to different baselines, socio-economic and agro-ecological context. At the global level the most significant improvements can be achieved at the field level (47 per cent) and in terms consumption waste (86 per cent), with significant regional variance (Kummu et al. 2012).

Suggested indicators and data sources:
Percentage of food lost prior to consumption: losses on the field, post-harvest, storage, manufacturing, processing, and distribution stage.
Percentage of food waste at the consumption stage.[17]

Focus area 6. Water and sanitation
Water and sanitation for a sustainable world

A number of reviewed documents list goals and targets on water resource management with the aim to ensure "the integrity of biodiversity and the ecosystems that maintain water quantity and quality for people and nature" (WWF 2014; ASEF 2014). These goals and targets also address long-term sustainability of groundwater supplies, and the necessary recovery of overexploited aquatic ecosystems (Schoon et al. 2013) by using integrated management of water resources to provide for all uses (UNEP 2013b).

Besides these, the literature also includes targets measuring the effectiveness and impacts of implementation efforts such as targets on the elimination of policies that support unsustainable fisheries practices, improving marine protected areas management and ensuring that water use and pollution takes into account needs of these areas.

Finally, there are also targets that relate to broader development needs such as ensuring access of people to clean water and sanitation in their homes, hospitals, schools and workplaces. However, these indicators are beyond the scope of this paper.

[16] http://www.initrogen.org/; http://www.unep.org/pdf/dtie/reactive_nitrogen.pdf
[17] Details on potential indicators based on from UNEP's submission to TST. Will be available shortly

Water is a regional good, with vast differences in terms of available supply, water quality and water demand. Individual countries and groups of countries sharing the same watershed would be expected to review global goals through their regional and local lens and identify targets that are context-specific, while in line with the spirit and ambition of the global goal.

Target: Reduce overall water footprint per capita and per unit of GDP in developed nations by 25 per cent by 2030 and increase water use efficiency in developing nations by 25 per cent by 2030 over 2000 levels

This target is based on suggested targets by Schoon et al. (2013) and the suggested indicators are based on Schandl and Chiu (2013). Water footprint records water usage for final consumption in a country from global water supply chains and includes direct water consumption and indirect water requirements for traded products that have contained water usage in the production such as e.g. agricultural products. This target includes efforts to improve water-use efficiency in agriculture and manufacturing enabled through technical innovation as well as more efficient water use in cities through demand management strategies and water saving features in households. Rainwater harvesting and reusing of waste water will also play a role in intensive urban use areas.

Suggested indicators and data sources:
Direct water use in production and consumption (for sectors including agriculture, mining, manufacturing and cities)
Water footprint – direct and indirect water use of a consumer or producer across the whole supply chain
Water footprint per capita (m^3; m^3/capita)
Water footprint per unit of GDP – GDP/water footprint ($ per m^3)

Target: Provide universal access to safe drinking water to lower income households in developing countries by 2030

This target contributes to poverty eradication by ensuring access to drinking water. Presently, nearly 1 billion people lack access to clean drinking (WHO/UNICEF 2010). Key areas of focus for water extraction and consumption indicators should be predominantly, arid and semi-arid and water-stressed regions. The vast regional differences in water availability and baseline conditions would have to be reflected in adjustments in the target as per the different context.

Suggested indicators and data sources:
Proportion of population using an improved drinking water source (per cent) [18]

Further suggested indicators in the reviewed literature include rates of groundwater depletion and percentage of water put into supply that is wasted, but no existing data sources could be found for these indicators.

Target: Reduce, year-on-year, the water footprint per unit of output in sectors that consume most fresh water, taking account of global supply chains – heavy industry, power generation, paper and pulp, irrigation-based agriculture for food and fibre, biomass, tourism etc.

This target is based on suggested targets by Schoon et al. (2013) and the suggested indicators are based on Schandl and Chiu (2013). While keeping to the spirit and direction of the global goal, water footprint calculations would have to take into account local water availability and use, as it has been argued in the general water footprint literature (Hoekstra 2009).

[18] Available: http://mdgs.un.org/unsd/mdg/Default.aspx

Suggested indicators and data sources:
Cubic metres of fresh water consumed per unit of output in:
- Iron and steel making and other heavy industry
- Power generation
- Paper and pulp making
- Agricultural water withdrawals

Focus area 7. Energy
Ensure access to affordable, sustainable, and reliable modern energy for all

The suggested targets focus on increasing levels of renewable energy in the energy mix, increasing the rate of energy efficiency, ensuring universal access to energy and cooking fuels and finally targets on guiding governments in implementing targets such as phasing out fossil fuel subsidies and increasing investments into clean energy. Of these four areas we focus on those that are directly relevant for SCP such as increasing the rates of renewable energy and increasing energy efficiency. These two priorities are similar to those recommended by the OWG emphasizing the importance of improving global share of renewable energy and reducing per capita energy consumption.

Target: Universal access to energy from national/regional grids or more local supplies, with doubling the share of global energy generated from clean, sustainable resources by 2030
This target is a combined target based on two targets one aiming to double the shares of renewable sources by 2030 (UNEP 2013b) and/or increase the contribution of energy production to poverty reduction by ensuring universal access to energy (Schoon et al. 2013; WWF 2014). Currently there are targets on population without access to energy, and approximately 2.7 billion people rely on traditional biomass for cooking and heating and about 1.3 billion have no access to electricity (IEA 2011 in WBCSD 2012).

Suggested indicators and data sources:
Proportion of renewable energy sources of total supply of primary energy (per cent)[19]
Primary energy/electricity production by type including the share of renewable energy
Renewable energy share in electricity production (per cent)
Total quantity of renewable energy generated from renewable sources as a percentage of total energy used (kWh sourced from renewable sources)

Target: Energy use per capita to fall in the developed world by xx per cent by 2030, energy consumption per unit of GDP to fall by xx per cent by 2030 in the developing world
The goal has been present in the literature for a few years and was suggested in different forms by UNEP (2008), Schoon et al. 2013 and EEA (2010) publications recently including UNEP (2014).
The suggested list of indicators is based on SDSN (2014), Schandl and Chiu (2013) and UNEP (2008).
The target is closely link to targets on material intensity of consumption and production described in the next chapter of this paper.

Suggested indicators and data sources:
Energy consumption per capita
Electricity consumption per capita
Total primary energy supply (TPES) (joule; joule/capita)
Overall energy consumption per unit of GDP
Average energy consumption per unit product

[19] In the Global Tracking Framework the focus is on for final energy instead of primary energy. Source: www.worldbank.org/en/topic/energy/publication/Global-Tracking-Framework-Report

Targets and indicators relevant for both focus areas 8 and 9

Focus area 8. Economic growth, employment, infrastructure
Promote sustainable, inclusive and sustained economic growth and decent jobs for all

Focus area 9. Industrialization and promoting equality among nations
Promote sustainable industrialization and equality among nations

Target: Decouple economic growth rates and progress in human well-being from escalating use of natural resources to achieve an average material intensity of consumption per capita of 10.5 tons in 2030 and 8 to 10 tons in 2050

Global material use in 2010 was at around 70 billion tons, equivalent to around 10 tons per capita. A continuation of current growth trends in material usage would see global material use grow to 180 billion tons by 2050 which would result in a doubling of material use to 20 tons per capita over the next four decades. Such growth would face severe financial and social constraints and would result in a dramatic increase in environmental pressures and impacts. It is highly uncertain if a business as usual scenario of such high supply rates of natural resources is possible amidst these constraints. The UNEP-hosted IRP (UNEP 2014) has suggested a target for material consumption of 6 to 8 tons per capita for 2050 which is very ambitious. Modelling by the CSIRO shows that a carbon price of $50 per ton of carbon, a large investment into resource efficiency, and a change from material to experience-oriented consumption in high-income countries would bring global material use to between 87 billion tons in 2030 and 95 billion tons in 2050. This would be around 10.5 tons per capita in 2030 and 10 tons per capita in 2050. Achieving less than 10 tons per capita will be a very ambitious and hard to achieve goal.

Suggested indicators and data sources:
Material extraction in each national economy
Material footprint of each national economy, i.e. attribution of global material extraction to final consumption in each country
Average national metabolic rates (material footprint per capita)

Target: Improve overall material efficiency by 30 per cent in 2030 and double material efficiency of production and consumption by 2050

In 2000, 1.25 kg of primary materials were required to produce 1$ of GDP (at 2005 prices). In 2010, material intensity has somewhat worsened and 1.4 kg of primary materials were needed to produce 1$ of GDP. The global GDP of 55.9 trillion US$ in 2013 is projected to grow to 171.5 trillion US$ by 2050. A low material use scenario in line with the suggested target of 8 to 10 tons per capita would result in a material intensity of 0.95kg per US$ in 2030 and 0.55kg per US$ in 2050. This would require a doubling of the material efficiency of production and consumption over the next four decades. This would require the global economy to return to the material efficiency path that was taken between 1960 and 2000, which appears to be an ambitious but achievable goal.

It will be important to complement national decoupling and material efficiency indicators with sectoral information for different industries. These include primary industries (agriculture, forestry and mining), heavy industries such as iron and steel, cement and paper industry and also manufacturing industries more broadly, so as to assess the contribution different sectors can make to achieve the overall decoupling target. Such information will be an important incentive for businesses to improve their decoupling achievements through benchmarking with other sectors or companies that operate in the same sector.

Suggested Indicator and data sources:
Material footprint per GDP for each national economy
Domestic extraction of biomass per GDP in agriculture, forestry and fisheries
Domestic extraction of ores and minerals per GDP in mining and quarrying
Domestic extraction of coal, crude oil and natural gas per GDP in energy sector
Sectoral material input per sectoral added value for main manufacturing sectors, construction, and transport sectors
Material footprint of service sector

Focus 10. Sustainable cities and human settlements
Build inclusive, safe and sustainable cities and human settlements

Target: Promote resource efficient construction and building sector through 50% reduction in energy-related CO_2 emissions, XX% increase in water efficiency in building operations and XX% decrease in the rate of raw material extraction for building and construction by 2030 through more efficient design and increase in use of recycled materials

This target is based on UNEP (2013b) and UNEP (2014), as well as on Schoon et al. (2013) and WWF (2014) for elements focusing on energy use and emissions. Note that proposed reduction in energy-related emissions is based on the recent IPPC WG II report (Lucon and Urge-Vorsatz, 2014) that indicates a reduction of 30% of Energy-related CO_2 emissions is a realistic scenario at global level within the next 20 years. Finally, this formulation also provides opportunity for a differentiated target as the reduction potential varies considerably across regions.

This target is needed to limit negative impacts on environment (e.g. land, water, air and climate[20]) and human health exacerbated by the expansion of construction and infrastructure development globally. The purpose of this target is also to ensure that construction reduces impacts on human health and creates safe and sustainable public and private space (WWF, 2014). The importance of overall decoupling construction in urban areas from their impacts on the environment is also highlighted by WWF (2014) for example.

Research suggests that innovation in the construction and building sector has the potential to contribute significantly to IPCC recommended target of 80 per cent reductions to greenhouse gas emissions (Von Weizsäcker et al. 2009). The recent IPCC WG II report (Lucon and Urge-Vorsatz, 2014) states that it is important to set ambitious targets in this sector as there is a significant lock-in risk into using carbon-intensive options in construction. Resource efficient construction and building sector requires that the target focuses not only on CO_2 emissions, but also on other resources such as water and mineral extractions for a holistic approach. Resource intensity improvements in the building sector depend on turnover rates of existing housing stock which suggests a target of 50% improvements to be both ambitious and achievable. Finally, this target has close linkages with targets listed under other focus areas, which aims at measuring impacts in terms of water consumption and pollution, emissions and type of energy sources, waste generation and material use.

The proposed indicators are based on UNEP (2013b), UNEP (2014), and WWF (2014)

Suggested indicators and data sources:
CO2 eq emissions from buildings along the life cycle of the building (including construction and use phase)

[20] Presented in SDSN (2014)

Building operations' water footprint
Rate of construction related mineral extraction

Focus area 11. Sustainable Consumption and Production
Promote sustainable consumption and production patterns

Target: Grow the end-of-life recycling rates of ferrous, non-ferrous and precious metals close to 100 per cent and of speciality metals to above 25 per cent by 2050

A UNEP report on metal stocks and recycling rates for metals (UNEP 2011) presented data on global recycling rates for ferrous metals, non-ferrous metals, precious metals and speciality metals. The highest recycling rates are reported for iron and steel of 70 to 90 per cent, which are enabled by a well-established recycling infrastructure for steel in many countries. Recycling rates for non-ferrous metals are also reasonably high because they are widely used and sufficiently valuable to encourage recycling infrastructure in countries. For aluminium, copper and lead, recycling rates of above 50 per cent are reported. End-of-life recycling rates for platinum group metals are between 60 and 70 per cent and silver and gold are above 50 per cent. According to the UNEP International Resource Panel (IRP), speciality metals which have been introduced to technological applications more recently are reported to have very low end-of-life recycling rates which are very close to zero. These metals are often used in very small quantities in a large variety of consumer applications, which constitutes a major challenge for recycling logistics (UNEP 2010).

End-of-life recycling rates for metals are disappointing at a first sight. Good recycling results for some metals that have a long history of industrial usage such as steel, aluminium, copper and lead demonstrate that there is a learning curve for recycling. This learning curve needs acceleration in the face of an increasing variety and complexity of industrial applications and products that contain metal and the ability of the recycling industry to recover most of those precious materials. The greatest potential to improve metal recycling is collection. This is not so important for iron, copper, or lead, which are typically used in forms that make them easy to identify and reprocess, but is absolutely crucial for the vast majority of metals that are used in small quantities in highly mixed products. The assessments undertaken by the UNEP IRP Working Group on Global Metals Flows suggests that recycling rates of close to 100 per cent in end-of-life recycling are technically feasible for ferrous, non-ferrous and precious metals while a 50 per cent recycling rate for speciality metals would be an ambitious goal.

Suggested indicators and data sources:
Overall (aggregate) end-of-life metals recycling rates
End-of-life recycling rates for ferrous, non-ferrous, precious and speciality metals
Avoided energy use and avoided environmental impacts through recycling

Target: Decouple economic growth rates and progress in human well-being from escalating amounts of waste to achieve an average waste intensity of consumption per capita of 500kg in 2030 and 450 kg in 2050

The amount of municipal waste generated in a country is related to the rate of urbanization, the types and patterns of consumption, household incomes and lifestyles. While municipal waste is only one part of total waste generated in a country, its management and treatment often absorbs more than one third of the public sector's financial efforts to abate and control pollution. In addition, there are large amounts of industrial waste and emerging new waste streams such as e-Waste. OECD countries had between 600 and 800 kg per capita of household waste in 2007 whereas China

had 115 kg of household waste (OECD 2010). A target of 450 kg of waste per person would be in line with the material use targets of 10.5 tons per capita by 2030 and 10 tons per capita by 2050.[21]

Suggested indicators and data sources:
DMC (waste equivalent)
Household and industrial waste, e-Waste

Target: To ensure, by 2020, that chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment

Chemical pollution is a critical dimension of global environmental change, but it is very difficult to measure on an internationally comparable basis. Several indicators exist for specific pollutants, but they are typically available only in a small subset of countries and measure only a small share of chemical pollution (TST 2013). The target is based on Johannesburg Plan of Implementation (JPOI) (WSSD 2002 Paragraph 23) as suggested by Barra et al. (2012).

This target is also relevant for the **Focus area 3. Health and population dynamics:** Healthy life at all ages for all

Suggested indicators and data sources:
Number of Parties to international multilateral environmental agreements on hazardous chemicals and waste such as the Basel, Rotterdam, Stockholm and Minamata Conventions, the ILO Chemicals (data available)
Conventions and the International Health Regulations
Number of countries with multi-sectoral and multi-stakeholder coordination mechanisms in place for a coordinated implementation of chemicals and wastes conventions and SAICM[22]

Target: Reduced releases to air, water and soil of hazardous chemicals and wastes from anthropogenic sources by x per cent by 2030

The problem of hazardous chemicals impacts both humanity and ecosystems. Currently, more than 90 per cent of water and fish samples from aquatic environments are contaminated by pesticides (Barra et al. 2012). Furthermore the need for action is also supported by Basel Convention (1989) which aims "to protect, by strict control, human health and the environment against the adverse effects which may result from the generation and management of hazardous waste and other wastes."

This target is also relevant for **Focus area 14. Ecosystems and biodiversity:** Protect and restore terrestrial ecosystems and halt all biodiversity loss

Suggested indicators and data sources:
Annual average levels of selected contaminants in air, water and soil (data from pollutant release and transfer registers and other metrics of environmental releases)
Releases of chemicals and waste into water from industrial sources, agriculture, transport and wastewater and waste treatment plants (data on wastewater and treatment of wastewater are available)

[21] We need to be aware that waste statistics are not very reliable and that these numbers are generated using a top-down approach assuming a waste supply from material throughput information
[22] Some information is available on the Convention web-site: www.saicm.org/index.php?option=com_content&view=article&id=115&Itemid=512

Focus area 12. Climate change
Take urgent and significant action to mitigate and adapt to climate change

Target: Decarbonize the energy system and reduce the climate forcing of energy supply by 50 per cent by 2050

This is a combined target between the integrated targets suggested by SDSN (2014) that also aim to cover access to clean energy and the more narrowly focused target of UNEP (2013b) targeting contributions of energy sectors to GHG emissions. Both targets aim at a 2050 time-horizon. The scientific justification is suggested by SDSN (2014) and it is based on the outcomes of the Intergovernmental Panel on Climate Change (IPCC) 2006 guidelines for the national GHG inventory, and the special chapters on energy and industry-related emissions.
The suggested list of indicators is based on SDSN (2014); Schandl and Chiu (2013) and UNEP (2008).

Suggested indicators and data sources:
Total energy and industry-related GHG emissions by gas and sector, expressed as production and demand-based emissions (tCO_2e)
Greenhouse gas emissions (GHG) (tons; tons/capita)
Carbon footprint per person
Non-carbon energy share in energy and electricity
GHG emissions from energy production and use (per capita and per unit of GDP)

Focus area 13. Conservation and sustainable use of marine resources, oceans and seas
Take urgent and significant actions for the conservation and sustainable use of marine resources, oceans and seas

Target: End overfishing, rebuild over-fished stocks by 2030

There are different indicators suggested in the literature focusing on the reduction of the overexploitation of fish stock maintain of the quality, diversity and availability of fishery resources in sufficient quantities for present and future (FAO 1995); targets for limiting the use of destructive fishing practices (SDSN 2014) and subsidies (WWF 2014) and targets for rebuilding depleted fish stocks (EEA 2010). From all the published targets one can derive one focusing on ending overfishing and rebuilding fish stocks which was suggested by Schoon et al. (2013) and linked to a specific time frame.

The indicators are based on UNEP (2013b), WWF (2014), SDSN (2014), and EEA (2010).

Suggested indicators and data sources:
Number of stocks over-fished and degree of overfishing: to represent this indicator one can use indicators such as the number of stocks overexploited, fully and not fully exploited fish stocks, fish catches and the proportion of fish stocks within safe biological limits

Focus area 14. Ecosystems and biodiversity
Protect and restore terrestrial ecosystems and halt all biodiversity loss

Target: Halt the expansion of global cropland into grasslands, savannahs and forests by 2020 below a global (net) cropland area of 1.640 Mha

This target is based on UNEP and International Resource Panel (IRP) recent publications (2013 and 2014 respectively). Similar targets were suggested by Schoon et al. (2013) but without indicating the scale of desired change; it was formulated as “reduce the annual rate at which natural and semi-

natural habitats are being converted to farmland, urban land and other uses that compromise or diminish ecosystem services by xx per cent by 2030". Another target on land conversion is suggested by SDSN (2014) which also emphasizes the importance to ensure soil protection and farming systems that are resilient to climate change and disasters.

The target is supported by Dobermann et al. (2013) cited by SDSN (2014) and by FAO World Food Summit Plan of Action (FAO 1996, para. 33g) cited in UNEP's Global Environmental Outlook (Ozkaynak et al. 2012) stressing the importance of 'reducing cropland expansion and preventing soil pollution/ degradation'. The indicators are based on UNEP (2013b), WWF (2014) and Ekins and Lemaire (2012).

Suggested indicators and data sources:
Global (net) cropland area
Conversion of land between land-uses such as agriculture, forest, pasture
Area of cropland per person
The indicators are available in a number of reviewed databases

Target: Reduce global deforestation to zero by 2030, increase reforestation and afforestation rates by xx per cent per annum

This indicator aims to reduce the deforestation rate and expand forest areas. It is listed in the Agenda 21 (UNCED 1992) Chapter 11.12a and furthermore UNEP (2013b) states that about a quarter of the earth's land area is highly degraded (up from 15 per cent in 1991) and 5.2 million hectares of forests are lost every year (UNEP 2013b).[23] This indicator is listed in a number of reviewed documents, including Schoon et al. (2013), which also emphasize the importance of ensuring timber extraction takes place in forests that are under sustainable management practices (partly an MDG Indicator in SDSN 2014).

Suggested indicators and data sources:
Forest cover and annual change in forest area (ha)
Data on annual rate of reforestation (ha)
Data on the above listed are available on national level in the reviewed databases
Data on annual rate of afforestation (ha), annual deforestation of land (ha) are not available.

Focus Area 15. Means of implementation/Global partnership for sustainable development

Strengthen global partnership for sustainable development

Target: By 2030, all public procurement follows sustainable development guidelines

The 10-Year Framework of Programmes on SCP (10YFP) adopted by the Rio+20 Conference includes sustainable public procurement (SPP) as one of its five initial programmes, to help accelerate the shift towards SCP patterns. Governments have the opportunity to promote environmental protection, social responsibility and inclusive economic development throughout the supply chains of procured products. Evidently, as government entities account for large shares of national consumption, increased sustainable procurement directly contributes to more sustainable consumption. This often significant demand for more sustainable products, in turn, promotes sustainable production patterns in business. Moreover, SPP is different from many other types of SCP-policies by acting on markets from the demand-side, rather than the supply-side. This can carry advantages in terms of exploiting innovation potentials and efficiencies of the private sector.

[23] UNEP (2013b) cites as a source FAO (2013) but this reference is not outlined in the details in the paper.

In the OECD, for which more detailed data are available, 25 out of its 38 member countries had developed a strategy or policy on "green" or sustainable public procurement at the central government level, while ten further member countries had "some procuring entities [which] have developed an internal policy" on GPP or SPP.[24] Furthermore, the level of public agencies bound by mandatory SPP policies vary from 11 – 33% based on the recent UNEP survey of 92 countries across all the continents (UNEP, 2013d).

Finally, beyond increasing welfare from SPP through avoided and social and environmental costs, SPP can also strengthen the economic pillar of sustainable development. Realizing that SMEs form the backbone of most economies, including by providing much employment, many governments use procurement strategically to grow their SMEs. Almost 70 percent of OECD member countries have strategies or policies to promote the use of procurement to support SMEs.[25]

The suggested target is based on goals and priorities outlined in WWF (2014); however WWF (2014) also emphasized the importance of ensuring that no procurement promotes environmentally harmful activities. Supporting targets focused on ensuring the adoption of necessary policies frameworks to support SPP at all levels of governance was suggested by Schoon et al. (2013). This supporting target was used to inform the list of suggested indicators as well as those indicators suggested by Schandl and Chiu (2013) and UNEP (2008). However, data collection is challenging and only few countries are collecting quantitative information on the number of contracts awarded that take into account SPP/GPP criteria (UNEP, 2013d).

<u>Suggested indicators and data sources:</u>
Share of sustainable public procurement in all government procurement (percentage)
Level of adoption of policies and frameworks for SPP at national and sub-national level

[24] http://www.oecd-ilibrary.org/governance/government-at-a-glance-2013_gov_glance-2013-en p.135
[25] http://www.oecd-ilibrary.org/governance/government-at-a-glance-2013_gov_glance-2013-en p.134

5. Summary of targets and indicators

Through the foregoing review of recently published literature, this paper analysed the many proposals for including SCP in the SDGs, and relevant targets and indicators relevant to address the issue. The literature reviewed indicates that current approaches to SCP should focus on embedding SCP within the broader development of SDGs and sustainable development agendas (at national and international levels), as well as its role in advancing poverty reduction, more efficient resource use, and contribution to quality of life.

During the selection of the targets and indicators for the SDGs, we propose a focus on targets and indicators that relate to core processes and impacts relevant to natural resource use; production processes; waste; and pollution. Addressing these issues is crucial for SCP, but they can be easily grouped under a broader set of indicators on advancing sustainable development, and can be applied within particular economic sectors and/or to key resources. Whether included under a SCP-specific goal, or integrated under other goal areas, these targets and indicators address the most pressing areas where progress is needed in shifting to more sustainable patterns of consumption and production. To make these linkages easier for the readers we grouped the indicators according to the OWG focus areas. The table below provides an initial list of science-based targets and indicators, for which data already exist or are reasonably accessible**.**

This paper is intended to be a starting point to find practical, relevant and effective SCP-oriented targets and indicators to guide the achievement of the future SDGs. Numerous and diverse recommendations for including SCP in the SDGs and the post-2015 development agenda abound, and this review attempts to prioritize some of the most important, comprehensive, scientifically sound and politically-feasible proposals out there.

The list below is an initial set of proposed targets and indicators, aligned with outputs from current negotiations in the OWG on SDGs. UNEP will continue to develop potential targets and indicators as those negotiations progress and in preparation for the Ministerial discussions on "SDGs and the post 2015 development agenda, including SCP" that will take place at the First United Nations Environment Assembly (UNEA 1) in Nairobi in June 2014.

Readers may use this document to evaluate how SCP is being addressed in the context of the SDG and post 2015 development processes, and what options Member States have to respond to various proposals from stakeholders and civil society. Furthermore, these proposed targets and indicators could be employed by Member States in the SDG negotiations, in order to ensure that SCP is addressed in a relevant, actionable, and cross-cutting manner.

Focus area	Target	Indicators
2. Sustainable agriculture, food security and nutrition	End hunger, ensure every adult and child receives adequate nutrition, with a focus on local and regional food security	Portion of population below minimum level of dietary energy consumption (%) % of children suffering from stunting, wasting, anaemia Average calorie intake of lowest decile/quintile by income % of locally and regionally grown food in diets
	Restore agricultural productivity of one-third of severely degraded abandoned land by 2030	% of restored agricultural land % of degraded land regenerated and brought back into agricultural production Land affected by land degradation and desertification mapped as dryland

	Reduce excess nutrient release by increase nutrient use efficiency in agriculture to reduce losses (i.e. close gap between nutrient input and plant uptake)	Kg of input N, P, K per kg of N, P, K in crop % wastewater treated with nutrient recovery (also linked to sanitation) % of animal waste recycled
	Reduce food loss along the food supply chain and waste at the consumption stage by 50 per cent by 2030	% of food lost prior to consumption: losses on the field, post-harvest, storage, manufacturing, processing and distribution stages. Percentage of food waste at the consumption stage
	Limit global cropland to 0.2 hectares per capita	Domestic extraction of biomass Biomass footprint of consumption Crop biomass, livestock fodder, feedstock for biofuels
6. Water and sanitation	Reduce overall water footprint per capita and per unit of GDP in developed nations by 25 per cent by 2030 and increase water use efficiency in developing nations by 25 per cent by 2030 over 2000 level	Direct water use in production and consumption (for sectors including agriculture, mining, manufacturing and cities) Water footprint – direct and indirect water use of a consumer or producer across the whole supply chain Water footprint per capita (m^3; m^3/capita) Water footprint per unit of GDP – GDP/water footprint ($ per m^3)
	Provide universal access to safe drinking water to lower income households in developing countries by 2030	Proportion of population using an improved drinking water source (per cent)
	Reduce, year-on-year, the water footprint per unit of output in sectors which consume most fresh water taking account of global supply chains – heavy industry, power generation, paper and pulp, irrigation-based agriculture for food, fibre, tourism	Cubic metres of fresh water consumed per unit of output in: • Iron and steel making and other heavy industry • Power generation • Paper and pulp making • Agricultural water withdrawals
Focus Area 7. Energy	Universal access to energy from national/regional grids or more local supplies, with doubling the share of global energy generated from clean, sustainable resources by 2030	Proportion of renewable energy sources of total supply of primary energy (%) Primary energy/electricity production by type including the share of renewable energy Renewable energy share in electricity production (%) Total quantity of renewable energy generated from renewable sources as a percentage of total energy used (kWh sourced from renewable sources) No. of people with access to energy
	Energy consumption per capita to fall in the developed world by xx% by 2030, energy consumption per unit of GDP to fall by xx% by 2030 in the developing world	Energy consumption per capita Electricity generation per capita Total primary energy supply (TPES) (joule; joule/capita) Overall energy consumption per unit of GDP Average energy consumption per unit product
Focus Area 8. Economic Growth, Employment, Infrastructure	Decouple economic growth rates and progress in human well-being from escalating use of natural resources to achieve an average material intensity of consumption per capita of 10.5 tons in 2030 and 8-10 tons in 2050	Material extraction in each national economy Material footprint of each national economy, i.e. attribution of global material extraction to final consumption in each country Average national metabolic rates (material footprint per capita)
Focus area 9. Industrialization and Promoting Equality Among Nations	Improve overall material efficiency by 30% over 2000 levels in 2030 and double material efficiency of production and consumption by 2050	Material footprint per GDP for each national economy Domestic extraction of biomass per GDP in agriculture, forestry and fisheries Domestic extraction of ores and minerals per GDP in mining and quarrying Domestic extraction of coal, crude oil, natural gas per GDP in energy sector Sectoral material input per sectoral added value for main manufacturing sectors, construction and transport Material footprint of service sector

Focus area 10. Sustainable cities and human settlements	Promote resource efficient construction and building sector through 25% reduction in energy-related CO2 emissions, XX% increase in water efficiency in building operations and XX% decrease in the rate of raw material extraction for building and construction by 2030 through more efficient design and increase in use of recycled materials	CO2 eq emissions from buildings Building operations' water footprint Rate of construction related mineral extraction
Focus area 11. Sustainable Consumption and Production	Grow the end-of-life recycling rates of ferrous, non-ferrous and precious metals close to a 100% and of speciality metals to above 25%	Overall (aggregate) end-of-life metals recycling rate End-of-life recycling rates for ferrous, non-ferrous, precious and speciality metals Avoided energy use and avoided environmental impacts through recycling
	Decouple economic growth rates and progress in human well-being from escalating amounts of waste to achieve an average waste intensity of consumption per capita of 500kg in 2030 and 450 kg in 2050	DMC (waste equivalent) Household and industrial waste, e-Waste
	To ensure, by 2020, that chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment[26]	Number of Parties to international multilateral environmental agreements on hazardous chemicals and waste such as the Basel, Rotterdam, Stockholm and Minamata Conventions, the ILO Chemicals Conventions and the International Health Regulations; Number of countries with multi-sectoral and multi-stakeholder coordination mechanisms in place for a coordinated implementation of chemicals and wastes conventions and SAICM
	Reduced releases to air, water and soil of hazardous chemicals and wastes from anthropogenic sources by x% by 2030[27]	Data from pollutant release and transfer registers and other metrics of environmental releases Annual average levels of selected contaminants in air, water and soil Releases of chemicals and waste into water from industrial sources, agriculture, transport and wastewater and waste treatment plants Percentage of wastewater reused in industrial processes in total industrial water consumption
Focus area 12.Climate Change	Decarbonize the energy system and reduce the climate forcing of energy supply by 50% by 2050	Total energy and industry-related GHG emissions by gas and sector, expressed as production and demand-based emissions (tCO_2e) Greenhouse gas emissions (GHG) (tons; tons/capita) Carbon footprint per person Non-carbon energy share in energy and electricity GHG emissions from energy production and use (per capita & per unit of GDP)
Focus Area 13. Conservation and Sustainable Use of Marine Resources, Oceans and Seas	End overfishing, rebuild over-fished stocks by 2030	Number of stocks overexploited, fully and not fully exploited fish stock, fish catches Proportion of fish stocks within safe biological limits
Focus Area 14. Ecosystems and Biodiversity	Halt the expansion of global cropland into grasslands, savannahs and forests by 2020 below a global (net) cropland area of 1.640 Mha	Global (net) cropland area Conversion of land to agricultural and other uses, Rate of land-use change between land-use types Area of cropland per person

[26] Also relevant for Focus area 3. Human health and Population Dynamics
[27] Also relevant for Focus area 14. Ecosystems and Biodiversity

	Reduce global deforestation to zero by 2030, increase reforestation and afforestation rates by xx% per annum	Annual change in forest area Annual Deforestation of Land (ha)
Focus Area 15. Means of implementation/ Global partnership for sustainable development	By 2030, all public procurement follows sustainable development guidelines	Share of sustainable public procurement in all government procurement (percentage) Level of adoption of policies and frameworks for SPP at national and sub-national level

6. References

Akenji L and Bengtsson M (2014) Making sustainable consumption and production the core of the sustainable development goals: Discussion paper. Kanagawa: Institute for Global Environmental Strategies. Retrieved from: http://pub.iges.or.jp/modules/envirolib/upload/4860/attach/SCP_in_SDGs_Discussion_paper_Akenji_and_Bengtsson.pdf

Asia-Europe Foundation (ASEF) (2014) Sustainable Development Goals for a Small Planet. Singapore.

Barra R, Portas P and Watkinson RV (2012) Chemicals and waste. Global Environmental Outlook 5. UNEP.

Beyond 2015 European Task Force position on a post-2015 framework (2013): Putting people and planet first. www.concordeurope.org

BioRegional (2013) One Planet Living -the case for SCP in the Post-2015 development agenda (distributed prior to OWG 7th session); One Planet Living -The case for Sustainable Consumption and Production in the Post-2015 development agenda (Lead authors: Nicholas Schoon, Freya Seath and Laura Jackson, BioRegional), pp. 36.

TEEB for Business (2010) www.teebweb.org/areas-of-work/teeb-for-business/

Blackman A (2010) Alternative Pollution Control Policies in Developing Countries. Rev Environ Econ Policy 4 (2): 234–253. doi: 10.1093/reep/req005

Boers TM and Ben-Asher J (1982) A review of rainwater harvesting. *Agricultural water management*, *5*(2), 145–158.

Daly H. (2005) Economics in a full world. Scientific American. 293: 100–107.

Daly H. (1973) Toward a Steady-State Economy. San Francisco: W.H. Freeman and Company.

Dobermann A and Nelson R et al. (2013) Solutions for Sustainable Agriculture and Food Systems. Technical report of the Thematic Group on Sustainable Agriculture and Food Systems. Paris, France and New York, USA: SDSN.

Ekins P and Lemaire X (2012) Sustainable consumption and production for poverty eradication. Nairobi: UNEP. Retrieved from: www.unep.org/10YFP/Portals/50150/downloads/publications/poverty/SCP_for_Poverty_full.pdf

European Commission. COM(2013) 92. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. A DECENT LIFE FOR ALL: Ending poverty and giving the world a sustainable future

European Environmental Agency (2010) Towards a Set of Indicators on Sustainable Consumption and Production (SCP) for EEA reportingETC/SCP working paper 1/2010, European Environmental Agency, Copenhagen, pp. 69.

European Environmental Bureau (EEB) 2014 The NGO Major Group vision & priorities for the Sustainable Development Goals and the post-2015 development agenda. A position paper for the programme: "Post 2 Post: Enhancing Stakeholder Engagement in the Post-Rio+20/Post-2015 Process"

FAO (1995) *Code of Conduct for Responsible Fisheries*. Food and Agriculture Organization of the United Nations, Rome

FAO (1996) Rome Declaration on World Food Security and World Food Summit Plan of Action. Adopted at the World Food Summit, November 13–17, Rome. Food and Agriculture Organization of the United Nations, Rome

Fischer-Kowalski M, Krausmann F, Giljum S, Lutter S, Mayer A, Bringezu S, Moriguchi Y, Schütz H, Schandl H and Weisz H (2011) Methodology and indicators of economy wide material flow accounting: State of the art and reliability across sources. Journal of Industrial Ecology. Vol. 15(6): 855–876.

Fischer-Kowalski M., Swilling M, von Weizsacker EU, Ren Y, Moriguchi Y, Crane W, Krausmann F, Eisenmenger N, Giljum S, Hennicke P, Romero Lankao P, Siriban Manalang A and Sewerin S (2011) Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group. Nairobi: UNEP IRP. Retrieved from: www.unep.org/resourcepanel/decoupling/files/pdf/Decoupling_Report_English.pdf

Food and Agriculture Organization (2013) *The State of Food Insecurity in the World.* in Schoon et al., (2013).

Griggs D, Stafford Smith M, Gaffney O, JRockström J, Öhman MC, PShyamsundar P, Steffen W, Glaser G, Kanie N and Noble I (2013) Sustainable Development Goals for People and Planet. Nature 495: 305–7. http://sustainabledevelopment.un.org/content/documents/844naturesjournal.pdf.

Hoekstra, A. Y. (2009). Human appropriation of natural capital: A comparison of ecological footprint and water footprint analysis. *Ecological Economics*,*68*(7), 1963-1974.
IEA (2011) *Energy for All – Financing access for the poor.* Special early excerpt of the World Energy Outlook 2011. OECD/IEA, Paris.
IISD Reporting Services (2014) Summary of the Seventh Session of the United Nations General Assembly Open Working Group on Sustainable Development Goals: 6-10 January 2014. Earth Negotiations Bulletin 23(7), 18p. Retrieved from: www.iisd.ca/download/pdf/enb3207e.pdf
IRP think piece contributing to the SDG process (Final version 7 February 2014 – to be added)
Jackson T (2005) Live Better by Consuming Less?: is there a "double dividend" in sustainable consumption? *Journal of Industrial Ecology*, *9*(1–2), 19–36.
Jackson Tim (2006) Readings in sustainable consumption. In Jackson Tim (Ed.) The Earthscan reader in Sustainable Consumption. London, Earthscan. 1-23.
Kummu, M., De Moel, H., Porkka, M., Siebert, S., Varis, O., & Ward, P. J. (2012). Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use. *Science of the Total Environment*, *438*, 477-489.
Lee B, Preston F, Kooroshy J, Bailey R and Lahn G (2012) Resources Futures. London, Chatham House.
Levy, M. A. (1995) Is the environment a national security issue?.*International Security*, 35–62.
Lucas P, Kok M, Nilsson M and Alkemade R (2014) Integrating Biodiversity and Ecosystem Services in the Post-2015 Development Agenda: Goal Structure, Target Areas and Means of Implementation. Sustainability 6, 193-216; doi:10.3390/su6010193
Lucon O. & D. Urge-Vorsatz (2014) IPCC Working Groups II – Mitigation of Climate Change; Chapter 9 – Buildings. http://report.mitigation2014.org/drafts/final-draft-postplenary/ipcc_wg3_ar5_final-draft_postplenary_chapter9.pdf
McKinsey Global Institute (2011) Resource Revolution: Meeting the world's energy, materials, food and water needs.
Millennium Ecosystem Assessment (2005) Ecosystems and human well-being: synthesis. Washington, D.C., Island Press.
Minamata Convention on Mercury (2013) Retrieved from: www.mercuryconvention.org/Convention/tabid/3426/Default.aspx
Myers N and Kent J (2003) New consumers: The influence of affluence on the environment. PNAS Vol. 100(8): 4963–4968.
OECD (2002) Indicators to measure decoupling of environmental pressure from economic growth. Paris: OECD. Retrieved from: http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=sg/sd(2002)1/final
Parfitt J, Barthel M and Macnaughton S (2010) Food waste within food supply chains: quantification and potential for change to 2050. Philosophical Transactions of the Royal Society B 365, 3065–3081.
Pimentel D, Hepperly P, Hanson J, Douds D and Seidel R (2005) Environmental, energetic, and economic comparisons of organic and conventional farming systems. *BioScience*, *55*(7), 573–582.
Pinter L, Almassy D, Antonio E, Hatakeyama S, Niestroy I, Olsen S and Pulawska G (2014) Sustainable development goals and indicators for a small planet: Part I: Methodology and goal framework. Singapore: Asia-Europe Foundation. Retrieved from: www.asef.org/images/docs/Sustainable%20Development%20Goals%20and%20Indicators%20for%20a%20Small%20Planet.%20Part%20I.pdf
Ozkaynak B, van Vuuren D, Pinter L, Alkemade R, Bizikova L, Lucas P, Mangaliacu D and Swansson D (2012) Scenarios and Transformative change. In: Global Environmental Outlook 5, Chapter 16; UNEP, Nairobi. (peer-reviewed)
Schandl H and Chiu A (2013) Indicators for a resource efficient and green Asia. UNEP SWITCH-Asia Regional Policy Support. Retrieved from: www.switch-asia.eu/fileadmin/content/PSC/Conference/25_26Sep13/Indicators_Resource_Efficient_Green_AsiaFinal.pdf
Schoon N, Seath F and Jackson, L (2013) One planet living: The case for sustainable consumption and production in the Post-2015 development agenda. Wallington, Surry: BioRegional. Retrieved from: www.bioregional.com/files/media/image/publications/BioRegional%20One%20Planet%20Living%20-%20The%20case%20for%20Sustainable%20Consumption%20and%20Production%20in%20the%20Post-2015%20Development%20Agenda.pdf

Seufert V, Ramankutty N and Foley JA (2012) Comparing the yields of organic and conventional agriculture. *Nature*, *485*(7397), 229–232.
Smith VL (1972) Dynamics of waste accumulation: disposal versus recycling. *The Quarterly Journal of Economics*, *86*(4), 600–616.
Sustainable Development Solutions Network (SDSN) (2013) An Action Agenda for Sustainable Development. Report for the United Nations Secretary-General, 6 June. http://unsdsn.org/files/2013/06/130613-SDSN-An-Action-Agenda-for-Sustainable-Development-FINAL.pdf.
Sustainable Development Solutions Network (2014) Indicators for sustainable development goals: a report by the Leadership Council. (Preliminary draft for public consultation). New York: SDSN. Retrieved from: http://unsdsn.org/wp-content/uploads/2014/02/140214-SDSN-indicator-report-DRAFT-for-consultation.pdf
The Royal Institute of International Affairs (2012) Resources Futures. A Chatham House Report. London.
Tiffin, R., & Arnoult, M. (2011). The public health impacts of a fat tax. *European Journal of Clinical Nutrition*, *65*(4), 427-433.
TST (2013) TST Issues Brief: Sustainable consumption and production, including chemicals and waste. Prepared by the TST drafting group on SCP with inputs from the 10YFP Inter-Agency Coordination Group (IACG). Retrieved from: http://sustainabledevelopment.un.org/content/documents/2296SCP%20Issues%20Brief%20SDG_FINAL.pdf
United Nations DESA (2013) World Population Prospects. The 2012 Revision. New York, United Nations
UNEA (2014) "Preliminary outline of UNEP Secretariat Background Document for UNEA-1: Sustainable Consumption and Production: a Universal Prerequisite for Sustainable Development" Provided by UNEP
UNEP (2010) Assessing the Environmental Impacts of Consumption and Production: Priority Products and Materials, A Report of the Working Group on the Environmental Impacts of Products and Materials to the International Panel for Sustainable Resource Management. Hertwich E, van der Voet E, Suh S, Tukker A, Huijbregts M, Kazmierczyk P, Lenzen M, McNeely J, Moriguchi Y.
UNEP (2013a) Embedding the environment in SDGs: UNEP Post-2015 Discussion Paper 1, Version 2, 19 July 2013 (includes the six criteria for developing goals and targets)
UNEP International Resource Panel (2013b) Managing and conserving the natural resource base for sustainable economic and social development. Retrieved from: www.unep.org/resourcepanel/Portals/24102/IRP%20Think%20Piece%20Contributing%20to%20the%20SDGs%20Process.pdf
UNEP (2013c) Cost of Inaction on the Sound Management of Chemicals. Nairobi: UNEP. Retrieved from: www.unep.org/chemicalsandwaste/Portals/9/Mainstreaming/CostOfInaction/Report_Cost_of_Inaction_Feb2013.pdf
UNEP (2014 unpublished) "Illustrative targets for 3 UNEP challenges (SCP Branch – 04/02/14)" Provided by UNEP
UNEP (2013) Indicators for a Resource Efficient and Green Asia, paper under UNEP managed SWITCH-Asia Regional Policy Support component, co-authored by Heinz Schandl, CSIRO and Anthony Chiu, De la Salle University
UNEP (2011) Resource Efficiency: Economics and Outlook for Asia and the Pacific. Melbourne, CSIRO Publishing.
UNEP internal paper (22 January 2014) Sustainable Consumption and Production as a theme for UNEA.
UNEP International Resource Panel (2011) Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group: Summary. Nairobi: UNEP IRP. Retrieved from: www.unep.org/resourcepanel/Portals/24102/PDFs/DecouplingENGSummary.pdf
UNEP International Resource Panel (2011) Recycling rates of metals. Nairobi, UNEP IRP.
UNEP International Resource Panel (2011?) Factsheet: Decoupling natural resource use and environmental impacts from economic growth. Nairobi: UNEP IRP. Retrieved from: www.unep.org/resourcepanel/Portals/24102/PDFs/Decoupling_Factsheet_English.pdf
UNEP International Resource Panel (2013) Overview. Nairobi: UNEP IRP. Retrieved from:
UNEP (2008) SCP indicators for developing countries: A guidance framework. Nairobi: UNEP. Retrieved from: www.unep.fr/shared/publications/pdf/DTIx1085xPA-SCPindicatorsEN.pdf
UNESCO (2011) Global Challenge of Wastewater: Examples from Different Countries. Presentation at World Water Week in Stockholm, 21 to 27August 2011.

United Nations (2000) *United Nations Millennium Declaration*. Resolution adopted by the General Assembly. United Nations, New York

United Nations Global Compact (UNGC) (2013) Corporate Sustainability and the United Nations Post-2015 Development Agenda: Perspectives from United Nations Global Compact Participants on Global Priorities and How to Engage Business Towards Sustainable Development Goals; UNGC: New York, NY.

United Nations High-Level Panel of Eminent Persons on the Post-2015 Development Agenda (UNHLP) (2013) A New Global Partnership: Eradicate Poverty And Transform Economies Through Sustainable Development. Report to the United Nations Secretary-General, 30 May. www.un.org/sg/management/pdf/ HLP_P2015_Report.pdf.

United Nations Open Working Group on Sustainable Development Goals (2014) Statistical note for the issue brief on: Sustainable Production and Consumption (including chemicals and waste): First Draft as of 16 February 2014. Retrieved from: http://sustainabledevelopment.un.org/content/documents/3292stat21.pdf

United Nations System Task Team (UN TT) (2012) Realizing the Future We Want for All. Report to the Secretary-General, June. www.un.org/millenniumgoals/pdf/Post_2015_UNTTreport.pdf.

United Nations (2013) A new global partnership: Eradicate poverty and transform economies through sustainable development. High-Level Panel of Eminent Persons on the Post-2015 Development Agenda. New York: United Nations Publications. Retrieved from: www.post2015hlp.org/wp-content/uploads/2013/05/UN-Report.pdf

United Nations (2012) A/CONF.216/5* Annex to the letter dated 18 June 2012 from the Permanent Representative of Brazil to the United Nations addressed to the Secretary-General of the United Nations Conference on Sustainable Development. A 10-year framework of programmes on sustainable consumption and production patterns. Rio de Janeiro, Brazil 20-22 June 2012

United Nations (2012) Resolution Adopted by the General Assembly 66/288: The Future We Want. New York: United Nations. www.un.org/ga/search/view_doc.asp?symbol=A/ RES/66/288&Lang=E

UNFCCC (2010) Report of the Conference of the Parties on Its Sixteenth Session. United Nations Framework Convention on Climate Change, Cancun. http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2

UNFCCC (1992) United Nations Framework Convention on Climate Change. FCCC/INFORMAL/84 GE.05-62220 (E) 200705. http://unfccc.int/resource/docs/convkp/conveng.pdf

Von Weizsaecker, K Hargroves, M Smith, C Desha and P Stasinopolous 2009. Factor 5. Transforming the Global Economy through 80% Improvements in Resource Productivity. London, Earthscan.

Watson D, Lorenz U, Stenbaek Hansen M, Szlezak F, Zoboli R, Kunhdt M, Wilson C, Mont O and Wittmer D (2010) Towards a set of indicators on sustainable consumption and production (SCP) for EEA reporting (ETC/SCP Working paper 1/2010). Copenhagen: European Topic Centre on Sustainable Consumption and Production. Retrieved from: http://scp.eionet.europa.eu/publications/SCP_Indicator_frame/wp/WP2010_1b

West J and Schandl H (2012) Recent Trends in Material Flows and Resource Productivity in Asia and the Pacific. UNEP.

West J and Schandl H (2013) Recent Trends in Material Flows and Resource Productivity in Latin America and the Caribbean. UNEP.

WHO/UNICEF (2010) *Progress on Sanitation and Drinking Water: 2010 Update*. WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation. World Health Organization, Geneva and United Nations Children's Fund, New York.

Wiedmann, TO, Schandl H, Moran D, Lenzen M, Suh S, West J and Kanemoto K (2013) The Material Footprint of Nations. Reassessing Resource Productivity. Proceedings of the National Academy of Sciences of the United States of America. Published online on 3 September 2013. www.pnas.org/cgi/doi/10.1073/pnas.1220362110

World Business Council for Sustainable Development (2012) Business solutions to enable energy access for all. WBCDS. Retrieved from: www.wbcsd.org/pages/edocument/edocumentdetails.aspx?id=14165&nosearchcontextkey=true

World Bank (2012) World Development Indicators. Washington, D.C., World Bank.

WWF (2014) TARGETING A SUSTAINABLE FUTURE INPUT TO THE SDG OWG 29 January 2014 , pp. 8

WWF International (2014) Targeting a sustainable future: Input to the SDG OWG. Retrieved from: www.un-ngls.org/IMG/doc/WWF_Targeting_a_Sustainable_Future_30_JAN.doc [Cached].

7. Annexes

7.1 Criteria for target and indicator selection

Criteria 1: Targets that have strong linkage to the socioeconomic development agenda of "leaving no one behind" and dignity for all – targets must ensure that everyone benefit from minimum environmental, social and economic safeguards (including poverty eradication and access to sustainable livelihoods, basic services and a clean and healthy environment)

Criteria 2: Targets that increase prosperity and equity while staying within the earth's 'safe operating space' , that decouple socioeconomic development from depletion of resources and irreversible changes in the global environment, and that are respectful of both ecological and social life supporting systems (e.g. solutions through resource efficiency, inclusive greening economies, sustainable consumption, sustainable production, equitable access to natural resources, justice and rule of law)

Criteria 3: Targets that promote investment in the natural, human and social, and built-capital to create the 'space' and resilience to achieve sustainable development, thus meeting the needs of current generations, and ensuring intergenerational equity (e.g. through ecological restoration, investing in indigenous knowledge and education for sustainable development, enhancing innovation, access to information, and resilience to social, economic and environmental shocks and disasters)

Criteria 4: Targets that take into account current commitments such as internationally agreed global environmental goals and targets, and use current goals and targets as "ground floor" for new goals and targets to avoid regression; and/or incorporate those that are showing slow progress

Criteria 5: Targets that are scientifically credible and verifiable and should be based on best scientific understanding and supported by the scientific community

Criteria 6: Progress on the targets must be trackable and should be backed up by specific and measurable targets and indicators, or their measurement should be feasible in the future.

Provided by UNEP to IISD and CSIRO.

7.2 Overview of the key contributions of SCP to the thematic areas of the Rio+20 outcome document

- **Health and population**: Positive impact of decreased air, water and chemical pollution for improving human health (paragraph 141).
- **Sustainable cities and human settlements:** The sustainable management of waste through the application of the 3R (reduce, reuse and recycle) principle (paragraph 134).
- **Promoting full and productive employment, decent work for all, and social protections:** Investment in restoring, regenerating and conserving natural resources and ecosystems (paragraph 154).
- **Sustainable tourism:** Capacity-building to promote environmental awareness and conserve natural resources (paragraphs 130 and 131). [28]
- **Chemicals and waste:** The use of a life cycle approaches (such as the 3R principle) to improve resource efficiency and achieve environmentally-sound waste and chemicals management (paragraphs 218 to 220).
- **Energy:** Efficient use of energy and the sustainable use of conventional energy resources and the application of appropriate incentives (paragraphs 127 and 128).
- **Food security and nutrition and sustainable agriculture:** The importance of sustainable agricultural production practices, including "crops, livestock, forestry, fisheries and aquaculture"; need to reduce food losses and waste throughout the food supply chain (paragraphs 110 to 112).
- **Water and sanitation:** Ensure sustainable water use, increase efficiency and reduce water losses through the development of integrated water resource management (paragraphs 120, 124).
- **Oceans and seas:** Sustainable use of oceans/sees to reduce the negative effects of pollution, acidification and destructive fishing practices (paragraphs 158, 160, 163, 176).
- **Forests:** Sustainable management of forests, reforestation, restoration and afforestation (paragraph 193).
- **Biodiversity:** Mainstreaming conservation and sustainable use of ecosystems, biodiversity and its components, together with investments in restoration and conservation (paragraph 201).
- **Mountains:** Sustainable use of mountain resources to safeguard water resources of fragile mountain ecosystems (paragraph 210).

SCP links to two cross-cutting themes:

- **Education: Promotion of** Education for Sustainable Development and introduction of sustainable management practices of educational institutions and the communities where they are located (paragraph 233).
- **Gender equality and women's empowerment:** Promotion of women's access to ownership and control over land and natural resources (paragraph 241). [29]

[28] Hence, the notion of sustainable consumption is somewhat weak, compared to the degree of impact of (unsustainable) tourism.

[29] Reference to women as predominant managers of households, i.e. procurers, and educators of children, both with a strong impact on consumption patterns, is missing.

7.3 SCP projects promoting the decoupling of environmental degradation from resource use and which contribute to poverty eradication

1. Regional Integrated Silvopastoral Approaches to Ecosystem Management Project (project supported by the World Bank in Colombia, Costa Rica and Nicaragua): The project aimed to encourage farmers by payment incentives to introduce integrated silvopastoral farming systems (SPS) in degraded pasturelands. The SPS increased the incomes of the farms involved in the project through higher yields and the payments for ecosystem services. As a social benefit, it was also found that even the poorest poor farmers were able to participate in the programme. With regards to environmental improvements, the projects resulted in increased biological diversity, increased carbon sequestration, increased water quality in catchment areas, reclaim of degraded soils, land rehabilitation and reduced fossil fuel dependence (UNEP 2013, p.34–38).

2. The Philippine farmer network MASIPAG (Farmers and Scientists for the Advancement of Agriculture): aims to promote introduction of better practices of organic agriculture in the country. In 2009 the network had 35,000 farmer members. The assessment of the project showed the highest economic benefits for the poorest families. Such practices result in higher net incomes, thanks to lower needs for chemical products and to higher yields on the long-term. Social benefits are also high for smaller-scale, poor farmers via involvement in community activities (i.e. education, training, communal labour, marketing activities). With regards to environmental benefits, the practices resulted in increased biological diversity, decreased use of pesticides and fertilizers, increased soil fertility and crop tolerance (UNEP 2013 p.38–42).

3. Waste and biogas in China: The rapidly growing uptake of biogas production in rural China has confirmed positive outcomes in poverty eradication. The necessary investments have a relatively short payback time, between 4 and 10 years and economic benefits include increased agricultural or livestock yields and reduced energy costs. The use of biogas had positive health effects (due to better quality of indoor air and surface water) and it also ensures improved employment conditions (by having access to higher and more regular revenue throughout the year). As for environmental benefits, the reduction in the usage of biomass and coal resulted in reduced CO_2 and SO_2 emissions, less significant soil erosion and water losses as well as reduced usage of fertilizers and pesticides (UNEP 2013 p.42–46).

4. Off-grid electrification concession with solar home systems in South Africa (NURA concession covering 10,000 km^2 and 14,000 people in rural parts of South Africa): As a direct economic benefit, 83 jobs were created and local community members filled most positions. For the users, the PV system can offer a charging point for mobile phones and can replace batteries, candles and paraffin. The system also has social benefits through extended and better quality lighting hours in public buildings (schools) and in individual houses. The use of PV solar systems also results in reduced CO_2 emissions and better indoor air quality (UNEP 2013 p.47–50).

7.4 Overview of the available indicators across global databases relevant for the identified targets

Key databases reviewed:
Environmental Data explorer (UNEP): http://geodata.grid.unep.ch/results.php
MDG Indicators website: http://mdgs.un.org/unsd/mdg/Default.aspx
National Accounts Main Aggregates Database http://unstats.un.org/unsd/snaama/cList.asp
OECD: http://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH
FAO STAT: http://faostat3.fao.org/faostat-gateway/go/to/home/E
World Bank Indicators: http://data.worldbank.org/indicator

Target	Indicators	Sources reviewed						
		Environmental Data explorer (UNEP)	**MDG Indicator web-site**	**National Accounts**	**OECD (on OECD countries)**	**FAO STAT**	**World Bank Indicators**	**Other**
End hunger, ensure every adult and child receives adequate nutrition, with a focus on local and regional food security	% of children suffering from stunting, wasting, anaemia, Average calorie intake of lowest decile/quintile by income % of locally and regionally grown food in diets		Proportion of population below minimum level of dietary energy consumption (%)	--				
Halt the expansion of global cropland into grasslands, savannahs and forests by 2020 below a global (net) cropland area of 1.640 Mha	Rate of land use change between key land-use types (agriculture, forest, pasture)	Land-sue change between land-use types	Proportion of land area covered by forest		Arable and cropland, % of total land area Pasture, % of total land area Forest ,% of total land area	Rate of land use change	Forest area Agricultural land	
	Global (net) cropland area		--	--	Arable and cropland, % of total land area	Global (net) cropland area	Arable land Permanent cropland	
	Area of cropland per person (UNEP, 2013b)	Can be calculated	--	--		Can be calculated	Can be calculated	
Restore agricultural productivity of 1/3 of severely degraded abandoned land by 2030	% of restored agricultural land	Not available	--	--	--	--	--	
	% of degraded land regenerated and brought back into agricultural production	Not available	--	--	--	--	--	
		Land Affected by Land Degradation and Desertification mapped as dryland – percentage and by total land area at the	--	--	--	--	--	

		national level						
Limit global cropland to 0.2 hectares per capita	Domestic extraction of biomass Biomass footprint of consumption Crop biomass, livestock fodder, feedstock for biofuels		--					Global Land Use Data
Reduce global deforestation to zero by 2030, increase reforestation and afforestation rates by xx % per annum	Annual change in forest area	Annual change in forest area	--	--	Forest, % in total land area	--	Forest area	
	Rate of reforestation Rate of afforestation		--	--	Forest, % in total land area)	Net forest conversion; Adjusted savings: net forest depletion (current US$; % of GNI	Forest area	
Reduce overall water footprint per capita and per unit of GDP in developed nations by 25 per cent by 2030 and increase water use efficiency in developing nations by 25 per cent by 2030 over 2000 levels Provide universal access to safe drinking water to lower income households in developing countries by 2030	Water footprint - direct and indirect water use of a consumer or producer	Proportion of population using an improved drinking water source (%)	--	--	--			
Reduce, year on year, the water footprint per unit of output in sectors which consume most freshwater taking account of global supply chains – heavy industry, power generation, paper and pulp, irrigation-based agriculture for food and fibre	Water Footprint per capita (m3; m3/capita)	UNEP and Water Footprint Network	Proportion of total water resources used	--	Total freshwater abstraction, thousand m3 per capita Water stress, total freshwater abstraction % total available resources Water stress, abstraction % total internal resources	Water withdrawal for agricultural use	Annual freshwater withdrawals, total (billion cubic meters) Annual freshwater withdrawals, total (% of internal resources) Annual freshwater withdrawals, agriculture (% of total freshwater withdrawal) Annual freshwater withdrawals, domestic (% of total freshwater withdrawal)	Other data from WB: Renewable internal freshwater resources per capita (cubic meters) Renewable internal freshwater resources, total (billion cubic meters)

							Annual freshwater withdrawals, industry (% of total freshwater withdrawal)	
	• Water Footprint per unit of GDP – GDP/Water Footprint ($ per m3)	Can be calculated based on the water footprint	--	--	Total freshwater abstraction, thousand m3 per capita	Water withdrawal for agricultural use	Can be calculated	
			--					
	Rates of groundwater depletion	UNEP and Water Footprint Network	--	--	--	--	--	Other data from WB: Renewable internal freshwater resources per capita (cubic meters) Renewable internal freshwater resources, total (billion cubic meters)
	% of water put into supply that is wasted		--	--	--	--	--	
	Cubic metres of freshwater consumed per unit of output in: • Iron and steel making and other heavy industry • Power generation • Paper and pulp making		--	--	--	--	--	
Reduce, year on year, the water footprint per unit of output in sectors which consume most freshwater taking account of global supply chains – heavy industry, power generation, paper and pulp, irrigation-based agriculture for food and fibre	• Agricultural water withdrawals		--	--	--	--	--	GDP per cubic meter of total freshwater withdrawal)
	Number of stocks overexploited	Number of stocks overexploited	--	--	--	Water withdrawal for agricultural use	--	X
End overfishing, rebuild over-fished stocks by 2030 Improving the share of renewable energy production in the energy mix at least to up to least 45% of all primary energy use and/or doubling the share of renewable sources by 2030 (UNEP, 2013b; WWF, 2014)	Fully and not fully exploited fish tock	Fully and not fully exploited fish tock	--	--	--	--	--	-
	Fish catches	Fish catches	--	--	--	--	--	-
	Fish stocks are rebuilt to ecologically safe levels.	Fish stocks are rebuilt to ecologically safe levels.	--	--	--	--	--	-
	Proportion of fish stocks within safe biological limits	Not available	--	--	--	--	--	

Universal access to energy from national/regional grids or more local supplies, with doubling the share of global energy generated from clean, sustainable resources by 2030 Energy consumption per capita to fall in the developed world by xx% by 2030, energy consumption per unit of GDP to fall by xx% by 2030 in the developing world	Total quantity of energy generated from renewable sources as a percentage of total energy used (KWh sourced from renewable sources)		--	--	Renewable energy supply, % TPES Renewable electricity, % total electricity generation	Bioenergy production % as share of total renewable energy production %	Electricity production from renewable sources, excluding hydroelectric (kWh) Electricity production from renewable sources, excluding hydroelectric (% of total) Electricity production from renewable sources (kWh)	IEA Other indicator from WB: Electricity production from oil, gas and coal sources (% of total)
	Energy Consumption per Capita Electricity Generation per Capita Total Primary Energy Supply (TPES) (joule; joule/capita) Overall energy consumption per unit of GDP Average Energy Consumption per Unit Product		--	--	Renewable energy supply, % TPES Renewable electricity, % total electricity generation	Bioenergy production % as share of total renewable energy production %	Can be calculated	IEA
Decarbonize the energy system and reduce the climate forcing of energy supply by 50% by 2050	Total energy and industry-related GHG emissions by oil and gas sector, expressed as production and demand-based emissions (tCO2e) Gas Emissions (GHG) (tonnes; tonnes/capita) Carbon footprint per person Non-carbon energy share in energy and electricity GHG emissions from energy production and use (per capita & per unit of GDP)		--	GDP figures aggregate and breakdown	Energy productivity, US$ per ktoe Energy intensity, toe per capita	Bioenergy production % as share of total renewable energy production %	Energy use (kg of oil equivalent) per $1,000 Energy use (kg of oil equivalent) per $1,000 GDP (constant 2005 PPP) Energy use (kg of oil equivalent per capita) Energy use (kt of oil equivalent) GDP per unit of energy use (constant 2005 PPP $ per kg of oil equivalent) GDP per unit of energy use (PPP $ per kg of oil equivalent)	IEA

Decouple economic growth rates and progress in human wellbeing from escalating use of natural resources to achieve an average material intensity of consumption per-capita of 10.5 tonnes in 2030 and 8-10 tonnes in 2050	Material extraction in each national economy Material footprint of each national economy, i.e. attribution of global material extraction to final consumption in each country Average national metabolic rates (material footprint per capita)		--	GDP figures aggregate and breakdown (Mining, Manufacturing, Utilities (ISIC C-E) GDP category is inclusive of oi and gas sector)	Production-based CO2 productivity, US$ per kg of CO2Production-based CO2 intensity, tonnes per capita Demand-based CO2 productivity, real net national income per unit of CO2	--	Energy related methane emissions (% of total) Methane emissions in energy sector (thousand metric tons of CO2 equivalent) Nitrous oxide emissions in energy sector (thousand metric tons of CO2 equivalent) Nitrous oxide emissions in industrial and energy processes (% of total nitrous oxide emissions)	IEA and UNFCCC for GHG related data
Improve overall material efficiency by 30% and double material efficiency of production and consumption by 2050	Material footprint per GDP for each national economy Domestic extraction of biomass per GDP in agriculture, forestry and fisheries Domestic extraction of ores and minerals per GDP in mining and quarrying Domestic extraction of coal, crude oil and natural gas per GDP in energy sector Sectoral material input per sectoral added value for main manufacturing sectors, construction and transport Material footprint of service sector		--					Material Flow Accounts
Grow the end-of-life recycling rates of ferrous, non-ferrous and precious metals close to a 100% and of speciality metals to above 50%	Overall (aggregate) end-of-life metals recycling rate End-of-life recycling rates for ferrous, non-ferrous, precious and speciality metals Avoided energy use and environmental impacts through recycling			GDP figures (aggregate)				Material Flow Accounts
Decouple economic growth rates and progress in human wellbeing from escalating amounts of waste to achieve an average waste intensity of consumption per-capita of 500kg in 2030 and 450 kg in 2050	DMC (waste equivalent) Household and industrial waste, e-Waste		--					Material Flow Accounts, waste statistics

Reduce excess nutrient release by increase nutrient use efficiency in agriculture to reduce losses (i.e. close gap between nutrient input and plant uptake)	N, P, potash and fertilizers in production and consumption		--				Fertilizer consumption (kilograms per hectare of arable land) Fertilizer consumption (% of fertilizer production)	Organic water pollutant (BOD) emissions (kg per day) Organic water pollutant (BOD)
Reduce food loss and food waste along the chain by xx % by 2030, from post-harvest losses to consumer waste	% wastewater treated with nutrient recovery (also linked to sanitation)	UNEP	--	--	--	FAO		
	% of food wasted or lost: post-harvest and in storage, in manufacturing and processing, in distribution and retail and by final consumers		--	--	--	--	--	
To ensure, by 2020, that chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment	Number of signatory countries to the three conventions on chemicals and wastes (Basel, Rotterdam, Stockholm); number of implementation plans being put in place by these countries	Number of signatory countries to the three conventions on chemicals and wastes (Basel, Rotterdam, Stockholm); number of implementation plans being put in place by these countries	--	--	--	--	--	

Reduced releases to air, water and soil of hazardous chemicals and wastes from anthropogenic sources by x% by 2030	Data from pollutant release and transfer registers and other metrics of environmental releases Annual average levels of selected contaminants in air, water and soil Releases of chemicals and waste into water from industrial sources, agriculture, transport and wastewater and waste treatment plants Concentration of nitrogen and Biochemical Oxygen Demand (BOD) in rivers, lakes and groundwater Percentage of wastewater reused in industrial processes in total industrial water consumption							Organic water pollutant (BOD) emissions (kg per day) Organic water pollutant (BOD)
Promote resource efficient construction and building sector through 25% reduction in energy-related CO2 emissions, XX% increase in water efficiency in building operations and XX5% decrease in the rate of raw material extraction for building and construction by 2030 through more efficient design and increase in use of recycled materials	Emissions from buildings Water consumed in building operations Rate of construction related mineral extraction	-	-	-	-	-	-	-
By 2030, all public procurement follows sustainable development guidelines	Share of sustainable public procurement ($; percentage) Level of adoption of policies and frameworks for SPP at national and sub-national level	-	-	Government expenditures are monitored but not directly focused on SPP	-	-	-	--

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The United Nations and its Member States are currently crafting a post-2015 development agenda to build on the Millennium Development Goals. Outcomes of previous UN Summits, including Rio+20 in 2012, have shown that the objective of shifting to sustainable consumption and production (SCP) patterns is central to achieving sustainable development. Negotiations on the post-2015 development agenda, and on the associated sustainable development goals (SDGs), indicate that there is a strong interest in many Member States in embedding the objective of SCP in both. The present advance copy of this discussion paper provides insights into potential targets and indicators for SCP, based on scientific literature, as well as on past and on-going international processes on sustainable development policy.