

## **Appendix 1.** Recent (2013-2014) proposals for sustainable development goals.

The United Nation's (UN) parallel processes relating to SDGs – defining the Post-2015 development agenda (focusing on the unfinished business of the MDGs) and the SDG process – are set to converge. Both processes include a number of activities; the key element in the SDG process up to August 2014 was the 30-member intergovernmental Open Working Group (OWG) of the General Assembly, which submitted its proposal on SDGs to the 2104 UN General Assembly convened in September 2014 ([UN Open Working Group 2014, hereafter OWG 2014](#)).

Prior to the OWG report the Post-2015 development agenda process had already led to a report ([United Nations HLP 2013, hereafter HLP 2013](#)) from the UN's High Level Panel (HLP) that emphasized the critical contributions of the MDGs, but also identified additional targets that would help meet some fundamental gaps. This report proposed a transformative shift in the global agenda post-2015 and argued for a universal charter to: a) remove extreme poverty; b) bring sustainable development to the core of the post-2015 agenda; c) enhance jobs and inclusive growth; d) promote peace and reduce conflicts and e) create a global partnership that strengthens governance across different scales.

The HLP report identified 12 universal goals that would enable countries in the world to meet this vision (see Table A1), including updated social targets.

The SDG process and the OWG was supported by various stakeholder groups, including the Sustainable Development Solutions Network (SDSN) which published a report outlining 10 SDGs ([UN SDSN 2013](#)) that also contain updated social targets and an emphasis on the necessity of promoting growth within planetary boundaries. Other stakeholder groups have been proposing goals and themes on an ongoing basis and available at various online depositories (UN Sustainable Development Knowledge Platform, SDGs-eInventory, Overseas Development Institute SDG Tracker). [Griggs et al. \(2013\)](#) proposed six overarching areas assessed as being essential for long-term Earth-system stability whilst delivering improved human wellbeing (Table 1 in the main text), derived from their identification of seven planetary must-haves" or global sustainability objectives (GSOs – see Table A2).

There are striking similarities between the proposals from OWG, HLP, SDSN and Griggs *et al.* Sustainable food, water and energy security are common to all and, significantly, given separate goals. Governance in some form too, features prominently and is given its own goal in all except the OWG. Healthy and productive ecosystems are deemed a necessity in all proposals but worded differently in each.

Education, health and gender equality are also common. Griggs *et al* argue for more equality generally as a foundational support for sustainability ([e.g. Wilkinson and Pickett 2009](#)). The proposals differ in the treatment of these challenges; some give each their own goal, others bring them together under a single goal. Griggs *et al*, for example, collect many social challenges under "Thriving lives and livelihoods," reflecting a focus on global sustainability aspects.

The HLP and the OWG specifically have goals on economic growth, which is implicit in Thriving Lives and Livelihoods in Griggs *et al.* Only the OWG sets sustainable consumption and production as a specific goal; the others choose to embed it throughout a suite of goals. The HLP and Griggs *et al* identify sustainable livelihoods as a high priority goal, SDSN only implicitly. SDSN and OWG give cities a goal of their own.

Only the OWG has a goal specifically on implementation. Other documents (e.g. concept paper by Governments of Colombia and Guatemala to the OWG on SDGs, March 2013) have noted issues related to the implementation of targets, some of which this paper (see main text) seeks to address.

We note the importance of research in supporting development, implementation, monitoring and interpretation of the goals, a point that is not made strongly in the OWG (2014) draft.

**Table A1: A comparison of the approximate scope of different goal formulations: the Millennium Development Goals (MDGs), the UN Sustainable Development Solutions Network (11) and High Level Panel (HLP) (12) proposals, the OWG (2014) and the Sustainable Development Goals as proposed by Griggs et al. (10). The details of goals differ considerably in some cases.**

Millennium Development Goals	SDSN	HLP Universal Goals	Open Working Group	Griggs et al.
1. Eradicate extreme poverty and hunger	1. End extreme poverty including hunger	1. End Poverty	1. End poverty in all its forms everywhere	<p><b>SDG1: Thriving lives and livelihoods.</b> End poverty and improve well-being through access to education, employment and information; better health and housing; and reduced inequality while moving towards sustainable consumption and production.</p>
2. Achieve universal primary education	3. Ensure effective learning for all children and youth for life and livelihood	3. Provide Quality Education and Life Long learning	4. Ensure inclusive and equitable quality education and promote life-long learning opportunities for all.	
3. Promote gender equality and empower women	4. Achieve gender equality, social inclusion, and human rights for all	2. Empower Girls and Women	5. Attain gender equality and empower all women and girls	
4. Reduce child mortality	5. Achieve health and wellbeing at all ages	4. Ensure Healthy Lives	3. Attain healthy lives and promote well-being for	
5. Improve maternal health				
6. Combat				

HIV/AIDS, malaria and other diseases			all at all ages	
<i>(No real parallel)</i>	2. Achieve development within planetary boundaries	8. Create jobs, sustainable livelihoods and equitable growth	8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	
			12. Ensure sustainable consumption and production patterns	
			9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	
	6. Improve agriculture systems and raise rural prosperity	5. Ensure Food Security and Nutrition	2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture	<b>SDG2: Sustainable food security.</b> End hunger and achieve long-term food security — including better nutrition — through sustainable systems of production, distribution and consumption.
	6. Achieve Universal Access to Water	6. Ensure availability and sustainable management of water and sanitation for all	<b>SDG3: Sustainable water security.</b> Achieve universal access to clean water and basic sanitation, and ensure efficient allocation through integrated water-resource management.	

	8. Curb human-induced climate change and ensure sustainable energy	7. Secure sustainable energy	7. Ensure access to affordable reliable, sustainable and modern energy for all 13. Take urgent action to combat climate change and its impacts	<b>SDG4: Universal clean energy.</b> Ensure universal, affordable access to clean energy that minimizes local pollution and health impacts and mitigates global warming.
	7. Empower inclusive, productive, and resilient cities		11. Make cities and human settlements inclusive, safe, resilient and sustainable	<i>(No direct parallel)</i>
7. Ensure environmental sustainability	9. Secure ecosystem services and biodiversity, and ensure good management of water and other natural resources	9. Manage natural resources sustainably	14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss	<b>SDG5: Healthy and productive ecosystems.</b> Sustain biodiversity and ecosystem services through better management, valuation, measurement, conservation and restoration.
8. Develop a global partnership	10. Transform governance	10. Ensure good governance	10. Reduce inequality within and	<b>SDG6: Governance for sustainable societies.</b> Transform governance and

for development	for sustainable development	and effective institutions	among countries	institutions at all levels to address the other five sustainable development goals.
		11. Ensure peaceful and stable societies	16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable and inclusive institutions at all levels	
		12. Create a global enabling environment	17. Strengthen the means of implementation and revitalize the global partnership for sustainable development	

**Table A2: “Planetary must-haves” or global sustainability objectives (GSOs: Griggs et al. 2013), and potential targets for these that are more or less justifiable from current literature or international processes.**

<b>Global sustainability objectives</b>	<b>Potential targets</b>
GSO 1: Maintain a stable climate system limiting global temperature increases to no more than 2C (and address ocean acidification)	global greenhouse gas emissions to peak 2015-2020, with an annual reduction rate of 3-5 % per year between the peak and 2030 (on track to reach global reductions by 50-80% of 2000 emissions by 2050) ( <a href="#">Huntingford et al. 2012</a> )
GSO 2: Reduce the rate of global biodiversity loss	reduce extinction rates to no more than ten times the natural background rate, halting rate of habitat loss (assuming rate is at least halved by 2020 in line with Aichi targets [ <a href="http://www.cbd.int/sp/targets/">http://www.cbd.int/sp/targets/</a> ]) keep at least 85% of the potential area of tropical rainforests and boreal forests sustainable management of ecosystems that safeguards terrestrial, inland waters, coastal and marine areas of critical importance for biodiversity and ecosystem

	<p>services (building on Aichi targets [<a href="http://www.cbd.int/sp/targets/">http://www.cbd.int/sp/targets/</a>] of protecting 17% terrestrial and 10% coastal systems by 2020)</p> <p>secure marine ecosystem services through sustainable management of oceans and seas, to safeguard diversity and abundance of fish stocks</p>
GSO 3: Safeguard ecosystem services from critical biomes	<p>better cost social and environmental externalities (greenhouse gas emissions, freshwater usage, pollution and waste) into product prices by 2030</p> <p>building on developments in climate and biodiversity policy, comprehensive national monitoring, reporting and verification systems are established for all SDG targets to ensure compliance and coherence</p>
GSO 4: Maintain the capacity of the global hydrological cycle to provide freshwater to sustain the resilience of ecosystems	<p>keep the global consumptive use of runoff water below <math>4000 \text{ km}^3 \text{ y}^{-1}</math> (<a href="#">Rockstrom et al. 2009</a>)</p> <p>withdraw no more than 25-50% of the mean monthly flow in any river basin (depending on hydrological regime) (<a href="#">Pastor et al. 2013</a>)</p>
GSO 5: Maintain well-functioning nitrogen and phosphorous cycles	<p>improve by 20% full-chain nutrient use efficiency by 2020 (<a href="#">Sutton et al. 2013</a>)</p> <p>apply to cultivated lands via fertilizers no more than 44M tons of nitrogen per year from industrial and intended biological fixation processes (<a href="#">building on de Vries et al. 2013</a>)</p> <p>ensure that the flux of phosphorous to the ocean remains no more than <math>11 \text{ M tons y}^{-1}</math> (<a href="#">Rockstrom et al. 2009</a>)</p> <p>reduce eutrophication of freshwater in rivers and lakes by reducing the flow of phosphorous to erodible soils to <math>3.7 \text{ Tg P yr}^{-1}</math> (<a href="#">Carpenter and Bennett 2011</a>)</p>
GSO 6: Maintain clean air for health and regional environments	<p>existing World Health Organization (WHO) guidelines and address air pollutants such as black carbon (<a href="#">Shindell et al. 2012</a>)</p>
GSO 7: Sustainable and precautionary use of new entities and abiotic natural resources	<p>precautionary critical loads for anthropogenic chemical compounds and extraction of toxic materials (heavy metals, nuclear materials etc.)</p> <p>adopt resource efficiency and circular processes as strategies for extracting and using scarce minerals and metals</p> <p>reduce emissions of ozone depleting substances to maintain a stratospheric ozone layer thickness no less than 276 Dobson units (<a href="#">Rockstrom et al. 2009</a>)</p>

Many targets for the GSOs are derived from existing international agreements, as follows, illustrating how their use in SDGs can provide a global coordinating and

synthesizing framework for these many existing agreements; others draw on recent research:

GSO1: These targets represent one track to achieving the UNFCCC commitment to stay within 2C global warming, applying a global emissions budget approach as raised in the latest IPCC Assessment Report; avoiding further ocean acidification requires the same action, though focused specifically on CO<sub>2</sub> – we have not set a separate target here. Forthcoming work may emphasize a lower boundary of a change in radiative forcing of no more than +1.0 W m<sup>-2</sup>, but the target suggested here would in any case be a reasonable one for the 2030 time horizon of the SDGs.

GSO2: These are drawn from the Aichi agreement, noting that these differ from known boundaries in the sense that the latter represent proven tipping points whereas a target is a safe level to aim not to exceed; these indicators will be improved and sharpened as the science progresses

GSO3: These topics are being explored in various fora, including the Intergovernmental Panel for Biodiversity and Ecosystem Services

GSO4: These are drawn from the sources noted but sometimes modified by recent results

GSO5: No global agreements for P and N cycles yet exist, although proposals are circulating, as referenced but sometimes modified by recent results

GSO6: Existing World Health Organisation guidelines

GSO7: A rapidly developing recent area of understanding, based mostly on the existing Stockholm Convention on Persistent Organic Pollutants ([www.pops.int](http://www.pops.int)) and related Conventions

#### ILLUSTRATING THE BALANCED DEVELOPMENT OF BIOPHYSICAL, SOCIAL AND INTEGRATIVE TARGETS.

Table A3 explores how social and biophysical targets interact within the SDGs and how these interactions can be made explicit and tracked through integrated targets. Where possible we have used targets proposed in the OWG (2014) report, noting where these could be made more quantitative (these are labeled in the form of x.y, being the y'th target of the x'th goal in the July 2014 version). In other cases we have used proposals from HLP (UN HLP 2013 – shown as HLP #.#) or proposed new targets where these are missing from the current debate, mostly from Table A2, sometimes simplified.

Our principal intent is to be illustrative; the table does not attempt to list all targets comprehensively. All of the GSO targets in Table A2 should appear somewhere in the Biophysical column; and many of the OWG 'pure' social targets could appear in the Socio-economic column but without a particular need to be linked to sustainability concerns. The OWG targets are therefore not all listed in the table, which aims to focus on illustrating where biophysical and socio-economic targets need an integrated target to handle trade-offs and synergies appropriately. As noted in the main text, our principal focus is on integrating global sustainability concerns; thus there are many targets related to SDG1 that do not materially interact with the biophysical outcomes, and we do not include these ones, important as they are. Here we illustrate just three areas where there is an interaction under SDG1, before examining the other SDGs. Some explanatory notes about each row, and their connections to proposed OWG targets, follow:

SDG1 (Health): this row highlights a case where significant synergies can be achieved by considering how the targeted management of pollutants in the environment generally and from less-clean sources of energy such as burning dung and wood can deliver health co-

benefits that are more substantial than those likely to be achieved in the absence of integrated targets. The listed integrated target, OWG 3.7, could additionally specifically target environments that affect mothers and young children. The biophysical target could be made more quantitative by referring explicitly to specific international standards such as the WHO Air Quality Guidelines (2005) for particulate matter and the Stockholm Convention for novel chemical compounds (see GSOs 6 and 7). We suggest a quantitative integrated target here that is related to achieving SDG4 at the same time as health and education social targets.

SDG1 (Equitable consumption): Consumption ultimately drives most of the GSOs, but this line specifically addresses the interactions between the management of the impacts of consumption and equality. As consumption by the less well-off increases, the distribution of the use of the remaining resources must also become more equitable in order to meet the GSOs. The biophysical targets will be identified in other SDGs below, but integrated targets are needed both to minimize the degree of trade-off by increasing resource use efficiency in general and through waste management; and then we propose a third to capture synergies with other social targets through fair distribution. The integrated targets would benefit from a more quantitative expression, which might occur at sub-global levels. For example, OWGs 8.4, 9.4 and 12.5 could be made more concrete for individual sectors or regions with an integrated target which defined a rate of improvement in resource efficiency or waste reduction by some standard (e.g. rate of resource use per unit of services delivered by particular infrastructure and industries); in fact these three could be combined.

SDG1 (Disasters): The OWG document contains 3 separate approaches to decreasing the effects of disasters on people, without relating these (where appropriate) to global change drivers (in fact a fourth, OWG 2.4, also refers strongly to extreme events and disasters in an agricultural context). This relationship could be made explicit as shown, where the types of disasters that are affected by global change include climate-related disasters as a result of climate change, landslips and flooding as a result of land use change, famines and water crises as a result of land degradation and over exploitation of water resources, etc.

SDG2: this row seeks to manage the tradeoff between food for a growing and more affluent population and not damaging the environment. Most items here are described in the main text. Note that the reason for reducing phosphorus loss is to avert widespread eutrophication of freshwater systems on land. The GSO-related biophysical targets here are not explicitly represented in OWG (2014), so are inserted here, along with an unquantified target for land degradation (OWG 15.3). In the integrated targets, OWG 12.3 should be more quantitative as noted, and the OWG has no target on agricultural resource use efficiency except in relation to water (captured under SDG3). As described in the main text, these are a crucial part of managing the interaction between obtaining more production for less environmental impact. We therefore add a resource use efficiency target for P and N (water is picked up in SDG3) – see main text. In addition, better use of P and N in particular could be achieved in ways that enhance social equity more or less effectively (cf. SDG1 Equitable consumption above); [de Vries et al. \(2013\)](#) argue that it is possible to establish regional targets for N use which enhance production in many developing countries with poor soil fertility at the same time as reducing surplus N use in regions where this does not help yields and causes environmental impacts, and



from these quantify a global target also (see also [Steffen and Stafford Smith \(2013\)](#)), and for phosphorus [Carpenter and Bennett \(2011\)](#)). Finally, the sense of increasing agricultural productivity has been lost in the OWG draft (e.g. OWG 2.3 focuses only on small-holders), so we have retained the HLP 5c formulation for the related social goal, in addition to OWG 2.1.

SDG3: this row addresses the trade-off between water accessibility for all needed uses and impacts on the water cycle, as discussed in the main text. As for P and N, the biophysical water targets have important regional elements, such that a global target can be articulated but this requires regionally specific management of aquifers and catchment withdrawals. These biophysical targets are no longer explicit in the OWG (an earlier draft contained “bring freshwater withdrawals in line with sustainable supply”), so we suggest these from the GSOs. The integrative OWG 6.4 is for general water use efficiency; for reasons given in the main text, it would be most important to focus on the dominant use of fresh water in agriculture (as in HLP 6c), so this could be made more quantitative and achievable as shown. OWG 6.3 addresses water quality and recycling – recycling would be better incorporated in water use efficiency, but water quality is important and could be framed to ensure that it delivers industrial production, health and biodiversity benefits through SDG1 and SDG5. The OWG social targets here focus on drinking water and sanitation; trade-offs arise in the use of water for increased production in other sectors, which are noted here but could in fact be linked to other SDGs.

SDG4: this row addresses the interactions between energy use and environmental impacts, in particular climate change, as discussed in the main text. The OWG provides no climate targets as yet (although part of OWG 14.2 addresses ocean acidification); we therefore retain our GSO target from Table A2, noting that this needs to be in line with the UNFCCC negotiations. OWG 7.2 and 7.3 approximately address the integrative targets that are needed here, but could be more quantitative, as suggested by our preferred wording that draws on [Rogelj et al. \(2013\)](#).

SDG5: this row addresses the trade-offs between meeting global demands for ecosystem services without continuing to increase impacts on biodiversity and ecosystems. In essence the social goal is the sum of meeting demands on ecosystem services for human well-being, and the integrated targets need to provide the means to better value the balance between these services and conservation goals established for a variety of purposes. OWG (2014) divides targets between marine (OWG 14) and terrestrial (OWG 15) ecosystem goals and we provide possible wording here that could be disaggregated again. For the biophysical targets, OWG 14.4 is specific about areas to be protected, but OWG 15 is not; therefore we suggest quantitative targets based on the Aichi targets (<http://www.cbd.int/sp/targets/>). OWG (2014) contains a number of targets that are more integrative, some examples noted here, but omits one on valuing ecosystem services.

SDG6: this row addresses governance – as noted in the main text, it is questionable whether governance is sensibly considered in quite the same way as previous goals, but we show some OWG (2014) targets that plausibly sit in each column. Some of these have both global and sub-global aspects.

**Table A3: Goals with examples of possible biophysical, socio-economic and integrated targets, drawing on the OWG (2014) report where possible (see text**

accompanying this table). Many global targets will need to be applied in a differentiated way at a regional or local scale. Figure 2 in the main text illustrates key examples from this Table, with a focus on those targets, whether biophysical, socio-economic or integrated, that relate to delivering the biophysical ‘planetary must-haves’ or Global Sustainability Objectives (Table A2).

	Global targets		
SDGs	Biophysical	Integrated	Socio-economic
SDG1: Thriving lives and livelihoods (Health)	12.4 by 2020 achieve environmentally sound management of chemicals and all wastes throughout their life cycle in accordance with agreed international frameworks and significantly reduce their release to air, water and soil to minimize their adverse impacts on human health and the environment [cf. GSOs 6, 7]	3.9 by 2030 substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination By 2025 ensure that all households with mother and young children have access to energy sources for cooking and heating that avoid effects on health and free up time for education	3.1 by 2030 reduce the global maternal mortality ratio to less than 70 per 100,000 live births 3.2 by 2030 end preventable deaths of newborns and under-five children
SDG1: Thriving lives and livelihoods (Equitable consumption)	[All GSOs] Ensure that total resource use stays within sustainable limits	8.4 improve progressively through 2030 global resource efficiency in consumption and production, and endeavour to decouple economic growth from environmental degradation [...] 9.4 by 2030 upgrade infrastructure and retrofit industries to make them sustainable, with increased resource use efficiency 12.5 by 2030, substantially reduce waste generation through prevention,	8.5 by 2030 achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value 10.1 by 2030 progressively achieve and sustain income growth of the bottom 40% of the population at a rate higher than the national average

		reduction, recycling, and reuse Achieve a fair distribution of the remaining global budget for emissions of CO2 (estimated at approximately 1000 GtCO2 for a 66 % chance of < 2C); the remaining N and P budgets; and other critical natural resources	10.4 adopt policies especially fiscal, wage, and social protection policies and progressively achieve greater equality 11.1 by 2030, ensure access for all to adequate, safe and affordable housing and basic services, and upgrade slums
SDG1: Thriving lives and livelihoods (Disasters)	[GSOs1,2,3] Avoid levels of global environmental change that exacerbate existing ‘natural’ disasters, which implies safeguarding current biological diversity and ecosystem resilience, and ensuring global emissions of CO2 peak within 5-10 years	11.5 by 2030 significantly reduce the number of deaths and the number of affected people and decrease by y% the economic losses relative to GDP caused by disasters, including water-related disasters, with the focus on protecting the poor and people in vulnerable situations	1.5 by 2030 build the resilience of the poor and those in vulnerable situations, and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters 13.1 strengthen resilience and adaptive capacity to climate related hazards and natural disasters in all countries
SDG 2: Sustainable food security	[GSO5] Keep flux of phosphorous to the ocean at no more than 11 million tons per year. [GSO5] Reduce input of phosphorus via fertilizers to cultivated land to 3.7 million tons per year No additional land conversion in the	[GSO5] Improve full-chain nutrient use efficiency by 20% by 2020 12.3 by 2030 halve per capita global food waste at the retail and consumer level, and reduce food losses along production and supply chains including post-harvest losses [e.g. by 50% by 2030: <a href="#">Lipinski et al. (2013)</a> ] 2.4 by 2030 ensure sustainable food production systems and implement	2.1 by 2030 end hunger and ensure access by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round 2.3 by 2030 double the agricultural productivity and the incomes of smallscale food producers [...] Increase agricultural productivity by x%, with

	<p>tropics [GSO5] Limit input of new reactive nitrogen from industrial and intended biological fixation processes to cultivated land via fertilizers to 44 million tons per year 15.3 by 2020, combat desertification, and restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land-degradation neutral world</p>	<p>resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and that progressively improve land and soil quality Redistribute nutrients (N, P) from areas where they are in excess to areas where they are scarce</p>	<p>a focus on sustainably increasing smallholder yields and access to irrigation [HLP 5c]</p>
<p>SDG3: Sustainable water security</p>	<p>Maintain and restore groundwater aquifers [GSO4] Global consumptive use of water runoff less than 4000km<sup>3</sup>/yr (4) [GSO4] Withdraw no more than 25-50% of the mean monthly flow in any river basin (depending on hydrological regime)</p>	<p>6.4 by 2030, substantially increase water-use efficiency across all sectors...[Suggested: Improve Water Productivity of all food crops to 1000 m<sup>3</sup>/ton by 2030] 6.3 by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling and safe reuse by x% globally</p>	<p>6.1 by 2030, achieve universal and equitable access to safe and affordable drinking water for all 6.2 by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations Enough water for increased production (x%) of food, fibre and industrial products</p>
<p>SDG 4: Universal</p>	<p>[GSO1] Global emissions peak</p>	<p>Decrease carbon intensity by increasing the share of</p>	<p>7.1 by 2030 ensure universal access to</p>

clean energy	2015-2020 and follow an annual reduction of 3–5% p.a. thereafter to be on track to reach 50-80% below 2000 emissions by 2050 14.3 minimize and address the impacts of ocean acidification [...]	renewable energy to x% (e.g., 30%) [OWG 7.2 increase substantially the share of renewable energy in the global energy mix by 2030] Increase energy intensity by y% p.a (e.g., 2.4% p.a.). [OWG7.3 double the global rate of improvement in energy efficiency by 2030]	affordable, reliable, and modern energy services
SDG5: Conservation and sustainable use of biodiversity and ecosystems	15.4 take urgent and significant action to reduce degradation of natural habitat, halt the loss of biodiversity, and by 2020 protect and prevent the extinction of threatened species [GSO2] By 2020, protect at least 17% of terrestrial and 10% of coastal and marine systems by 2020 [GS02] Reduce global extinction rates to no more than 10x the natural background rate [GSO2] Halt habitat loss globally (halve rate by 2020)	[GSO3] Fully cost all social and environmental externalities (greenhouse gas emissions, freshwater usage, pollution and waste) into product prices by 2030 14.6 by 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing [] 15.2 by 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests, and increase afforestation and reforestation by x% globally 15.8 by 2020 introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems, and control or eradicate the priority species	Increase delivery of ecosystem services to meet demands on provisioning, regulating and cultural services
SDG6: Governance for sustainable societies	13.2 integrate climate change measures into national policies, strategies, and planning	Establish qualified majority voting in key international bodies concerned with delivering outcomes relevant to the SDGs ( <a href="#">Biermann et al. 2012</a> )	10.4 adopt policies especially fiscal, wage, and social protection policies and progressively achieve greater equality

13.3 improve [...] human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning 15.2 by 2020, promote the implementation of sustainable management of all types of forests [...]	17.14 enhance policy coherence for sustainable development 6.5 by 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	16.3 promote the rule of law at the national and international levels, and ensure equal access to justice for all 10.6 ensure enhanced representation and voice of developing countries in decision making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions
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#### APPENDIX LITERATURE

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