

# Linking LCA and SDG 6

Goal 6. Ensure availability and sustainable management of water and sanitation for all



Fact-based sustainability



Life Cycle Initiative

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Prepared by: PRé Sustainability  
Mark Goedkoop  
Rosan Harmens

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For thirty years PRé has been at the forefront of life cycle thinking and has built on its knowledge and experience in sustainability metrics and impact assessments to provide state of the art methods, consulting services and software tools. Internationally, leading organizations work with PRé to integrate sustainability into their product development procedures in order to create business growth and business value. PRé has an office in the Netherlands and a global partner network to support large international or multi-client projects.

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Do you have a sustainability challenge for us? We would be happy to discuss it together.

PRé Sustainability B.V.

Stationsplein 121

3818 LE Amersfoort

The Netherlands

T +31 33 455 50 22

E [consultancy@pre-sustainability.com](mailto:consultancy@pre-sustainability.com)

W [pre-sustainability.com](http://pre-sustainability.com)

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# 6 Goal 6. Ensure availability and sustainable management of water and sanitation for all

## 6.1 Introduction

SDG 6 considers water and sanitation. The World Health Organization (WHO) provides the following summary of the current situation in relation to drinking water<sup>1</sup>:

- In 2017, 71% of the global population (5.3 billion people) used a safely managed drinking-water service – that is, one located on premises, available when needed, and free from contamination.
- 90% of the global population (6.8 billion people) used at least a basic service. A basic service is an improved drinking-water source within a round trip of 30 minutes to collect water.
- 785 million people lack even a basic drinking-water service, including 144 million people who are dependent on surface water.
- Globally, at least 2 billion people use a drinking water source contaminated with faeces.
- Contaminated water can transmit diseases such as diarrhoea, cholera, dysentery, typhoid, and polio. Contaminated drinking water is estimated to cause 485 000 diarrhoeal deaths each year.
- By 2025, half of the world's population will be living in water-stressed areas.
- In least developed countries, 22% of health care facilities have no water service, 21% no sanitation service, and 22% no waste management service.

The problem that SDG 6 describes is clearly linked to the situation in developing countries. Point 6 above shows that the availability of water is becoming an increasing problem, especially due to urbanisation.

- The WHO distinguishes some service levels for water accessibility:
- 1.4 billion people with *basic* services, meaning an improved water source located within a round trip of 30 minutes
- 206 million people with limited services, or an improved water source requiring more than 30 minutes to collect water
- 435 million people taking water from unprotected wells and springs
- 144 million people collecting untreated surface water from lakes, ponds, rivers and streams

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<sup>1</sup> <https://www.who.int/news-room/fact-sheets/detail/drinking-water> retrieved in December 2019

The main factor determining the accessibility lies in the time it takes to reach “improved” drinking water services. The costs (related to purchasing power) seem to be a less relevant factor for determining accessibility. According to the WHO/UNICEF Joint monitoring programme, most countries pay only a few percent of their income on drinking water<sup>2</sup>. This is different compared to the situation in SDG 2 (no hunger), where purchasing prices and remuneration are more relevant.

## 6.2 Main elements in the SDG 6

This SDG focusses on the availability and management of water. Except target 6.6, all targets focus on the availability of water for humans, usually referring to water for drinking and sanitation. There is no direct mentioning of satisfying water demand for irrigation and industrial processes, although there is a reference to increasing water-use efficiency across all sectors. Having not enough water for irrigation is referenced to in SDG 2, No hunger

### **Note**

Companies can have different impacts on the SDG. If they are in the business of supplying water delivery systems, they can significantly influence the accessibility of water by vulnerable groups. Companies that use water or source from water using/ water polluting supply chains, can potentially affect the supply side of this SDG, if they (over) consume or pollute water.

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<sup>2</sup> The report is very extensive but the Guardian summarized the most important aspects:  
<https://www.theguardian.com/global-development-professionals-network/2017/mar/17/access-to-drinking-water-world-six-infographics>

## 6.3 Targets and indicators of SDG 6

Table 1. The targets and indicators defined for SDG 6

Target	Indicator
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services
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	6.2.1 Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water
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 substantially increasing recycling and safe reuse globally	6.3.1 Proportion of wastewater safely treated 6.3.2 Proportion of bodies of water with good ambient water quality
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	6.4.1 Change in water-use efficiency over time 6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources
6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	6.5.1 Degree of integrated water resources management implementation (0–100) 6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation

6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies

6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan

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6.b Support and strengthen the participation of local communities in improving water and sanitation management

6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management

## 6.4 Classifying the links between SDG targets and LCA impact categories

### 6.4.1 Target 6.1

*“By 2030, achieve universal and equitable access to safe and affordable drinking water and water for sanitation for all.”*

#### **Environmental LCA:**

The Environmental LCA focusses on factors that address the supply-side, the availability of water in a region, especially in periods of drought

- **Water deprivation:** Captures water use as the relative available water remaining per area in a watershed, after the demand of humans and aquatic ecosystems have been met. It assesses the potential of water deprivation, to either humans or ecosystems, building on the assumption that the less water remaining available per area, the more likely another user will be deprived. The health effects this is causing is captured in SDG 3 (good health and well-being).

- **Climate change:** There is sufficient evidence, e.g. in WHO and IPCC reports and also in Schryver et. al. 2009<sup>3</sup>, that climate change can cause (severe) shortage of water for drinking and sanitation. The health effects this is causing is captured in SDG 3 (healthy lives).

### Social LCA:

Equitable access of drinking water and water for sanitation is, according to the WHO, mainly determined by the distance and time it takes to reach water sources fit for drinking and sanitation, and is less dependent on the cost of such sources, although affordability may play a role, especially if people are dependent on bottled water.

It refers to fair remuneration (PSM 1.2). In PSM this relates to having a living wage plus some form of social security. However this only becomes a problem if water is provided in a way that is not inclusive to poor people, and therefore we only assess this the inclusiveness topic below.

**Small scale entrepreneurs:** this refers to the ability of meeting basic needs (PSM 4.1), but also this aspect we will only deal with in the inclusiveness topic.

- **2.5 Inclusiveness (Users):** for users with a low income it also relates to inclusiveness. In this case inclusiveness can refer to costs, but also efforts to get access to water, for instance a free source of water, that requires a long journey would also not count as an inclusive system. So organisations and companies that are installing systems that provide water that is affordable and within reach to all, could count as a positive contributor, while monopolies and discrimination against minorities can raise the costs to levels that are not affordable.
- **4.3 Empowerment of women (Small-scale entrepreneurs):** although significant this aspect is treated under SDG 5 (gender equality).

## 6.4.2 Target 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.”*

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<sup>3</sup> De Schryver AM, Brakkee KW, Goedkoop M, Huijbregts MAJ. (2009) Characterization factors for global warming in life cycle assessment based on damages to humans and ecosystems. *Environmental Science & Technology*, 43 (6) 1689– 1695



### Environmental LCA:

- **Water deprivation:** Captures water use as the relative available water remaining per area in a watershed, after the demand of humans and aquatic ecosystems have been met. It assesses the potential of water deprivation, to either humans or ecosystems, building on the assumption that the less water remaining available per area, the more likely another user will be deprived. The health effects this is causing is captured in SDG 3 (good health and well-being).
- **Climate change:** There is sufficient evidence, e.g. in WHO and IPCC reports and also in Schryver et. al. 2009<sup>4</sup>, that climate change can cause (severe) shortage of water for drinking and sanitation. The health effects this is causing is captured in SDG 3 (healthy lives).

### Social LCA:

- **Inclusiveness (users)** refers to products and services that are developed to provide access to underprivileged groups. Therefore, this is important for achieving adequate and equitable access to sanitation and hygiene for women and girls in vulnerable situations.

## 6.4.3 Target 6.3

*“Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials.”*

### Environmental LCA:

- **Ecotoxicity, freshwater** covers the negative impact on human health through drinking water with chemical pollution.
- **Eutrophication** of water can in principle also affect the availability of clean water, but the way this is treated in LCIA methods such as ReCiPe, this is not reflected. The issue in the SDG is that vector borne diseases, and high concentration of eutrophying substances that cause high oxygen demand can make water unsuitable for sanitation and drinking water. In Most LCIA methods, the local high levels of oxygen demand (BOD and COD) are not taken into account, and the focus is very much on things like algae growth and disturbances on ecosystems further away from point sources. We could use an LCI indicator as COD or BOD as an indicator that can affect local pollution that limits the availability of water for drinking or sanitation, but this still does not address the related problem caused by vector borne diseases from run-off from animal and human faeces.

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<sup>4</sup> De Schryver AM, Brakkee KW, Goedkoop M, Huijbregts MAJ. (2009) Characterization factors for global warming in life cycle assessment based on damages to humans and ecosystems. *Environmental Science & Technology*, 43 (6) 1689– 1695

Therefore, the overall impact category of eutrophication is used as an approximation of this effect.

#### Social LCA:

- **3.2 Access to Tangible Resources (local communities):** The issues related to vector borne diseases can be linked to the topic 3.2 Access to tangible resources for Local communities
- **Access to resources and input for small-scale entrepreneurs,** if there is clear evidence that the issue of providing toilets and water treatment facilities are included in the provision of such resources by a company or supply chain actor.

### 6.4.4 Target 6.4

*"Substantially increase water-use efficiency."*

#### Environmental LCA:

- **Water deprivation** captures water use as the relative available water remaining per area in a watershed, after the demand of humans and aquatic ecosystems have been met. It assesses the potential of water deprivation, to either humans or ecosystems, building on the assumption that the less water remaining available per area, the more likely another user will be deprived.

#### Social LCA:

- No links are identified.

### 6.4.5 Target 6.5

*"Implement integrated water resources management at all levels, including through transboundary cooperation as appropriate."*

Although this target is especially relevant for governmental organisations, companies that are active in water management and water supply systems can have a positive or negative contribution in reaching this target

#### Environmental LCA:

- No links are identified.

#### Social LCA:

Only companies in the water management and water related technologies sector can provide a very relevant contribution or impact.

- **3.2 Access to Tangible Resources** for local communities. A well designed water management system that includes sewage treatment and reliable water supply system can improve access to drinking water and sanitation, in terms of travel time or costs.
- **3.3 Community engagement:** Developing and managing systems, while actively engaging with local communities can have a very positive impact; whereas organisations

that do not engage, and implement systems without involvement could contribute to unfair and ineffective systems. However, there is no clear evidence that this aspect has a very significant impact.

### 6.4.6 Target 6.6

*“Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.”*

The target mentions water related ecosystems, but clearly recognises the fact that aquatic systems cannot be restored without restoring terrestrial systems (mountains, forests, wetlands etc.

#### **Environmental LCA:**

- **Climate change.** Climate change affects all ecosystems, whether they are water-related or not.
- **Ecotoxicity, freshwater, marine and terrestrial.** Toxicity of water sources directly affects water-related ecosystems.
- **Eutrophication, freshwater, marine and terrestrial.** Eutrophication of water sources directly affects water-related ecosystems.
- **Water deprivation.** A lack of available water directly affects water-related ecosystems.

#### **Social LCA:**

- No links are identified

### 6.4.7 Overview of links

In Figure 1 the overview of the links between LCA impact categories and SDG 6 is shown.

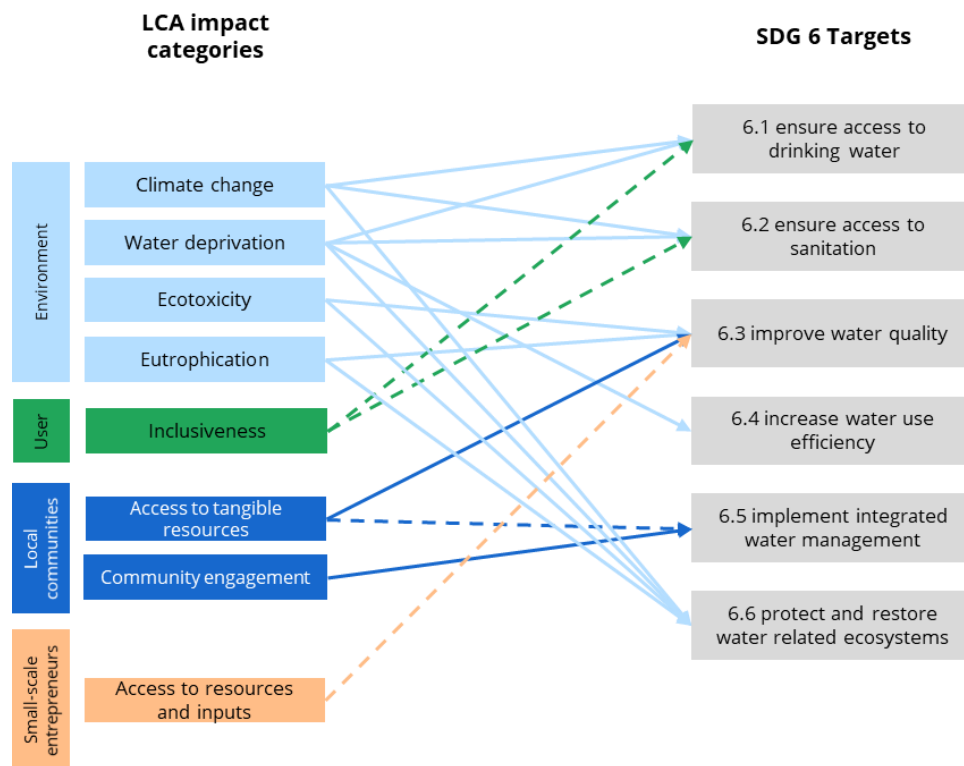


Figure 1 Overview of links between LCA impact categories and SDG targets for SDG 6

## 6.5 Characterizing the relation between LCA and SDG 6

In this paragraph, the nature of the relation between the impact categories and the targets of SDG 6 are defined. This step determines the score needed to qualify as a contribution to a target, per target and impact category. The first section describes how environmental impact category indicator results can be linked; the second section does the same for social metrics.

### 6.5.1 Environmental LCA

LCA impact category	Rationale	Requirements to be counted as a contribution to SDG 2
<b>Climate change</b>	SDG target 6.1, 6.2 and 6.6. Shifting climate zones and precipitation, can be an	<b>+2</b> The environmental impact is a lot lower than the reference product (>10%)

	important threat irregular water supply.	-2	The environmental impact is a lot higher than the reference product (> 10%)
<b>Water deprivation</b>	Target 6.1, 6.2, 6.4 and 6.6 all relate to this topic directly. Increased water deprivation is likely to be a negative contributor to this SDG overall, while reducing it can be a contributor.	+2	The environmental impact is a lot lower than the reference product (>10%)
		-2	The environmental impact is a lot higher than the reference product (> 10%)
<b>Ecotoxicity, freshwater, marine and terrestrial</b>	SDG target 6.3 and 6.6; Eco toxicity covers the negative impact on human health and ecosystems through water with pollution.	+2	The environmental impact is a lot lower than the reference product (>10%)
		-2	The environmental impact is a lot higher than the reference product (> 10%)
<b>Eutrophication</b>	SDG target 6.3 and 6.6; Eutrophication affects the quality of water-related ecosystems	+2	The environmental impact is a lot lower than the reference product (>10%)
		-2	The environmental impact is a lot higher than the reference product (> 10%)

Table 6.2 environmental topic linking to SDG 6

### 6.5.2 Social LCA

Stakeholder	Social topics	Rationale	Requirements to be counted as a contribution to SDG 6
User	2.5 Inclusiveness (user)	Target 6.1 and 6.2 focus on equitable access. Companies and other organisations that design and deliver the water and water services with the	+2 The solution offered by the company is designed and marketed with the clear objective to give the most vulnerable groups in a society access to essential products and services at considerably lower costs than traditional solutions.

	objective to be accessible to even the most vulnerable groups can claim a contribution to this SDG	+1	The solution offered by the company is designed and marketed to give all users access to essential products and services, including some of the vulnerable groups in a society.	
Local communities	3.2 Access to tangible resources	Target 6.3: Companies that directly or indirectly influence water availability to the most vulnerable groups in the local communities can claim a contribution. Companies that extract water at a rate that decreases the water availability have a detrimental impact	+2	The company or facility has a PDCA programme in place to address the local community's access to tangible resources (beyond the requirements set in the local laws). Commitments, performance, improvements and effectiveness of programmes are disclosed publicly.
		Target 6.5 is supported for certain products, if there is clear evidence that the issue of providing toilets and water treatment facilities are included in the provision of such resources by a company or supply chain actor.	+1	The company or facility has a PDCA programme in place to address the local community's access to tangible resources (beyond the requirements set in the local laws).
			-2	Incidents of actual damage, adverse impacts or risks to the community's access to tangible resources have been discovered, but a corrective action plan with a timeline for completion has not been developed.
	3.3 Community Engagement	Target 6.5, Developing and managing systems, while actively engaging with local communities can have a very positive impact; whereas organisations that do not engage, and implement systems without involvement could	+2	The company or facility has continuous dialogues with representatives of the local community and pays special attention to the voice of vulnerable groups, such as indigenous peoples and women.  The company has implemented rules that require it to base decisions on consent of the local community if such decisions have serious implications for the community.

		contribute to unfair and ineffective systems. However, there is no clear evidence that this aspect has a very significant impact.	+1	The company or facility is engaging in a dialogue with the community representatives and incorporates their views into management decisions. There is evidence that the company or facility has taken these inputs seriously and, where appropriate, softened the consequences of the decision.
Small-scale entrepreneurs	4.2 Access to resource and inputs	Target 6.3: if there is clear evidence that the issue of providing toilets and water treatment facilities are included in the provision of such resources by a company or supply chain actor.	+2	Evidence indicated that the offered services and inputs are used by the majority of small-scale entrepreneurs.
			-2	No actions (screening, evaluation, monitoring) have been taken to assess the local conditions and evaluate improvement opportunities  OR circumstantial evidence indicates that small-scale entrepreneurs' access to services or inputs is limited.

Table 6.3: Social topic linking to SDG 6

## 6.6 Scoring matrix for SDG 6

Based on the tables above, the following summary can be made as a checklist for determining if the LCA results can support a contribution to SDG 5.

Based on the tables above, the following summary can be made as a checklist for determining if the LCA results can support a contribution to SDG 6.

SDG 6	Blocking	Contributing
<b>Target 6.1</b>		
Climate change	-2	2
Water deprivation	-2	2
2.5 Inclusiveness*		1 2
<b>Target 6.2</b>		
Climate change	-2	2
Water deprivation	-2	2

2.5 inclusiveness*			1	2
<b>Target 6.3</b>				
Ecotoxicity, freshwater	-2			2
Eutrophication, freshwater	-2			2
3.2 Access to tangible resources	-2		1	2
4.2 Access to services and inputs*	-2			2
<b>Target 6.4</b>				
Water deprivation	-2			2
<b>Target 6.5</b>				
3.2 Access to tangible resources*	-2		1	2
3.3 Community engagement			1	2
<b>Target 6.6</b>				
Climate change	-2			2
Ecotoxicity, freshwater	-2			2
Ecotoxicity, marine	-2			2
Ecotoxicity, terrestrial	-2			2
Eutrophication, freshwater	-2			2
Eutrophication, marine	-2			2
Eutrophication, terrestrial	-2			2
Water deprivation	-2			2

\*link can be established under certain conditions (see section about the related target)

Table 6.4: Scoring matrix for determining whether the LCA results can indeed support SDG 6