Application of the CCQI methodology for assessing the quality of carbon credits

This document presents results from the application of version 3.0 of a methodology, developed by Oeko-Institut, World Wildlife Fund (WWF-US) and Environmental Defense Fund (EDF), for assessing the quality of carbon credits. The methodology is applied by Oeko-Institut with support by Carbon Limits, Greenhouse Gas Management Institute (GHGMI), INFRAS, Stockholm Environment Institute, and individual carbon market experts. This document evaluates one specific criterion or sub-criterion with respect to a specific carbon crediting program, project type, quantification methodology and/or host country, as specified in the below table. Please note that the CCQI website Site terms and Privacy Policy apply with respect to any use of the information provided in this document. Further information on the project and the methodology can be found here: www.carboncreditquality.org

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Sub-criterion:	**6.2: Sustainable development impacts of the project type or project**
Project type:	**Hydropower (dams)**
Date of final assessment:	**12 September 2023**
Score:	**LDCs/SIDS: 1.00** **Other countries: 1.00**

Assessment

Relevant scoring methodology provisions

The methodology assesses the extent to which a specific project or project type contributes to or hinders the achievement of each of the 17 Sustainable Development Goals (SDGs), with the exception of Goal 13 on climate action, which is the primary goal of the climate mitigation projects. To assess the impacts of a project type or individual project on each SDG, the methodology draws on a seven-point ordinal scale for each SDG (see further details in the methodology). The following table illustrates the scale from -3 to +3 points to assess the impact or influence of a project type or individual project on each individual SDG goal:

Impact of the project on the SDG goal	Points
Indivisible: The successful implementation of the project automatically delivers progress on this SDG goal.	+3
Reinforcing: The successful implementation of the project directly makes it easier to make progress on this SDG goal.	+2
Enabling: The successful implementation of the project indirectly creates conditions that enable progress on this SDG goal.	+1
Consistent: There is no significant link between the project and this SDG goal.	±0
Constraining: The successful implementation of the project constrains the options for how to deliver on this SDG goal.	−1
Counteracting: The successful implementation of the project makes it more difficult to make progress on this SDG goal.	−2
Cancelling: The successful implementation of the project automatically leads to a negative impact on this SDG goal.	−3

As an additional step of the evaluation, it is assessed whether the project is implemented in Least Developed Countries or Small Island Developing States, which are recognized to face special circumstances that require additional support. Projects implemented in these countries receive an upgrade of one score point (e.g. from 3 to 4) in the overall evaluation of criterion 6.2. Note that the overall score cannot exceed 5.

Information sources considered

1 SDG Climate Action Nexus Tool (SCAN-tool), sector “electricity and heat”, category “reduce emissions intensity”, mitigation action “renewable energy: large hydro”

2 Moran et al. (2018) – Sustainable hydropower in the 21st century: https://www.pnas.org/doi/full/10.1073/pnas.1809426115

3 Haya and Parekh (2011) – Hydropower in the CDM, examining additionality and criteria for sustainability: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2120862

4 World Commission on Dams (2000) – Dams and Development, a new framework for decision-making: https://archive.internationalrivers.org/sites/default/files/attached-files/world_commission_on_dams_final_report.pdf

5 Soukhaphon et al. (2021) - The Impacts of Hydropower Dams in the Mekong River Basin: A Review: https://www.mdpi.com/2073-4441/13/3/265?type=check_update&version=1

6 International Energy Agency (2022) – Hydroelectricity, a technology deep dive: https://www.iea.org/reports/hydroelectricity

7 Voegeli and Finger (2021) - Disputed dams: Mapping the divergent stakeholder perspectives, expectations, and concerns over hydropower development in Iceland and Switzerland: https://www.sciencedirect.com/science/article/pii/S2214629620304473

8 Walicki et al. (2017) – Case study series dam displacement, dams and internal displacement: https://www.internal-displacement.org/sites/default/files/inline-files/20170411-idmc-intro-dam-case-study.pdf

9 Zeng et al. (2017) - Hydropower versus irrigation - an analysis of global patterns: https://iopscience.iop.org/article/10.1088/1748-9326/aa5f3f

10 Review of descriptions of different individual carbon credit projects

Assessment

The criterion is here assessed at the level of the project type, noting that the actual impacts may differ substantially between individual projects. The assessment thus aims to provide a picture of the typical impacts of the relevant project type. The project type is characterized as follows:

“Installation of a new hydropower plant by building a new dam or adding a plant to an existing reservoir. The electricity is fed into a national or regional electricity grid. The project type reduces emissions by displacing more greenhouse gas intensive electricity generation."

The assessment results are summarized in the below table.

SDG	Points	Justification
Goal 1: No Poverty	-2	Displacement has been a major impact of dam projects and has largely been underestimated. There is also a negative impact on income by impacting agriculture and fisheries downstream (targets 1.1 and 1.5).
Goal 2: Zero Hunger	-2	The project can reduce food security, access and production by negatively impacting (especially) fish biodiversity, irrigation capacities and agricultural soils (target 2.1). Filling of reservoirs can displace people and reduce land available for agriculture depending on the design of the project. Further, dams impact fisheries as dammed up water reduces fish diversity inter alia by hindering fish migration (targets 2.3 and 2.4).
Goal 3: Good Health and Well-being	0	Compared to a baseline of fossil fuel power generation (especially when relying on coal), dammed hydropower can reduce air, soil, and water pollution leading to reduced risks for related illnesses (target 3.9). However, especially in tropical regions, large reservoirs increase the likelihood of vector-borne diseases and the risk of release of toxins through cyanobacteria due to eutrophication. Also, dam projects decrease the water quality of the river and lead to potential health impacts due to pollution and poisoning of food (e.g., bioaccumulation of mercury in fish).
Goal 4: Quality Education	0	No interaction.
Goal 5: Gender Equality	0	No interaction.
Goal 6: Clean Water and Sanitation	-1	Fossil fuel power generation plants require freshwater for cooling and pollute adjacent water bodies through their wastewater (temperature change, harmful particles from combustion or alike). The use of hydropower reduces these impacts (target 6.3 and 6.4). However, there is a potential impact on local communities' abilities to access water resources as large reservoirs created by large hydro projects can substantially increase evaporation of freshwater (targets 6.1 and 6.4) and thus exacerbate water scarcity. Some natural areas are inundated to make space for the water reservoirs and the original route of the river may be changed. Furthermore, dams lead to sediment deposition and interfere with freshwater wildlife. The project type likely constraints the protection/restoration of water-related ecosystems (target 6.6). Large-scale dam projects might also hinder transboundary cooperation on water resources management, as downstream areas/countries are subject to the water flow decisions by country/company owning the dam (target 6.5).

Goal 7: Affordable and Clean Energy	3	As relevant international agencies (e.g. the IEA) define hydropower as a source of renewable energy, projects make a positive contribution towards efforts to substantially increase the share of renewables in the electricity mix (target 7.2). It should be noted that hydropower dams are, however, not emission-free as anaerobic and aerobic decay from flooded forests result in reservoirs emitting significant amounts of (methane) emissions. Construction, land-use (drainage of wetlands) and livelihood changes downstream lead to further CO_2 and methane emissions. Hydropower is more vulnerable to the adverse effects of climate change compared with other sources of renewable energy. Increased frequency and intensity of extreme weather have a high impact on the reliability of hydropower. More frequent droughts and floods will impact availability and flow rate of water and thus the ability of dam projects to provide stable flows of electricity. The contribution of the project type to target 7.1 (universal access to affordable, reliable and modern energy services) is therefore likely limited. As the positive contribution to target 7.2 is considered to outweigh the limited contribution to target 7.1, overall, 3 points are assigned.
Goal 8: Decent Work and Economic Growth	-1	Dam projects create jobs, especially in the construction phase. However, dams negatively affect jobs and livelihoods downstream. Projects in particular impact fisheries and agricultural productivity. Additionally, expansion of hydropower in the electricity mix might come with losing jobs in the fossil fuel sector as the number of plants in that sector will decrease (target 8.5). The project type enables the decoupling of economic growth and energy production from environmental degradation to a larger extent than most fossil alternatives. However, hydropower can still have many negative environmental impacts and does thus not completely enable the decoupling of economic growth and energy production from environmental degradation (target 8.4).
Goal 9: Industry, Innovation and Infrastructure	1	Deployment of dams for hydropower supports the development of sustainable, reliable and resilient infrastructure (target 9.1), sustainable industrialisation (target 9.2) compared to the baseline of fossil fuel energy generation. The project type also contributes to the adoption of clean technologies (target 9.4). However, climate-related reliability risks and negative environmental impacts of large dams limit the extent of the contribution that the project type can make towards this goal.
Goal 10: Reduced Inequality	-2	If not properly consulted and included in project inception and design, poor, vulnerable and marginalized or Indigenous groups are particularly at risk to experience negative impacts due to the implementation of the project type. This especially includes issues such as involuntary displacement or resettlement. In addition, communities often do not benefit from the additional electricity production/access from the dam, exacerbating existing inequalities. Downstream impacts on communities (incl. transboundary impacts) are often neglected or not considered in initial impact assessments or only showing after implementation. Dam projects might damage social identity and culture within a community (e.g. leading to fragmentation of communities around a dam, exacerbating tensions with communities downstream that are negatively affected by the dam, or due to displacement) (targets 10.1, 10.2, 10.3).

Goal 11: Sustainable Cities and Communities	-1	Large hydro projects often involve the flooding of extremely large areas of land. In some cases, this will damage or destroy cultural and historic sites or require their relocation (target 11.4). Dams will be under increasing stress (heavy rainfall, varying sedimentation transport towards reservoirs) due to climate change. Dams thus establish an additional risk for communities downstream for water-related disaster, in case of dam failures or sudden releases of water if a reservoir is in danger of overflowing (target 11.5). However, multi-purpose dams can also deliver water and flood control if designed in that way.
Goal 12: Responsible Consumption and Production	0	No interaction.
Goal 14: Life Below Water	-1	Depending on the (cumulative) size of the dam, the change of sediment and water flow can negatively impact river deltas and thus coastal ecosystems and communities (target 14.2).
Goal 15: Life on Land	-3	The timing, amount, pattern, and temperature of river(-flow) is changed by dams (seasonal hydrological changes might be completely eliminated), leading to changes in sedimentation and freshwater ecology downstream and upstream. This specifically has negative impacts on migratory fish populations. Dams also fragment habitats and can also affect the water cycle through increased evaporation (target 15.1). Particularly if built in mountainous areas, dams and reservoirs disrupt and alter ecosystems, including river and forestry ecology, by negatively impacting biodiversity (target 15.4). Large hydropower can help reduce degradation of natural habitats through reduced air, soil, and water pollution and reduced water consumption, if displacing more polluting or intensive alternatives (target 15.5). However, large hydropower can lead to degradation of natural habitats by inundating natural areas, changing river flows, sedimentation rates and interfering with freshwater wildlife.
Goal 16: Peace and Justice Strong Institutions	0	No interaction – assuming that international standards are followed, the political environment and history of the land and grievances are taken into account. Otherwise, displacement may be accompanied by tensions, violence and conflict which would result in a negative interaction (target 16.1).
Goal 17: Partnerships to achieve the Goal	0	No interaction.
Total points achieved: -9		

The project type receives -9 points in the SDG impact evaluation. Using the scoring approach in the methodology, this results in a score of 1.00. Furthermore, one of the goals is assessed with a score of -3, which according to the methodology automatically leads to a score of 1.00 for criterion 6.2. Due to the automatic assignment of a score of 1.00, there is also no upgrade for implementing this project type in LDCs/SIDS as per the methodology.