

IDENTITY BASED CONSENSUS FRAMEWORK

FOR ISO 14064-2 GHG REPORTING

An introduction paper

Fabian Schwarzbeck & Thorsten Zoerner

STROMDAO GmbH

Abstract

This document provides a framework for Greenhouse Gas (GHG) monitoring as a tool for reporting and continuous auditing. It is not intended to be a full explanation of the validation and verification standards, the related requirements, or implementation regulations. Instead, it aims to promote an understanding of how self-sovereign identities (SSI) could be facilitated in a consensus-based manner to establish a framework. It uses the ISO 14064-2 specification with guidance at the project level for quantification, monitoring, and reporting of greenhouse gas emission reductions or removal enhancements.

Keywords: self-sovereign identities, consensus framework, GHG protocol, ISO 14064-2

GHG STANDARD ISO 14064

The ISO 14064 standard is one of the newest of the ISO 14000 family of International Standards and is aimed at environmental management. The ISO 14064 is divided into three individual parts that act as stand-alone standards or can be combined to meet specific GHG accounting and verification requirements. The ISO 14064 standard provides a framework of standardized principles and approaches for the preparation and production of GHG inventories. This provides governments and industries with an integrated set of accountable and verifiable tools for best practices in quantification and reporting of emissions and emissions reductions. The standard also facilitates the development and implementation of GHG projects, by providing organizations with relevant information on voluntary or mandatory GHG project requirements. The overall aim is to increase consistency and transparency in GHG accounting and reporting by helping to support programs focused on reducing greenhouse gas emissions and emissions trading.

The ISO 14064 Part 2 helps organizations, governments, project proponents, and stakeholders in all aspects of GHG projects or project-based activities. This standard facilitates the monitoring of project baseline scenarios against project performance and ensures all reporting is validated and verified. The standard applies to CDM/JI projects in the context of Kyoto Protocol, CDM/JI projects in the context of emission trading programs (EU ETS), and other GHG projects in the context of emission trading programs in different countries.

GHG REPORTING AND AUDITING PROCESS

Typical auditing begins with the preliminary inspection of relevant documents. These documents must include:

1. Calculation of the CO₂ inventory
2. Documentation report
3. Evidence of data sources used:

the calculation

the secondary data and standard values

the documentation of inspected mathematical errors and discrepancies

the use of data and factors

In so far as assumptions were made, they are evaluated to ensure that they can be logically understood and that, in case of doubt, they are conservative. Any errors or discrepancies that are identified are recorded in a nonconformity report. If the nonconformities are so serious that a certification seems impossible, the certification procedure is broken off.

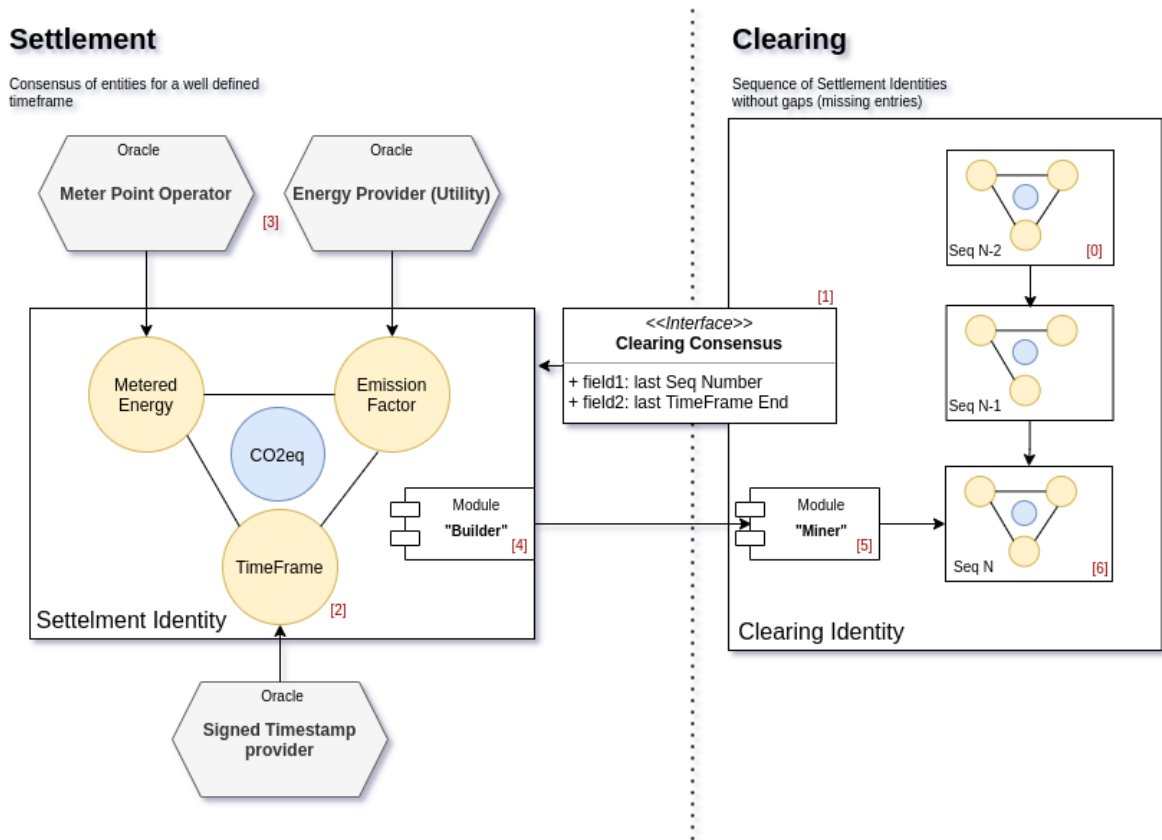
CONSENSUS FRAMEWORK FOR GHG REPORTING

The Consensus Framework for GHG Reporting is a multi-layer concept outlining the shared principles that should guide the conduct of the various tasks required for reporting and auditing. It is designed as a tool for continuous monitoring of the compliance status where

implemented.

The framework itself consists out of two separated and independent consensus frames. One to get a common understanding of settlements and a second frame that is used for clearing and accounting. While the clearing frame is initiated once and keeps consensus once the GHG accounting got started, the settlement frame rebuilds consensus periodically (ex. every day).

Both frames require an independent nature of entities. The nature of settlement entities requires a fixed relation of timeframe, metering data (ex. consumption in timeframe), and factors to calculate co₂eq. The nature of a single clearing entity requires a valid sequence of settlement entities that are immutable as soon as they get part of the sequence. This behavior ensures an ongoing audit and validity.



EVENT FLOW

Figure 1 gives a general overview of the two frames and their relationship. At the beginning, [0] is required that the Clearing Identity is able to provide the last processed settlement entity [1]. This starts a generation of a new settlement entity and defines the starting point and the endpoint (current time) of the timeframe [2]. Using this timeframe, the energy consumption and the corresponding emission factor is required [3] to calculate the CO2 equivalence. Digitally signing all data values of the settlement entity makes it immutable [4] and could be inserted as the newest entry on top of the clearing entity [5][6]. As soon as [6] is

completed, the flow might start again at [1].

ORACLES

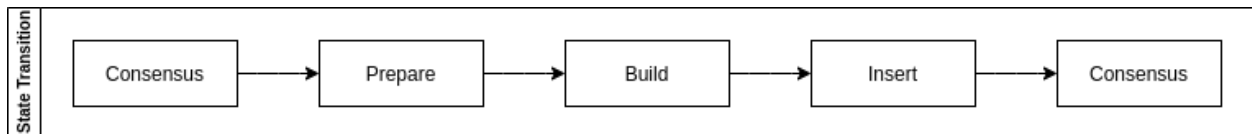
In a consensus framework, an oracle is any device or entity that connects a deterministic entity with trusted external data. The proposed framework for GHG reporting uses three oracle services providing authoritative data during the generation of a new settlement entity:

- I. Meter Point Operator
- II. Energy Provider
- III. Timeservice

It is out of the scope of this document to describe how and why the data of those oracles could be trusted. However, it is important during building a new settlement entity, that all oracles are functioning and accessible by the builder. If this is not the case, the builder will not create a new settlement entity and the event flow needs to start at [0] again at a later point in time.

Mathematical errors and discrepancies keep isolated in the settlement identity, as no new valid entity could be built. Secondary (external) data is a consensus given part of a settlement entity.

STATE TRANSITION - CLEARING



It must be ensured that during any time the clearing entity has a last valid consensus. As the consensus is given by a logical sequence of settlement entities, a state transition needs to be

implemented.

AUTOMATED REPORTING AND DOCUMENTATION

Using the clearing entity, an automated balance of the GHG inventory is available for each inserted new settlement entity. Having a valid report in short timeframes, a contemporary evaluation of tactical decisions is possible. This provides in-depth insights for strategical planning of emission reduction and compensation efforts.

Close to real-time emissions reporting can act as a communications tool within companies, helping to gain sustainable support for emissions management. As the identity bases, consensus provides a forward audit, benefits in terms of reputation and brand value from external parties might be expected.