

Utility Emissions Channel Project

This is an implementation of the audited emissions data channels from the [Operating System for Climate Action](#).

A Demo

Introduction

Let's take a look at a very specific use case: a permissioned Hyperledger Fabric channel where an auditor calculates the emissions of a customer's electricity based on its utility bill. The same pattern could be repeated for other data services (travel, commute, shipping, etc.)

Players

Imagine a network with multiple utilities, emissions auditors, and customers:

- Utility – utility which generates electricity and provides energy use data. The Utility is not part of the blockchain or channel. It provides data with the same authentication process, such as [Green Button](#), as it already does.
- Auditors – trusted third-parties who calculate CO2 emissions from utility energy use and published data sources (see below.) The auditor is like an engineering company and uses specialized software to calculate emissions from data such as utility bills. A group of independent auditors set up the blockchain and maintain it collectively.
- Customers – customers of the utility who used electricity and need to get their CO2 emissions data. Customers also do not have to have blockchain or channel infrastructure. It interacts through the Auditors.
- Orderer Operator - third party entity which operates the orderer. Since the [same organization should not be both peer or orderer](#), a neutral orderer is needed.

Problem Statement

Customer would like to get audited GHG CO2 emissions for the energy it purchased from Utility.

Emissions from energy purchased by a company need to be calculated according to [Greenhouse Gas Protocol Scope 2](#). In [GHG Protocol Scope 2 Guidance](#) (see pages 11 and 26), the emissions for purchased energy should be calculated from utility bills and emission factors, which should be based on local source if available, then grid and finally national level data if more precise data is not available.

In the United States, the [Emissions & Generation Resource Integrated Database \(eGRID\)](#) is a source of audited emissions factors for different utilities and grids.

Interactions - the Use Case

- Customer contacts Auditor to request that its CO2 emissions from its Utility bill be calculated.
- Auditor sends an authorization request for data access from the Utility to the Customer. This could be an emailed link or a paper document, see [Green Button](#) standards.
- Customer grants the authorization request, by clicking on agree or sending back the paper document.
- Utility grants Auditor access to Customer's bill data.
- Auditor downloads Customer bill data from Utility, applies the emissions factors from a published database like the [Emissions & Generation Resource Integrated Database \(eGRID\)](#).
- Auditor publishes the Customer's CO2 emissions on the channel.
- Customer access channel to obtain his calculated CO2 emissions.

Set Up the Channel

The first step is to set up the channel, with the following organizations:

- Auditor 1 - Peer and Certificate Authority
- Auditor 2 - Peer and Certificate Authority
- Operator - Orderer

Later additional parties could be added to support the channel.

Data Stored on Channel

Each time CO2 emissions data is stored on the channel, it will have the following data:

Get Involved

This is an open source project and anyone is welcome to get involved and we will be happy to see you contribute.

1) Start by subscribing to the [Climate SIG mailing list](#) for updates and meeting notifications.

2) Join our bi-monthly Peer Programming Zoom call for developers on Mondays at 9 AM US Pacific time (UTC-07:00 America/Los Angeles.) Please [check the calendar for the next call](#).

3) Check out the [good first issues from our blockchain-carbon-accounting in Hyperledger-labs](#) and feel free to contribute a fix for one that looks interesting to you.

4) See our [How to Contribute](#) page for other ways how you could get involved.

- Data Range
- Utility identifier
- kWh of electricity used
- CO2 emissions in metric tons equivalent
- Format of raw utility bill data – Green Button XML, PDF of bill, CSV, something else?
- Link to raw utility bill data stored on the cloud
- HASH of utility bill data for verification

Store Emissions Data

A micro-service run by the auditor will:

- Get the utility bill for each customer
- Convert the kWh of electricity used to CO2 emissions based on the [Emissions & Generation Resource Integrated Database \(eGRID\)](#) database. This database is stored on the ledger.
- Present its security key to the channel
- Write the CO2 emissions for each customer to the channel as private data for each customer

Get Emissions Data

A micro-service run by the customer will:

- Present its security key to the channel
- Get its CO2 emissions from the channel's private data

Emissions Data are Not Tokens

The emissions data are not tokens and not meant for transactions. The emissions data can be used to create a token which is suitable for transaction as part of the [Emissions Tokens Network Project](#). For example, the emissions data from a full month or several months could be used to create a token. The token may require that the emissions data used covers enough of the time period, and that there are no overlaps of emissions data.

To prevent double counting, we will not allow emissions records for the same utility customer in overlapping date ranges on the channel.

Get Involved

15 Open **0 Closed** Query: [labels=utility-emissions&is:open](#)

- > **integrate trustid into fabric utility emissions channel** 3
fabric mentorship-trustid
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#166 opened Jun 03, 2021 by sichen1234
- > **create generic European utilities for seed data** 4
fabric good-first-issue utility-emissions
#136 opened Apr 02, 2021 by sichen1234
- > **Review of emissionscontract.js** 0
enhancement
fabric utility-emissions
#112 opened Mar 26, 2021 by udosson
- > **test cloud kubernetes deployment of utility emissions channel and update documentation** 0
fabric good-first-issue
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#101 opened Mar 15, 2021 by sichen1234

- > **add oauth 2.0 security to rest api** fabric 8
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#100 opened Mar 15, 2021 by sichen1234
- > **test utility emissions channel and update documentation** fabric good-first-issue 18
mentorship-testing utility-emissions
#98 opened Mar 15, 2021 by sichen1234
- > **get utility emissions channel automated tests working** fabric good-first-issue 1
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#80 opened Feb 16, 2021 by sichen1234
- > **problem storing European emissions data on Mac OS X** fabric utility-emissions 2
#76 opened Feb 10, 2021 by sichen1234
- > **Python is not set error in startApi.sh script** mentorship-testing utility-emissions 2
#71 opened Jan 27, 2021 by sichen1234
- > **electricity emissions data for India** fabric 8
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#54 opened Dec 08, 2020 by sichen1234
- > **Move emissionscontract to separate dir in chaincode** fabric good-first-issue utility-emissions 3
#51 opened Dec 06, 2020 by udosson
- > **Client applications for emissions** utility-emissions 2
#31 opened Nov 11, 2020 by sichen1234
- > **expand utility emissions base data to other regions** fabric utility-emissions 1
#29 opened Nov 11, 2020 by sichen1234
- > **Sign Transactions Offline - fabric-node-sdk** utility-emissions 4
#11 opened Sep 09, 2020 by udosson
- > **Private data for emissions record** fabric 0
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#6 opened Aug 18, 2020 by sichen1234