- Summary -

Introduction to EAC schemes (systems, standards, and markets)

Link to the full report

What are EACs and what are they used for

Energy Attribute Certificates (EACs) are tradable digital certificates that contain factual information of how a specific standard size of energy was generated. These certificates are based on a book-and-claim system which means that certificates are created based upon real and verifiable output whilst the certificates are traded independently from the underlying commodity. This is extremely useful for tracking commodities that are difficult to track physically such as electricity. EAC schemes enable end-users around the world to make reliable claims about their energy usage such as: "my factory runs on 100% renewable energy", "our products are made with 100% wind energy" and "our global electricity usage causes zero end-of-pipe emissions".

Why are EACs useful

Firstly, EAC schemes allow for transparency in the market on who consumes energy from what source or specific power plant. Without a mechanism such as EACs, it would be impossible to link energy production with energy consumption. Secondly, having a robust EAC scheme prevents having multiple claims from being made on the same MWh of energy. Without a clear mechanism in place to make claims, one single MWh can be easily counted multiple times by, for example, claiming the national grid average, claiming based upon power contracts, or claiming based upon geographic proximity to the plant. Thirdly, EAC schemes can accelerate a country's energy transition by putting an additional, marketable value on the production of renewable energy. Such additional value creation can co-exist with governmental stimulus to increase the production of renewable energy, however, it does not necessarily mean that governments should invest less in the generation of renewable energy.

Alternative mechanisms for energy attribute tracking

EAC schemes can be developed and implemented in many ways (we will discuss this in the remainder of this document), but all of them are based on a book-and-claim system, as it would be impossible to make reliable claims without such a system because electricity is not a tangible product that can be boxed and sent from the producer to the consumer. As it stands, a producer injects an electrical charge into the grid in one place and somewhere else, a consumer takes the same amount of charge off the grid; there is no way to track electrons through a grid.

1. What is meant with an EAC scheme

EAC schemes are made up of three core elements:

a) EAC Standards – The rules and regulations which govern the EAC scheme across the whole life cycle of an EAC. Standards are often written independently from national regulations. Standards clarify how stakeholders and market players should use an EAC scheme in ways that adhere to that Standard.

b) EAC Systems – The mechanisms that facilitate a scheme as it organizes the ownership and trade of EACs to ensure that a single user can claim the use of a unique unit of energy. An EAC system is an IT-based system, often called a Registry, that ensures the correct issuance, trade, and redemption of EACs in adherence with the Standard.

c) EAC Markets – The means through which a scheme creates value. EAC markets arise when an EAC product is created based on an accepted and recognised Standard, and a system is in place to organise ownership of that product.

2. Functions of an EAC scheme

Defining the attributes of a unit of energy

EACs convey Attributes, which can be defined as factual, verifiable and auditable characteristics of a unit of electricity production. Examples of attributes are energy technology (e.g., Solar PV), the capacity of the device, and the commissioning date of the device.

Tracking the attribute of a unit of energy

Acknowledging the physical inability to track electrons through a grid, an EAC scheme enables the trade of certificates, conveying factual and verifiable information of the underlying commodity, while remaining independent from the underlying commodity (e.g., electricity). The entity owning the certificate has exclusive ownership of all the attributes this certificate conveys. The ultimate goal of EAC schemes is to have all energy generation, renewable and non-renewable, booked, and all energy consumption claimed through the use of EACs. Such a scheme is called 'full disclosure' and would provide ultimate consumer information.

Providing a reliable way to make claims about energy use

EACs can be traded until the owner of the certificate decides to redeem the certificate, which enables the beneficiary to claim the attributes of the one EAC. The beneficiary is indicated on the redeemed certificate and can be the certificate owner or a different end-user or group of end-users to provide a green tariff. EACs can be purchased through different means such as long-term contracts or one-off trades. The purchase strategy can vary with end-users often combining cost-efficiency and the electricity product of their choice.

3. EAC scheme stakeholders

To fully understand how EAC schemes, made up of Standards, systems and markets function in practice, it is important to understand the key stakeholder groups that are engaged in them. The various groups are discussed, bottom-up, from figure 1.

3.1 End-User / Beneficiary

This term encompasses the smallest household, the largest multinational corporation (MNC), and everything in between. Every end-user can make a claim about where their energy came from as long as an EAC was redeemed by the end-user or through a market player acting on their behalf.

3.2 Market Players

Supply – (Representative) Device Owner

These entities register their devices on the Registry. Once registered, these entities periodically send data to the Issuer indicating their electricity output, and they receive EACs in return. Registered entities will have a financial advantage over unregistered competitors due to the additional income as a result of selling the EACs.

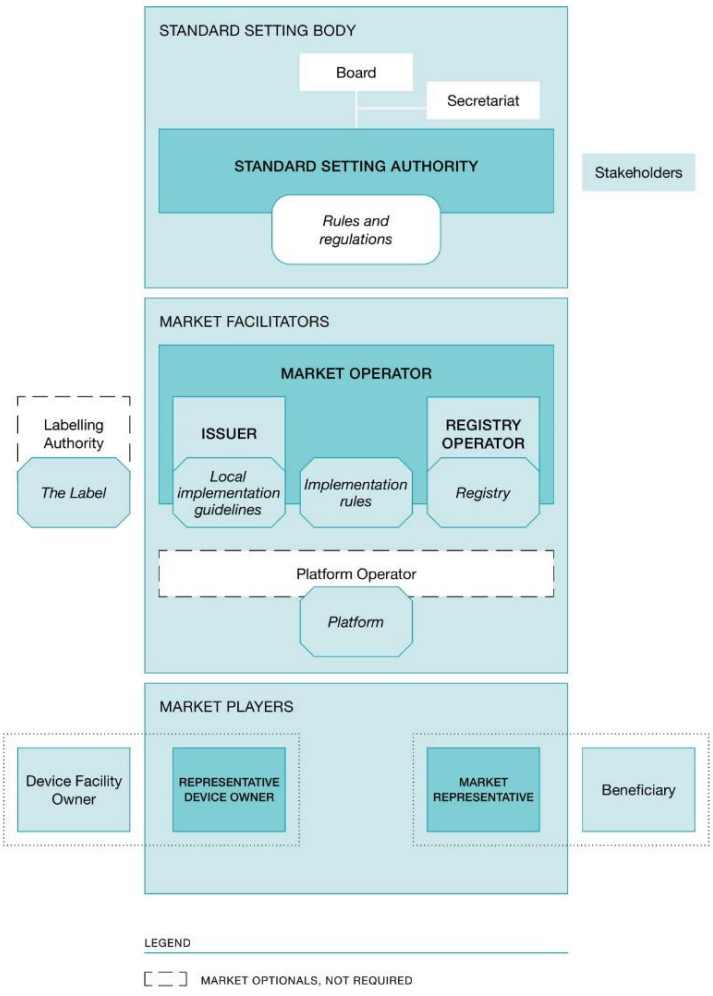

Figure 1 – Organisational overview EAC Scheme Participants

Demand – Market Representative

Some proportion of both end-users and generators will not, and need not, engage in the details of how a given EAC scheme works. Instead, they can use a market representative (also known as suppliers, traders or brokers) to act on their behalf. These third parties have extensive knowledge of how EAC schemes work and can support the trade of EACs between market participants.

3.3 Market Facilitators

Market Operator

A Market Operator is an individual or organisation that ensures there is a functioning market that includes an Issuer, a Registry Operator, and functional implementation of market rules that are published, clear, and adhered to by market players.

Issuer

An Issuer must follow the rules established by the Market Operator and is responsible for the issuance and tracking of EACs. Their role is bound to the geographic area of the scheme for which they are given responsibility. As a facilitator of the market, an Issuer must create a level playing field for all generators and as such, cannot engage in the generation of electricity or the trade of certificates.

Registry Operator

A Registry Operator must follow the rules established by the Market Operator and is responsible for the development and operation of digital or IT infrastructure tasked with providing a primary source of information of the whole lifecycle and ownership of the associated EAC. This system must be shown as an accurate and auditable permanent record of every issued EAC within a scheme, and store the information in perpetuity or in line with national legislation.

3.4 Standard Setting Body

A Standard Setting Body can be a governmental or non-governmental organization that sets out basic principles, definitions, and a general set of rules that all Market Facilitators (3.3) should adhere to when facilitating an EAC scheme. These principles, definitions, and rules can focus on a specific commodity (e.g., electricity) or can be created for the tracking of any commodity whether this is electricity, gaseous fuels, sustainable aviation fuel, metals, or any other commodity. Regardless of the commodity being tracked by the EAC scheme, the same overarching principles can be applied to ensure robustness, accuracy, and the facilitation of reliable claims. The International REC Standard Foundation created and owns the 'International Attribute Tracking Standard' and allows Market Operators (see 3.3) to come up with a set of rules for a specific commodity (e.g., electricity) that adheres to the overarching principles, definitions, and rules of that 'International Attribute Tracking Standard.' Section 4 highlights further information regarding the Standardization of EAC schemes and the importance of such Standardization.

3.5 Public Authorities

Some developed EAC schemes are established within and underpinned by a legal framework. However, while a legal framework can strengthen an EAC scheme by integrating it into the national electricity market, it is not a prerequisite. An EAC scheme can function on a voluntary basis as the life cycle of an EAC can be created and completed through independent entities. State involvement can entail many things such as acknowledging or endorsing an EAC scheme, appointing or becoming a national Issuer, or using the EAC scheme as a tool to achieve policy goals such as the (mandatory) reporting of renewable usage or progress towards renewable targets.

4. International Standardization of EAC schemes

While the European EAC scheme (the Guarantee of Origin or GO) is underpinned by an EU directive, the vast majority of countries within the European Economic Area (EEA) adhere to a non-legal, voluntary EAC Standard. This Standard is owned by the Association of Issuing Bodies (AIB), an umbrella organization of all European GO issuing bodies. The AIB's membership is now made up of issuing bodies from 26 countries in the EEA. The AIB and its members maintain and follow a highly developed GO scheme known as the European Energy Certificate System (EECS).

The EAC scheme in the US is defined in various legislative documents.

Outside of Europe and the US, the International REC Standard Foundation is providing a voluntary Attribute Tracking Standard that is currently (Q1 2021) implemented in 40 countries. While approval or recognition from national authorities has been given to the I-REC Standard in most countries, participation in the scheme is completely voluntary in all countries. Due to the lack of legal footing, the legal basis for the EAC scheme is often contractual rather than regulatory.

4.1 Why Standardize EAC schemes

Facilitates engagement of market participants

Market players are more likely to participate in tried and tested internationally recognized schemes as this saves them a lot of time and financial investments in assessing the robustness of the scheme, the legal implications, and the user-friendliness. Also, internationally recognized schemes are less likely to be subjected to undue influence by powerful market participants in a given jurisdiction. Due to their multi-jurisdictional nature, Standardized EAC schemes have greater liquidity because greater volumes of EACs are available for trade and use between market participants.

Also, standardized schemes can easily be used for reporting under CDP and RE100, and are accepted by the Green House Gas Protocol (GHGP) for Scope 2 reporting, which is beneficial for attracting market participants.

Reduces implementation and management problems for new systems

The principles, definitions, and rules of internationally recognized Standards are a result of over 20 years of interaction between market players, market facilitators, and other stakeholders. As a result, such schemes have eliminated teething problems that are more likely to arise in newly developed schemes. While there is no reason to completely reinvent the wheel of EAC schemes, it is possible for a new national scheme to closely base itself on an international scheme while making some adjustments to reflect national circumstances.

Can reduce or even eliminate costs around implementation

Because EAC Standards have the rules and Registries required for the facilitation of an EAC market, a voluntary market can be implemented based on an existing Standard quickly, easily, and cheaply, without the need for supporting national legislation, time, and money investments. To set up a national compliance market would require some legislation and regulation to clearly define, for example, who must participate in the compliance market, with what objective they must comply, and how their compliance should be verified.

Attracts other stakeholders in the development of more renewables

The benefits of adhering to internationally recognised EAC Standards also accrue to stakeholders who are not market participants. International Non-Governmental Organisations (NGOs) such as labelling organisations benefit from common market rules and processes as this reduces the investment required to analyse an EAC scheme before deciding whether and how to interact with it.

Labelling organisations play an important role in EAC schemes as they promote the use of EACs with their label on it among end-users, which often leads to an additional, general demand for EACs. The approval of a labelling organisation for EACs adds value similar to when products such as wood, are labelled under a scheme such as the Forest Stewardship Council (FSC) or bananas labelled under the Fairtrade Foundation.

4.2 Difficulties of non-standardised schemes

Given the number and variety of national Standards, it is not possible to provide a blanket statement on their quality or robustness. However, the legal framework of non-standardised national systems is often poorly defined or not in line with market player nor end-user expectations. National systems often use the same terms and concepts as internationally recognised standards such as RECs, but frequently, the similarities with standardised systems are limited to the use of the term itself. The functions behind those terms, like an EAC scheme being an information system that facilitates reliable claims about one's energy usage, are often implemented in a way that can lead to unnecessary market restrictions or a lack of clarity on topics such as legal ownerships of EACs or the associated claims for which they should convey.

In addition to market design problems, the IT infrastructure often lacks functionalities that are vital for a robust EAC scheme.