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Webinar: A Path to Solving the Complexity of Fractional RECs : Issuance, Transaction and Retirement.

Questions and Answers

Q. What's the difference between GC and real time RECs retirement? Is there any link?

A. Answered by Toby in webinar

Q. How is the loss of renewable or carbon free energy as a result of charging/discharging a Battery Energy Storage System tracked?

A. Answered in Webinar by Katrien

Q. Is the main aim of fractional recs to include the consumer household market, or simply to increase industrial usage?

A. Rosie answered this in webinar

Q.This seems really relevant to the evidential requirements that exist around grid connected hydrogen electrolysers and the renewable transport fuel obligation development fuels in the UK. Has the benefits of this been communicated to DfT and/or BEIS in the UK?

A. Toby Responsed in the webinar comments as follows: Yes it is very relevant for green hydrogen - several of the largest hydrogen producers in the world are actively involved in energytag and in demonstrators e.g. Air Liquide in Denmark. I have spoken to BEIS in the UK but not DfT. Please feel free to mention us! Is the main aim of fractional recs to include the consumer household market, or simply to increaseindustrial usage?

Q.GO -- "policymakers can decide what to use" Can you provide what options policymakers have?

A. Please reach out to Katrien Verwimp <katrien@aib-net.org> to discuss the tools that policy makers in the EU have to address this issue. In the United States, because the voluntary market is loosely regulated at the federal level (FTC Green Guide) and then subject to various state regulations. However, there is often less prescriptive regulation than in the EU, such as the EU requiring a GoO equal 1 MWh.

Q. Thanks for interesting discussion so far. query jumps to mind -given many power markets are half hourly, is that a potential scale for these certs?

A. Toby - Cera - yes, a lot of members are thinking of matching the time stamp to the delivery period of the local power market - often 30 mins but sometime less. happy to discuss this in the Q&A

Q. If the last fraction isn't purchased, doesn't that make the MW more expensive?

A. If the last fraction is not purchased, it is possible that the full MW may be more expensive. However, if a specific hour or portion of an hour is needed, it could make that hour or fraction of an hour more valuable overall. The market will determine the prices. The owner of a certificate will need to make that decision whether they want to sell thefull MW or a fraction.

Q.Can't you just move from 1 certificate = 1MWh to 1 certificate = 1kWh or even 1Wh, then no need for fractional remainders

A.Yes, that is possible. However, the EAC market—and most physical electricity markets still operate on a standard MWH basis. It does not make sense to deviate from the standard transaction. However, allowing fractional quantities still allows users to transact in those quantities if they wish.

Q. Can RECs from any generator be switched to hourly certificates?

A. In the M-RETS System, we plan to offer this option to any generator. You can see our straw proposal here where we outline the answer in greater detail. It will be opt-in and it requires that the generator owner provide a full month of generation data in consistent intervals. However, there is a current debate in the Energy Tag group about this so it is not settled on how a global standard will handle this.

Q. what entity is responsible for validating the hourly consumption data and ensuring there is actually a 1:1 match with production?

A. That is an evolving area, however, the Energy Tag White Paper defines a Consumption Verification Body as Follows: An organisation responsible over a Consumption Verification Area of checking that Granular Certificates (GCs) are cancelled against the energy consumption measured at one or a group of multiple Consumption Points. This organisation can be a GC Issuer, ora different organisation.

For example, M-RETS offers the ability to retire RECs with hourly data. However, a registry is often different from a certification body. At the time of publication, there wasno mature certification body that would sign off on a 24/7 match.

Q. Open question: Would providing price signals for hourly RECs customers pose burden to market design?

A. No, in fact it is important that there are mechanisms to provide pricing signals to users. M-RETS is working with at least one spot market operator (Power Ledger) that is looking to build a platform that provides hourly REC transaction opportunities. This will be a critical piece of establishing a robust hourly REC market.

Q. Regarding the generation profiles, where would the data come from to determine what it consists of?

A. Right now M-RETs receives hourly data from RTOs. However, M-RETS does provide qualified reporting entities (a/k/a QREs which are third party reporters) to upload hourly data as well as self-reporting generators. All self-reported generation whether it is monthly or hourly includes a clear indication on the certificate that it was self-reported data.

Q. For REC trading, I see the big opportunity is in generating at the hourly levels so the FAANG companies can get their hourly RECs, then for the undesirable hours can then be re-aggregated back to monthly volumes to trade in the current manner. If you don't allow this structure, then generators are having to choose if they are going to commit to selling to FAANG companies, or to everyone else.

A. Please read the straw proposal here on how M-RETS plans to handle this. There is too much risk from a data management and double counting perspective to “re-aggregate” hours

Q. Do not understand why cannot make annual claim. Could you clarify?

A. Rosie answered in webinar. However, this is an area that will evolve, and M-RETS and Energy Tag would like to hear perspectives on whether a REC or GoO that was part of a batch ubject to an hourly claim could be used to make an annual claim.

Q. Are energy losses from point of generation to point of consumption / claim by customer taken into account?

A. Ben answered in webinar

Q. So, hourly retirement would occur during high cost hours and reduce energy cost forcustomers and avoid cost spiking during grid overload?

A. Under the current framework for RECs (note: that there is nothing wrong with continuing the existing REC framework as was emphasized at multiple points in the webinar) there is no connection between the RECs and the generation. Creating the ability to transact (buy/sell/retire) on specific hours may create a market where certain hours have higher or lower values. This could be tied to grid prices or may be wholly separate from actual physical power markets. For example, Company A may have a needfor specific hours where they are short on RECs to meet a 24/7 goal, thus, they may need to go out and purchase those hours and there may be a higher or lower price for thosehours depending on the demand for those specific hours.

www.energytag.org

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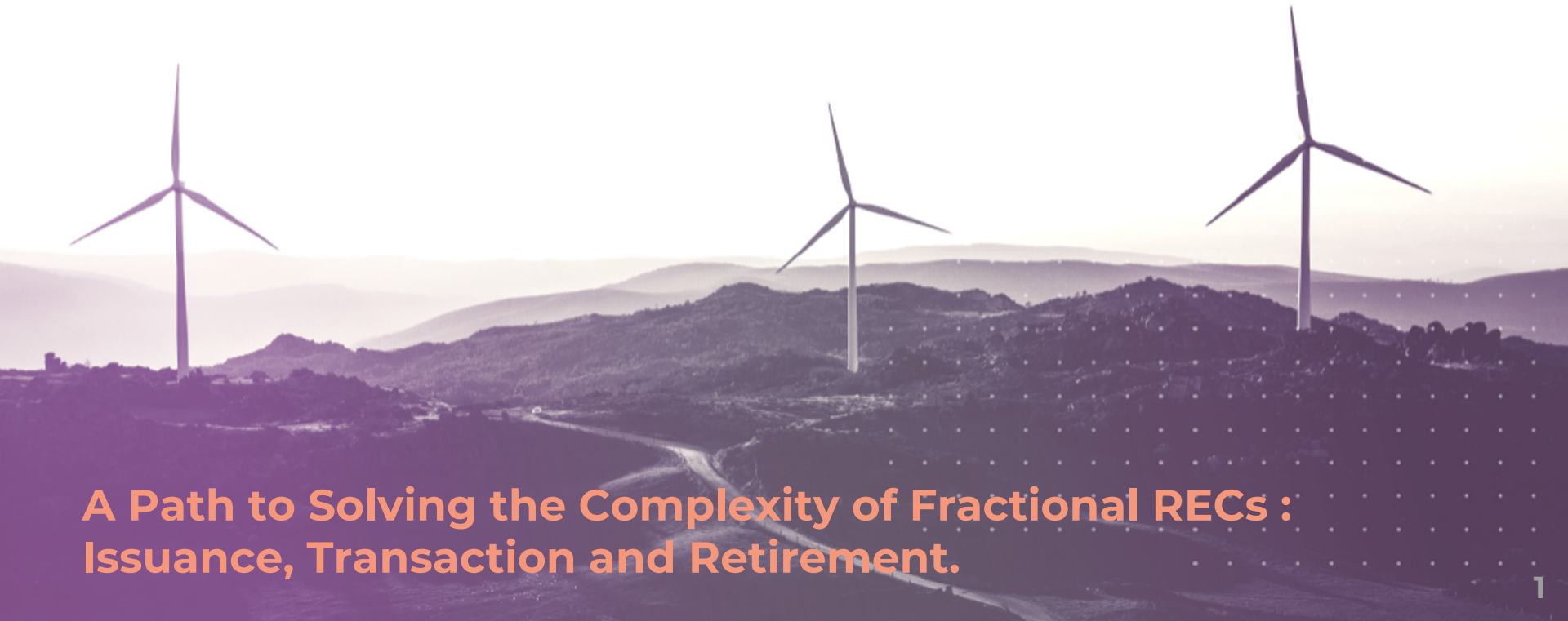
EnergyTag

September 8th



A Path to Solving the Complexity of Fractional RECs : Issuance, Transaction and Retirement.

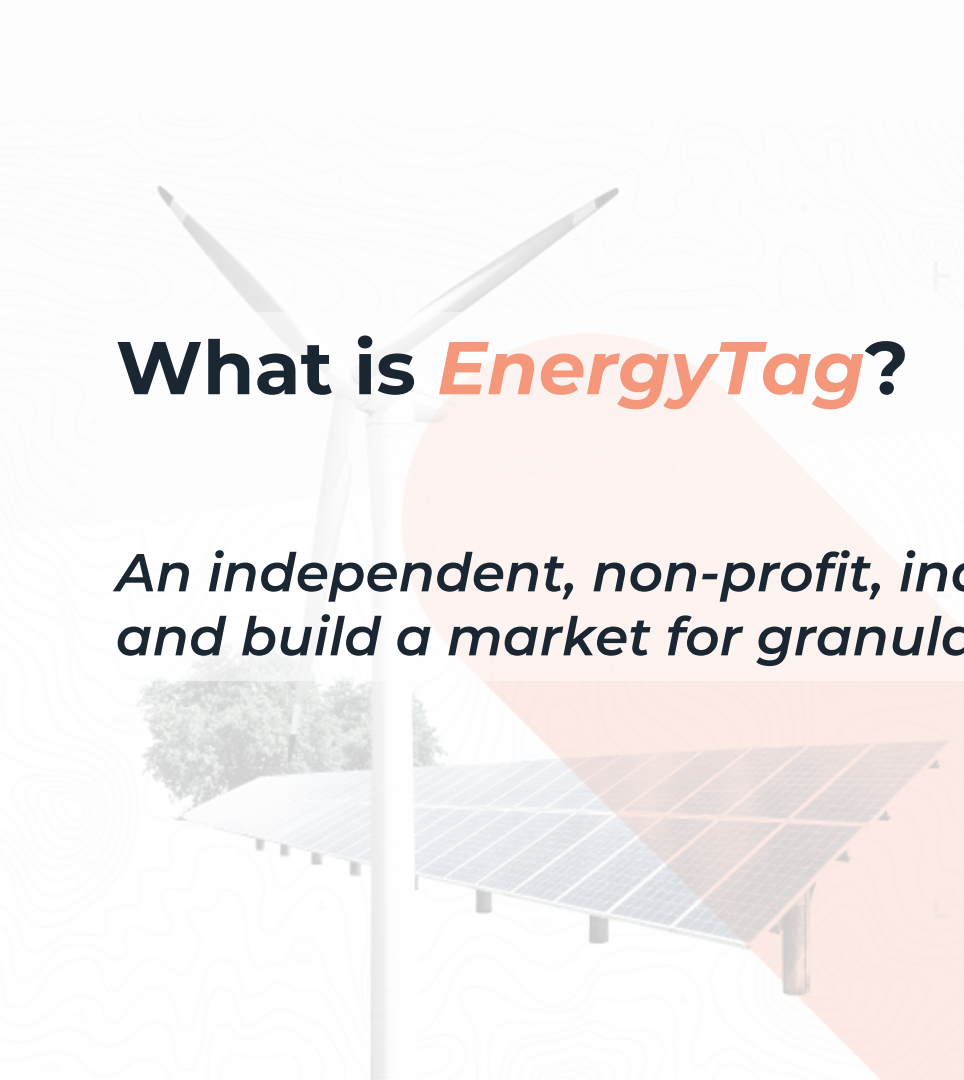
AGENDA

Today's Agenda

1. Toby Ferenczi, EnergyTag - **Introduction to Granular Certificates and Energy Tag**
2. Katrien Verwimp, Coordinator Sector Integration, AIB – **Challenges of integrating granular certificates into the EU framework**
3. Ben Gerber, President & CEO and Rosie Hoyem, Technical Program Manager of M-RETS – **Technical proposal**
4. **Q&A**

What is *EnergyTag*?

An independent, non-profit, industry-led initiative to define and build a market for granular energy certificates.



Why Granular Certificates? In a future of distributed renewable energy, storage and electrification, granular energy certificates provide many benefits;

1.

BUILDS TRUST

by linking actual production to consumption, in real-time

2.

INCREASES ACCESS

For all organisations to join the 24/7 energy movement

3.

SUPPORTS STORAGE AND FLEXIBILITY

by providing a new price signal

4.

ENABLES NEW CARBON ACCOUNTING

standards by tracking hourly carbon data

Activities: Initially, the initiative has three main activities:

1. **Setting guidelines** for hourly time-stamped energy certificates, and guidelines for a voluntary market
2. **Coordination of demonstrator projects** to showcase technology and kick-start market development
3. **Raising awareness** of the importance of hourly accounting in energy

4 active working groups

EnergyTag whitepaper:

Update

Upcoming Events

Event	Details
M-RETS + Energy Tag Webinar	**8th Sep '21 - 16:00 CET, 09:00 Central** ***"A Path to Solving the Complexity of Fractional RECs: Issuance, Transaction and Retirement"*** (Register Here)
Working Groups Meetings	WG1 - Guidelines: **14th Oct '21** (Invite to Follow) WG2 - Use Cases: TBC WG3 - Demoes: **23rd Sep '21** (Invite to Follow) WG4 - Policy: TBC
EPA Webinar ***(added post meet)***	**15 Sep '21 14:00-15:30 ET** ***"EPA Webinar Series: 24/7 Hourly Matching"*** **(Register Here)**
EU SEW	**12th Oct,** Brussels / Online
RE-SOURCE Conference Talk	**14-15th Oct** , Amsterdam, 24/7 Discussion
REC Market Meeting	**30th Nov-1st Dec**, Amsterdam, 24/7 Discussion

WG1 Overview & Mission

- **Mission:** WG1 is to draft and publish the Energy Tag Guidelines in Whitepaper II
  - Drafted by the Core WG1 Team (which has met 3 times during summer)
  - Reviewed by the Extended WG1 Team

- **WG1 Technical Drafting Sub-Group:** The core team is comprised of the following members:
  ***Phil Moody** - Energy Tag (Chair), **Adam White** - RECS, **Ben Gerber** - M-RETs, **Bruno Menu** - Energy Tag, **Emanuele Rossi** - Flexidao, **Jared Braslawsky** - RECs, **Killian Daly** - Energy Tag, **Katrien Verwimp** - Enunda, **Martin Schmidt** - Energinet, **Nicolas Bernhardi** - Energinet, **Remco van Stein Callenfels** - CertiQ, **Rosie Hoyem** - M-RETS, **Simone Accornero** - Flexidao, **Savannah Goodman** - Google, **Taylor Sloane** - AES, **Toby Ferenczi** - EnergyTag*

- **Mandate:** ET shall propose a set of **credible guidelines, rather than a strict standard** - however should be sufficient to **support a voluntary, but real, market for GCs**. The guidelines will;
  - Make it clear the **minimum criteria** for compliance
  - Provide **recommendations** on options that are not requirements
  - Clarify **actions** that will lead to **non-compliance**

- **Extended Team Meeting (i.e Today):**
  - Core team shall present update every 6 weeks for extended team input.
  - All content presented is for comment and review → **so please speak up**

Timeline for Drafting and Publication of 2nd Whitepaper

WG 1 Timeline		Sep '21				Oct '21				Nov '21				Dec '21				Jan '22				Feb '22				Mar '22				Apr '22			
		W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4
Meetings	Core Team	✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓					
	Extended Team	✓					✓								✓									✓					✓				
Draft & Review	Core Team Draft	D1	D1	D1	D1	D1	D1			D2	D2	D2	D2	D2	D2				D3	D3	D3	D3	D3	D3									
	Extended Team Review							R1	R1							R2	R2	R2							R3	R3							
Whitepaper II	Final Review (All)																										FR	FR	FR				
	Publication																													✓			

Next Steps for Extended Group Members

- ➔ Meeting W2 Oct ‘21
- ➔ Help review drafts from mid-october onwards

Topics

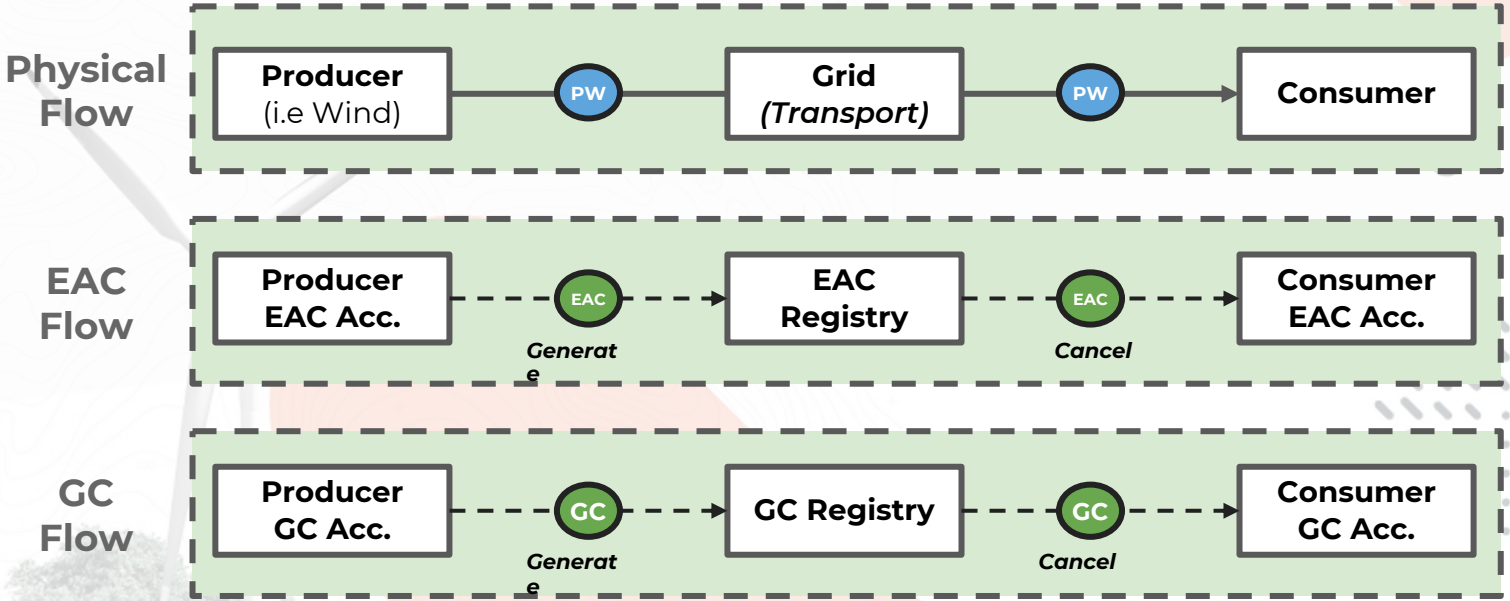
WG1 Issues and Call to Action

ID	Section	Issue	Lead
1.1	**Fundamentals**	Basic purpose of Granular Certificates	P. Moody
1.2	**Fundamentals**	Granular Certificate System Boundaries	TBC
1.3	**Fundamentals**	Relationship between transfer of GCs and physical energy transmission	K. Verwimp
2.1	**Major Issues**	Link/integration with an existing energy attribute certificate (EAC) system	S. Accornero
2.2	**Major Issues**	Transition from existing to proposed GC systems	S. Accornero
2.3	**Major Issues**	Role allocation	T. Ferenczi
2.4	**Major Issues**	Attributes on a granular certificate (GC) (i) Size of GC - fractions etc.	P. Moody
2.5	**Major Issues**	Methodology for determining greenhouse gas (GHG) emissions	K. Daly
2.6	**Major Issues**	Time zones	P. Moody
2.7	**Major Issues**	Metering data	TBC
2.8	**Major Issues**	Prevention of double counting	Katrien
2.9	**Major Issues**	Storage	T. Sloane
2.10	**Major Issues**	Period of validity of a granular certificate	T. Ferenczi

ID	Section	Issue	Lead
3.1	**Other Issues**	Systems architecture	TBC
3.2	**Other Issues**	Consumption matching (=cancellation “timebox”)	K. Verwimp
3.3	**Other Issues**	Fraud detection and prevention	P. Moody
3.4	**Other Issues**	Market design	A. White
3.5	**Other Issues**	Linkage with support systems	TBC
3.6	**Other Issues**	Sector coupling	Killian
3.7	**Other Issues**	Eligibility of energy / onsite demand/production (also known as “self-consumption”)	K. Verwimp
3.8	**Other Issues**	Definition of auxiliaries	K. Verwimp
3.9	**Other Issues**	Residual mix calculation	TBC

Let us know if you want to contribute: phil@energytag.org

How to Link/integration with existing EAC systems



Talking Points

- ➔ Ensure **no Double Counting** between GC/EAC.
- ➔ Ensure **same energy quantity covered by GCs and EAC issued** per production unit.
- ➔ GCs market should be **complementary** to EAC market
- ➔ Q: Should **EAC/GC registries** be operated by the **same operator?**
- ➔ Q: How should **uncancelled GC** be treated? 'Converted' back to EAC?

For more information or to express interest see:
www.energytag.org

Guarantees of origin in Europe

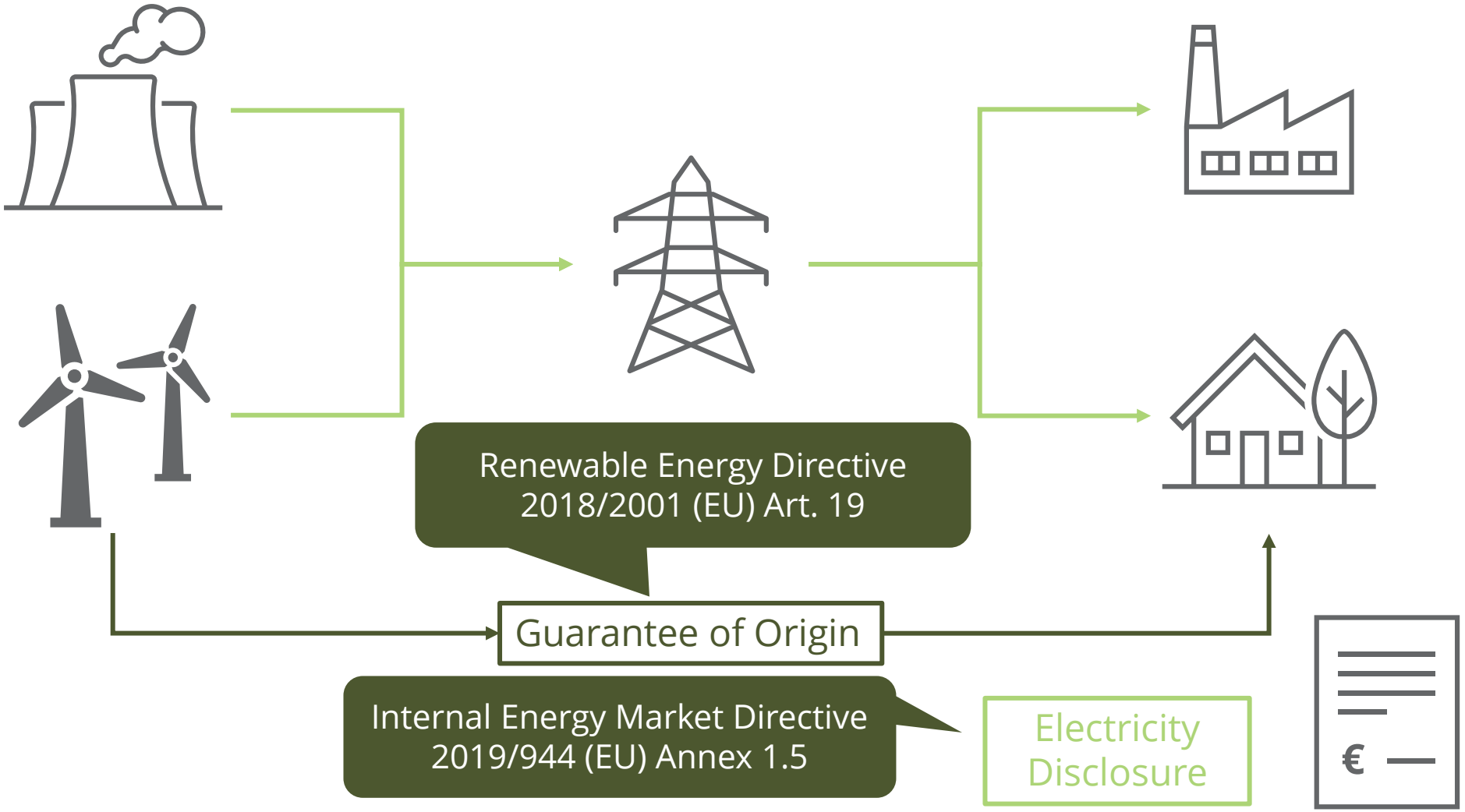
Challenges of moving towards higher temporal granularity

Katrien Verwimp – Coordinator Sector Integration for Energy Certificates

September 8th, 2021

Guarantees of Origin

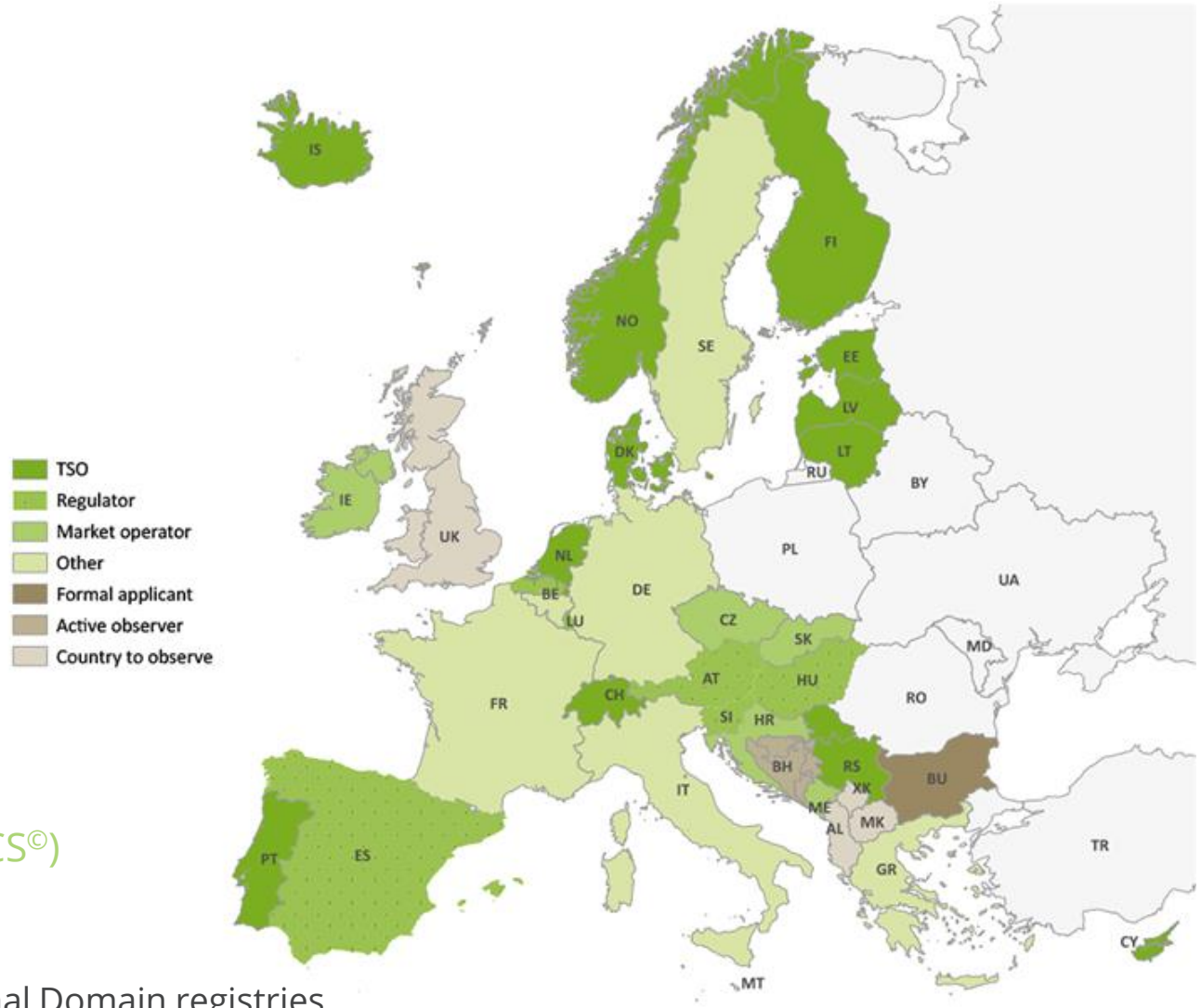
Embedded in EU legislation



AIB and its Member Countries / Regions

The Association of Issuing Bodies - Facts

- AIB: non profit association founded in 2002,
- Now 27 countries connected (31 members)
- Geographical scope: EU - EFTA – Energy Community
- Issuing Bodies are very diverse: regulator, market operator, TSO, ministry, power exchange etc.
- All AIB's current members are issuing bodies for electricity GOs
- About half AIB's members are also competent bodies for the supervision of electricity disclosure
- 7 AIB members assigned by their government for issuing gas GO – more to follow
- Developer and custodian of the EECS© standard



Pillars of the European Energy Certificate System (EECS©)

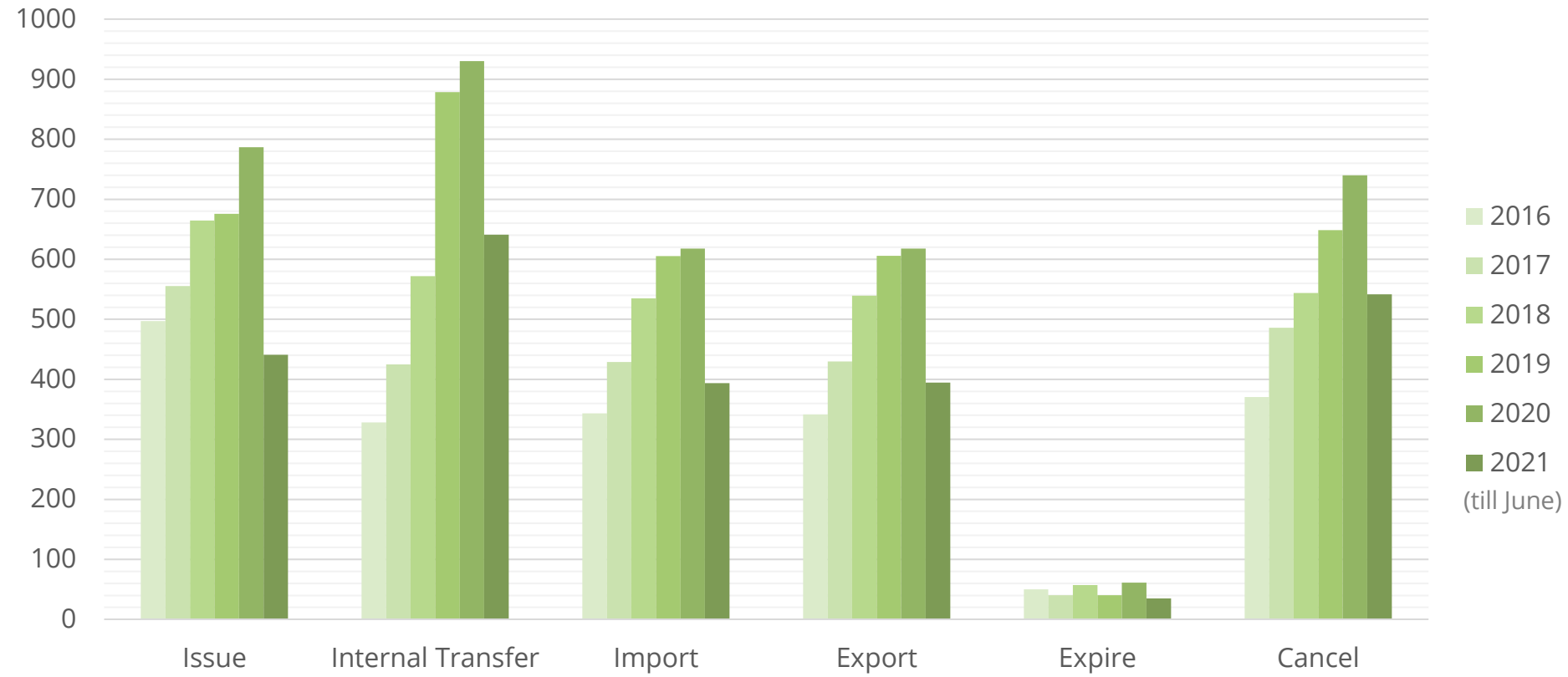
I. **EECS Rules**: engaging into quality and harmonisation
II. **IT hub**: enables GO transfer between national/regional Domain registries
III. Peer reviews and **audits**

www.aib-net.org

Size of the market for electricity GOs

AIB Statistics

Annual EECS transactions by transaction date (TWh)



https://www.aib-net.org/facts/market-information/statistics

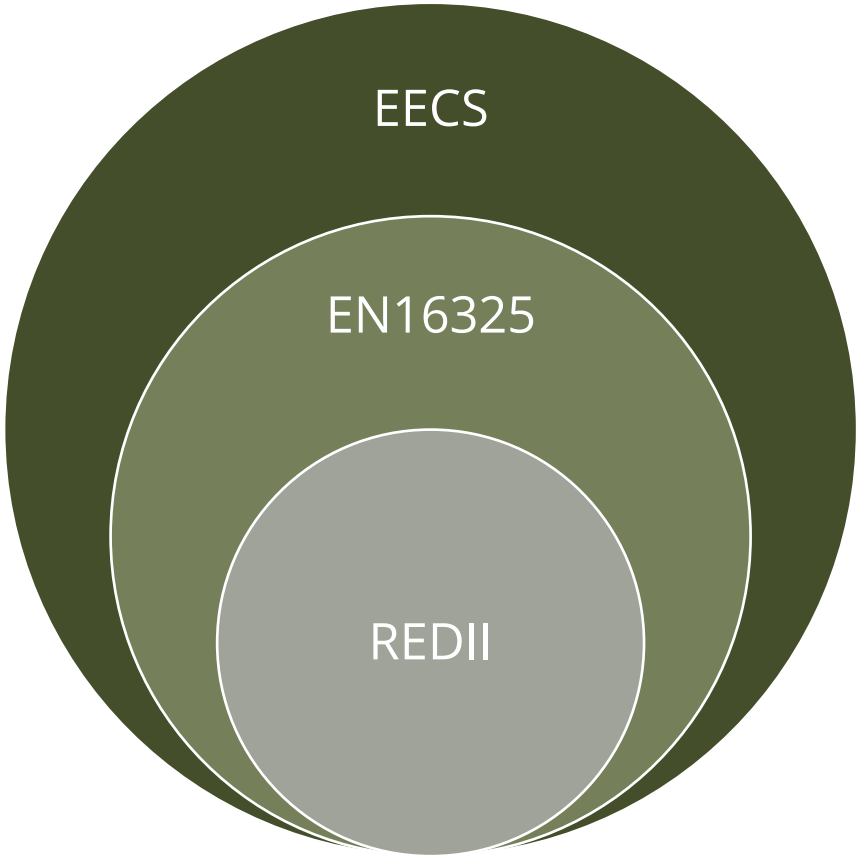
Guarantees of origin

Framework

3. Efficient and reliable GO system – voluntary standard EECS

2. Reliable GO system – mandatory CEN standard

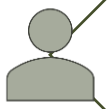
1. GOs are **for disclosure** – EU legislation



Note: EECS Facilitates more certificate products than only Guarantees of Origin

Components to be managed in a reliable GO system

Guarantees of Origin

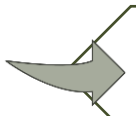


Account Holder Registration

- Prevent access of fraudulent actors
- Ensure rule-compliance contractually

Production Device Registration

- Verify plant data
- Ensure data maintenance and re-verification



GO Issuing

- Base isuing on verified meter readings
- Verify shares of energy origin in multi-fuel pants

GO Transfer

- Secure and electronic transfer independently from the pshyical energy or energy trading
- Immutability and uniqueness of certificate data

GO Cancellation

- GO as the sole instrument to disclose renewable energy to consumers

Disclosure

- Disclosure of the energy origin sold/consumed
- Where applicable, calculation of the residual mix and obligation to use it for untracked energy

Competent Body

www.aib-net.org/EECS

What does a GO look like under EECS™?

Guarantees of Origin

- Energy Medium
- Product
- Unique certificate number
- Production period (start and end dates)
- Energy source
- Type of installation
- Production device info
- Identity and country of originating member
- Issue date
- Identity and country of relevant competent body
- Purpose
- Support received by type
- Independent Criteria Schemes (Labels) *

*Optional field

Data fields Generic certificate

Additional Gas certificate

- Type of Gas
  - *Networking compatible gas, hydrogen, other gas*
- Calorific Value
- Means of Supply – Category
- CO2 Emissions Saved & Produced*
- Sustainability Criteria met?*
  - *Y/N; name Certification Body, reference to report*
- GHG saving criteria met?*
- End-Use of gas category*

*Optional field

! Updating the data field structure is subject to a vote by the AIB members

Challenges and opportunities in relation with moving to granular

- **GOs are fixed to 1MWh by EU legislation**
  - Plausible evolution through EECS data field “Face Value” on the certificate ?
- **Production Periods in EECS are determined by their start date and end date**
  - Plausible evolution through adding start time and end time of a production period
- **GOs are issued in substantial volumes (>600 TWh/y), IT investments have been accordingly**
  - Plausible registry rebuilds are part of a multiple-year workplan
- **Disclosure supervision focussing at avoiding double claims and ensuring reliable claims**
  - Consumption matching on time-basis might involve the national supervisory Competent Bodies for Disclosure

Lessons learnt, to remember for further architecture development

- Cross registry transfers benefit from:
  - Harmonised rules and data format
  - Unique ID per certificate: enables back-tracking, double counting prevention and error-handling
  - Immutability principle
  - Transparent coverage of liability of all parties involved
- Fixed certificate size enables a liquid market
- Transparent information on GOs enables consumer choice

Thanks!

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Upgrading

Moving fast: go alone,

Moving far: go together

M-RETS

A Path to Solving the Complexity of Fractional RECs: Issuance, Transaction, and Retirement

9-8-2021

Rosie Hoyem
Technical Program Manager
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Benjamin L. Gerber
CEO
Ben@mrets.org

M-RETS Renewable Electricity

M-RETS Renewable Thermal

Agenda

- Philosophy
- Fractional Issuance
- Hourly Generation Profile
- Converting Certificates to Hourly
- Hourly Discussion Scenarios
- Granularity and Loss of Significance
- System Imports and Exports

Fully Lifecycle of Granular/Hourly RECs

- Support granular transactions in an hourly market.
- Preserve data integrity across multiple hourly transactions.
- Clearly communicate the nature of certificates to users in the system. Certificates that have undergone an Hourly Transaction should be clearly distinguishable from Standard Certificates.
- Preserve the functioning of existing markets, programs, and integrated systems.
- Provide flexibility when possible, to provide users the ability to simultaneous
- participation in the standard REC market and also conduct hourly transactions.

Fractional Issuance

- Fractional issuance a necessary next step
- Provide for an “opt-in” feature
- If checked, the system will issue the full quantity uploaded including any non-whole certificates. In order to qualify for hourly transactions, a certificate batch must contain a full hourly generation profile for a defined period, currently in M-RETS a full month.
- Fractional Issuance Transition Issue: M-RETS proposes to issue the last fractional quantity with non-hourly data upon the first hourly issuance with the appropriate vintage. This final fractional issuance will be less than one REC and will not have hourly data associated with it. This final fractional issuance will be given the vintage of the last month that was uploaded.

Generation Profile

- The Generation Profile is an hourly data matrix representing the ***proportional generation*** (percentages) submitted and issued for any given period. It is calculated from the original generation data submit for a given generator.
- The Generation Profile is integral to a Certificate in the M-RETS system. The Certificate object is where the immutable attributes are stored, such as vintage and fuel type, and is referenced by any subdivision (Certificate Quantity) of an issuance.
- Standard Certificate – Generation Profile is proportional and constant. This allows for an unlimited number of batch divisions without concern for specific hourly REC composition for a given transactions. M-RETS preserves data of these certificates in the system even if they are never part of a granular transaction.
- On every batch of Certificates in M-RETS (Certificate Quantity), we will also store a proportional Hourly Data Matrix. This is calculated by referencing the quantity on the batch, the total number of certificates originally issued, and the Generation Profile.

Quantity on batch: 50 MWh
Total Issued quantity: 100 MWh
For hour 1, value in Generation Profile: 1%

50 MWh / 100 MWh * 1% = .005 MWh in hour 1

Converting Certificates to “Hourly Certificates”

- M-RETS approaches this with an attempt to provide market flexibility.

- Hourly RECs would undergo a conversation process - M-RETS proposed life cycle would begin with all RECs looking like standard certificates. Certificates would be issued in a single quantity representing the whole quantity of submitted generation for the given period. The difference would be that certificates issued with the complete generation produced in any given period and with attached hourly data would have the potential to be converted to hourly certificates.

- CONVERSION – Certificates with hourly data can be converted to an hourly certificate. The whole batch would become converted.

Conversion Process

- This Conversion process is triggered by the first hourly transaction in which specific hours are split from a batch. This process converts a ***Standard*** or monthly vintage quantity of certificates into a true ***Hourly Certificates***.

- Conversion changes the nature of the Certificates from that moment on. Post conversion, all certificates will contain a clear hourly marker in the UI and all subsequent transactions including transfers and retirements must be hourly transactions.

- **The Conversion process is final. Our proposal at this time is that Hourly Certificates can never be converted back to Standard Certificates and should not be used for an annual claim.**

Conversion Process

- Conversion to hourly certificates can happen during an internal transfer (within the same organization) or external (to another organization).

- New decision point in every transaction flow will give user ability to specify whether a transaction should be an Hourly Transaction. This will trigger the requirement to select specific hours.

- Post Conversion, all transactions with Hourly Certificates must include a step where the user edits—or simply verifies—the hourly quantities to transact.

- **HOURLY CERTIFICATES CANNOT UNDERGO A NON-HOURLY CERTIFICATE FLOW PROCESS**

Hourly Discussion Scenarios

- If a user retires a batch of certificates and only retires select hours, if that same party later sends (i.e., sells) those certificates to another party outside their organization/account, should they have to select the individual hours they want to send? This is important because it means that if a party that does not want to engage in hourly markets acquires a batch of certificates with specific hours removed, that user may now be required to select hours to send to a counterparty to a transaction where pre-hourly transactions, that would never be the case. This is a critical question and requires thinking through how to ensure the system functions well with both hourly and non-hourly transactions.

- Org A has 100 certificates. They retire only the certificates from the hours of 1-5pm, M-F as part of an hourly claim. Org A then sells what is left of the batch, totaling say 50 certificates to Org B. Should Org B be allowed to do a non-hourly retirement with the Hourly Certificates (presumably resulting in a non-hourly claim)?

Granularity & Loss Significance

- M-RETS philosophy is that the parts, or certificate quantities, should always equal the whole, or original certificate issuance.
- Within the M-RETS system for hourly increments, M-RETS will support precision without loss of significance out to 6 decimal places (watt).
- To do this, M-RETS will utilize the full capabilities of our database (Postgres) and track out to 11 decimal places. M-RETS main concern with this strategy is maintaining data integrity, meaning the parts should always equal the whole.

System Imports & Exports

- M-RETS does not see any issue with accepting imports/exports from other systems. However, M-RETS will require that a system attempting to export RECs into M-RETS manages hourly data in a similar methodology, especially as it relates to handling fractional quantities.

- **If rounding and the carry-over of remainders occurred at issuance in the exporting tracking system, imported Certificates will not meet our data integrity rules for hourly data.**


M-RETS
THANK YOU
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Renewable Thermal