# SAF Registry

# System Rules

# Contents




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# 1. About the SAF Registry

The SAF Registry (Registry) is a global, robust, aviation-centric system to transparently account for, record, and report emissions reductions resulting from the use of Sustainable Aviation Fuel (SAF). The Registry is tailored specifically to meet the needs of the SAF value chain, including fuel producers and suppliers, aircraft operators, and airline customers, while providing highest degrees of transparency. It ensures that environmental benefits of SAF can be accurately tracked within the system, and that they can be claimed by airlines and their customers against voluntary and regulatory decarbonization commitments.

In essence, the SAF Registry functions as a chain of custody system, simplifying the administration and accounting of SAF environmental claims while safeguarding the strategic interests of airlines and adhering to the GHG Protocol. Also, the system caters not only to the airlines' needs but also offers flexibility to accommodate the business models and reporting requirements of other stakeholders in the SAF value chain, including producers, suppliers, end customers, and freight forwarders.

This is achieved through two distinct layers: Administration and Central Registry. In these two layers, various users interact based on their role in the SAF value chain.

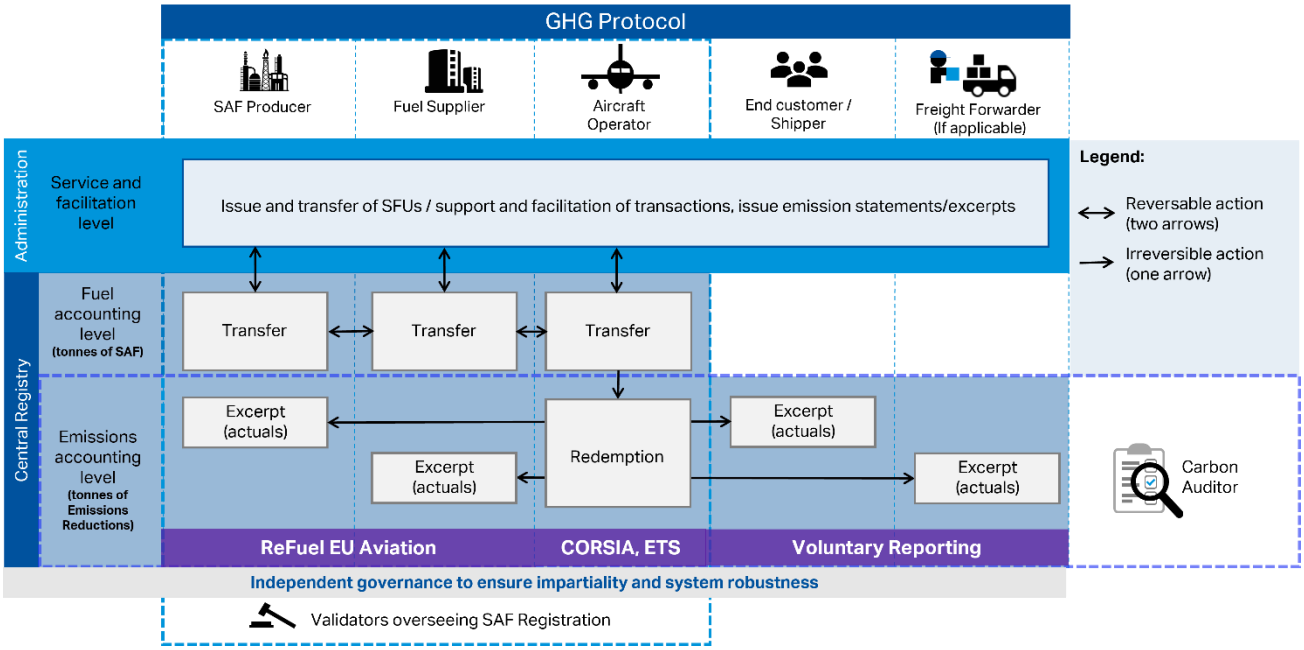


**Figure:** Conceptual overview: system layers (vertical) and system users and functions (horizontal)

1. **The Administration layer**: serves as the facilitation level, offering non-transactional services such as registering and validating SAF batches, issuing SAF Fuel Units (SFUs), executing transfers of SFUs between users, facilitating the redemption of SFUs, onboarding and managing users, and supporting environmental reporting and regulatory compliance related to SAF.

2. **The Central Registry layer:** includes two distinct accounting levels: a flexible (reversible) fuel level and a rigid (irreversible) emissions level.

    - **Fuel accounting level:** manages SFUs in fuel volume units, representing the total potential emissions reductions associated with the amount of SAF. Fuel **P**roducers, Fuel Suppliers, and Aircraft Operators have a transfer function that allows them to transfer SFUs within their inventories. Aircraft Operators additionally have a redemption function, allowing them to irreversibly redeem SFUs to the emission accounting level, creating scope 1 and scope 3 emissions.

- **Emission accounting level:** generates stakeholder-specific emission statements and excerpts based on redeemed SFUs by the Aircraft Operator, providing evidence of emission reductions. Both emission excerpts and statements are facilitated by the administration layer.

In summary, the Central Registry layer serves as the core database for managing the chain of custody of environmental claims. It stores all relevant information for SFUs, including original Proof of Sustainability (PoS), issuances, transfers, and redemptions, which are logged and retained in the system indefinitely as evidence to be provided to authorities implementing regulatory schemes and auditors verifying voluntary carbon reduction claims.

## 1.1 About the System Rules

This System Rules document sets out the rules that govern the Registry, which uses the IATA SAF Accounting and Reporting Methodology (Methodology) as its basis. The Methodology and the Registry's core principles are:

- A level playing field.
- Prevention of double counting.
- Integrity in environmental and reporting claims.
- Transparent, verifiable data.

## 1.2 Key Terminology

| Term | Definition |
|---|---|
| SAF Fuel Unit (SFU) | The working unit of the Registry, corresponding to 1 kg of neat SAF. The Registry enables operations with as little as one hundredth of an SFU (0.01 SFUs, corresponding to 0.01 kg neat SAF). |
| SAFR ID | A unique identifier generated by the system that represents SFUs with identical properties and transaction history. |
| Parent ID | The SAFR ID of SFUs before a transfer or redemption |
| Emissions Reductions Formula | A formula used to calculate the GHG emission reductions associated with SAF use. |
| Company Role | The type of account that a company can gain access to. The Primary Company Role should be reflective of the actual operations of the company. |
| Inventory | A series of tables that organize all SFUs currently or previously held by a user. |
| Logbook | A table with information on all the different actions conducted by a user of a given organization. |
| Registration | The process of registering SAF batches in the Registry. A Fuel Producer, Fuel Supplier, or an Aircraft Operator can register a SAF batch in the Registry. The sustainability documentation is then surrendered to the Registry and can no longer be passed on. |
| Point of no return | The final destination of a SAF batch, e.g., an airport's fuel farm. The duty point may also be considered the point of no return, depending on the specific requirements within the jurisdiction. The point of blending is not considered the point of no return unless it is at or after the duty point within the applicable jurisdiction. |
| Registrant | The party that registers the pertinent SAF batch. |

| | |
|---|---|
| Proof of Sustainability (PoS) | The sustainability documentation issued for a batch of SAF by a certified-entity under a recognized sustainability certification scheme. It confirms the batch's sustainability properties and compliance with recognized sustainability standards. |
| Proof of Compliance (PoC) | The sustainability documentation issued for a batch of SAF by a certified entity under a recognized sustainability certification scheme. It includes the same data points as the PoS and is only issued in case the PoS is surrendered toward an incentive or regulatory scheme. |
| Validation | The process of ensuring that a SAF batch registration is valid. Once validated, the system issues SFUs for the corresponding amount of SAF, which can then be held, transferred, or redeemed. |
| Validator | The party that is responsible for validating SAF batches as they are being registered into the system. |
| Transfer | A change of ownership of SFUs among Fuel Producers, Fuel Suppliers, and Aircraft Operators. |
| Sender | The party that initiated the transfer of the SFUs. |
| Recipient | The party that received the transfer of the SFUs. |
| Redemption | The action of virtual fuel consumption that converts SFUs into emissions reductions in the Registry. Scope 1 and Scope 3 emissions reductions are generated at the time of redemption. The redemption process cannot be reversed/undone. |
| Emissions Statement | A document that summarizes the redemption of SFUs with a single SAFR ID and associated allocation of Scope 3 attributes. |

## 1.3 Emissions Reduction Formulas

There are four emissions reductions formulas used in the SAF Registry.

The two first formulas refer to the formulas available in the Methodology.

- **CAF well-to-wake (WTW) emissions factor**: The default value of fuel is 3.84kg CO2e/kg
- **CAF tank-to-wake (TTW) emissions factor**: The default value follows ICAO's fuel conversion factor under the CORSIA scheme, equal to 3.16 kg CO2/kg fuel for Jet-A fuel, Jet-A1 fuel, TS-1 fuel, or No. 3 Jet fuel, and 3.10 kg CO2/kg fuel for AvGas or Jet-B fuel. These values are also aligned with the values used under the EU ETS scheme and the ISO 14083, but in case of any disagreement, the official CORSIA values in force prevail.

The latter two are observed in the market. These are also enabled by SAF Registry to accommodate user preferences and regulations in specific jurisdictions.

The TTW formula is not available for selection during the transfer or redemption process. Instead, it is always shown as a reference in the transfer and redemption screens and can be chosen as a column in the inventory.

### IATA WTW (kg of $CO_2e$):

$$3.84\ \left[\frac{kgCO_2e}{kg}\right] \times Amount\ of\ Neat\ SAF\ [kg] \times \left(1 - \frac{Total\ LCA_{SAF}\ \left[\frac{gCO_2e}{MJ}\right]}{89\ \left[\frac{gCO_2e}{MJ}\right]}\right)$$

IATA TTW (kg of $CO_2$):

$$3.16\left[\frac{kgCO_2}{kg}\right] \times Amount\ of\ Neat\ SAF\ [kg] \times \left(1 - \frac{Total\ LCA_{SAF}\left[\frac{gCO_2e}{MJ}\right]}{89\left[\frac{gCO_2e}{MJ}\right]}\right)$$

Formula 3 (kg of $CO_2e$):

$$\frac{Neat\ SAF\ Energy\ Contnet\ [MJ] \times 89\left[\frac{gCO_2e}{MJ}\right] \times LCA_{SAF}\ Reductions\ [\%]}{1000},\ where\ LCA_{SAF}\ Reductions\ [\%] = 1 - \frac{Total\ LCA_{SAF}\left[\frac{gCO_2e}{MJ}\right]}{89\left[\frac{gCO_2e}{MJ}\right]}$$

Formula 4 (kg of $CO_2e$)

$$\frac{Neat\ SAF\ Energy\ Contnet\ [MJ] \times 94\left[\frac{gCO_2e}{MJ}\right] \times LCA_{SAF}\ Reductions\ [\%]}{1000},\ where\ LCA_{SAF}\ Reductions\ [\%] = 1 - \frac{Total\ LCA_{SAF}\left[\frac{gCO_2e}{MJ}\right]}{94\left[\frac{gCO_2e}{MJ}\right]}$$

## 1.4 Pricing

The Registry will be offered free of charge for the first two years following its launch. This initiative aims to reduce the administrative costs associated with SAF and the use of registries.

After the initial two-year period, a fee structure will be introduced. The Registry will then operate on a cost-recovery basis, ensuring that the fees collected are used solely to cover the operational costs of maintaining the Registry. In case users do not agree to the newly introduced fee structure, they can deactivate their accounts free of charge within the given time.

# 2. Functional Units

SAF Fuel Unit (SFU) is the working unit of the Registry and represents 1 kg of neat SAF fuel and the corresponding SAF environmental attributes. The smallest unit that can be transacted in the system is 0.01 kg of SAF (i.e. 10g).

The Registry allows SAF registration, display, and transactions in tonnes, kg, litres, m3/15 deg, US gallons and US tons (registration only). However, the system will always convert the SAF amount to kg on the backend, which determines the exact amount of SFUs that the user owns, can register, hold, transact and claim. This conversion to kg may require rounding because the smallest unit in the system is 10 g. There are two main rounding principles, one applies to rounding following the registration of SAF into the system and the other applies to the transfer and redemption of SFUs within the system:

1. Following the registration of SAF into the Registry, the SAF batch amount on the PoS will be always converted to kg on the backend and rounded **down** to the nearest 10 grams. The system will then use this kg number to convert to the other available units in the registry, including conversion to the original unit provided. As a result of the conversions and the rounding, the registrant may hold up to 10 grams less of SAF after the SAF registration is completed.

2. During a transaction (transfer, redemption) of SFUs, the user would indicate the amount of SFUs they would like to transact. The system will always convert the indicated amount to kg first and round **up** to the nearest 10g. Following that, the system will convert the amount in kg back to the indicated unit. As a result of the conversions, the user may transact up to 10 grams of SAF more than initially indicated.

The logic of rounding of SAF at registration and during transactions is based on a conservative approach that the users should never register, hold, or transact more emissions reductions than they own.

Registrants are responsible for confirming the density of the fuel. If the registrant does not have information related to the density of the fuel, the system allows the use of the default density of 0.77 kg/l as per the Methodology. Alternatively, they can input the density value of the pertinent SAF batch provided that they provide documentation proving the accuracy of the actual density value used.

Conversions of units in the system:

- **x** US gallons to liters: **x** * 3.78541 l/gal [1]
- **x** liters to kg: **x** * 0.77 kg/l (or actual value as indicated)
- **x** $m^3$ in 15 degrees Celsius to liters: **x** * 1000 l/$m^3$ at 15°C
- **x** metric tonnes to kg: **x** * 1000 kg/MT
- x US tons to kg: x *907.18474 kg/tn

## 3. Company Roles and User Permissions

All individuals are required to onboard to the Registry and follow a registration process to become a user, and before being able to access the information and system functionalities of the Registry, as noted in 1. Registration in the SAF Registry Terms and Conditions.

Following the onboarding of the first user and essentially the creation of a new company in the Registry, the system generates a unique ID for the company. Each company is given an ID based on its company role. The ID consists of a 2-letter abbreviation of the company role followed by a 10-digit number.

The Company ID as well as company name and address can be used to identify the correct entity during a transaction.

| Company Role | Company ID |
|---|---|
| Fuel Producer | FP-########## |
| Fuel Supplier | FS-########## |
| Aircraft Operator | AO-########## |
| Freight Forwarder | FF-########## |
| End Customer | EC-########## |

### 3.1 Company Roles

Each company will have one primary role that most accurately reflects the operations of the company. When the company makes an onboarding request, it shall request one of the following roles with reasoning as to why the company is best suited for the requested role.

Below are the key actions that the corresponding company role can take.

| | Register SAF | Hold SFUs | Transfer SFUs | Redeem SFUs | Access emission statements/ excerpts |
|---|---|---|---|---|---|
| **Fuel Producer (FP)** | X | X | X | | X |
| **Fuel Supplier (FS)** | X | X | X | | X |
| **Aircraft Operator (AO)** | X | X | X | X | X |
| **Freight Forwarder (FF)** | | | | | X |
| **End Customer (EC)** | | | | | X |

[1] AFSMA ed 5.1 July 2023

A company account may be subject to additional compliance checks. They shall comply with the request to provide any necessary documentation which may be one of the following:

- Copy of the Certificate of Incorporation (COI) or Certificate of Registration (COR)
- Ownership structure that details the 100% ownership
- A Certificate of Incorporation, Certificate of Registration, or the ownership structure of one or more of entity owners identified in the initial ownership structure
- A copy of the passport identity page or national identification document of an owner/directors identified in the ownership structure or within the board of directors.

The documents must be translated to English by a certified translator.

## 3.2 User Permissions

There are three main types of users on the Registry. The user permissions are given to a user at the time of onboarding and can be edited later via User Management.

| | Manage Users | Register SAF | Transfer SFUs | Redeem SFUs | View Inventory | View Logbook | Access emission statements/ excerpts |
|---|---|---|---|---|---|---|---|
| **Company Representative** | X | X | X | X | X | X | X |
| **User** | | X | X | X | X | X | X |
| **Read-only** | | | | | X | X | X |

### 3.2.1 Company Representative

The Company Representative is responsible for managing their users within the organization and can access all functionalities available to the organization. Please refer to the functionalities available to each organization in 3.1 Company Roles.

There can be one or more Company Representatives per organization. The first user of a given organization will be automatically assigned to be the Company Representative. The company representative will approve any new users thereafter within the same organization.

Each organization should, at all times, have at least one Company Representative. In the case an organization does not have an active Company Representative, users must request access as if they are the first user of the company.

### 3.2.2 User

The user can access all functionalities available to the organization including initiating actions (registration, transfer, and redemption). They cannot access the user management functionality.

### 3.2.3 Read-only

A read-only user can view the company's inventory and logs but cannot perform any actions. They may also access emission statements/excerpts.

## 3.3 Deactivation of a Company

The Registry Administrator may deactivate all users of a given company, essentially deactivating the company, if either of conditions below is satisfied:

1. The company violates the Terms and Conditions
2. The company fails to accept the newest version of the Terms and Conditions
3. The account is suspected to be fraudulent or used for serious crimes
4. The company holds no active volumes and wishes to deactivate their account

The Registry Administrator can reactivate all users of a company in case the reasons for blocking are resolved.

# 4. Key Functionalities

## 4.1 Register, Validate, and Issue SAF Fuel Units

Fuel Producer, Fuel Supplier, and Aircraft Operator users can access the “Registration” functionality, which is the inputting of SAF fuel details in the system. Once the details of the SAF is successfully validated by the Validator, the environmental attributes are decoupled from the physical molecules of the SAF Batch and SFUs are issued.

### 4.1.1 Register

A Fuel Producer, Fuel Supplier, and Aircraft Operator can register SAF upon meeting two conditions; 1) the registrant is certified under a recognized scheme or can prove ownership of the SAF batch and/or its environmental attributes and 2) the SAF batch reached its final destination (point of no return); has been introduced into an airport’s fuel farm or passed a duty point (depending on the specific regulations within the jurisdiction).

Only Fuel Producers or Fuel Suppliers certified under a recognized scheme can generate and register the PoS of the SAF batch that belongs to them in the Registry. The validator must verify the registrant's eligibility through public registries of certification bodies or by requesting the certification document from the registrant.

Aircraft Operators can register a SAF batch without certification themselves. However, their PoS provider must be certified, and the PoS should list the Aircraft Operator as a recipient. Additionally, the Aircraft Operator should provide an invoice or other proof of ownership of the batch along with the PoS.

The proof of delivery or PoS/PoC should verify that the SAF batch has reached the point of no return.

The PoS documentation is surrendered to the system at this point, and any PoS/PoC associated with it can no longer be issued unless it does not meet the validation criteria and is returned to the registrant.

**The user is responsible for reviewing and inputting all required information at the registration, to ensure accuracy and use under regulatory schemes.** All submitted information must be supported by documentation so it can be validated by the Validator.

### 4.1.2 Validate

The Validator reviews the registered content of the SAF Batch and its supporting documentation following the Validator’s Rulebook. The Validator may accept or return the pending SFUs for the registrant to edit until it meets the validation criteria.

If the Validator suspects the pending SFUs to be invalid according to the Validation Rulebook criteria, the validation will then be 'declined'. Once a validation is 'declined', the PoS can be used again by the registrant to resubmit after taking the necessary corrective actions.

### 4.1.3 Issuance of SAF Fuel Units

Upon successful registration, SFUs are issued, and the registrant can transact (transfer and redeem) the SFUs. SFUs cannot be issued until 14 days after the date of delivery, the date the SAF was delivered to a point of no return. After 14 days, it can be assumed that the physical fuel has been burnt and used for aviation. If the 14-day period has not been met, the SFUs will be put on an “On hold” status. The SFUs will be made available with the status “Active” for transactions once 14 days after the date of delivery have passed.

## 4.2 Transfer and Accept

A Fuel Producer, Fuel Supplier, and Aircraft Operator can transfer and accept SFUs among one another.

Transfers are done at the reversible “fuel accounting level,” and the SFUs containing both the Scope 1 and Scope 3 emissions reductions are transferred at the same time.

### 4.2.1 Initiate a Transfer

The holder of active SFUs can transfer to another company by designating the volume and recipient company. If only a Fuel Producer, Fuel Supplier, or Aircraft Operator is designated, i.e., a Scope 3 recipient is not designated, the corresponding amounts of SFUs, representing both the Scope 1 and Scope 3 emissions reductions will be transferred to the recipient.

When a Fuel Producer or Fuel Supplier initiates a transfer to an Aircraft Operator, the sender can choose to allocate an End Customer (and Freight Forwarder) as its Scope 3 recipient(s). The Freight Forwarder can only be allocated with the End Customer if the Freight Forwarder facilitated the service for which they are responsible for the same Scope 3 as the End Customer. The sender can also block the Aircraft Operator from claiming Scope 1 for regulatory purposes, to fulfil a contractual obligation with the Scope 3 recipient and in agreement with the Aircraft Operator

### 4.2.2 Accept a Transfer

The recipient must accept the transfer within 14 days of initiation. If the recipient does not accept within that period, the transfer is automatically cancelled and the amount pending transfer returns to the sender’s inventory. The same happens when a transfer is declined. When accepted, the SFUs become “active” in the recipient’s inventory, allowing them to further transfer or redeem that SFU.

When a Fuel Producer or Fuel Supplier predetermines a Scope 3 allocation in the transfer to an Aircraft Operator, the transfer acceptance by the Aircraft Operator initiates a simultaneous redemption. In the redemption process, Scope 1 emissions reductions are allocated to the recipient Aircraft Operator, and Scope 3 emissions reductions are allocated to the specified End Customer(s) (and Freight Forwarder(s)) based on the specification by the sender.

## 4.3 Redeem

Redemption is the virtual burning of the SFUs and can be performed only by Aircraft Operators. It marks the point when the units move from the flexible (reversible) “fuel accounting level” to rigid (irreversible) “emissions accounting level”, and when both the Scope 1 and Scope 3 emissions occur (at the same time). This is also the point when the system generates emissions statement(s), which serve as proof that the redemption took place and provide the redemption details, including Scope 1 and Scope 3 emissions reduction recipients and the SFUs sustainability attributes.

During the redemption, the Aircraft Operator is automatically allocated Scope 1 emissions reductions and must allocate Scope 3 emissions reductions either to a specific End Customer and optionally Freight Forwarder or to their broader customer base (per-passenger/shipment basis). The second option of allocation implies that the Aircraft Operator keeps the Scope 3 benefits to distribute the SAF emissions reductions among their “general” customers, in alignment with section 5 of the Methodology. During the redemption process, the Aircraft Operator can also designate a regulatory scheme to claim the SFUs under, depending on

the eligibility, which is determined by the certification scheme of the SAF. The claiming of SAF benefits under a regulatory scheme is done outside the Registry.

The emissions reduction formula selected at the point of redemption is final and cannot be changed at the later stage. It determines the Scope 3 environmental benefits that the recipients of Scope 3 environmental attributes obtain. This formula is clearly displayed in the emissions statements. In the scenario mentioned above, when the Fuel Producer or Fuel Supplier initiates a transfer to Aircraft Operator with a Scope 3 allocation(s), the Redemption formula is fixed at the point of transfer confirmation and cannot be changed by the Aircraft Operator later.

## 4.4 Freezing and unfreezing SFUs

In case the validator suspects that the SFUs are invalid, it can freeze the units at any time. If SFUs are frozen, they move to the All tab in the inventory regardless of its status, and its holders cannot benefit from its environmental attributes.

If the reasons for freezing are eliminated, the SFUs can be unfrozen, and transactions can be resumed/ holders can benefit from its environmental attributes.

# 5. Logbook

The purpose of the logbook is to record the history of actions, enabling transparency among users within the same entity. The logbook details the name and email of the user who performed the action if the user is of the same entity. If not, the name and email of the user will be anonymized and displayed as “hidden”. As for the validator, their IDs will be displayed. The logbook can be shared with external auditors to be used for auditing purposes.

The actions that are recorded are the following:

| Action | Status of Parent ID before action | Status of Child ID after action | Actor | Counterparty |
|---|---|---|---|---|
| Registration Started | | Registration Draft | Registrant | |
| Registration discarded | Registration Draft | Archived | Registrant | |
| Registration submitted | Registration Draft | Validation pending | Registrant | Validator |
| Registration cancelled | Validation pending | Registration Draft | Registrant | |
| Validation started | Validation pending | Validation in progress | Validator | |
| Validation discarded | Validation in progress | Validation pending | Validator | |
| Validation completed | Validation in progress | Active | Validator | Registrant |
| Information requested | Validation in progress | information required | Validator | Registrant |
| Registration discarded | Information required | Archived | Registrant | Validator |
| Registration edits submitted | Information required | Validation pending | Registrant | Validator |
| Validation declined | Validation in progress | Validation declined | Validator | Registrant |

| | | | | |
|---|---|---|---|---|
| Transfer started | Active | Transfer draft | Sender | |
| Transfer discarded | Transfer draft | Active | Sender | |
| Transfer sent | Transfer draft | Transfer pending | Sender | Recipient |
| Transfer cancelled | Transfer pending | Active (in sender's inventory) | Sender | Recipient |
| Transfer expired | Transfer pending | Active (in sender's inventory) | Sender | Recipient |
| Transfer accepted | Transfer pending | Active (in recipient's inventory) | Recipient | Sender |
| Transfer declined | Transfer pending | Active (in sender's inventory) | Recipient | Sender |
| SFUs split | Active | Active | Sender | |
| Redemption started | Active | Redemption draft | Sender | |
| Redemption discarded | Redemption draft | Active | Sender | |
| Redemption completed | Redemption draft | Redeemed | Sender | Recipient (if applicable) |
| SFUs Frozen | Any status | Frozen | Validator | Any involved party |

| **Action** | **Status in User Management (before)** | **Status in User Management (after)** |
|---|---|---|
| User invited | | Invited by CR |
| User invited | | Invited by Admin |
| User onboarding complete | Pending CR Approval | Active |
| User declined | Pending CR Approval | Declined |
| User permissions changed | Active | (no change) |
| User deactivated | Active | Deactivated |
| User reactivated | Deactivated | Active |

## 6. Interoperability

The Registry safeguards against double issuance and prevents errors, duplication, and fraud by enabling interoperability with other SAF registries.

The following data points that are to be exchanged among the participating registries are the following:

1. **SAF Registry Identifier**: In SAF Registry, this is the SAFR ID
2. **PoS/PoC number**: In SAF Registry, the Batch ID (selected at the point of Registration)
3. **PoS Certification Scheme**: In SAF Registry, the Certification Scheme (selected at the point of Registration)
4. **Date of Registration**: In SAF Registry, the date a user confirms to register a SAF batch for the validator's review