AEA Certification System: Moving to Pilot Operation

Overview and Panel Discussion

Nov 12, 2024

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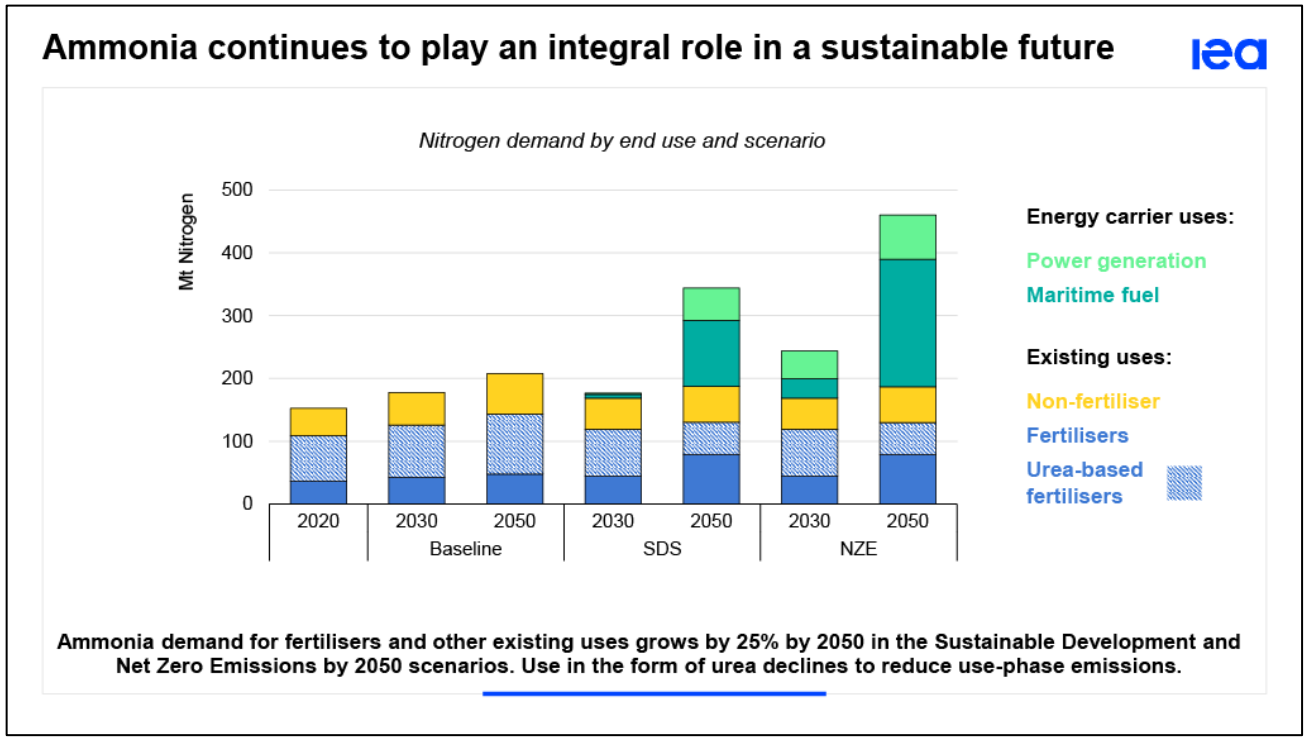
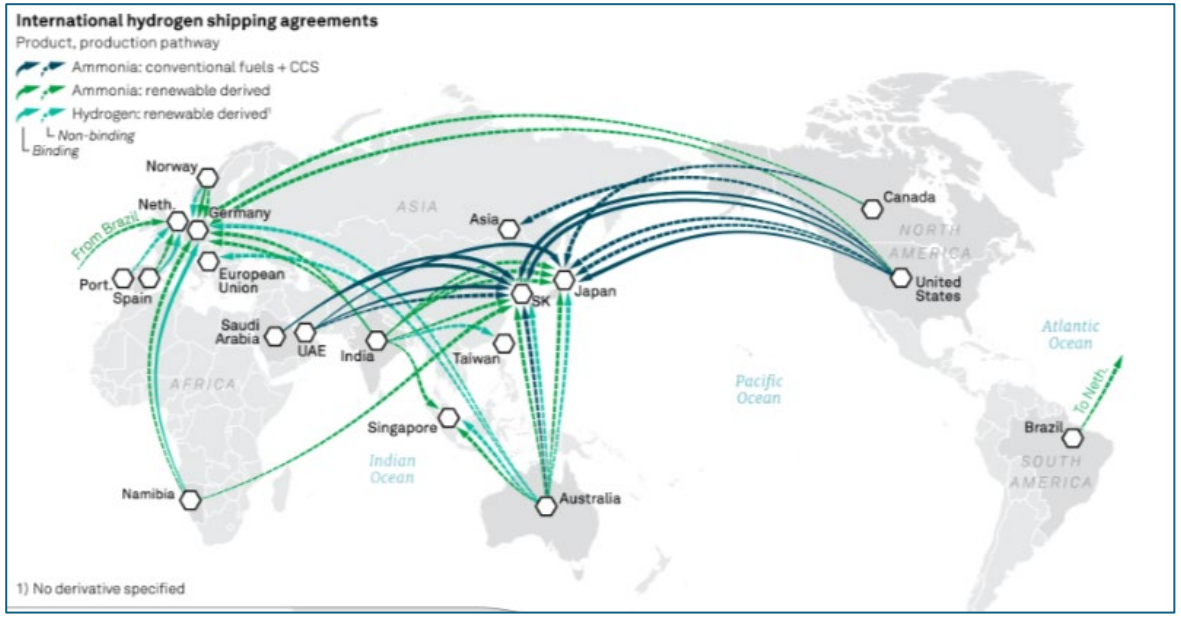
Global Ammonia Market/Supply Chain





S&P Global

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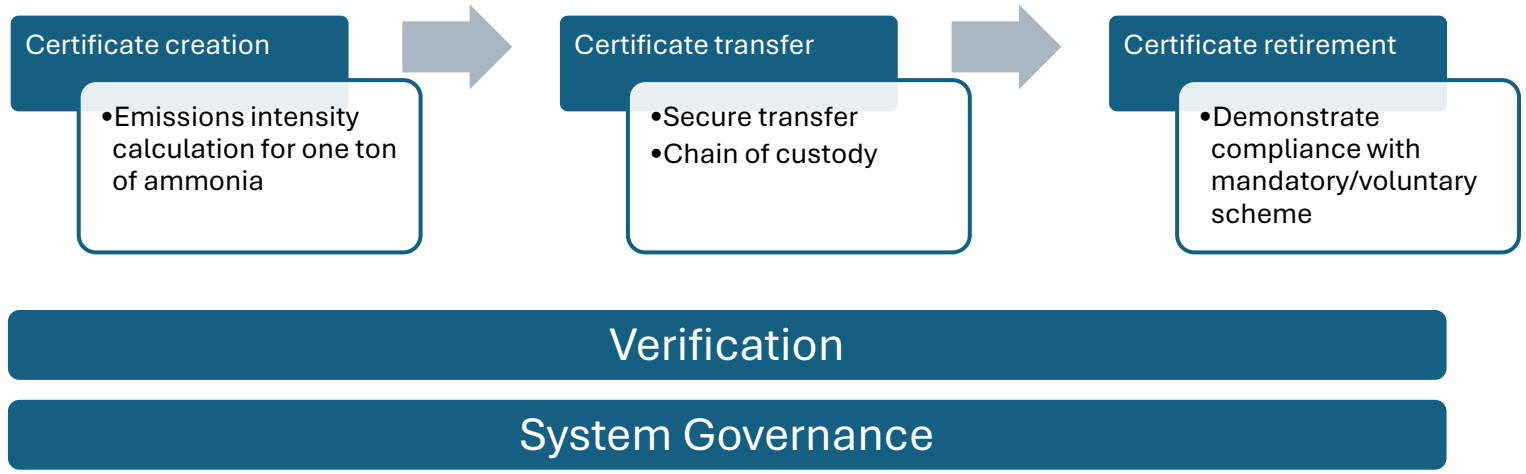
Purpose of Certification System

- Objective: Enable the creation and trading of certificates that convey the environmental attributes of ammonia
- Users: Global Producers, distributors and consumers of ammonia
- Features
  - Quantitative
  - Transparent & Verifiable
  - Designed for trade
  - Inclusive of third-party schemes



Reference: AEA Design Principles

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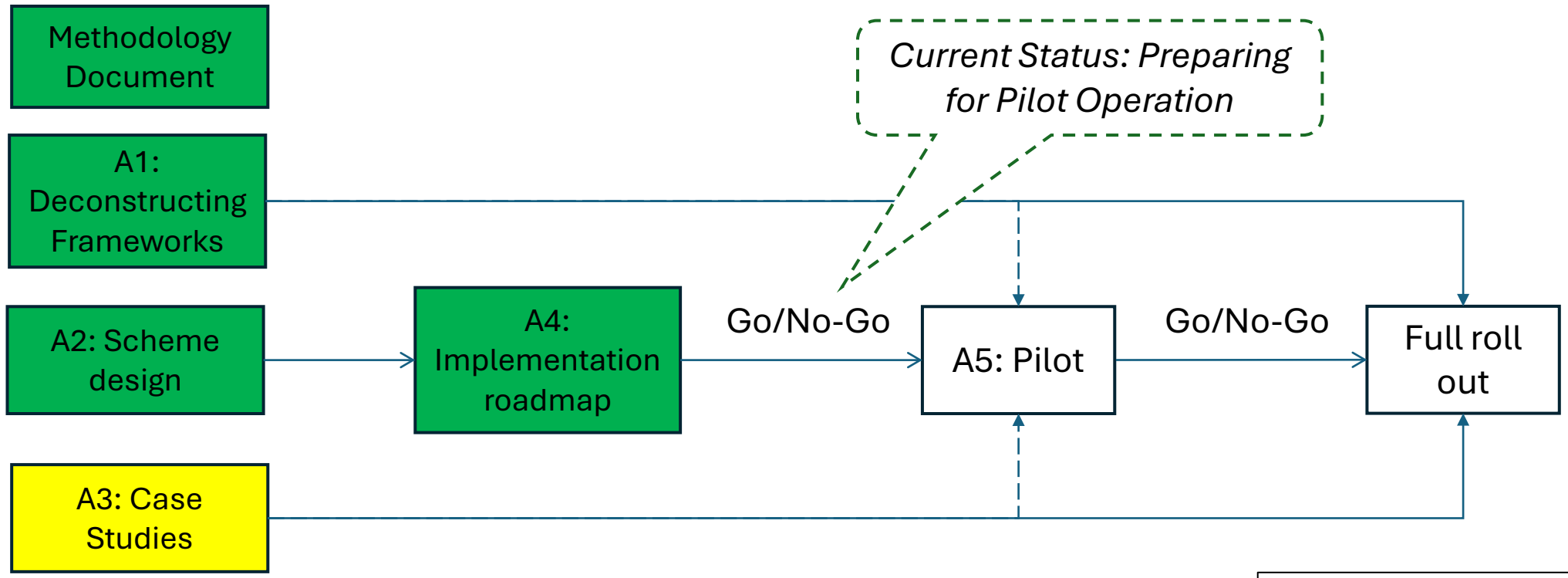
Roadmap to Implementation



- Pilot details
  - Scope
  - Duration
  - Governance
  - Budget

- Pre-certification
- Generate and trade certificates
- Involve partners
- Develop plan for full roll out

- System growth and adoption
- Recognition by voluntary/mandatory schemes
- Long term governance/ certification authority

Complete

In progress

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Overview of Pilot

- “Pilot Operation” phase of the AEA Certification System is on track to commence operation in 1Q’25
  - Pilot Operation is the first time that either ‘Pre-Certification’ or ‘Operational Certification’ will be possible under the AEA System.
  - 7 projects are ready for participation in the pilot – anticipate additions once the pilot is underway
- In progress – Evaluation to select registry operator and define budget/timeline for pilot
- Final plan/budget for the pilot will be presented at the December board meeting

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Definition of Success

The pilot will be a success if it can enable

*An **account holder** to **generate, transfer and retire certificates**; that display **environmental attribute(s)** generated using an **approved methodology**; from a plant that has undergone a **certified audit** by a **qualified auditor**; with **accurate** life cycle information stored in a **secure registry***

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Registry Certificate vs Customer Certificate

Registry Certificate (aka Certified ton)	Customer Certificate (aka Product Attribute Declaration)
• Digital certificate • Unit: one ton of ammonia • Immutable: data never changes • Created, stored, retired in the registry • Transferrable between user accounts	• Digital Certificate • Unit: one transaction of specific certified tons • Changeable: updated with supply chain emissions for the consignment, enabling mass balance chain of custody (optional). Can combine or split batches of certified tons but can not alter Registry Certificates. • Recorded in the registry • Provided by seller to buyer at registry transaction (along with physical delivery of ammonia)
Communicates the verified environmental attributes of each ton of ammonia at the time of production (Well to Production Gate)	Communicates the environmental attributes of a consignment of ammonia, as it moves through the supply chain (Well to end use)

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Today’s Session: 3 Key Pilot Phase Activities

- Pre-certification
- Operational Certification & Certificate Issuance
- Certificate Transfer & Retirement

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Panelists

Nick Cook
CF Industries

Emile Herben
Yara

Jakob Krummenacher
LSB Industries

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Pre-Certification

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Pre-Certification Process

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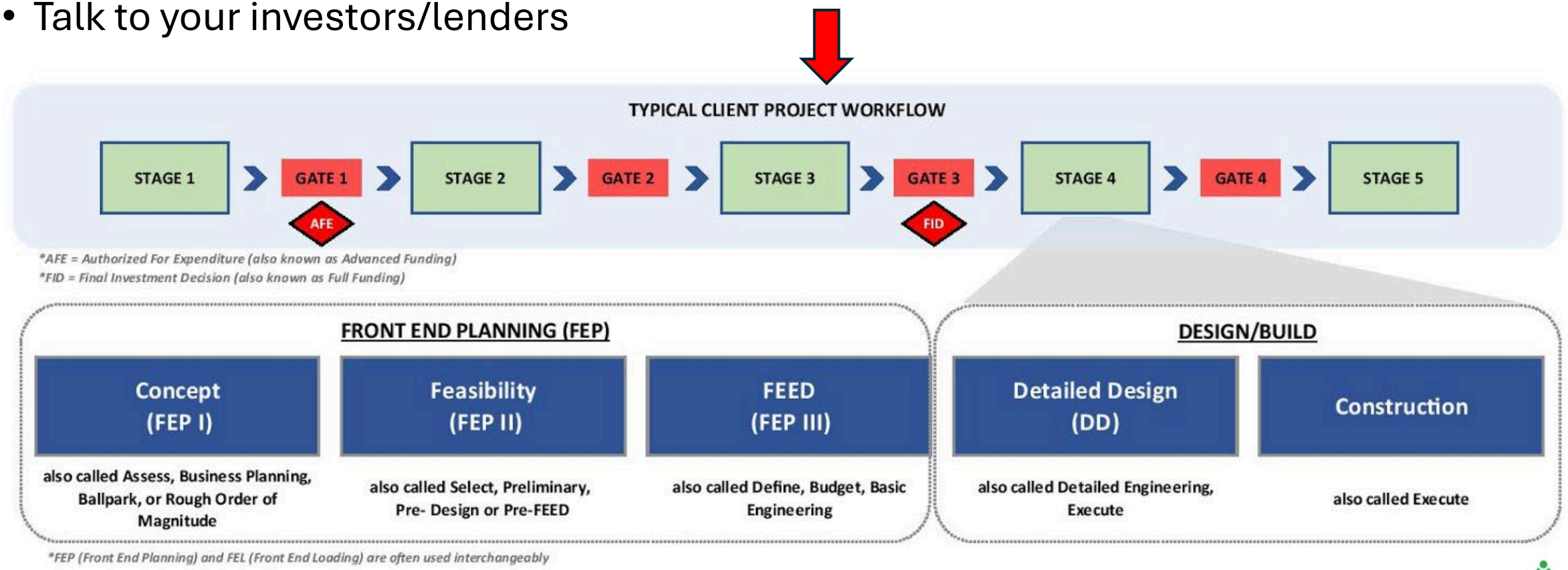
When should I do Pre-certification?

- Typically right before FID (Final Investment Decision)
- Use Heat & Material balance from FEED
- Talk to your investors/lenders



Source: H+M Industrial EPC

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Choosing an Auditor

Suggested Auditor Qualifications

Company requirements:

- Accreditation by a national accreditation body to ISO 17065 and ISO 14065

Individual requirements:

- Have been trained to ISO 19011 and maintained their competence
- Be free of conflicts of interest
- Have at least 2 years of experience in LCA and quantification of GHG emissions

Selection Process

- Ammonia producer chooses the auditing company they want to work with
- That auditing company provides to AEA an application (to be developed) with its current accreditations that would meet the needs of the AEA auditor capabilities
- Auditing company participates in a pre-pilot training program for auditors and ammonia producers

Reference: Auditor Selection Guidelines

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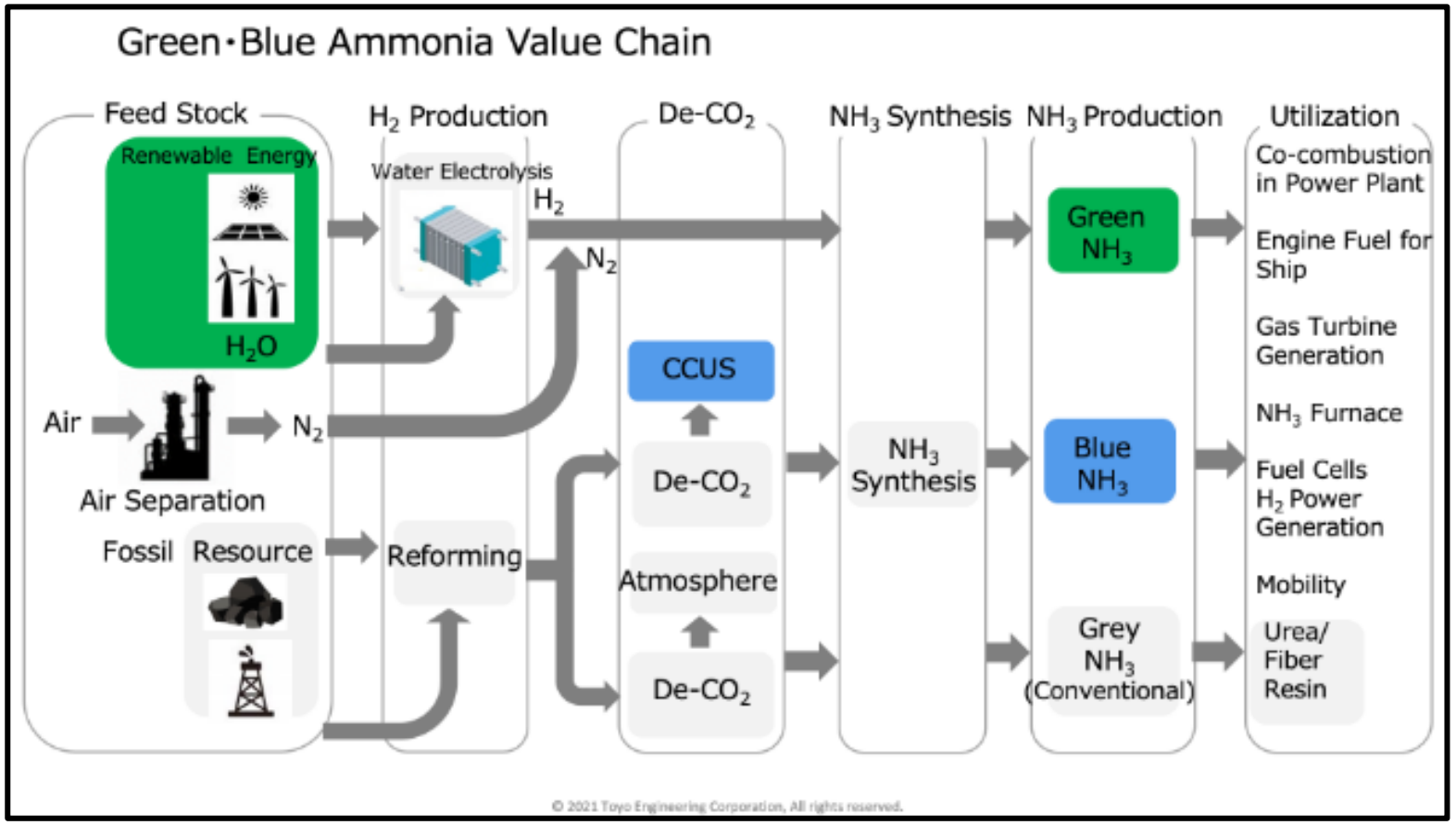
Data for Pre-certification

- FEED quality data should include
  - Feedstock information
  - Energy source information
  - Energy consumption per ton of ammonia (from heat & material balance)



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Using Different Methodologies

- Account holders can have their pre-certification done to any recognized standard
- The pre-certification report should list the carbon footprint as calculated by each standard
- Remember – Carbon footprint should be “Well to Gate”

Standard	WtG CFP (t CO_2/t NH_3)
AEA Certification	0.20
Green H2 Standard	0.30
ISO standard (e.g. ISO 14067)	0.25

** Fictional numbers - for illustration purposes only*

Reference: CFP Methodology Document

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Summary: Pre-Certification

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Operational Certification & Certificate Issuance

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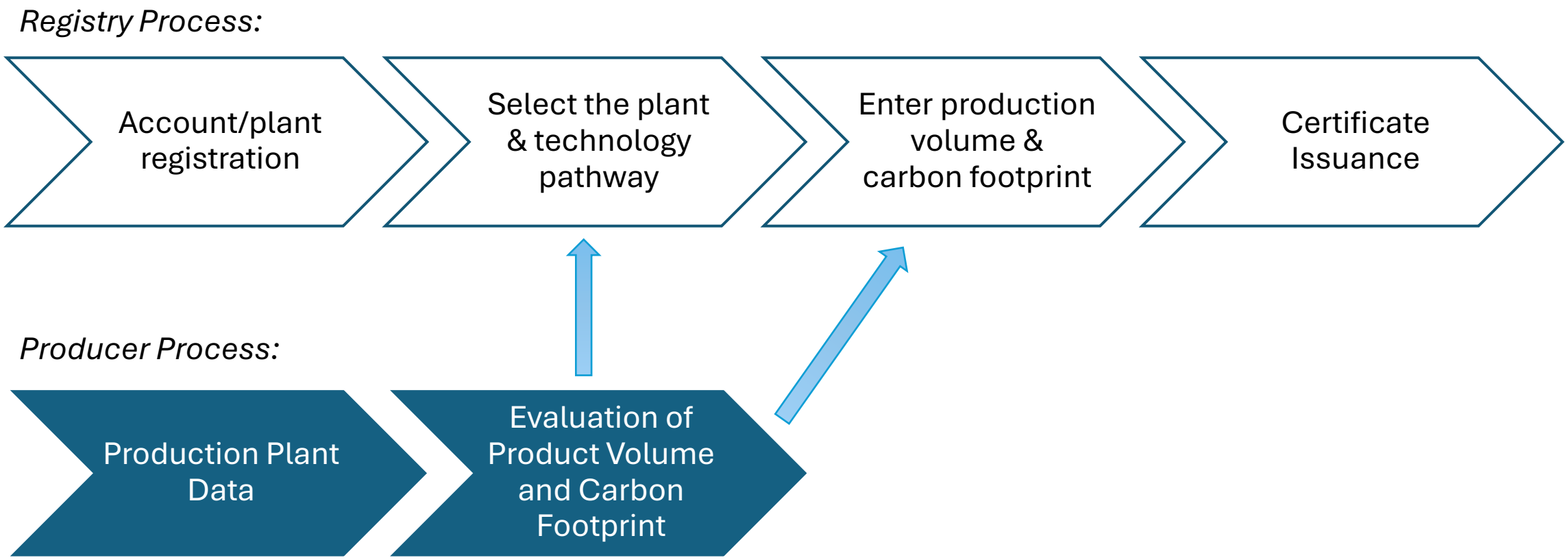
Operational Certification and Certificate Issue



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Who needs to be an account holder?

- Under a mass balance approach, all entities that will physically handle the produce must be an account holder in order to transfer and retire certificates
- Under a book-and-claim approach, it's possible only the producer would need to be the account holder in the transaction

Main Functions of the Registry	Main Actors implementing the functions	
Account Holder Registration	Supply Chain Operators*	Registry Operator
Production Plant Registration	Production Plant Operators	
Certificate Issuing	Production Plant Operators	
Certificate Transfer	Supply Chain Operators	
Certificate Retirement	Suppliers	

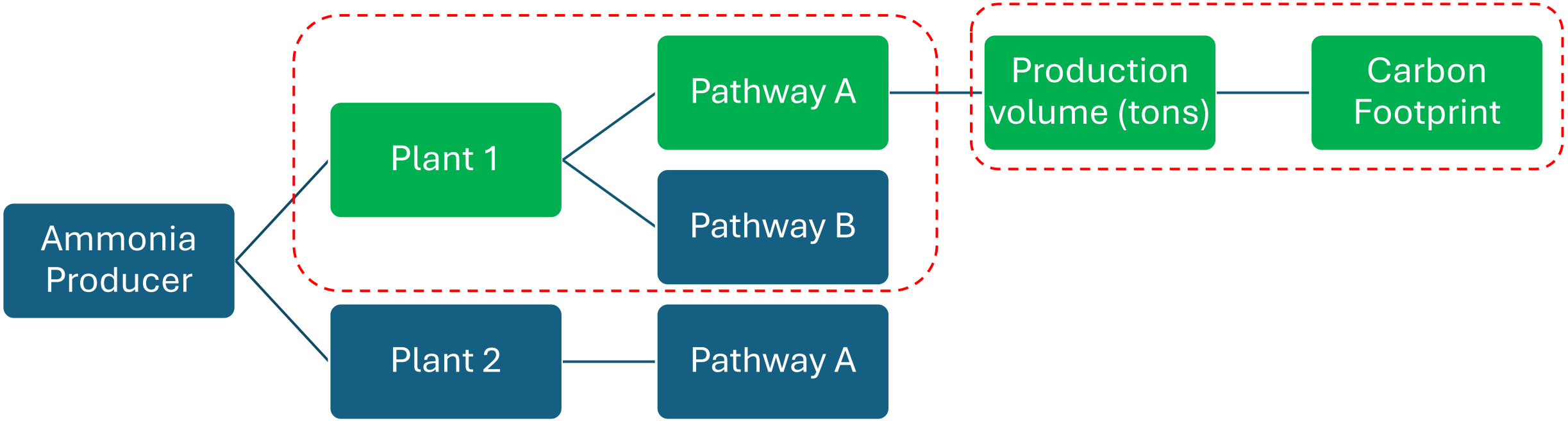
*Including production plant operators and suppliers

Operational Certification

- Development of the pre-certification process but with real plant data
- Provide updated information to the registry
- Certificates will be issued based on the actual carbon footprint calculated from operational certification

Source: Galveston County Economic Development

Select Plant & Technology Pathway



Reference: CFP Methodology Document

What Does the Registry Hold for a Unit of Ammonia?

Product Certificate Number	#
Certification Body	
Identification of production plant • Production Plant ID • Name • Location country, city, postal code • Commissioning date • Installed production capacity	
Date & Time of beginning and end of ammonia production batch	
Feedstock energy source	
Share of feedstock from that energy source in preceding 12 months	%
Technology pathway	Pathway code
Well-to-gate Carbon Footprint	t_{CO2e}/t_{NH3}
Certificate Information • Issuing date • [Expiry date: N/A in AEA System]	
Environmental Sustainability Attributes	If Applicable

Additional columns will be added to the certificate to upload data applicable to the additional scheme

Pathway	Code
Steam Methane Reformer	SMR
Steam Methane Reformer w/ Carbon Capture	SMRCC
Electrolytic	ELE

If there are Social Environmental Attributes associated with the certificate there is an ability to display

Account/plant registration → Operational Certification → Select the plant & technology pathway → Enter production volume & carbon footprint → Certificate Issuance

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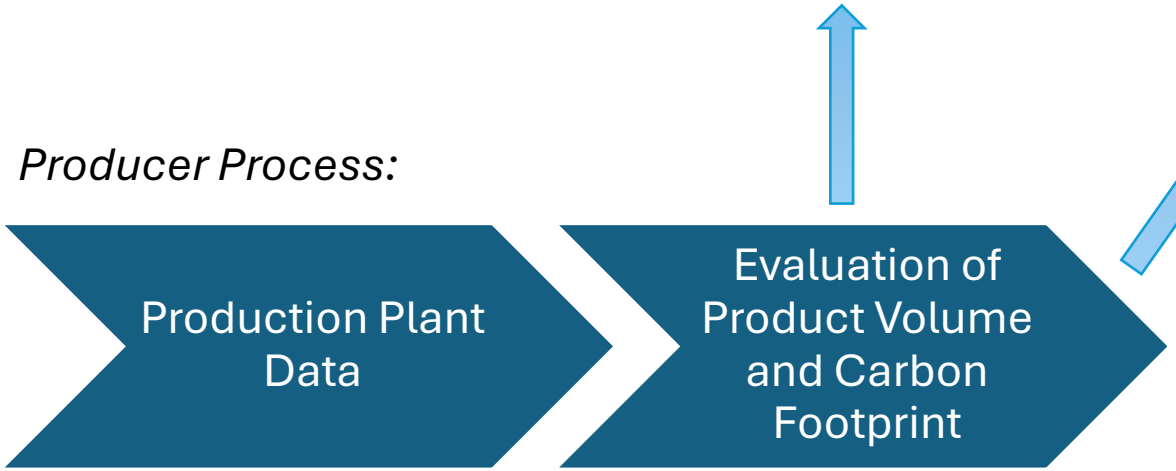
Summary: Operational Certification and Certificate Issue

Registry Process:

Producer Process:



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Certificate Transfer & Retirement

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Process for Certificate Transfer

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Transfer Process

Transfer on May 1 2025

Company A: Producer

Certificate number	Issue date	Plant	Technology Pathway	CFP
0-1000	2025-02-01	A	HB	1.8
1001-1500	2025-03-01	B	HB+CCS	0.2
1501-3000	2025-04-01	B	HB+CCS	0.2
3001-5000	2025-05-01	A	HB	1.8
5001-8000	2025-06-01	C	Green H2	0.0

Company B: Supplier

Certificate number	Issue date	Recd on	Technology Pathway	CFP
1001-1500	2025-03-01	2025-05-01	HB+CCS	0.2
1501-3000	2025-04-01	2025-05-01	HB+CCS	0.2

Transfer on July 1 2025

Company C: Supplier

Certificate number	Issue date	Recd on	Technology Pathway	CFP
3001-5000	2025-05-01	2025-07-01	HB	1.8
5001-8000	2025-06-01	2025-07-01	Green H2	0.0

Reference: Chain of Custody document

** Fictional numbers - for illustration purposes only*

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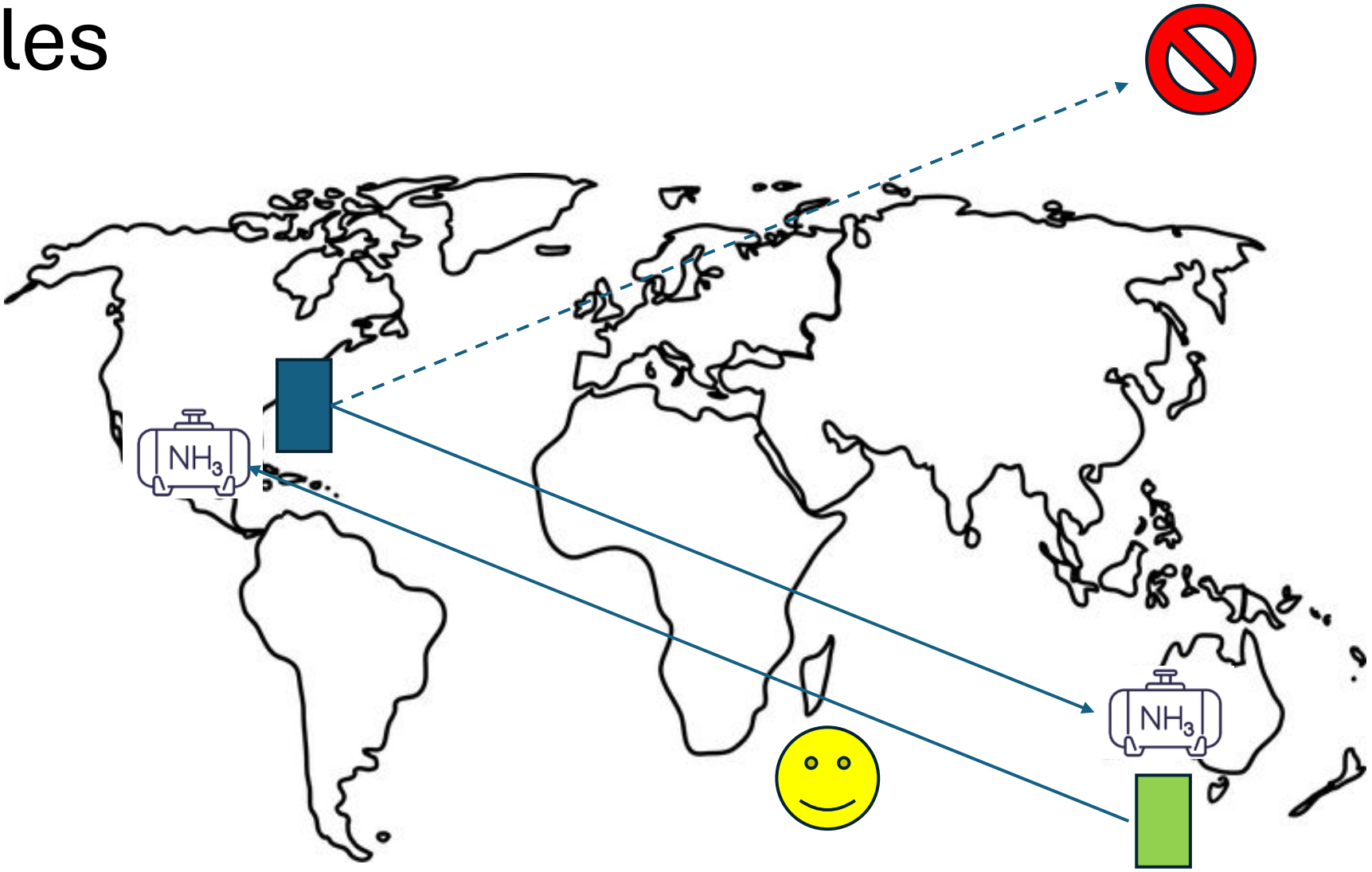
Transfer Principles

- ✓ Can "swap" certificates between physical batches of ammonia
  - ✓ Both batches need to be within the system to enable the swap
- ✗ Cannot have "stranded" certificates – each certificate needs to be linked to an actual ton of ammonia
- ➢ Registry will not track any financial transactions related to inter-company certificate swapping



Reference: Chain of Custody document

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Updating the Carbon Footprint (Optional)

- The registry certificate is immutable and will always show the Well-to-Gate carbon footprint
- During transportation of ammonia there will be incremental GHG emissions
- The additional GHG emissions are notated in the Product Attribute Declaration (PAD)/Customer Certificate
- Options to include the Product Attribute Declaration as part of the registry will be evaluated during the pilot

PAD data content

PAD Number:[unique ID]
Certificate string: [first & last #]
Product Transfer:
  Date: [Y/M/D]
  From: [supplier ID]
  To: [Recipient ID]
    or "For consumption"
  Quantity: [in t]
Footprint increment from transportation: [x tCO2/t]

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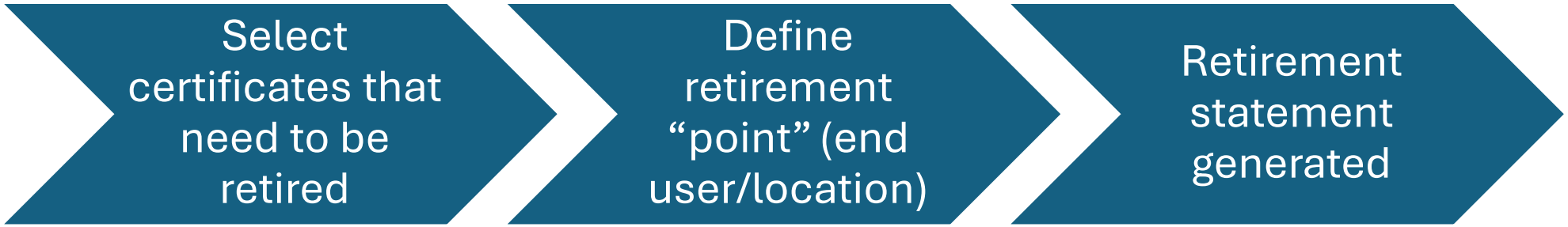
Certificate Retirement



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Retirement Process

Company D: End User

Company B: Supplier

Certificate number	Issue date	Recd on	Technology Pathway	CFP
1001-1500	2025-03-01	2025-05-01	HB+CCS	0.2
1501-3000	2025-04-01	2025-05-01	HB+CCS	0.2

Requested retirement

Retirement certificate generated

Registry entries marked as “Retired/Cancelled”

Reference: Chain of Custody document

** Fictional numbers - for illustration purposes only*

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Retirement Principles

- Retirement means the ammonia has been “consumed” and can no longer be traded
- Typically done at the point of last transfer to an end user
- For the pilot, account holders can submit a retirement request on behalf of an end user
- Retirement certificate will be generated for recordkeeping/ regulatory submission

Reference: Chain of Custody document

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THANK YOU!

QUESTIONS?

Please send feedback to certification@ammoniaenergy.org

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BACKUP

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Definition of Success

Feature	Success Criteria
Registry	• Seamless registration of account holders & plants – at least 10 entries • Registry is secure (cannot be corrupted or subject to unauthorized modification) • Registry is easily accessible and user friendly – based on survey of account holders
Audit/CFP	• Auditors can be qualified to the prescribed standard – at least 3 different auditors to be qualified • Audits are performed and information submitted to AEA • CFP calculation follows AEA methodology
Certificate	• Certificate reflects accurate information for a given ton of ammonia – at least 1000 certificates to be created • Certificate transfer occurs seamlessly between account holders – at least 10 transfers • Certificates once retired cannot undergo further transactions – at least 100 retirements • Certificate is tied to PAD

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Pilot Scope

Task	Description	Responsible
Registry Design & Build	Design & build a registry that meets the specification requirements	Third party with AEA/Hinicio support M-RETS & Unicorn
Project Submission	Operators propose projects for inclusion in the pilot.	Operator
Auditor Selection	Select and qualify auditors to carry out CFP assessment of different operators. Perform audits for certification/pre-certification	Operator + AEA
Registry Operation	Register operators & plants Generate, transfer and retire certificates	AEA with input from account holders

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Pilot Execution Plan

- Registry Build
  - Issue RFP
  - Interview candidates
  - Select winning bidder
  - Design registry
  - Beta testing
  - Roll out registry
- Project Nomination
  - Operators propose projects for certification/pre-certification
- Auditor selection
  - Operators identify auditors and propose them to AEA for qualification
  - Auditors carry out plant audit and submit report to AEA
- Registry operation
  - Account holders submit information for registry – accounts created
  - Account holder requests creation of certificate
  - Certificates transferred between entities – registry updated
  - Certificates retired – registry updated

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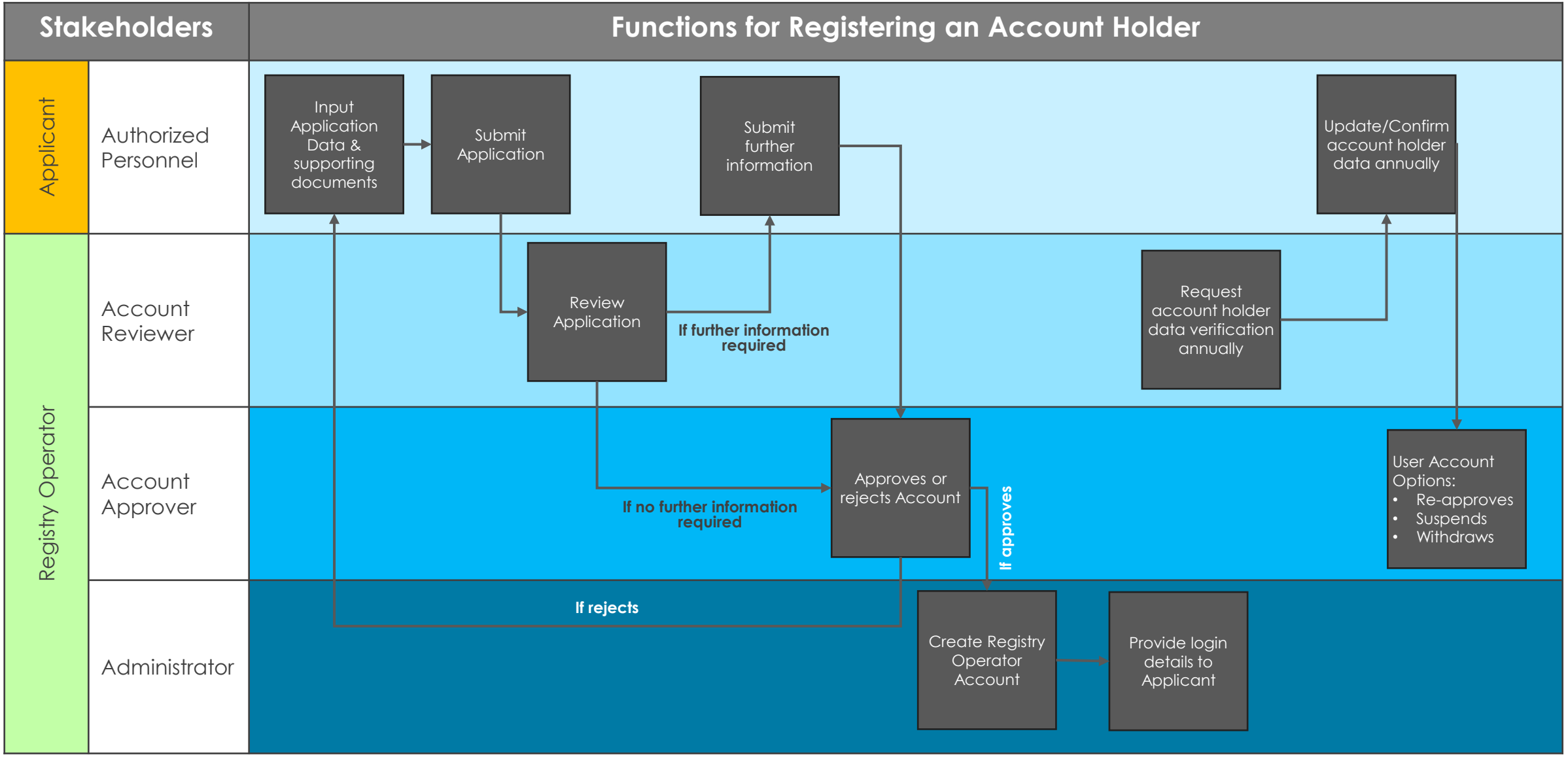
Account Holder Registration (and account management)



*Subject to change depending on final registry