Annex 1 – Technical Specifications

1st Open Call – NASCHA project

List of topics

- ☐ Hydrogen safety, certification and compliance-readiness package....2
- ☐ Smart agricultural monitoring, irrigation optimisation and integrated operational management...2
- ☐ Public-service hydrogen demand, offtake and service-model development....2
- ☐ Modular hydrogen logistics, refuelling and distribution model....3
- ☐ Fast hydrogen cylinder connection interface for small mobility and modular applications....3
- ☐ Hydrogen procurement and operational-readiness protocols for public actors....3
- ☐ Hydrogen deployment knowledge and matchmaking hub with sustainability model....4
- ☐ Urban power-to-H_2-to-power integration and control logic....4
- ☐ Island hydrogen logistics and resilience service model....4
- ☐ Hydrogen carrier interface and input-output modelling....5
- ☐ Thermal-management optimisation for hydrogen storage and distribution systems....5
- ☐ High-pressure cylinder bundle and rack system for storage and transport....5
- ☐ Standardised high-pressure fill interface and valve integration for Type IV composite vessels....6
- ☐ Adaptive resin impregnation control for high-speed filament winding....6
- ☐ Digital traceability, smart valves and cybersecurity for hydrogen storage....6
- ☐ Energy-community metering and local balancing model for hydrogen-enabled sites....7

Note for applicants:

Please be informed that preference is given to solutions demonstrating an appropriate level of technological maturity (TRL), a credible pathway towards validation in a relevant operational environment, and a clear potential for integration into the pilot infrastructure and subsequent commercial deployment.

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Hydrogen safety, certification and compliance-readiness package

Innovative solutions, technologies or services related to:

- Development and implementation of solutions for hydrogen certification, regulatory compliance, sustainability verification and traceability across different hydrogen production, storage and utilisation applications. Solutions may include RFNBO compliance, Guarantees of Origin, energy sourcing verification, metering and monitoring systems, data management, auditing support and integration with certification and reporting frameworks
- Service framework to be applied to hydrogen plants (commercial uptake shall be demonstrated)

Relevant value-chain segment: Cross-cutting / certification, compliance, traceability, safety and standardisation

Expected output:

- Certification and regulatory compliance framework
- Technical and organisational solutions
- Metering, monitoring, data collection and reporting concepts, including relevant hardware and software where required.
- Renewable energy sourcing, Guarantees of Origin and hydrogen traceability solutions.
- Certification documentation, audit preparation and support for obtaining relevant certifications.
- Ongoing compliance monitoring, reporting and advisory support throughout pilot implementation and operation.

Smart agricultural monitoring, irrigation optimisation and integrated operational management

Innovative solutions, technologies or services related to:

- Practical smart irrigation solutions linking irrigation demand, clean energy, storage logic, metering and operational scenarios, with an emphasis on optimising agricultural resource management, operational validation and potential integration into existing or planned irrigation infrastructure.

Relevant value-chain segment: Downstream / smart agriculture, water management, digital monitoring and automation

Expected output:

- Integrated smart agriculture and irrigation management pilot solution.
- Intelligent irrigation decision-support and operational optimisation
- Automated irrigation control
- Digital platform for monitoring, visualisation, notifications, data and operational management
- Integration with relevant field equipment and irrigation infrastructure, including installation
- Scalable and interoperable architecture enabling future technological enhancements and wider deployment
- Practical solutions linking irrigation demand, clean energy, storage logic, metering and operational scenarios, with an emphasis on operational validation and potential integration into existing or planned irrigation infrastructure

Public-service hydrogen demand, offtake and service-model development

Innovative solutions, technologies or services related to:

- Demand aggregation, first-user logic and public-service use cases need to be validated to support bankability and market uptake.

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Relevant value-chain segment: Downstream / market creation

Expected output:

- Demand mapping
- First-user scenarios
- Public-service use cases
- Offtake assumptions
- Service-pricing logic
- Replication potential

Modular hydrogen logistics, refuelling and distribution model

Innovative solutions, technologies or services related to:

- Storage/distribution pilots need realistic delivery, refuelling and last-mile logistics scenarios connected to SCoP needs or movable storage solutions.

Relevant value-chain segment: Midstream / logistics and refuelling

Expected output:

- Modular delivery scenarios (including trailer with over 80 kg pressurised hydrogen storage)
- Refuelling-service model
- Route assumptions
- Storage exchange logic
- Early-user interface
- Replication package

Fast hydrogen cylinder connection interface for small mobility and modular applications

Innovative solutions, technologies or services related to:

- Safe, user-friendly and standardised connection concept for swappable/refillable hydrogen cylinders at low-, medium- and high-pressure ranges.

Relevant value-chain segment: Midstream / downstream technology interface

Expected output:

- Connector requirements
- Design concept
- Interface specification
- Safety risk assessment
- Pressure-range logic
- Prototype or prototype-ready design
- Certification pathway

Hydrogen procurement and operational-readiness protocols for public actors

Innovative solutions, technologies or services related to:

- Practical protocols for procurement, O&M roles, emergency interfaces and operational readiness (for municipalities and utilities).
- Development of practical tools and protocols to strengthen the operational capacity of public actors.

Relevant value-chain segment: Governance / operational readiness

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Expected output:

- Procurement specification templates
- O&M readiness checklist
- Emergency-response interface protocol
- Role-allocation matrix
- Implementation guidance

Hydrogen deployment knowledge and matchmaking hub with sustainability model

Innovative solutions, technologies or services related to:

- A new platform/hub to aggregate practical outputs, SME profiles and replication resources, by including a sustainability/business model.

Relevant value-chain segment: Ecosystem development / exploitation

Expected output:

- Hub architecture
- SME and competence database
- Topic-to-provider mapping
- Repository for tools/protocols
- Exploitation plan
- Sustainability/business model

Urban power-to-H_2-to-power integration and control logic

Innovative solutions, technologies or services related to:

- Urban storage, reconversion and e-mobility/service interfaces based on more mature site data and operating assumptions.

Relevant value-chain segment: Midstream / downstream urban integration

Expected output:

- Integration concept
- Control logic
- Energy-flow assumptions
- Storage/reconversion scenarios
- Implementation pathway for urban flexibility and e-mobility use cases

Island hydrogen logistics and resilience service model

Innovative solutions, technologies or services related to:

- A more specific portfolio of hydrogen use cases, logistics options and public-service resilience scenarios.
- Service should be developed and provided to all applicable pilots.

Relevant value-chain segment: Downstream / island resilience

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Expected output:

- Island use-case portfolio
- Storage/logistics model
- Resilience service concept
- Public-service prioritisation
- Replication model for other islands

Hydrogen carrier interface and input-output modelling

Innovative solutions, technologies or services related to:

- System interfaces between renewable input, carrier storage, transport, reconversion and end use for a clearer modelling.

Relevant value-chain segment: Upstream / midstream integration

Expected output:

- Input-output model
- Interface map
- Performance assumptions
- Non-confidential technical specification
- Compatibility assessment

Thermal-management optimisation for hydrogen storage and distribution systems

Innovative solutions, technologies or services related to:

- Storage and distribution systems requiring improved heat/cold management and operational efficiency analysis.

Relevant value-chain segment: Midstream technology

Expected output:

- Thermal-management concept
- Simulation
- Design recommendations
- Efficiency assumptions
- Implementation pathway

High-pressure cylinder bundle and rack system for storage and transport

Innovative solutions, technologies or services related to:

- Modular bundling/rack solutions for high-pressure Type IV cylinders, including safety and transport/homologation pathways.

Relevant value-chain segment: Midstream / storage and transport

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Expected output:

- Technical concept
- Rack/bundle design
- Pressure-level assumptions
- Safety assessment
- Transport/homologation pathway
- Validation plan

Standardised high-pressure fill interface and valve integration for Type IV composite vessels

Innovative solutions, technologies or services related to:

- Type IV vessels with validated fill connector and valve interface concepts for 700-bar heavy-duty and stationary HRS applications.

Relevant value-chain segment: Midstream / HRS and heavy-duty interface

Expected output:

- Validated interface concept
- Valve/fitting specification
- Safety assessment
- Certification/approval pathway (TPED, PED, UN134)
- HRS integration testing plan

Adaptive resin impregnation control for high-speed filament winding

Innovative solutions, technologies or services related to:

- Improved closed-loop impregnation control to stabilise fibre-to-resin ratios at higher winding speeds for composite pressure vessel production.

Relevant value-chain segment: Upstream / composite manufacturing process

Expected output:

- Adaptive resin bath concept
- Closed-loop impregnation control approach
- Sensor/control specification
- Validation protocol
- Integration pathway for Type IV vessel production

Digital traceability, smart valves and cybersecurity for hydrogen storage

Innovative solutions, technologies or services related to:

- Monitoring, traceability and smart-component solutions to improve the safety and lifecycle management of hydrogen storage systems.

Relevant value-chain segment: Midstream / digital safety and traceability

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Expected output:

- Traceability architecture
- Smart-valve concept
- Data model
- Cybersecurity requirements
- Monitoring logic
- Link to safety/certification evidence

Energy-community metering and local balancing model for hydrogen-enabled sites

Innovative solutions, technologies or services related to:

- SCoPs with a structured metering, governance and local balancing model to connect hydrogen systems with local energy communities and public services.

Relevant value-chain segment: Cross-cutting / local energy systems

Expected output:

- Metering architecture
- Governance model
- Local balancing scenarios
- Revenue-sharing logic
- Integration recommendations for hydrogen-enabled sites

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