Project Solar Ammonia Chile

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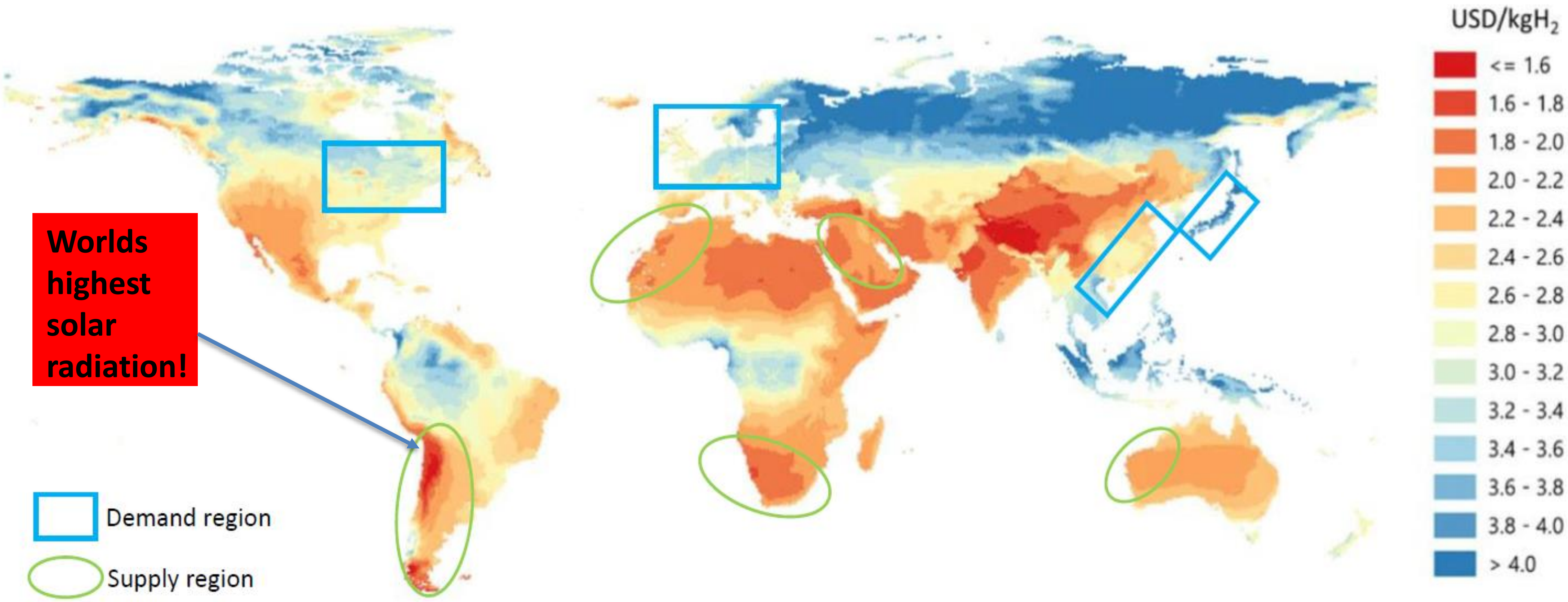
SAC Solar Ammonia Chile

Why SAC in Northern Chile?

Solar Ammonia Chile

- Best solar irradiation available worldwide, with high contribution margins (PV/North: >3,200 full load hours; opportunities for CSP, or thermal storage: >8,000 full load hours).
- Successful energy transition ongoing in Chile and not threatened by new green H_2 industry.
- Sufficient vacant land available (state-owned and private properties).
- Local demand for green H_2 and derivatives (mining industry, heavy transport, etc.) existing.
- Industrial culture and skilled regional labour market due to copper mining industry
- Good infrastructure available (ports, road and rail access, gas pipelines, power lines, seawater desalination)
- Chile has a liberal market structure (stable national economy and currency).

Solar Ressource in the Atacama Dessert



Objective and Approach

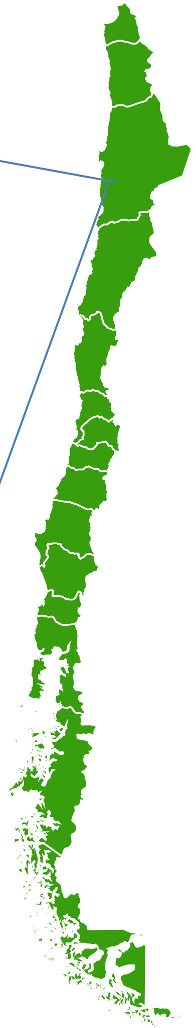
Solar Ammonia Chile

Our objective is to launch a green ammonia production facility with the lowest production cost worldwide (LCOA)

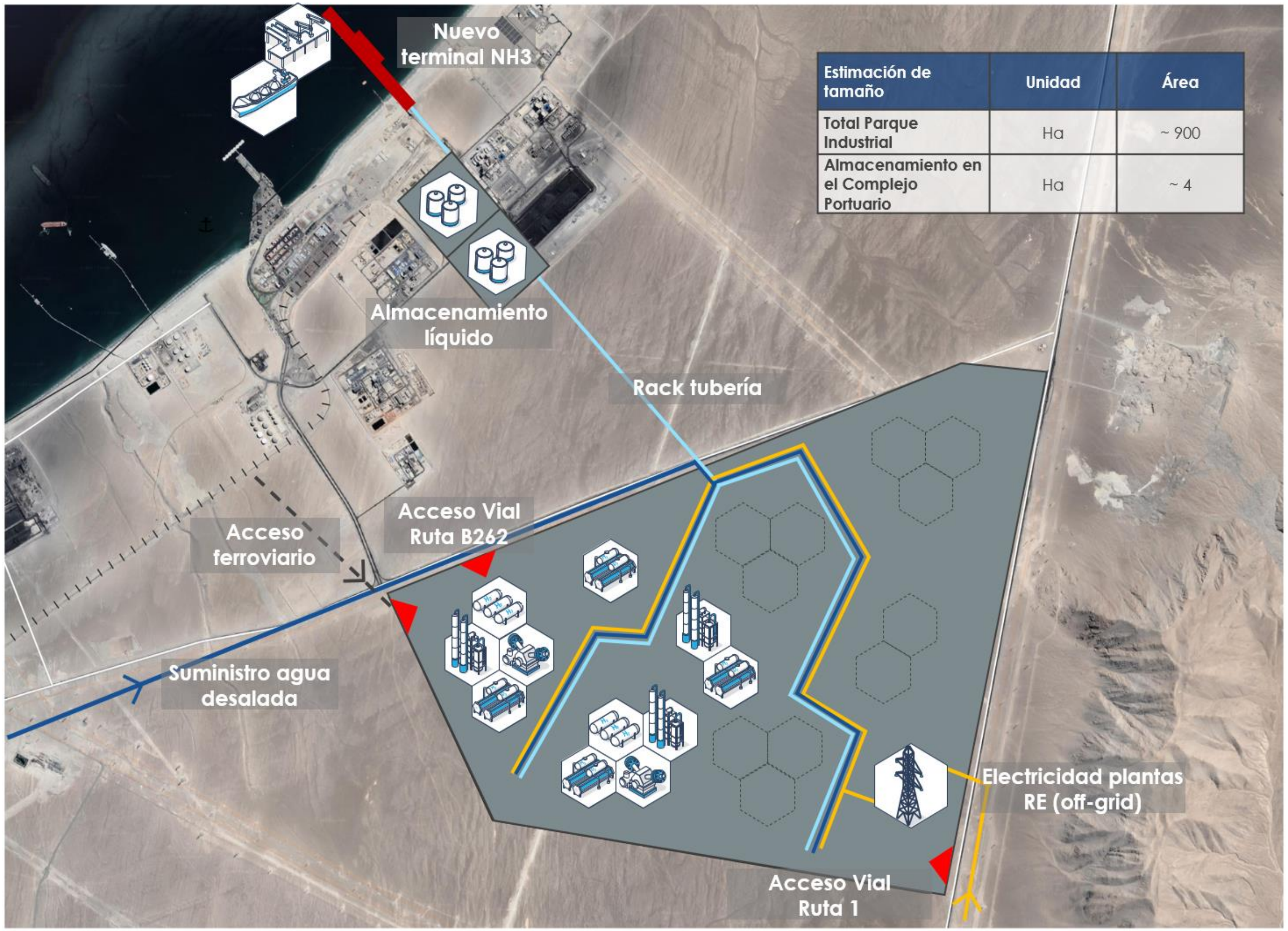
Our approach is to consistently optimize the project development through:

- Leveraging the framework conditions for de-risking project development and minimizing initial investment
- Optimization of the project design and operation
- Best renewable resources
- Shared Infrastructure

Leveraging framework conditions



Leveraging framework conditions



Estimación de tamaño	Unidad	Área
Total Parque Industrial	Ha	~ 900
Almacenamiento en el Complejo Portuario	Ha	~ 4

Summary:

H2 Mejillones Industrial Park

- collaborative environment
- Enhance of synergies
- Maximise industrial development

Services:

- Land availability for the location of multiple production plants and supporting SMEs
- Access to port infrastructure
- Concentration of cargo and shipping services
- Rail and road access
- Electricity supply from renewable sources
- Availability of desalinated water
- Shared storage of hydrogen and its derivatives

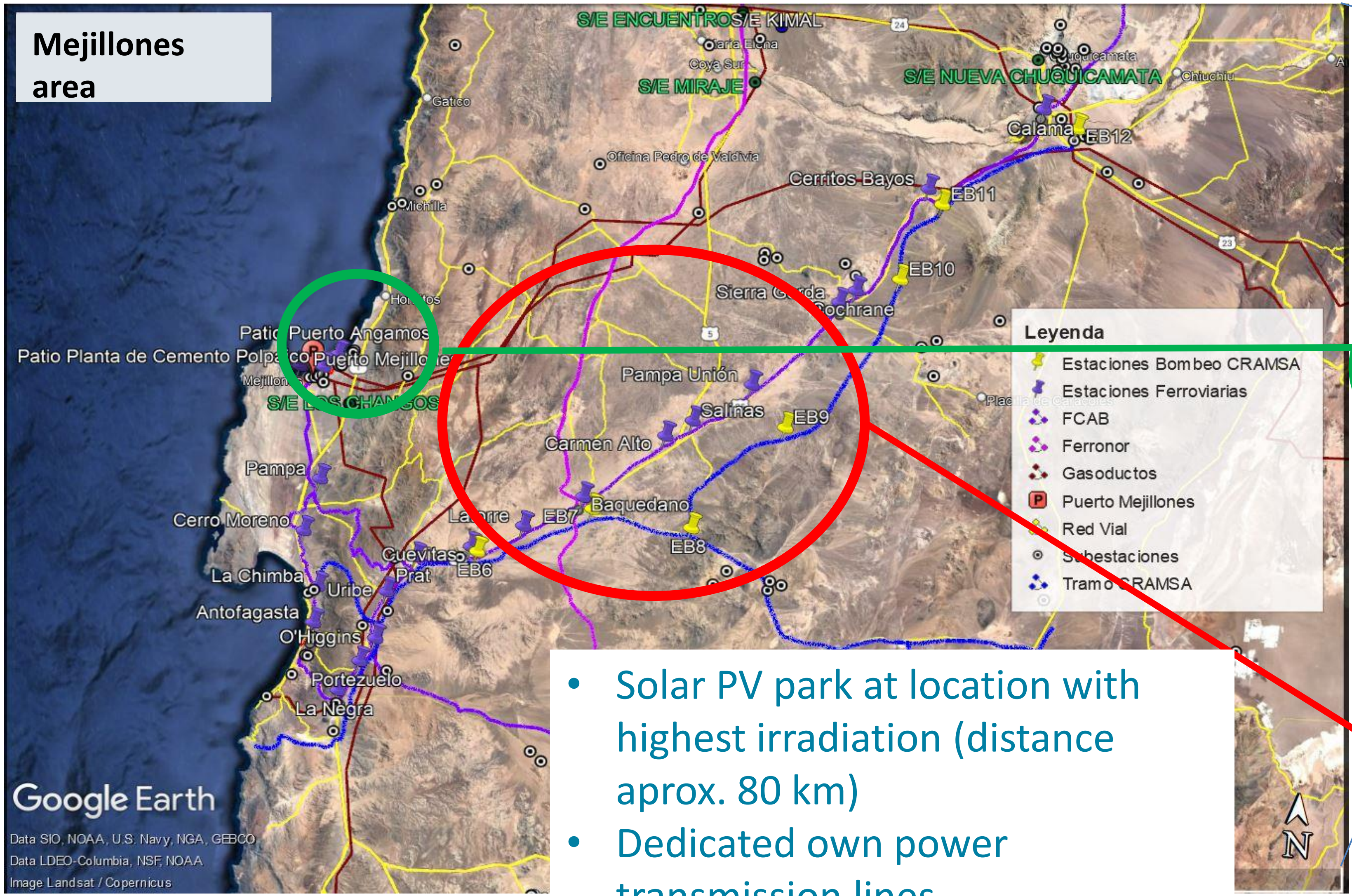
Optimizing Project Design

- **Optimizing locations of the project components**
  - Low-cost energy generation (3.200 kWh/kWp), complemented with renewable PPAs
  - Production plants inside of an industrial park at Mejillones
  - Energy transportation through own power lines

- **Pre-design optimization using a best in market tool**:
  - Optimizing the project size considering economies of scale and phasing
  - Optimizing the energy supply system
  - Optimized plant design and technology selection
  - Optimizing the logistics
  - Global system optimization (top-down and bottom-up approach)

Optimization of Project Locations

Solar Ammonia Chile



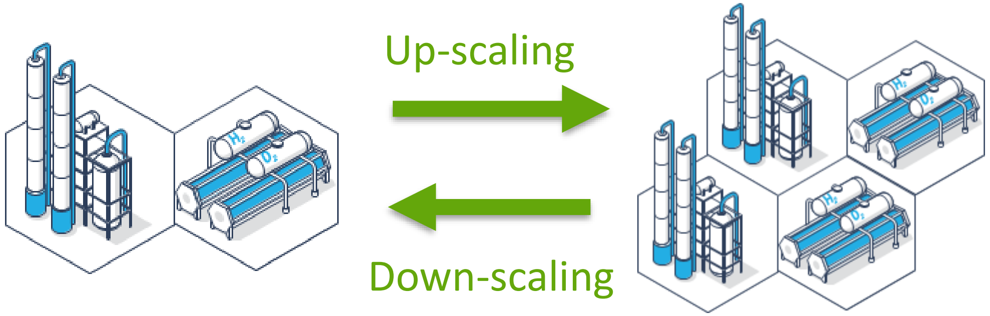
- Solar PV park at location with highest irradiation (distance aprox. 80 km)
- Dedicated own power transmission lines

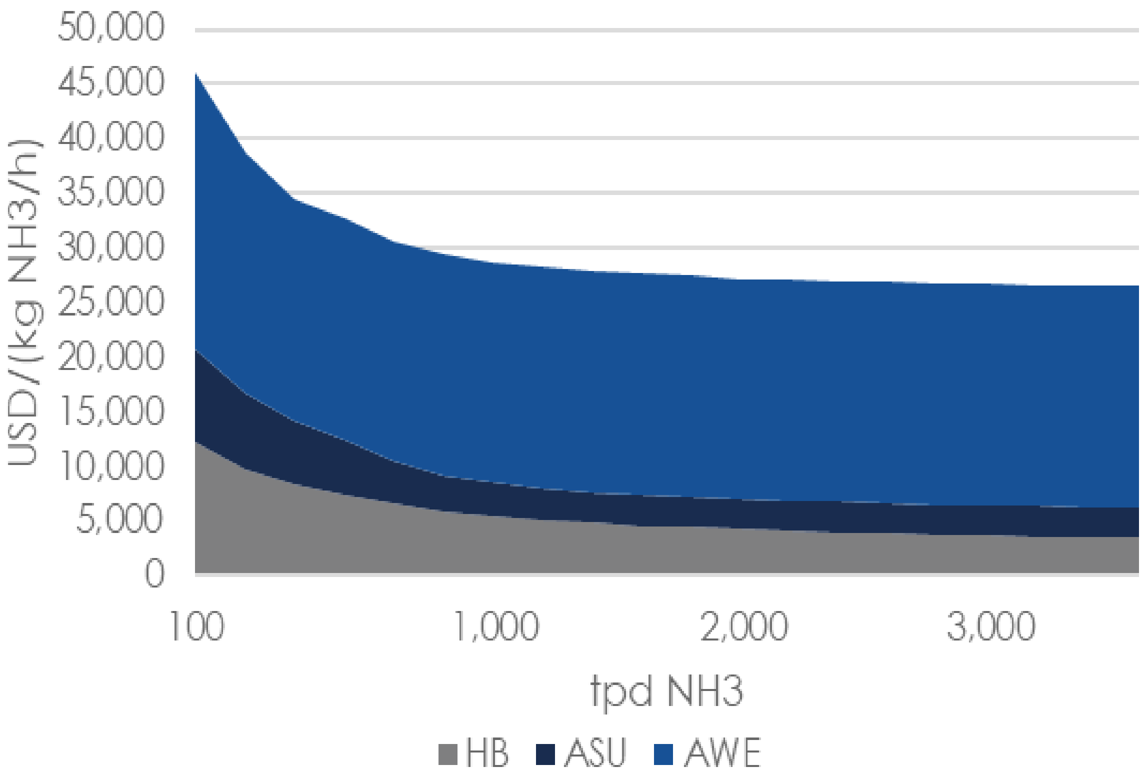
Seaport & production plants of H2 and ammonia

Solar PV park

Optimizing the Project Size

- 1.000 t of green NH3 per day (aprox. 320 ktpa); we reach 95% of possible economies of scale.
- It is feasible to down-scale or up-scale this size



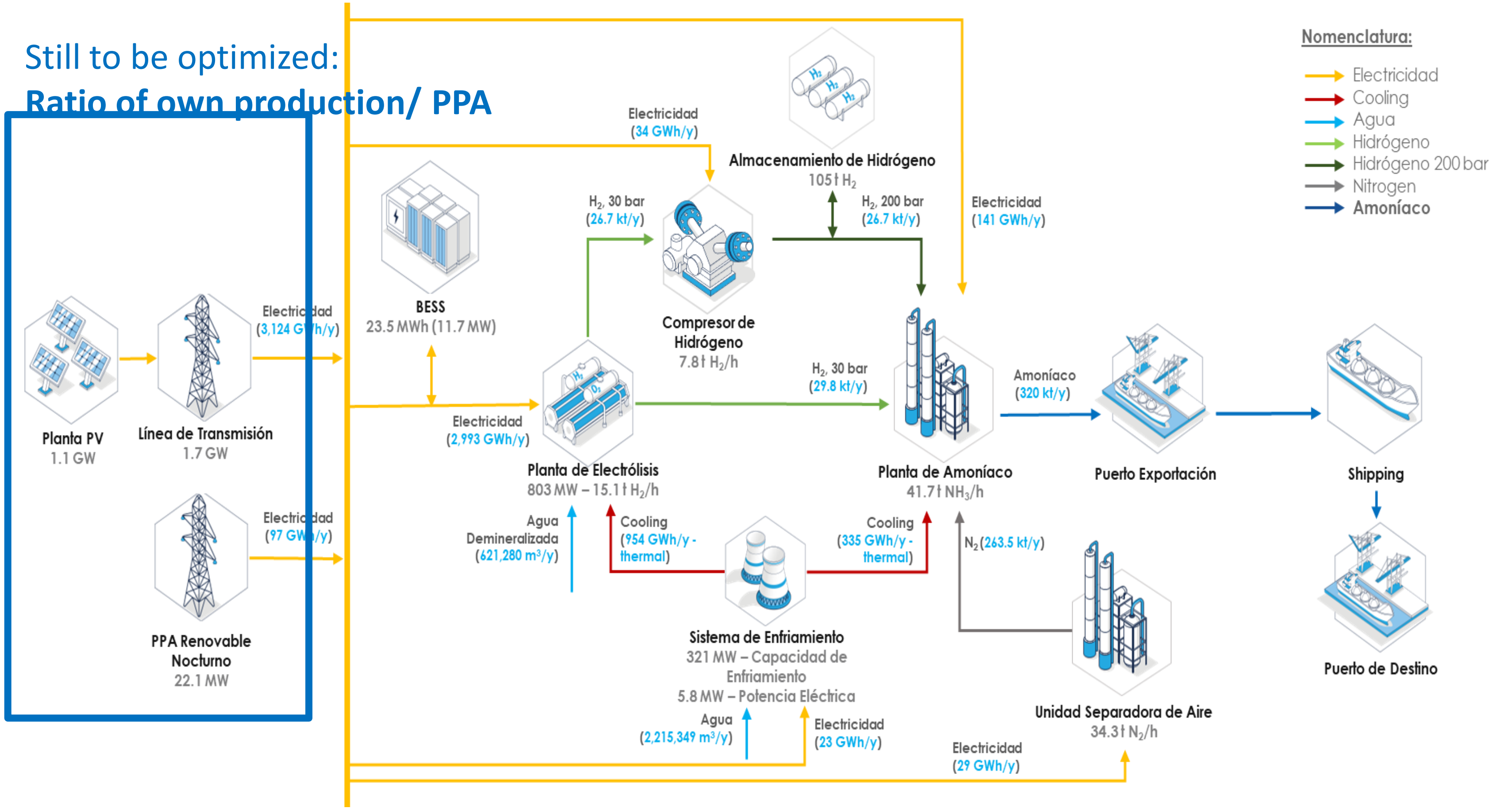


HB = NH3-production; ASU: air separation unit; AWE: alkaline electrolysis

Global System Optimization

Still to be optimized:

Ratio of own production/ PPA



Summary:

- 1,1 GW PV supply (Ratio own/PPA still to be defined)
- PPA with CSP plant and/or BESS during the night
- 800 MW Electrolysis → 56.500 t H2 / year
- **1.000 t NH3 / day →** 320.000 t NH3 / year
- Optimization through modular extension

Thank you!

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