



HVDC PROJECT KIMAL - LO AGUIRRE

International Tender Process of Chile's First HVDC Transmission Line

JAIME PERALTA
NATIONAL ELECTRIC COORDINATOR

NOVEMBER 25th, 2020

National Electric Coordinator

Independent technical organization responsible for the reliable, secure and economic operation of the national electric system

- ✓ Guarantee a secure and economic operation of the power grid
- ✓ Ensure open access to transmission system
- ✓ Other functions:
 - Administer energy, capacity and ancillary services markets
 - Planning expansion of the transmission system
 - International tender process for transmission projects
 - Monitoring market competition conditions
 - Promote innovation, research and development
- ✓ Annual budget of US\$ 50 million and 300 employees

Energy Transition

- ✓ Decarbonization & Renewable Energy
- ✓ Infrastructure Development
- ✓ System Security & Flexibility
- ✓ Digitalization & Smart Grids



Transmission Development in Chile



2011 - 2019

170 projects

US\$ 2.800 millions



2020

56 projects

US\$ 473 millions



2021 - 2025

300 projects

US\$ 3.200 millions

HVDC Kimal – Lo Aguirre Project, 1500km, > 2000 MW
Estimated Investment US\$1300 millions

¿What Transmission Infrastructure?

Efficient

**Timely
Avaliable**

**HVDC
KIMAL – LO AGUIRRE**

**Environmentally
Friendly**

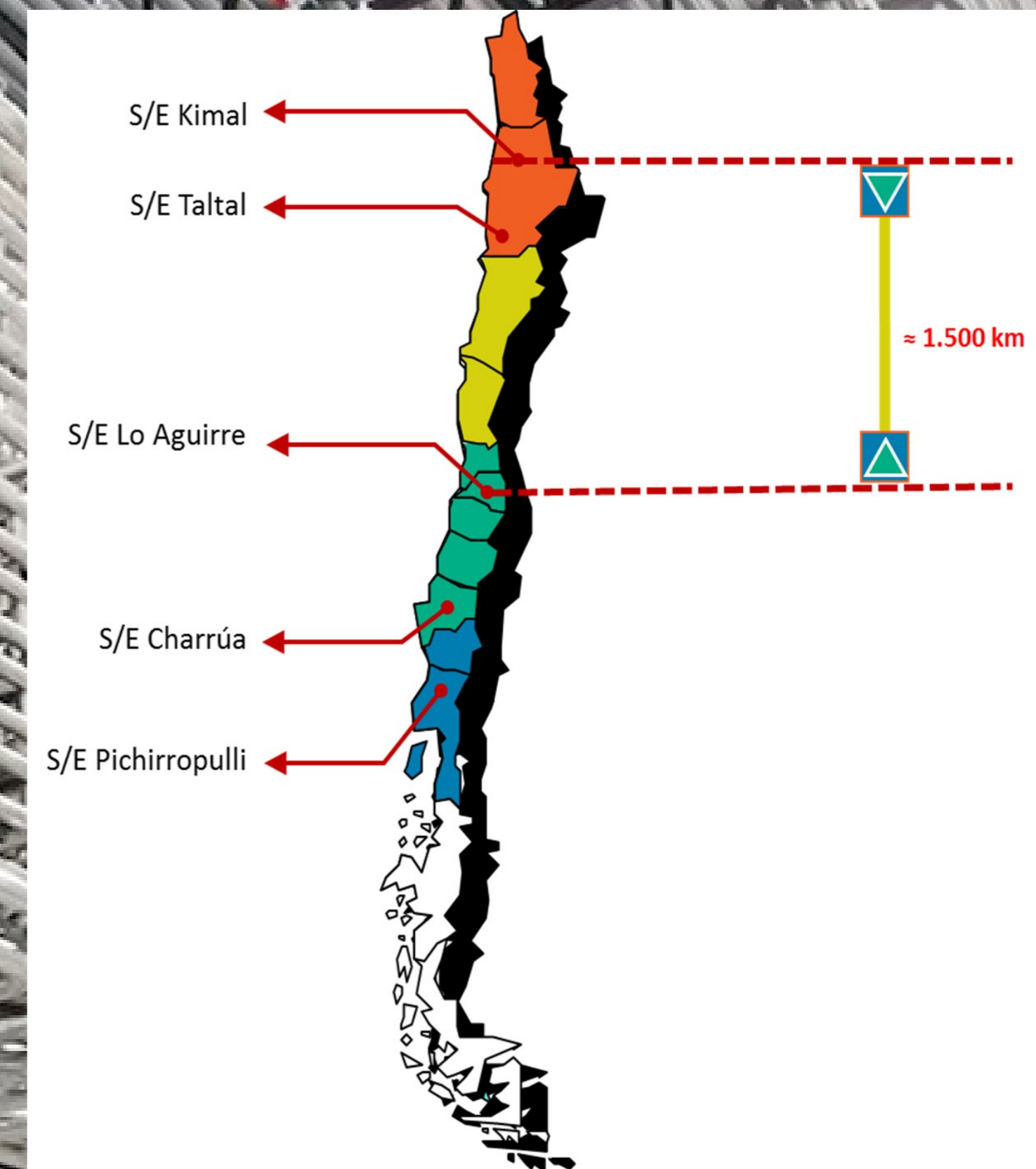
Reliable & Flexible

Benefits of the HVDC Project

- ✓ Integration of large amounts of renewable energy
- ✓ Enable decarbonization process
- ✓ Allow energy exchange between main load centers
- ✓ Make the grid more robust and resilient
- ✓ Improve grid stability against faults
- ✓ Enable future regional interconnections
- ✓ Environmentally friendly, less use of land, and lighter structures

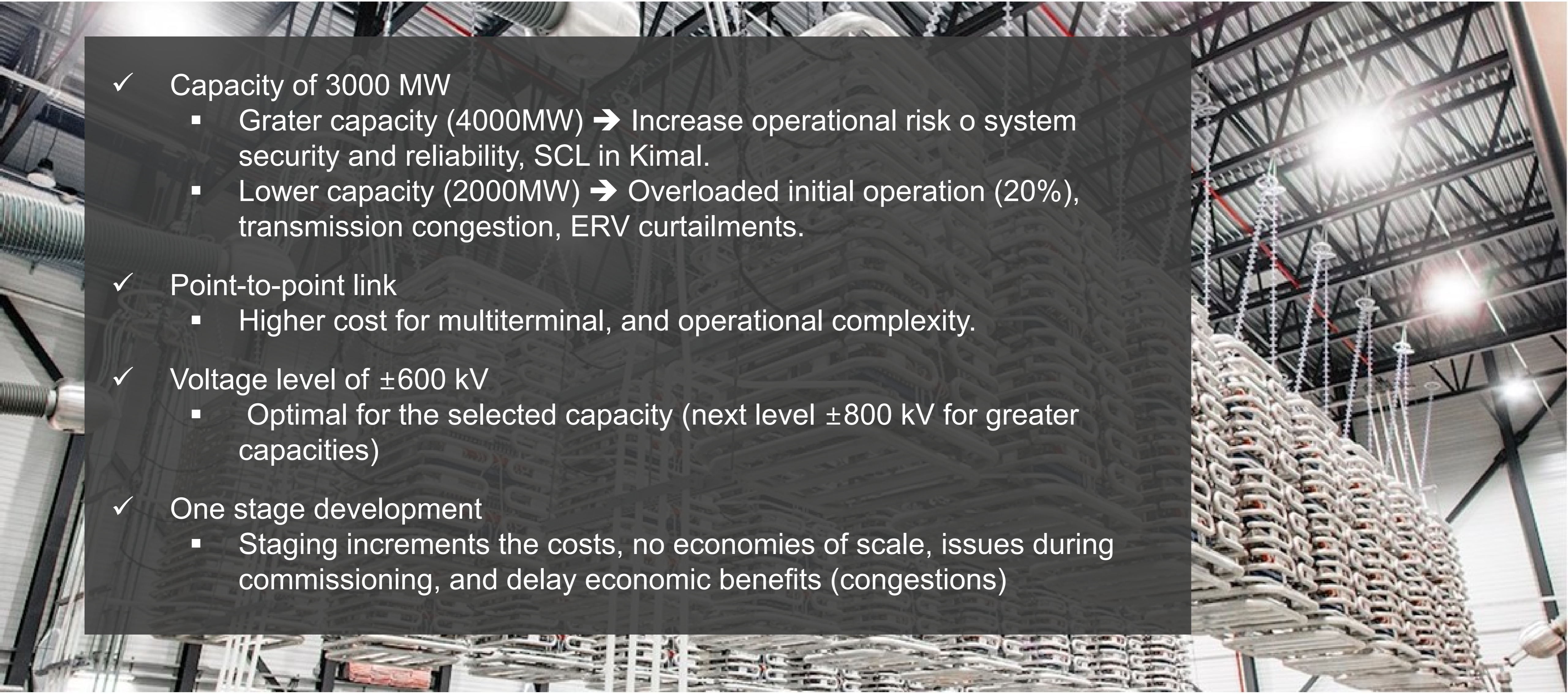
General Characteristics of the Project

- ✓ LCC Technology
- ✓ Bipolar system with dedicated metallic return
- ✓ Nominal capacity of 3000 MW
- ✓ Point-to-point of 1500 km long
- ✓ DC Voltage level of $\pm 600\text{kV}$
- ✓ Construction period 84 months
- ✓ Start of Operation in December 2028



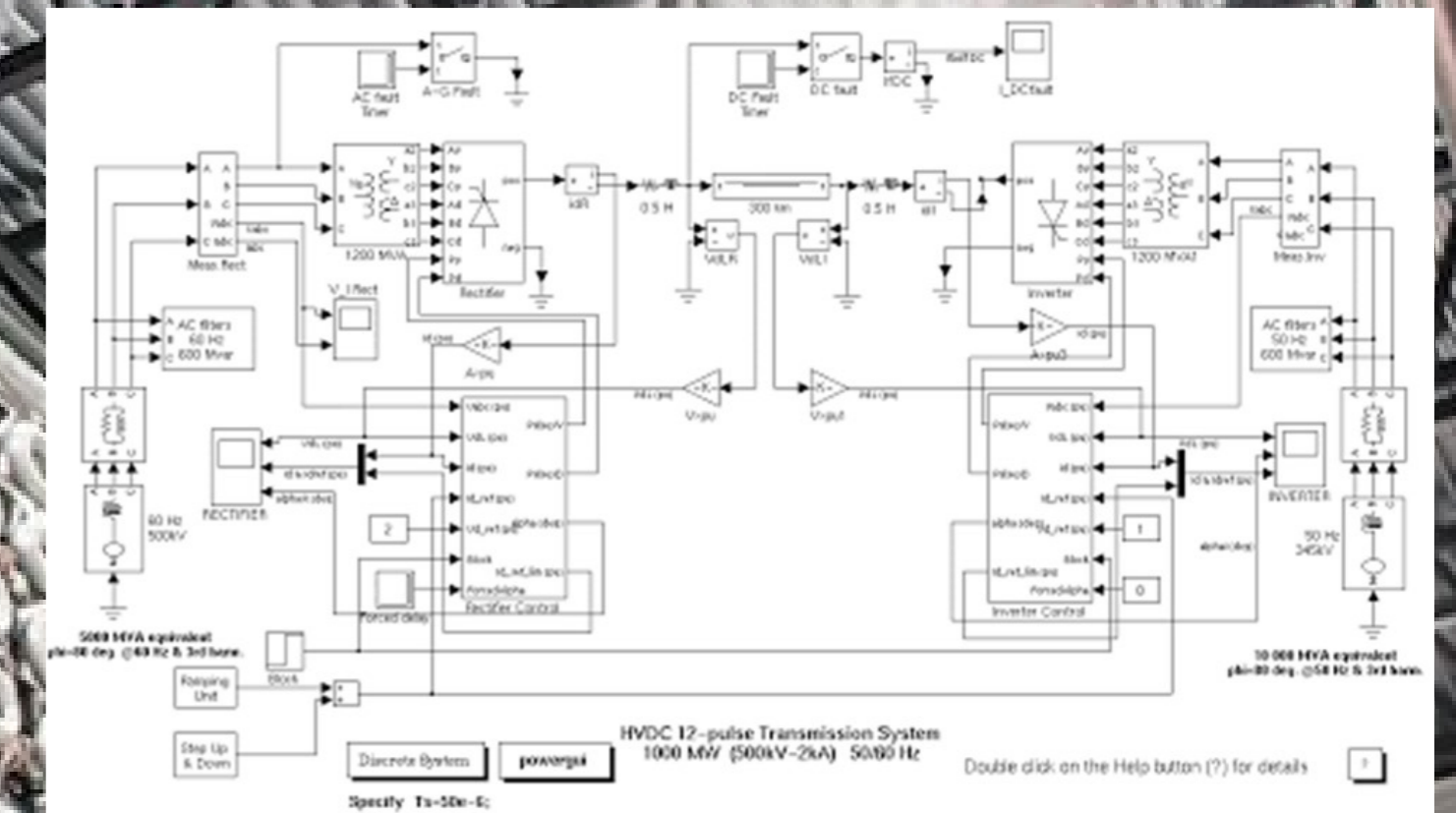
General Characteristics of the Project

- ✓ Capacity of 3000 MW
 - Greater capacity (4000MW) → Increase operational risk o system security and reliability, SCL in Kimal.
 - Lower capacity (2000MW) → Overloaded initial operation (20%), transmission congestion, ERV curtailments.
- ✓ Point-to-point link
 - Higher cost for multiterminal, and operational complexity.
- ✓ Voltage level of ± 600 kV
 - Optimal for the selected capacity (next level ± 800 kV for greater capacities)
- ✓ One stage development
 - Staging increments the costs, no economies of scale, issues during commissioning, and delay economic benefits (congestions)



Activities and System Studies

- ✓ Transgrid Solutions (Canada) – Consulting services
 - General characteristics and design
 - Power system studies
 - HVDC Technical specifications
- ✓ Dessau Engineering – Consulting services
 - Design criteria and applicable standards
 - Investment costs and schedule
- ✓ Collect system data and requirements
- ✓ Other system studies (SC, DB, impedances, harmonics measurements)



Bidding Process Schedule

No	Stage	Deadlines
1	Preliminary Bidding Terms & Conditions	October 26 th , 2020
2	Preliminary Technical Specifications	November 23 rd , 2020
3	Participant Registry, Definitive Terms & Conditions, and Specifications	February 1 st , 2021
4	Bidding Terms Acquisition	Until June 18 th , 2021
5	Questions and Answers Period	From February 1 st to April 22 nd , 2021
6	Period of Answer to Questions	May 5 th , 2021
7	Maximum deadline for modifications and Amendments to the Terms	May 12 th , 2021
8	Period for Proposal Submission by Bidders	August 2 nd to 4 th , 2021
9	Opening of Admin. And Technical Offers	August 5 th , 2021
10	Opening of Economic Offers	October 25 th , 2021
11	Project Awarding	October 29 th , 2021

120 interested parties as of today

Preliminary Bidding Terms & Conditions

- ✓ General Characteristics of the Project
- ✓ Guarantees and Policy Bonds
- ✓ Offer Requirements and Evaluation
- ✓ Opening and Awarding
- ✓ Guaranteed Performance
- ✓ HVDC Experience
- ✓ Project Milestones
- ✓ Consortia and Minimum Capital
- ✓ Spanish and English version (reference)



Preliminary Bidding Terms & Conditions

- ✓ Guarantees Policies and Performance Bonds
 - ✓ During bidding process
 - Seriousness of Bid – 2.5% of ref. VI: USD 29.4 millions.
 - Incorporation promise – USD 2.0 Millions
 - ✓ During execution
 - Project Execution, by milestone compliance – 2% of ref. VI: USD 23.5 millions.
 - Effective execution and penalties for delay of Start of Operation – 8% of ref. VI: USD 94.1 millions.
 - Performance and correct operation – 3% of ref. VI: USD 35.3 millions.
- ✓ Penalty for delays in the start of operation of the Project: 0.068% of ref. VI per day.
- ✓ Guaranteed Performance (36 months)
 - Availability and Reliability (98.5%)
 - Converter Station Losses (0.7%)



Preliminary Bidding Terms & Conditions

✓ Consortia

- ✓ SAGET (Exclusive transmission business) 99,9%
- ✓ At least during construction and up to 36 months
- ✓ Incorporated 30 days from Award Decree
- ✓ At least one legal entity must have HVAC/DC experience
- ✓ Financial background and experience must have 30% of participation.
- ✓ Minimum Capital/Equity of 1/3 of ref. VI: USD 392 millions.
- ✓ Risk Classification (minimum BB int. scale or BBB nat. scale).

✓ Experience

- ✓ 30% participation in SAGET
- ✓ Operation of HVAC (220kV or 500kV), and
- ✓ Operation or Execution of HVDC-LCC
 - Similar characteristics
 - Performance EA >97%
 - Commissioned within the last 15 years



Preliminary Bidding Terms & Conditions

✓ Bids

- Administrative
- Technical
- Economic → VATT = Annually of VI+COMA

✓ Scope of work

- Design, engineering, procurement and construction, testing and commissioning.
- Lands, easement, ROW and permitting
- Compliance with environmental regulation (RCA)

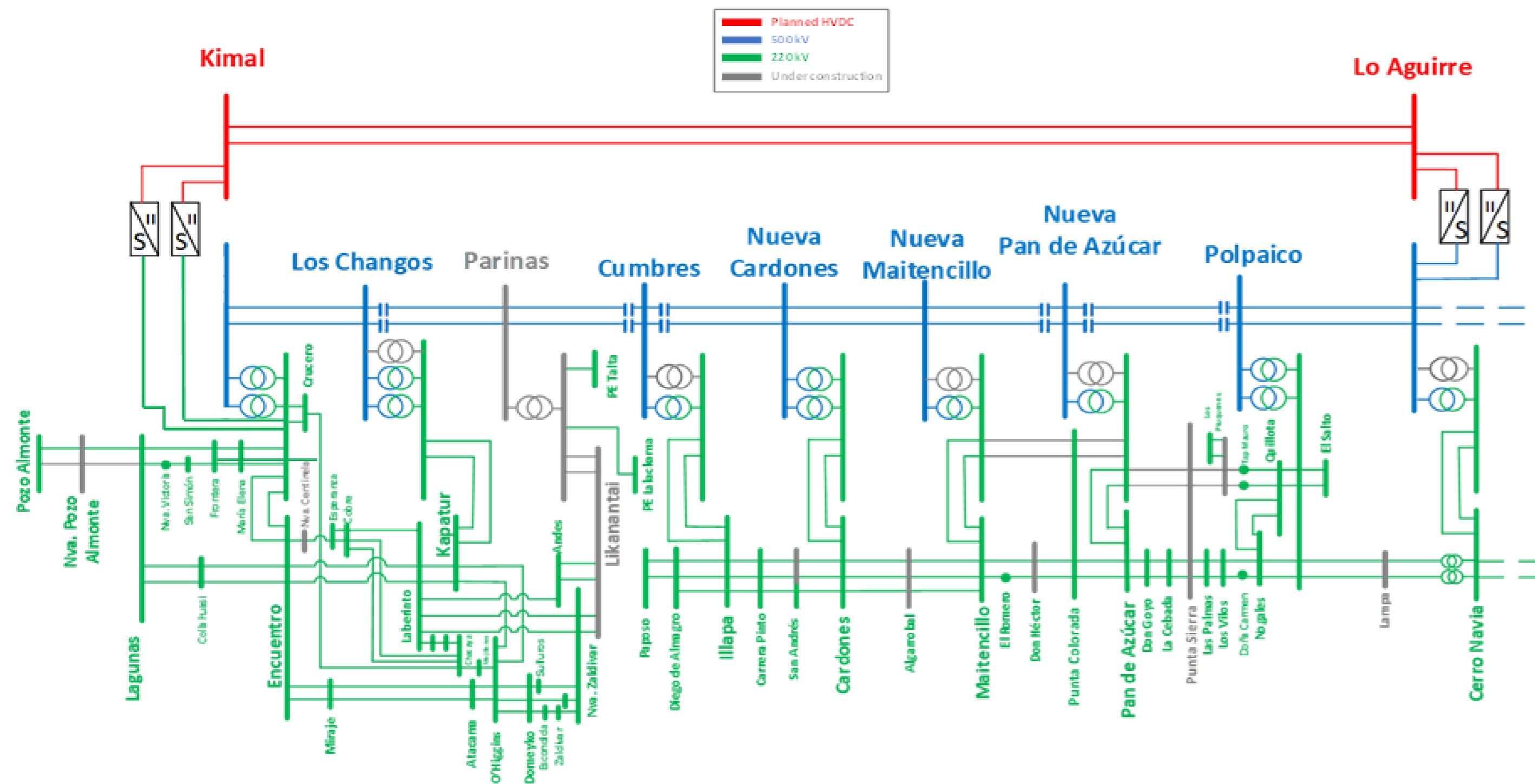


Preliminary Technical Specifications (Nov. 23rd)

- ✓ **General Technical Specifications**
 - Two double circuit AC 220kV Lines (<5km) to Kimal
 - One double circuit AC 500kV Line (<5km) to Aguirre
 - Existing SE upgrades (bays, positions)
- ✓ **HVDC Functional Technical Specifications**
 - Technical requirements for converter stations and DC transmission line
 - Studies to be provided
- ✓ **Technical Datasheets**
 - Equipment and performance



Preliminary Technical Specifications (Nov. 23rd)



Conclusions

- ✓ Enabler of the decarbonization process
- ✓ Critical infrastructure for renewables development
- ✓ System security & flexibility
- ✓ Strategic project requires new expertise in HVDC technology in Chile





Bidding Process Information

www.coordinador.cl

licitacion.hvdc@coordinador.cl





THANKS