Electrical Studies Group

Overview

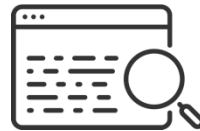**EE Group**

Background

Studies

Field Testing

R&D

EE Group
Founded: 2003

Permanent Staff

- 90 — 2024
- 71 — 2021
- 57 — 2019
- 49 — 2017

Y-axis: 40, 50, 60, 70, 80, 90

Offices

USA
Electrical Studies Corp.

Colombia
Estudios Eléctricos Colombia

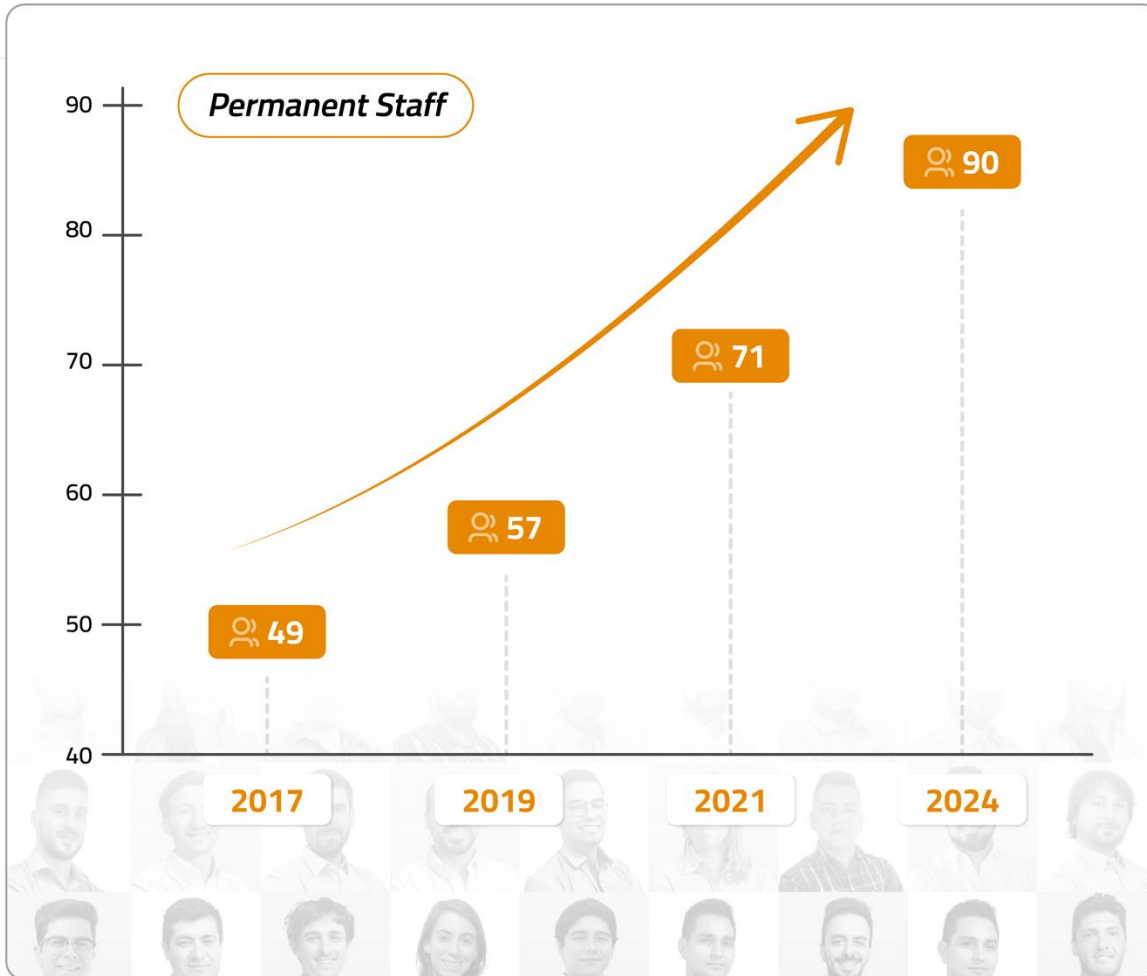**Perú**
Estudios Eléctricos Perú

Chile
Estudios Eléctricos Chile

EE Group

Operational Areas

- Field testing, modeling and commissioning.
- Interconnected System Studies
- R&D: Simulation tools development

Management Areas

- Administration
- Marketing
- Human Resources

CANADA
USA
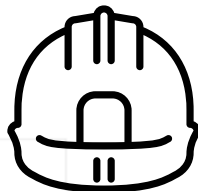MEXICO
GUATEMALA
COSTA RICA
PANAMA
COLOMBIA
PERÚ
PARAGUAY
ISLA DE PASCUA (CHILE)
CHILE

ALEMANIA
IRLANDA
REINO UNIDO
BÉLGICA
ITALIA
PORTUGAL
ESPAÑA

PUERTO RICO
EL SALVADOR
VENEZUELA

BRASIL
URUGUAY
ARGENTINA

CHAD
CONGO

CHIPRE

TURQUÍA

INDIA

COREA DEL SUR
CHINA

SINGAPUR

AUSTRALIA

Studies Department

 Interconnection Studies

 Design Studies

 Protection Studies

 Innovation & New Technologies Studies

40+ Engineers

SILENT DIG

PSCAD

PSS®E

SES

EMTP-RV
SIMULATION SOFTWARE

photon™++
YUI

CYMGrd
Distribution System Analysis

ATP LINE RL DRAW

Studies Department

Management

Ing. Alejandro Musto
MANAGER

Ing. Javier Vives
DEPUTY MANAGER

Ing. David Perrone
DEPUTY MANAGER

RMS Team
Ing. Nicolás Turturici
COORDINATOR

Operation, Control & Stability

Leaders
Advanced Project Engineers
Project Engineeers

EMT Team
Ing. Julián Vega
COORDINATOR

Design & EM Transients

Leaders
Advanced Project Engineers
Project Engineeers

PRT Team
Ing. Jorge Cano
COORDINATOR

Protection Systems

Leaders
Advanced Project Engineers
Project Engineeers

INT Team
Ing. David Perrone
COORDINATOR

Innovation & New Technologies

Leaders
Advanced Project Engineers
Project Engineeers

Studies Department

Project Engineers

- Senior
- Specialist
- Junior
- Trainee

Senior

Requirements

- **At least 6 years of Experience:** Garner a minimum of six years of experience in the field.
- **Advanced Technical Knowledge:** Attain a high level of expertise in the technical domain.
- **Software Management:** Consolidate proficiency in managing software systems, including PSSE and/or Digsilent, PSCAD and/or EMTP-RV, and Python.
- **Professional Report Writing:** Refine skills in preparing comprehensive and high-quality reports.
- **Autonomy:** Exhibit a strong sense of self-direction and the ability to work independently.
- **Personal Organization:** Strengthen organizational abilities to effectively handle complex tasks and projects.
- **English Level (B2):** Maintain an advanced level of English language skills, equivalent to level B2.
- **Personal Objectives:** Set and pursue ambitious personal and professional objectives.

Specialist

Studies Department

RMS (Connections, Control and Stability)

- Database Development
- Load Flow
- ShortCircuit
- Transtient Stabiliy
- Small Signal Stability / PSS Tunning
- Power Quality
- Voltage and Frequency regulation
- Islanding Operation
- SPS Design

Studies Department
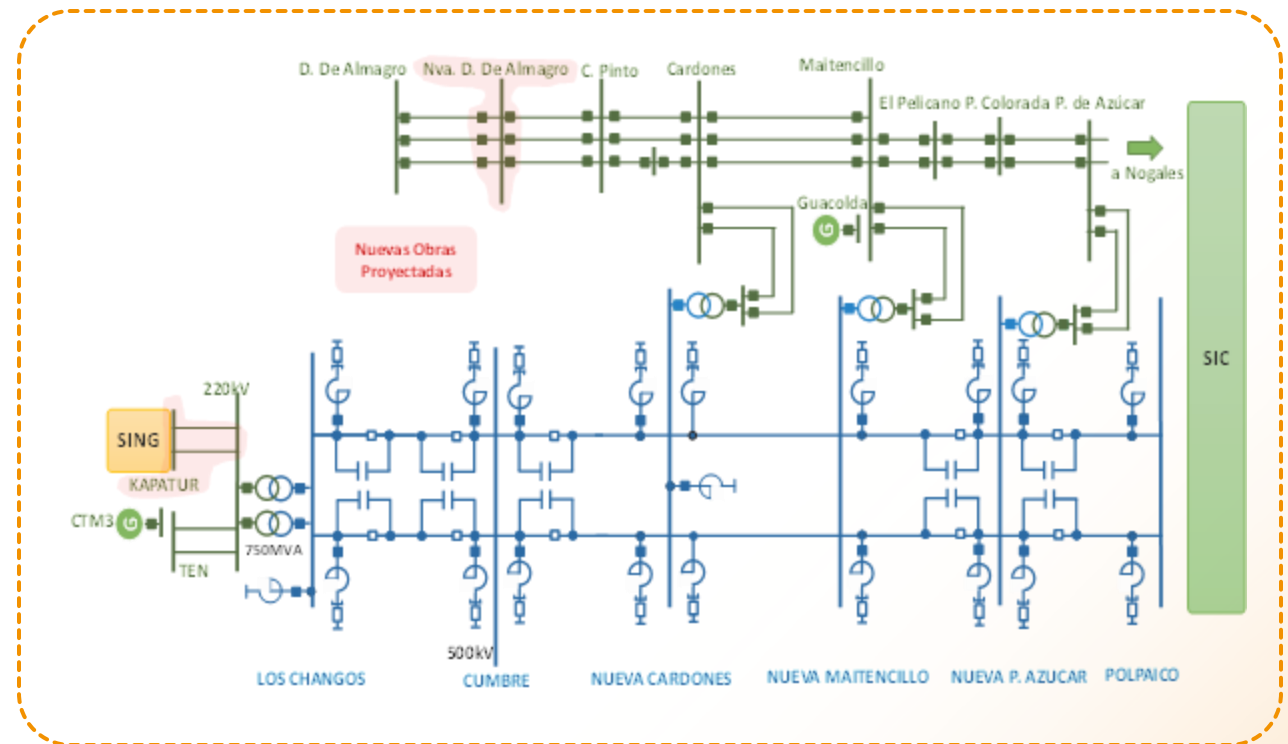
EMT / Design Studies

- Overvoltages
- Insulation Coordination
- Equipment Energizations
- Ferroresonance
- Transient Recovery Voltage (TRV)
- Reactive power compensation dimensioning
- Inductive/Capacitive equipment maneuvers
- Sub Synchronous Resonance
- Design and verification of earth meshes

S/E bajo estudio
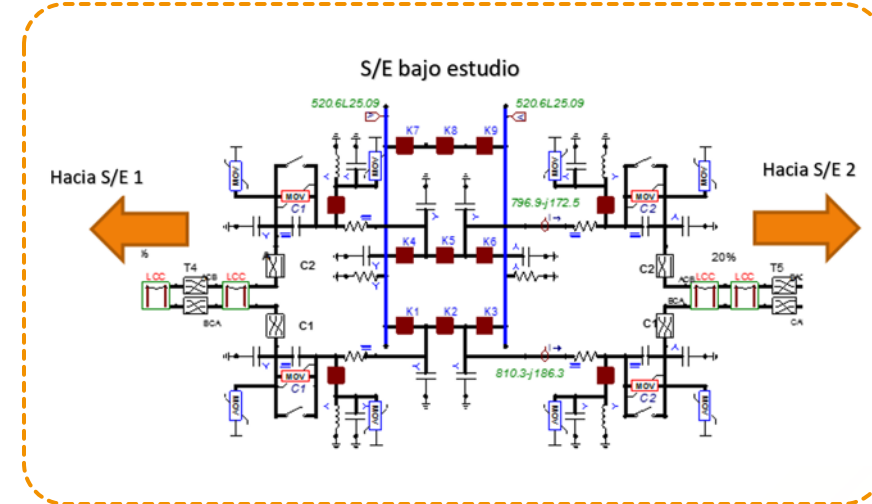
Protection Studies

- Protections adjustment and coordination
- Current Transformer Saturation
- Arc-Flash
- Faults evaluation
- RTDS & Comtrade Tests

Innovation & New Technologies

- A team of experts with specific skills and experience, carefully selected to work on a particular project.

- High adaptation capacity to identify the relevant aspects of the study, meeting the requirements and objetives of each project.

Some examples:

- HVAC / HVDC Isolated system interconnections

- Electrical System impact of Decarbonization plans

- Evaluation of new technologies to improve stability and transmission capacity (BESS, GF-IBRs)

- Specification and quantification of ancillary systems to ensure a reliable system operation

Field Testing Area

Grid Code Compliance

Audit and Performance

Electrical Commissioning
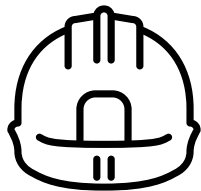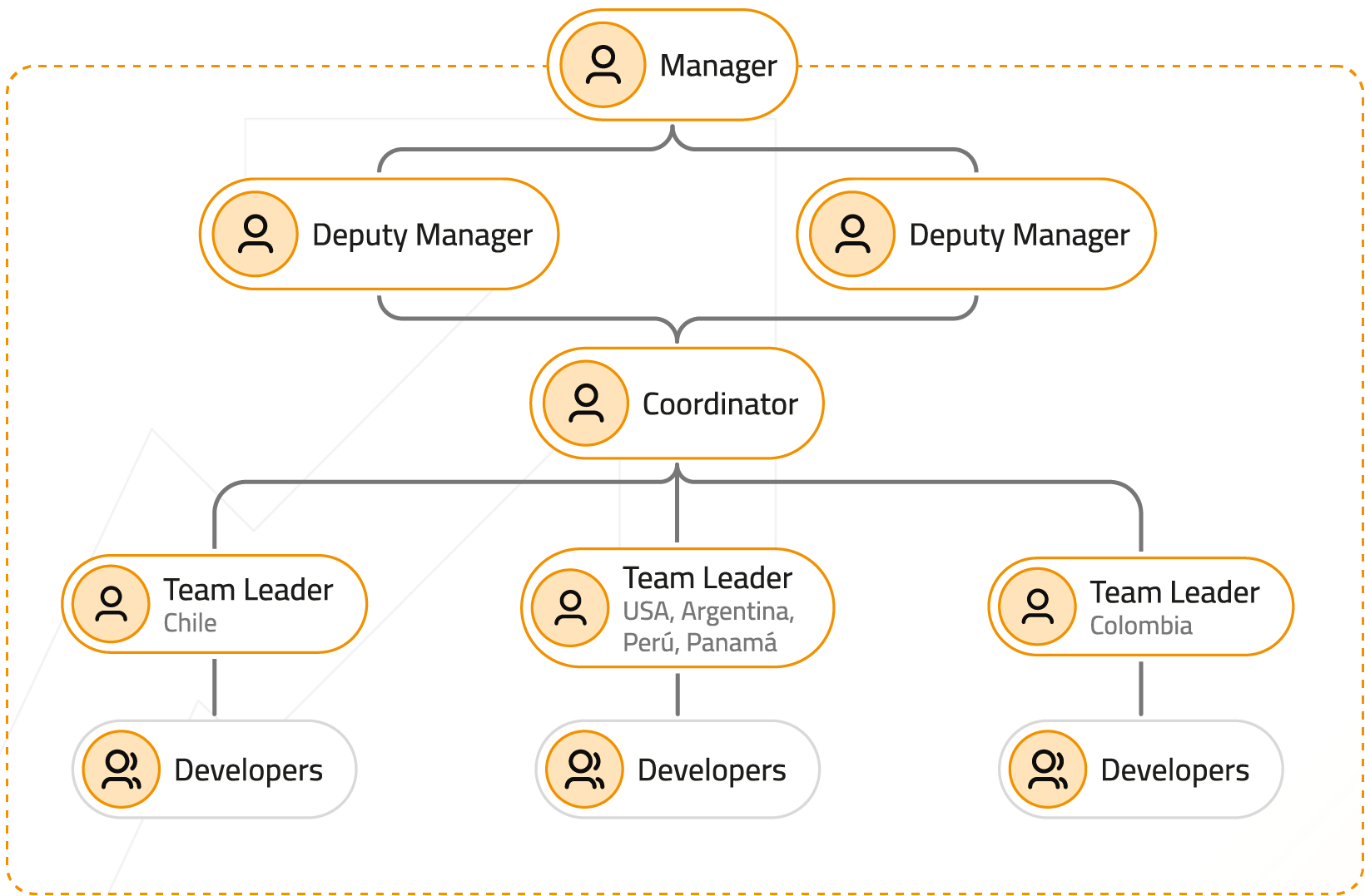
Mathematical Modelling

✓ EE-owned and certified data acquisition and monitoring equipment

✓ Capacity for Testing in face-to-face or remote format

Field Testing Area

30 Engineers

Field Testing Area

Grid Code Compliance Tests - NERC

- **Conventional (synchronous) and non-conventional (renewable) generators**

- **Excitation Systems (AVRs) y Power/Frequency governors (GOVs)**

- **Tunning and commissioning of Power System Stabilizers (PSS)**

- **Batery Energy Storage Systems (BESS)**

- **Development and validation of mathematical models of controls and generators**

Field Testing Area

Audit and Performance

- **Ancillary Servicies (voltage and frequency control, black-start and fast isolation)**

- **Performance test (maximun power, technical minimum and heat rate)**

- **Active and Reactive Power Capacity (PQ Curve)**

- **Power Quality (Flicker, Harmonics, etc.)**

Field Testing Area

Electrical Commissioning

- **Control and protection panels**

- **Power and measurement (CT&PT) transformers**

- **Synchronous generators and motors**

- **Circuit breakers and insulators**

- **Grounding and insulation systems**

- **Design and implementation of logics, interlocks and control loops**

R&D

SATURN 2e

A complet internal mathematical model

The goal:

- To analyze the correct functioning of frequency regulation.
- To optimize economic operations of the units.

A comple internal mathematical model allows SATURN 2e to adapt to every kind of operative conditions.

The strength of the implemented mathematical algorithms combined with the internal microprocessor's calculation ability make the SATURN 2e an incredibly reliable device.

SATURN 2e allows the ISOs to know, in real time, the different PFR indicators (Dead Band, Droop and Settling Time) of the units participating in this ancillary service. Based on that, ISOs are able to take actions, such as, including more units that regulate frequency and/or increasing the spinning reserve for certain units.
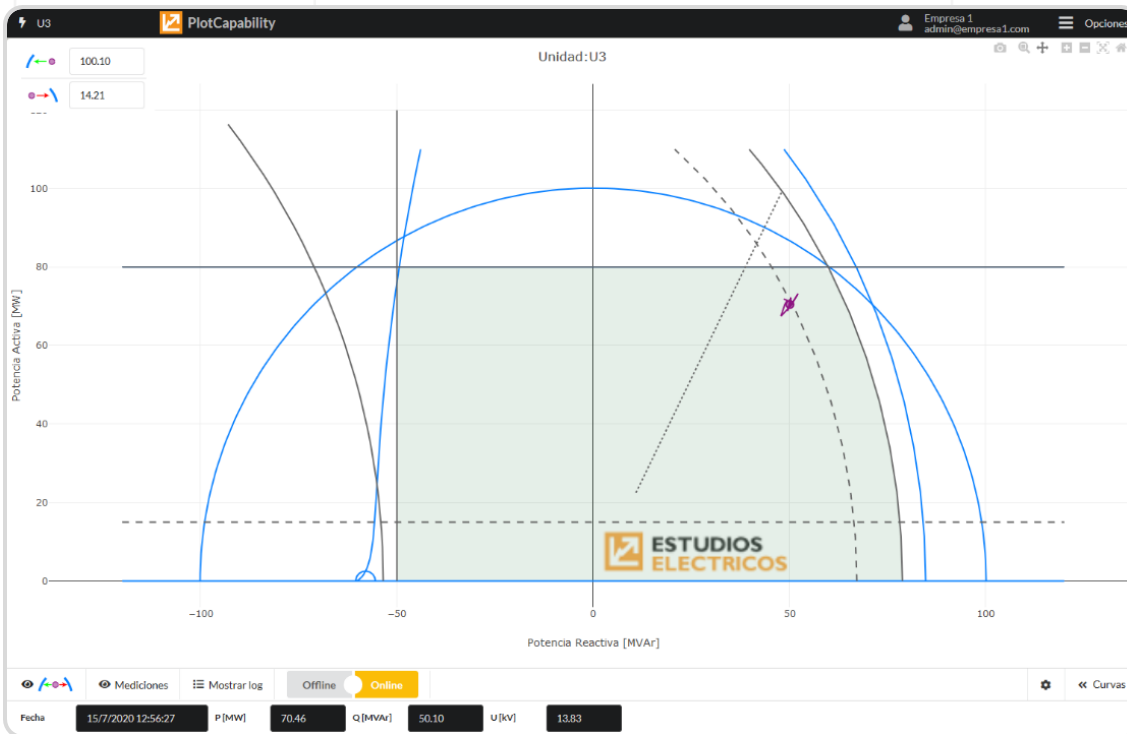
# PLOT CAPABILITY
Web (v5.0)

PlotCapability Web is a powerful monitoring tool for Power Plants Reactive Power operation. Through this application, it is possible to know in real time whether a generator is operating within the safe area. In addition, the user is also able to monitor the under and over excitation limits (OEL, UEL) and protections of the generator as a function of the real time voltage

Photon is a powerful and easy-to-use general-purpose simulator, optimized for electric power systems controls. With more than 15 years of development and testing, it is a stable and robust software.

Photon is a simple, fast and effective way to build and simulate tailor-made dynamic system models using block diagrams.

Photon uses a powerful simulation engine developed by Estudios Eléctricos: Freesim 6. This simulation core is highly optimized towards maximizing the speed of the calculation process.
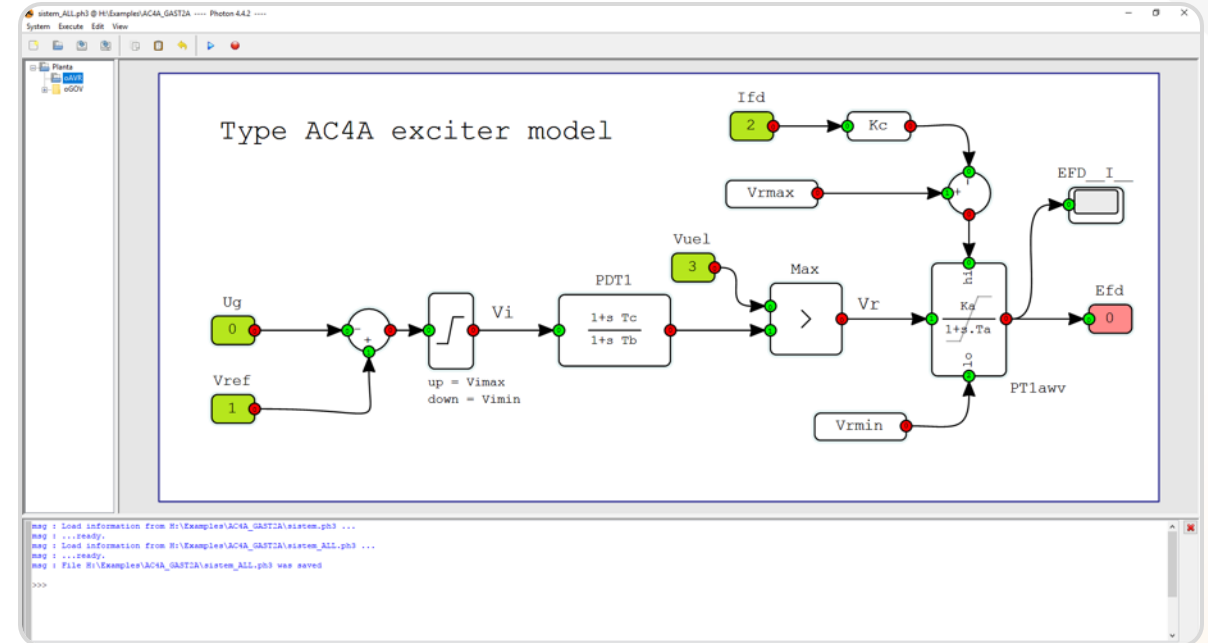
FORTRAN CONVERTER MODULE is one of the key modules within Photon. It is required for converting control models into Fortran programming language. Therefore, any electric generator´s control developed in accessible block diagrams can be translated into a Fortran user model.

Clients

System Studies @2023:

→ **INDIA - Pang-Kaithal** → 13GW Renewable & Storage + 4x1250MW VSC HVDC Link

→ **CHILE - HVDC Kimal – Lo Aguirre** → LCC Bipole /1500km / 3000 MW / 600kV

→ **CHILE - BESS Parinas – Lo Aguirre** → 2x500MW Storage as virtual transmission

→ **CYPRUS – Euroasia HVDC** → 1000MW Multiterminal VSC Link

→ **PANAMÁ – ETESA** → System study to optimize the overall transmission operation

Modeling and Field Testing:

→ **US - MOD 026/027 Field tests and Model Validation** → PV Rising Tree 200MW & GT Algoma

→ **PANAMÁ - ETESA** → Tests and model validation on units of different technologies

→ **GLOBAL - Equipment Model Development** → NIDEC / Fimer Inverters, PPC, BESS
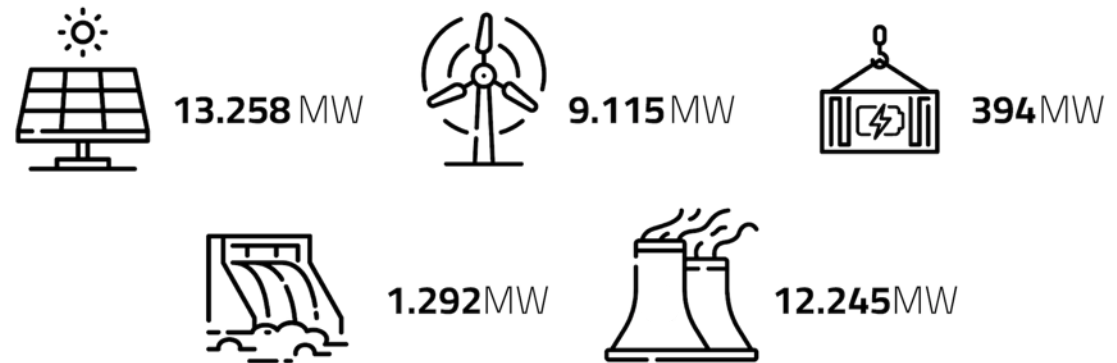
→ Different Grid Codes: AEMO, México, USA

Background – Relevant Generation Projects

Interconnection and Field Testing:

→ **CH Alto Maipo –** 570 MW Chile

→ **PF CEME –** 380 MW Chile

→ **PE Lomas de Taltal –** 350 MW Chile

→ **PF+BESS Andes IIB –** 180 MW Chile

→ **PF Caucharí Solar –** 300MW Argentina

→ **PF Don José –** 215MW México

→ **PE Marcona –** 130 MW Perú

→ **PF El Coco** – 150 MW Panamá

→ **CC Costa Norte –** 400 MW Panamá

→ **CC Gatún –** 670 MW Panamá

→ **PF Fundación** – 100 MW Colombia

→ **PF Guayepo 1 & 2** – 400 MW Colombia

More than 35GW in Interconnection Studies:

13.258 MW   9.115 MW   394 MW

1.292 MW   12.245 MW

More than 58GW in Field Testing:

7.365 MW   4.001 MW   258 MW

16.146 MW   30.724 MW