International Centre for Hydropower

CPD MEMBER The CPD Certification Service

Norad

30 years

MODELING INTEGRATED POWER MARKETS

Building practical skills for connecting power system modeling with market perspectives.

JOHANNESBURG, SOUTH AFRICA 26–30 May 2025

Application deadline – 18. April 2025

*Course fee €1000,- *(inkl. accommodation & meals*)*

Women are encouraged to apply.

Collaborating partners

Open Energy Transition

Bredesen Consulting

GAINING THROUGH TRAINING

MODELING INTEGRATED POWER MARKETS

RATIONALE

Across Africa, energy sectors are evolving with increasing focus on regional integration, market development, and renewable energy expansion. Understanding both the technical operation of power systems and the market frameworks that govern them has become essential for professionals in the sector.

This program responds to the growing need to bridge technical modeling capabilities with market and regulatory perspectives. As power pools across Africa continue to develop their trading platforms and market structures, the ability to analyze technical constraints and translate them into market implications becomes increasingly valuable. By focusing on key areas where energy system limitations and market design intersect, this program offers practical insights that bridge the gap between engineering and economic considerations in power system planning and operation.

COURSE DESCRIPTION

This five-day program introduces the fundamental connections between power market frameworks and practical modeling approaches. Using PyPSA models and guided exercises, participants will explore how technical limitations impact market outcomes and how market designs influence system operation.

The course focuses on two critical areas where technical and market perspectives meet: transmission constraints and renewable energy integration. Each topic is explored through a combination of market concept presentations, modeling demonstrations, and hands-on activities using simplified but realistic scenarios.

COURSE OBJECTIVES

- Develop an integrated understanding of power market structures and technical modeling tools
- Learn to use PyPSA to model and analyze specific market challenges relevant to power systems
- Understand how to interpret modeling results to inform market and policy decisions
- Gain practical insights to analyze transmission constraints, renewable integration, and cross-border trading
- Build capacity to contribute to energy planning and policy development from both technical and market perspectives
- Apply key concepts to relevant challenges in participants' home contexts

Women are encouraged to apply.

COLLABORATING WITH LOCAL PARTNERS TO IMPROVE SKILLS FOR ENERGY SECTOR PROFESSIONALS

MAIN TOPICS

- Power Market Fundamentals: Market structures, pricing mechanisms, and regulatory frameworks
- Energy System Modeling Principles: Introduction to PyPSA and modeling approaches
- Transmission Analysis: Modeling network constraints and understanding congestion impacts
- Renewable Energy Integration: Modeling variable generation and analyzing system impacts
- Regional Power System Integration: Cross-border trading mechanisms and interconnected systems
- Investment Decision-Making: Translating modeling results into practical market applications
- Implementation Strategies: Applying technical and market insights to local contexts
- Participants will receive preparatory materials and basic PyPSA instruction before the in-person program to maximize hands-on learning during the course.

TARGET GROUP

- This course is designed for professionals who work at the intersection of technical and market aspects of power systems, or who need to better understand the other domain:
- Power market professionals seeking to understand technical modeling implications
- Engineers and technical specialists wanting to grasp market context for their work
- Regulatory staff involved in both technical and market rule development
- Utility planners working on system expansion with market considerations
- Energy ministry officials developing integrated policies
- Academics and researchers focused on applied energy system analysis
- Participants should have a background experience in either power markets OR technical aspects of energy systems.

ADMISSION REQUIREMENTS

- Minimum of 5 years of working experience.
- An applicable degree or relevant background knowledge in either power markets or energy systems.
- Proficiency in English.
- Basic computer skills and familiarity with spreadsheets.
- A commitment to implementing learned skills and knowledge in their respective workplaces.
- Applicants MUST diligently complete the application form before submission.
- Please ensure your completed application is received no later than the given deadline – 18th April
- ICH reserves the right to accept or reject any applicant based on their qualifications and experience.

Participants will receive preparatory materials
and basic PyPSA instruction before the in-person program
to maximize hands-on learning during the course.

PRE-COURSE PREPARATION

To maximize learning during the program, participants will be provided with:

- Introductory reading materials on PyPSA. A brief online tutorial will precede the on-site training.
- A short questionnaire to assess individual learning needs and experience levels
- Participants are strongly encouraged to complete these preparatory materials before arrival to ensure a common foundation for the course.

GENERAL

All lecturers and resource persons are well-known specialists within their fields, bringing extensive international and regional experience in both power markets and technical modeling.

Attending the course provides a unique opportunity to discuss current challenges with professionals from across the continent and abroad. Participants are encouraged to bring along information about specific energy market or modeling challenges from their own contexts to enrich group discussions.

The application form can be accessed at the ICH website – www.ich.no. Notification of admission will be issued shortly after the application deadline.

Information on travel, the course program, and other relevant details will be sent to participants in due course. Arrival is expected the day before the course starts, and departure no earlier than the day after the course ends.

COURSE FEE

The course fee includes lectures, materials, accommodation, meals*, and a social program if applicable. International travel expenses are not included.

There is a reduced fee for ICH members. A limited number of sponsored seats are available for participants from countries prioritized by NORAD (Norwegian Agency for Development Cooperation).

Those who would like a guaranteed seat on the course should secure their own funding.

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