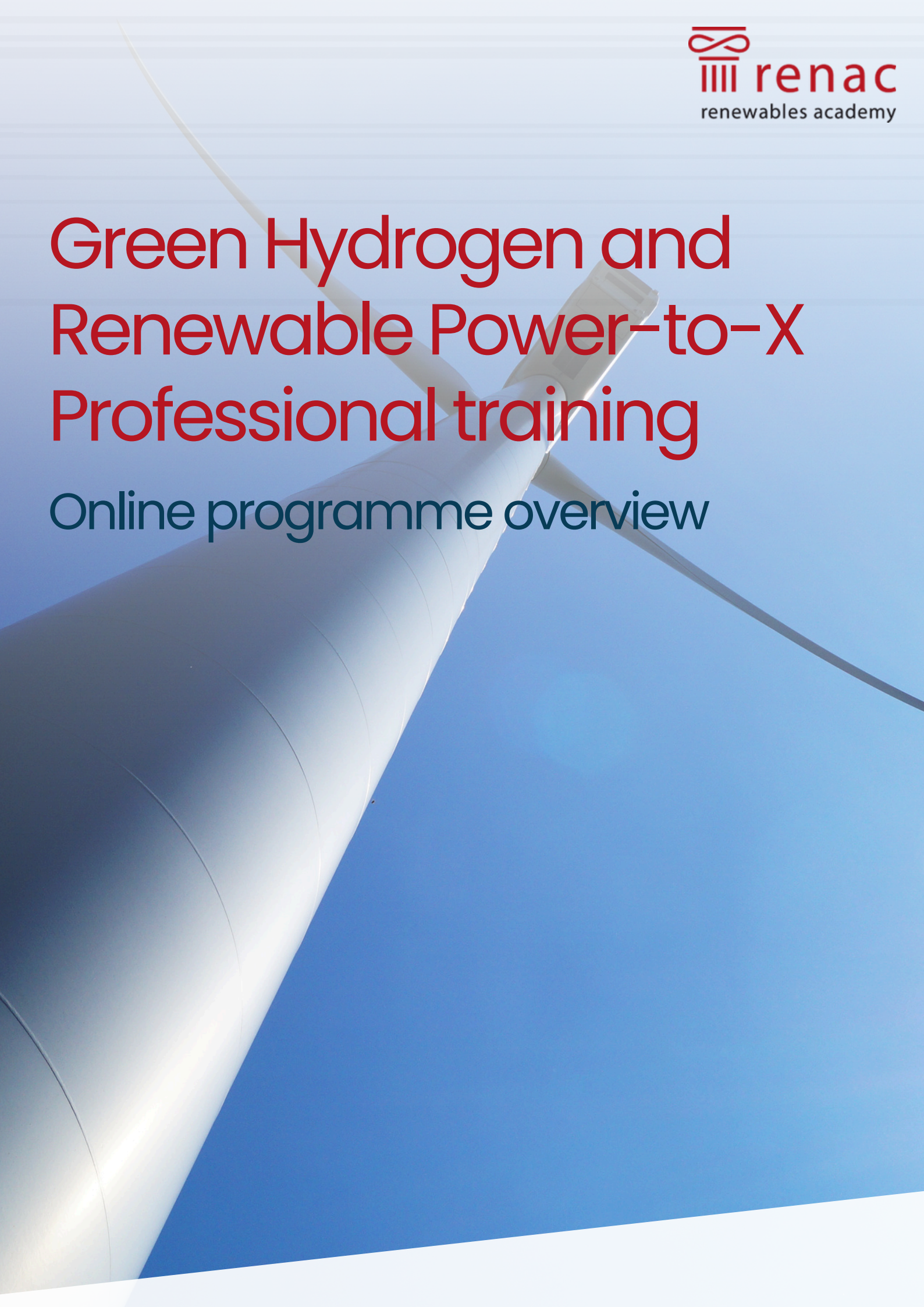
renac
renewables academy

Green Hydrogen and Renewable Power-to-X Professional training

Online programme overview



COURSE OVERVIEW & ENROLLMENT INFORMATION

INTRODUCTION

The Green Hydrogen and Renewable Power-to-X Professional introduces the main technical and economic aspects of PtX, including hydrogen, heat pumps, and e-mobility. It covers PtX terminology, current trends, energy storage, AI in energy, and project bankability from a banker's perspective. A practical exercise on green hydrogen generation costs is also included.

THIS PROGRAM IS SUITABLE FOR THOSE WHO ARE:

- Planning or transitioning into a career in renewable Power-to-X
- Identifying and evaluating green hydrogen market opportunities
- Setting frameworks for Power-to-X applications
- Working with stakeholders in project appraisal.
- Having basic knowledge of finance, business, wind, and PV sectors
- Experienced in using Excel

LEARNING OBJECTIVES

- Explain the purpose and potential of Power-to-X
- Compare energy storage applications and technologies
- Describe hydrogen's role as an energy carrier for a sustainable future
- Evaluate economic and environmental aspects of heat pump technologies
- Explain e-mobility for passenger cars and grid impacts
- Apply AI to improve the renewable energy sector
- Collect data for bankability assessments
- Calculate economic parameters of green hydrogen

SCHEDULE & ORGANISATION

STARTING DATES	Spring I Fall semester each year Start date: 1 April / 1 October
ESTIMATED WORKLOAD	• 120 hours in total • 5 - 10 hours study time per week • 6 Live webinars • Assignments
FEES	€ 1710 Payment methods: VISA, MasterCard, American Express, PayPal, Invoice
DISCOUNTS	Early Bird 10%, Alumni 10%, Group 5% (min. 2 courses)
REGISTRATION	You can register online: Shop - RENAC

DEADLINES

Early bird deadline:
20 February/ 20 August

Registration deadline:
30 September / 31 March

LEARNING OBJECTIVES & CONTENT OF THE COURSES

OPTIONAL AND MAIN COURSES

Optional Courses

Elective (non-mandatory) courses – 50 hours:

- Introduction to electricity
- Introduction to the solar resource
- Planning of large-scale grid connected PV systems
- Introduction to wind resource
- Wind power - planning and measurement

Main Courses

Main (mandatory) courses – 120 hours:

- Power-to-X (PtX): applications and cost developments
- Heat Pumps
- Energy Storage: application and technology
- Introduction to hydrogen
- E-mobility for private transport and charging Infrastructure: an introduction
- Co-benefits from Artificial Intelligence (AI) in RE
- RE feasibility assessment and investment valuation
- RE project Finance

MAIN COURSES

Power-to-X: applications and cost developments

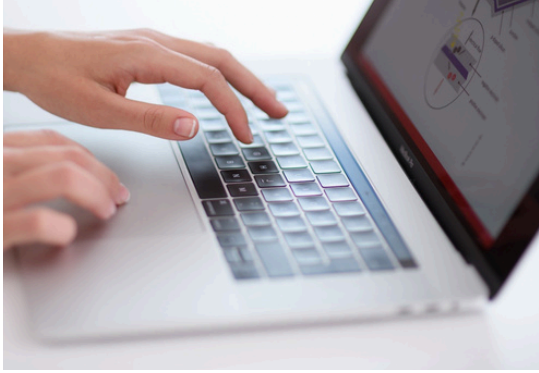
After completion of this course, participants will be able to:

- Explain the concept of sector coupling as well as the opportunities and challenges associated with it
- Compare the status quo of available technologies for sector coupling in the heating/cooling sector and in the transport sector
- Outline the generally expected future developments regarding technology options and costs

Content

- Introduction to sector coupling
- Direct electrification in the heating and cooling sector
- Direct electrification in the transport sector
- Indirect use of electricity
- Renewable hydrogen in steel production
- Renewable methanol
- Regulatory framework
- PtX supply chain examples

LEARNING OBJECTIVES & CONTENT OF THE COURSES



MAIN COURSES

Heat pumps

After completion of this course, participants will be able to:

- Describe a heat pump, including its components and working cycle
- Classify different heat pump working modes
- Evaluate efficiencies to compare technologies and use cases
- Describe different heat pump technologies and their applications in terms of their performance and use in different climate zones
- Classify refrigeration fluids according to their applications, global warming potential, and method of disposal

Content

- Definition of a heat pump, its components and its working cycle
- Introduction to the parameters related to environmental and financial performance
- Existing heat pump technologies and their applications
- Heat pumps and their application in different climate zones
- Refrigerant fluids

Energy storage – application and technology

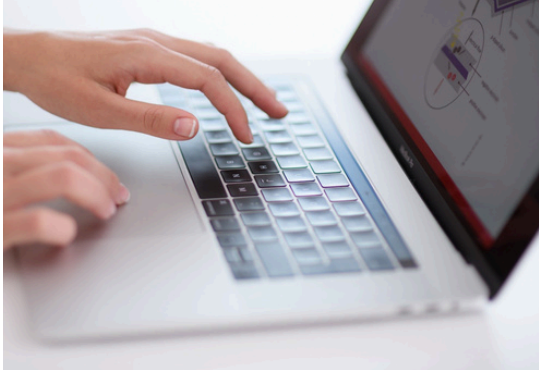
After completion of this course, participants will be able to:

- Describe the purpose and future role of energy storage systems (ESS)
- Classify storage technologies
- Calculate specific costs and compare different economic aspects of ESS
- Explain how different energy storage technologies complement each other

Content

- Storage systems: components, technologies, and integration strategies
- Terminology and definition
- Energy storage system classification
- Storage applications in different sectors
- Mechanical energy storage systems
- Electrical energy storage systems
- Electrochemical and chemical energy storage systems
- Thermal energy storage (TES)
- Economics of energy storage systems
- Competition among technologies

LEARNING OBJECTIVES & CONTENT OF THE COURSES



MAIN COURSES

Introduction to hydrogen

After completion of this course, participants will be able to:

- Explain the basic components of a hydrogen-based energy system and infrastructure
- Describe the current uses of hydrogen, its production methods, and value chains
- Describe the opportunities and limitations of hydrogen as a future energy carrier
- Developing a sustainable energy future
- Understand the current status of hydrogen policies in the international arena

Content

- The element hydrogen (H)
- Energy related properties of hydrogen
- Types of hydrogen applications
- Hydrogen generation and fuel cells
- Hydrogen infrastructure
- System integration / sector coupling (Power-to-X) PtX
- The cost of hydrogen
- International hydrogen strategies and roadmaps

E-mobility for private transport and charging infrastructure

After completion of this course, participants will be able to:

- Justify why the transport sector must contribute to climate protection
- Name different types of electric cars and their efficiencies
- Explain the elements of the charging infrastructure

Content

- Transport and sustainability
- Electric vehicles for private transport
- Private EV charging infrastructure
- Payment systems for charging stations

AI for Renewable Energy and for Sector Coupling

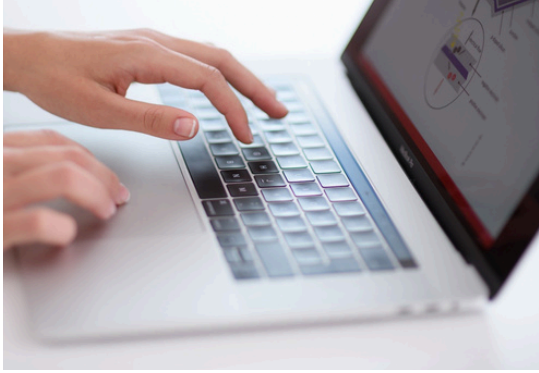
After completion of this course, participants will be able to:

- understand foundational AI concepts, terminology, and learning paradigms
- explain how AI contributes to the clean energy transition and aligns with the UN Sustainable Development Goals (SDGs)
- assess practical applications of AI
- identify and evaluate AI solutions for RE forecasting, grid balancing, demand-side flexibility, and energy trading
- analyse AI applications in sector coupling
- make informed decisions on integrating AI into low-carbon energy strategies and climate protection efforts.

Content

- Artificial intelligence and its co-benefit
- AI terminology, concepts, and algorithms
- Assessments of AI in the literature
- AI use cases in renewable energy (RE)
- Use case identification and employment

LEARNING OBJECTIVES & CONTENT OF THE COURSES



MAIN COURSES

Renewable energy project finance

After completion of this course, participants will be able to:

- Explain the different financing options for renewable energy projects in principle and the project finance option in more detail
- Perform a risk assessment for renewable energy projects
- Understand a bank‘s perspective of the risks related to PV, wind, and biogas plants
- Collect the data required for a bankability assessment of a renewable energy project

Content

- Available financing options
- SPV contract negotiation
- Business planning
- Bankability assessment
- Financial engineering
- Examples

Renewable energy feasibility assessment and investment valuation

After completion of this course, participants will be able to:

- Explain basic financial principles including the time value of money and how to determine the cost of capital
- Understand capital budgeting tools to assess renewable energy investment attractiveness.
- Calculate important economic parameters to assess the viability of a renewable energy project
- Explain the concepts of risk and uncertainty as well as risk assessment instruments

Content

- Basic financial principles and concepts
- Financial performance indicators
- RE project risk and uncertainties

LEARNING METHODS & ONLINE PLATFORM FEATURES

IMPORTANT FEATURES

- Interactive learning platform
- Multilanguage platform
- Forum for participants
- Integrated Glossary
- Feedback questionnaires
- Stream/Download videos
- Live lectures
- Self-quizzes/Online exams
- Certificates

EARN YOUR CERTIFICATE

- Digital Certificate of Completion (final grade 70% or above)
- Digital Certificate of Attandance (final grade below 70%)

TECHNICAL REQUIREMENTS

- An e-mail address, which is regularly checked
- A stable internet connection (at least 2 Mbit/s)
- We use Zoom for webinars
- Headset or speakers are required to participate on webinars

Programme certified by ZFU (German Central Office for Distance Learning – official quality standard for distance learning in Germany)

DEMO COURSE

For a first impression of our online platform, have a look at our demo course: Demo Course

Contact

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Scan to start your learning journey

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