



Renewables Academy RENAC

Course Program

Renewable Energy
Energy Efficiency





Welcome to Berlin!

RENAC is based right in the heart of Berlin. Just a few minutes away from our seminar and training center is 'Alexanderplatz' with its famous Berlin TV Tower. Close to RENAC there are many good restaurants, cozy cafes and bars, shops, theaters and museums. Combine a training course at RENAC with an exploration of Berlin's metropolis – our team will gladly help you in organizing a city tour, give you tips about the most beautiful corners of the city, help you with your hotel booking and answer any other questions so that you have an enjoyable stay.

Contact us for further information:

Renewable Academy AG (RENAC)
Schönhauser Allee 10-11
10119 Berlin
Germany
Tel.: +49 (0) 30 52 689 58 70
Fax: +49 (0) 30 52 689 58 99
E-mail: info@renac.de

www.renac.de





Hello from RENAC

If the use of renewable energy is to spread effectively, the various stakeholders involved must have the right technical or economical expertise. From politicians, who create the appropriate policies, through providers of finance, project managers, to the actual engineer or technician who ultimately builds and maintains the plant – our courses have something to offer for each of these. Additionally, we place a great emphasis on practical use of the knowledge. RENAC courses open up the material through hands-on training, case studies, field trips, exercises, group presentations and discussions. Feedback from our course participants clearly shows us that we are on the right track with our training approach.

Your RENAC Team

What our course participants say about us:

“Thanks so much for the excellent organization, and for sharing such wonderful knowledge with us. We came back buzzing with information, ideas and knowledge, and couldn’t wait to get started.”

Georgie Benardete, The Climate Project, Turkey

“I have already taken two courses with RENAC; Solar Thermal Systems in Berlin and CSP here in Chile. Both of them were excellent.”

Dr. Gabriel Merino, Universidad de Concepción, Chile

“I have enjoyed the high level of RENAC courses tremendously. The knowledge I have gained has made me more aware of the challenges but also of the opportunities for support businesses through banking and other financing mechanisms.”

Johan Piek, NedCapital, Namibia

“I want to thank you very much for the opportunity to participate in the wind energy seminar! I was able to take away lots of information and I think that many things seem to fit better together now and I understand more.”

Leena Morkel, Bosch & Partner GmbH, Germany

Table of Contents

| | |
|---|----------|
| Customer-Specific Training in Germany and Abroad | 5 |
| Online Training | 5 |
| Mixed Technologies | |
| Introduction to Renewable Energy | 6 |
| Hybrid Wind/PV Micro Grids (I) and (II) | 7 |
| Wind Energy | |
| Onshore Wind Energy: Fundamentals | 8 |
| Wind Farm Planning and Design | 9 |
| Wind Farm Operation and Maintenance | 10 |
| Wind Farm Financing | 11 |
| Wind Energy Expert Training | |
| Wind Farm Grid Connection and Grid Codes | 12 |
| Small Wind Turbines | 12 |
| Wind Powered Desalination Systems | 12 |
| Offshore Wind Energy: Fundamentals | 12 |
| Impact Analysis for Onshore Wind Energy Projects | 13 |
| Public Relations for Wind Energy Projects | 13 |
| Registration | |
| Registration Form | 14 |
| Terms and Conditions | 15 |
| Photovoltaics | |
| PV Engineering Training: Grid-Connected Applications | 16 |
| PV Engineering Training: Off-Grid Applications | 17 |
| Understanding PV: Technical Training for Non-Technicians | 18 |
| Managing PV Projects: Market Conditions, Economics, Sales | 19 |
| Solar Thermal | |
| Solar Thermal Systems for Hot Water Provision | 20 |
| Large-Scale Solar Thermal Systems: Design and Installation | 21 |
| Other Solar Training | |
| Solar Cooling Systems | 22 |
| Concentrating Solar Power (CSP): Overview | 22 |
| Energy Efficiency | |
| Energy Efficiency in Industry and Commerce for Managers | 23 |
| Energy Efficiency in Industry and Commerce for Engineers | 24 |
| Energy Efficiency in the Built Environment | 25 |
| Planning Low Energy and Passive House Standards including Renewables | 26 |
| The RENAC Training Center | 27 |

Online Training and Customer-Specific Training in Germany and Abroad



Online Training

Study renewables from any place at any time!

The following courses can be studied online:

- Investment Appraisal
- Project Management
- Marketing
- Support Mechanisms for Renewable Energy and Energy Efficiency
- Law and Contracts

Customer-Specific Training in Germany and Abroad

In addition to our open seminars, all of which can be booked as in-house training, we offer customized courses for your business or organization. Based on your specific training requirements, we will tailor individual courses for you. You determine when and where the training is to take place – in RENAC's Training Center or at your premises worldwide.

We can offer you training expertise in a number of technologies:

- Solar thermal energy, grid-connected and off-grid photovoltaics, wind energy, bioenergy and geothermal energy;
- Energy efficiency in buildings, industry and commerce.

You can choose between technical and non-technical topics and can combine these depending on your needs. For technical courses we can bring our mobile RENAC Training Center for practical, hands-on training.

We can help you to get your staff prepared for the growing markets of renewable energy and energy efficiency. Talk to us, we will gladly prepare you an offer!

**For further information check out our website!
www.renac.de**





REM3-01

See the bigger picture for renewable energy technologies and their economics – in both urban or rural settings.

This course is ideal for those who are new to renewable energies or are starting a career either in renewable technologies or in their commercial aspects. Through a blended mix of instructor-led training and hands-on workshops you will get a comprehensive overview of the main, commercially-viable renewable technologies, and come to understand how they work and how systems are designed. At the end of this course you will be able to assess the appropriateness of different technologies for different situations and undertake your own initial designs for renewable energy systems. Additionally the course will present an overview of the renewable energy markets and latest market trends.

Topics

- Overview of renewable technologies
- Impact of renewables
- Solar electricity: grid-tied and off-grid photovoltaics
- Solar thermal technology: solar water heating, solar cooling and process heat generation
- Solar thermal electricity generation
- Wind power: large and small, grid-tied and off-grid, wind farms
- Bioenergy: woodchips and wood pellets, biogas and liquid biofuels
- Heat pumps: ground source, water source and air source
- Micro-hydro: from small systems up to 5MW, grid-tied and off-grid
- System design and sizing
- Project assessment and planning
- Finance and investing in renewable energy
- Field trip

Target groups

Anyone with no or little knowledge of renewables, technicians, sales people, members of public bodies, governmental and non-governmental organisations

Language: English

Duration: 3 days



Hybrid Wind/PV Micro Grids (I) and (II)



7

WT2-01

Understand the demands of hybrid-system project planning.

At the end of this five-day course you will have an understanding of hybrid systems including wind power, PV, power storage. The emphasis is on understanding the various technologies and the interaction of system components. You will be able to carry out the essential steps for the planning of hybrid systems including an estimation of economic benefits. To round off the picture, we study typical applications in the context of rural electrification and off-grid power supplies.

Topics

- Hybrid and micro-grid concepts
- PV fundamentals
- Storage batteries
- Wind fundamentals
- Hybrid components
- Grid management
- Business models
- Software introduction
- Field trip
- AC-coupled mini-grids
- Case studies: Introduction to, HOMER' software and exercises

Target groups

Non-technicians, advisors and consultants, employees of financial institutions and insurance companies, students

Language: English

Duration: 4 ½ days

Hybrid Wind-PV Systems and Micro Grid Design (II) – Advanced Course

WT2-02

This 3-day advanced course covers the design of hybrid wind-PV systems from both technical and economic perspectives. Planning and design – in particular for complex projects – will be taught in detail.



Onshore Wind Energy: Fundamentals

8



WT1-01

Gain the expertise to realize projects in the fastest growing sector of renewable electricity generation.

This course covers the fundamentals of onshore wind power for persons with a non-technical background. You will learn how to measure the wind resource, how to carry out an energy analysis and how to calculate the annual energy yield. You will gain an understanding about wind turbine technology, grid connections and licensing requirements. You will find out about global market trends and the parameters that influence the economics of wind farms. Practical exercises complement the theoretical material to ensure an optimal learning outcome.

Once you have mastered this course, you can enhance your knowledge through the advanced courses:

Planning and Design ▪ Financing ▪ Operation and Maintenance ▪ Wind Energy in Hybrid Systems

Topics

- Meteorology
- Wind assessment
- Wind turbine technology
- Grid integration
- Wind farm design
- Energy yield
- Economics of wind farms
- Licensing, spatial planning and environmental impact
- External effects

Target groups

Advisors, consultants, employees of finance or insurance institutions involved with renewable energies, those starting their careers, students

Language: English

Duration: 4 ½ days





WT1-02

Avoid costly planning mistakes and ensure high quality planning.

In this course you will gain the theoretical and practical skills required for wind farm planning and design, especially for complex wind farm projects. The course provides an overview of the planning steps and includes: constraints on wind farm planning, wind farm layout and siting, wind farm operation, SCADA-systems, contracts and insurance, mitigation of environmental impacts and cash flow analysis. A heavy emphasis is placed on practical work, with numerous exercises and a field trip.

Complemented by many practical exercises, for example:

- Typical wind farm projects
- Calculation of shadow casting and noise propagation
- Planning software for wind farms
- Turbine technology and calculations
- Exercises in technical and economic turbine management

Topics

- Basics of wind energy
- Wind farm planning
- Typical wind farm projects
- Shadow and noise
- Planning software
- Wind farm layout
- Turbine technology and calculations, SCADA-systems
- Contracts and insurance
- Environmental impacts & issues
- Standards and regulations

Target groups

Those with responsibility for planning and design of wind farms, or from the finance and insurance sector

Language: English

Duration: 4 ½ days





WT1-03

How to improve the performance of your wind farm while minimizing costs.

The emphasis of this course lies on good maintenance strategies for onshore wind farms. The course examines different maintenance strategies in detail, how they can be adapted to the wind turbine technology, maintenance of the electrical and hydraulic system and rotor blades. You will also look at guarantees and warranties, safety aspects, personal safety equipment, communication structures and procedures, condition monitoring systems and documentation. In addition the course provides advice on how to improve wind farm performance. At the end of the course you will be able to define an operation and maintenance strategy for your wind farm.

Complemented by many practical exercises, for example:

Technical management
Performance characteristics
Step-by-step: How to do an inspection
Elements of PSE

Topics

- Operation and maintenance strategies
- Understanding wind turbine technology
- Maintenance of rotor blades
- Performance characteristics
- Maintenance of mechanical systems
- Maintenance of electrical systems
- Guarantees and warranty
- Safety aspects
- Documentation, practice inspections, tools for O&M
- Aspects of financing and investment

Target groups

Those responsible for planning of operation and maintenance of wind farms

Language: English

Duration: 4 ½ days





WE3-01

Reduce both timescales and costs of financing.

This course will give you the practical skills you need for sound financial planning of wind farms. You will learn about cash flow analysis, equity and debt financing together with the requirements for due diligence for complex wind farm projects. You will analyze cost structures of wind farms, contracts and revenues. You will find out about financing instruments and financial viability of projects. Practical exercises complement the theoretical material to ensure an optimal learning outcome. Case studies in groups and the presentation of working group results will help you become familiar with the challenges of putting the theory into practical use. You will work on topics such as costing, sensitivity analysis, risk assessment, preparing equity and debt financing proposals, energy yield calculations and much more.

Topics

- Current status of wind energy and future trends
- Wind resource assessment in feasibility studies
- Wind farm cost structures
- Investment and operations
- Contracts
- Revenues
- Wind farm financing
- Due diligence
- Cash flow analysis
- Financing instruments

Target groups

Non-technicians, advisors and consultants, employees of financial institutions and insurances, those starting their career, students

Language: English

Duration: 4 ½ days





Wind Farm Grid Connection and Grid Codes

WT1-04

This 3-day course provides detailed information about grid connection of wind farms, grid codes, participation in balancing power markets, static and dynamic grid support, handling situations of peak power generation combined with low power demand, capacity credit of wind energy.

Language: English

Duration: 3 days

Small Wind Turbines

WT1-05

Gain expertise on technical and commercial aspects of small wind turbine. Topics such as technology, market development, global trends, international standardization and labeling, product safety, quality criteria, innovative concepts and economics are in this 3-day course.

Language: English

Duration: 3 days

Wind Powered Desalination Systems

WT2-03

This 2-day course provides in-depth instructions on the most important aspects of wind power for desalination systems. Topics such as the technologies, system design, market development, operation, design criteria, maintenance and economics will be presented.

Language: English

Duration: 2 days





Offshore Wind Energy: Fundamentals

WT1-06

This 2-day course is ideal for anyone who wants an intensive crash-course about the offshore wind energy industry. Through a blended mix of technical and economical know-how, you will learn about access to turbines, multi-megawatt turbine technology, grid connections, project planning, economics, environmental impact.

Language: English

Duration: 2 days

Impact Analysis for Onshore Wind Energy Projects

WF3-03

Learn the essential tools for analysing the environmental impact of onshore wind farms in this 2-day course. Methodologies are given for impact assessment together with appropriate mitigation measures.

Language: English

Duration: 2 days

Public Relations for Wind Energy Projects

WF3-04

New wind energy projects often tread a fine line between acceptance and rejection by the various stakeholder groups. This 2-day course shows how to increase and/or ensure public acceptance of wind energy projects. Strategies covering the whole life cycle of wind energy projects are investigated. Lectures are supplemented by practical exercises in RENAC's Training Center in Berlin.

Language: English

Duration: 2 days





I wish to make a firm booking for the following course:

Course Title: _____

Course Number: _____

Date of course: _____

Company: _____

Function: _____

Title: _____

First/ Last Name: _____

Street: _____

ZIP/ City: _____

Country: _____

Phone: _____

E-Mail: _____

I understand that the course fee includes all costs associated with the training, including lunch each day. It does not include any costs for transport to and from Germany, or for accommodation.

By signing and remitting this registration form I agree to RENAC's terms and conditions.

Date/ Signature:

Please return by fax to:

Renewables Academy AG (RENAC)

Ms. Laura Scharlach, Schönhauser Allee 10-11, 10119 Berlin

Via Fax: +49 30 526 895 8 99

For further information please contact Ms. Laura Scharlach:

Tel: +49 (0) 30-5268958-70

E-mail: scharlach@renac.de

You can also fill in the online registration form on:

www.renac.de



Payment procedure

Once an application has been received, the booking will be confirmed and an invoice raised. 50% of the course fee is to be paid within 2 weeks of receipt of the invoice; the total amount of the course fee must be paid no later than 2 weeks before the course. Payment must be made by international bank transfer. We cannot accept cheques or credit cards. Registrants are responsible for paying any bank charges accruing in their country of residence; RENAC will pay any fees for the funds transfer accruing in Germany.

Cancellation policy

If, for any reason, RENAC has to cancel the course, the fees already paid will be refunded in full. In the event of RENAC having to cancel a course less than 6 days before the start of the course, RENAC will additionally pay resulting flight cancellation fees. RENAC will not be responsible for any other costs (other flight costs, hotel fees etc.) incurred. Should a course participant have to cancel their booking, RENAC will retain a cancellation fee. For cancellation between day 21 and 8 before the training: 150 €, cancellation between day 7 and 1 before the training: 80% of the course fee.

Letter of invitation/visa

Should you need a letter for your local German Embassy, we will send it to you following receipt of your payment in RENAC's bank account. Registrants are responsible for all costs associated with the visa application. Please take the duration of the visa application process into account when making your booking.

Deadline for applications

Applications must be received no less than seven days before the start of a course.

Discount for early bookings

Bookings received more than 8 weeks before the start of a course will secure an early booking discount of 10%.

Discount for group bookings

Bookings for several members of a company or organization on a course will secure a group discount of 10%.

Combined discount for early group bookings

A combined early booking for a group on any course will secure a discount of 15% for each participant.

PV Engineering Training: Grid-Connected Applications

16



PVM1-01

Learn how to design and install a complete PV facility in this practical hands-on course.

In this course you will become familiar with the main aspects and key challenges of the technical implementation of PV projects. You will find out about the components of a PV system, and how to distinguish the different types of modules and inverters. You will examine the different connection methods and simulate the design of PV systems. You will be able to evaluate and monitor the system's daily output in the simulator. Through many practical exercises you will get a good insight into the specific issues and problems that might arise in a practical implementation.

The course includes many practical exercises, for example:

- Determining the electrical properties of modules - measurement of characteristics, module testing
- Module installation
- System planning and design
- Installation of a complete PV system
- Examples of system monitoring
- Field trip to a PV system in the vicinity

Topics

- Introduction to solar energy
- Solar radiation and site survey

Components

- Solar cells and modules
- Mounting systems, cables, wiring and isolation methods, loads
- Inverters and charging regulators, battery configurations
- System design
- Grid connections, commissioning and functional test
- Lightning and surge protection, system monitoring
- Economics, financing models and markets

Target groups

Engineers, technicians, business people

Language: English

Duration: 5 days





PVM2-01

Practical knowledge in an intensive and compact one-week course. Includes a special focus on sales and marketing.

This hands-on workshop teaches you how to design and install a PV off-grid system. By the end of the course you will know about the various components and different types of modules and PV system components. Topics such as system design and sizing as well as component selection, simulations and monitoring will be presented. The course also focuses on challenges that may arise during installation.

The course is supplemented by numerous practical exercises, for example:

- DC circuits and use of tools
- Measuring module characteristics
- Assembling a PV off-grid system
- Use and handling of batteries and inverters

Excursion

During two field trips you will get to know systems and concepts which provide the operators with reliable power in unusual situations.

Topics

- Introduction to solar energy
- Configuration of PV off-grid and hybrid systems
- Solar irradiation
- Components: technical properties, sizing and preparation
- Solar cells and modules
- Mounting systems: cables, wiring and isolation methods
- Inverters and charging regulators, battery configurations
- Solar water pumps
- System design
- Economic aspects, marketing and sales, project management

Target groups

Engineers, technicians, installers, business people

Language: English

Duration: 5 days



Understanding Photovoltaics: Technical Training for Non-Technicians

18



PVT3-01

Get a technical and economic understanding of photovoltaics in only two days.

This course teaches the technical fundamentals of photovoltaics to those who have little or no technical background. At the end of the two-day course you will have gained a good overview of the various components of a photovoltaic system, their functioning and specifics. You will understand the importance of selecting the right components, correct installation and the overriding significance of the location for PV systems. In this way you will have gained important guidelines for the assessment of PV projects.

The practical training includes exercises using special training equipment to understand how a complete PV system works. In particular, measurements are undertaken to explore how module characteristics depend on temperature as well as on the direction and tilt of the module.

Topics

- Introduction to important physical and electrical fundamentals, technical terms
- System components: from the cell via the module to the inverter, characteristics and functioning
- Basics of design and installation
- Using the standard design software PV*Sol
- Monitoring and maintenance
- Economic viability

Target groups

Business people, advisers, consultants, employees of banks, financial institutions and insurance companies, sales representatives, lawyers and other professionals who need an insight into the workings of photovoltaics for their daily work

Language: English

Duration: 2 days



Managing Photovoltaic Projects: Market Conditions, Economics and Sales



PVE3-01

Get a head-start in PV project development by utilizing the in-depth, active experience of our trainers in the PV business.

In this course, you will gain the essential information for successfully implementing large-scale PV projects - from initial concept to full operation. You will learn about common PV technologies and typical PV system configurations. You will be able to assess market conditions and recognize market barriers and project opportunities. The course covers the planning and organization of complex, large-scale PV projects and the major risks that could affect them. The course will show you how to perform a feasibility study for a PV project, and organize suitable finance as well as how to develop an appropriate market entry and sales strategy.

High proportion of group work using case studies, for example:

- Development of project management strategies
- Analysis and setting up of financial business plans
- Inspection of a large PV system during a guided field trip

Topics

- Technical aspects: what you need to know about PV projects
- Recent developments in the global PV market and outlook
- Current energy policies and financial support schemes for PV
- Management of solar projects with case studies
- Solar investments: economic assessment and financing
- Market analysis and development of sales strategies
- Marketing and sales of solar technology
- Field trip to a working PV system

Target groups

Engineers and electricians, staff from financial institutions, electricity utilities, public administration, project developers from the PV or other renewable energy sectors, management and sales staff, civil engineers, young professionals, students

Language: English

Duration: 3 days





STM3-01

Practical introduction to solar thermal system design and installation for newcomers and those who want to deepen their knowledge.

In this seminar you will gain an insight into all stages of solar thermal projects - from design and installation through to commissioning, operation and maintenance. You will learn about different system configurations and will carry out system design and simulation. It includes energy and feasibility assessment, site analysis and an evaluation of prospective power yields using suitable simulation software. The course has a high practical element - you will learn about installation and commissioning through a number of exercises with solar thermal components. Several training rigs with industry-standard solar thermal components are available for a large variety of practical exercises or for closer inspection. The course is rounded off with an economic analysis of solar thermal projects.

Excursion

Field trips to existing projects will highlight installation issues and typical problems and pitfalls of real systems.

Topics

- Potential of solar thermal energy and typical hot water demand
- System components
- Solar hot water system configuration and simulation
- Installation and commissioning with practical exercises
- Operation and maintenance
- Economics of solar thermal systems
- Guided field trip to a working solar thermal system

Target groups

Heating engineers and plumbers, civil engineers, project developers from the solar thermal or other renewable energy sectors, sales engineers active in the building industry, members of government bodies, young professionals, students

Language: English

Duration: 5 days



Large-Scale Solar Thermal Systems: Design and Installation



STM3-02

Covers the practical expertise to design and install optimized, large-scale solar thermal systems.

The course provides you with both technical and commercial skills to develop large-scale solar thermal systems for hot water generation and heating. It covers design, installation, operation and monitoring and includes dynamic system simulations. The course combines theory with practical training in the RENAC Training Center, demonstration of different system designs and applications. Case studies are used to illustrate the typical demands of, for example, hospital and hotel systems. Additionally, the course looks at the economics of different system designs, with the necessary calculations.

Topics

- Differences between small- and large-scale systems
- Components
- Basic system schematics
- Large-scale system sizing
- Large-scale collector array configurations
- Array frame structures
- Roof penetration and sealing
- Stagnation
- Case studies
- Testing, inspection and safety requirements
- Quality control and maintenance
- Simulation software – function, usability, process
- Project management
- Economics
- Practical training – installation and commissioning
- Field trip

Target groups

Heading engineers and plumbers, civil engineers, facility managers, technicians, sales engineers, young professionals, students

Language: English

Duration: 5 days





Solar Cooling Systems

SCM3-01

In this course you will learn about the most important technical and economic aspects of solar cooling technology. You will find out about the operation of different cooling techniques using solar energy and will be able to distinguish between them. The broad outlines of technical design and installation of solar cooling systems are described - including the collector field - as well as strategies to optimize the cooling effect. You will also see how solar cooling can be integrated into existing refrigeration systems. Real life case studies will be used to show which applications solar cooling is particularly suitable for.

During the course we also examine the investment and operating costs of typical applications and you will learn how to calculate cooling costs.

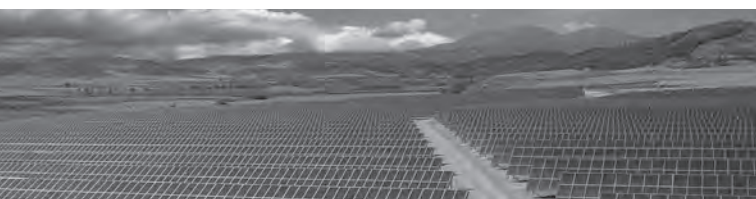
Language: English **Duration:** 3 days

Concentrating Solar Power (CSP): Overview

SPM3-01

At the end of this 2-day seminar, you will have learnt about the fundamentals of the current CSP technologies, the state of the technology and the possible applications. You will know about storage technologies, power generation, operation and maintenance and the choice of location for a plant. An introduction to project management will enhance your understanding of the key implementation steps and the key success factors for a CSP project. The theoretical part of the course is complemented by an investigation of the economic feasibility of CSP. As an additional bonus you will learn how to use modeling software to investigate the effects of various parameters (natural factors, costs, finance). In this way you will be able to develop a better understanding of the factors that affect performance and efficiency of a CSP plant.

Language: English **Duration:** 2 days



Energy Efficiency in Industry and Commerce for Managers



23

EEE3-01

Learn about the powerful impact of energy efficiency technologies on competitiveness and energy costs.

This course is ideal for managers and decision makers from industry and commerce who are seeking training on the economics of energy efficient technologies and products. Following an introduction to the subject, the course provides an overview of energy efficient technologies and describes their costs and economics. We also look at project management for energy efficiency in industry and commerce. Lectures are supplemented by demonstrations and practical exercises in RENAC's Training Center.

Topics

- Potentials for energy efficiency in industry and commerce
- Economics of energy efficient technologies and measurements
- Technical fundamentals and necessary conditions
- Examples and case studies
- Heating
- Electric drives
- Cooling / chilling
- Ventilation
- Compressed air
- Lighting
- Project implementation and project management
- Operation and maintenance
- Field trip, practical demonstrations and exercises

Target groups

Managers from manufacturing industry and commerce seeking to reduce internal energy consumption and lower operating costs. Public administrators and authorities, financial institutions and insurers

Language: English

Duration: 2 ½ days



Energy Efficiency in Industry and Commerce for Engineers

24



EEM3-02

Learn how to minimize operational and maintenance costs for the most common consumers of energy in industry and commerce.

This course provides comprehensive training about different energy-efficient technologies and processes for industry and commerce. A technical description of energy efficient technologies and measurements is followed by an examination of their economic aspects. Activities, project management and barriers are discussed for different industrial and commercial applications. The lectures are supplemented by exercises and experiments in RENAC's Training Center in Berlin.

Topics

- Potential for energy efficiency in industry and commerce
- Fundamentals and necessary conditions
- Energy saving measures
- Heating
- Electric drives
- Cooling / chilling
- Ventilation; compressed air
- Lighting
- Procedures and energy management
- Examples and case studies
- Economics of energy efficient technologies and measurements
- Project implementation
- Operation and maintenance
- Field trip, exercises and experiments

Target groups

Technical factory managers, energy commissioners, facility managers, energy consultants

Language: English

Duration: 4 ½ days





EEM3-03

Explore state-of-the-art technologies and standards for energy efficient buildings.

The course investigates energy efficiency (EE) in the built environment and gives a framework for international dialogue, looks at state-of-the-art and innovative approaches to building design, and examines components, materials and construction methods.

You will gain an understanding about the cost effectiveness of different EE measures, legal frameworks and standards. Lectures are supplemented by practical exercises and demonstrations in RENAC's Training Center.

Topics

- Energy analysis
- Energy efficiency
- State-of-the-art of EE technologies
- Economics of different approaches
- Subsidies and experiences
- Life cycle analysis
- Strategies and instruments
- Legal frameworks and standards
- IT tools for analysis, design, monitoring
- Implementation and monitoring
- Field trip, practical demonstrations and exercises

Target groups

Building engineers and architects, public administrators and authorities, financing institutions, energy commissioners, energy consultants

Language: English

Duration: 3 days



Planning Low-Energy and Passive House Standards including Renewables

26



EEM3-04

Get a head-start in innovative energy-efficient building design.

Planning highly energy-efficient buildings – potentially including renewable energies – is a complex task and requires knowledge in a broad range of technical issues. This course aims to cut through the complexity and provide participants with a practically-oriented approach to planning buildings. Using real-life case studies and the models and equipment in RENAC's Training Center, you will be introduced to building physics and how to calculate building energy demand. You will learn about design principles for energy-efficient construction and how to dimension heating and air conditioning systems. Here, renewables energies will play an important role. We will look in detail at planning strategies for new buildings and renovation projects. An economic assessment of the various technical approaches completes the course.

Topics

- Introduction to low-energy and passive house standards
- Building physics and room climate
- Aesthetic design opportunities with low-energy and passive houses
- Calculation of a building's energy demand
- Construction principles to avoid energy losses: walls and insulation, windows, air tightness, avoiding heat bridges
- Inspection of demonstration model buildings
- Dimensioning ventilation systems: components and layout
- Dimensioning and integrating heating and hot water generation systems with focus on renewable energies
- Integration of renewable energy technologies
- Investment costs and economic efficiency
- Case studies

Target groups

Architects, civil engineers, engineers in heating, ventilation and air conditioning, energy consultants, those in the building trade, private and public owners and operators of buildings

Language: English

Duration: 3 days



The RENAC Training Center



To maximize learning outcomes, RENAC has a well-equipped Training Center which provides: PV systems, solar thermal systems, wind power systems and energy efficiency technologies.

- Experimenter kits to demonstrate the principles of renewable energy technologies.
- Training rigs to enable realistic simulation of solar systems.
- A computer lab to allow system simulation using state-of-the-art design and planning software.
- A demonstration area, with sample components and information panels, to showcase a broad range of technological applications.
- RENAC Mobile Training Center to undertake training at clients premises.



Contact:

Renewables Academy AG

Schönhauser Allee 10-11

10119 Berlin, Germany

Phone: +49 (0)30 52 689 58-70

Fax: +49 (0)30 52 689 58-99

E-mail: info@renac.de

www.renac.de