

# RENAC

## Catalogue of Services

Training and Capacity Building for  
Renewable Energy and Energy Efficiency



## Target groups

Public sector

Private sector

Finance sector

Training sector

## Renewable energy (RE) and energy efficiency (EE)

 Photovoltaics

 Hydropower

 Solar thermal

 Geothermal energy

 CSP

 Grid integration of RE

 Bioenergy

 Energy efficiency

 Wind energy

 Hydrogen

## Content focus

  
Technical aspects

  
Legal aspects

  
Financial aspects

  
Market development

  
Project development

## Services with educational, qualifying focus

Trainings

Capacity building

Consulting

Market development

Communication

Growth of green energy worldwide

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ENERGY THROUGH EDUCATION!



# ABOUT RENAC

The rapid growth of renewable energy (RE) and energy efficiency (EE) markets worldwide, and the increasing necessity for greenhouse gas mitigation and climate protection, has led to an increased demand for the expertise and qualifications of individuals, industry and organisations. Public, private, finance and training sectors are all building up professional capacities to facilitate the market growth of green energy technologies and fully enhance their respective roles.

RENAC's vision and mission is to support the market development of green energy technologies (RE and EE) worldwide through capacity building and trainings, consultancy in the training sector, expert exchange and networking.

Since its founding in 2008, RENAC has trained more than 30,000 participants from over 160 countries with online trainings, face-to-face trainings and train-the-trainer trainings.

Have a look at our catalogue to see whether the RENAC services are of interest for you or your organisation.

Your RENAC Team



# PROJECTS WORLDWIDE


## Public sector officials for legal frameworks, regulation and implementation:

- Ministries
- Regulators
- Local administrations



## Private sector:

- Project developers
- System integrators
- Engineers and technicians
- Investors
- Financing institutions
- Grid operators

A world map with a blue background and white outlines of continents. Numerous red circular dots are scattered across the map, representing the locations of various organizations. The dots are densely clustered in North America, Europe, and parts of Asia, with more sparse distribution in Africa, South America, and Australia.

**Multipliers and development organisations:**

- Development corporations
- Energy agencies
- International financing institutions
- NGOs

**Capacity building and dissemination sector:**

- Public and private training institutions
- Vocational training institutions
- Universities

# OUR CONCEPT

## Target groups

We offer trainings and services for most parts of the RE and EE value chains and involved stakeholders, comprising the public, private, finance and training sector. We support companies and institutions like energy agencies, development cooperation agencies, NGOs and think tanks with sharing our experts knowledge and experience.

### On an institutional level we target to:

- Public sector: policy setting bodies (ministries, parliamentarians), local administration and regulators
- Private sector: engineering consultants, project developers, installers, IPCs, operation and maintenance companies
- Generation and distribution: utilities, transmission and distribution grid operators
- Finance sector: private and public banks, development banks, funds, investors
- Training sector: TVET (technical and vocational training), training institutions for professionals, universities
- Market promoting institutions: energy agencies, development cooperation agencies, NGOs, think tanks

Ministries



Administration



Finance institutions



Project developers



Installation operation



NGOs  
Think tanks



Consultants  
Engineers



Grid operation



Training institutions





## Value chain

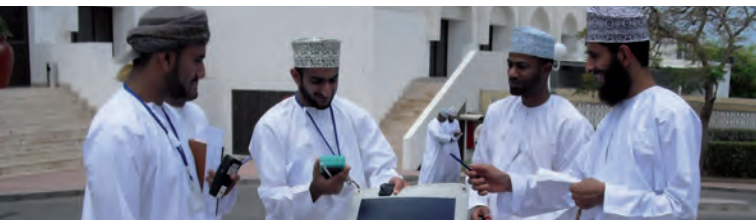
We design and implement tailor-made trainings and services along the value chain in a holistic concept.



## Our approach

Our approach to RE & EE is manifold: technology related knowledge is the basis and then each RENAC training and service focus on technical, economic, legal or project related aspects according to the target group. RENAC is also very active in international business matchmaking and market development services.

In our capacity building services we supply a variety of programmes to train trainers, to build training centres and to establish quality assurance processes.



# OUR TRAINING CONCEPT

## Tailor-made training – what does it mean?

We offer tailor-made trainings according to client needs and participant job requirements in all green energy sectors. Based on an analysis of requested knowledge for specific job tasks and the level of existing knowledge, we develop a training concept proposal.

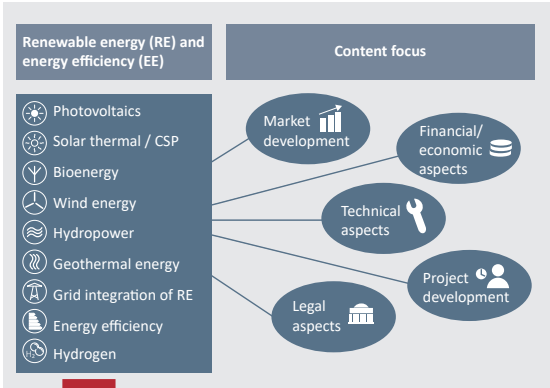
The concept includes recommendations for online or face-to-face trainings, or both. We develop the training concept taking the given resources on budget and learning time into account. After feedback from the client, we fine-tune the concept for approval.

Depending on the needs of our clients, we offer different levels of trainings (basic, intermediate, advanced).

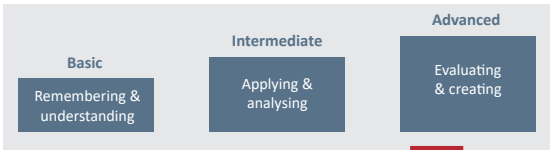


## Target groups

### Which training suits best?



### Training levels



### Training formats



Tailor-made training concepts



# TRAINING FORMATS

## RENAC face-to-face trainings

RENAC face-to-face trainings are an exceptional opportunity to gain more insight into renewable energy and energy efficiency. Employing a blend of up to date theoretical lectures, state-of-the-art practical training, and field excursions, RENAC makes learning not only effective but also very exciting.



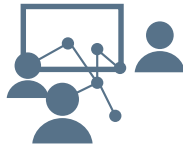
## RENAC online trainings

RENAC Online offers extensive support and an interactive learning platform. Participants can learn at any time and from any location and study with flexibility according to their own schedule.



## RENAC blended Learning

Participants can register in a combination of online and face-to-face trainings to achieve the best learning outcomes. This method combines the advantages of both hands-on practical experience and in-depth theoretical study.



## Virtual learning format

The virtual format includes dynamic digital elements that simulate in-person interactions as part of online courses and programmes. Live virtual lectures, discussions, group exercises, and networking opportunities create a productive learning environment.



# Capacity Building Services



## CAPACITY NEEDS ASSESSMENT

RENAC offers capacity building services (CBS) for organisations interested in establishing or expanding their own services to include courses on renewable energy and/or energy efficiency into their training portfolio. These services can be booked on their own or as a package. The complete CBS package will equip the partner institution with a training centre, locally adapted training schedules and materials, a team of good trainers and a clear quality assurance strategy.

### Capacity needs assessment

A good understanding of each target group's needs is essential in order to offer suitable education programmes. RENAC's capacity needs assessment services can be flexibly applied to the different demands.

#### Assessment includes:

- Identification of relevant target groups
- Capacity needs assessment workshop
- Mapping the required capacities and skills
- Identifying the training needs
- Outline of capacity building measures/strategies
- Identification of local standards and requirements



# DEVELOPMENT OF CURRICULA AND TRAINING MATERIAL

Implementing a new course programme in the fast-changing environment of renewable energy and energy efficiency can be challenging and time-consuming work. RENAC can provide client-specific curricula and training materials to ensure that courses are current and of a high quality.

## **RENAC offers:**

- Well-composed and logically structured curricula, corresponding to learning targets, with comprehensive explanations, exercises, case studies, images and graphics
- Review and adaptation of existing training materials and integration of local aspects
- Definition of quality standards and evaluation criteria
- Development of specific exercises
- Train-the-trainer courses on the use of the equipment
- Development of instructions
- Regular update of training equipment



## TURNKEY TRAINING CENTRES

Training with practical equipment plays a crucial role in efficient and sustainable teaching. RENAC offers turnkey training centres with corresponding instructions and exercises for advanced trainings. This is a highly customised service adapted to client requests, local needs, markets and conditions.

### Technologies:

- Photovoltaics
- Solar thermal
- Wind energy
- Bioenergy
- Hydropower
- Grid integration
- Energy efficiency in buildings
- Energy efficiency in industry

### Services available:

- Concept and design
- Selection and purchase of components
- Transportation and logistics
- Assembly and installation at location
- Development of specific exercises
- Development of instructions for trainers
- Train-the-trainer courses on the use of the equipment
- Regular update of training equipment



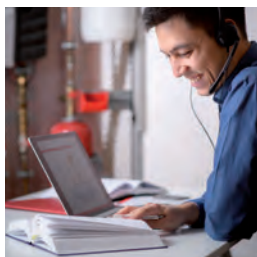


# QUALITY ASSURANCE

High quality standards are crucial for the development of green energy markets. This can only be achieved and maintained when professionals in the sector are skilled and reliable. RENAC's quality refinement services assess the level of know-how of students or employees and improve it with suitable training concepts and measures.

## Services available:

- Student and/or trainer assessment
- Assessment of course materials, course structures and training equipment
- Train-the-trainer update courses
- Update of training materials
- Training centre equipment updates
- Market trend and trainer demand analysis
- Co-certification (for RENAC provided courses)
- Preparation and execution of exams



## TRAIN-THE-TRAINER PROGRAMMES

RENAC's goal is to produce highly qualified trainers, trainers who are able to undertake courses autonomously and, if required, to the standards set by accreditation bodies or professional institutions. At the end, participants will have sufficient skills and materials to allow them to develop their own courses.

### Services available:

- Selection and assessment of future trainers for train-the-trainer trainings
- Design and development of content and methodology
- Facilitation of train-the-trainer courses
- Evaluation and recommendations of newly trained trainers
- Support programme for newly trained trainers (twinning programme)

### Modules in a train-the-trainer course:

- Technical training
- Didactical and methodological training
- Starter kit of slides, exercises and additional tools for trainers



# TRAIN-THE-TRAINER SCHEME

## Selection of participants



1 Preparatory online training with exam

2 Face-to-face and/interactive live online seminars

### Technical training with experts

Technologies: ☀ ☀ Ψ 人 ≈ ≡ ㊦ ㊦  
Aspects: technical, legal, economic

Day 1 + 2

Methodology and didactics

Day 3 + 4

Practical training and exercises  
Topic selection for demonstration lesson

Day 5

3 Teaching experiences and exams

### Demonstrations

Demonstration of lessons by participants  
Evaluation of the participant lesson

Day 1 + 2

Experts input on questions

Day 3

### Excercises

Practical and theoretical excercises

Day 4

Exam in theory and practice

Day 5

4 Optional

Shadowing of first trainings

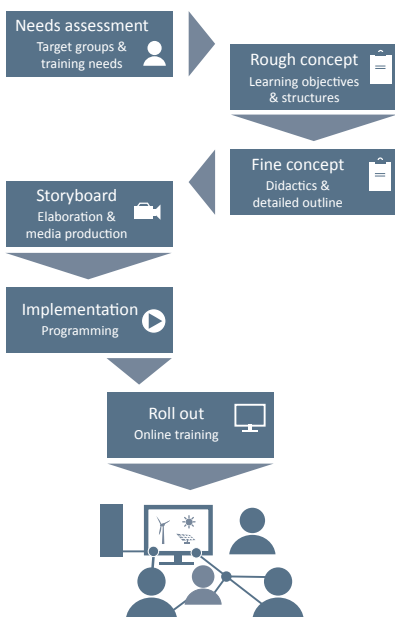


## E-LEARNING/ONLINE TRAININGS

Implementing an online training offer can be the right solution when the audience is geographically spread or not available at the same time. RENAC can be a full service provider to help clients to build an e-learning/online training offer. With an online training the flexibility to study at any time and from any location will be provided.

### RENAC offers:

- Consultancy services on content development
- Hosting on our learning management system with client's own branding
- Learning office (training delivery, exam and certificate)
- Certification of training programmes by ZFU (German Authority for Distance Learning)



Market Development,  
Communication and  
Consulting



# BUSINESS MATCHMAKING

RENAC offers business matchmaking activities in Germany and abroad bringing together product and service providers with potential clients.

The transfer of energy expertise, the promotion of foreign trade and the facilitation of international development cooperation are part of the German Energy Solutions Initiative coordinated and financed by the German Federal Ministry for Economic Affairs and Energy (BMWi).

### Offered modules:

- Webinars and information days in Germany and abroad provide an overview on international markets for German companies
- Networking and business opportunities abroad and in Germany
- Together with the international German Chambers of Commerce (AHK), RENAC organises business trips abroad for German units
- RENAC offers delegation tours for interested international stakeholders

### Services available:

- Research and compilation of RE and EE markets abroad
- Business-to-business (B2B) meetings and networking in Germany and abroad
- Lecturers on renewable energy and energy efficiency
- Travel organisation and support services
- Site visits and field trips to reference projects
- Preparatory readings or online trainings
- Website: [www.renac.de/energy-solutions](http://www.renac.de/energy-solutions)



MITTELSTAND  
**GLOBAL**  
ENERGY SOLUTIONS  
MADE IN GERMANY



Federal Ministry  
for Economic Affairs  
and Climate Action



## STUDY & DELEGATION TOURS

RENAC offers customised study and delegation tours in Germany and worldwide for RE and EE technologies and applications. Depending on client and participant interests, RENAC compiles ambitious programmes including theoretical input, meeting with high ranking representatives from public and private sector, field trips, B2B meetings and evaluation.

### Services available:

- Survey on participants and client interests and objectives
- Programme planning of customized study and delegation tours
- Travel organisation and support services
- Organisation of meetings with target organisations and companies
- Compilation of study tour booklet
- Guiding on the study and delegation tours
- Organisation of cultural programme
- Business-to-business meetings
- Lecturers on renewable energy and energy efficiency
- Organisation of site visits and field trips
- Wrap up of learnings and evaluation



# CONSULTING

RENAC offers consulting services for institutions involved in capacity building and the market development of RE and EE.

### Consulting services on capacity building are:

- Capacity needs assessments as a basis for developing capacity building programmes
- The establishment of quality assurance schemes in the training sector
- Curricula and sequence plan development, training material development
- Participatory and interactive training methodologies and didactics
- Integration of RE and EE related topics into existing curricula of TVET, universities and further training institutions
- Design of interactive training and workshop formats
- Assessment of trainers
- Development of customised capacity building strategies for in-house staff or extern



### Consulting services for RE/EE market development are:

- Research on market conditions and opportunities for RE and EE investments
- Energy statistics related to RE/EE market development
- Programming of economic evaluation tools
- Mentoring for business plan development
- Guidance for entrepreneurs and business development
- Prefeasibility studies for RE and EE applications
- Technical and financial due diligence of project proposals



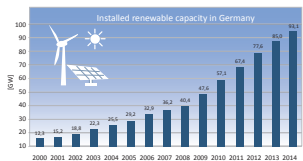
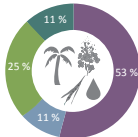
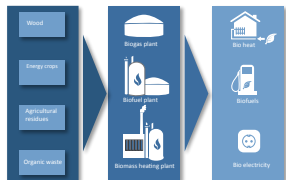
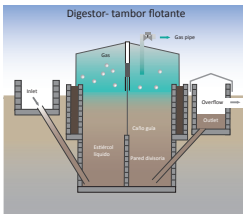


# MARKET DEVELOPMENT AND CONSULTING

## COMMUNICATION SERVICES

RENAC offers a variety of communication services supporting the market development of RE and EE worldwide:

- Development of technical graphics, charts, videos
- Corporate and graphic design of leaflets, brochures, reports
- Design and execution of social media campaigns
- Development of powerpoint presentations for energy topics
- Composition of speeches and background information for speakers
- Development of exhibitions and marketing material
- Concept and design of stakeholder portraits



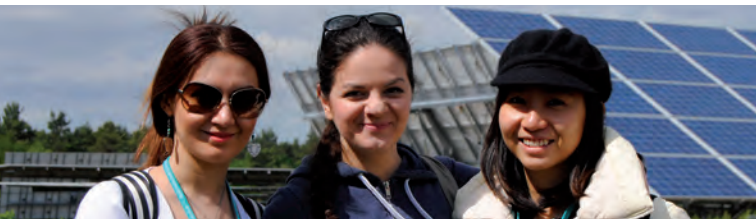
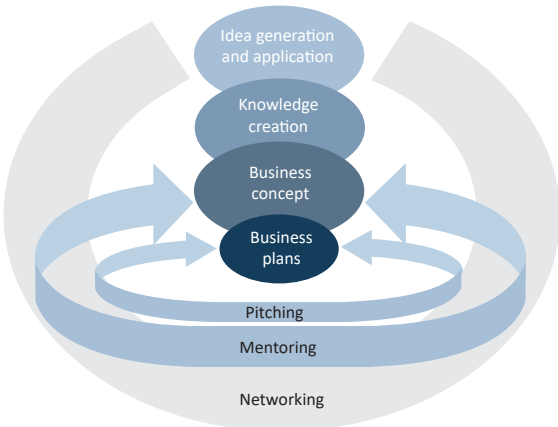
# EMPOWERING WOMEN

The comprehensive and targeted capacity building, mentoring and networking programmes support accelerated career advancement of women in the green energy sector. The programmes are designed for women who aim for leading positions in the renewable energy industry. The programmes' theory of change rests on three key pillars:

- Increasing knowledge of renewable energy or energy efficiency technologies, markets and policies.
- Enabling the participants to develop sound, comprehensive and convincing business plans and project ideas.
- Facilitating professional exchanges, peer-to-peer mentoring and networking to finance institutions and/or future project partners.



The overall goal is to contribute to a paradigm shift in the energy sector towards an environment of gender equality and equal opportunity.



# SHORT-TERM EXPERTS

RENAC supports international development cooperation organisations and projects with short-term experts specialised in the implementation of renewable energy and energy efficiency.

## **RENAC's short-term experts have:**

- At least 5 years of practical experience in the respective renewable energy technology and/or energy efficiency
- Interest and ability to work internationally for assignments with a duration from one week to several months
- Excellent language skills for the respective tasks (English, Spanish, French, Portuguese, Italian and Russian, among others)
- Profound expertise in technical, managerial, political, legal and financial aspects
- Many national and international project and project management references

Besides the short-term experts abroad, we provide an experience backstop team located at our Berlin headquarters.



# TAILOR-MADE TRAINING COURSE LIST

For companies and institutions



# TAILOR-MADE TRAINING COURSE LIST

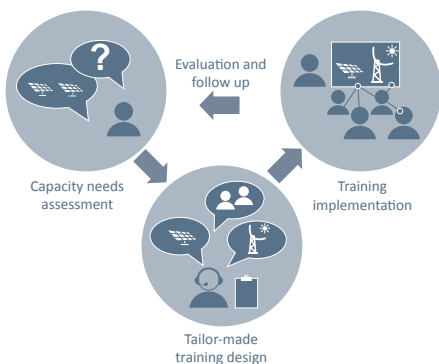
Job requirements in green energy markets are complex and manifold. To ensure a company or organisation succeeds, employees need extensive skills and up to date know-how. RENAC's tailor-made trainings offer the best way to meet participants' training objectives.

## Process:

- Analysis of participants' capacity needs
- Selection of training contents and methods according to prior knowledge and needs
- Selection of the most suitable trainers
- Development of comprehensive materials with the highest quality standards
- Implementation of the training worldwide

Additionally, the training can be adjusted in duration and depth, organised for groups of various sizes and adapted to cover various technologies. Clients can determine when and where the training takes place.

The following training course list gives an overview of possible topics we cover in our tailor-made trainings, which can be used as basis to develop a tailor-made training for a company or organisation.



# INTRODUCTION AND OVERVIEW

## Face-to-face training

### Introduction to renewable energy

RE market development, fundamentals of solar energy, bioenergy, small hydropower, wind energy, grid integration of renewable energies

## Online trainings

### Introduction to energy

Energy supply and demand, RE resources, physical basics, units and conversions

### Introduction to electricity

Electricity fundamentals, electric energy, electric power

### Overview of renewable energy technologies

RE sources, global trends, electricity generation technologies, heating/cooling, biofuels

### Overview of power generation technology

Conventional power generation, renewable electricity generation, cost comparison, LCOE

### Introduction to solar resource

Solar energy, solar radiation, measurement equipment, sun positioning

### Introduction to wind resource

Wind speed units, power density, power coefficient, Betz limit, and wind shear

More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)





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### Introduction to hydrogen

Hydrogen applications, production and infrastructure, system integration and sector coupling, economics of hydrogen, hydrogen strategies, roadmaps from around the world

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### Introduction to electric grids

Structure of electric grids, quality and security of energy supply, frequency range, voltage stability

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### Introduction to energy efficiency projects

Definitions and standards, benefits of energy efficiency, drivers and barriers, economics, energy efficiency financing

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### Introduction to renewable energy projects

Characteristics of RE projects, life cycle, financial aspects, non-financial aspects, externalities

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### Market overview of RE and EE financing

RE & EE finance market: volumes, regional markets, technology-based markets, asset classes, league tables

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# PHOTOVOLTAICS

## Face-to-face trainings

### On-grid photovoltaic (PV) systems: from project development to O&M

Feasibility studies, planning, EPC, economics, operation and maintenance

### Off-grid photovoltaics: from stand-alone systems to hybrid micro-/mini-grids

Solar home systems, micro-grids, mini-grids, hybridisation

### Project development, planning and feasibility of PV systems

Feasibility studies, project partners, main contracts, economics, risk assessment

### Off-grid photovoltaics: planning and installing solar home systems

Solar home systems, off-grid, engineering, commissioning, sizing

### Design of on-grid photovoltaic systems (1)

Sizing, planning, optimisation, component selection, simulation of the system

### Design of off-grid photovoltaic systems (2)

Sizing, planning, optimization, component selection, simulation of the system

### Installation of photovoltaic systems

Construction, mounting, commissioning, electrical engineering, health and safety

More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)







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### Operation and maintenance of photovoltaic systems

Performance evaluation, troubleshooting, optimisation of PV systems, maintenance plans, management of operation

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### Solar pumping

Pipes and pumps, installation, planning, economics, photovoltaic systems

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### Off-grid photovoltaics: planning (hybrid) micro-/mini-grids

Micro-grids, mini-grids, off-grid, hybridization, solar systems

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### PV entrepreneurship/business development

Starting a business, business models, business plans, economics, financial aspects

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### Managing and financing PV projects

Investment, business plans, bankability of projects, economics, management and planning

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# PHOTOVOLTAICS

## Online trainings

### Photovoltaic – application

Configuration, components, power output, economics, physical aspects

### Photovoltaic – technology

PV cells, PV modules, shading effects, efficiency, configurations

### PV off-grid systems

Configuration, components, sizing, installation, commissioning and O&M, economics

### Small-scale PV grid-connected systems

FiTs and net metering, components, sizing, installation, commissioning and O&M

### Planning of large-scale PV grid-connected systems

System components, project development, planning, construction, installation, operation

### Business models for photovoltaic projects

Design of business models, business model navigator, development methodologies, roles and activities of different actors in the PV value chain

### Business plans for photovoltaic projects

Development of bankable business plans, business description, SWOT analysis, marketing plans, financial plans, actors in the PV value chain

More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)





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## PV-diesel hybrid systems

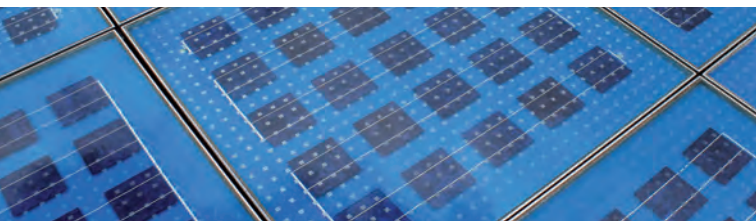
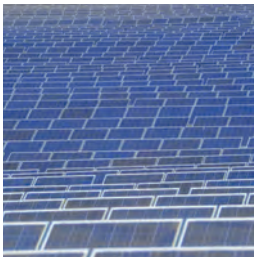
Components, sizing, dynamic behavior, economics, case studies

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## Planning of PV-diesel hybrid systems

Feasibility study, technical aspects for conversion, optimisation, economics, installation, commissioning and O&M

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## Face-to-face trainings

### Solar thermal systems: from design, to installation and operation

Thermosiphon, forced circulation, collector and store sizing, installation, commissioning and fault-finding

### Large-scale solar thermal systems

Forced circulation, pressurised systems detailed, system design, component sizing/selection, installation, commissioning and fault-finding project management and economics

## Online trainings

### Solar thermal

Flat plate collectors, evacuated tube collectors, thermosiphon, forced circulation, open and closed, direct and indirect, system components, basic system design

### Planning of large-scale solar thermal systems

Collector configurations, detailed system design, system selection, component sizing and selection, commissioning, frequent faults, economics

### Concentrated Solar Power (CSP)

Parabolic trough, power tower, heat transfer fluids, thermal storage, technology comparison

More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)





## Face-to-face trainings

### Applying wind power onshore

Technology, resource assessment, site assessment, environment and economics

### Financial due diligence in wind power

Project finance and project contracts, risks, evaluation and financial viability

### Wind power financing – fundamentals

Project financing process, financial terms, instruments, contracts, revenues, cost and cash flow

### Wind power financing – advanced

Cash flow valuation, sensitivities, scenarios, simulations and due diligence

### Understand the financing of wind power projects

Wind resource and technology, annual energy production, uncertainties and risks





## Online trainings

### Wind power application

Large-scale, small-scale, onshore and offshore, wind turbine components, CAPEX, OPEX and LCOE

### Wind power technology

Wind turbine components, technical parameters, standards and norms

### Wind power planning and measurement

Feasibility study, wind measurement, resource assessment, annual energy production, uncertainties and risks

### Small wind application and technology

Applications, wind technology, quality, standards and norms, operation and maintenance and costs

### Small wind power planning

Wind resource and site assessment, system sizing, planning steps and annual energy production



More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)





## Face-to-face trainings

### Introduction to bioenergy

Biogas, solid biomass, Combined Heat and Power (CHP) plants, biofuels, sustainability aspects

### Understanding biogas plants

Anaerobic digestion, input substrates, digestate, design criteria, biogas yield

### Biomass heat and power plants

Solid biomass, combustion, district heating, biomass resources, Combined Heat and Power (CHP) plants

### First and second generation of biofuels

Biodiesel, bioethanol, lignocellulosic biomass, biomass to liquid (BTL), sustainability aspects

## Online trainings

### Biogas – application

Anaerobic digestion, input substrates, digestate, biogas yield, biogas utilisation

### Planning of medium-sized biogas plants

Feasibility study, design criteria, digester, planning process, environmental standards





## Face-to-face training

### Small hydropower: from feasibility to installation

Head and flow assessment, permits and contracts, design, civil, mechanical and electrical engineering, intake, penstock, turbines, generators, grid-connection, off-grid, rural electrification, project management, economics

## Online trainings

### Small hydropower

Power from water, head and flow assessment, energy yield, intro to intakes, penstocks, turbines and generators

### Planning of small hydropower systems

Project planning, permits, licences, contracts, site assessment, resource assessment, design, construction plan, financial analysis



More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)







### Online trainings

#### Geothermal power generation – application

Global market development, types of systems, suitable locations, project development, finance and economics

#### Geothermal power generation – technology

Geologic control factors, reservoir parameters and modelling, drilling technologies, thermodynamic laws, pumping the reservoir

## HYDROGEN

### Online training

#### Introduction to hydrogen

Hydrogen applications, production and infrastructure, system integration and sector coupling, economics of hydrogen, hydrogen strategies, roadmaps from around the world

## POWER-TO-X

### Online training

#### Applications and cost developments

Sector coupling principles, electrification of transport, heating and cooling systems, demand profiles and flexibilisation strategies, indirect use of electricity, regulatory frameworks for profitable sector coupling





## Face-to-face trainings

### Sustainable power system planning overview

Long-term view, residual load, unit commitment, capacity constraints, flexibility and software

### Power system planning and operation with variable renewable energy

Base/middle/peak load, balancing power, short-term forecast, security of supply and grid studies

### Grid integration of variable renewable energy – photovoltaic and wind power

Grid codes, voltage and frequency control, monitoring, high/medium/low voltage grids

### Rooftop and open field photovoltaics in distribution grids

PV technology, voltage/frequency control, short-term power forecast, low/medium voltage grids

## Online trainings

### Highly resolved scenarios for electricity generation from wind, PV and CSP

Tools and methods for developing feed-in time series and grid study scenario development

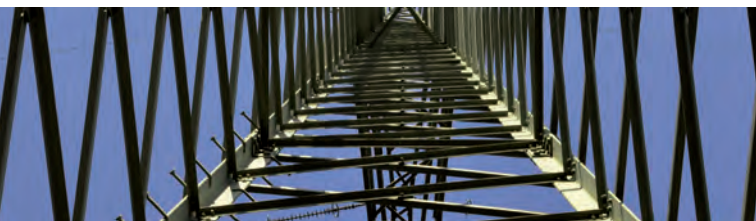
### Short-term prediction of wind and solar power

Weather-to-power models, forecast applications and forecast for a grid control centre

### Grid integration and system integration studies

Structure and typical questions, modelling, assumptions and recommendations

More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)



## Online trainings

### Generator concepts for renewable generation

Synchronous and induction generator, double fed induction generator, fully converted generator and inverter technology

### Balancing power design

Purposes, reserves types, stochastic functions, outage model

### Grid codes for renewables

Grid code structure, technical requirements, voltage and frequency control

### Generation expansion planning of systems with high share of wind and PV generation

Generation adequacy, equivalent load carrying capacity, capacity credit, software tools (PLEXOS, WASP)

### Storage

Battery storage systems and applications, technologies (FES, CAES, PHS, SuperCaps, SMES, TES) and costs

### Wind and PV grid integration

Variable renewable energy scheduling and operation, grid congestion, capacity planning and grid code parameters

### Flexibility options for power systems

Variable RE, grid, storage, demand-side integration, dispatchable generation, levelised cost of flexibility, market frameworks

### Flexible grid infrastructure and management

Boundary conditions, limits, infrastructure improvements, congestion management, demand-side management

### Flexibility of thermal power plants

Flexibility parameters, O&M, retrofit measures, operational costs and market environments





## Online trainings

### Digitalisation and smart technologies

Drivers of digitalisation, key technologies, smart generation, risks, cyber security

### Coupling to the power sector

Generation of power, heating and cooling sector, transport sector, indirect use of electricity, regulatory framework

### The integration costs of wind and solar power

Grid costs, balancing costs, plant utilisation, total costs, economic effects

### Inertia requirements for renewable power systems

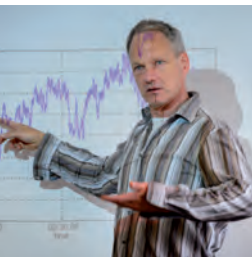
Stability and control, importance of inertia, inertia gain, dynamics of generators, dynamical modelling

### Protection settings in low and medium voltage grids

Behaviour of protection, calculation methods, planning, testing, monitoring

### Battery systems for ancillary services

Method for sizing, modelling, time-series simulation, economics, standards



More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)





## Face-to-face trainings

### Overview of energy efficiency in buildings

Active side of the building, passive side of the building, energy performance certificates, energy audits, legal framework

### Energy efficiency in buildings and districts

Active side of the building, passive side of the building, district heating, legal framework, economics

### Overview of energy efficiency in industry

Energy management, economics, cross-sectoral technologies, procurement and contracting, legal framework

### Energy efficiency in industry: cross-sectoral technologies

Energy management, industrial heating and cooling processes, compressed air, pumping and ventilation systems, electric drives

### Energy auditing for buildings

Energy audit process, energy audit standards, measurement instruments, data collection and evaluation, case studies





## Online trainings

### Technological aspects of energy efficiency

Industrial heating, cooling processes, compressed air, pumping/ventilation systems, electric drives, lighting

### Energy efficiency in industry – application

Industrial heating/cooling processes, electricity-based cross-sectoral technologies, energy demand reduction measures

### Energy efficient buildings – application

Energy consumption, -balance of buildings, energy flows, different climate zones, policies, standards, green buildings

### Energy efficiency in buildings – technology

Passive solar architecture, building envelope, heating ventilation, air conditioning, renewable energies, lighting

### Systematic approaches to energy savings

Energy management systems, energy audits, qualification of energy auditors, energy efficiency networks, financing

### Financing of energy efficiency projects and ESCOs

Appraisal of the client/ESCOs, technical/financial appraisal, environmental, social, climate performance assessment

### Support mechanisms for energy efficiency projects

Barriers of energy efficiency, regulation policy, information policy, economic incentive, bundling of policies

### Heat pumps

Coefficient of performance, environmental parameters, application in climate zones, refrigerant fluids

More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)



# RE/EE LEGAL ASPECTS

## Face-to-face trainings

### Policy framework and energy planning

Energy market concepts, energy planning, policy instruments, financing mechanisms, sustainable energy transition

### Decarbonisation roadmap development

Power system modelling, design thinking, role play, decarbonisation roadmap

### Sustainable cities: energy planning for municipalities

RE, EE, power, heating, cooling, transport, political instruments, governance, multi-stakeholder participation, roadmap

### Procurement of renewable energy projects

Tendering process, tendering documents, evaluation of results, contract development, case studies

## Online trainings

### Co-benefits of RE in climate change mitigation – overview

Definition, environmental, economic, social, political, co-benefits indicators

### Policies and instruments to mobilize the socio-economic (co-)benefits of RE

Climate policy framework, SDGs, Paris agreement, NDCs, leverage points

### Methods and tools to assess co-benefits of RE

Modelling tools, CGE, cost-benefit analysis, multi-criteria analysis, key socio-economic co-benefits

### Political and market frameworks for specific countries

Mena, Southeast Asia, Latin America



## Face-to-face training

### Green energy finance

RE technologies, due diligence, project finance, project contracts, financial modelling

## Online trainings

### Methodology of project valuation

Time value of money, NPV, IRR, LCOE, risk and uncertainty

### Policy frameworks for RE power generation

Physical basics, net metering, feed-in tariff design, auctions, quota systems

### Renewable energy project finance

SPV, business planning, bankability assessment, financial engineering, case studies

### Project contracts

EPC, PPA, supply agreements, land lease contracts, O&M contracts

### Environmental and social standards for RE projects

Equator principles, ESIA, sample standards, practical implementation guidance

### Bankable insurance cover for international RE projects

Construction insurance, operational insurance, scope of cover, typical clauses, insurance as credit collateral

More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)





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### Greening the bank

Climate change, greening bank operations, green finance definition, green credit cycle, project environmental performance monitoring (EPM)

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### Portfolio management in renewable energy

RE as asset class, risk management, quantitative basics, portfolio diversification, portfolio management

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### Debt financing process and credit risk management

Project finance credit risk analysis, term sheet, loan documentation, due diligence, contract options

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### Loan syndication for RE project

Originate-to-hold model, originate-to-distribute model, syndication process, pricing, syndication risks

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### Bankable O&M strategies for RE projects

O&M PV-Wind-Biogas, contractual arrangements, guarantee schemes, incentives, maintenance strategies

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### Measures for competitive power markets

Market structure, associated opportunities, single buyer market, provision of flexibility, centralized vs. decentralized

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## Online trainings

### RE investment vehicles and the aggregation of projects

Rationale for project bundling, YieldCos, infrastructure investment funds, FinCos, bank portfolio financings

### Climate finance

Principles of climate finance, UNFCCC, sources of climate finance, carbon pricing, NDC implementation

### Accessing the Green Climate Fund

Introduction to GCF, investment criteria, accredited entities, accreditation process, project approval

### Green microfinance

Introduction to microfinance, country case studies, checklist for implementation

### Climate finance options for South-East Asia

Climate finance overviews for: India, Indonesia, Philippines, Thailand, Vietnam

### Carbon pricing mechanisms

GHG Emission Landscape, emission trading, carbon taxes, offsetting mechanisms, effectiveness evaluation



More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)



# RE/EE MARKET DEVELOPMENT

## Face-to-face trainings

### Green energy for agriculture (powering agriculture)

Energy-Food-Nexus, energy efficiency, solar applications, solar thermal, wind, small hydro, biomass, biogas, water security, renewable energy business models for food investment

### Rural electrification: renewable energy solutions

Photovoltaics, wind, hydro vs. diesel, hybrid solutions, batteries, off-grid, mini-grids, economics

## Online trainings

### Social and gender aspects of energy projects

Gender and Energy Nexus, gender concepts, considerations in project cycle/energy interventions

### Negotiation skills

Benefits, formal and informal negotiations, BATNA, anchoring, creating and claiming value



# TRAIN-THE-TRAINER

Trainers can cooperate in various ways with their participants to transfer knowledge. All methods have advantages and disadvantages. Nevertheless, from RENAC's experience, nothing can be more tiring than monologues and non-stop PowerPoint presentations. RENAC wants to equip trainers with a concept for interactive and participatory approach to teaching.

The trainings on methodology and didactics that are part of the train-the-trainer programmes provide potential trainers with a toolkit for different teaching methods. Through examples, group work, interactive exercises and information, trainers increase their understanding of both a successfully conducted training and the role of the trainer. The guidelines offered also provide didactical methods and ways on how to plan a training session.

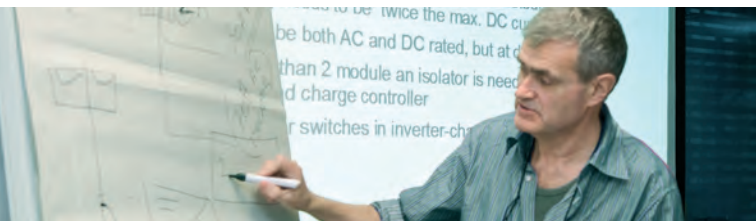
## Face-to-face training

### Train-the-trainer – seminar for didactics and training methods

Learning styles, role of a trainer, communication, teaching methods, effective seminar planning

Technology (one elective): PV application/wind power/biogas application, principles of PV, wind power, biogas

More information: [www.renac.de/tailor-made-trainings](http://www.renac.de/tailor-made-trainings)



# Academic Programmes

For individuals



## ACADEMIC PROGRAMMES

In cooperation with several universities, RENAC offers RE and EE related university degrees in English and Spanish. They are designed for students with some years of professional experience who want to upgrade their career.

### MBA Renewables

MBA Renewables is the first distance learning programme worldwide that offers the opportunity to obtain the Master of Business Administration (MBA) degree with a focus on renewable energy and energy efficiency.



In cooperation with:

Berliner Hochschule für Technik

[www.mba-renewables.de](http://www.mba-renewables.de)



### Especialización en Energías Renovables

The one-year distance learning programme Especialización en Energías Renovables (Specialisation in Renewable Energy) is offered by RENAC in cooperation with Earth University in Costa Rica. It covers fundamental knowledge on renewable energy technologies as well as advanced knowledge on the technical and economic aspects of planning renewable energy projects.



Especialización  
en Energías  
Renovables

In cooperation with:

Earth University, Costa Rica

[www.renac.de/especializacion](http://www.renac.de/especializacion)

ACQUIN



## Global Production Engineering

The international Master of Science Global Production Engineering is a two-year academic programme offered by the Technische Universität Berlin (Germany). In the GPE programme, RENAC offers the module Renewable Power Technologies and Grid Integration (RPTG). It provides students with a comprehensive overview of the main, commercially-viable and upcoming renewable power technologies and the incorporation of renewable power capacity into electricity grids.



In cooperation with:

Technische Universität Berlin

[www.renac.de/gpe](http://www.renac.de/gpe)



# Ready-made Trainings

For individuals





# READY-MADE TRAININGS

In addition to our trainings tailored to individual or client needs, RENAC has also developed a large number of ready-made trainings and courses. They are offered as online or face-to-face trainings, and as a combination ('blended learning').

Ready-made trainings cover a variety of topics related to renewable energies and energy efficiency – from introductory courses that provide an overview of RE and EE to advanced training courses for specialists who want to expand their knowledge.

The training courses are suitable for all those who are interested in furthering their professional or private development in this special field. These are mainly professionals who look for compact, specific and practice oriented knowledge on technical, legal, financial or project development related aspects.

RENAC is a certified provider of high quality, up to date trainings that encompass the latest and newest knowledge and technology. The ready-made RENAC trainings are regularly expanded.

For more information please check the RENAC catalogue on 'ready-made trainings'.

You can also find an overview here:  
[www.renac.de/ready-made-trainings](http://www.renac.de/ready-made-trainings)



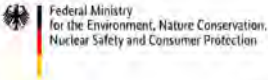
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# RENAC PARTNERS



## TESTIMONIALS



“The course I attended was really joyful and I was happy with the rich content and the way everything is organized and displayed. I’m looking forward to attending another course in order to build and expand my knowledge in the RE-Area.”

*Mahmoud Derbas, Germany, Applying Renewable Energy, 2020*

“My most memorable experience was the practical training and the field trip to Feldheim. I was able to gain a better understanding of renewable energy technologies.”

*Thobeka Mchunu, South Africa, GESS 2022*



“The content was more than I expected and the RENAC team is incredibly supportive. I will definitely come back again to RENAC academy for other professional training.”

*Mohammed Sallam, Green Energy Finance Specialist, GEFS 2021*

“RENAC’s Certified PV Professional programme is definitely a great way to get up to speed with photovoltaic business and technology. Not to mention the very hands-on do’s and don’ts tips included in the modules. Definitely a „must do“ training programme”

*Vincent Mignard, France, Certified PV Professional, 2020*



“I really enjoyed the course and the experience was well worth the money paid. Really good value for money. Many thanks and I would no doubt be back for another course in the very near future.”

*Ademola Thompson, Certified Renewable Energy Project Developer: Photovoltaics, 2020*

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