

## CERTIFICATE

Participants will receive a certificate of postgraduate in **Sustainable Hydropower** by ESHA

## PRACTICAL INFORMATION

### *Language*

All lectures are held in English. All the lecture material and handouts are in English

### *Duration*

The course lasts for ten weeks

### *Start of the course*

1 March 2010

### *Registration*

Participants register either at the headquarters of ESHA or with the director of the course Prof. Bernhard PELIKAN. Registration forms are available at [www.esha.be](http://www.esha.be)

### *Teaching method*

The course **Sustainable Hydropower** is taught in an interactive and practical way. Students are expected to actively participate in class discussions, to analyse cases, to prepare presentations and to engage in computer-assisted exercises. The course will focus on the practical applicability.

## LOCATION

The lectures will be held in Vienna, Austria in an excellently equipped seminar room near the city centre.

Free internet access, coffee, tea, water and fruits are available during the entire duration of the course. Participants are allowed to stay in the location also in periods without lectures for studying and group work.

## FEES

We are happy to offer the following very favourable fees of

1500 €	Non professionals
2000 €	Professionals

for this **Sustainable Hydropower** course. The number of participants is restricted.

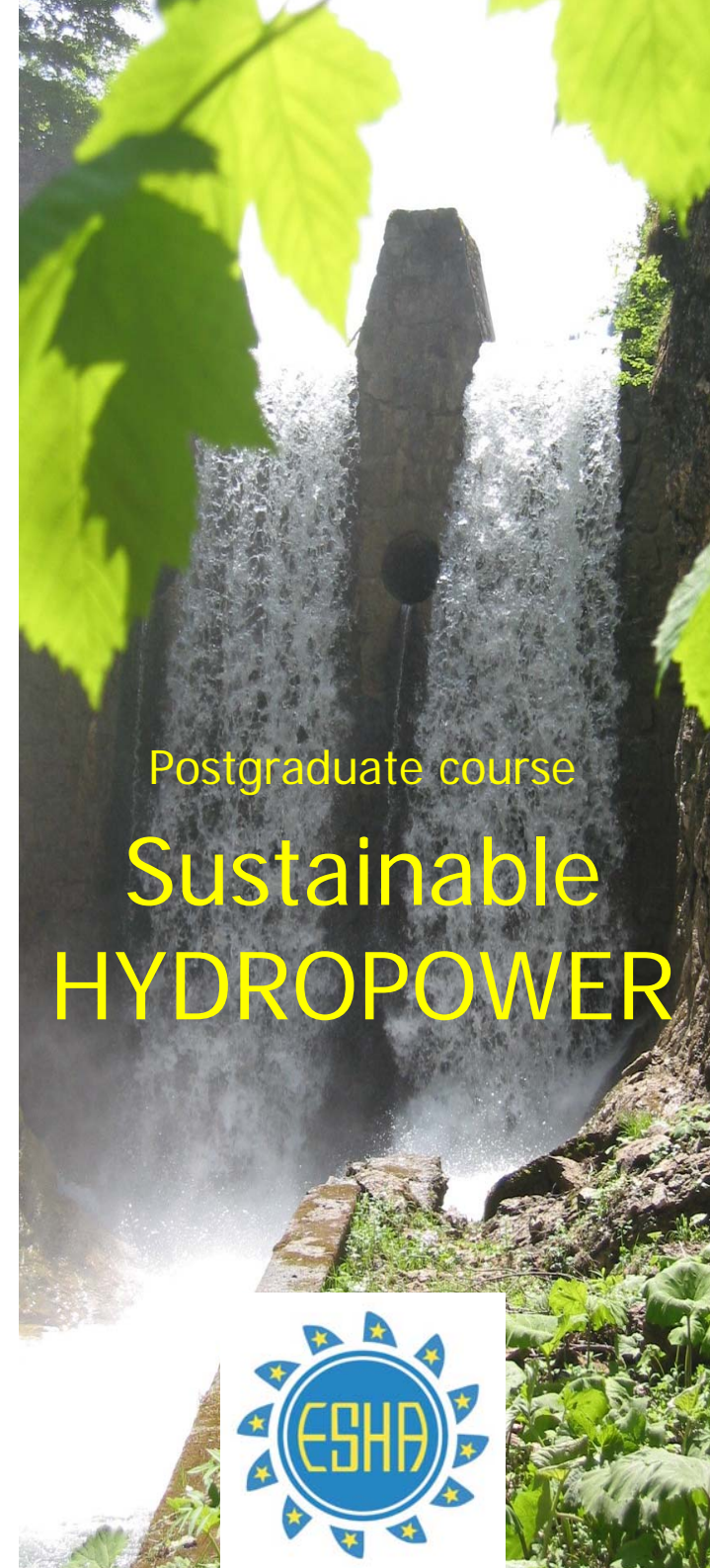
Fees include tuition, excursions, hand outs of the lectures, welcome reception, closing dinner and use of all facilities of the location. Fees are exempt of VAT.

Invoices are due within thirty days.

## MORE INFORMATION?

[www.esha.be](http://www.esha.be)

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Postgraduate course

Sustainable  
HYDROPOWER



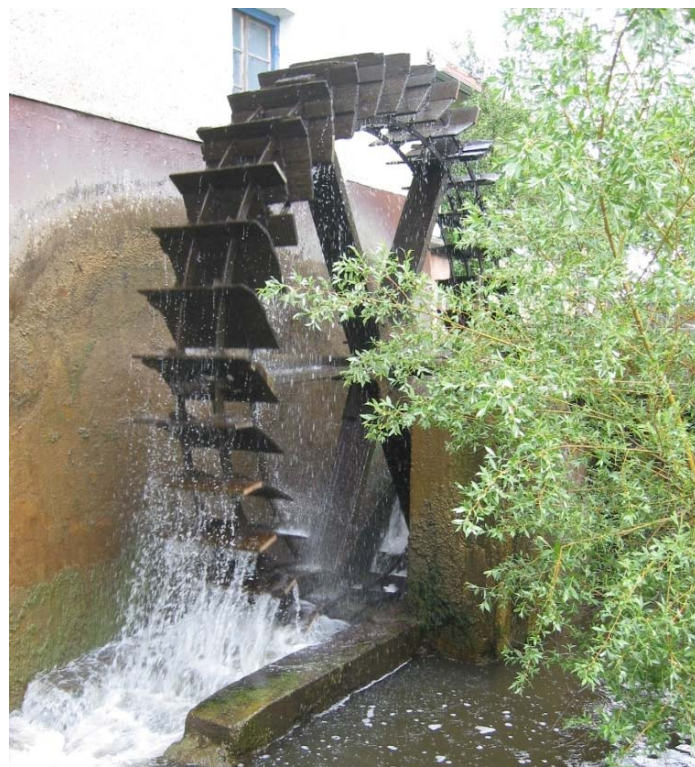
## INVITATION

Hydropower is the backbone of renewable energy. Although traditional there is still a huge development in both design and technology. The continuously increasing economical, environmental and social challenges result in an increasing demand of specialists not only in Europe but all over the world.

To become a specialist in **Sustainable Hydropower** means to acquire the ability of interdisciplinary engineering and the feeling of how to find compromises. Although there already exists some sectoral education in hydropower-related topics like hydrology or turbine technology at different European universities, there is still no comprehensive education offered focusing exclusively on **Sustainable Hydropower**.

## OBJECTIVES

The course **Sustainable Hydropower** is designed to equip the participants with the competency to understand the state of the art on hydropower design and technology. The course aims to improve the understanding of concepts and systems and enhance knowledge regarding tools and approaches. The course will educate those involved in design, engineering and implementation of advanced and sustainable hydropower concepts.



## ORGANISERS

The course **Sustainable Hydropower** is organised by ESHA, the European Small Hydropower Organisation. ESHA is the representation of thousands of small hydro operators all over Europe.

## TARGET GROUP

**Sustainable Hydropower** is tailored to professionals in the hydro power business, to potential investors who want to learn about the background of their business, to students who want to specialise in hydropower exploitation and generally to people who are interested in one of the most colourful sectors of renewable energy.

## PROGRAMME

**Sustainable Hydropower** is a course resulting in 30 credits

### 1. Introduction

Scheme classification, definitions and basic principles

### 2. Hydrological data

Stream flow measurement and records, simple precipitation – runoff models, bedload transport and groundwater

### 3. Hydraulic structures

Hydraulic principles, dams, weirs, intake structures, trashracks, sediment traps, open channels, penstocks. Spillways, gates and valves

### 4. Electromechanical equipment

Hydraulic machines, speed increasers, generators, control, governing and metering, powerhouses

### 5. Environmental impact and its mitigation

Introduction and legislation, burdens and impacts, identification and mitigation measures

### 6. Estimation and optimisation of capacity and output

Power equation, design discharge, residual flow, average annual energy production

### 7. Economic analysis

Basics, Tariffs and incentives, economic evaluation

### 8. Planning principles and engineering process

Pilot study, feasibility analysis, administrative procedures, practical examples, student projects

### 9. Survey of the current internal market

Present status and potential of hydropower, market description

### 10. Ocean energy

Resources (wave, tidal, current) and new technologies

