If you are establishing your career as scientist and you are looking for the best possible foundation for fulfilling your dreams and ambitions, this is your chance. We offer the best possible training for you to become a mature top-level researcher giving you excellent career opportunities both in academia and industry.
The green transition of energy systems requires the implementation of novel emerging energy conversion technologies based on turbomachinery with two-phase flow. However, the current level of knowledge and understanding of two-phase flow in turbomachinery is low, urgently calling for the need of educating scientists that can support the development of such technologies.
In this context, as part of a recently started MSCA-DN (Marie Skłodowska-Curie Actions, Doctoral Network) project on two-phase flow in turbomachinery entitled "Training42Phase", Exergy International currently has one opening for a PhD position with focus on aero-thermodynamics.
The aim of Training42Phase is to educate the future leading scientists within turbomachinery with two-phase flow, thereby providing the scientific and technological basis required for the development of the next generation of turbomachinery. Within this project you will get the chance break new ground at the absolute forefront of what is possible. You may read more about the Training42Phase project here at https://training42phase.dtu.dk/.
The other project partners recruiting PhD students are Technical University of Denmark, (four PhD positions with focus on aero-thermodynamics), Politecnico di Milano, Italy (two PhD positions with focus on aero-thermodynamics), CentraleSupélec, France (three PhD positions with focus on reliability and maintenance), and Imperial College of Science Technology and Medicine, UK (two PhD positions with focus on structural mechanics). The project also includes other industrial partners from large international companies and SMEs.

Responsibilities/ object of the research
The research will be focused on the design and optimization of an axial – centrifugal pump stage for boiling Organic Rankine Cycle (ORC) fluid with the aim to:

1) Develop a thermodynamic model suitable to predict fluid dynamic behaviour of ORC condensate fluid at the onset boiling threshold;
2) Develop numerical methods to predict the formation of bubbles/droplets at the pump inducer;
3) Design and evaluate different concepts/geometries of the pump stage with the target to mitigate any cavitation phenomena, considering also blade erosion and reliability;
4) Evaluate the performance of the design via numerical tools and scaled model test to assess onset cavitation at different fluid conditions both for its thermodynamic status as well as for distortions that might arise from upstream equipment. The performance assessment shall define the expected operating characteristics of the pump and the preferred regulation and flow control strategy

The expected results:

1) Conceptual design for a high-efficiency low-cavitation pump centrifugal stage for the use in ORC feed pump service with zero net positive suction head;
2) Identify the methods to cavitation energy in centrifugal pump inducers;
3) Prepare a conceptual design for pump stage suitable for low / zero net positive suction head in ORC applications.

Qualifications

- **Earned degree:**
  - MSc in Energy, Mechanical or Aerospace Engineering (or related area). In the latter two cases, preference will be given to candidates with a specialization in energy/power/propulsion or related areas
  - MSc with a final score no lower than 95/110 or 86/100
  - MSc with a minimum average score in exams indicated here

COUNTRY	MINIMUM GPA
BANGLADESH	3,3/4
CHINA	70/100
COLOMBIA	3,5/5
European Countries (ECTS grading system)	C+
EGYPT	65/100
ETHIOPIA	3/4
GHANA	65/100
INDIA	70/100
INDONESIA	2,8/4
IRAN	14,5/20
NIGERIA	3/5
PAKISTAN	3,3/4,0
SERBIA	7,5/10
TURKEY	3/4
VIETNAM	7/10

(for the Countries not included in this list, the evaluation will be carried out directly by the Selection Committee).

- **Background (mandatory):**
  - Thermodynamics
  - Thermo-fluid-dynamics
  - Turbomachinery design and analysis
  - Power plant engineering (design and analysis)
  - Matlab/Python programming
  - Fundamentals of CFD and FEM

- **English language:**
  - A certification of the level of English is required. Below is a list of the main certifications and levels accepted for this position:

TEST	MINIMUM LEVEL REQUIRED
CAMBRIDGE	≥ FCE grade B
CAMBRIDGE IELTS (International English Language Testing)	≥ 6
ETS – TOEFL (Test of English as a Foreign Language)	Paper based (total score): ≥ 547
ETS – TOEFL (Test of English as a Foreign Language)	Computer based (total score): ≥ 210
ETS – TOEFL (Test of English as a Foreign Language)	Internet based (total score): ≥ 78
ETS – TOEIC (Test of English for International Communication – Listening and Reading Test)	≥ 720
TRINITY COLLEGE LONDON	≥ ISE II

Furthermore, note that the MSCA-DN mobility clause applies; **the applicant must not have resided or carried out his/her main activity (work, studies, etc.) in Italy for more than 12 months in the 36 months immediately before the date of recruitment**. Compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention1 are not taken into account.

Timeline:

- M1-M17 the applicant is hired and hosted by Exergy International at the main headquarters (via Santa Rita, 14, 21057 Olgiate Olona VA) with periodic visits at Politecnico di Milano (Department of Energy, Building BL25, Via Lambruschini 4, 20156 Milano, Italy) due to the strong scientific target of the project;
- M18-M21: the applicant is seconded at Danmark Tekniske Universitet (DTU) by Prof. Fredrik Haglind, and trained in CFD modelling of two-phase flow in centrifugal pumps;
- M22-M36: the applicant is hosted by Exergy International to apply the developed models to industrially relevant contexts.

We offer

EXERGY are the developers, engineers and producers of ORC systems, with the innovative, pioneering Radial Outflow Turbine. ORC systems are used for power production from renewable energy sources, including biomass, solar, geothermal energy and waste heat recovery. They perform with greater efficiency and flexibility than traditional Rankine cycle and operate under diverse conditions.
EXERGY undertake the development and manufacturing process of the ORC turbine and plant internally. This includes R&D, testing, engineering, project management and after-sales service.
EXERGY is part of China's TICA GROUP, an international high-tech group with annual turnover of approx 1 Billion $ with more than 3.000 employees across the globe.

Appointment terms

- Start date (estimate): 1st trimester 2025
- Type: full-time exclusive
- Duration: 3 years

Find more information on the Marie Sklodowska Curie Action here at:
https://marie-sklodowska-curie-actions.ec.europa.eu/calls/msca-doctoral-networks-2022

Application

Submit the application package (see below) to: info@exergy.it

The Application Package is comprised of:

- CV
- Letter of motivation
- A short essay (maximum length is 3 pages, including references) on the topic of "*State-of-the-art and challenges of ORC plants and machinery".*
- The application package must not exceed 15 Mb

The offer is open to all candidates irrespective of age, gender, race, disability, religion or ethnic background.