MSc in Sustainable Energy Futures

www.imperial.ac.uk/energyfutureslab
ENERGY FUTURES LAB is Imperial College London’s flagship multidisciplinary energy institute. At the heart of Energy Futures Lab’s mission from its inception in 2005 has been postgraduate education.

Reflecting the nature of the Energy Futures Lab, the MSc in Sustainable Energy Futures was launched in 2006 and is a truly multidisciplinary course. With bespoke course content the MSc in Sustainable Energy Futures is taught by leading experts from 13 departments across the College ranging from the Electrical Engineering to Physics and the Business School.

Since its first cohort in 2007 the MSc in Sustainable Energy Futures has graduated almost 300 students with over 90% currently working in the energy sector.

Energy Futures Lab works closely with industry and government to ensure the MSc in Sustainable Energy Futures remains at the forefront of energy issues.
“Energy remains a critical global challenge. Key to the solutions to that challenge are people. At Imperial College we draw on our world leading expertise in energy technology, science, policy and business to train the next generation of sustainable energy professionals. Through a bespoke and unique range of taught modules and projects our graduates pursue careers in, and make an impact on, the energy industry, the energy investment sector, the public sector and non-governmental organisations.”

Dr Johannes Spinneken
Director of Education, Energy Futures Lab

WORKING WITH INDUSTRY AND GOVERNMENT
Industry and government are key in delivering a sustainable energy future. Drawing on Imperial's outstanding reputation, students have the opportunity to work with industrial and governmental partners during their research project.

ALUMNI LINKS
With almost all of our graduates working in the energy sector, our alumni make for a unique global network of highly skilled professionals. Numerous events are organised throughout the year to facilitate interaction between current students and alumni and strengthen relationships between graduates within the alumni network.

SITE VISITS
Nothing will give you a true idea of the scale of the energy problem like visiting Europe's largest hydroelectric power station. Each year students tour the 288MW Dinorwig Power Station in north Wales, along with other industrial power stations.

STUDENT CONFERENCE
Run by the students for the students. With support from Energy Futures Lab, each cohort organise a one day conference to communicate their research. From fund-raising to the guest list students take charge to ensure their conference meets their needs.

ENERGY FUTURES LAB EVENTS
Fancy chatting with industry leaders and policymakers? Through the Energy Futures Lab Lecture Series our students have unparalleled access to leaders in the energy sector.

DEDICATED WORKSPACE
Our students enjoy their own homeroom environment with desk space, computers, meeting rooms and kitchen area.
The MSc in Sustainable Energy Futures is a uniquely structured course. With the diverse cohort in mind the first semester is used to create a common language amongst our students by exploring the underpinning skills and knowledge required to analyse the energy system. These modules run concurrently for the duration of the term. The second semester is the opportunity to take a deeper dive into different technology areas. The modules are taught by the leaders in their field at Imperial and are presented in two week intensive blocks. Alongside the taught modules in the first and second semester students will also choose and initiate their research project. This project is an independant piece of work that is informed by original research through experimentation, or modelling and statistical analysis. Students are given the freedom to devise their own project if they wish and are co-supervised by two academics to ensure interdisciplinarity is at the core of the project. Following submission of their thesis students present an assessed poster to delegates from industry, government and academia at the annual MSc in Sustainable Energy Futures conference.

SEF01: Energy Systems Technology: This module explores the technical properties and the economic and environmental impacts of modern/future energy systems, including solar photovoltaic electricity generation, fuel cells and hydrogen for stationary and transport electricity generation and wind power.

SEF02: Methods for the Analysis of Energy Systems: This modules investigates a range of tools for the analysis of energy systems and resources from technical/capability and environmental impact view points. Students develop skills in modelling, simulation and optimisation of energy systems (components, networks and supply chains), exploring multiscale modelling, sensitivity, uncertainty and risk analysis, and life cycle and scenario analysis.

SEF03: Energy Economics and Policy: Students examine the key issues in energy economics and policy, exploring how these topics must be considered closely with technology development initiatives. Skills are developed in synthesis and critical analysis of energy literature and in writing technical reports.

SEF04: Debating society: This is an opportunity to look beyond the confines of the taught course modules allowing consideration of broader aspects of energy, exploring current energy issues and gaining key professional skills. Additionally guest speakers from the leading edge of academia, industry and government are invited to give bespoke lectures exclusively to MSc in Sustainable Energy Futures students.

SEF05: Urban Energy Systems: Students explore the challenges associated with delivering urban energy needs now and in the future using methodologies for the analysis and modelling of urban energy systems, and understanding the technologies of relevance to urban energy systems.
SEF10: Entrepreneurship in Renewable Energy: This module explores different elements of entrepreneurship including technology commercialisation, product positioning, new market development and financing options. Students will examine the challenge of making energy entrepreneurial opportunities viable. Investigating how large scale opportunities using wind or solar make it hostile for new entrants with less capital, and why niche opportunities and technology-based ideas show greater potential.

SEF06: Bioenergy: Students will investigate biorenewables production and use, and the wide range of conventional, advanced and emerging technological options for the production, pre-conversion, conversion and end use of biomass. Students will evaluate the impacts and opportunities for climate mitigation and adaptation, energy security and rural development through the identification of sustainable solutions for the exploitation of the biosphere for ecosystem and human services.

SEF07a: Low Carbon Technologies: Marine Energy: This module will introduce key offshore engineering concepts common to all technologies. An introduction to the wave and tidal energy resource will also be provided, complemented by an outline of the key energy conversion principles. The module also addresses challenges related to offshore foundations, site licensing, and technology barriers.

SEF07b: Low Carbon Technologies: Nuclear: Students develop an understanding of basic radiation related processes associated with nuclear energy generation, their risks and consequences. Skills will be developed to assess technological issues associated with nuclear institutions including reactor designs, nuclear waste, decontamination of nuclear installations and transport of nuclear materials.

SEF08: Energy Transmission and Systems: Students explore future distributed energy systems including power flow analysis in planning and operating electric power transmission systems. High voltage direct current transmission and flexible AC transmission system technologies will be examined alongside transmission network issues of large scale integration of wind power, the role of hydrogen transmission and storage infrastructure, and the principles, design and operation of batteries alongside the role of gas in a low carbon future.

SEF09: Sustainable Transport: Students will explore sustainable transport options for passenger and freight transport and investigate the challenges and opportunities associated with conventional and future technologies for different transport modes.

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OUR STUDENT COHORT IS DIVERSE. We accept students from a variety of academic backgrounds ranging from engineers to physicists, to geoscientists and economists.

Many of our students have professional experience, whether developed through month-long internship placements or decades in industry or the financial sector. Some of our students have chosen the MSc in Sustainable Energy Futures to kick start a new career.

We have very international cohorts. Most years our students represent all of the inhabited continents of the world.

Our students are attractive to a wide variety of employers; over 90% of our graduates work in the energy sector in industry, government and academia.
Graduate Destinations include:

- ABB
- Ameresco
- Arup
- ASB
- Bloomberg New Energy Finance
- BP
- Carbon Descent
- Carbon Trust
- Cofeley
- DECC
- E4 Tech
- EDF Energy
- Element Energy
- Exxon Mobile
- Forbury Environmental
- GazProm
- GDF Suez
- GE
- Gehrlicher Solar
- GL Garrad Hassan
- IBM
- J.P. Morgan
- Ofgem
- Petredec
- Petrojam
- Poyry
- Schlumberger
- SgurrEnergy
- Shell
- Sia
- Sunnco
- Total
- Wood Mackenzie

“I really enjoyed the opportunity to meet, and work with, some of the top academics and business people in the energy sector. The course gave me a strong foundation across all energy technologies and systems, and put it all in an economic and policy context.” Simon Bushell (2014), Energy Engineer at Ameresco.

“This course leapt out as an excellent foundation on which to build a new career helping to tackle the considerable environmental challenges that the world faces.” David Collier (2008), Energy and Sustainability Manager at Broadgate Estates.

“What motivated me to apply for a place on the MSc in Sustainable Energy Futures was the opportunity to be a part of what (in my opinion) is the biggest engineering and political challenge to face our generation; energy sustainability.” Richard Chatterton (2008), Lead Analyst, Global Carbon Markets at Bloomberg New Energy Finance.

“The students were a mix of different backgrounds: recent graduates, experienced professionals or even people that wanted to start their own business.” Angeliki Koulouri (2010), Research Officer at the European Wind Energy Association.

“I loved that so many nationalities were on the course, providing invaluable global perspectives. The thorough technical lectures and assignments, in tandem with excellent policy analysis - and all delivered from world leaders in their respective fields - gives you the skills and confidence to engage with all energy issues at depth.” Andrew Turner (2013), Energy Analyst, Bloomberg New Energy Finance.

Background data from 2013/14 cohort:

- **Home Continents**
  - 57% UK & EU
  - 29% Asia
  - 7% South America
  - 7% Other

- **Degrees**
  - 29% Electrical Engineering
  - 22% Civil Engineering
  - 15% Mechanical Engineering
  - 13% Energy Engineering
  - 12% Chemical Engineering
  - 9% Natural Sciences, Physics, Chemistry
As the only UK university to focus entirely on science, technology, engineering, medicine and business, Imperial College London offers a critical mass of international research expertise and a vibrant home for innovation and enterprise.

Sustained support for Imperial's research at Energy Futures Lab is a sound investment in the UK's economy and in developing the next generation of energy pioneers, researchers, innovators and entrepreneurs.

» Coordinates the strategic development of interdisciplinary energy research across Imperial College

» Works with industry, Government and funding agencies on research addressing the major energy challenges

» Instrumental in training and educating the next generation of skilled researchers and energy policy-makers

» Forms national and global partnerships addressing major energy themes

» Supports entrepreneurship in developing energy technologies

» Hosts regular public lectures and events to communicate our vision to the widest audience

» Influences policy by providing peer-reviewed scientific evidence

If you are interested in learning more about the MSc in Sustainable Energy Futures, please go to our website or contact our course coordinators:

Tel: +44 (0)207 594 5816
E: mscinsef@imperial.ac.uk
W: www.imperial.ac.uk/energyfutureslab

Register as a member of Energy Futures Lab to receive regular updates and invitations to events:
www.imperial.ac.uk/energyfutureslab/about/membership

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