



# Energy Systems Integration 101

KU Leuven, Belgium  
May 18<sup>th</sup> to 22<sup>nd</sup>, 2015

The [International Institute of Energy Systems Integration](#) presents an introductory course on Energy Systems Integration (ESI). The course will cover the concept of ESI at all scales (from residential to continental) across multiple energy (and non-energy) domains e.g. electricity and gas nexus, electricity and water nexus, gas and transport etc. from a technical, market and regulatory perspective. The course is designed for graduate students and practitioners working in the field to give a perspective on the state of the art in ESI. Each of the five days will consist of 4 hours of lectures and 4 hours of projects work.

## Curriculum

The ESI subject is vast and the course is designed to illustrate the breadth and importance of the area while highlighting some specific methods and applications at a level of detail that is challenging and useful to the students.

- What is Energy Systems Integration (ESI)
- Research challenges in ESI
- Distributed generation and MicroGrids as part of an integrated energy system
- Supergrids on a continental scale as part of an integrated energy system
- Energy Policy and Regulation in integrated energy systems
- Impact and design of emission trading schemes in an integrated energy system
- Costs and benefits of an integrated energy system
- The gas/electricity nexus
- The transport/energy nexus
- Building energy systems
- Flexibility within the demand side of the integrated energy system

## Project work

During the course, the students will collaborate in teams on a regional energy systems integration case. They will learn hands-on about the challenges posed by an energy-consuming demand that needs to be balanced by a multitude of energy resources across the adequate infrastructure. At the end of the week, the teams present to their peers and discuss the proposed solutions.

## Instructors

- Dr. Erik Delaure, KU Leuven
- Prof. Mark O'Malley, UCD, Ireland
- Dr. Ben Kroposki, NREL, USA
- Prof. Henrik Madsen, CITIES, Danish Technical University
- Dr. C. Marnay, LBL, USA
- Prof. Johan Driesen, KU Leuven / EIT-KIC InnoEnergy
- Prof. William D'haeseleer, KU Leuven
- Prof. Dirk Van Hertem, KU Leuven
- Dr. Pieter Vingerhoets, KU Leuven
- Dr. Chris Dent, Durham University
- Prof. Leonardo Meeus, KU Leuven-Vlerick Management School
- Dr. Marco Cometto, NEA/IEA
- Prof. Jan Horst Keppler, Dauphine University Paris
- Dr. Luc Pelckmans, VITO
- Prof. Stef Proost, KU Leuven
- Dr. Eric Bosman, Gdf-Suez
- Prof. Dirk Saelens, KU Leuven

The course is sponsored by iiESI with the generous support of KU Leuven & EIT-KIC InnoEnergy. **There is a fee of €100**, which is waived for registered EIT-KIC programme students. Participants will have to cover their own transport and accommodation costs.

For further information and to reserve your place please contact [iiESI@ucd.ie](mailto:iiESI@ucd.ie)

ESI 101 Course Leuven, Belgium, May 18-22 2015

	Monday May 18 Introductory Block	Tuesday May 19 Electrical System Integration	Wednesday May 20 Economical & Policy Aspects	Thursday May 21 Thermal Aspects in Buildings	Friday May 22 Energy & Transport
8:30h-10:00h	What is the iIESI & EIT? <i>Prof. Mark O'Malley &amp; Prof. Johan Driesen</i>	Distrib Gen & Microgrids <i>Dr. Chris Marney</i>	Emission Trading and ESI effects <i>Dr. Erik Delarue</i> (8:30h-9:45h)	Energy conscientious buildings <i>Prof. Dirk Saelens</i> (8:30h-10:30h)	Electric Transport & V2G storage <i>Prof. Johan Driesen</i>
10:00h-11:30h	Challenges ESI + European view <i>Prof. William D'haeseleer</i>	Supergrids in EU continent & US <i>Prof. Dirk Van Hertem</i>	En Pol & Regulatory Aspects <i>Prof. Leonardo Meeus</i> (9:45h-11:15h)	Break (10:30h-11:00h)	Fuelling cars of the future: energy and environment issues <i>Prof. Stef Proost</i>
11:30h-12:00h	Break	Break	Break (11:15h-11:45h)		Break
12:00h-13:00h	Solutions to ESI + US view <i>Dr. Ben Kroposki</i>	EnergyVille projects on DSM/BIPV <i>Prof. Johan Driesen</i>	Cost of System Integration <i>Dr. Marco Cometto</i> (11:45h-13:00h)	Modeling the dynamics of Buildings <i>Prof. Henrik Madsen</i> (11:00h-13:00h)	The role of biomass in the European energy system <i>Dr. Luc Pelkmans</i>
13:00h-14:00h	Lunch	Lunch	Lunch	Lunch	Lunch
14:00h- 15:30h	Transm Grids in Islands IRE & JPN <i>Prof. Mark O'Malley</i>	Statistical modelling for energy system planning <i>Prof. Chris Dent</i>	Visit European Commission DG R&I and DG ENER	Project Work	Gas / Electricity Nexus & P2G <i>Ir. Vincent Verbeke</i>
15:30h-17:30h	Project work	Dem Resp Industry / Flexibility <i>Dr. Cedric De Jonghe</i>	Visit European Commission DG R&I and DG ENER	Project Work	Project Work
Evening			Social Activity Brussels		