

<b>Module Title:</b>  Energy generation, supply and demand in cities	<b>Module Code: EV7116</b>  <b>Level: 7</b>  <b>Credit: 15</b>  <b>ECTS credit: 7.5</b>	<b>Module Leader:</b> Frances Hill  <b>Additional tutors:</b> Bryce Gilroy-Scott Jane Fisher Alan Owen Louise Halestrap Siobhan Maderson Tom Barker Ruth Stevenson Tim Coleridge
<b>Pre-requisite:</b> none	<b>Pre-cursor:</b> none	
<b>Co-requisite:</b> none	<b>Excluded combinations :</b> none	
<b>Location of delivery: CAT on-site and distance learning</b>		
<b>Main aims of the module are to enable students to;</b>  Gain a thorough understanding of current and projected energy demand and supply in buildings and transport. Explore technical economic and social dynamics that underlie the development and management of communities and cities. Examine the developing use of energy management systems, and renewable and low carbon energy including combined heat and power, biomass, heat pumps solar thermal and district heating.  Discern and assess critically the complex factors that influence the provision of and potential for sustainable energy, the management of supply and demand, and energy use behaviours within urban and community focused environments.  Recognise and rationalise the prospects for innovative research and practice for city and community regeneration.		
<p style="text-align: center;"><b>Main topics of study:</b></p> Within the context of increasing global-scale urbanisation and climate change, this module will examine the challenges of ensuring sustainable energy use and management, an environmentally sustainable energy supply to, and within, urban areas, and the use of this energy. It will explore current discourse on the functions of cities, and the communities that comprise them.  The module will explore: <ul style="list-style-type: none"> <li>• Energy (heat and power) current and projected in domestic and commercial buildings and in transport</li> <li>• Environmental impacts, sustainability and adaptation issues,</li> <li>• Policy planning economic and social and behavioural aspects of the urban environment</li> <li>• Efficiency or demand reduction opportunities,</li> <li>• supply opportunities including from CHP, biomass, heat pumps, solar thermal etc</li> <li>• Design Build Finance Operation and Maintain solutions for different technologies</li> <li>• Specific phenomena of cities (e.g. Urban Heat Island, cooling needs, fuel poverty and equity issues, urban regeneration and transformation.</li> </ul>		
<b>Learning Outcomes for the module</b>  At the end of this module, students will be able to:		

**Knowledge**

1. Apply a critical understanding of issues concerning the development of sustainable energy generation, supply and demand in developed areas within the context of adaptation and sustainability;
2. Identify the influences and interconnectedness of the key political, social, economic and behavioural influences on urban energy demand, supply and management. Examine the human relationship to material and energy systems within the context of the global environment;
3. Evaluate the technology available or potentially available to cities to regulate demand within urban areas and for the generation, supply and management of energy.

**Thinking skills**

4. Assess and critically evaluate theories and practice in the field of sustainable energy supply and demand in cities and communities;
5. Produce a critical analysis and evaluation of the technical issues challenging communities and cities at the infrastructure scale: resources, demand management, supply, and transport infrastructure;
6. Present a local to global perspective synthesising the different environmental change and energy resource pressures and problems facing communities, cities and local environments.

**Subject-based practical skills**

7. Assess the energy generation and use of CHP, renewables and heat pump technologies, and the associated energy supply and storage within an urban context

**Skills for life and work (general skills)**

8. Communicate findings effectively (written and oral) to a team or a wider audience.

**Teaching/ learning methods/strategies used to enable the achievement of learning outcomes:**

On-site students will be supported through lectures, seminars and tutorials within the subject areas and in study skills. On-site students will also gain hands-on experience through practical tuition facilitated by specialist practitioners;

There is formative learning element to the module to allow the students to receive critical feedback on their work without the pressure of marked assessment.

For distance learning (DL) students, learning will be supported through Internet-based lectures (of the onsite lectures), situation related practical exercises, seminars and tutorials.

All students also have access to Moodle discussion boards and regular Skype surgeries, where they can meet with their peers and a tutor to discuss any academic issue.

Lectures onsite and through DL highlight key concepts, models and frameworks, and integrate additional resources (such as journal articles). They encourage deep learning through the use of self-assessment questions which encourage students to engage with the topic, to help students understand new topics and skills.

<b>Assessment methods which enable students to demonstrate the learning outcomes for the module:</b>	<b>Weighting:</b>	<b>Learning Outcomes demonstrated:</b>
1. Essay (2,400 words )	80%	1,2,3,4,5,6,7
2. Presentation (600 words equiv)	20%	8

**Reading and resources for the module:****Core**

Roaf S., Crichton D., Nicol F. (2009). *Adapting Buildings and Cities for Climate Change*. 2<sup>nd</sup> edition. Architectural Press, Oxford. (\*)

Register, R (2013). *EcoCities: Rebuilding Cities in Balance with Nature*. Revised. New Society Publishers.

**Recommended**

Benton-Short, L. and J. R. Short (2008). *Cities and Nature*. Oxon, Routledge.

Cantor J. and Harper G. (2011) *Heat Pumps for the Home*. The Crowood Press, Marlborough.

CIBSE (2013) *AM12 combined heat and power for buildings* NEW 2013 (CIBSE Applications Manual 12). London: CIBSE.

Department of Energy and Climate Change (2012) *The future of heating: a strategic framework for low carbon heat in the UK*. Available at:  
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/48574/4805-future-heating-strategic-framework.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48574/4805-future-heating-strategic-framework.pdf) (Accessed: 23 August 2015).

Girardet, H. (1999) *Creating Sustainable Cities*. Schumacher Briefings, Green Books. Dartington.

McLaren, D. and J. Agyeman (2015). *Sharing Cities: A Case for Truly Smart and Sustainable Cities*. Cambridge, MA, USA, MIT Press.

Van der Ryn S. & Calthorpe P. (2008). *Sustainable Communities: A New Design Synthesis for Cities, Suburbs and Towns*. New Society Publishers, Gabriola Island.

van Loo, S. and Koppejan, J., (2008) *The Handbook of Biomass Combustion and Co-firing* Earthscan, London. (\*)

Wong, T-C., Yuen, B. (editors) (2011). *Eco-city Planning: Policies, Practice and Design*. Springer, Dordrecht.

Further relevant journals, websites and other relevant resources will be provided within reading materials that are made available for the module.

(\*) Available as an e-book

Indicative learning and teaching time  (10 hrs per credit):	Activity
1. Student/tutor interaction:	Activity and hours (lectures, seminars, tutorials, project supervision, demonstrations, practical classes and workshops)  Contact learning: 30hr
2. Student learning time:	Activity (e.g. seminar reading and preparation/assignment preparation/ background reading/ on-line activities/group work/portfolio/diary preparation, unsupervised studio work etc): Self directed learning: 120hr
Total hours (1 and 2):	150hr