Module Title: Energy generation from solar	**Module Code: EV7118** **Level: 7** **Credit: 15** **ECTS credit: 7.5**	**Module Leader**: Frances Hill **Additional tutors:** Bryce Gilroy-Scott Jane Fisher Alan Owen Louise Halestrap Siobhan Maderson Tim Coleridge Ruth Stevenson

Pre-requisite: none	**Pre-cursor:** none
Co-requisite: none	**Excluded combinations :** none

Location of delivery: CAT/By distance learning

The main aims of the module are to enable students to:

Synthesise an informed understanding of the technological, wider policy, environmental and social benefits and limitations of solar power generation.

Form a critical appreciation of the technological aspects, functioning, resource potential, limitations, maintenance needs, associated carbon emissions and environmental impacts of solar power technologies.

Main topics of study:

- Principles and practice of solar energy generation;
- Solar resource - availability and limitations, both in the UK and internationally;
- Principles of photovoltaic modelling;
- Policy and economics issues, planning, social and legislative aspects of energy provision from solar;
- Solar thermal technologies for providing heat and power generation;

Learning Outcomes for the module

At the end of this module, students will be able to:

Knowledge

1. Demonstrate a critical understanding of the principles of the technology;
2. Form a synthesis of the benefits and limitations (e.g. intermittency) of transforming energy provision systems;

Thinking skills

3. Critically appraise the technological capabilities and limitations of the technology;
4. Critically appraise the wider environmental impacts and carbon implications of installation, use and end of life outcome of the technologies;

Subject-based practical skills

5. Systematically analyse solar energy resource availability in relation to demand trends and critically appraise using these sources of energy locally or at distance through grid or storage networks;

Skills for life and work

6. Communicate effectively (written and oral) to a team, peer or a wider audience.

7. Use data to assess the efficacy of the featured technology

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

The factual content of the module is taught through lectures, seminars, practical workshops, presentations, demonstrations and tutorials, and throughout this process an active exchange of views and opinions is encouraged. Both theoretical and practical aspects are covered. Students have access to Moodle discussion boards and to regular Skype surgeries where they can meet with their peers and a tutor to discuss any academic issue. The summative coursework consists of an academic investigative essay and presentation of this.

There is a 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.

Assessment methods which enable students to demonstrate the learning outcomes for the module:	**Weighting:**	**Learning Outcomes demonstrated:**
1. Report (2400 words)	80%	1,2,3,4,5,6,8
2. Presentation (600 words equivalent)	20%	7

Reading and resources for the module:

Core

Deutsche Gesellschaft für Sonnenenergie (2013) Planning and installing photovoltaic systems: a guide for installers, architects and engineers. 3rd edn. Abingdon: Routledge.)

Recommended

BRE, EA Technology, Halcrow Group and Sun Dog Energy (2006) *Photovoltaics in buildings: Guide to the installation of PV systems*. Available at: http://www.bre.co.uk/filelibrary/pdf/rpts/Guide_to_the_installation_of_PV_systems_2nd_Edition.pdf (Accessed: 9 August 2015).

EPIA and Greenpeace (2011) *Solar generation 6. solar photovoltaic electricity empowering*

the world. Available at: http://www.greenpeace.org/international/Global/international/publications/climate/2011/Final%20Solar Generation%20VI%20full%20report%20lr.pdf (Accessed: 9 August 2015).

Fraunhofer ISE (2014) Photovoltaics report. Available at: http://www.ise.fraunhofer.de/de/downloads/pdf-files/aktuelles/photovoltaics-report-in-englischer-sprache.pdf (Accessed: 9 August 2015).

International Energy Agency (2011) *Life cycle inventories and life cycle assessments of photovoltaic systems*. Available at: www.iea-pvps.org/index.php?id=3&eID=dam_frontend_push&docID=2395 (Accessed: 9 August

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<tr><td colspan="2">2015).Messenger, R. & Ventre, J., (2010) Photovoltaic Systems Engineering. 3rd edition. CRC Press, Oxford

Smith, Adrian, Kern, Florian, Raven, Rob and Verhees, Bram (2013) Spaces for sustainable innovation: solar photovoltaic electricity in the UK. Technological Forecasting & Social Change. ISSN 0040-1625

Further relevant journals, websites and other relevant resources will be provided within reading materials that are made available for the module.</td></tr>
<tr><td>Indicative learning and teaching time

(10 hrs per credit):</td><td>Activity</td></tr>
<tr><td>1. Student/tutor interaction:</td><td>Lectures, seminars, tutorials, presentations, practicals / demonstrations

30 hours</td></tr>
<tr><td>2. Student self learning and research time:</td><td>Seminar reading and preparation, assignment preparation, background reading, and research activities.

120 hours</td></tr>
<tr><td>Total hours:</td><td>150 hours</td></tr>
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