Sustainable Energy Management
GBAT9109

Course Overview
Semester 2 2014
Important Notice

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## Semester 2 2014 course schedule

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<th>Date</th>
<th>Unit:</th>
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<tr>
<td>1</td>
<td>28 July</td>
<td>Unit 1: Global energy sources</td>
</tr>
<tr>
<td>2</td>
<td>4 August</td>
<td>Unit 2: Impacts of energy use</td>
</tr>
<tr>
<td>3</td>
<td>11 August</td>
<td>Unit 3: Energy production and use in Australia</td>
</tr>
<tr>
<td>4</td>
<td>18 August</td>
<td>Unit 4: Energy and carbon markets</td>
</tr>
<tr>
<td>5</td>
<td>25 August</td>
<td>Unit 5: Energy, sustainability and strategy</td>
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<tr>
<td>6</td>
<td>1 September</td>
<td>Unit 6: Electricity generation and its use</td>
</tr>
<tr>
<td>7</td>
<td>8 September</td>
<td>Unit 7: Energy use in the built environment</td>
</tr>
<tr>
<td>8</td>
<td>15 September</td>
<td>Unit 8: Transportation: existing and alternative fuels</td>
</tr>
<tr>
<td>9</td>
<td>22 September</td>
<td>Unit 9: SEM in organisations: the ICT sector</td>
</tr>
</tbody>
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**Mid-term recess: Friday 26 September – Tuesday 7 October**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Unit:</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>7 October*</td>
<td>Unit 10: Corporate reporting on sustainable energy management</td>
</tr>
<tr>
<td>11</td>
<td>13 October</td>
<td>Unit 11: Sustainable energy management in organisations</td>
</tr>
<tr>
<td>12</td>
<td>20 October</td>
<td>Unit 12: Sustainable energy management – the future</td>
</tr>
<tr>
<td>13</td>
<td>27 October</td>
<td>Examination week 1</td>
</tr>
<tr>
<td>14</td>
<td>3 November</td>
<td>Examination week 2</td>
</tr>
</tbody>
</table>

*Monday 6 October is a public holiday in NSW
Course staff

Course Coordinator

Each course has a Course Coordinator who is responsible for the academic leadership and overall academic integrity of the course. The Course Coordinator selects content and sets assessment tasks, and takes responsibility for specific academic and administrative issues related to the course when it is being offered. Course Coordinators oversee Class Facilitators and ensure that the ongoing standard of facilitation in the course is consistent with the quality requirements of the program.

The Course Coordinator is:

Dr Robert Gale

email: r.gale@unsw.edu.au

Dr Robert Gale

Robert has over 25 years’ experience in natural resources, environmental management and sustainable development. Robert’s cross-disciplinary academic experience linking biophysical and socioeconomic science includes teaching and research at UNSW, the Australian Maritime College and in Canada at Royal Roads University and the University of Toronto.

As a consultant in Canada, Robert advised a range of clients on economic instruments, environment–economy linkages, environmental issues, and strategic management. As Manager of the City of Toronto’s Environmental Protection Office and a board member of the City of Toronto’s Department of Health, Robert led initiatives on sustainability (including development approvals, environmental policy, strategy, education and advocacy). At an early stage of his career, he managed stakeholder engagement and public consultation processes with the Royal Commission on the Economic Union and Development Prospects for Canada. Robert has written more than 100 academic and technical reports.

Robert believes that climate change risks are a fundamental driver of sustainable energy management, and that we all have important roles to play in developing and/or participating in alternative technologies and transition strategies.
Class Facilitator

The role of your Class Facilitator is to support the learning process by encouraging interaction amongst participants, providing direction in understanding the course content, assessing participant progress through the course and providing feedback on work submitted. MBT Class Facilitators comprise academics and industry practitioners with relevant backgrounds.

You will be notified of your Class Facilitator’s name and contact details in your class confirmation email sent by MBT Student Services. Details will also be available in the gallery section of your online class for face-to-face and distance classes.

Course authors

Dr Ian Lavering was the founding author of the course, and was the Course Coordinator until his retirement in 2007. Dr Robert Gale has been the Course Coordinator since then.

Dr Ian Lavering  
BSc (Hons), PhD (Applied Science), MA (Hons) (Economics and Management) UNSW, Grad Dip Management UCQ, Grad Dip Admin UCan, Grad Cert Restoration Ecology, MBA, CSU

Ian’s wide experience in the area of energy included working with the WA Department of Minerals and Energy, SA Oil and Gas Corp and Esso Aust. He was a scientific adviser to the Federal Resources portfolio and consulted to the Asia–Pacific Economic Commission, Australian Mineral Foundation and Environment Australia on minerals, energy, resources and the environmental impacts of resource exploration, production and utilisation. He has been a member of several federal committees, including one on the implementation of a carbon capture and sequestration regulatory regime. Ian is a Fellow of the Geological Society of London and the Australian Institute of Energy, and a Member of the International Association of Energy Economists.

Acknowledgements

We wish to acknowledge the valuable contributions of Professor Peter Rogers, UNSW Department of Biotechnology, and Professor Tony Owen, UNSW School of Economics (academic reviewers 2000–1); Robert Barbaro, science educator, and Mike Roarty, energy and environment researcher (academic reviewers 2006–7); Ruth Luxton, educational consultant, for earlier revisions; and Andrew Chambers, educational consultant, for revisions since 2009.
Aims

The aims of this course are to:

- provide managers with an appreciation of the issues and implications of energy use
- address anthropogenic greenhouse gas emissions that drive climate change
- outline the very basic science of energy and the range of energy technologies
- outline the very basic issues of human-induced climate change and the efforts to mitigate greenhouse gas emissions
- develop an understanding and appreciation in contemporary managers of the innovations and policies related to energy use and greenhouse gas emissions at a societal level
- enable managers to outline and discuss the effect of traditional energy use on the environment, and the business-related implications of mitigation measures for greenhouse gas emissions such as carbon taxes and emissions trading systems being applied throughout the world
- provide managers with the range of knowledge and skills to analyse and make recommendations about sustainable energy and use in their own organisations.

Everything that happens in both the living and the nonliving world is due to the flow and transformation of energy. Energy drives the economy….There can be no more fundamental question fuelling our existence.

(Bent, Lloyd and Baker 2002)

Since the beginning of human existence, our predecessors have been engaged in the pursuit and use of natural resources. Following the Industrial Revolution more than 200 years ago, a range of non-renewable resources was harnessed on a large scale for basic fuel sources. Since then, the diversity and complexity of technology and industrial systems have vastly increased as a consequence.

These days, with the impacts of fuel use becoming a major source of environmental concern, more than ever before the sustainability of energy use and the management of these resources is a fundamental and core issue for business enterprises, as well as for individuals. What are the prospects for energy supplies for the 21st century for our own nation, our major trading partners and for the rest of the world?
Energy is, as we know only too well, essential for the functioning of most of the industrialised world and for progress in developing nations. At the same time, energy production and consumption are the main issues associated with climate change and environmental degradation.

For managers who are involved in business in this changing age, sustainable energy management is one of the most critical issues for the future.

More than ever before, we need to understand the traditional sources of energy, their quality, availability and environmental effects, as well as the potential alternatives for energy and the effects of these upon the natural environment and modern industrial economies.

Over the past 200 years, the use of primary energy sources in manufacturing or processing has evolved from simply using locally available resources – such as water power, firewood or coal – to an issue of primary importance in business. The transition from coal to a petroleum-based fuel economy took place throughout the 20th century.

Some oil experts make the case that the world’s oil producing capacity is about to peak or will peak soon and gradually decline thereafter. What will follow the ‘petroleum economy’ is still a matter for conjecture and speculation, with a range of combined or competitive energy sources and technologies available.

With daily changes to the global oil market commanding media attention around the world, there is growing interest in the potential transition to renewable energy sources. Managing energy is now a basic feature of business in a globally focused economy.

Energy is a major business cost and a strategic component of how a business enterprise derives its competitive edge.

Fossil fuels in the form of oil, natural gas and coal comprise approximately 80% of the world’s energy use, and an even higher proportion for major industrial countries such as the US and parts of Europe. We now face a situation where the environmental impacts of combusting fossil fuels have been clearly identified as unsustainable in the long term.

The need to increase the use of sustainable and renewable energy sources is self-evident. Most of the world’s fossil fuels are used in developed nations; the pattern of use of these fuels in such countries is determined by a combination of the number of people, the nature of the societies in which they live and the technologies available to them.

In this course, we deal with options for more sustainable use of energy resources and fuels – fundamental drivers of all major business activity in developed and developing economies. The sustainable management of energy relates to the concept that underlies much of the energy and environment literature today, of meeting the needs of current generations without compromising the ability of future generations to meet their needs (Brundtland 1987; Dresner 2002).
The present and past use of energy, and fossil fuels in particular, has in fact improved somewhat; but the harsh reality is that much more progress is required before we can hope to achieve the required level of sustainable energy use and management.

Indeed, our current pattern of energy resources use underpins the very basis of our economic system. Trying to change the pattern of energy use is an urgent aim; yet slow progress is possibly the best result we can hope for in the current socioeconomic and political climate. Energy use plays an important role in almost every part of our daily lives. Increased interdependency in our business world creates greater reliance on the availability and low cost of efficient energy sources, and increasingly more clean and effective use of those resources now and in the future.

While the prospect of resource limits has greatly influenced research and discussion in the recent past about finite resources on planet Earth, more comprehensive issues about their use have become the focus of current concern. The effects of combusting fossil fuels and venting the products into the atmosphere are now the dominating issues of our increasingly environmentally focused world, in both our business and personal lives.

Our analysis of the critical area of sustainable energy management includes significant current energy issues, impacts on climate and natural environment, the major energy resources and technologies, effects of ‘peak oil’, prospects for renewable energy sources, and prospects for a ‘hydrogen economy’ or a ‘methanol economy’. We also consider issues associated with distributed energy, energy use in the built environment and society, applying sustainable energy management issues in a corporate setting, and the potential of carbon taxes and emissions trading schemes to reduce a corporation’s carbon footprint.

Structure

Unit 1: Global energy sources. In this first Unit, we look at the current pattern of world energy supply and use and the ongoing transition to renewable energy sources.

Unit 2: Impacts of energy use. Here, we examine atmospheric carbon dioxide build-up, the anthropogenic greenhouse effect and climate change, fossil fuel use and energy use as key impacts on environmental quality.

Unit 3: Energy production and use in Australia outlines the features of present energy markets, both renewable and non-renewable, that influence resource use.

Unit 4: Energy and carbon markets covers the markets for major fossil fuels, their quality, limits and future availability to business users or producers. The ‘peak oil’ phenomenon is also discussed. Unit 4 also covers carbon markets and the debate about pricing carbon.
Unit 5: Energy, sustainability and strategy will expose you to some of the major technologies associated with energy supply, generation and use, and how these can be made more sustainable in business enterprises.

Unit 6: Electricity generation and its use. We look at management of electricity generation and its use, and matching demand and supply patterns of business users. The recent development of contestable electricity markets in an Australian context is also reviewed.

Unit 7: Energy use in the built environment. This Unit includes the issues of management and technology devoted to optimising the consumption and use of energy in habitable structures.

Unit 8: Transportation: existing and alternative fuels. In this Unit, we examine the issues associated with transportation in a carbon constrained economy and explore different scenarios for sustainable transportation.

Unit 9: SEM in organisations: the ICT sector outlines power consumption and adaptive measures that can be taken to reduce the burden of contemporary telecommunication and computing technologies.

Unit 10: Corporate reporting on sustainable energy management. Here, we focus on the importance of corporate perspectives on environmental performance reporting and note the growing importance of third party-accredited sustainability reports.

Unit 11: Sustainable energy management in organisations. Here we summarise the basic elements required to develop a sustainable energy strategy for your organisation.

Unit 12: Sustainable energy management – the future, outlines broad issues of energy and climate change and links the corporate organisation to changes taking place within society, including efforts to regulate greenhouse gas emissions through carbon taxes and emissions trading systems.

Learning outcomes

After you have completed this course you should be able to:

• discuss trends, innovations and policies related to energy usage at a business and societal level
• evaluate key market and resource issues related to energy use
• critically appraise the basic features of energy and a range of energy technologies
• critically appraise the basic effects of energy use on the environment
• evaluate key domestic and global efforts to reduce greenhouse gases through carbon tax or emissions trading systems
• analyse and make recommendations about sustainable energy management in your own organisational context
• identify and develop strategies to reduce energy-related environmental impacts, and increase use of economically viable technologies which are based on sound renewable energy sources.

Skills and experience you will need

There are no prerequisites for this course.

Resources

A diverse range of printed and digital information sources is available on the subject matter and issues discussed in this study guide. They may be a useful source of information for research and additional reading. Some of the more recent printed resources are listed below.

Books


Websites

Students are encouraged to consult a wide range of additional sources including research journals and major websites. The following are some commonly used websites by students in this course.

Australian Government Department of the Environment:  
www.environment.gov.au

Australian Institute of Energy:  
www.aie.org.au

European Commission:  
http://ec.europa.eu/environment/index_en.htm

European Commission – Emissions Trading Scheme:  
http://ec.europa.eu/clima/policies/ets/index_en.htm

Intergovernmental Panel on Climate Change:  
http://www.ipcc.ch/

International Energy Agency:  
www.iea.org

US Department of Energy:  
www.energy.gov/

United Nations Framework Convention on Climate Change  
http://unfccc.int/2860.php

US Energy Information Administration  
www.eia.doe.gov/environment.html

References


Olah G A, Goepert A and Surya Prakesh G K, 2006, Beyond Oil and Gas: The Methanol Economy, Wiley-VCH.


Additional resource material

Some additional resource material has been cited at the end of most Units. This material has been provided so students have further background information should additional information be required. This material is not examinable.

Relationship to other courses in the MBT program

In this course we examine the current and future role of sustainable energy in our world, as well as in business and our society. We discuss the use of major energy resources and technologies and the impacts of energy use on the natural environment, including the issue of greenhouse gas emissions and what to do about them. The course provides an insight into the imperative to make energy use more sustainable, the threat of climate change to national and regional economies, the role of markets over the price and availability of energy fuels and sources, and the application of sustainable energy technologies. The course can be taken early in your MBT studies and does not require any specific prior knowledge.

GBAT9103 Business Management for a Sustainable Environment has a broader focus on environmental issues for business, and is designated as an integrated course in the MBT Program.
Assessment

There are two assignments and an examination for GBAT9109 *Sustainable Energy Management*. Note that assignments must be received by 9.30am Sydney time on the due dates.

<table>
<thead>
<tr>
<th>Participation</th>
<th>Throughout the term</th>
<th>15%</th>
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<tbody>
<tr>
<td>Assignment 1</td>
<td><strong>Monday 25 August 2014</strong> (Week 5)</td>
<td>20%</td>
</tr>
<tr>
<td>Assignment 2</td>
<td><strong>Tuesday 14 October 2014</strong> (Week 11)</td>
<td>25%</td>
</tr>
<tr>
<td>Examination*</td>
<td><strong>Wednesday 5 November 2014</strong> (10am if sitting on campus)</td>
<td>40%</td>
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</table>

*Examination is 2 hours; open book*
Continual course improvement

MBT courses are revised each time they run, with updated course overviews and assessment tasks. All courses are reviewed and revised every two years and significant course updates are carried out in line with industry developments, and also when new editions of prescribed textbooks are published.

The MBT surveys students via the UNSW CATEI system each time a course is offered. The data collected provides anonymous feedback from students on the quality of course content and materials, class facilitation, student support services and the MBT Program in general. This student feedback is taken into account in all course revisions.

The Australian School of Business (ASB) also monitors the quality of students’ learning experiences in all its programs. A random selection of completed assessment tasks may be used for quality assurance-purposes. This information will be aggregated and used:

- to determine the extent to which program learning goals are being achieved for accreditation purposes
- to improve the quality of ASB programs.

All material used will be treated as confidential and these processes will have no bearing on course grades.

Student evaluations from the last presentation of the course

Students from S2 of 2013 appreciated the discussion group forums, regular feedback throughout the course and the flexibility of the two written assignments (reports). Some students thought that a few readings were out of date.

Coordinator’s response

I will explain why I am using some older readings more clearly. Sometimes it is because the perspective is still of interest; and other times it might be to show that change in the energy mix can take place over time.