Sustainable Energy Management

Semester 2, 2015

Course Overview

AGSM MBA Programs 2015

AGSM @ UNSW Business School
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We welcome ideas to improve these course materials. Please email suggestions to coursematerials@agsm.edu.au
## Course schedule

### Semester 2, 2015

#### Sustainable Energy Management

<table>
<thead>
<tr>
<th>Week no</th>
<th>Week begins</th>
<th>Unit</th>
<th>Assessment** (weighting)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27 July</td>
<td>1</td>
<td>Participation is assessed throughout the semester (15%)</td>
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<tr>
<td>2</td>
<td>3 August</td>
<td>2</td>
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<tr>
<td>3</td>
<td>10 August</td>
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<td>4</td>
<td>17 August</td>
<td>4</td>
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<tr>
<td>5</td>
<td>24 August</td>
<td>5</td>
<td>Assignment 1 due on 24 August by 9.30am Sydney time – literature review (20%)</td>
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<tr>
<td>6</td>
<td>31 August</td>
<td>6</td>
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<tr>
<td>7</td>
<td>7 September</td>
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<td>14 September</td>
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<td>9</td>
<td>21 September</td>
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<td>10</td>
<td>6 October*</td>
<td>10</td>
<td></td>
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<tr>
<td>11</td>
<td>12 October</td>
<td>11</td>
<td>Assignment 2 due on 12 October by 9.30am Sydney time – report (25%)</td>
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<tr>
<td>12</td>
<td>19 October</td>
<td>12</td>
<td></td>
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<tr>
<td>13</td>
<td>26 October</td>
<td></td>
<td>Independent reflective learning and review</td>
</tr>
<tr>
<td>14</td>
<td>2 November</td>
<td>Examination week</td>
<td>Examination** – Friday 6 November on campus (40%) – 10am if sitting</td>
</tr>
</tbody>
</table>

* Mid-term recess: Saturday 26 September – Monday 5 October*

** Examination is 2 hours, open book

*Monday 5 October is a public holiday in NSW
Course information

Course-level aims and learning goals

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 & 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 United States 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.

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 studies and does not require any specific prior knowledge.

Business Management for a Sustainable Environment has a broader focus on environmental issues for business, and is designated as an integrated course in your degree program.
Course learning outcomes

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

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

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.
Program quality assurance

A number of international standards are embedded in the program to ensure the courses you study are high quality. At present this includes specific design to meet AACSB accreditation standards (through measurement of students’ program-level learning outcomes), and the United Nations Principles for Responsible Management Education (UNPRME). EQUIS accreditation is also held by UNSW Business School.

Program-level learning goals and outcomes assessed for AACSB accreditation

The Course Learning Outcomes are what you should be able to do by the end of this course if you participate fully in learning activities and successfully complete the assessment items.

The Course Learning Outcomes will also help you to achieve at least some of the overall Program Learning Goals that are set for all postgraduate coursework students in AGSM programs.

However, course-level learning outcomes are not sufficient to fully describe a student’s skills as they complete the qualification, and so we add an additional set of Program Learning Goals. These specify what we want you to have achieved by the time you successfully complete your degree. As an example, for the Teamwork learning goal we specify: ‘Our graduates will be effective team participants’.

You demonstrate that you have met these Program Learning Goals by achieving specific Program Learning Outcomes that are directly related to each goal. These indicate what you are able to do by the end of your degree. In the case of the Teamwork goal, the related outcome includes: ‘participate collaboratively and responsibly in teams’. Note that the ability to meet these program-level learning goals and outcomes will be measured in each capstone course for your degree program.

The Program Learning Goals (and related outcomes) used at the AGSM for the MBAX and MBT programs are as follows.

1. Knowledge:
   Our graduates will have current disciplinary or interdisciplinary knowledge applicable in local and global contexts.
   Learning outcome: Students should be able to identify and apply current knowledge disciplinary or interdisciplinary theory and professional practice to business in local and global environments.

2. Critical thinking and problem-solving:
   Our graduates will have critical thinking and problem-solving skills applicable to business and management practice or issues.
   Learning outcome: Students should be able to identify, research and analyse complex issues and problems in business and/or management, and propose appropriate and well-justified solutions.
3. Communication:
Our graduates will be effective communicators in professional contexts.
Learning outcome for 3a – Written Communication: Students should be able to produce written documents that communicate complex disciplinary ideas and information effectively for the intended audience and purpose.
Learning outcome for 3b – Oral Communication: Students should be able to produce oral presentations that communicate complex disciplinary ideas and information effectively for the intended audience and purpose.

4. Teamwork:
Our graduates will be effective team participants.
Learning outcome: Students should be able to participate collaboratively and responsibly in teams, and to reflect on their own teamwork, and on the team’s processes and ability to achieve outcomes.

5. Ethical, social and environmental responsibility:
Our graduates will be aware of ethical, social, cultural and environmental implications of business issues and practice.
Learning outcome for 5a – Ethical, social and environmental responsibility: Students should be able to identify and assess ethical, environmental and/or sustainability considerations in business decision-making and practice.
Learning outcome for 5b – Social and cultural awareness: Students should be able to consider social and cultural implications of business.

6. Leadership:
Our graduates will have an understanding of effective leadership.
Learning outcome: Students should be able to reflect upon their own personal leadership style and on the leadership needs of business and of team.

Associated governing bodies
AACSB: http://www.aacsb.edu
EQUIS: https://www.efmd.org/accreditation-main/equis
UNPRME: http://www.unprme.org
Resources

Learning resources
You have four major resources to help you learn:

1. The course materials, comprising the weekly study units with readings, references, insights and commentary. You will do much of your learning outside the classroom by working through the course materials, and by completing the exercises as they arise.

2. Your online or face-to-face classes with your facilitator. The facilitator’s job is to guide your learning by conducting class discussion, answering questions that might arise after you have done the week’s work, providing insights from his or her practical experience and understanding of theory, providing you with feedback on your assignments, and directing discussions and debates that will occur between you and your co-participants in the classroom.

3. Your co-participants. Your colleagues in the classroom are an invaluable potential source of learning for you. Their work and life, and their willingness to question and argue with the course materials, the facilitator and your views, represent a great learning opportunity. They bring much valuable insight to the learning experience.

4. In addition to course-based resources, please also refer to the AGSM Learning Guide (available in Moodle) for tutorials and guides that will help you learn more about effective study practices and techniques.

Course materials
The course materials comprise this Course Overview, the Assessment Details and 12 Units. Each Unit has a number of associated readings.

Readings
Specific readings are prescribed throughout the Units and are available via active hyperlinks or URLs. Please note that you may be required to enter your UNSW zID and zPass in order to access these hyperlinked readings.

If you experience any problems in accessing the readings, please try the following:

- Search directly for the article on the UNSW Library home page (https://library.unsw.edu.au/) by placing the name of the article in the Search box.
- Search directly for the book excerpt on the UNSW Library home page (https://library.unsw.edu.au/) by placing your course code into the Search box. When you do this all the course readings that are excerpts from books will appear.
Other resources

A diverse range of printed and digital information 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 these 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:

Australian Institute of Energy:

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

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

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

International Energy Agency:
http://www.iea.org/

US Department of Energy:
http://www.energy.gov/
References


Intergovernmental Panel on Climate Change, 2014, Climate Change 2014 Synthesis Report: Summary for Policymakers


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

http://onlinelibrary.wiley.com/


**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.

**eLearning**

To access Moodle, go to: https://www.business.unsw.edu.au/agsm/students/mbt-students/online-classes and select Login to Moodle.

Login with your student zID (username) and zPass (password).

**Moodle eLearning support**

Should you have any difficulties accessing your course online, please contact the eLearning support below:

For **login** issues:

**UNSW IT Service Centre**

**Hours:** Monday to Friday: 8am – 8pm  
Saturday and Sunday: 11am – 2pm  
**Email:** ITServiceCentre@unsw.edu.au  
**Phone:** Internal: x51333  
External: 02 9385 1333  
International: +61 2 9385 1333

For help with technical issues and problems:

**External TELT Support**

**Hours:** Monday to Friday: 7.30am – 9.30pm  
Saturdays and Sundays: 8.30am – 4.30pm  
**Email:** externalteiltsupport@unsw.edu.au  
**Phone:** Internal: x53331  
External: 02 9385 3331  
International: +61 2 9385 3331
Administrative and eLearning support

Student Experience
If you have administrative queries, they should be addressed to Student Experience.

Student Experience
AGSM MBA Programs
UNSW Business School
SYDNEY NSW 2052
Phone: +61 2 9931 9400
Email: studentexperience@agsm.edu.au

Additional student resources and support
The University and the UNSW Business School provide a wide range of support services for students, including:

- **Business School Education Development Unit (EDU)**
  https://www.business.unsw.edu.au/students/resources/learning-support
  The EDU provides academic writing, study skills and maths support specifically for Business students. Services include workshops, online resources, and individual consultations.
  EDU Office: Level 1, Room 1033, Quadrangle Building.
  Phone: +61 2 9385 5584; Email: edu@unsw.edu.au

- **UNSW Learning Centre**
  www.lc.unsw.edu.au
  Provides academic skills support services, including workshops and resources, for all UNSW students. See website for details.

- **Library training and search support services**
  http://info.library.unsw.edu.au/web/services/services.html

- **UNSW Counselling and Psychological Services**
  https://student.unsw.edu.au/wellbeing
  Provides support and services if you need help with your personal life, getting your academic life back on track or just want to know how to stay safe, including free, confidential counselling.
  Office: Level 2, East Wing, Quadrangle Building;
  Phone: +61 2 9385 5418.

- **Student Equity & Disabilities Unit**
  http://www.studentequity.unsw.edu.au
  Provides advice regarding equity and diversity issues, and support for students who have a disability or disadvantage that interferes with their learning.
  Office: Ground Floor, John Goodsell Building;
  Phone: +61 2 9385 4734; Email: seadu@unsw.edu.au
Continual course improvement

Our 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.

The AGSM 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 program in general. This student feedback is taken into account in all course revisions.

Student evaluations from the last presentation of the course

Students from Semester 2 of 2014 provided the following feedback on the best features of the course:

- The way the course was structured to direct the student to public and relevant information.
- The instructor provided very good feedback on weekly topics and clearly has a broad experience in this subject, which was highly beneficial as a student.
- … the readings [were] fascinating. Well-researched course with a really cohesive approach to learning the principles of sustainability in business.
- The course was comprehensive and relevant.
- Flexibility. Despite having a small study group, the discussion was very interesting and comprehensive.

The students reported that the course could be improved by:

- … face to face [discussions] because the discussions are quite broad and topics quite deep.
- More military examples in environmental management.
Some of the course literature came from the 1990s and appeared to be quite dated considering how quickly things are moving. Also, the context of the course positioned environmental and sustainability issues as high on the priority stack for business and government – which was probably quite true from the mid 2000s until 2011 – however with the change in attitude brought on by the rise of neo-conservatives, this context has changed.

Some of the information was a bit dated, e.g. pre-GFC, when things have changed since then. Also, some of the references could have been more recent.

Coordinator's response

I will endeavour to hold more focused discussion groups – and/or alert participants when the discussion might require more reflection than normal because of its deeper nature.

I will ask students about the information they are seeking in particular (e.g. military examples in environmental management).

I have deleted many older readings.

For older readings that I need to keep, I will provide a clearer explanation about why these readings are still relevant. For example, sometimes it is because the perspective is still of interest but just needs to be applied; and other times it might be to show comparative change over time.
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 more than 25 years’ experience in environmental management and sustainable development in academic, government and consulting roles. He has been involved in the MBT’s *Sustainable Energy Management* course since 2006 and *Business Management for Sustainable Environment* course since 2008. Robert has also taught sustainability courses in business programs at the undergraduate and MBA level at Royal Roads University, Canada.

Robert is a Senior Fellow, Institute of Environmental Studies, UNSW, and 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. 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 AGSM Student Experience. 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 Laxton, educational consultant, for earlier revisions; and Andrew Chambers, educational development manager, for revisions since 2009.