i. Course title: **Managing Energy Businesses**

ii. Area to which the course belongs: Public Systems Group

iii. Term in which the course is to be offered: Slots XI and XII

iv. Instructors' name:Prof Amit Garg (W-16, 4952) and Prof PR Shukla (W-3, 4827)

v. Course credits: 0.75

vi. Course content and objectives:

Content

Energy companies are prominent among the top companies globally, including Fortune-500 and at various stock exchanges. They are among the fastest growing companies, both in terms of revenue and profits. In India, four of the top ten companies are in the business of energy exploration, production and/or distribution. Apart from the conventional energy businesses, new avenues have also opened up in fields of alternative energy supply, smart grids and energy services.

Energy businesses face unique challenges. The demand for energy is on the rise, conventional fossil fuel stocks are uncertain and depleting, and there is a global imperative to reduce the emissions of greenhouse gases. Since the energy businesses often transcend national borders, they are exposed to global risks from geopolitics, financial and environmental market dynamics.

Objectives

The course aims to introduce how the global energy businesses are evolving, what risks they face and how do they respond to the changing competitive dynamics marked by scalability, diversification and integration. The focus will be to identify solutions that can integrate energy business concerns with environmental, socio-economic, technological and geopolitical considerations. The course will also discuss recent advances and emerging business opportunities in:i) new and renewable energy technology markets, ii)energy services businesses focusing on the demand-side efficiency(e.g. lighting, appliances, automobile), iii) entrepreneurship and risk finance and iv) integrated energy and environment solutions (e.g. infrastructures, ICT solutions).

Type, plan and session-wise content of the course:

- indicates required reading/case for the session

DM indicates discussion material for the class

\+ indicates additional reading (provided as soft copies)

Module 1: Global Energy Trends and Competitive Strategies

What is the current status of the global energy business – in terms of energy resources, carriers and end use technologies? What shapes the competitive dynamics for energy businesses?

Session	Date/Day/Time	Session Theme, Readings
1	22/12/15 Tuesday (A) 8:45 – 10:00 hrs. (B) 11:55 – 3:10 hrs.	**Emerging Trends in Energy Businesses** The session provides an overview of the energy sector in general. Topics covered include – an introduction to the major sources of energy, forces of energy supply and demand, the changing share of renewable and non-renewable sources, changes in energy markets and evolution of new methods of energy transmission and distribution. • Note on Energy, Stanford Business School (2008) • DM: Executive Summary, World Energy Outlook, IEA (2015) + Curbing Global Energy Demand Growth: The Energy Productivity Opportunity, McKinsey Global Institute (MGI) Report (2007)

Module 2: Managing Conventional Energy Businesses

A large number of energy companies globally are formulating strategies for growth, both at a national level and in most cases attempting to make a global presence. What factors should these firms consider when formulating strategies for growth, expansion and diversification?

2	23/12/2015 Wednesday (A) 8:45 – 10:00 hrs. (B) 11:55 – 13:10 hrs.	**Managing Coal Businesses** Coal is the mainstay of Indian energy system and contributes more than a third of global energy consumption. Coalbusinesses include mining, transport, combustion and waste disposal. What are the main challenges in coal businesses and how are the main players meeting these? • Case: Alpha Natural Resources (2011) • DM: Issues for the Coal Industry, Case Studies in Sustainable Development in the Coal Industry, IEA pp. 19-23 (2006)
3	28/12/2015 Monday (A) 8:45 – 10:00 hrs.	**Managing Oil and Gas Businesses in Turbulent Times** The world is witnessing major changes in energy value chain. The demand for energy is on the rise, fossil fuel

	(B) 11:55 – 13:10 hrs.	stocks are uncertain and there is an increasing imperative to reduce climate change impacts. This has major implications for firms engaged in the business of transformation, supply and distribution of oil and gas. This session will discuss perspectives on the current business climate in relation to the global oil and gas scenarios, the way in which global industry structure is being affected and being shaped also by unconventional oil and gas, the issue of price volatility and why it is here to stay, and the role of markets. • DM: Fractured finances: America's shale-energy industry has a future. Many shale firms do not, The Economist (2015)
4	29/12/2015 Tuesday (A) 8:45 – 10:00 hrs. (B) 11:55 – 13:10 hrs.	**Managing Production Sharing Agreements in Challenging Geopolitics** Global energy majors are unanimous in their view that without having a foothold in former USSR's energy reserves, they cannot possibly claim to be truly global and also cannot possibly remain competitive. A rise in resource nationalism across many resource-endowed countries, and equitable production sharing agreements come under a scanner due to heavy stakes involved. • Case: The Kashagan Production Sharing Agreement (PSA), HBS (2013)
5	30/12/2015 Wednesday (A) 8:45 – 10:00 hrs. (B) 11:55 – 13:10 hrs.	**Energy Portfolio Mix Decisions: Managing in Multiple Dimensions and Extreme Risks** How to expand energy-mix portfolio under changing market conditions? How energy market shocks (egg. Nuclear accidents) influence the energy mix decisions? • Case: Dominion Resources – A and B, HBS (2013) • DM: Stranded Assets: what next? (Chapter 1), HSBC (2015) + Small Nuclear Reactors are Becoming Big Business, Bloomberg Business Week (2010) + Understanding Buyer choice/Rejection/Experience Processes for Complex Business, Note Richard Ivey School of Business (2010)

Module3:Managing Clean and Renewable Energy Businesses

Increased uncertainty about supply volumes and pricing of conventional energy forms, and associated global risks of energy security and climate change have generated a renewed interest in various renewable energy businesses. These are also spurring investment in new energy technologies. The module discusses status of renewable energy businesses and the challenges they face.

6	4/1/2016 Monday (A) 8:45 – 10:00 hrs. (B) 11:55 – 13:10 hrs.	**Biofuel Business: Scalability and Value Chain Management** Biofuels emit less environmental pollutants than conventional gasoline. They are also favorable from the climate change perspective. Biofuels are now being looked upon as viable alternatives to petroleum fuels, albeit with limited availability. What growth strategies do companies producing biofuels adopt – regarding production and commercialization of biofuels, vertical expansion, distribution and retail? • Case: Cosan - Thinking outside the barrel, HBS (2010) • DM: Biofuels heat up, Nature (2015) • DM: The Transportation Nexus: Ethanol is a 'Food vs. Fuel' Issue, Wharton (2013)
7	5/1/2016 Tuesday (A) 8:45 – 10:00 hrs. (B) 11:55 – 13:10 hrs.	**Financing Clean Technology Ventures** The session deals with the strategic choices faced by VinodKhosla, the founder of Khosla Ventures, a Venture Capital firm investing in clean technology firms. How should he position his firm: 1. Should he seek funds from major oil companies 2. Develop a new fund or 3.Raise money from managers of the sovereign funds? • Case: Khosla Ventures - Biofuels Gain Liquidity, HBS (2012) • DM: Venture Capital Investment in the Clean Energy Sector HBR (2014) +People and their Power, Forbes India(2010)
8	6/1/2016 Wednesday (A) 8:45 – 10:00 hrs. (B) 11:55 – 13:10 hrs	**Wind power and renewable energy certificates** Wind business offers a clean and bankable project proposition. Wind markets all over the world are facing mixed fortunes. There are also emerging consulting opportunities in data analytics for wind power generation.

		Renewable Energy Certificate (REC) separates the carrier and content in renewable energy businesses. How are RECs generated and traded?
9	11/1/2016 Monday (A) 8:45 – 10:00 hrs (B) 11:55 – 13:10 hrs	**Solar Energy** In recent years, the solar energy business has expanded rapidly. Solar power is closer to achieving grid parity. Companies have evolved different business models responding to government policies and in expectation of global carbon markets. How are companies responding to these changing dynamics? Case: Sun Edison caselets, 2014. To be distributed
10	12/1/2016 Tuesday (A) 8:45 – 10:00 hrs (B) 11:55 – 13:10 hrs	**Modernizing Biogas Business** What are the challenges and opportunities that biogas business offers? What are the international experiences and trends in this business? How to manage the risks and transitions required to make this business modern and more attractive in India, including creating market for cleaner and affordable rural fuels? DM: To be distributed
11	13/1/2016 Wednesday (A) 8:45 – 10:00 hrs (B) 11:55 – 13:10 hrs	**Energy-water nexus** Water provides an important link to energy supply and energy use. For instance, in India, hydro power provides a quarter of total energy generated, while water use in agriculture consumes a quarter of national electricity consumption. Hydro power is one of the cleanest energy resources and provides good peaking load management. On the other hand, water is also a necessary resource required in abundance to produce new energy resources such as shale gas, tight gas, and coal-bed methane using hydraulic fracturing. These are raising concerns on extracting these new energy resources all over the world. • Case: Caprica Energy and its choices, Darden Business Publishing (2011) • DM: Withdrawing water from an aquifer: The economics, Darden Business Publishing (2014)

Module 4: Innovation and Market Expansion: The Business of Energy Services

As energy prices are rising, consumers are becoming increasingly aware of the saving potential from end-use energy efficiency enhancement. Government regulations are pushing forward more stringent energy efficiency standards and benchmarks. In view of these changes, what are the critical issues faced by major energy services businesses? How can entrepreneurs benefit from this emerging opportunity? How can energy entrepreneurs help improve energy access and deliver modern energy affordably and sustainably?

12	18/1/2016 Monday (A) 8:45 – 10:00 hrs (B) 11:55 – 13:10 hrs	**Distributed energy solutions & Smart Grids** Distributed energy solutions provide an expanding market opportunity, especially due to un-reliable power supply and demand for high quality power in urban areas. Renewable energy generation such as rooftop solar has added an additional dimension. Demand reduction through energy efficient devices and demand response are latest buzz words for consumers and utilities. What are the emerging possibilities to integrate distributed energy solutions with information technologies to create grid responsive buildings and smart grids? What business risks and opportunities these face? • DM: Distributed Energy: A Disruptive Force, BCG (2014) • Case: The Smart Grid, HBS (2012)
13	19/1/2016 Tuesday (A) 8:45 – 10:00 hrs (B) 11:55 – 13:10 hrs	**Making a Business Case for Enhancing Energy Efficiency** Energy efficiency enhancement is the industry Mantra, with demand side energy businesses projected to contribute considerably. Businesses in lighting, air-conditioning, efficient appliances in all domains, and enhancing energy efficiencyof various clients are devising new strategies to expand shares of their businesses. How couldentrepreneurs leverage these opportunities? What should be the focus of their marketing strategy – cost savings or environmental benefits? What is the future of this business? What types of financial products are needed for such upcoming energy efficiency businesses? • Case: Yantra: Financing Energy Service Companies, IVEY (2014) • DM: NMEEE

		• DM: Helping businesses become more energy efficient, Bain and Company (2013)
14	20/1/2016 Wednesday (A) 8:45 – 10:00 hrs (B) 11:55 – 13:10 hrs	**Emerging Energy Technologies: Electric Vehicles** How to expand the market share of electric vehicles? How do these companies face challenges in a highly competitive automobile market throughinnovation, given the infrastructure support required for electric vehicle businesses? • Case: Tesla Motors (in 2013): Will sparks fly in the automobile industry? McGraw Hill Education (2014) • DM: Johnson and Suskewicz, How to jump start the clean-tech economy (2009) + Low carbon transport in India, UNEP study, Shukla et al (2014)
15 and 16	27/1/2016 Wednesday and 28/1/2016 Thursday (A) 8:45 – 10:00 hrs. (B) 11:55 – 13:10 hrs.	**Student Project Presentations and Feedback** Energy businesses occupy a large space in corporate world. The challenges they face and opportunities they provide are continuously evolving under changing technological, geopolitical, socio-economic and environmental landscape. Some interesting energy business situations from around the world would be provided for student groups to analyze. The student groups could also take up project work to explore a specific dimension of their choice. These two sessions would provide an opportunity for student groups to share their project work with their colleagues and also receive feed-back.

Student Group Assignments

Each student has to do a Group project as part of this course. The group size could be up to 5students (preferred) or 6(at most).Projectscouldbeon topics that represent latest challenges and opportunities in energy businesses. These could be on any generic topic covered in the class sessions, OR could be from some interesting energy business situations from around the world provided below. The project report has to be up to 15 pages in the former case, while in the latter case, the students have to analyses the case (5-6 pages) and also write an industry note (8-10 pages) on the topic.

The project topic needs to be cleared by the course instructors by January 6, 2016. Student groups would be required to make a final presentation on their project in the class as per the

schedule above, and submit their project report by February 5, 2016 (duly incorporating the comments received during presentation) in soft copies to course coordinator.

1. E.ON Corporate Strategy, HBS, 2006
2. Case: ONGC India: In Search of a New Growth Strategy, Thunderbird School of Global Management, 2008
3. Case: Harvest (A) &(B), HBS, 2010
4. Case: Journey to the East: Natcore Technology in China, HBS, 2012
5. Case: C12 Energy, HBS, 2014
6. Case: Cree Inc.: Introducing the LED light bulb, HBS, 2014
7. Case: Husk Power, HBS, 2014
8. Case: Sasol: U.S. growth program, HBS, 2014
9. Case: Venture capital investment in the clean energy sector, HBS, 2014
10. Case: Progress Energy and Duke Energy (A), HBS, 2014
11. Case: The U.S. shale revolution: Global rebalancing?, HBS, 2014
12. Case: Novozymes: Establishing the cellulosic ethanol value chain, HBS, 2013
13. Case: The Kashagan production sharing agreement (PSA), HBS, 2013
14. Case: Groom energy solutions: Selling efficiency, HBS, 2013
15. Case: Low-carbon, indigenous innovations in China, HBS, 2014
16. Case: Coal, Nuclear, Gas, Oil or Renewable: Which type of power plant should we build?, HBS, 2010
17. Case: OPOWER-Increasing EE through normative influence (A) and (B), HBR., 2012
18. Case: ABB's Hydropower Sustainability Dilemma, Ivey, 2011
19. Case: Viridity Energy- The challenge and opportunity of promoting clean energy solutions, Ivey, 2014
20. Case: Groom Energy Solutions-Selling Efficiency, HBS, 2013
21. Case: BUNGE – Food, Fuel and World Markets, HBS, 2007
22. Case: Balancing the power equation-Suzlon Energy, ISB, 2015
23. Case: Suzlon-Concerning the Global Wind Energy Industry- A profile of one of India's Pioneering Multinationals, Harvard BPC, 2009
24. Case: Goldwind USA-Chinese Wind in the Americas,HBS, 2012
25. Case: BrightSource-Challenges and Prospects for a Concentrated Solar Power Plant, Stanford, 2013
26. Case: First Solar, Inc. in 2013, Stanford, 2014
27. Case: Shaping the Future of Solar Power-Climate change, Industrial Policy and Free Trade (Part B), Harvard Kennedy School, 2013
28. Case: NuScale Power 2014

vii. **Pedagogy:** Case method and class discussions

viii. **Number of sessions required, hours needed per student for class sessions, major papers/projects, etc.**

The course will have 15 classroom sessions of 75 minutes each. Term projects themes will be discussed in class within the first week and students shall provide a brief proposal outlining their term project, the final date for which will be announced in class.

ix. **Evaluation criteria (including pass/fail)**

Class Participation and presentation	:	20%
Group Project	:	30%
Examination	:	50%

x. **Prerequisites and eligibility if any and their justification:** None

xi. **Restriction on class size (both minimum and maximum), if any, and their justification:** None

xii. **Relationship of the course with the overall programme objective and related courses:** Eminent

xiii. **Course support:**

Mr. Vinayak Kishore (Academic Associate, 4951, vinayak@iimahd.ernet.in)
Ms. Saritha Vishwanathan (FPM-3, 3403, sarithasv@iimahd.ernet.in)