

Course title: Energy Markets and Trading				
Course code: DSE 114		No. of credits: 3	L-T-P: 40-05-00	Learning hours: 45
Pre-requisite course code and title (if any): N.A.				
Department: Sustainable Engineering				
Course coordinator: Dr. Sapan Thapar			Course instructor(s): Dr. Sapan Thapar	
Contact details: sapan.thapar@terisas.ac.in				
Course type: Core			Course offered in: Semester 2	
<p>Course description</p> <p>Energy is at crossroads of being transitioned from a public merit good to a commodity. Energy markets are platforms for buying and selling of energy, in different formats</p> <p>The course offers students an understanding of the energy market structure and the governing principles, focusing on India. It encompasses evolution of the Indian energy sector, key regulations, sectoral stakeholders, pricing mechanisms and procurement modes. Discussions will include electricity as well as non-electric formats (oil, gas, coal), crisscrossing conventional (coal, oil, gas) and renewables (solar, wind, biomass, hydro). A significant part of the syllabus encompasses energy security dimensions, besides providing overview on evolving market products and services.</p>				
<p>Course objectives</p> <p>The course provides an in-depth understanding on various dimensions of the energy markets in India.</p> <p>Key objectives are -</p> <ul style="list-style-type: none"> ▪ Overview on the Indian energy / power Sector ▪ Understand planning & operational Aspects of Indian Power System ▪ Understand working of a Power Exchange ▪ Understanding sourcing and Pricing of Coal, Oil and Gas ▪ Exposure to energy diplomacy ▪ Awareness on evolving market products 				
Course contents				
Module	Topic	L	T	P
1	<p>Overview- Indian Energy & Power Sectors</p> <p>Energy - Sources, Supply & Demand Scenario Trends - Energy Production, Imports, Sales Institutions & Governing Structure Policy and regulations Sectoral Stakeholders – Thermal, Hydro, Renewables, Oil, Gas, Coal Energy Transition</p>	6	0	0
2	<p>Power Sector - Planning & Operational Aspects</p> <p>Power Procurement Planning Resource Adequacy, Demand and Supply, Load Forecasting Tariff Determination - Generation, Transmission, Distribution Procurement Modes (Cost Plus, Bidding, open access, Captive) Consumer Types and Tariffs Merit Order Despatch Role of Regulator/ Government agencies Power Distribution Reforms</p>	8	2	0
3	Power Markets	8	2	0

	<p>Open Access – Concept, Modes, Charges Green Energy Open Access Types of trading platforms Power Exchange – Operations & Instruments Congestion Management Green Power Trading REC, ESCerts, Carbon Certificates, I-REC Grid Management & DSM regulations Role of RLDC, SLDC, REMC, QCA Cross Border Power Trading International Best Practices Simulating Power Trading (Group Activity)</p>			
4	<p>Coal, Oil and Natural Gas (including LNG)</p> <p>Resource Availability Domestic Production and Imports Procurement – Modes, Pricing, Taxes and duties Oil Refining -Products and Pricing Natural Gas Grid, LNG Imports, Pricing Indian Gas Exchange – Operations & Instruments Hydrogen based energy systems Sale & Pricing Norms Role of Regulator/ Government agencies</p>	8	0	0
5	<p>Energy Security Dimensions</p> <p>Energy Diplomacy critical minerals – availability, policies National Schemes (PLI, SPR) Resilience Against Climate Risks Regional Grids & Energy Markets Geopolitical Trends Case Study</p>	4	1	0
6	<p>Evolving Concepts</p> <p>Digital & Advanced Metering Technologies Security Constrained Economic Despatch Energy Derivatives Ancillary Services Net-Metering / P2P Energy Storage Systems Demand Response Hydrogen Energy</p>	6	0	0
		40	5	0
<p>Evaluation criteria</p> <ul style="list-style-type: none"> ▪ Test 1: 20% (in form of assignment –power sector assessment) ▪ Test 2: 20% (in form of assignment –coal, oil and gas sector assessment) ▪ Case Study 20% (Global best practices/ business models) ▪ Test 3 40% (after completion of all modules) 				

<p>Learning outcomes</p> <ul style="list-style-type: none"> ▪ Broad understanding of Indian power markets ▪ Working of a power exchange ▪ Pricing of coal, oil and gas ▪ Role of energy diplomacy in energy security and access ▪ Exposure to evolving energy market products and services
<p>Pedagogical approach</p> <p>A combination of class-room interactions, group discussions, tutorials, assignments, case studies with industry expert interaction</p>
<p>Suggested Readings</p> <ul style="list-style-type: none"> ▪ India 2020 Report, IEA ▪ Integrated Energy Policy, Niti Aayog ▪ Annual Reports on Short-term Power Market, CERC ▪ Petroleum and Natural Gas Reports, PPAC <p>Websites</p> <p>CEA (http://cea.nic.in/) CERC (http://www.cercind.gov.in/) Web Portals of Exchanges- IEX, PXIL, HPX Web Portals of SERCs, RLDCs, SLDCs, RPCs Ministry of Power (https://powermin.nic.in/) Grid Controller of India (https://posoco.in/en/) Ministry of New & Renewable Energy (https://mnre.gov.in/) Ministry of Petroleum and Natural Gas (https://mopng.gov.in/en) Petroleum and Natural Gas Regulatory Board (https://pngrb.gov.in/eng-web/) Petroleum Planning and Analysis Cell (https://ppac.gov.in/) Ministry of Coal (https://coal.nic.in/)</p>
<p>Additional information (if any): N.A.</p>
<p>Student responsibilities: Attendance, feedback, discipline: as per university rules.</p>
<p>Course reviewers:</p> <ul style="list-style-type: none"> • Mr Prashant Singh, Chief General Manager, ONGC • Ms Sneha Daheriya, VP, PTC India Limited • Mr Mithun Dubey, VP, RE-Connect Energy