# RTU Course "Socio-economic aspects of energy supply"

**11509 Vides aizsardzības un siltuma sistēmu katedra**

*General data*

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| Code | EAS704 |
| Course title | Socio-economic aspects of energy supply |
| Course status in the programme | Compulsory/Courses of Limited Choice |
| Course level | Post-graduate Studies |
| Course type | Academic |
| Field of study | Environmental Engineering and Management |
| Responsible instructor | Gatis Bažbauers |
| Volume of the course: parts and credits points | 1 part, 4.0 Credit Points, 6.0 ECTS credits |
| Language of instruction | LV, EN, RU |
| Possibility of distance learning | Not planned |
| Maximum auditorium capacity | 50 |
| Maximum number of students per semester | 50 |
| Abstract | Concept of socio-economic aspects of energy supply systems. Techno-economic, socio-economic and environmental aspects of energy supply; the current situation, trends and projections at the global, EU and Latvian context. Investment project cycles. Public regulation of energy supply. Basic aspects of pre-investment study. Market institutions and technological change, its impact on the technical and economic studies; the entrance and exit barriers. Content of the technical-economic study. The basic principles of calculation of capital investments, financial analysis of energy project and investment analysis. Calculation of long-term marginal cost of electricity production. Activities of the energy supply companies in a competitive environment. The external costs in economic calculation. Socio-economic figures for energy projects. |
| Goals and objectives of the course in terms of competences and skills | To teach the basic principles of tariff formation for energy sector, as well as the ability to calculate electricity and heat tariffs for different energy sources and fuels. To train for economic evaluation of energy projects. To teach to do calculations of the external costs of power supply technology and to create appropriate technical-economic and socio-economic models. |
| Structure and tasks of independent studies | Literature research work to characterize techno-economic and socio-economic aspects of various energy technologies. Practical works in order to determine the energy supply tariffs based both on existing legislative requirements, and technical and economic considerations. Practical works of technical-economic and socio-economic evaluation of energy projects. Practical work to determine external costs. Practical works are made to teach students to create mathematical models for the techno-economic and socio-economic evaluation.<br>Using knowledge obtained during the course, students prepare course work carrying out the techno-economic study of certain technological solution of energy supply or |
| Recommended literature | 1. Behrens W., Hawranek P.M., Manual for the preparation of industrial feasibility studies, United Nations Industrial Development Organization, Vienna, 1991.;<br>2. Hveplund F. un Lund H., Energoapgādes socioekonomiskie aspekti, Mācību kompendijs<br>3. Didenko K., Lāce N., "Korporatīvās finanses: investīciju lēmumu pieņemšana", Mācību līdzeklis, RTU, 2001<br>4. Rurāne M., Uzņēmuma finansu vadība, Turības mācību centrs, 1997.<br>5. Extracts from "Energy Plant and Systems Engineering", lecture notes by prof. Björn Kjellström, Luleå University of Technology, Sweden<br>6. "Financial Management and Control", the official text for the professional qualification ACCA, Foulks Lynch Ltd, 2002<br>7. Lund H., Renewable energy systems, The choice and Modeling of 100% Renewable Solutions, Elsevier, 2010<br>Papildus literatūra:<br>1. „Projected costs of generating electricity", Nuclear Energy Agency, International Energy Agency, 2005 Update<br>2. Feretic, D., Tomsic, Z., Probabilistic analysis of electrical energy costs comparing: production costs for gas, coal and nuclear power plants, Energy Policy 33(2005), p.5-13, Elsevier<br>3. Li, K.W, Priddy, A.P., Power plant system design, John Wiley & Sons, 1985<br>4. Darin K., Gradin R., Honnér G., Lagergren S., Lalander S., Mattsson B. Energy Management.- SwedPower AB in cooperation with The Swedish State Power Board<br>5. Technology Data for Electricity and Heat Generation Plants: Danish Energy Authority, Elkraft System&Eltra, March 2005, 134 p (available at http://www.energinet.dk/)<br>Periodika:<br>1. Energy Policy, Elsevier, ISSN 0301-4215<br>2. Energy, Elsevier<br>3. Renewable and Sustainable Energy Reviews, Elsevier, ISSN 0304-3800<br>4. Biomass and Bioenergy, Elsevier<br>5. Enerģija un Pasaule |
| Course prerequisites | Basic knowledge of energy technologies, basic computer skills and ability to use spreadsheets |

*Course outline*

| Theme | Hours |
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| Introduction: Course goals and content; requirements. Concept of socio-economic aspects in the energy supply. | 4 |

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| Techno-economic, socio-economic and environmental aspects of the energy supply systems in EU, current situation, trends | 4 |
| Techno-economic, socio-economic and environmental aspects of the energy supply systems in Latvia, current situation. | 4 |
| Investment project cycles. Fundamental aspects of pre-investment study. Market institutions and technological change. | 4 |
| Choice awareness theory and strategy. Public regulation. Techno-economic and socio-economic studies. | 4 |
| The cost allocation method for CHP plants. | 4 |
| Capital investment calculations. Technological learning curve. | 4 |
| Financial analysis and investment appraisal of energy projects - the basic principles. | 8 |
| Calculation of long-term marginal costs for the electricity and heat. | 4 |
| Operation of energy companies in a competitive environment. | 4 |
| Including of external costs in economic calculations. | 4 |
| Techno-economic model of power supply solutions, sensitivity analysis. | 4 |
| Consideration of socio-economic aspects of energy supply options. | 8 |
| Summary of the course, questions, discussions. Defence of the course work assignment. | 4 |

***Learning outcomes and assessment***

| Learning outcomes | Assessment methods |
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| To be able to set up a mathematical model for techno-economic assessment, calculation of necessary capital investment and accomplishment of sensitivity analysis. | Examination: Practical works, course work<br>Assessment criteria: accomplished practical works No.1, 7, 13, successful completion and defence of course work. |
| To be able to calculate the short-term and long-term marginal costs of various energy technologies and energy sources. | Examination: Practical works<br>Assessment criteria: accomplished practical works No.2, 3, 10, 11. |
| To be able to calculate tariffs for CHP plants and power plants using renewable energy resources. | Examination: Practical works<br>Assessment criteria: accomplished practical works No.4, 5. |
| To be able to apply allocation method of heat and electricity production costs for CHP plants. | Examination: Practical works<br>Assessment criteria: accomplished practical work No.6. |
| To be able to carry out economic evaluation of energy supply project. | Examination: Practical works, course work<br>Assessment criteria: accomplished practical works No.8, 9, successful completion and defence of course work. |
| To be able to calculate external costs of energy technologies. | Examination: Practical works<br>Assessment criteria: accomplished practical work No.12. |
| To be able to create a mathematical model for socio-economic assessment of energy solutions. | Examination: Practical works<br>Assessment criteria: accomplished practical works No.14, 15.<br>The knowledge level will be evaluated in the final degree examination |

***Study subject structure***

| Part | CP | ECTS | Hours per Week | | | Tests | | |
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| | | | Lectures | Practical | Lab. | Test | Exam | Work |
| 1. | 4.0 | 6.0 | 2.0 | 2.0 | 0.0 | | * | |