# Teaching module: Decentralised energy systems. Social aspects of energy production and use Session 1: Innovative technological solutions in energy production and distribution

**Class plan Class time:** 3x45 min.

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| No. | Activity name | Procedure | Teaching guide | Method | Interaction type | Expected outcome | Materials | Overall time |
| 1 | Introductory lecture | 1. Topic introduction
2. Presentation of available DES technologies
3. Presentation and justification of technical and economic *pros and cons* of DES
4. Discussion and conclusions
 | Introduce and explain technical and economic factors that drive the change from centralized to decentralized energy systems (DES). Give examples of debates existing in technical circles considering such a change. Shortly introduce DES technologies that make the change feasible. Specify a list of technical and economic *pros and cons* of DES. Let Ss discuss the *pros and cons* indicated, and summarize the discussion. | Lecture with discussion | T->SsT<->Ss | Understanding of technical foundations of DES | TM8-ST1-RM1-Innovative Technological Solutions | 30 min |
| 2 | Case study analysis | 1. Introduction of technical/ economic analysis of DES
2. Presentation of analysis method
3. Introduction of calculation task (cases to be analyzed by Ss)
4. Calculation task completion
5. Results comparison and conclusions
 | Present the assumptions and the method of LCOE analysis in case of a small-scale wind power plants. Describe the example to students. Discuss shortly the analysis results and conclusions. Introduce calculation task to Ss – comparing PV power plants of different capacities (sizes). Watch the films included in the presentations. Divide Ss into two groups (case study 1 and 2) and establish main parameters of the analysis. Let Ss do the analysis. Allow Ss to present and compare the analysis results. Optional: present the full presentation to verify students calculations. Let Ss discuss the results and indicate technical/ economic parameters that influence the analysis the most. Specify a list of the significant parameters, and summarize the analysis. | Group work & discussion | Ss<->Ss | Evaluation of DES in practice | TM8-ST1-RM2-Case-study-method of analysis TM8-ST1-RM3-Case-study-presentation with analysisTM8-ST1-RM4-DES Case analysis instruction handout | 45 min |
| 3 | Consequence discussion | 1. Extension of act. 2 conclusions
2. Discussion on non-technical and non-economic factors that influence the rationale of DES
3. Summary
 | Remind Ss the results of the case study analysis of act. 2. Let Ss discuss the need to include other (non-technical / non-economic) factors into the analysis. Guide the discussion to discover social factors “hidden” within the technical/ economic parameters listed in act. 2. Let Ss discuss the existence of other (social/ political) factors that are inexistent in the case study analysis of act. 2. Specify the list of such factors. Summarize the discussion and the whole class. | Discussion | T<->Ss | Identification of SSH aspects of DES | Flip charts/notes from act.2 discussion | 30 min |
| 4. | Assignment for self-study in-between | Examples of existing and potential distributed energy systems’ solutions | Ss in groups of three prepare a short (up to 5 minutes) presentation of a chosen DES-solution based on a selected technology discussed in the first presentation. | Group discussion | Ss<->Ss | Identification and evaluation of a chosen DES case | To be chosen by the students | 10 min |

\* Interaction type:

**T** – teacher **S** – student **Ss** – students **->** - one way **<->** - two way