

PHYS-E0483 Advances in New Energy Technologies (Spring 2022)

Exercise 11

Submit your answer by Friday 1.4.2022 at 14:15. Address questions to justinas.jasiunas@aalto.fi.

This essay exercise includes two options with different reading sources and questions – **select one**. Both article and report are available in MyCourses page. Direct access to journal articles online is available from the Aalto University network or with an Aalto account on your own computer.

Option 1 - journal article: [Power-to-What? – Environmental assessment of energy storage systems](#)

The article provides technically dense overview of various energy storage technologies. Read the article and write 1-2 page-long essay on **one** of the following topics:

- 1.1. Present shortly the main categories for the energy storage systems (categorized by the product). Give examples about existing technologies in each category. Discuss about the environmental effects of each category.
- 1.2. Discuss about determining environmental effects by using Life Cycle Assessment (LCA) method. What are the factors that should be taken into account while using LCA? How is this done in real cases?
- 1.3. Choose one energy storage technology and present its main principles. In what category (in terms of the product) it belongs? What efficiencies it typically achieves? Are there existing energy storage systems which use this technology?

Option 2 – IEA report: [The Future of Hydrogen](#)

The report provides broad overview of current status and future potential of hydrogen in energy systems. Read executive summary (pages 13-16), introduction subchapter "*Hydrogen and energy: A primer*" (pages 31-36) and first pages of the other chapters (pages 37, 67, 89, 123, 167). Then write 1-2 page-long essay answering **all** of the following questions:

- How much H₂ is used today and where does it come from? How much H₂ could be used in upcoming decades and where it could come from?
- Let's assume after the end of this course there is at least one student left not completely discouraged from working in energy field. Let's further assume that this student has an ambition for the next 10 years to pursue jobs with highest impact to H₂ contribution in sustainable energy transition. What would you advise to this student and why? Any relevant career path (e.g. technology R&D, engineering, business, consultancy, policy) is ok, but be specific with suggested energy system problem focus, individual roles and their justifications.