

EXAM GUIDE STV4282, Spring 2022

Part 1 counts 25 % of exam, part 2 counts 75 % of exam. Exam counts 50 % of overall grade, term paper counts 50 % of overall grade. There will be one overall grade.

Part 1: Give a short answer to three of the five questions below.

a) *How would you define the concept 'energy system'? Give an example of an energy system and its key components.*

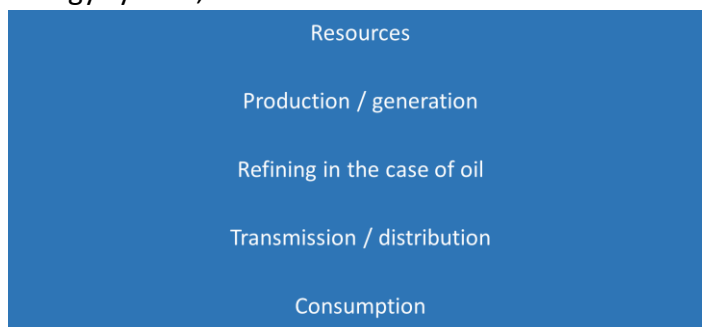
Energy system is defined in the syllabus and lectures as follows:

- "A **vital energy system** has two essential characteristics. First, it is "**vital**" in a sense that it supports critical functions of a modern society. Secondly, it is a "**system**" which means that it consists of elements (natural resources, technical infrastructure, and social institutions), which are connected to each other stronger than they are connected to elements outside the system. This means that in case of a disruption the elements within the system can be substituted by one another much easier than by the elements from outside the system."
- Cherp , A, and Jewell, J. 2013, 'Energy security assessment framework and three case-studies'. In: Trombetta M, Dyer H, eds. *International Handbook of Energy Security*, Cheltenham: Edward Elgar, pp. 146–73.
- In the lectures the components have been outlined as follows:

TABLE 1.1 Components of the contemporary energy system

Primary energy	Secondary energy	Useful energy	Usable energy	Energy services
Fossil fuels (hard coal, brown coal, natural gas, petroleum)	Briquettes, coke, gas from coal, gasoline from coal, oil, fuel oil, vehicle fuels, liquefied gas, natural gas (processed), charcoal, biogas	Secondary energy used by the consumer (private homes, industry, small consumers) (not counting transportation losses or non-energy consumption)	Heat	Warm rooms
Nuclear fuels (uranium, thorium)			Refrigeration	Hot water
Renewable energy (sun, water, biomass [wood], geothermal energy)			Mechanical work (power)	Propulsion of engines
			Chemically bound energy	Locomotion
	Electric power	Electric power	Light	Smelting aluminium
	District heat	District heat	Sound	Heating steel
	Hydrogen	Hydrogen		Lighting rooms
				Communications

The vertical value chain of the oil industry has been included in the discussion of the energy system, as follows:'



The students are expected to know these features. Examples presented in the syllabus and lectures are the global oil market, the European gas network, the Nordic electricity network.

b) *What do we mean by private property rights and states territorial/jurisdictional rights? Where are oil resources regarded as private property rights? Briefly identify some implications of a private governance system for the resource extraction.*

The philosophical starting point in Claes 2018 and the lecture is the following definition by Cara Nine:

- “A *property right* gives the owner of the land the right to control access to that land and to use that land in any way that does not violate the law of nature or civil laws . . .
- A *state territorial right*, by contrast, describes a relationship between the state and a geographic region. It is a jurisdictional right – the state has the right to make, adjudicate, and enforce law within a certain area” (Nine, 2008, p. 149)

A private governance system for oil is found in the lower 48 states in the US and in Alberta, Canada. The consequence of a private system is as follows:

- Free investments into reservoirs on individual properties
- Licenses only in order to protect individual property rights
- US - Rule of capture: the first person to capture a natural resource owns that resource.
- Excess profit taxation

c) *Hotelling’s rule suggest that if oil producers optimize production between the two periods ‘now’ and ‘later’, the oil price will increase with the same rate as the interest rate. Briefly discuss the empirical validity of this theory.*

The Hotelling rule is presented in the syllabus and lectures as follows:

- **If the oil price increases at a slower rate than the interest rate**, it is better to produce more oil now, put the money in the bank, and collect the interest rate. Since there is a fixed amount of oil, more production now means less production later. Thus, the price will fall now, while later on it will increase.
- **If the oil price increases at a higher rate than the interest rate**, oil in the ground is more valuable than money in the bank. Thus, producers will reduce production now in order to produce more at a higher price in the later period. The oil price will increase as production is reduced and fall in the latter period when production increases. Remember there is a fixed amount of oil to produce – therefore less oil produced now means more oil produced later.
- **It follows that it is more profitable to reallocate production between the two periods until the price increases at the same rate as the interest rate.**
- Dahl (2004, p. 285) concludes: “***if producers dynamically optimize in this simple model, market forces should cause price to go up at the interest rate.***”
- H. Hotelling (1931) ‘The Economics of Exhaustible Resources’ *Journal of Political Economy*, 39(2), 137-175.

It is important to note that the students are not supposed to reiterate the rule itself, but simply to discuss its empirical validity. Key points in this respect is found in Claes 2018 and Øystein Noreng’s piece on the reading list:

- Knowledge of the world's oil reserves is complete
 - Reserve estimates are constant
 - Extraction inevitably takes the shape of a fairly symmetric curve
 - Technology is constant
 - Oil prices do not matter
 - All oil producers have the same revenue/profit motive and goals
- "None of these assumptions corresponds to reality."

d) *Outline the main arguments in the literature proposing that oil resources increase the likelihood of civil war in petrostates. Briefly discuss the empirical validity of these propositions.*

The relationship between oil resources and civil war has been outlined as follows in Claes 2018 and in the lectures:

Resource wealth enables the government to buy off or repress potential insurgents and increases the prize of controlling the state and thus strengthen the incentive of rebels to pick up arms.

Variations:

in time: If oil revenues are the main cause of civil war, the incentives for rebels to take up arms would have increased dramatically with changes in the oil price.

in space: Offshore oil – no effect on civil war. Onshore oil in poor regions more likely to cause conflict. Conflicts in oil rich regions seems to last longer than regions without oil.

Mechanisms:

Greedy rebels. Natural resources increase the 'prize' of capturing the state. Resources concentrated in ethnic areas might encourage secessionist movements.

Grievance. The development of natural resources can create inequalities among various domestic groups, especially if the resources are geographically concentrated. The production of oil might also cause grievance if it leads to environmental degradation or forced migration. The revenues from the resources might also be unjustly distributed among the citizens.

Weak state. Following the rentier state/resource curse theories, state capacity and structures may be weaker in resource dependent states.

e) *Briefly outline some approaches related to the concept 'energy security'. Discuss the relevance of these for European gas consumers in the present political crisis between Russia and Ukraine.*

Approaches to the concept 'energy security' is outlined in the reading list contribution by Szulecki as follows:

- Conventional: e.g. Yergin's (2006) "classic" definition: "the availability of sufficient supplies at affordable prices"
- Inductive: how is energy security understood?
- Abductive: what is the underlying essence of these understandings?
- Deductive: How Energy security ought to be understood

Szulecki 2017, Ch. 1

The latter part of the question is an open invitation to adopt some (or all) of these approaches to the present situation in Europe. The answers here will have to be evaluated on their merits regarding soundness, precision, and analytical quality.

Part 2: Discuss one of the three topics below.

- a) *How would you characterize the global institutional governance structure in the field of energy? In your opinion, which are the most dominant of powerful institutions and/or states in this field? Discuss to what extent the institutional structure and power distribution serves either/or (i) the commercial aim of energy companies, (ii) the political aim of energy producing states and/or (iii) the possibility of a successful energy transition aimed at reducing the emission of greenhouse gases.*

This topic is presented as in the framework of the theoretical perspective in IR called Neo-liberal institutionalism. The main features of this perspective is presented briefly in Claes 2018, but will not be repeated here. First the students should discuss the vague role of formal international organizations in the filed of energy, for instance the following examples:

- GATT/WTO:
 - Oil is traded freely, but the market is far from a free market.
 - As more and more OPEC members become members of WTO, cartel-like behavior of OPEC can be seen as a violation of WTO principles, or...?
 - WTO bans restrictions on exports, but not on production.
- OPEC:
 - Established in 1960 to strengthen the exporting countries against the dominance of the International Oil Companies.
 - Efforts to achieve market governance since the 1970s (cf. lecture 5).
- IEA:
 - Established in 1974 to counter the market power of OPEC.
 - 1984: Coordinated Emergency Response Measures (CERM), applied under the Gulf War in 1991 and Hurricane Katrina in 2005.
- IEF:
 - Cooperation between oil producers and consumers.

The pattern of global energy institutions and interaction is presented as follows in Claes (2018) and in the lectures as follows:

	IOCs	Producer countries	Consumer countries	Producer NOCs	Consumer NOCs
IOCs	Seven Sisters ^b	Concessions for exploration and production (E&P)	Private downstream activities in refining and product sales	Production sharing agreements (PSAs)	Companies' alliances in upstream investments abroad
Producer countries		OPEC ^a	IEF ^a	State ownership of E&P in domestic oil provinces, e.g. NOCs in OPEC countries	Consumer NOCs E&P abroad, e.g. Chinese companies' in Sudan
Consumer countries			IEA ^a	Foreign NOCs' downstream investments abroad, e.g. Kuwait's investments in U.S. refining	State ownership of domestic downstream activities, e.g. ENI in Italy
Producer NOCs				The NOC Forum ^b	Companies' alliances in upstream investments abroad
Consumer NOCs					Minimal activity
	^a) Formal international governmental organizations (IGOs)			Source: Claes 2018, p. 113	
	^b) Informal alliances among companies				

When it comes to the content of the discussion, the candidates are of course free to choose their own angle and approach. Some points are outlined by the entry in the reading list by Van de Graaf and Colgan and in the lectures as follows:

- Energy security
 - Managing petroleum reserves to buffer energy shocks, case: IEA
 - Energy Market information, case: JODI, IEA: WEO
 - Natural gas pipelines disputes, cut-offs, case: Russia-Ukraine
- Economic development
 - Reducing energy poverty
 - Facilitating technology transfer and cooperation
- International security
 - Risk of nuclear proliferation and accidents
 - The role of oil in armed conflicts
 - Mitigating terrorist attacks on energy infrastructure, piracy and cyberattacks
- Environmental sustainability
 - Reducing emission of greenhouse gases from use of fossil energy
 - Develop renewable alternatives to fossil fuels
 - Reducing local pollution from energy production
- Domestic good governance
 - Addressing human rights violation and poor working conditions in extractive industries
 - Adoption of best practice in energy regulations

b) *Briefly outline the mechanism of the economic and/or political resource curse. Discuss how states can avoid, or at least reduce, the negative effects from income related to exports of natural resources.*

The main aspects of the Resource Curse is outlined in Claes (2018) and the lectures as follows:

The economic aspects of the RC:

- The '*Dutch Disease*'
 - Exchange rate appreciation
 - Role of the exchange rate regime
- Fiscal Policy – 'Do not spend the money!'
 - Volatility
 - Sustainability
 - *How to save the income?*

The political aspects of the RC:

- The *Rentier* state
 - Taxation
 - Government spending and lack of investments
 - Corruption and rent seeking
- Academic critique of the literature
 - Mistaken assumptions
 - Correlations rather than causal mechanism
 - Measurement errors

To avoid the RC the Hartwick rule is a key aspect: *Hartwick's Rule*: the resource owner should instantly invest the resource rents in reproducible capital, goods or assets, and then spend only the rent from the reproducible capital or assets.

c) *In the reading list there are several contributions discussing the possibilities and obstacles for a successful energy transition reducing the emission of greenhouse gases, either focused on energy producers, the situation in a particular country or region, or on various energy industries.*

Choose your own empirical focus and discuss the relative importance of technological change, economic factors and political interests and institutions for the possibilities and obstacles for a successful energy transition reducing the emission of greenhouse gases.

Approximately the last quarter of the lectures were dedicated to the so-called *Energy transition*. This task is deliberately very open. The students will have to design their own take on the issue, both empirically and when it comes to research question, possible theoretical approach and so on.

The answers here will have to be evaluated on their merits regarding soundness, precision, and analytical quality.