

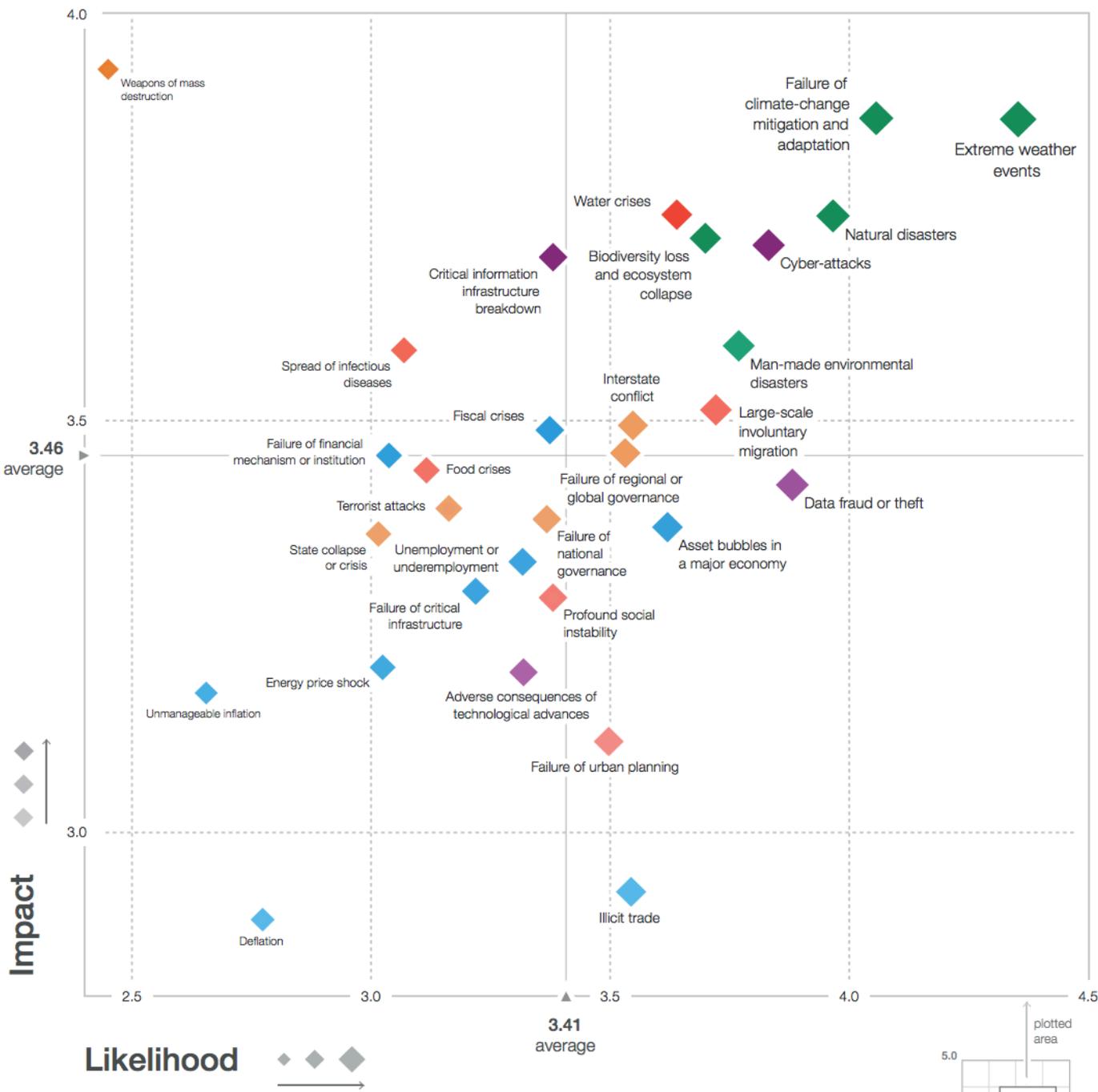
Seminar on Energy and Climate Change

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Climate Change and Sustainable Development Policies

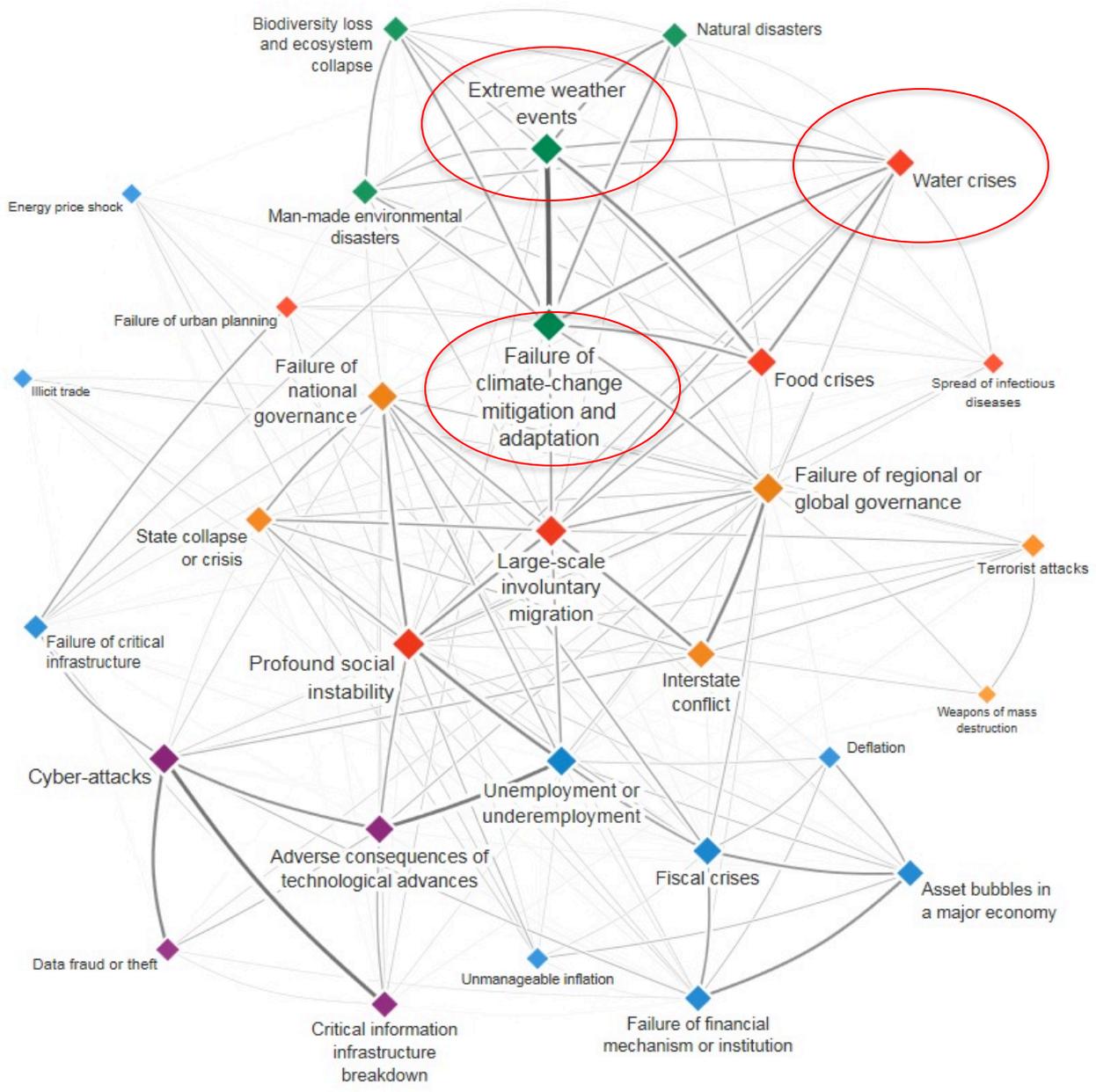
- I. ENERGY & CLIMATE CHANGE: A COMPLEX, PERENNIAL AND INTERDISCIPLINAR RELATION
- II. Scope and purpose of the course. Syllabus. *Practicalities.*

ENERGY ?



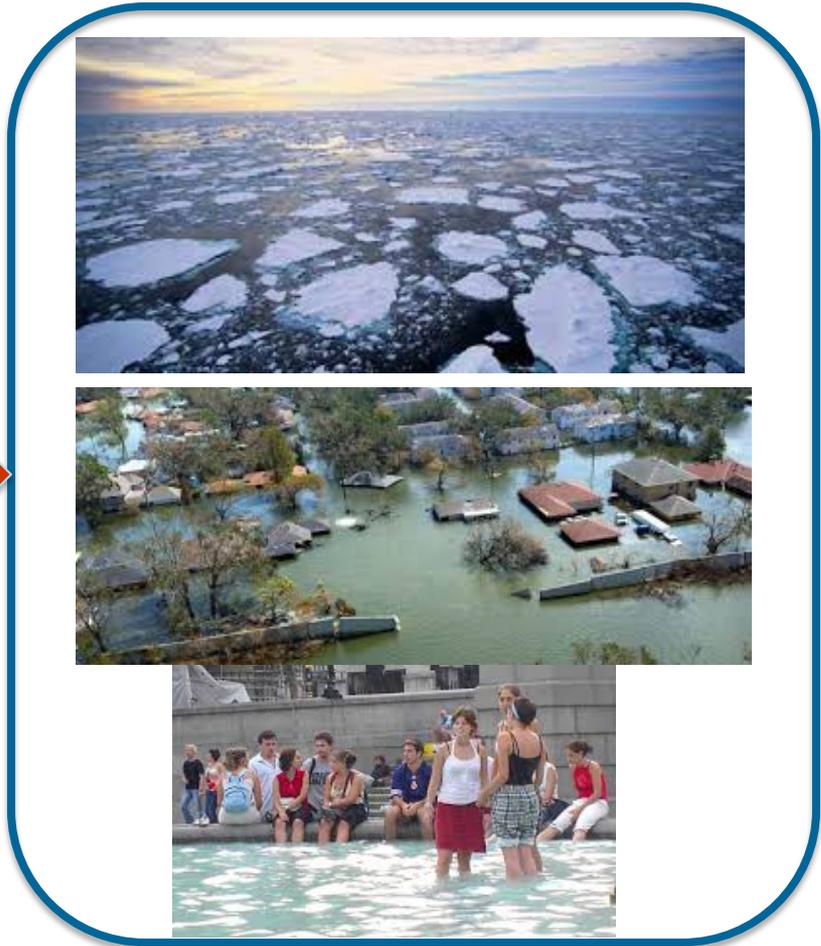
Explore the report here: http://www3.weforum.org/docs/WEF_Global_Risks_Report_2019.pdf

How are global risks interconnected?



Explore the report here: http://www3.weforum.org/docs/WEF_Global_Risks_Report_2019.pdf

ENERGY & CLIMATE CHANGE: A COMPLEX, PERENNIAL AND INTERDISCIPLINARY RELATION



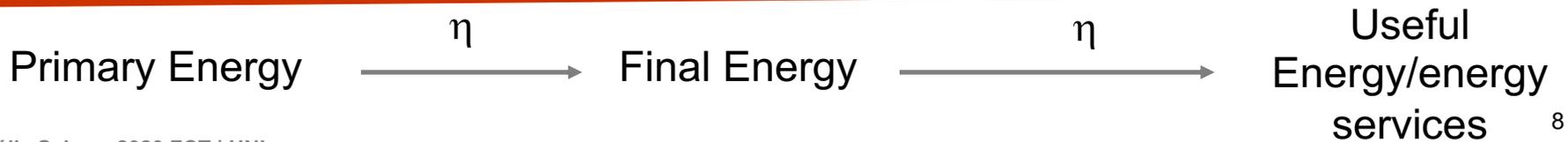
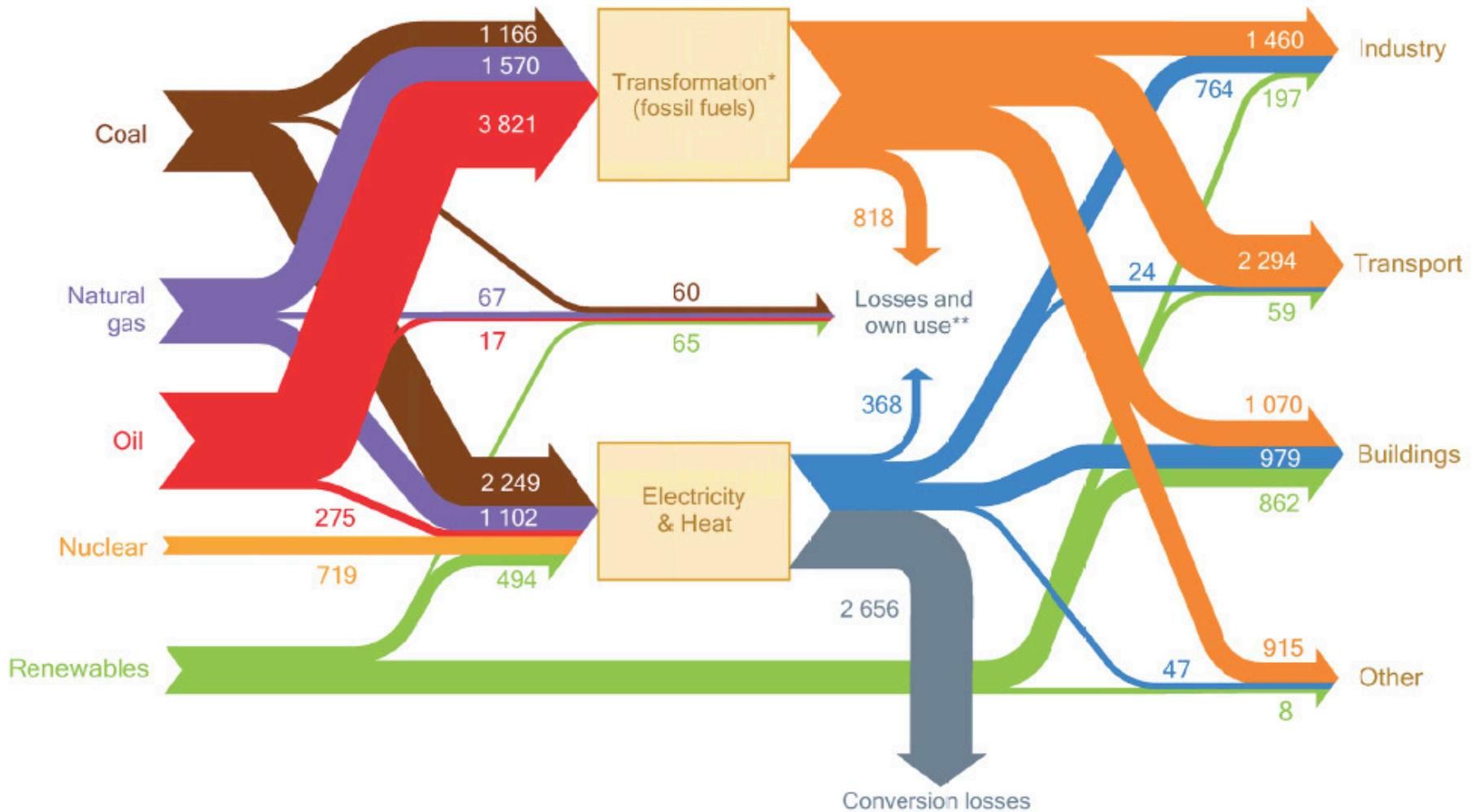
ENERGY & CLIMATE CHANGE: A **COMPLEX**, PERENNIAL AND INTERDISCIPLINARY RELATION

- Oil | coal
- Sun | water | wind
- Thermoelectric power plants
- Production of electricity from renewable sources
- Passengers mobility
- Heating / Cooling
- Biofuels
- Double windows
- Refrigerators & Freezers
- LED lamps
- Comfort | welfare

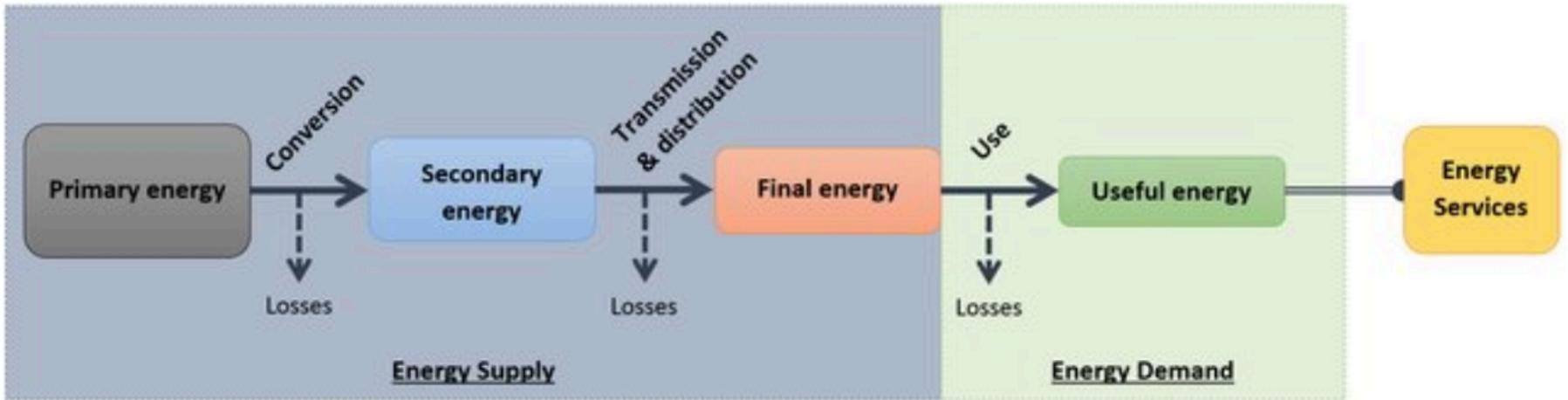


- 2016 warmer year
- Reduction of the icy area of Greenland
- Heat waves
- Snowstorms
- Forest fires
- Less efficient power plants in summer
- Rational energy use behaviors
- Access to electricity
- Energy cost - competitiveness
- Electrical Gadgets
- Urban habits

Figure 2.8 ▶ The global energy system, 2010 (Mtoe)



THE ENERGY SYSTEM



COAL
OIL
SOLAR
HYDRO

HEAT
STEAM

ELETRICITY
OIL PRODUCTS

LIGHT
HEAT
MOVEMENT

See next
slide

To explore more on “Energy services: A conceptual review



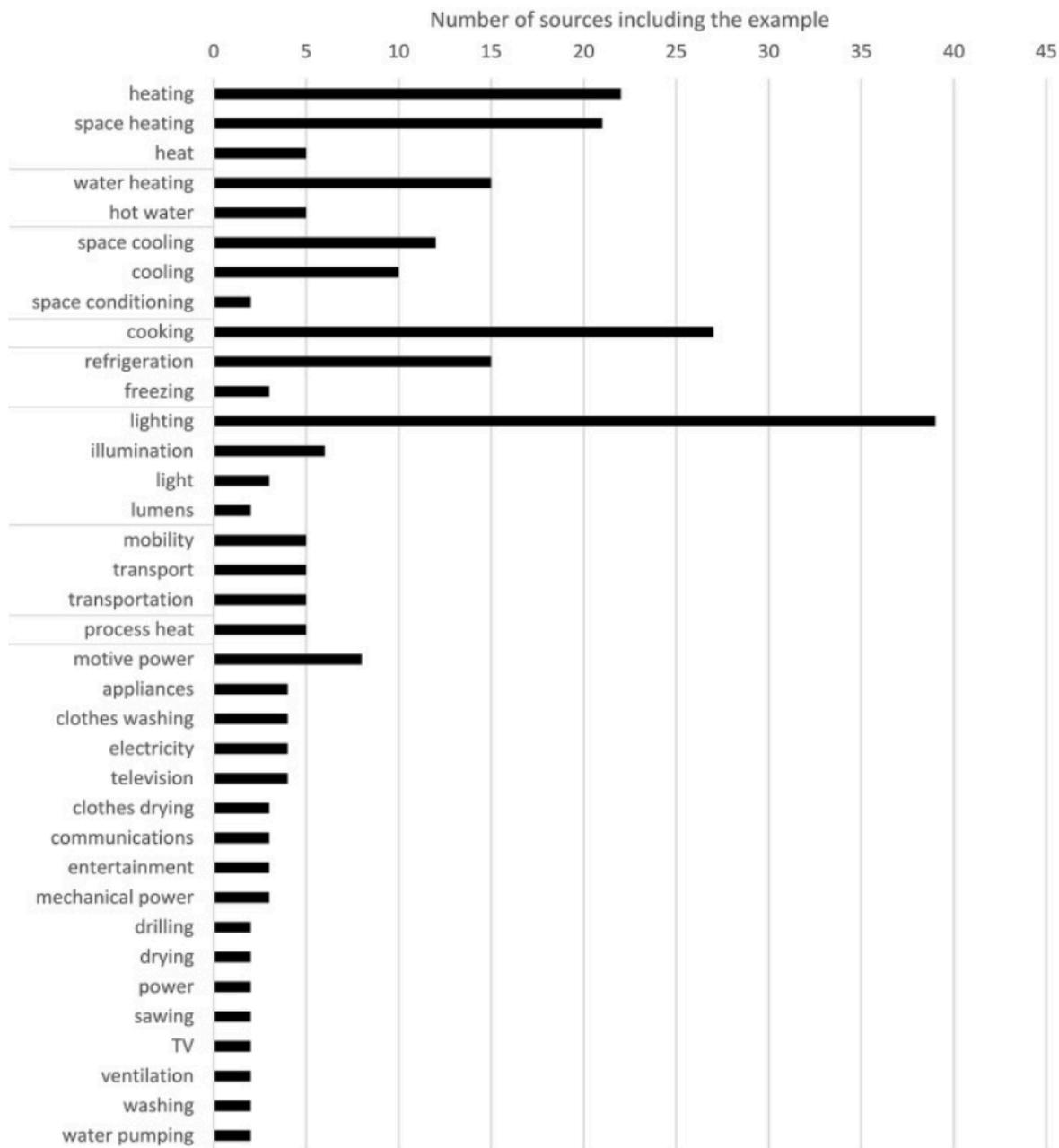


Fig. 2. Examples of energy services included in two or more sources. Source: ([Fell, 2017](#))

The cost of importing energy in Portugal in 2018 was approximately:

a) 17 billion €

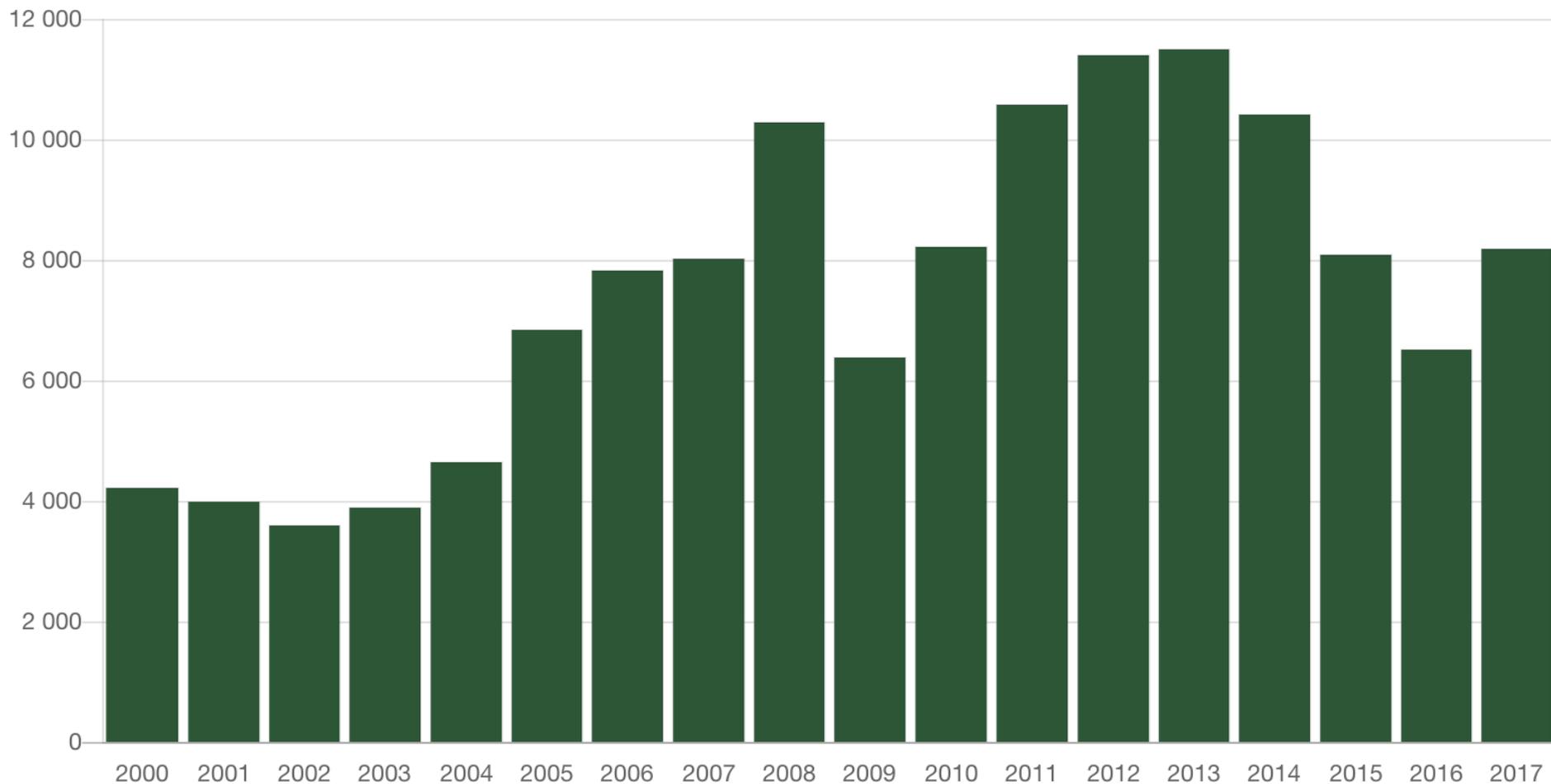
b) 9 billion €

c) 0,5 billion €

In 2014, Portugal imported agricultural and food products worth € 6.9 billion

PORTUGAL ENERGY INVOICE: IMPORTS

De: 2000 Até: 2017 Valores: M€



PORTUGAL ENERGY INVOICE: NET IMPORTS (IMPORTS MINUS EXPORTS)

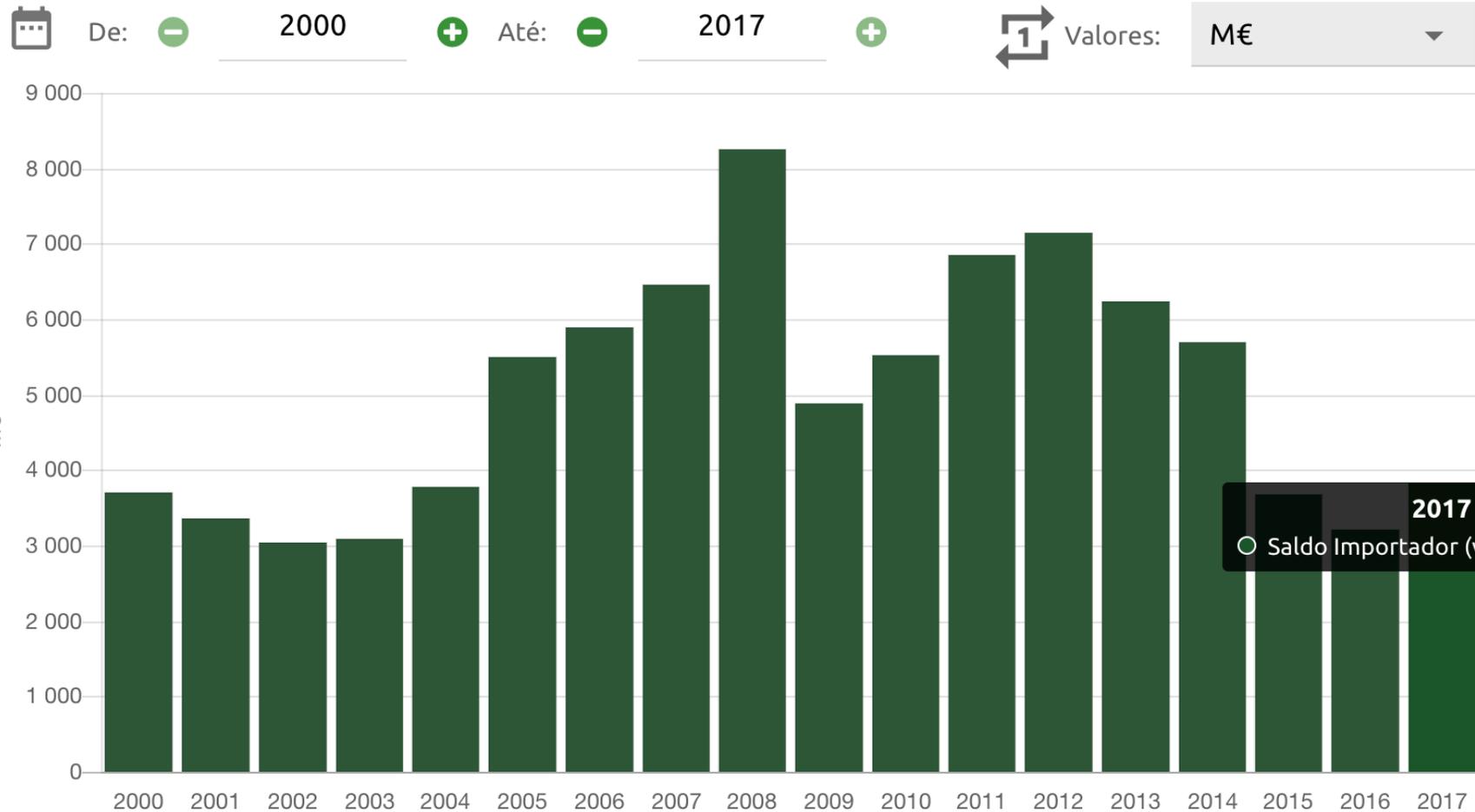


Tabela 3 - Evolução do Saldo Importador de Produtos Energéticos (2016 a 2018)

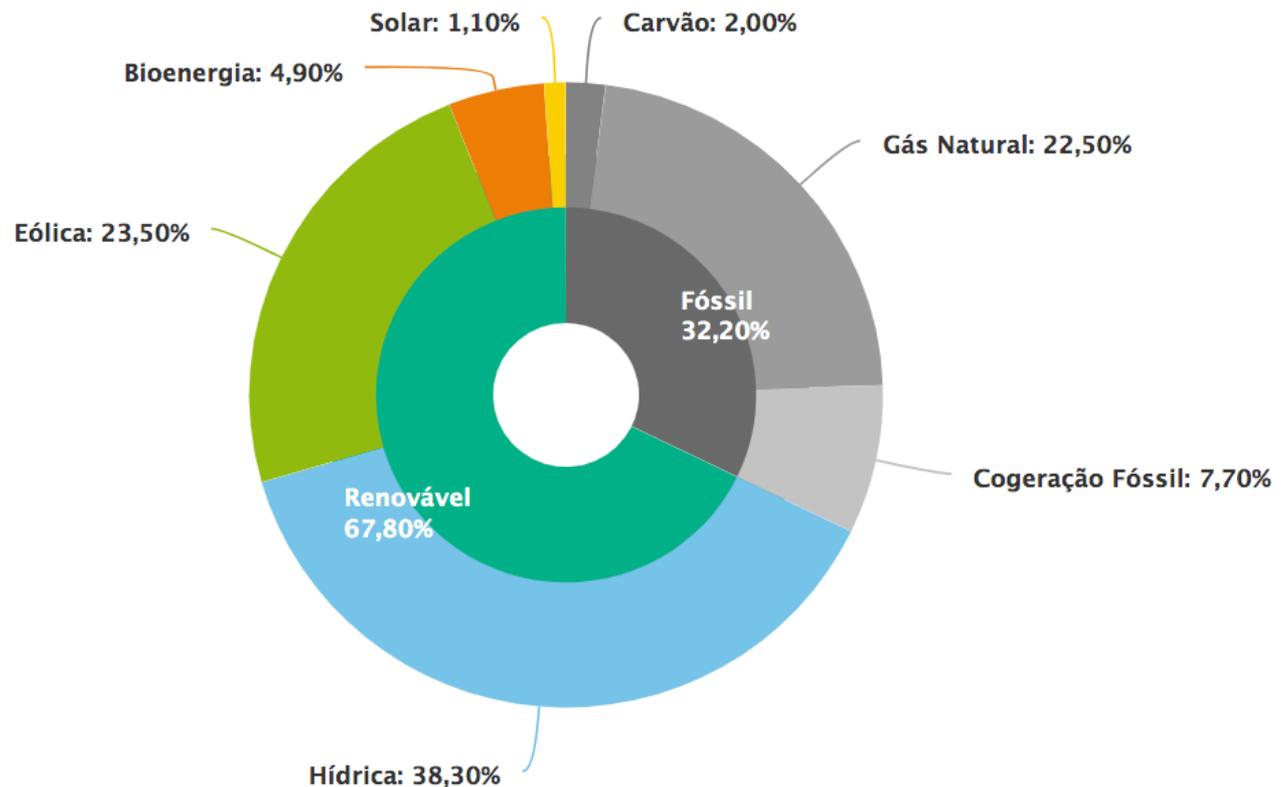
	2016	2017	% 2017/_16	2018	% 2018/_17
10 ⁶ USD	3 564	4 326	21,4	5 783	33,7
10 ⁶ EUR	3 222	3 843	19,3	4 927	28,2

Fonte: DGEG

1. IMPORTAÇÃO DE PETRÓLEO BRUTO E REFINADOS	9. EXPORTAÇÃO DE REFINADOS
1.1. PETRÓLEO BRUTO	10. (RE)EXPORTAÇÃO DE CARVÃO
1.2. REFINADOS	11. EXPORTAÇÃO DE BIOMASSA ⁽²⁾ E OUTROS
2. IMPORTAÇÃO ENERGIA ELÉTRICA ⁽¹⁾	12. EXPORTAÇÃO DE ENERGIA ELÉTRICA ⁽¹⁾
3. IMPORTAÇÃO DE HULHA	13. (RE)EXPORTAÇÃO DE GÁS NATURAL
4. IMPORTAÇÃO DE COQUE DE CARVÃO E ANTRACITE	14. EXPORTAÇÃO DE BIOCOMBUSTÍVEL
5. IMPORTAÇÃO DE BIOMASSA ⁽²⁾ E OUTROS	
6. IMPORTAÇÃO DE GÁS NATURAL	
7. IMPORTAÇÃO DE BIOCOMBUSTÍVEL	

In January 2020, the share of the renewable component in electricity production was:

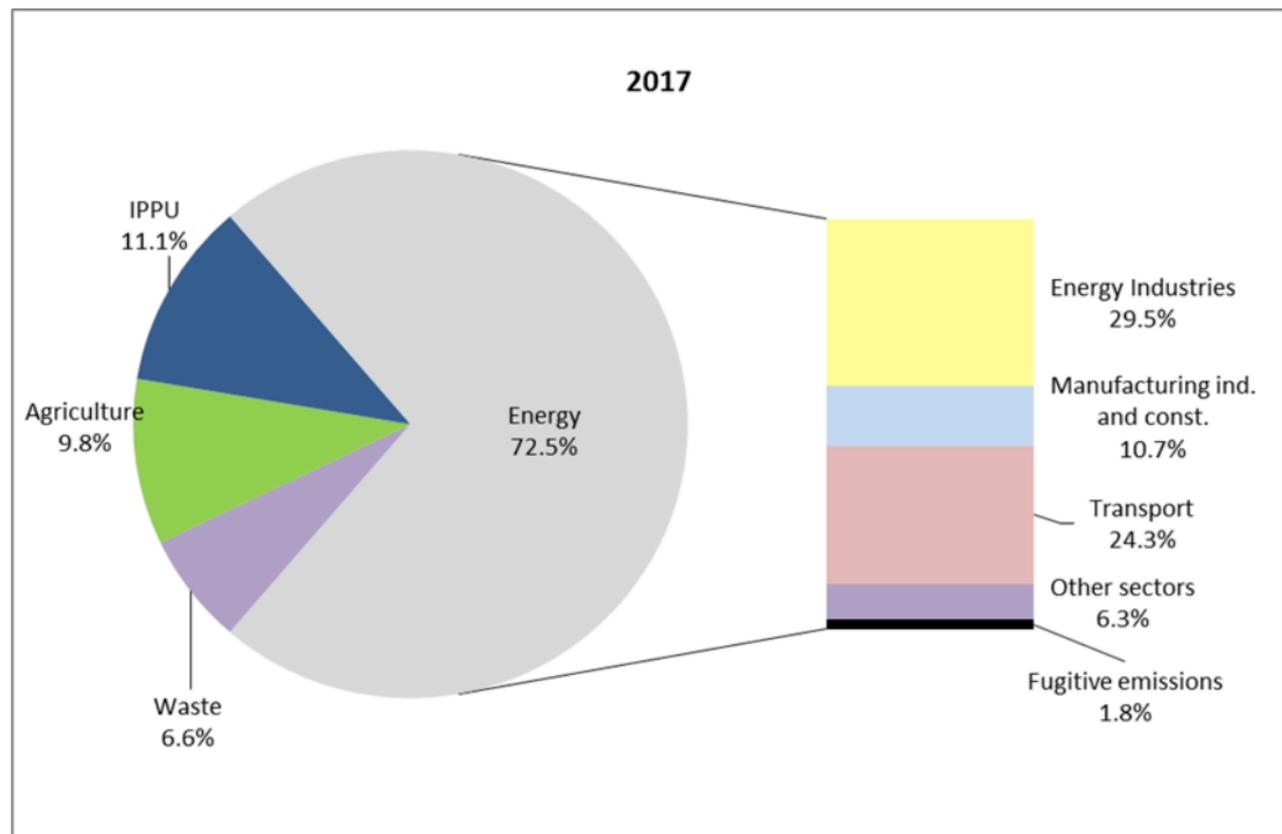
- a) 40%
- b) 20%
- c) 65%



The energy sector contribution for the in Portugal's global greenhouse gas emissions balance is approximately:

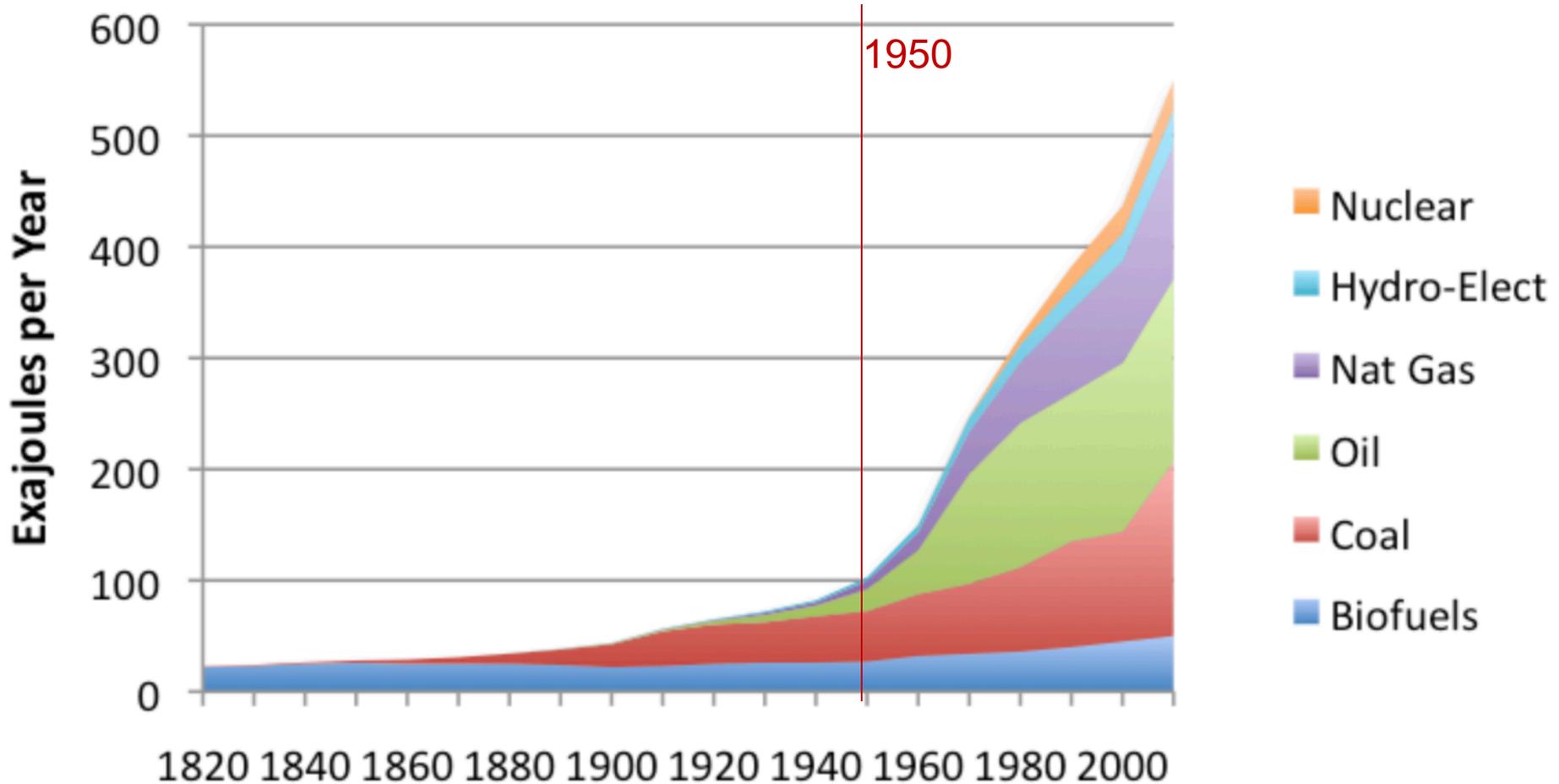
- a) 70%
- b) 90%
- c) 40%

Figure 2.8 - GHG emissions in Portugal by sector (LULUCF excluded).

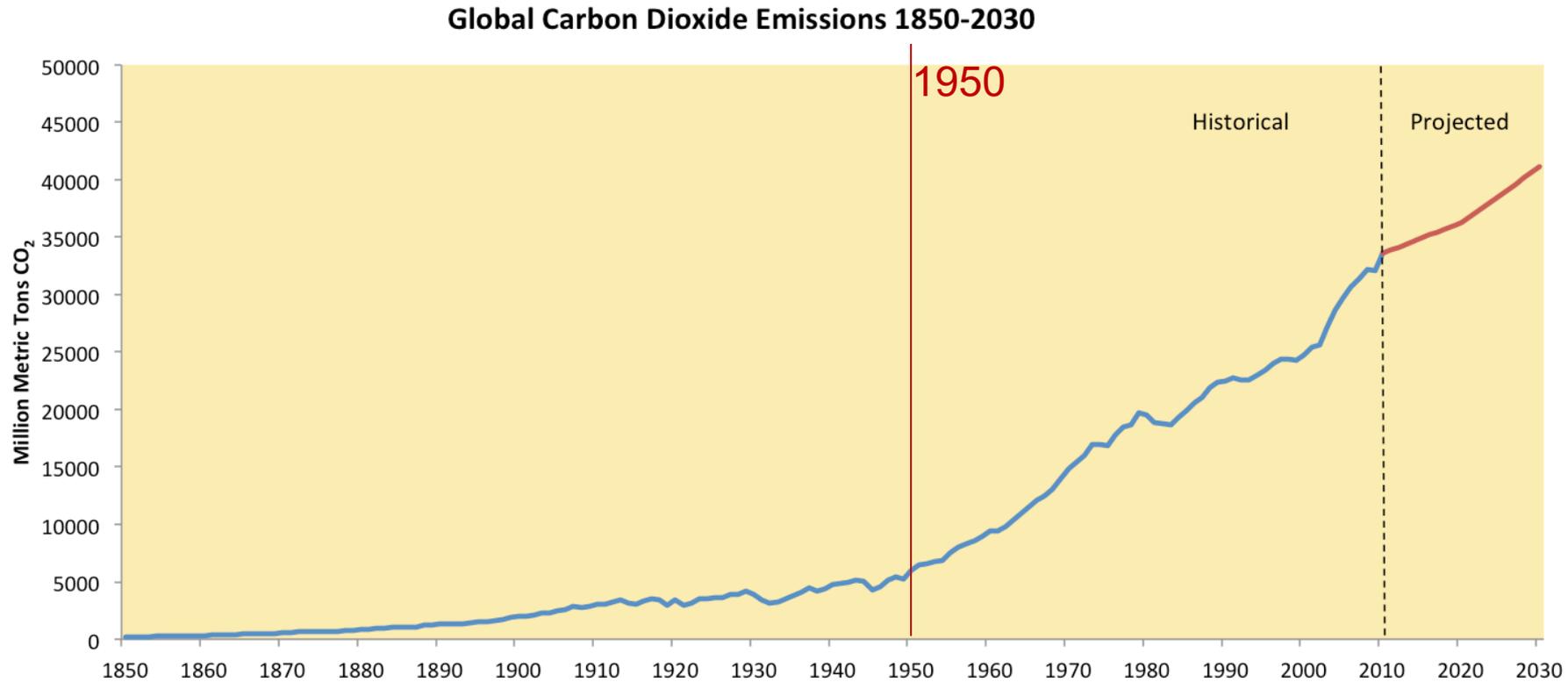


ENERGY & CLIMATE CHANGE: A COMPLEX, **PERENNIAL** AND INTERDISCIPLINARY RELATION

World Energy Consumption

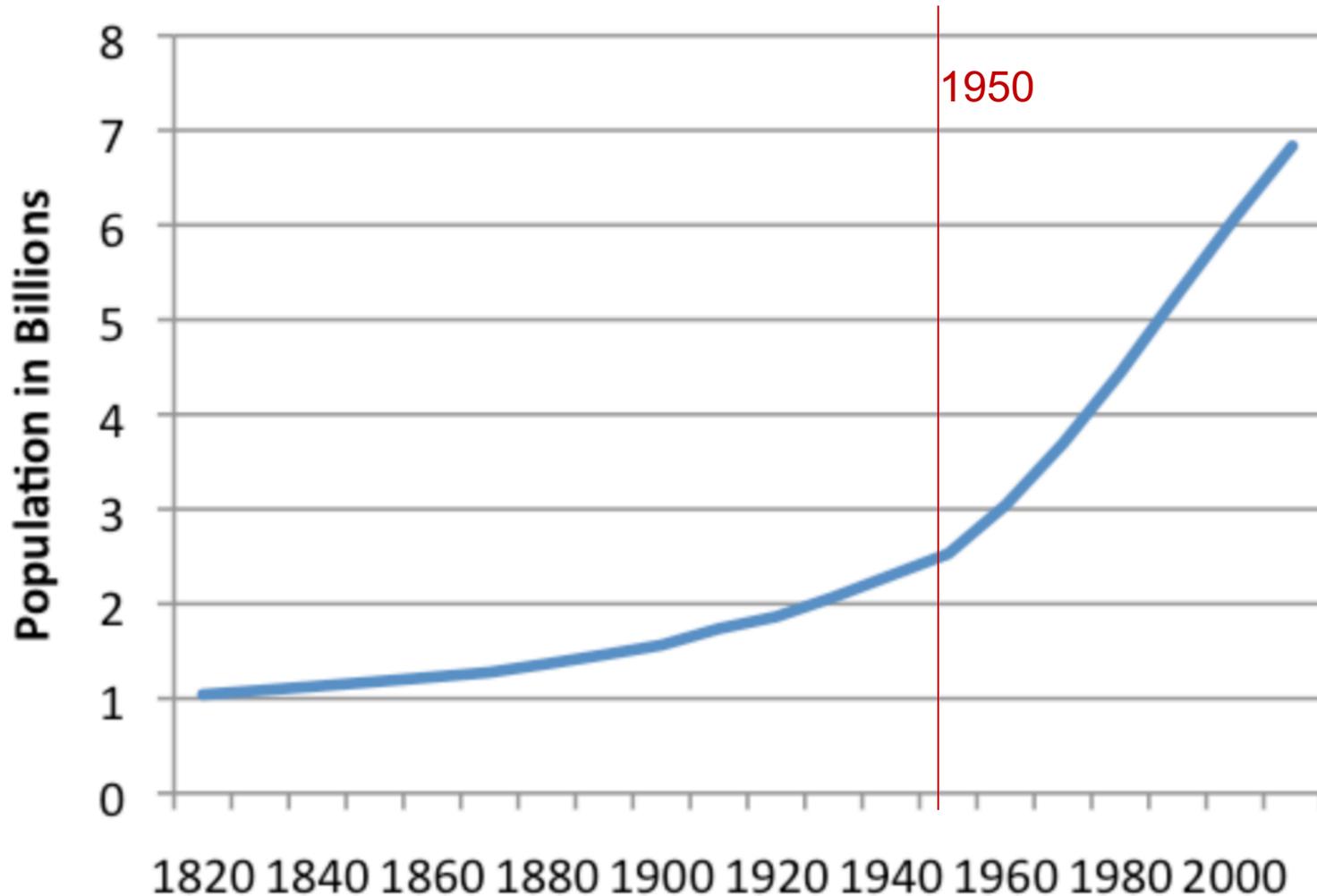


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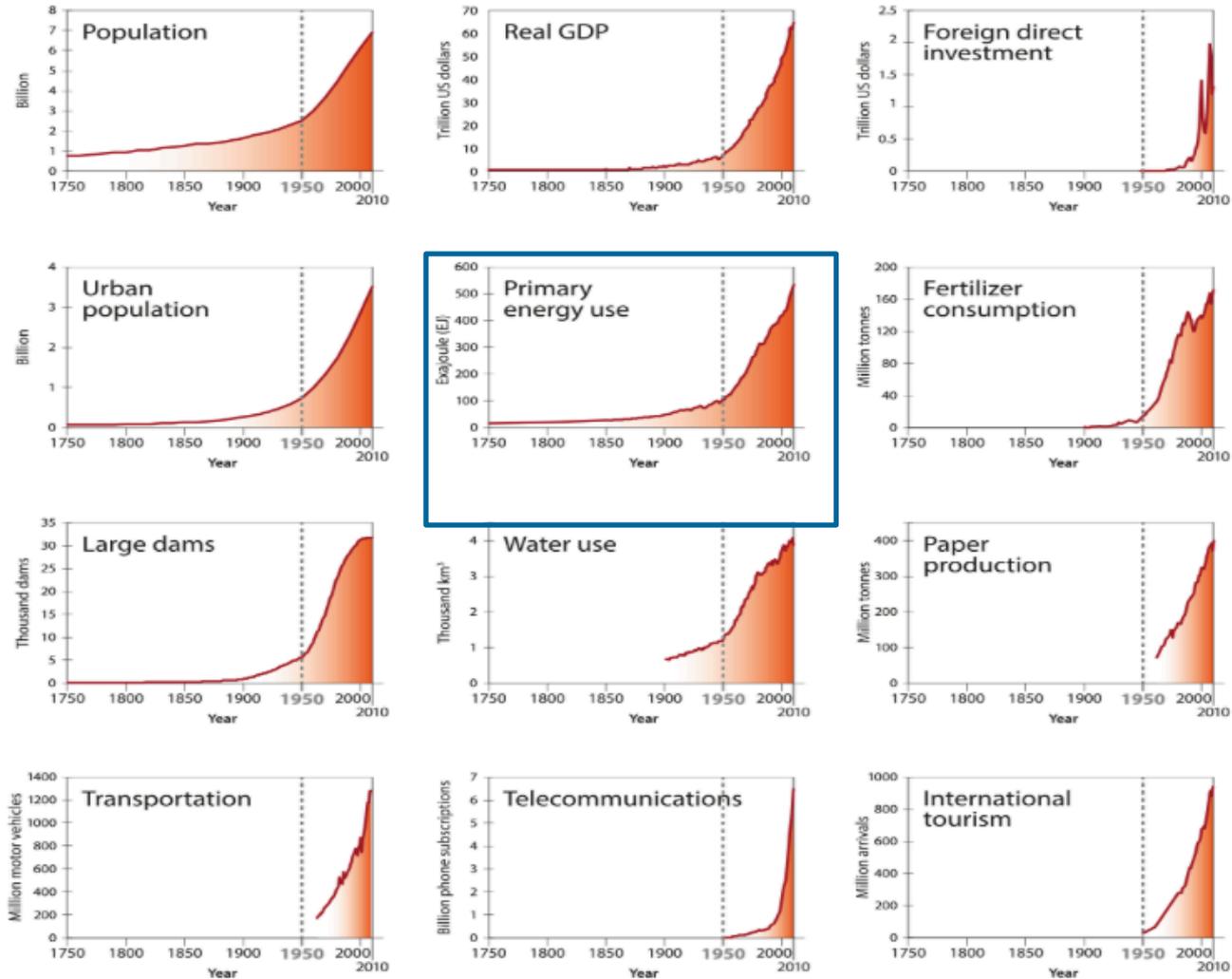
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World Population



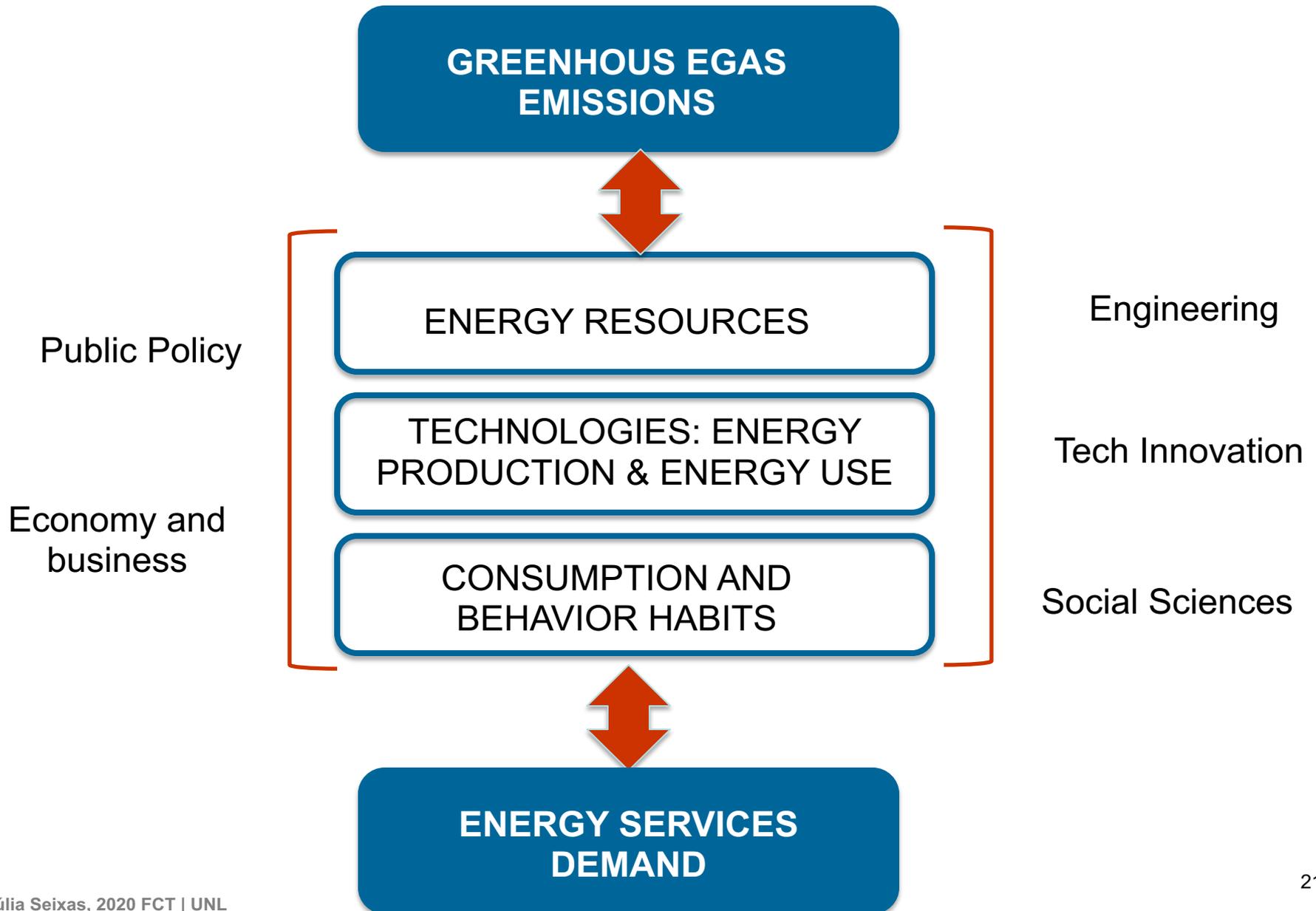
ENERGY & CLIMATE CHANGE: A COMPLEX, **PERENNIAL** AND INTERDISCIPLINARY RELATION

Socio-economic trends



Explore more on the Great Acceleration [here](#)

ENERGY & CLIMATE CHANGE: A COMPLEX, PERENNIAL AND **INTERDISCIPLINARY** RELATION



ENERGY & CLIMATE CHANGE: A COMPLEX, PERENNIAL AND INTERDISCIPLINARY RELATION

CHALLENGE FOR THE 21ST CENTURY

How can we deliver the benefits of energy services to the entire population of the planet without deteriorating the environment, without negatively affecting social stability and without threatening the well-being of future generations.

Climate Change and Sustainable Development Policies

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Seminar on Energy and Climate Change

PURPOSE OF THE COURSE:

- deepen the intrinsic relationship between climate change and energy, taking the perspective of greenhouse gas emissions mitigation.
- focus on technological, economic, environmental and social aspects.
- train the reasoning and practices on medium to long-term prospective exercises

At the end of the course, students will be able to perform a critical and robust analysis on:

- the impact of energy options on the problem of climate change from the perspective of systems analysis and in the medium to long term;
- the importance of clean energy production to economic competitiveness, in particular within the regulatory framework to promote low-carbon economy;
- prospect and develop a plan for the success of an economic activity in a neutral carbon economy pathway - EVALUATION.

PROGRAMA & RECURSOS @ <https://moodle.fct.unl.pt/course/view.php?id=5772>
(weekly updated)

Seminar on Energy and Climate Change

EVALUATION:

Challenge: Within the scope of your personal interests, select an economic activity from the following areas:

Communication | Final Product | Industry | Services | Mobility | Other

Assuming Portugal (or your country) by 2030, will be in the midst of a pathway to achieve a carbon neutral economy by 2050 (as stated in the Paris Agreement) or earlier, how do you envisage the selected activity will picture in that time horizon (2030)?

Seminar on Energy and Climate Change

Suggestion of script for development:

- firstly, **formulate (and detail) the problem** as far as you are able;
- **characterize the activity at present** [for example, production / import technologies | type of markets and consumers | competition from other markets? | energy consumption profile | indicators of carbon intensity]
- **envisage the activity up to 2030** [technological options | product change - green? | change of consumers | energy consumption profile | indicators of carbon intensity]
- **systematize opportunities for the mitigation** of the selected activities (identify needs of R & D, act on consumption preferences, the product value chain, among others)
- identify and **anticipate constraints and barriers** to the desired mitigation, and explain how to overcome them.

Tips: Start now; try to be objective and quantify what is possible; do not try to be exhaustive (you can not do it within just one course); explore examples that already exist in other countries; be creative.

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EVALUATION:

Criteria [points/100], the goal of the exercise is to promote:

1. Your ability to reason about the problem, in a structured and integrated way (for example, within the value chain of the activity, including the international dimension if applicable); [25]
2. Consistency and creativity in the scenario design in 2030 taking into account the expectations of a 450 ppm scenario (aggressive reduction of GHG emissions); [20]
3. Show knowledge about technological mitigation options, in particular regarding the energy component; [20]
4. Demonstrate robustness of analysis and arguments, focusing on aspects of cost effectiveness, carbon economics, competitiveness, among others. Demonstrate ability to synthesize information and data processing; [20]
5. Evidence of group work and cooperation [7.5]
6. Clear and concise presentation [7.5]

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How the work will be developed?:

- Groups of 3 students (please send me an email with the group members until march 27)
- Coaching session to each group, on the work development (one class dedicated to this, end of may or very early June)
- Oral presentation: 30 min/group [15 min for oral presentation + 15 min Q&A]
- *Deliverable: at the day before the oral presentation at maximum, students will send to me the presentation by email*
- Presentation in pdf format: maximum 10 slides + word document with 3 pages at maximum (only if needed for complementary information).

Oral presentation:

3 July 2020, friday, 14:00h, ICS (tbd)