Renewable Energy Sources in Global Politics

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October 2020

Renewable Energy Sources = RES

Class with be taught in English

- Any Erasmus students will be integrated with the class
- Some material will be in Greek
  - Supplementary English sources will be provided

Microsoft Teams class at

https://teams.microsoft.com/l/team/19%3a7594d7a715054d638f7d0b5908dbdc86%40thread.tacv2/conversations?groupId=6ac3a58c-df30-45fc-b2ea-5cfeaebd6a37&tenantId=d9c8dee3-558b-483d-b502-d31fa0cb24de

University of Piraeus e-class at

https://eclass.unipi.gr/courses/DES254/ (still in Greek)

Class textbook

https://link.springer.com/book/10.1057%2F9781137298799

Moe, Espen (2015). *Renewable Energy Transformation or Fossil Fuel Backlash: Vested Interests in the Political Economy*. Palgrave McMillan.

- Not sure how it works with ΕΥΔΟΞΟΣ and getting the book from Springer
- Will have parts of the book given out in class

ASSESSMENT

- Final exam 50%
- Mandatory midterm exam 10%
- Mandatory individual class project 40%
  - Class project will be PowerPoint only
  - Projects will be presented in class
  - Oral presentation will be worth half (20% of the 40%) of the project
  - There will be one external examiner with Dr. Paravantis

Projects

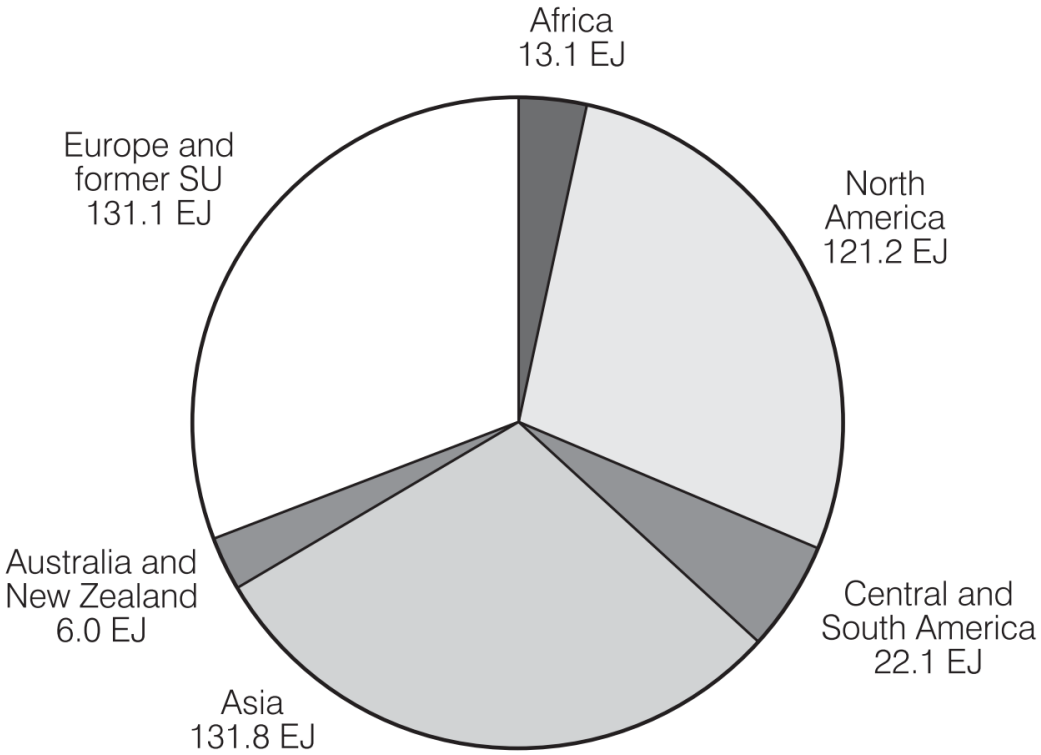
- Topics should be finalized by the beginning of November
- Projects on geothermal and (3rd generation) biofuels are greatly encouraged

CLASS CONTENTS

- Introductory concepts and RES misconceptions
- Worldwide energy and RES consumption
  - Energy and RES consumption in select countries
  - Energy and RES consumption in Europe
- RES and the environmental
  - Defining sustainable development
  - Siting RES projects
  - Environmental impacts of RES
    - Public attitudes towards RES (Dr. Paravantis will present research on this)
- Economics (capital/operational costs) of RES
- Types of RES
  - Wind power

Solar power
Hydro power
Geothermal energy (new this year)
Based on work for project Horizon 2020
Biomass
Geopolitics of 3rd generation biofuels (new this year)
Recycling

RES and geopolitics



Source: DOE, 2003

Figure 1.5 *World Primary Energy Demand by Region in 2001*

Primary energy demand = primary energy consumption

*"**Primary energy consumption** measures the total energy demand of a country. It covers consumption of the energy sector itself, losses during transformation (for example, from oil or gas into electricity) and distribution of energy, and the final consumption by end users. It excludes energy carriers used for non-energy purposes (such as petroleum not used not for combustion but for producing plastics)."*

https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Primary_energy_consumption#:~:text=Primary%20energy%20consumption%20measures%20the,final%20consumption%20by%20end%20users.

1 EJ = 1 Exajoule = 1×10^{18} joules = 2.778×10^{11} kWh

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Χαλκοκονδύλη 30,104 32 Αθήνα, e-mail: info@dei.com.gr
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Εξυπηρέτηση Πελατών ΔΕΗ
ΚΑΤΑΣΤΗΜΑ ΚΑΛΑΜΑΤΑΣ
ΑΡΤΕΜΙΔΟΣ 128 821 00
11 770

Εξυπηρέτηση ΔΕΔΔΗΕ
Πληροφορίες: 11500
Βλάβες: 22710 44365
Καταμέτρηση: 22710 22984

Είδος Λογαριασμού	**ΕΚΚΑΘΑΡΙΣΤΙΚΟΣ**
Τιμολόγιο	**Γ1 Οικιακό Τιμολόγιο**
Περίοδος Κατανάλωσης	**03/01/2017 - 04/05/2017**
Ημέρες	**122**
Κατανάλωση Ηλεκτρικής Ενέργειας	**1397 kWh**
Ημερομηνία Έκδοσης	**07/12/2016**
Κωδικός Εταίρου	1111111111
Λογαριασμός Συμβολαίου	300000000000
Α/Α Λογαριασμού	1111111111
Στοιχεία Πελάτη	1050 04 06 016300
Αρ. Παραστατικού	665000000000
ΑΦΜ/ΑΔΤ	999999999
Εγγύηση	35,00 €

342 094290

ΠΑΠΑΔΟΠΟΥΛΟΥ ΜΑΡΙΑ
ΔΕΛΦΩΝ 99
999 99 ΚΑΡΔΙΤΣΑ

639

Αριθμός Παροχής	1 23456789-01 5
Διεύθυνση Ακινήτου	ΧΙΟΥ 6 999 99 ΚΑΛΑΜΑΤΑ
Επόμενη Καταμέτρηση:	**01/09/2017**

Για οποιοδήποτε θέμα σχετικά με το λογαριασμό σας καλέστε στο 11 770.

Ενημερωθείτε για θέματα εξοικονόμησης ενέργειας στο **https://energy-saving.dei.gr**

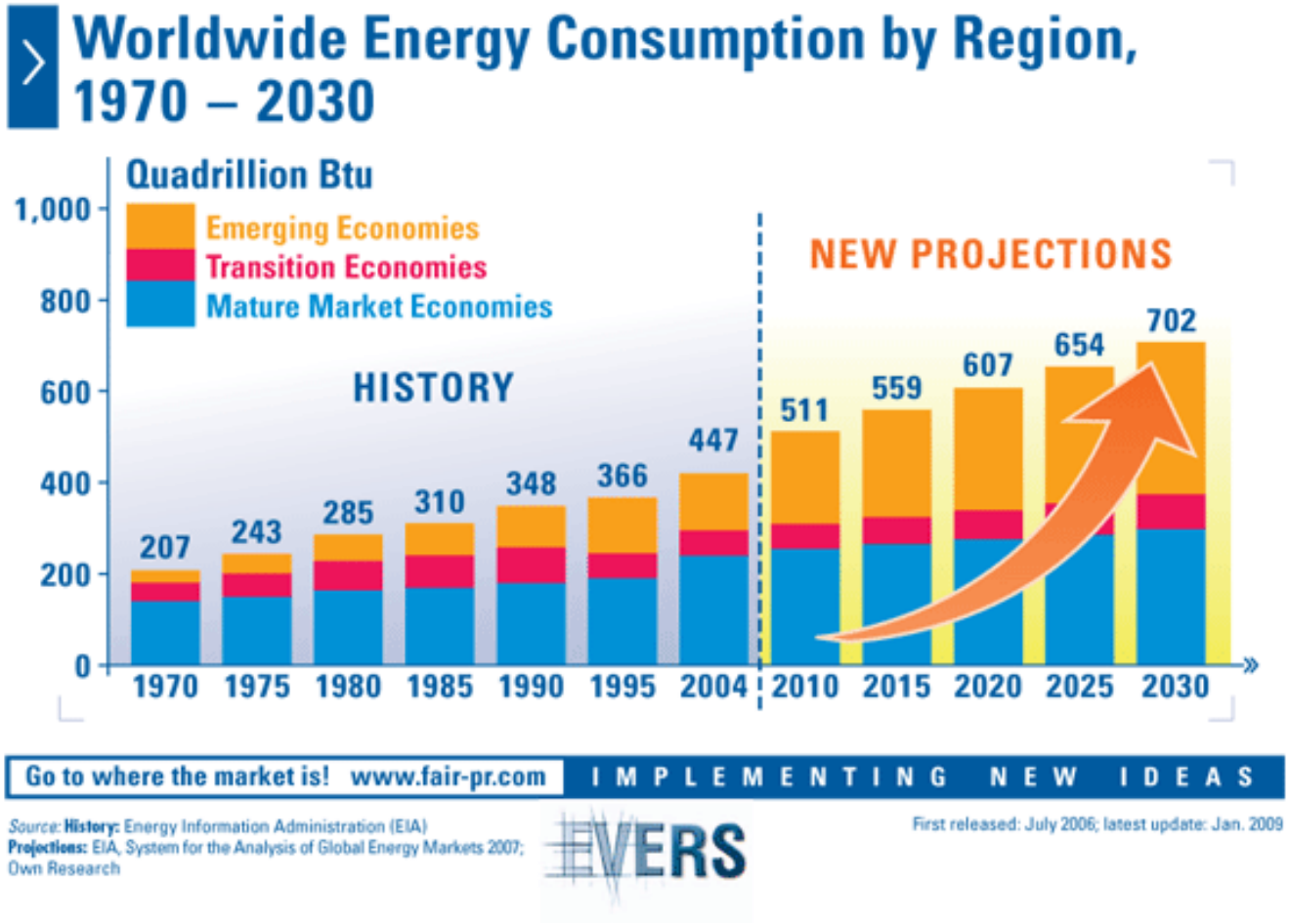
Λογαριασμός εξοφλούμενος από την EUROBANK

Κωδικός Ηλεκτρονικής Πληρωμής 123456789017

Λήξη Προθεσμίας Πληρωμής **03/06/2017**

Ο λογαριασμός σας συνοπτικά

	Αξία σε €
ΔΕΗ	133,71
ΑΔΜΗΕ- ΔΕΔΔΗΕ	38,91
ΥΚΩ Νησιά / Κοινωνικό Τιμολόγιο / Πολύτεκνοι κ.λπ.	9,77
ΕΤΜΕΑΡ Ανανεώσιμες Πηγές Ενέργειας	34,74
Λοιπές Χρεώσεις	0,10
Έναντι Κατανάλωσης	-87,05
Διάφορα ΕΦΚ / Ειδικό Τέλος 5‰ κ.λπ.	4,00
ΦΠΑ	17,32
Χρεώσεις ΔΗΜΟΥ	23,93
ΕΡΤ	6,31
Προηγούμενο Ανεξόφλητο Ποσό (Αγνοήστε το εάν έχει πληρωθεί)	
ΣΥΝΟΛΙΚΟ ΠΟΣΟ ΠΛΗΡΩΜΗΣ	*181,74



Btu or BTU = British Thermal Unit (more used in the US than in the UK)

Definition

> *"the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit at a specified temperature (such as 39°F)"*
>
> https://www.merriam-webster.com/dictionary/British%20thermal%20unit

1 kWh = 3,412.14 BTU

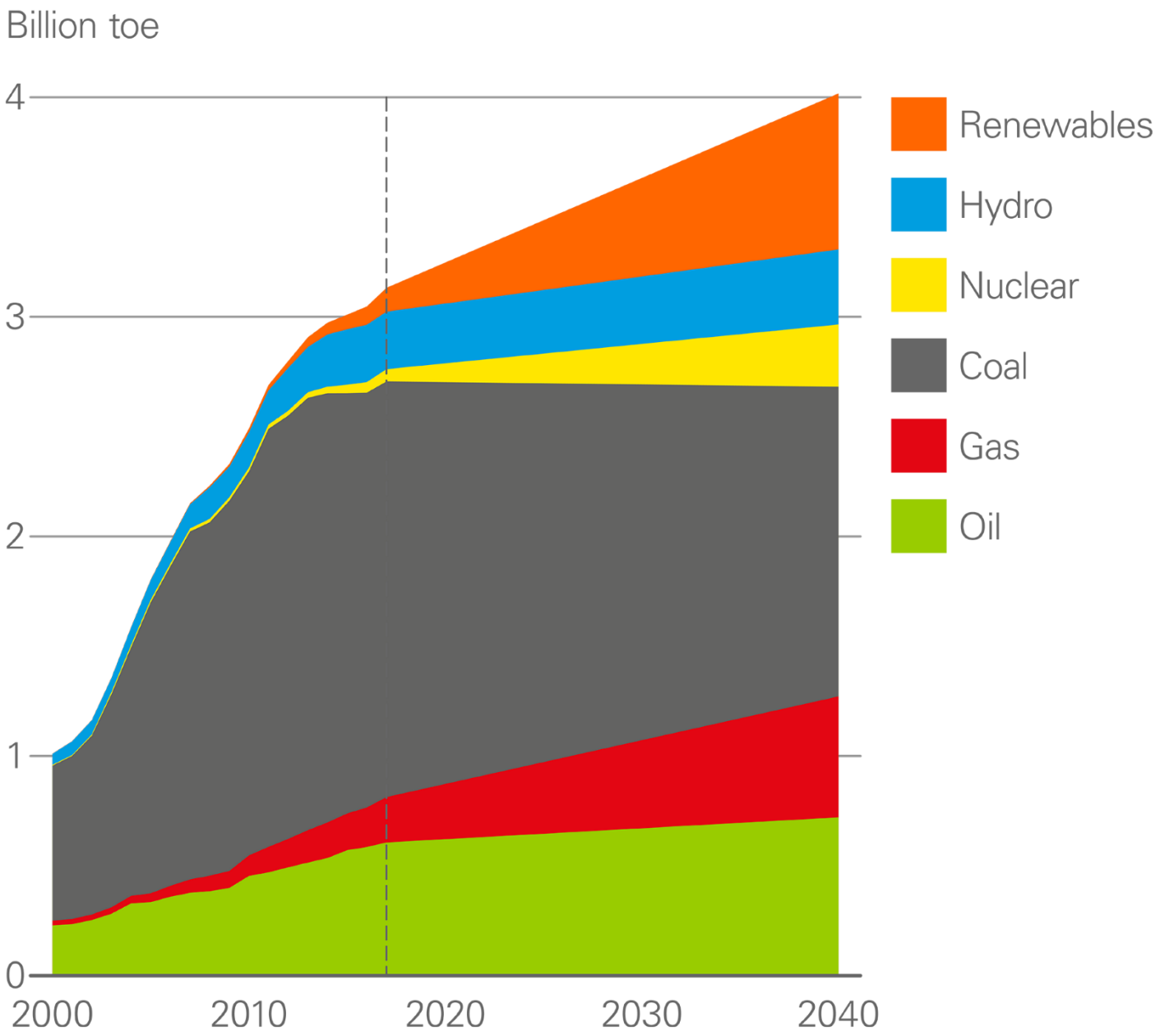
BTU = 0.000293071 kWh

1 quadrillion (or quad) of a quantity = 10^{15} units of that quantity

As an example

> 607 quadrillion BTUs = 607×10^{15} BTUs = $607\times10^{15}/3412.14$ kWh
>
> = $(607/3412.14)\times10^{15}$ kWh = 0.177894×10^{15} kWh = 177,894,000,000,000 kWh
>
> = $177,894,000,000,000/1\times10^{6}$ GWh = 177,894,000 GWh =
>
> or = $177,894,000,000,000/1\times10^{9}$ TWh = 177,894 TWh

Moral: you have to be mindful with energy units



toe or TOE = tonnes (or tons) or oil equivalent

Definition

> *"Tonne(s) of oil equivalent, abbreviated as toe, is a normalized unit of energy. By convention it is equivalent to the approximate amount of energy that can be extracted from one tonne of crude oil. It is a standardized unit, assigned a net calorific value of 41 868 kilojoules/kg and may be used to compare the energy from different sources."*
>
> https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Tonnes_of_oil_equivalent_(toe)

1 TOE = 11,630 kWh = 11,630×3,412.14 BTU = 39,683,188.2 BTU

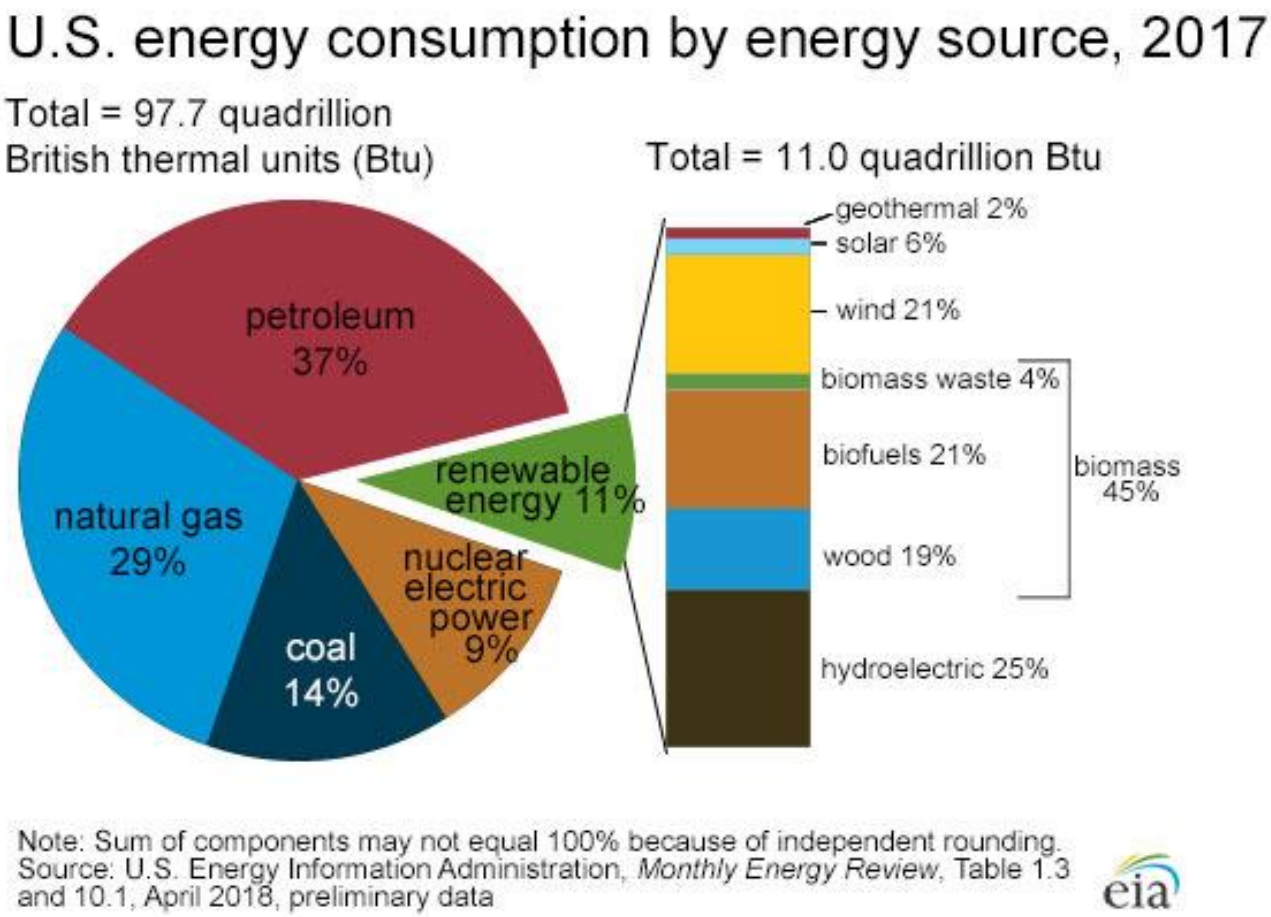
≅ 39,683 thousand BTU

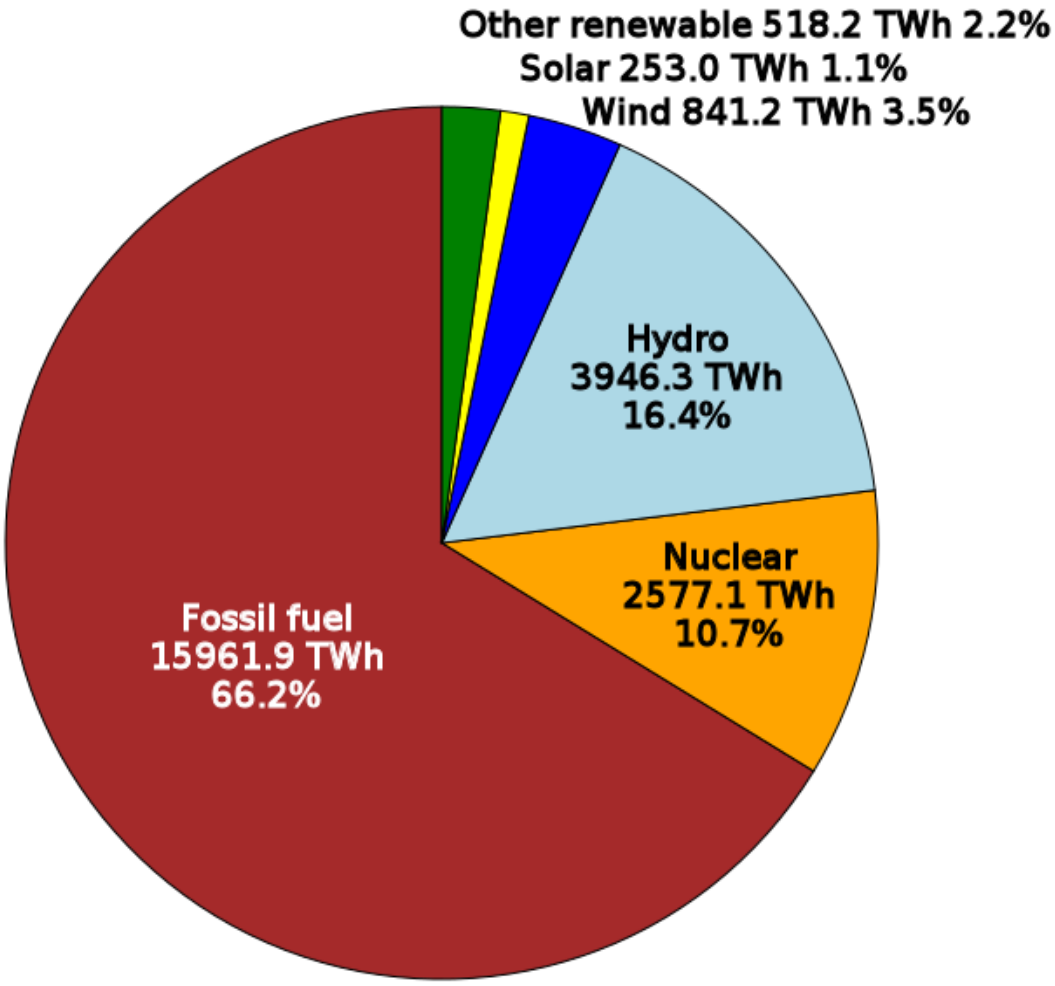
≅ 40 million BTU

careful with the use of MBTU

> "**MBTU**: The unit MBtu is a measure unit of energy, defined as one thousand the British thermal unit (symbol: Btu). The "M" stands for one thousand, distinguishing with the SI mega (M) prefix, which stands for one million. In order to avoid confusion, many companies and engineers use MMBtu to represent one million Btu."

https://www.theunitconverter.com/mbtu-to-btu-conversion/1-mbtu-to-btu.html#:~:text=MBTU%20%3A%20The%20unit%20MBtu%20is,to%20represent%20one%20million%20Btu





World Electricity Generation by Source (2015)