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Green CaMMp Workshop

17.12.2021 – online session

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Energy in the past, present and future of the Earth

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Timeline of the Universe

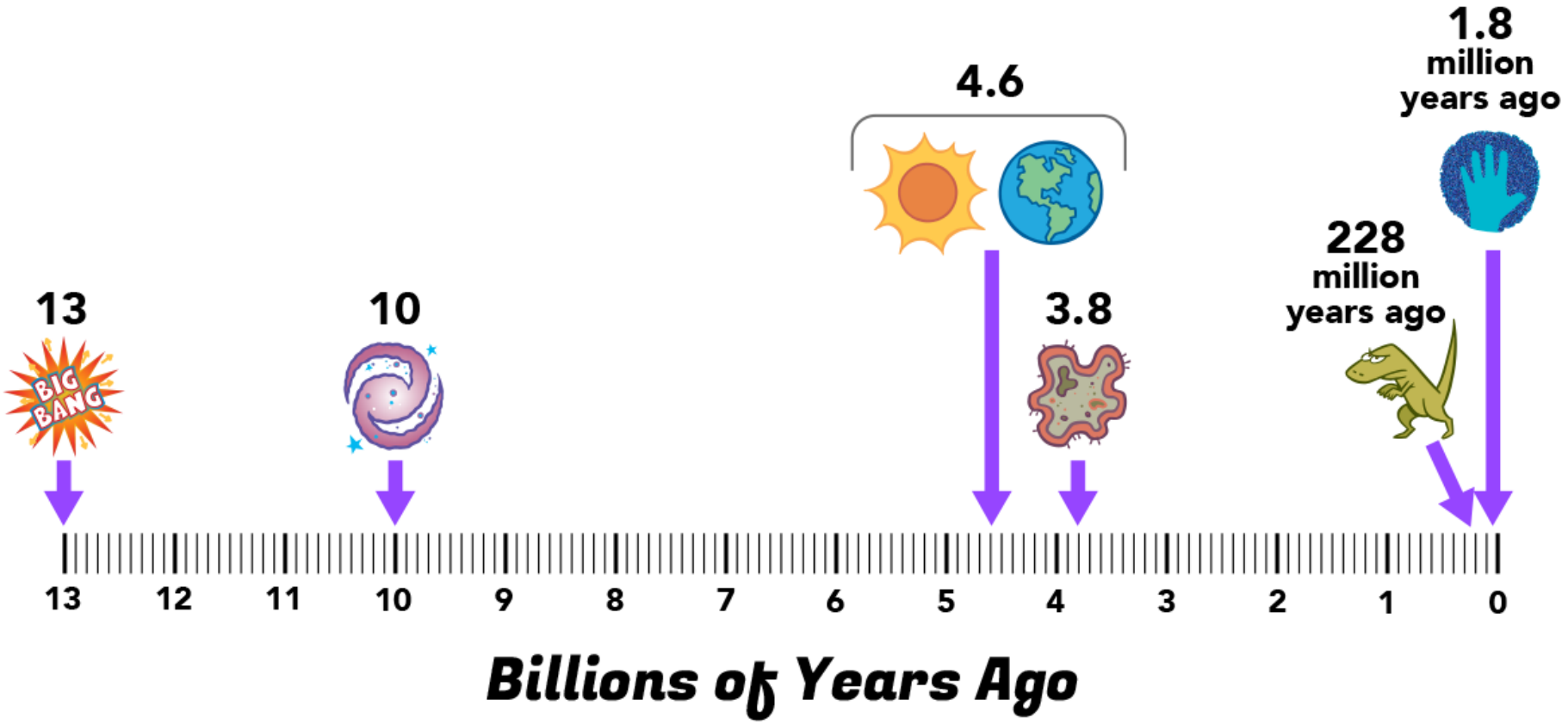


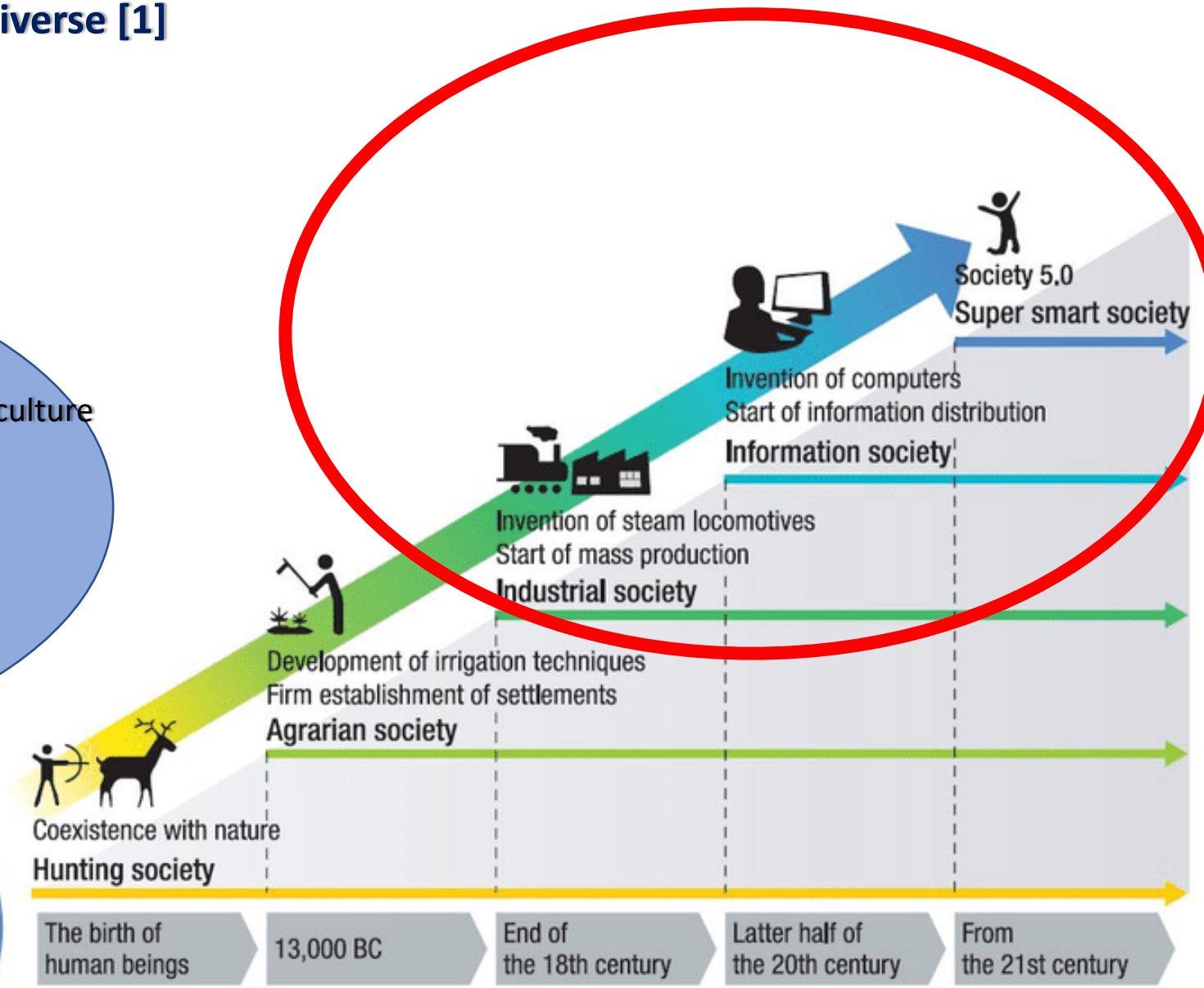
Image Credits:

Milky Way over Thailand, © Matipon Tangmatitham; Hubble at telescope, courtesy of NASA; George LeMaitre illustration by Amanda Duffy © AMNH; Icon illustrations by Daryl Collins © AMNH.

Timeline of the Universe [1]

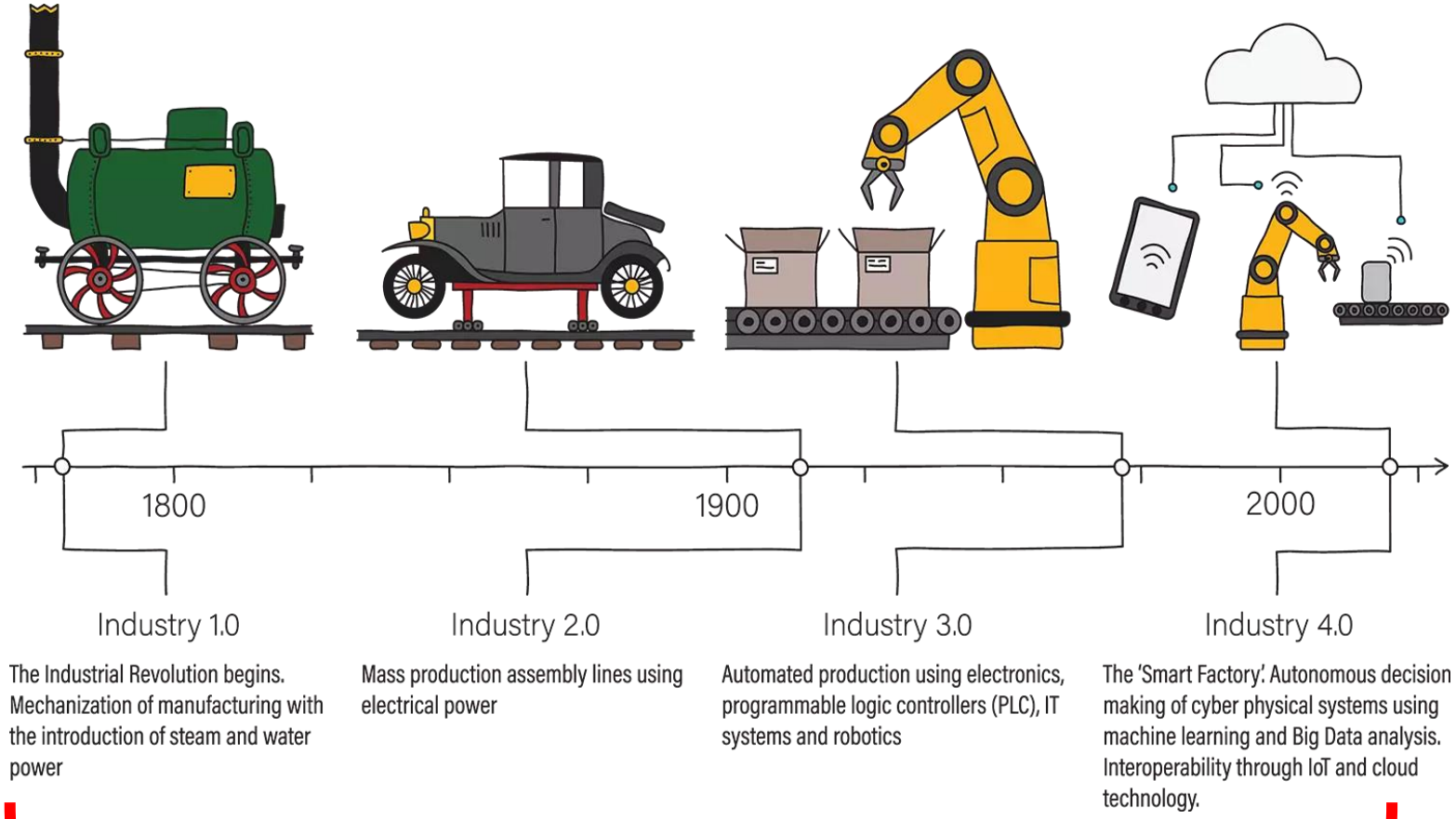
- ✓ - 13,5 ·10^9 years ⇨ The Big Bang
- ✓ - 4,5 ·10^9 years ⇨ Planet Earth
- ✓ - 3,8 ·10^9 years ⇨ Orgyearssms
- ✓ - 2,5 ·10^6 years ⇨ Genus Homo
- ✓ - 300.000 years ⇨ Fire
- ✓ - 70.000 years ⇨ Knowledge, fictional language
- ✓ - 12.000 years ⇨ Sapiens the only human species, Agriculture
- ✓ - 500 years ⇨ The Scientific Revolution
- ✓ - 250 years ⇨ First Industrial Revolution
- ✓ - 150 years ⇨ The Second Industrial Revolution
- ✓ - 50 years ⇨ The Third Industrial Revolution
- ✓ Now ⇨ The Fourth Industrial Revolution

Economic and social innovation by deepening of Society 5.0

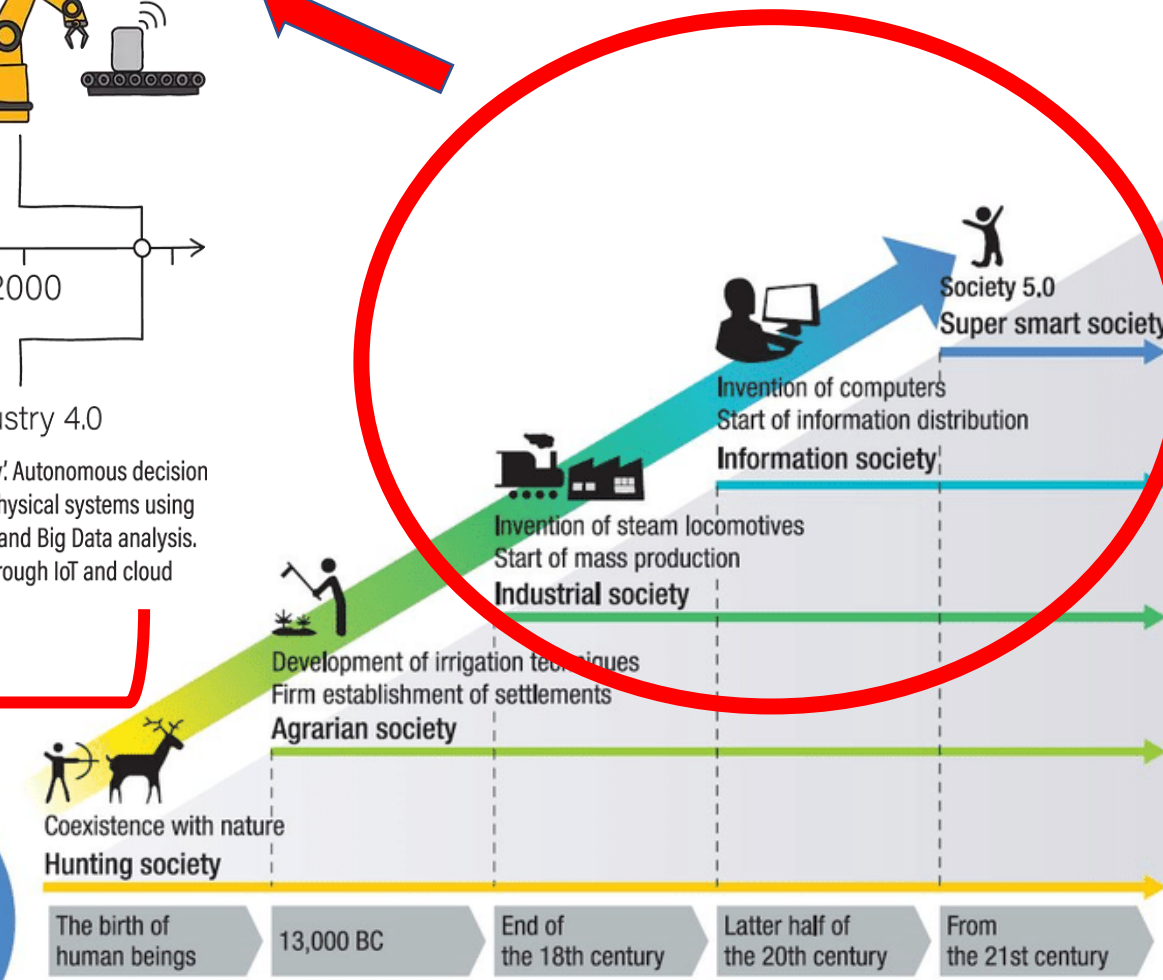


Source: Prepared by the author based on material from the Japan Business Federation (Keidanren) "Japan's initiatives — Society 5.0"; Y. Harayama, "Society 5.0: Aiming for a New Human-centered Society", Hitachi Review, vol. 66, no. 6, 2017, pp. 556–557

Source: https://www.simio.com/applications/industry-40/industrial-revolution-through-the-ages.php



Energy dependent

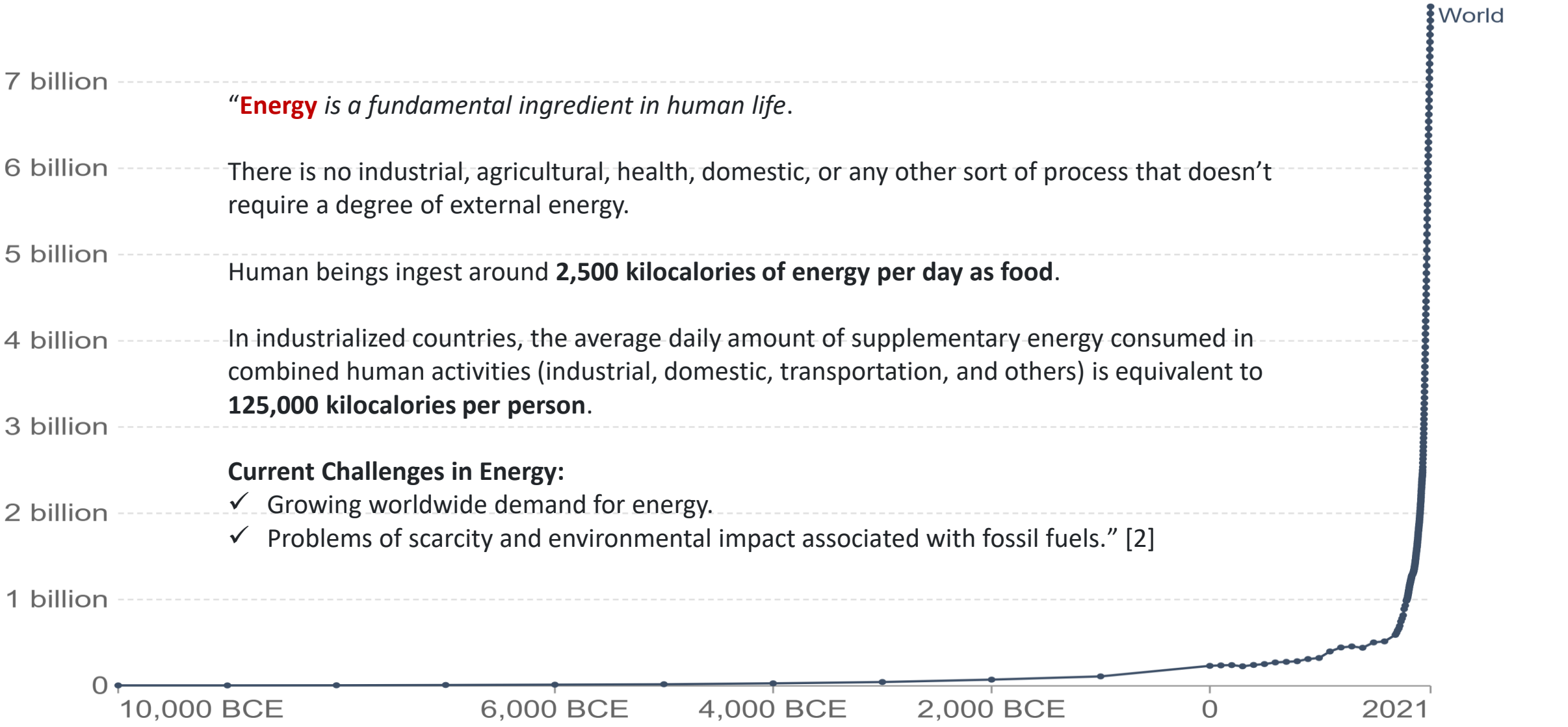


Economic and social innovation by deepening of Society 5.0

Source: Energy Information Administration (EIA), Energy Kid's page

Source: Prepared by the author based on material from the Japan Business Federation (Keidanren) "Japan's initiatives — Society 5.0"; Y. Harayama, "Society 5.0: Aiming for a New Human-centered Society", Hitachi Review, vol. 66, no. 6, 2017, pp. 556–557

Population, 10,000 BCE to 2021



"**Energy** *is a fundamental ingredient in human life*.

There is no industrial, agricultural, health, domestic, or any other sort of process that doesn't require a degree of external energy.

Human beings ingest around **2,500 kilocalories of energy per day as food**.

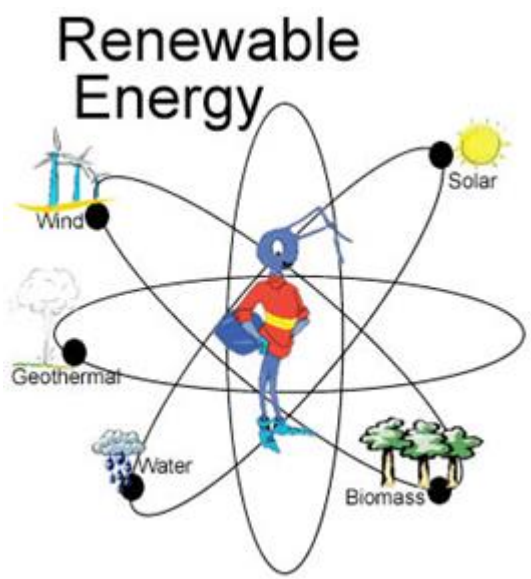
In industrialized countries, the average daily amount of supplementary energy consumed in combined human activities (industrial, domestic, transportation, and others) is equivalent to **125,000 kilocalories per person**.

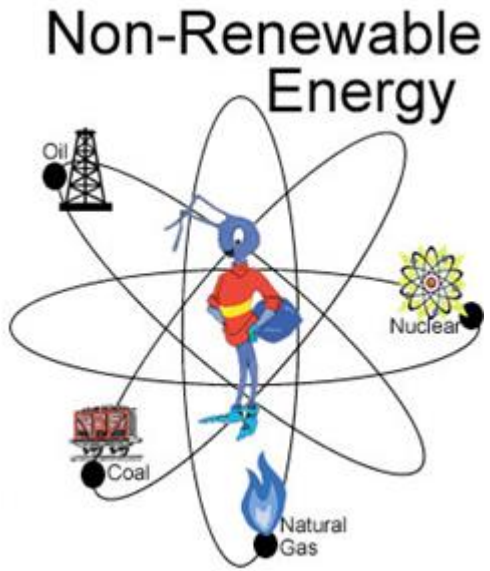
Current Challenges in Energy:

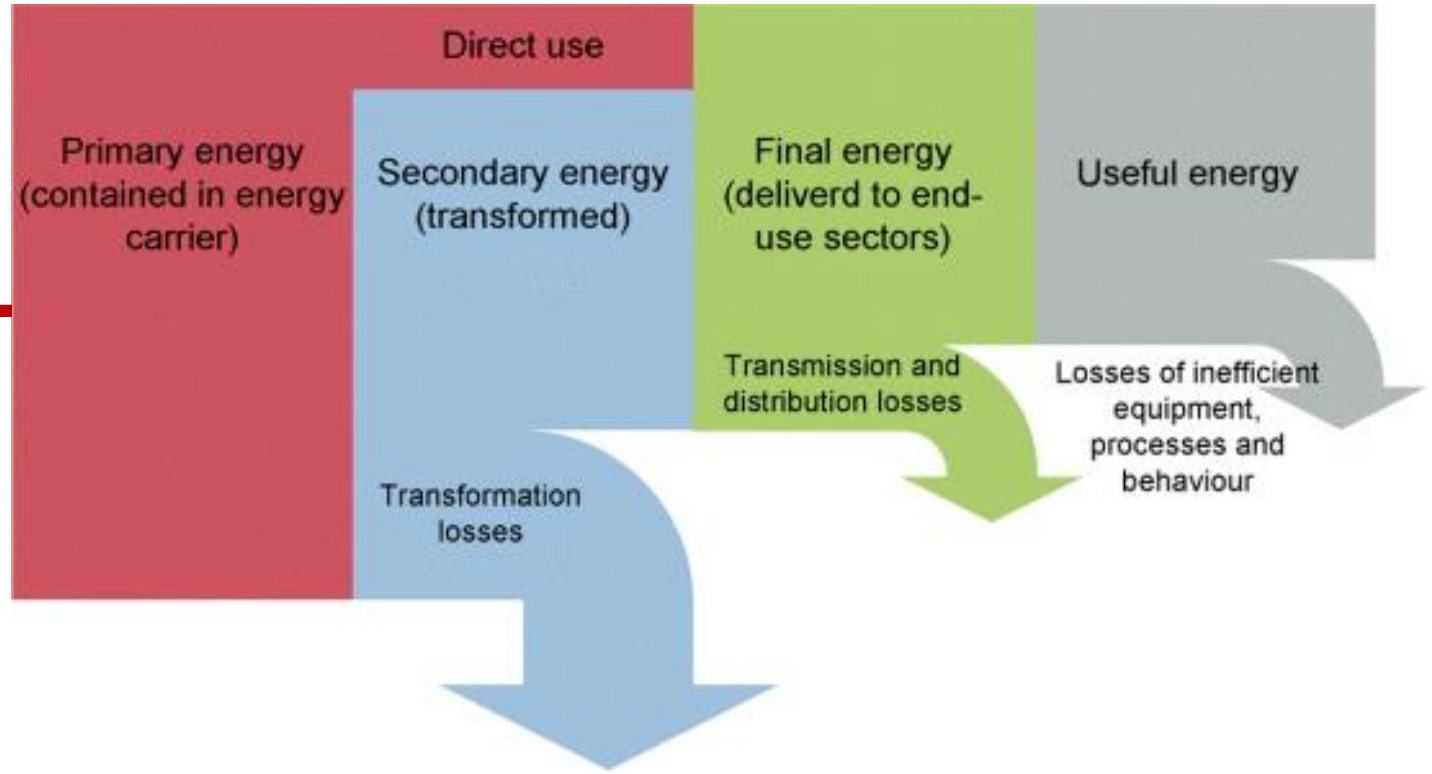
✓ Growing worldwide demand for energy.

✓ Problems of scarcity and environmental impact associated with fossil fuels." [2]

Source: Gapminder (v6), HYDE (v3.2), UN (2019)







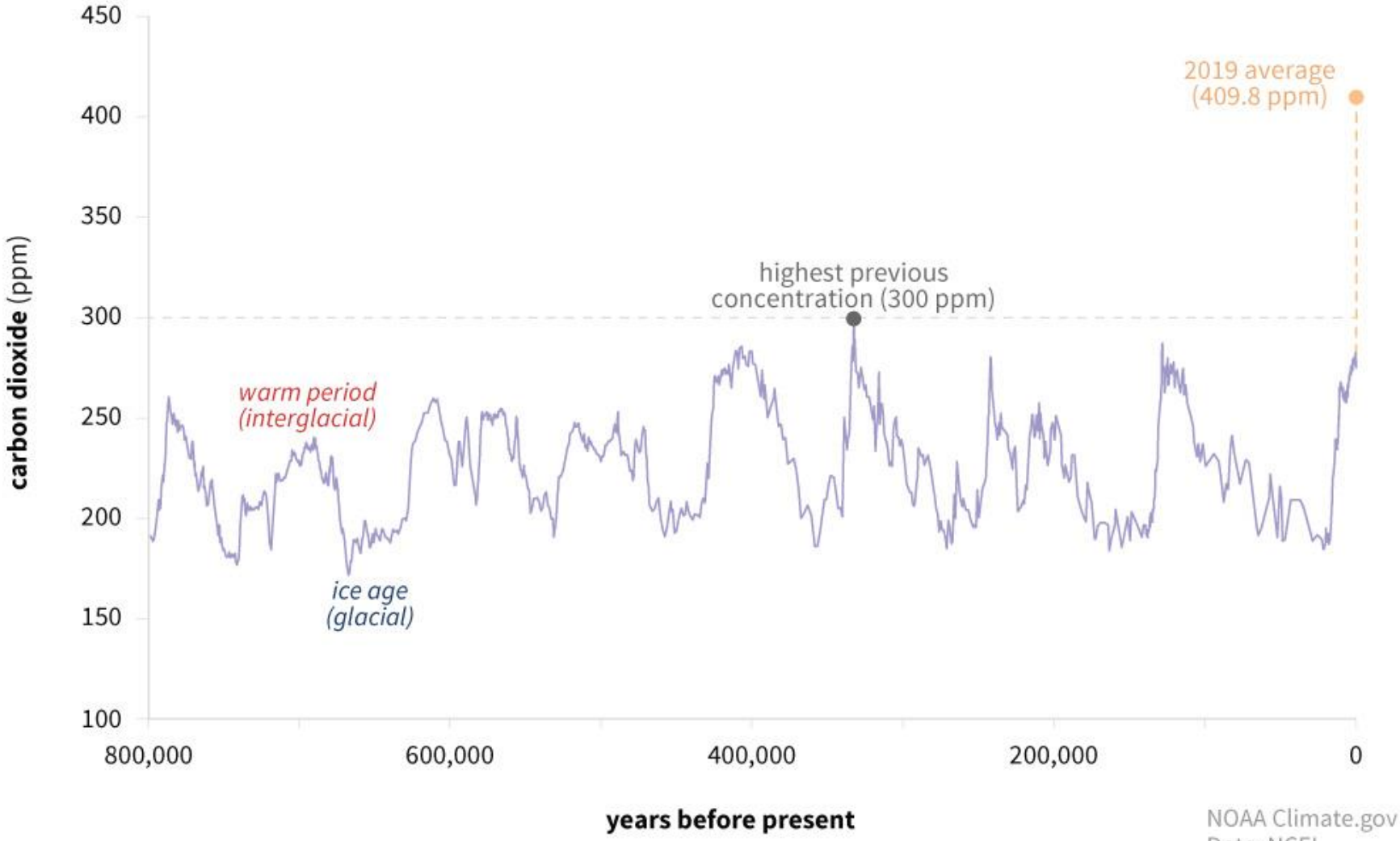
Source: V. Bukarica, S. Robić and Ž. Tomšić, "Securing energy supply by harnessing negajoules," *2011 8th International Conference on the European Energy Market (EEM)*, 2011, pp. 741-746

Source: Energy Information Administration (EIA), Energy Kid's page

Fossil fuels [3]

What Is the Greenhouse Effect? [4]

CARBON DIOXIDE OVER 800,000 YEARS



NOAA Climate.gov
Data: NCEI

“Climate change is already affecting the entire world, with extreme weather conditions such as drought, heat waves, heavy rain, floods and landslides becoming more frequent, including in Europe. Other consequences of the rapidly changing climate include rising sea levels, ocean acidification and loss of biodiversity.

In order to limit global warming to 1.5 degrees Celsius – a threshold the Intergovernmental Panel for Climate Change (IPCC) suggests is safe – **carbon neutrality by mid-21st century** is essential. This target is also laid down in the Paris agreement signed by 195 countries, including the EU.

In December 2019, the European Commission presented the European Green Deal, its flagship plan that aims to make Europe climate neutral by 2050. This target will be reached through the European Climate Law that sets climate neutrality into binding EU legislation.” [6]

“**What is carbon neutrality?**

Carbon neutrality means having a balance between emitting carbon and absorbing carbon from the atmosphere in carbon sinks. Removing carbon oxide from the atmosphere and then storing it is known as carbon sequestration. In order to achieve net zero emissions, all worldwide greenhouse gas (GHG) emissions will have to be counterbalanced by carbon sequestration.

Carbon sink is any system that absorbs more carbon than it emits. The main natural carbon sinks are soil, forests and oceans. According to estimates, natural sinks remove between 9.5 and 11 Gt of CO2 per year. Annual global CO2 emissions reached 38.0 Gt in 2019.” [6]

Using	Find	Choose	Prepare
Using the link bellow, check the causes, impacts and solutions regarding the climate change.	Find at least one consequence of global warming that you would not have attributed to this cause until now. Use the “Impact” page for this task.	Choose the solution that you consider the most effective in the fight against climate change from those available on the "Solutions" page and tell us how you can contribute to its implementation.	Prepare a short presentation about the above tasks to be shared with all participants.

Our planet, our future. Fighting climate change together [5]

References

1. Yuval Noah Harari, *Sapiens: A Brief History of Humankind* , Editura Polirom, Iași, 2017.
2. Cayetano López, *Frontiers of Knowledge. Current Challenges in Energy*, BBVA, 2008.
3. https://climatekids.nasa.gov/carbon/
4. https://climatekids.nasa.gov/greenhouse-effect/
5. https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide.
6. https://www.europarl.europa.eu/news/en/headlines/society/20190926STO62270/what-is-carbon-neutrality-and-how-can-it-be-achieved-by-2050.
7. https://ec.europa.eu/clima/sites/youth/node_en.