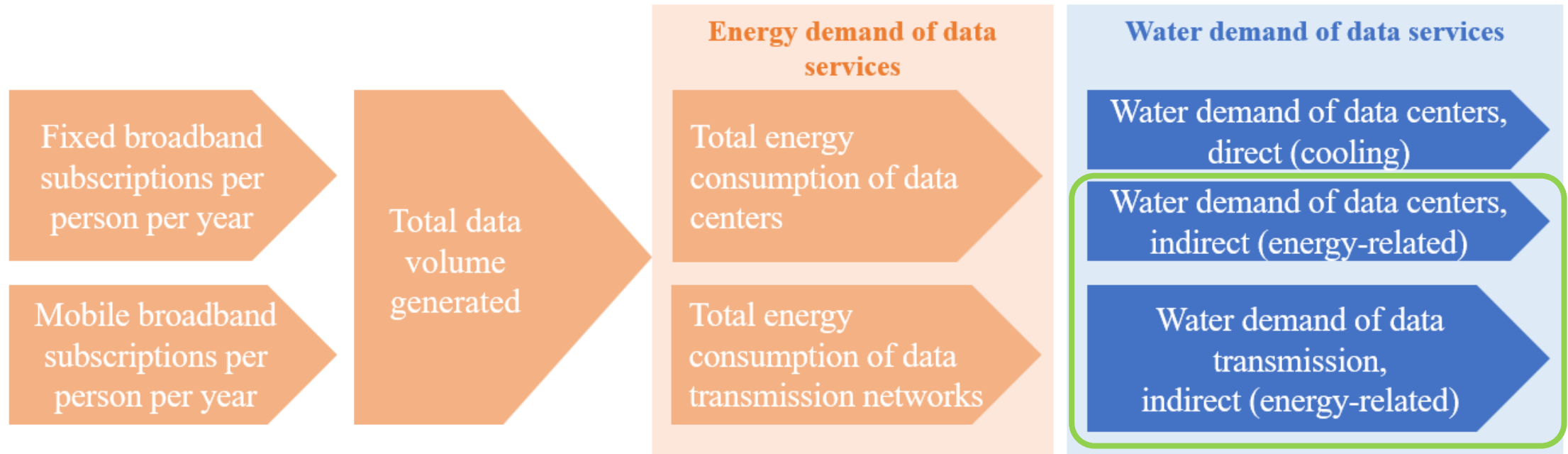




“Hidden” energy-related water footprint of data usage

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Water-energy-data nexus (I)



Scope of the study: OECD Europe, from 2016 to 2030

Water-energy-data nexus (II)

On the data user level

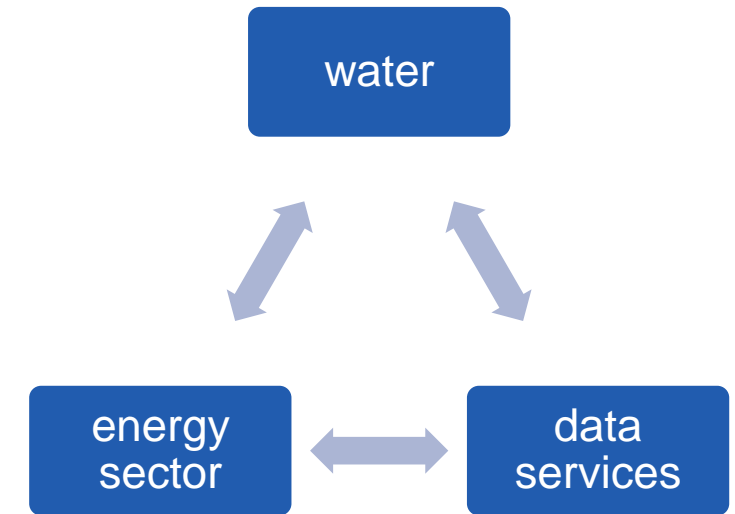
- The estimated energy consumption of a Google search query is 0.3 Wh ^[1]
- A single search using Chat GPT “consumes” three times more energy than a typical Google search ^[1]
- In 2020, OECD EU average monthly data usage was 10 GB per subscription^[2]

On the data center level

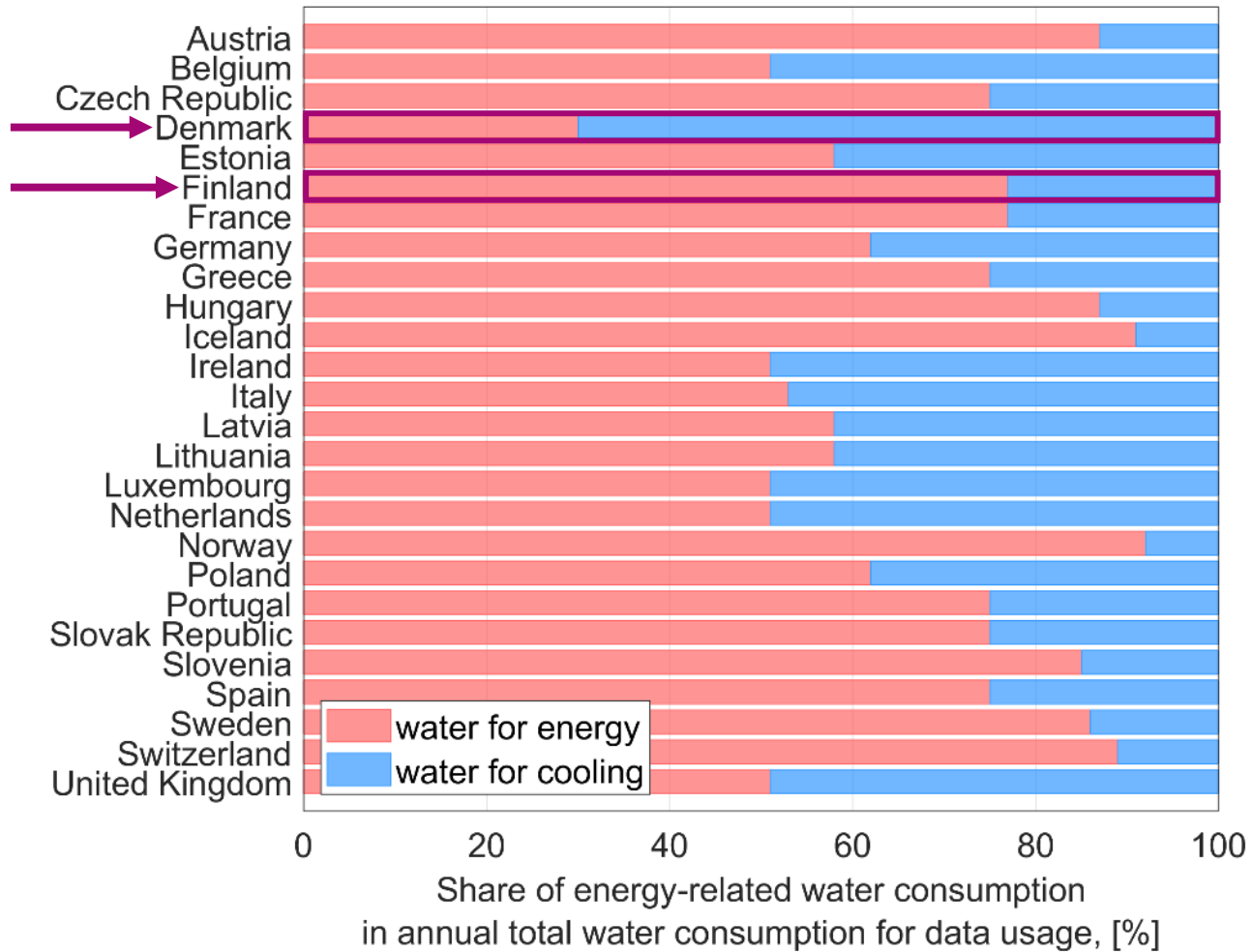
- About 0.3 kWh of electricity is used per GB of processed data (estimation for 2018)^[3]

On the energy system level

- On average, 3.74 m³ of water is used per MWh of generated electricity – global power system^[4]
- 3.9 m³ of water/MWh – Europe’s power system (average)^[4]



Influence of electricity mix on water demand for data usage



68% of the water footprint for data usage is energy-related (OECD EU average) [2]

Example countries with a similar number of subscriptions in 2022

54% of Denmark's generation is water-free **wind** [5]

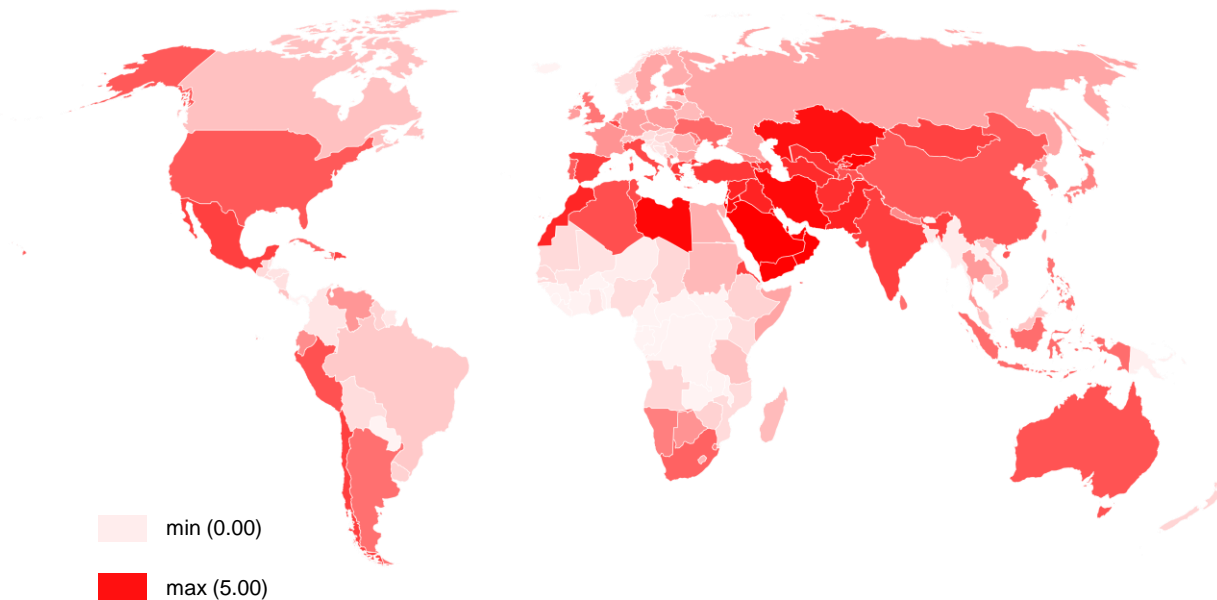
54% of Finland's generation is highly water-demanding **nuclear and hydro** [5]

Finland's total data usage requires **11 times more water** than Denmark's.

Competition for water resources

- By making our world more digitalised, we use more energy and, consequently, consume more water
 - Thus, creating even a higher competition for local water resources
- Climate change is water change, water resources are becoming more unreliable globally

Water stress score in 2020 ^[6]



Does that actually mean that we should stop using all energy-intensive technologies (including data services)?

Key insights and final remarks

- Depending on the country's electricity generation mix, the share of the energy-related water footprint can reach as high as 90% of the total water footprint of data usage
- The total water footprint can be considerably reduced as a result of the transition of the country's energy system to low-water-demanding technologies
- One possible solution: on-site generation from low-water-demanding renewables → solar PV and wind

Wrong strategy	Stop using all energy-intensive technologies (including data services)
Better strategy	Reshape the energy system



Thank you very much for your attention!

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