



More sustainable agriculture: Energy perspective



Lu Aye

Faculty of Engineering and Information Technology

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Acknowledgements

We recognise the importance of our relationship to the traditional owners of the land. I pay my respects to the traditional custodians of the land and extend that respect to other indigenous people.

Professor Dr I Nyoman Suprapta Winaya

Professor Dr Rajbir Singh



The University of Melbourne

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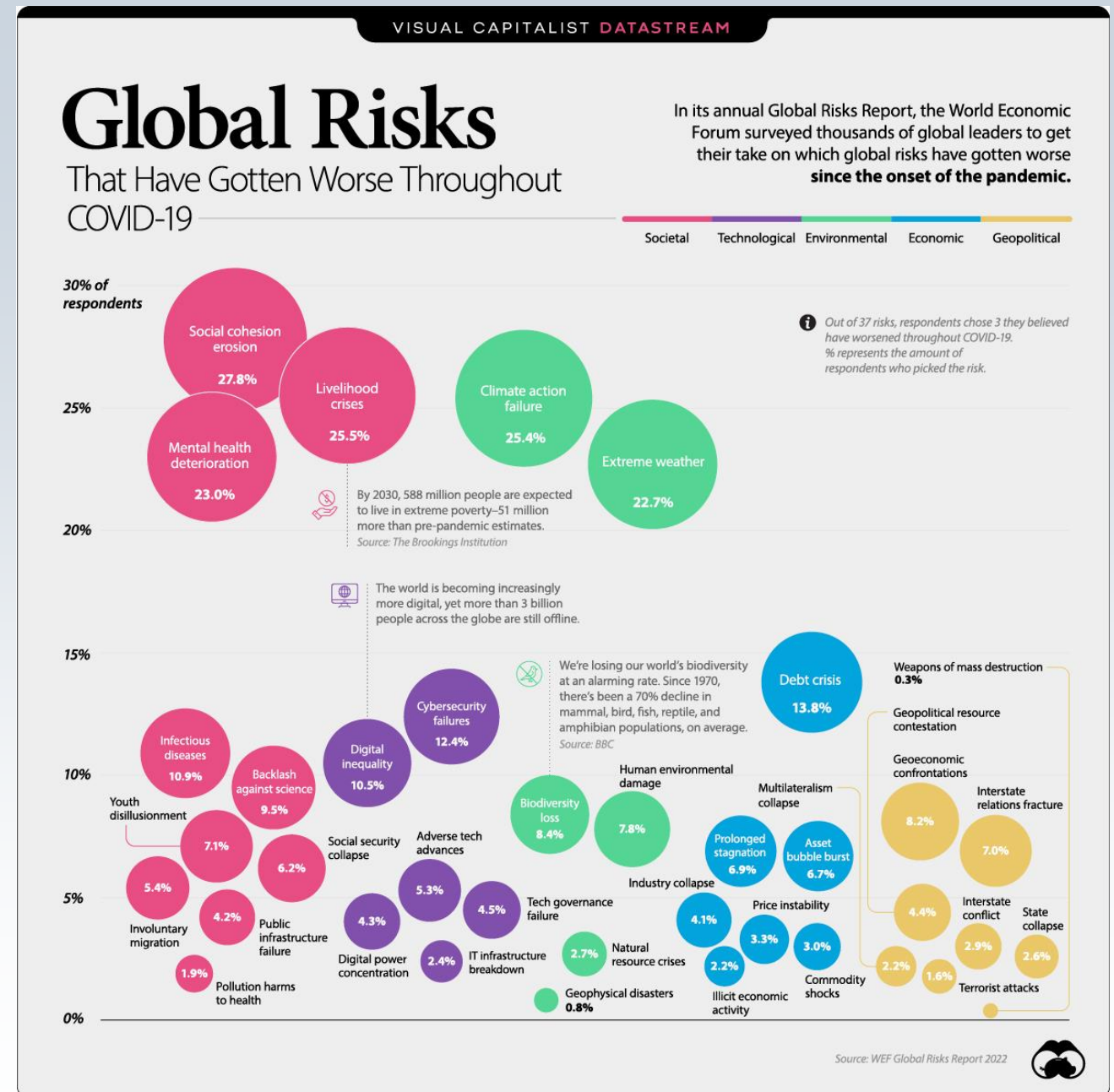
- FEIT 2025 Strategy: Powered by
 - ❑ People,
 - ❑ Places, and
 - ❑ Partners.

Build networks to extend our reach

We will develop a targeted, purposeful plan to strengthen and build our partnership networks with highly ranked institutions, industry leaders, governments and influential alumni to extend our reach and influence and strengthen our position as a trusted voice and partner.



<https://www.visualcapitalist.com/wp-content/uploads/2022/01/global-risks-covid-19-getting-worse.jpg>





Sustainable Agriculture

“Sustainable agriculture is farming in such a way to protect the environment, aid and expand natural resources and to make the best use of nonrenewable resources.” (USDA 2023)

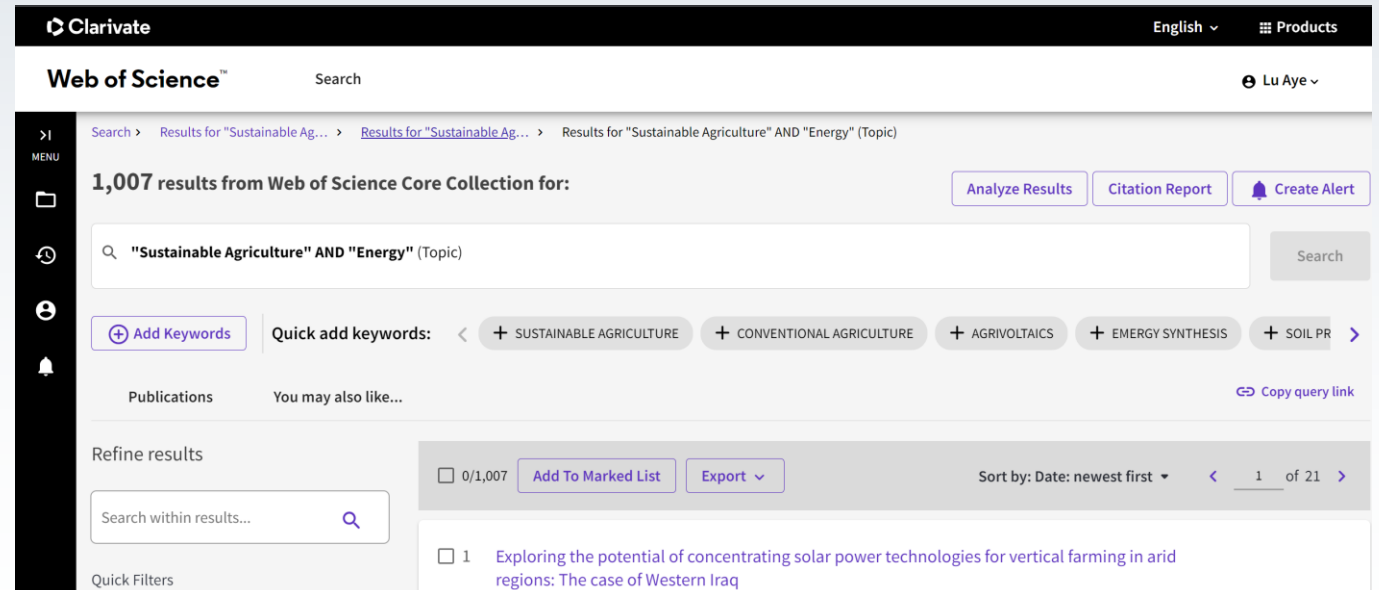
Legal definition ([U.S. Code Title 7, Section 3103](https://www.nal.usda.gov/farms-and-agricultural-production-systems/sustainable-agriculture)) may be found at <https://www.nal.usda.gov/farms-and-agricultural-production-systems/sustainable-agriculture>

Sustainable Agriculture & Energy Literature

Search in Web of Science (WoS) core collection

Search string: “sustainable agriculture” AND “energy”

Documents found --> 1,007



The screenshot shows the Web of Science search results page. The search string is "Sustainable Agriculture" AND "Energy" (Topic). The results show 1,007 documents from the Web of Science Core Collection. The page includes a search bar, a list of keywords, and a list of publications. The first publication is "Exploring the potential of concentrating solar power technologies for vertical farming in arid regions: The case of Western Iraq".

Clarivate English Products

Web of Science™ Search Lu Aye

Search > Results for "Sustainable Ag..." > Results for "Sustainable Ag..." > Results for "Sustainable Agriculture" AND "Energy" (Topic)

1,007 results from Web of Science Core Collection for:

Analyze Results Citation Report Create Alert

Q "Sustainable Agriculture" AND "Energy" (Topic) Search

+ Add Keywords Quick add keywords: < + SUSTAINABLE AGRICULTURE + CONVENTIONAL AGRICULTURE + AGRIVOLTAICS + ENERGY SYNTHESIS + SOIL PR >

Publications You may also like... Copy query link

Refine results

Search within results... Q

Quick Filters

0/1,007 Add To Marked List Export Sort by: Date: newest first < 1 of 21 >

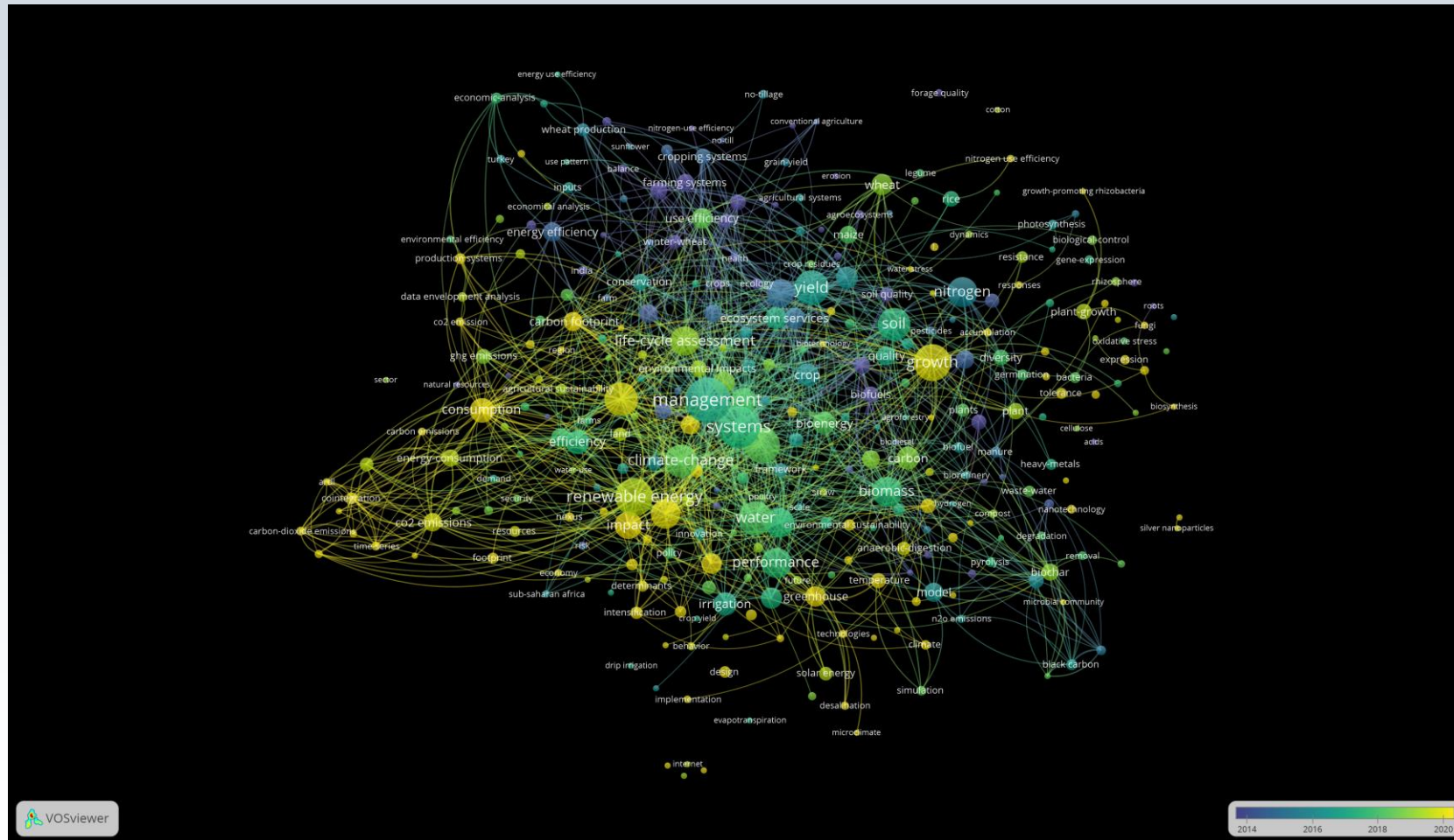
1 Exploring the potential of concentrating solar power technologies for vertical farming in arid regions: The case of Western Iraq

Keyword Occurrences

	Keyword	Occurrences	Total link strength
1.	management	76	489
2.	systems	67	411
3.	greenhouse-gas emissions	49	345
4.	yield	53	318
5.	life-cycle assessment	41	309
6.	renewable energy	59	299
7.	food security	54	292
8.	growth	57	290
9.	climate-change	48	285
10.	soil	48	283

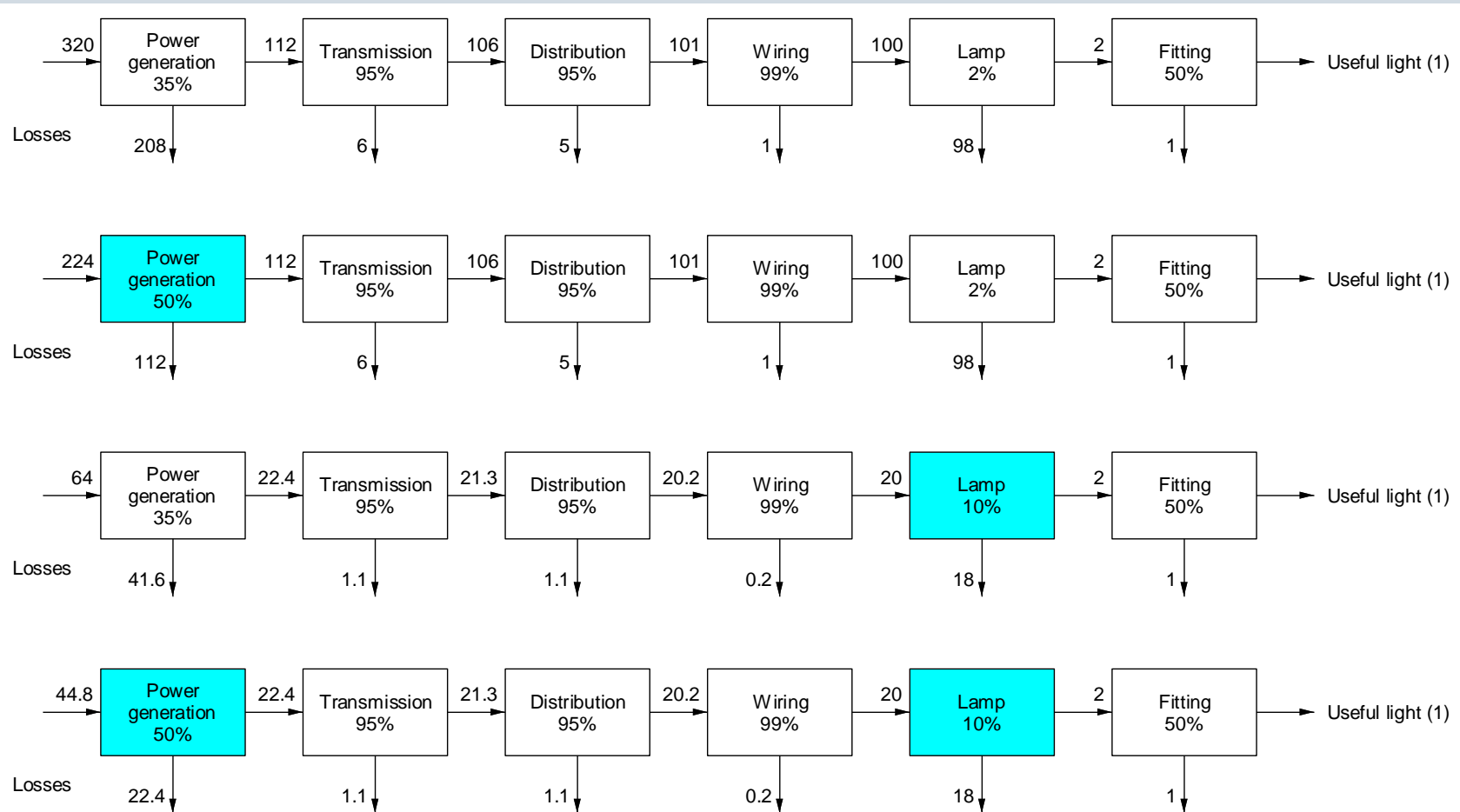


Overlay visualisation

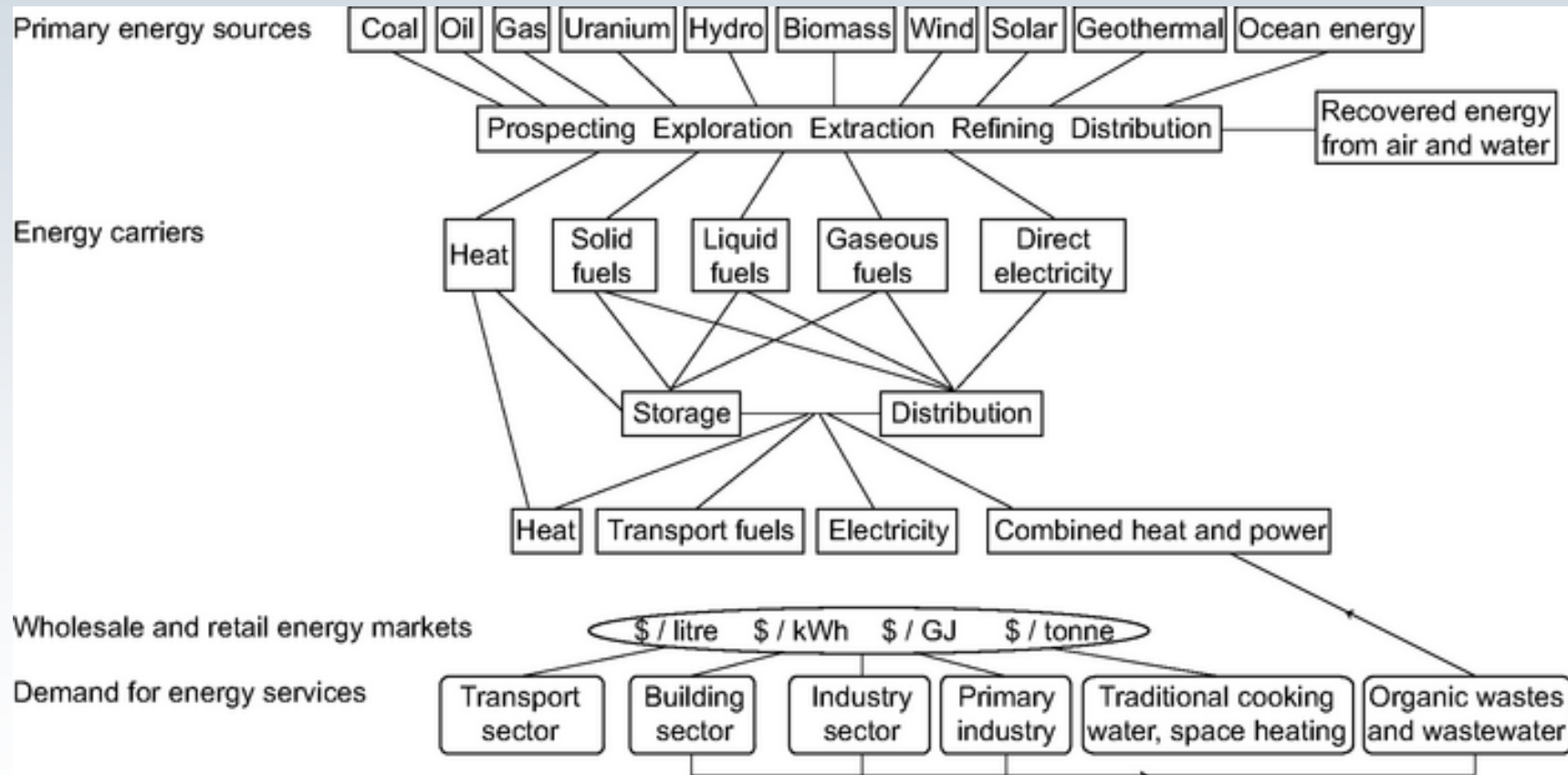




Primary energy to end-use, Supply and demand side technologies

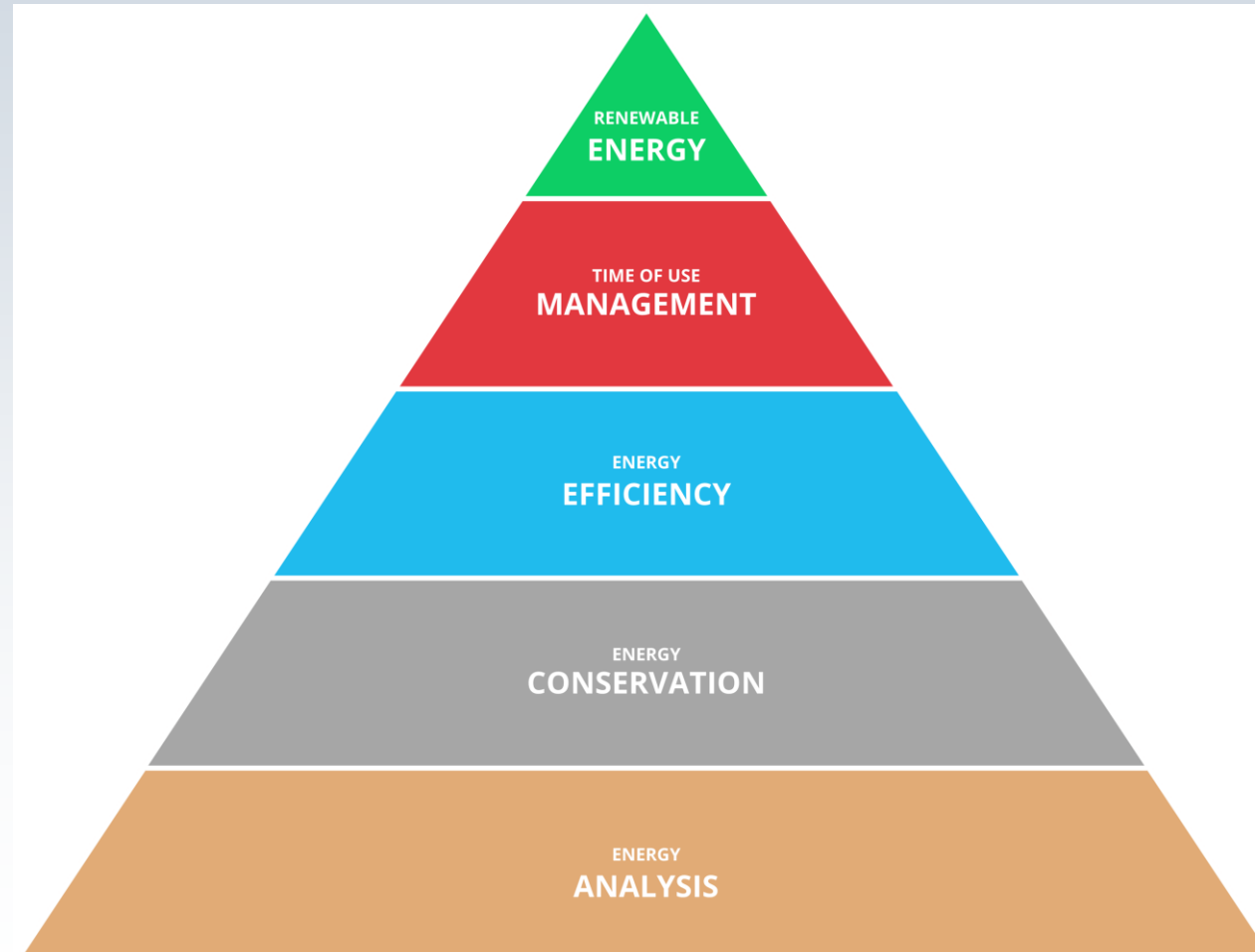


Primary Energy Sources to Energy Services (IPCC 2007)



Energy pyramid a decision-making tool

(https://extension.umd.edu/sites/extension.umd.edu/files/styles/optimized/public/2021-03/Energy_Hierarchy_upright.png?itok=33jl8EmH)





Extracts from US legal definition on Sustainable Agriculture

- An **integrated** system of **plant** and **animal production** practices having a site-specific application that will over the long-term:
 - ❑ Satisfy **human food** and **fiber** needs.
 - ❑ Enhance **environmental quality** and the **natural resource** base upon which the agriculture economy depends.
 - ❑ Make the **most efficient use of nonrenewable** resources and on-farm resources and **integrate**, where appropriate, **natural biological cycles** and controls.
 - ❑ Sustain the **economic viability** of farm operations.
 - ❑ Enhance the **quality of life** for farmers and society as a whole.

Conclusions

- Climate action failure and extreme weather were the two environmental global risks gotten worse since the onset of the pandemic.
- From energy perspective the most occurred top three keywords in the current literature for 'Sustainable Agriculture' are: management, systems, and greenhouse-gas emissions.
- Energy efficiency improvements in both supply side and demand side need to be considered before considering renewable energy technologies.
- Matching supply and demand of energy (e.g. quantity, quality, time of use) plays an important role.
- Low carbon solutions must sustain economically viability and enhance the quality of life for farmers and society.



Many thanks!

The End.

Contact: lua@unimelb.edu.au