

# A qualitative analysis of energy services and human need satisfaction

## Developing indicators for decoupling energy use from human need satisfaction

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The ambition of Goal 7 of the UN Sustainable Development Goals (SDG's) is to "ensure access to affordable, reliable, sustainable and modern energy for all". This sentence already concludes that energy and human well-being are related somehow. This relationship is very complex (Ortiz, Kuvers and Bluysen 2017) - especially if you include the driver greenhouse gas (GHG) emissions.



Figure 1: Sustainable Development Goals. Source: (United Nations General Assembly 2015)

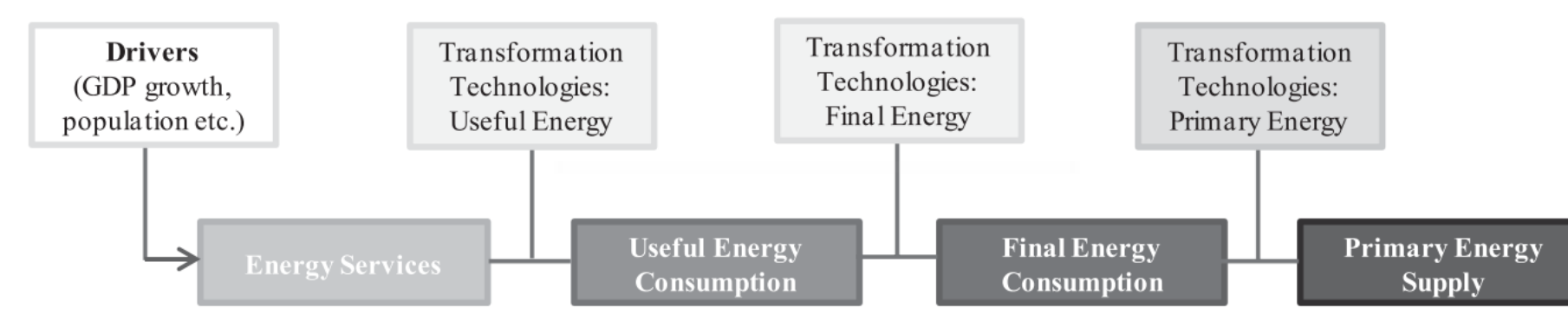


Figure 2: Structure of the energy chain. Source: Köppl et al. 2014

The link between the well-being of a person or country and the emissions generated through their energy consumption lies not in raw energy sources (primary energy) or even electricity (final energy) but in the service obtained from energy (Brand-Correa and Steinberger, 2017; Lamb and Steinberger, 2017; Figure 2).

Fell 2017: "energy services are those functions performed using energy which are means to obtain or facilitate desired end services or states."

We experience already, that climate change threatens human well-being, and not only through catastrophic events and impacts today but also "spatially across the world, and temporally into the future including the far future" (Gough, 2015, p. 1).

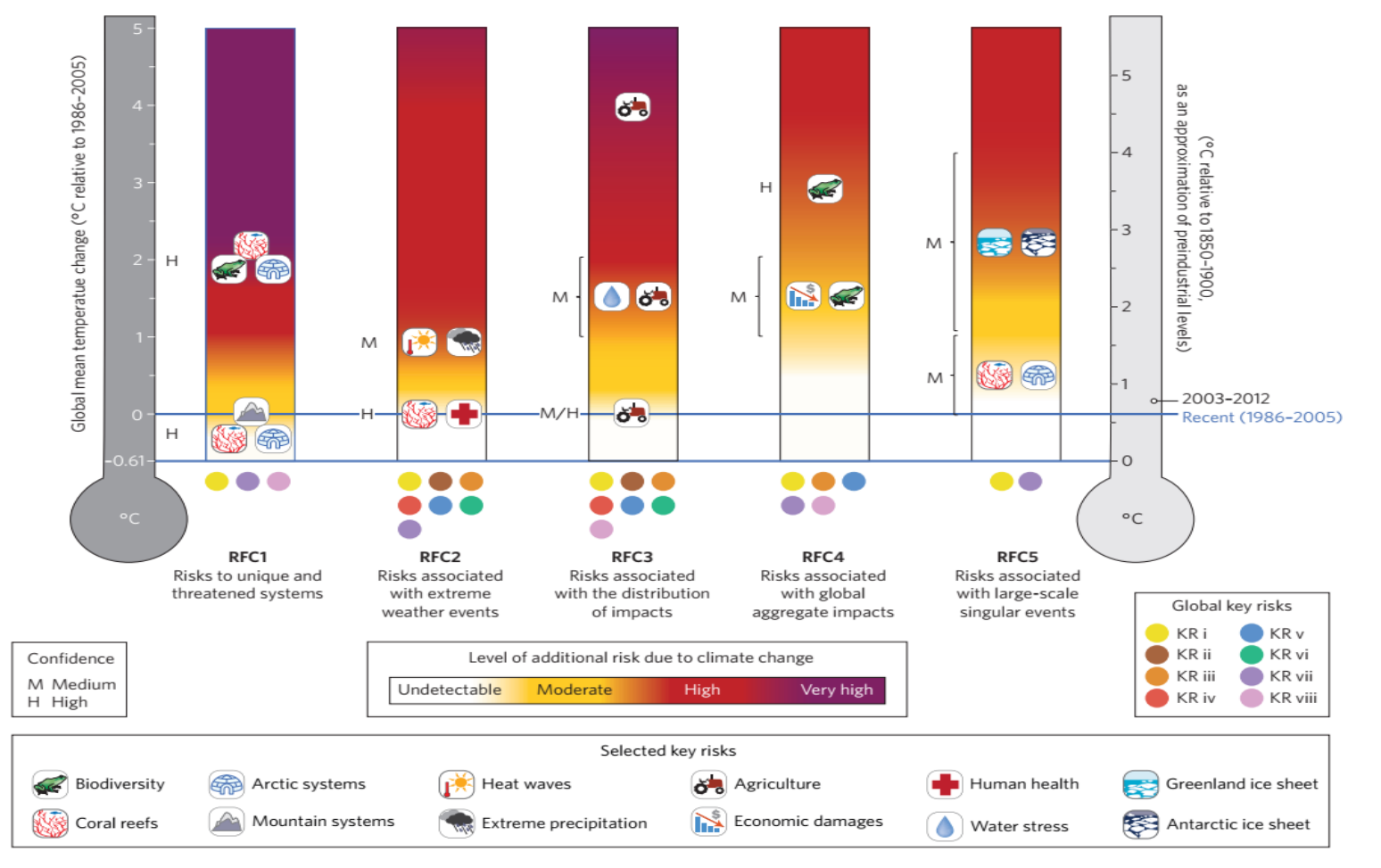
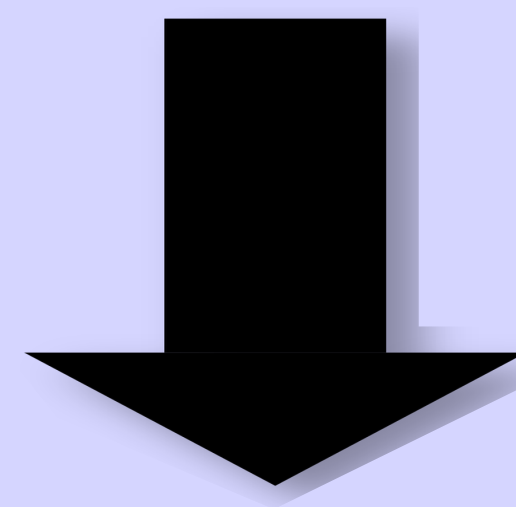


Figure 3: The enhanced burning embers diagram, providing a global perspective on climate-related risks. Source: O'Neill et al. (2017)



How can energy use, GHG emissions and human well-being be interlinked conceptually?

Which indicators can be used to measure these interlinkages?

What is the role of new technologies in the context of decoupling human well-being from GHG emissions?

### Method

First, to address this questions a literature research to provide an overview of different conceptual approaches of human well-being is done. The task to establish indicators to link well-being and GHG emissions will be approached through semi-structured expert interviews. The questions are developed according to theoretical considerations, based on the previously done literature research. The questions are worded in an open way during the interview and should enhance the participants to narrate openly. The interviewees are stakeholder from science, policy, private sector, non-governmental organisations, governmental institutions and practice (Figure 4).

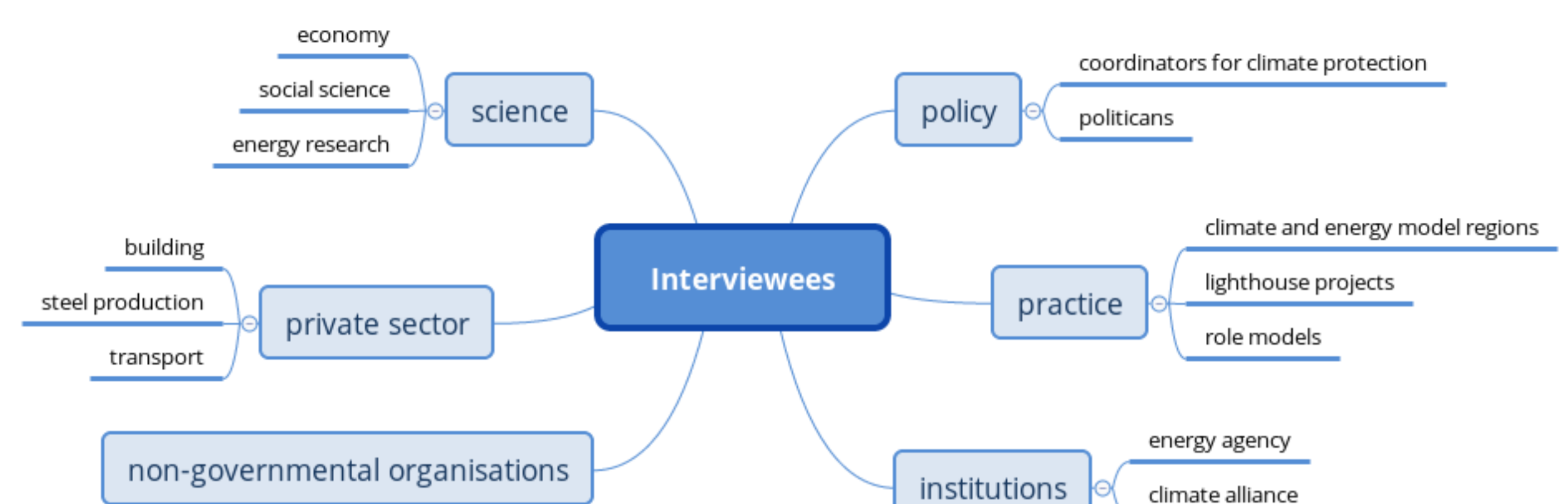


Figure 4: Cluster of the interviewees. Own visualization

### Preliminary Results

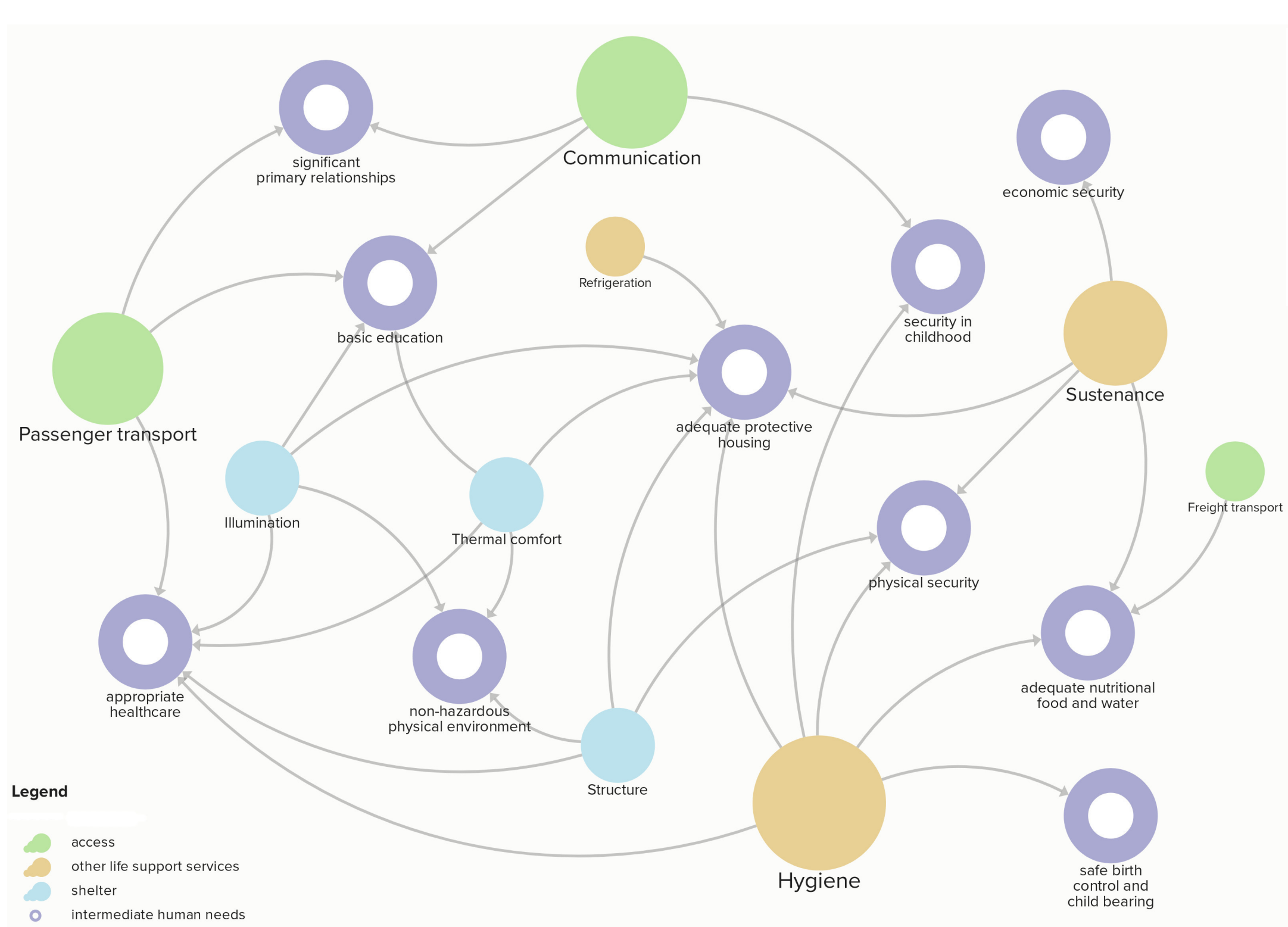


Figure 5: Mapping energy services to the intermediate needs given by Gough (2015). Source: own visualization

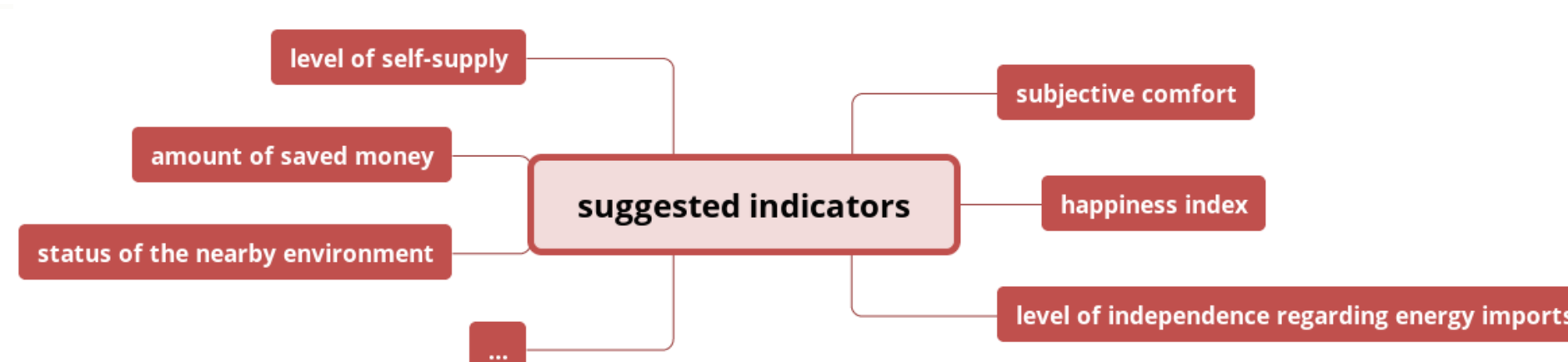


Figure 6: Indicators suggested by experts in the expert interview. Source: own visualization

The expert interviews conducted so far show the considerations of the interviewees align with the concept of energy services as linking point between the energy chain and human well-being. Nevertheless, some interviewees argue for a more broad linking. One argument given during the interview is, that without a direct connection to the primary energy form sustainable resource use is not achievable.

Brand-Correa LI, Steinberger JK (2017) A Framework for Decoupling Human Need Satisfaction From Energy Use. *Ecol Econ* 141:43-52. doi: 10.1016/j.ecolecon.2017.05.019  
 Fell, M. J. (2017) 'Energy services: A conceptual review', *Energy Research and Social Science*. Elsevier Ltd, 27, pp. 129-140. doi: 10.1016/j.erss.2017.02.010.  
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 O'Neill BC, Oppenheimer M, Warren R, et al (2017) IPCC reasons for concern regarding climate change risks. *Nat Clim Chang* 7:28-37. doi: 10.1038/nclimate3179  
 Ortiz MA, Kuvers SR, Bluysen PM (2017) A review of comfort, health, and energy use: Understanding daily energy use and well-being for the development of a new approach to study comfort. *Energy Build.* 152:323-335  
 United Nations General Assembly (2015) Transforming our world: The 2030 agenda for sustainable development. <https://sustainabledevelopment.un.org/content/documents/7891Transforming%20Our%20World.pdf> 1-5. doi: 10.1007/s13398-014-0173-7.2