

# Synergies and trade-offs between energy and the SDGs

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# **KTH Climate Action Centre**

**Vision:** A world with net zero carbon emission, and climate resilient and sustainable societies

### Mission:

- For KTH to become a leader university in transdisciplinary climate action research and education
- To engage all KTH students in climate and sustainability projects
- To support the national-level achievement of climate action goals in Sweden and abroad
- To foster innovation with the private sector to address climate action







### **GLOBAL GOALS IN PRACTICE**





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#### Mapping synergies and trade-offs between energy and the Sustainable Development Goals

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The 2030 Agenda for Sustainable Development—including 17 interconnected Sustainable Development Goals (SDGs) and 169 targets—is a global plan of action for people, planet and prosperity. SDG7 calls for action to ensure access to affordable, reliable, sustainable and modern energy for all. Here we characterize synergies and trade-offs between efforts to achieve SDG7 and delivery of the 2030 Agenda as a whole. We identify 113 targets requiring actions to change energy systems, and published evidence of relationships between 143 targets (143 synergies, 65 trade-offs) and efforts to achieve SDG7. Synergies and trade-offs exist in three key domains, where decisions about SDG7 affect humanity's ability to: realize aspirations of greater welfare and well-being; build physical and social infrastructures for sustainable development; and achieve sustainable management of the natural environment. There is an urgent need to better organize, connect and extend this evidence, to help all actors work together to achieve sustainable development.



		A: Does the	B: Is there published evidence of synergies and trade-offs between the Target and decisions in pursuit of SDG7? SYNERGY with SDG7 TRADE- OFF with SDG7			KEY EVIDENCE DOMAIN(S)			
	GOAL OR TARGET IN THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT	target require certain actions in relation to energy systems?			REASONING	Individual and collective aspirations of greater welfare and wellbeing	Infrastructure for sustainable development	Environment and natural resources	SAMPLE REFERENCES
Goal 1:	End poverty in all its forms everywhere		1					,	
1,1	By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day				(A) Target calls for certain changes (poverty eradication) in relation to energy systems. (B) Evidence that eradicating poverty will need to be supported by the provision of access to modern energy services for all people; proven interlinkages between energy access, living standards and income. Renewable energy and efficient appliances could support the creation of new jobs and the provision of those services. There are limited potential trade-offs with Targets 7.2 and 7.3 depending on how the energy services for eradicating poverty are provided (e.g. with little renewable energy sources, or unefficient energy appliances).				<ol> <li>Willcox, M. et al. Utilising Electricity Access for Poverty Reduction (Practical Action Consulting, 2015).</li> <li>Practical Action. Poor People's Energy Outlook (Practical Action, 2014).</li> <li>Guruswamy, L. Interational Energy and Poverty: the emerging contours (Routledge, 2016).</li> </ol>
1,2	By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions				As 1.1.				(1) Hussein, M.A. & Filho, W.L. Analysis of energy as a precondition for improvement of living conditions and poverty reduction in Sub-Saharan Africa. <i>Scientific Research and Essays</i> <b>7(30)</b> , 2656-2666 (2012).
1,3	Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable				(B) Evidence that social protection measures can include also protection on energy access, such as social tariffs and measures to prevent consumers from disconnection from electricity and heating services.				(1) Dobbin, A., Fuso Nerini, F. & Pye, S. Measures to protect vulnerable consumers in the energy sector: an assessment of disconnection safeguards, social tariffs and financial transfer. Policy Report (INSIGHT_E, 2016).
1,4	By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance				(A) Target calls for access to basic services, which includes electricity, and to appropriate technology which encompasses off-grid energy solutions for off-grid populations; (B) Evidence that access to economic resources impacts on the rates of electrification and the ability of people to access energy (whether via grid or otherwise).				<ol> <li>Power for All. The Energy Access Imperative. http://www.energynet.co.uk/webfm_send/1716 (2014).</li> <li>IFAD. What works for gender equality and women's empowerment - a review of practices and results. https://www.ifad.org/documents/10180/229358bf-f165-4dcd- 9c4a-1af4f09ab065 (2017).</li> </ol>
1,5	By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters				(A) Target calls for changes to energy systems to make them more reliable in the face of a changing climate. (B) Evidence on the need of energy infrastructure for protection from extreme events and for supporting energy services in disaster situations. However that infrastructure could either have synergies with certain Targets of SDG7 (e.g. 7.1) or trade-offs (e.g. the infrastructure could be based on fossil fuels back up technologies, that would have trade-offs with 7.2)				<ol> <li>World Health Organization. Energy access and resilience. http://www.who.int/sustainable-development/health-sector/health-risks/energy- access/en/ (2017).</li> <li>Perera,N., Boyd, E., Wilkins, G. &amp; Itty R.P. <i>Literature Review on Energy Access and</i> <i>Adaptation to Climate Change</i>. UK Department for International Development (DFID) Adaptation Knowledge and Tools, Evidence on Demand (2015).</li> </ol>

### **B: SYNERGIES AND TRADE-OFFS WITH SDG7**





### 65 TRADE-OFFS

WELLFARE AND WELLBEING	Potential trade-offs with <b>local</b> communities from renewable energy projects (e.g. hydro, biomass)
INFRASTRUCTURES	<b>Large infrastructure</b> projects can have impacts on achieving several other SDGs
ENVIRONMENT	Energy services for all by 2030 can impact <b>climate change and</b> local pollution





# FROM GLOBAL INTERLINKAGES TO PROJECTS AND POLICY DESIGN

#### **REFERENCES:**

- Castor, J.; Bacha, K.; Fuso Nerini, F. SDGs in action: A novel framework for assessing energy projects against the sustainable development goals. Energy Res. Soc. Sci. 2020, 68, 101556.
- Leite de Almeida, C.M.; Bergqvist, E.; Thacker, S.; Fuso Nerini, F. Actions to Align Energy Projects With the Sustainable Development Goals. Discov. Sustain. 2021, 2, 16.
- Tool also downloadable at: https://github.com/KTH-dESA/SDGs-IAE-Framework





Source: Hacking, T. Proj. Apprais. 2019, 37, 2–16.



### FRAMEWORK DEVELOPMENT

1. LITERATURE ON GLOBAL INTERLINKAGES BETWEEN ENERGY PROJECTS AND SDGs OUTCOMES

2. CREATION ON QUESTIONAIRE BASED ON THAT KNOWLEDGE

3. FRAMEWORK AND APPLICATION





# **CASE STUDY:**

# **GRAND ETHIOPIAN RENAISSANCE DAM**



### THE GRAND ETHIOPIAN RENAISSANCE DAM



- 6,000 MW capacity hydropower project
- Ethiopia's plan for green growth and clean energy
- Expands electricity access

### Controversial

- Water-rights in the region- conflict with Egypt
- Community re-location- approximately 20,000 people
- General lack of transparency

**Sources**: [1] Dessu S B and Abtew W 2019 *The Grand Ethiopian Renaissance Dam on the Blue Nile* (Springer Geography) [2] El-Nashar W Y and Elyamany A H 2018 Managing risks of the Grand Ethiopian Renaissance Dam on Egypt *Ain Shams Eng. J.* **9** 2383–8 Online: <u>https://doi.org/10.1016/j.asej.2017.06.004</u> [3] Chen H and Swain A 2014 The Grand Ethiopian Renaissance Dam: Evaluating Its Sustainability Standard and Geopolitical Significance *Energy Dev. Front.* **3** 11–9 Online: https://www.researchgate.net/publication/267328233











### THANK YOU!

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