White Paper on “Planet of the Humans”

Contributors: *(alphabetically)*

- Asma Rouabhia
- Beniamin Strzelecki
- Bima Surya
- Birendra Rai
- Chiagozie Udeh
- Ebrahima M Boye
- Esther Wanza
- Jorge R. Martínez Pérez Tejada
- Joyce Mendez
- Juan Ignacio Arroyo
- Lennart Tiller
- Mauricio Trujillo
- Mohammad Rahman
- Paola Flores
- Pranav Sinha
- Prudence Lihabi
- Rind Alhage
- Sajith Wijesuriya

The white paper is a collaborative work and in its entirety, it does not reflect views of any individual contributor.

Introduction

The documentary “Planet of the Humans” has gained a lot of attention from the international audience and as SDG7 Youth Constituency, we believe that it is important for us to issue a statement that will reach wide audience, in particular youth, to inform their judgement on facts and opinions presented in the movie.

We acknowledge that there are many complexities involved with energy transition and deployment of renewable energy systems (RES). In particular, it is important to consider the life-cycle impact and the energy returned on energy invested (ERoEI) of RES. Moreover, there are many concerns related to the use of biomass. Lastly, demand management and, potentially, reducing economic growth should be considered as to limit the anthropogenic greenhouse gases emissions. Yet, we need to acknowledge that people have the right to access to electricity, health care, education and better quality of life and energy is needed for all of these.

Many of the claims presented in the movie are outdated and inaccurate and their use raises serious concerns regarding the legitimacy of the production. Below, we are presenting the best scientific data that address concerns outlined above. In particular, we believe that there exist many solutions for ensuring sustainable energy for all and many more are under development. We need to be taking action in the face of the climate crisis rather than subscribing to the doomism presented in the movie.

Statement

Life cycle analysis and environmental impacts of renewable energy systems

When we watch a visual presentation related to a certain global issue, may it be a movie, a documentary, a podcast or a similar medium, one must make sure that it presents the latest available data. For the case of renewable energy systems, there are many relevant sources such as International Renewable Energy Agency (IRENA), Sustainable Energy for All(SEforAll), International Energy Agency (IEA)[2], member state databases, academic journals and other such entities who keep verified data. To assess the life-time environmental impact of RES, life-cycle analysis is an accepted methodology . According to different peer reviewed literature and case studies the following conclusions emerge:

- Life-cycle GHG emissions of coal, oil, and gas energy generation exceeds the emissions of renewable energy sources
- There are many studies that confirm these findings for different types of REsources such as hydro, solar, wind, geothermal, waves etc.
- One aspect that agrees with the movie based on published literature is that the GHG impact of construction of renewable energy generation plants per kWh is higher than that for fossil fuels plants
- There are certain environmental impacts of the RES, such as:
    - PV panels require rare earth elements that come from mining
    - Wind farms cause harm to birds

but there are solutions being developed to limit these impacts

Moving forward, it is important that solutions are being developed to reduce the environmental impact of RES.

- For the solar energy systems: important that we think about the raw materials, think of recyclable resources. Innovative findings on using alternative resources.
- For wind energy system: Make it less harmful by design but much noise pollution
- For geothermal energy systems: Mostly located in remote and sensitive ecological areas, so project developers must take this into account in their planning processesGeneral: High spatial requirements driven by low power densities are one of the most weaknesses of renewables. This higher spatial requirement makes humans occupy more space and intervene more ecosystems to deliver the same energy.

There should be continued study and research on the environmental impacts of RES and education programs to make the public aware of those. There are solutions being investigated to minimize the environmental impact by introducing sustainable construction principle, which is consist of protecting the natural environment, reducing waste and using recyclable resources to construct the components and system of the renewable energy generation units like solar panels, wind turbines, geothermal and power stations Furthermore, the technology transfer and facilitation is required to support member states to implement best practices to minimize the environmental impact.

Energy returned for energy invested in renewable energy systems

Energy returned on energy invested (ERoEI) is the ratio of energy that comes out of the plant compared to the energy that was put into constructing and running it. The following findings emerge from research:

- In the past ERoEI for RES was worse than for fossil fuels power generation systems but as there is a transition to tar and shale, this relationship does not hold anymore.
- Among RES, hydropower has the highest ERoEI

Levelized cost of energy (LCoE) is the total monetary cost of producing the energy from "cradle to grave" and it is another important aspect when determining the choice of energy system to be deployed. In this regard, the falling prices of RES have made them the most competitive energy source. Having this in mind, RES are particularly attractive in places where high up-front costs of conventional power plants are barriers to energy access. Moreover:

- Fossil fuels impact morbidity and mortality which in turn drive the willingness to accept renewables up
- One of the crucial elements of deployment of RE is availability of finance and there are numerous existing channels to finance them

Feasibility of biomass as a renewable energy source

Biomass can be utilised to generate electricity or make fuels for cooking.Use of biomass as a renewable energy source is a practice that generates many controversies. There are both advantages and disadvantages to its use, and the environmental impacts should be thoroughly considered. Some materials, like briquettes, are expensive, while others are available only seasonally.

Advantages of biomass	**Disadvantages of biomass**
- Have lower GHG emissions relative to fossil fuels - Partially act as carbon sink during growth phase - Less costly than fossil fuels - Reduces waste - Uses accessible waste - Can be produced locally - Can be used to create different products - an abundant source of renewable energy	Requires a lot of water No clear policies in the sector No availability of livestock for large-scale generation Regeneration is very slow - Not entirely clean and has related GHG emissions relatively higher than other renewable sources - Not as efficient as fossil fuel - Burning needs wood - Needs large spaces - Brings about conflicts around food security - Most of the technologies used are still in pilot stages.

Any use of biomass must be sustainable, for example crops must be grown sustainably. There is also increasing potential from new biomass sources like algae, grass, food waste, etc.

Degrowth and demand management as a solution

With the ever-growing, yet limited, capacity of variable renewable energy sources, the question arises as to whether they can replace power generation from fossil fuels to the extent that would allow meeting the climate targets. One of the conceptual frameworks that offers a solution to this question is degrowth. Degrowth is a new idea that comes from Europe and it is based on the principle that humans need to reduce the use of energy, limit the extent of development and embrace indigenous knowledge. While degrowth supports renewable energy, the energy demand from some of the sectors may never be met with renewable energy sources, such as shipping, aviation and industry. Degrowth deliberately wants to disrupt ideas like development and it may not be suitable in some political forums. It is an uncomfortable idea that youth have an opportunity to introduce.

In planning any energy projects, we must look not only for economic development but also for social-impact, prosperity and well-being for all. Energy must be affordable for all but there also must be better resource management and responsibility for the local , indigenous communities and small remote access civilians. It is crucial that the renewable energy sector will not become yet another industry in the hands of a few multinational corporations. And not only contributing to the sustainable energy supply, but also creating multiple impacts to other aspects in sustainable development.

Further reading material

A. Importance of evaluating the environmental impacts of RE systems

Environmental Impact of Renewable Energy by Penn State University

The Power of Renewables: Opportunities and Challenges for China and the United States (2010) by National Academy of Engineering and National Research Council

Life-cycle assessment of electricity generation systems and applications for climate change (2002) by Paul J. Meier from University of Wisconsin

Assessment of sustainability indicators for renewable energy technologies (2009) by Annette Evans, Vladimir Strezov and Tim J.Evans at *Sustainable and Renewable Energy Reviews*

The spatial extent of renewable and non-renewable power generation: A review and meta-analysis of power densities and their application in the U.S. (2018) by John van Zalk and Paul Behrens at *Energy Policy*

Energy Transitions (2010) by Vaclav Smil (pp 107 to 120)

Evaluating Renewable Energy Policy: A Review of Criteria and Indicators for Assessment (2014) by International Renewable Energy Agency (IRENA)

B. Evidence on energy break-even by RE systems

Understanding future emissions from low-carbon power systems by integration of life-cycle assessment and integrated energy modelling (2017) by Michaja Pehl et al. at *Nature Energy*

Life cycle assessment (LCA) of electricity generation technologies: Overview, comparability and limitations (2013) by Roberto Turconi, Alessio Boldrin and Thomas Astrup at *Sustainable and Renewable Energy Reviews*

Benefits of Renewable Energy Use (2017) by the Union of Concerned Scientists

Renewable Energy Futures Study (2012) by the National Renewable Energy Laboratory (USA)

EROI of different fuels and the implications for society (2014) by Charles A.S.Hall, Jessica G.Lambert and Stephen B.Balogh at *Energy Policy*

Energy Return on Investment: Toward a Consistent Framework (2008) by Kenneth Mulder and Nathan John Hagens at *AMBIO: A Journal of the Human Environment*

C. Evaluation of the feasibility of biomass as a renewable energy source

Fact sheet on bioenergy with carbon capture and storage (BECCS) (2018) by the American University

The Statistical Report 2020 on Bioelectricity by Bioenergy Europe

Australian BioEnergy Roadmap to 2020 and Beyond by Clean Energy Council

Biomass vs. Other Alternative Energy by Viaspace

Electricity Generation Based On Biomass Residue: Scope, Relevance And Applications by Imrul Reza Shishir et al

The likely adverse environmental impacts of renewable energy sources by S.A Abbasi et al

D. Importance of managing and/or reducing demand and overall economic growth to meet the energy needs

A 2000-Watt society in 2050. A realistic vision? (2010) by Marco Morosini at *Conference "Ethics and climate change"*

A Call to Look Past An Ecomodernist Manifesto: A Degrowth Critique by Jeremy Caradonna et al.

Brown to Green: The G20 transition towards a net-zero emissions economy (2019) by Climate Transparency, Berlin, Germany

E. Other

Meta-analysis of high penetration renewable energy scenarios (2014) by Jaquelin Cochran, Trieu Mai and Morgan Bazilian at *Renewable and Sustainable Energy Reviews*

Energy Analysis Publications by the National Energy Technology Laboratory (USA)