

ELK COAST INSTITUTE

FOR MINDFUL SUSTAINABLE INNOVATION

Energy Equity Summit

Government group

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Framing/ Background (see also Technology/Framework working paper)

Over the past 400 years, advancements in the energy supply have underpinned extraordinary economic growth and improvements in prosperity and quality of life. However, it has come with two seemingly intractable problems:

1. **Energy Equity:** The energy growth of the past century has not been evenly distributed. Many global regions are still mired in poverty, unable to access low-cost, resilient energy supplies and the economic and social benefits that follow.
2. **Climate Change:** Greenhouse gas emissions from the burning of fossil fuels are breaching planetary GHG limits and risk crossing certain thresholds that triggers catastrophic nonreversible climate change. We both need to curtail our emissions and remove CO₂ already in the atmosphere.

Findings:

1. The distributed, low-demand areas in developing regions are not well matched and thus not effectively addressed by the large-scale, centralized infrastructure of conventional power systems and the associated funding and governance challenges.
2. With significant and various government support there has been extraordinary, faster than predicted, improvements in the cost and capabilities of renewable energy sources such as solar and wind in the past two decades. Technology has allowed for decentralized, simple to install, and modular renewable energy production. This transformation in the nature of our energy infrastructure will impact our approach to providing energy and the products it produces.
3. The availability of lower-cost energy and the right government carbon incentives and regulations will help create a Renewable Energy and Carbon Materials Economy ([\[2012.14976\] REME -- Renewable Energy and Materials Economy -- The Path to Energy Security, Prosperity and Climate Stability](#)). REME uses renewable energy to produce hydrogen from water and atmospheric CO₂. These components transform via an industrial version of photosynthesis into synthetic hydrocarbons and carbon materials. In other words, a circular carbon economy can be created where the carbon cycle will be closed and a sustainable future of unparalleled energy prosperity is enabled.
4. The emerging renewable energy-driven REME offers the potential not just to address the 'flow' of greenhouse gas emissions but to confront the built-up 'stock' of emissions by radically transforming the cost of sequestration via transformation of CO₂ into economically valuable products such as synthetic green hydrocarbons
5. The modularity, scalability and distributed potential of renewable energy and REME provide electricity and carbon neutral synthetic hydrocarbon energy sources and products needed locally and regionally. This in turn creates a positive feedback between more energy equity and climate change protection because of the bottom up nature of the transforming technology. This transforms the trade-off between creating equitable prosperitate communities and addressing climate change into positive feedback – the more energy equity, the more climate change protection.
6. The bottom-up nature of the transforming technologies empowers local entrepreneurs and communities to create cascading positive feedback across society while low-cost energy becomes accessible, independencies and jobs are created, and prosperity increases while ensuring growth potential. No longer is

addressing energy equity/ poverty exclusively in the domain of top-down intervention that characterized the centralized, capital-intensive nature of energy in the past.

7. Low-cost renewable energy and the new system architecture will have a wide range of impacts on the future of transport, food production, water desalination, and many more essential sectors.
8. As we have witnessed within the solar industry, government leadership is crucial for furthering actions for more equity and a cohesive climate action plan. Subsidies , policies and procurements set the right environment for a successful implementation of our two most important modern objectives, energy equity and climate change protection.
9. Learning by doing will reduce the cost of REME technologies resulting in market forces enhancing the rate of adoption because the products reach lower cost than those produced by fossil fuels just as was done by renewable energy.
10. The crucial elements in hindering our objectives are: government stability, corruption, socio-, gender, and economic inclusiveness
11. A transition to clean energy will see many developing regions benefit from an advantage of geography. Equatorial zones have better solar potential and limited seasonality to overcome, meaning they will benefit more from far lower cost power than many northern developed regions.
12. Equity and sustainability are not the inevitable result of low-cost renewable energy and have potentially catastrophic climate and social, political consequences if not achieved on time. Ensuring a timely transition will require leadership, a coherent plan, and unprecedented cooperation between governments, industry, and philanthropy. It will also need a holistic approach that looks beyond geographic boundaries and sees the possibilities beyond the narrow confines of the current energy system.
13. In an unlimited market, such as the energy market, monopolies do not make commercial sense because no individual company can address the whole market. Instead, what matters the most for the commercial success of a technology is universal adoption. This is the role of Standard Setting Organizations (SSO). An SSO manages the development of the standards surrounding the technology and encourages transparency and fairness among all stakeholders. Setting standards facilitates universal accessibility and adoption by guaranteeing the right for any

market participant to obtain a license on a Fair Reasonable and Non-Discriminatory (FRAND) basis. FRAND rates are generally relatively low compared to the average industry rate, making them accessible to virtually any commercial entity. FRAND licensing does not require extensive negotiation between licensors and licensees, because generally, the licensing rate is set by the SSO

14. The social science and policy knowledge of how to implement the technology transformation in an equitable way lags far behind our technical capability to provide the increased energy demand to achieve energy equity.

Recommendations

1. Change the mindset for government action and adopting a more holistic, systemic approach. Critical to understand this is not just a technology substitution but a new system with new properties, architecture and possibilities – addressing the challenge of climate change with a focus on energy equity and bottom up focus will transform those threats into an opportunity and the positive feedback between them will enhance our capability to address both energy equity and climate change in the timely manner needed.
2. Support the transition to REME. In WEIRD countries (Western, Industrialized, Rich, and Democratic) REME offers the transition to a sustainable and more equitable economy. For developing countries REME offers the possibility of becoming self-sufficient because of the wide accessibility to its input components: water, CO2 and renewable energy.
3. Create the capability for locally produced carbon neutral synthetic fuels together with renewable electricity to provide increased energy equity to the large energy poor agrarian societies. Carbon neutral fuels have the benefit of an expansive existent infrastructure and equipment.
4. Implement public policies like "Build Back Better" in the US that align market forces and equity can address the dual threats of energy equity and climate change. Complementary policies that enable countries to become self-sufficient will enhance energy equity. Particularly important are policies that create positive feedback between those building back better and those becoming self-sufficient.
5. Generally one should have policies and subsidies that support efforts that create positive feedback between energy equity and climate change protection. For example the

distributed nature of REME will need less costly physical infrastructure that will free capital for vital social infrastructure(-e.g., education, broadband, etc.) which in turn increase demand and enhance the capability to achieve energy equity and address the threat of climate change.

6. The policies and subsidies needed to enhance the rate of the transition to REME should not be installed permanently. They need to start high to enable the technologies to be implemented while their costs are high and need to be reduced eventually going to zero as costs are lowered by learning by doing and market forces take over.
7. An important instrument for governments generally to align equity and market forces is the use of public procurement policies that directly link the two.
8. Many current approaches and suggested solutions to energy equity are based on an incomplete understanding of our future capabilities, and the magnitude of the challenges we will face in implementing them. They need to be updated.
9. Generally, there is reason to believe that we have greater capability than reflected in our current policies. Not unlike the Covid pandemic - we have the vaccine(technologies) and can scale their production. The equivalent challenge we face is to get it into the arms globally(social and political policies) before the virus (social and climate instabilities) take over.
10. The policy challenge is to accelerate the transition to where market forces will take over through fiscal policy (tax and subsidy), and ensure markets are open and transparent by removing barriers to the adoption of REME and adapting market structures to the new properties/architecture of REME and the new industries they enable.
11. Enable unparalleled cooperation between governments and the industry to ensure a timely transition. As was done in war efforts use government powers to march in and direct private capabilities to public purposes(Ford to make tanks in World War II) and allow cooperation within industries for those efforts of Johnson and Johnson and Merck to manufacture the J&J vaccine.
12. Remove subsidies on fossil fuels (unless it is required to 'keep the lights on') as existing conventional power plants become uneconomic and instead provide subsidies to enhance the transition to REME that sunset

13. Remove barriers (for example corruption and monopolies) to implementation and cooperation by giving individuals and distributed organizations the right to produce and sell energy. In general support the bottoms up approach.
14. Create clear international regulations that ensure interoperability to allow new clean power supplies to plug and play. Establish an international SSO for renewable energy and REME that will establish Fair Reasonable and Non-Discriminatory (FRAND) licensing rates for renewable energy and REME IP to enable the technologies to be implemented by essentially any commercial entity anywhere.
15. Ensure pre-requirements for prosperity are met: Focus on access to capital and financing mechanisms to deliver low-cost capital anywhere. Enable transfer of technology and training of local workforces that:
 - Ensures equal access to information (internet connection) and education
 - Empowers local entrepreneurs to provide low-cost plug and play renewable energy solutions to communities in the developing world
16. Develop plans to mitigate the impacts of disruption. Focus on protecting people, not businesses. Leave no one behind by following a bottoms up approach :
 - Equity assessment of each proposed change so the most vulnerable and underserved communities can be helped first and most.
 - Procedural justice so all stakeholders have the opportunity to engage and have agency in how changes are implemented, bottoms up approach..
 - Places/countries advantaged by the transition need to support the efforts of those regions disadvantaged. Learn from the reasons such transfers did not work in the natural resource based economy by providing the capability to be self sufficient
17. Establish Climate/Equity Power Corps, similar to Peace Corps but updated to reflect equity priority, to transfer knowledge, technology, and funds.
 - In a collaborative, culturally sensitive effort, the Climate Corps would help set up and support community-led initiatives such as:
 - Provide and connect with investment capital
 - Free skill development and learning courses to train community members on business best-practices, and technical know-how to install and maintain renewable energy technology.

- Technical workshops targeting utility professionals on how to transition to a clean energy grid.
- Workshops that focus on fostering community resilience and adaptive planning through community empowerment.
- The Climate Corps would also transfer financial support for entrepreneurs, training, and local staff support.
- The Climate Corps would also provide training for carbon sequestration and utilization infrastructure and business practices so that developing countries can also benefit from the new carbon economy
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Combining renewable electric energy

Additional points:

True equity: Localized community level solutions

Framing/ Background Before August

Growth in energy supplies over the past 200 years has underpinned extraordinary economic growth and improvements in prosperity and quality of life. However, this has come with 2 seemingly intractable problems:

1. Equity. This growth has not been evenly distributed. Many regions of the world are still mired in poverty, unable to gain access to low-cost, resilient energy supplies and the economic benefits that follow.
2. Climate change. Greenhouse gas emissions from the burning of fossil fuels in our energy system are breaching planetary boundaries and risk crossing certain thresholds that will trigger irreversible damage to our climate system.

The extraordinary improvements in the cost and capabilities of renewable energy sources, solar, wind, and batteries transform how we think about countering these issues. **High carbon energy is now in many parts of the world on its way globally to being high-cost energy.** And, as the 2020s progress, renewables will continue to improve exponentially, while conventional power sources enter a vicious cycle of increasing cost, reducing utilization and decreasing competitiveness – making the delta between the two systems ever greater. **There is no longer a green premium**, meaning that the trade-off between creating prosperity and addressing climate change has been broken. In fact, the availability of lower-cost energy will help create a future of unparalleled prosperity and most notably, enable energy equity because of its abundance and more equitable distribution.

The emerging clean energy system offers the potential not just to address the 'flow' of greenhouse gas emissions but confront the built-up 'stock' of emissions because it radically transforms the cost of sequestration and transformation of CO₂ into valuable products

such as synthetic green hydrocarbons. As other sectors of the economy are transformed in tandem, other low-cost avenues to sequestration will open. For example, the disruption of livestock farming and fishing will free vast swathes of agricultural land and the oceans from food production, allowing them to regenerate.

Furthermore, the architecture/ properties of a clean energy system are fundamentally different from conventional power systems in ways that can transform energy equity.

- The distributed, low-demand profiles in developing regions mean that the large-scale, centralized infrastructure of conventional power systems and the associated funding and governance challenges act as a barrier to electrification in many parts of the world. However, the modularity, scalability, and distributed potential of solar and battery systems overcome this barrier.
- This architecture allows the challenge to be addressed from the bottom up by empowering local entrepreneurs and communities in a way that can create cascading positive feedback across society as jobs are created, low-cost energy becomes accessible and prosperity increases. No longer is addressing energy equity/ poverty exclusively in the domain of top-down government-led intervention that characterized the centralized, capital intensive nature of conventional energy.
- Furthermore, a transition to clean energy will see many developing regions benefit from an advantage of geography. Subtropical zones have both better solar potential and limited seasonality to overcome, meaning that they will benefit from far lower cost power than many northern developed regions.

Solving climate change and addressing energy equity are therefore achievable together. However, equity and sustainability are not inevitable and have potentially catastrophic consequences if not achieved on time. Ensuring a timely transition will require leadership and a coherent plan and unprecedented cooperation between governments, within the industry, and between governments and industry. It will also need a holistic approach that looks beyond geographic boundaries and sees the possibilities beyond the narrow confines of the current energy system.

Choices:

This paper sets out a series of principles that can guide the development of detailed policy and plans across regions and levels of government.

Mindset: understanding disruption

Where clean energy is already the lowest cost solution it makes no economic sense to build new fossil fuel power plants and in others a transition strategy is needed.. As improvements continue over the 2020s, costs of solar and batteries and other renewable energy systems will drop below the marginal cost of fossil fuel generation in an ever increasing parts of the world, meaning that existing power plants will be outcompeted, making disruption of conventional generation inevitable. Accepting the emerging reality that market forces are no longer a headwind that needs to be overcome, but a tail wind is a critical first step. In fact the need to make the transition in a timely manner will result in accelerated rates of cost reductions as was already experienced in solar energy, driven by Germany's policy driven demand in the early 2000s.

Many current approaches and suggested solutions are based on an incomplete and inaccurate understanding of progress to date and future potential, meaning some solutions are misguided and incomplete, or at worst counter-productive. More generally one needs to change the mindset that addressing climate change is a cost to the economy to one where it is an opportunity for overall economic prosperity and equity. Furthermore, that policies and subsidies needed to enhance the rate of the transition are not permanent and need to be ended as market forces take over.

Harness and accelerate market forces.

The challenge for policy is therefore one of accelerating the transition to market forces through fiscal policy (tax and subsidy), and ensuring markets are open and transparent by removing barriers to the adoption of clean energy and adapting market structures to the new properties and architecture of clean energy and the new industries they enable. Enable Unparalleled cooperation between governments, within industry and between governments and industry to ensure a timely transition

- Remove subsidies on fossil fuels (unless required to 'keep the lights on' as existing conventional power plants become uneconomic) and provide subsidies to enhance the transition to a sustainable and equitable energy future.
- Give individuals and organisations the right to produce and sell energy and connect to grids.
- Reduce regulatory burden and constraints on cooperating within industries
- Break-up monopolies and
- Create fair, open and transparent markets.

Create clear regulations that ensure interoperability to allow new clean power supplies to plug and play.

Don't pick winners. Ensure regulations and incentives are technology agnostic and 'pre-competitive'.

Take a systems approach to catalyze positive feedback through a bottom-up approach that creates jobs, provides energy and hence economic activity, and creates prosperity, increasing demand and lowering cost. Developing a plan to address both energy equity and climate change requires an understanding both of the potential role of technology and the complex processes that will be triggered as disruption begins. Ensure pre-conditions for prosperity are met:

- Focus on access to capital and financing mechanisms to deliver low cost capital
- Enable transfer of technology and training of local workforces
- Ensure access to information (internet connection) and education
- Empower local entrepreneurs to deliver low-cost plug and play solutions in developing world

All of the principles above will have a positive economic payback and create cascading impacts that reinforce and accelerate the transformation. However, other inventions will be necessary to ensure the full potential of disruption is captured and the adverse effects are mitigated.

Create mechanisms to incentivize carbon sequestration. Recognize the opportunities that will emerge from the disruption of livestock farming to free land and oceans from food production and from low-cost energy that can transform the economics of sequestration including synthetic green hydrogen and CO₂ produced hydrocarbons.

Creating a "clean up" carbon removal service where industries would have to pay to have their carbon removed similarly to trash removal services. This could create jobs wherever the carbon removal is occurring which could include developing countries.

Carbon tech start-up incubator to create businesses in developing countries

Develop plans to mitigate the impacts of disruption. Recognize that the disruption of conventional power is inevitable. Focus on protecting people not businesses.

- Equity assessment of each proposed change so the most vulnerable can be helped first and most

- Procedural justice so all stakeholders have the opportunity to engage and have agency
- Place-specific planning

Climate/Power Corp (similar to peace corp)

- Developed countries provide knowledge to developing countries on investing in clean energy
- Go to developing countries and teach how to install and maintain solar panels etc. and starting clean energy businesses
- Workshops on how to transition to a clean energy grid, what utilities need to know
- US and other developed countries donate funds to get businesses and investments started as “reparations” for past contributions to climate change
- Teach strategies for adapting to climate change
- This should be a bottom up strategy. Knowledge will be passed to individuals who want to start businesses and get involved in the clean energy transition. Once the knowledge is transferred, they will be able to teach the next group without the help of developed countries.

Preparation for the Summit presentation:

Findings:

Recommendations: