The Nexus between Sustainable Power and Growing Local Economies

"Program for Rural Electricity for Poverty Alleviation"

Presented by;
Amer Zafar Durrani
CEO Reenergia and CEO Paidartwanai

Prepared by;
Amer Zafar Durrani, Humairah Jabeen, Bakhtawar Aurangzeb Khan.

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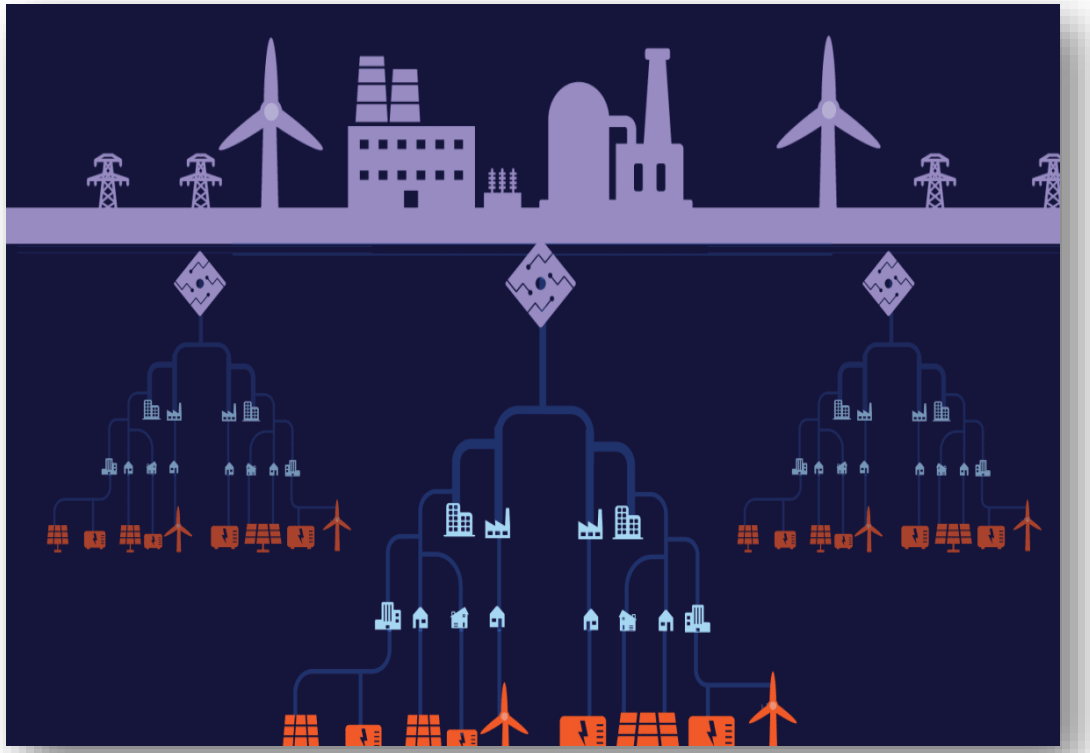
Energy access is the core for local economic development …

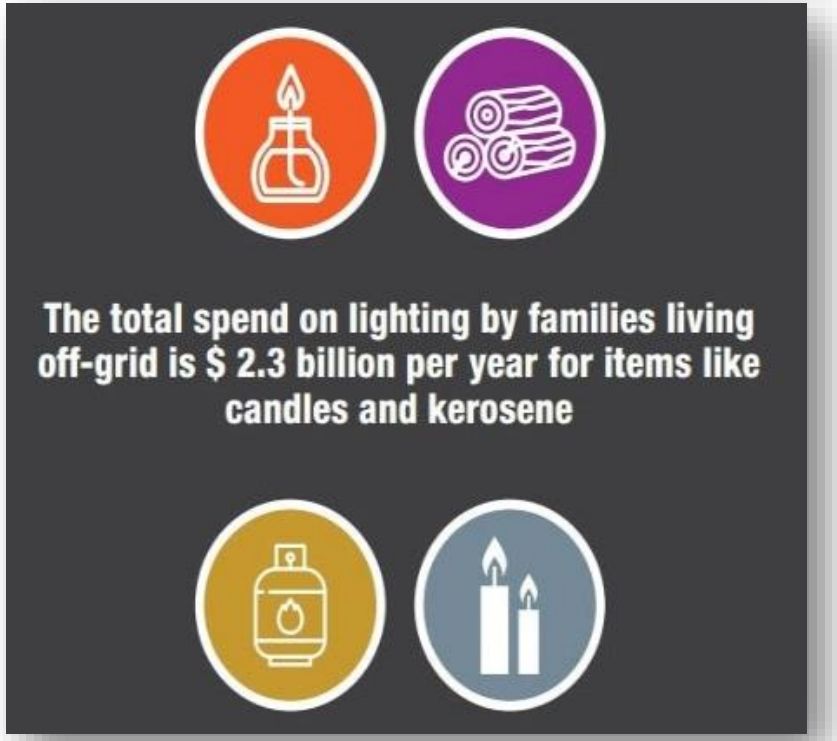


No water, no sanitation, no health, no education, no agriculture, no industry, no security, in fact no development is possible without this basic access to energy.

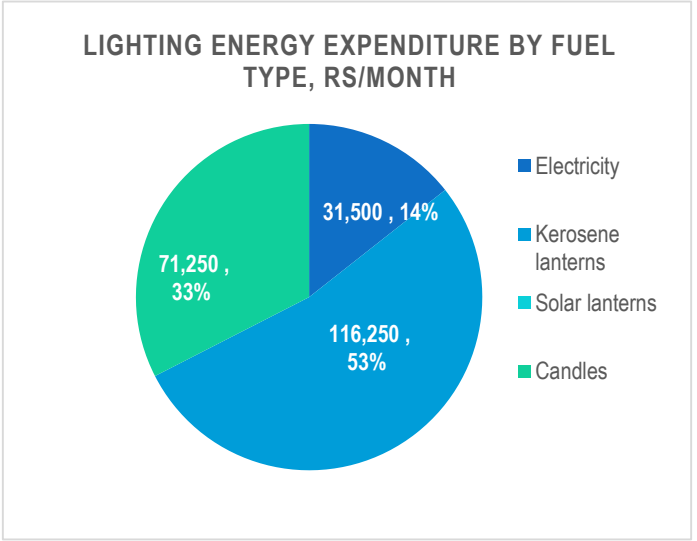
Access to energy, in particular, power, requires money and livelihoods provide the finance to pay for improved energy access. This is a symbiotic relationship.

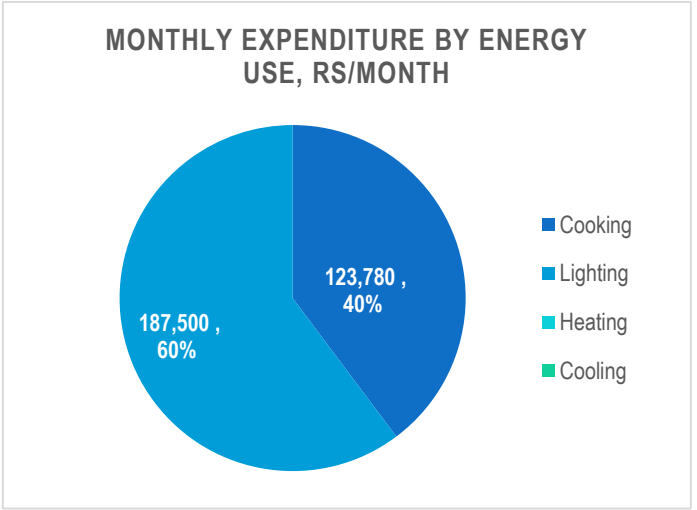
Planners and policy makers say that the MEMs are not supplied as they are too poor to afford electricity… Are they? A case study from Pakistan:

Yet poor in Pakistan are spending on traditional energy sources is $2.3 billion annually!!—MEMs?

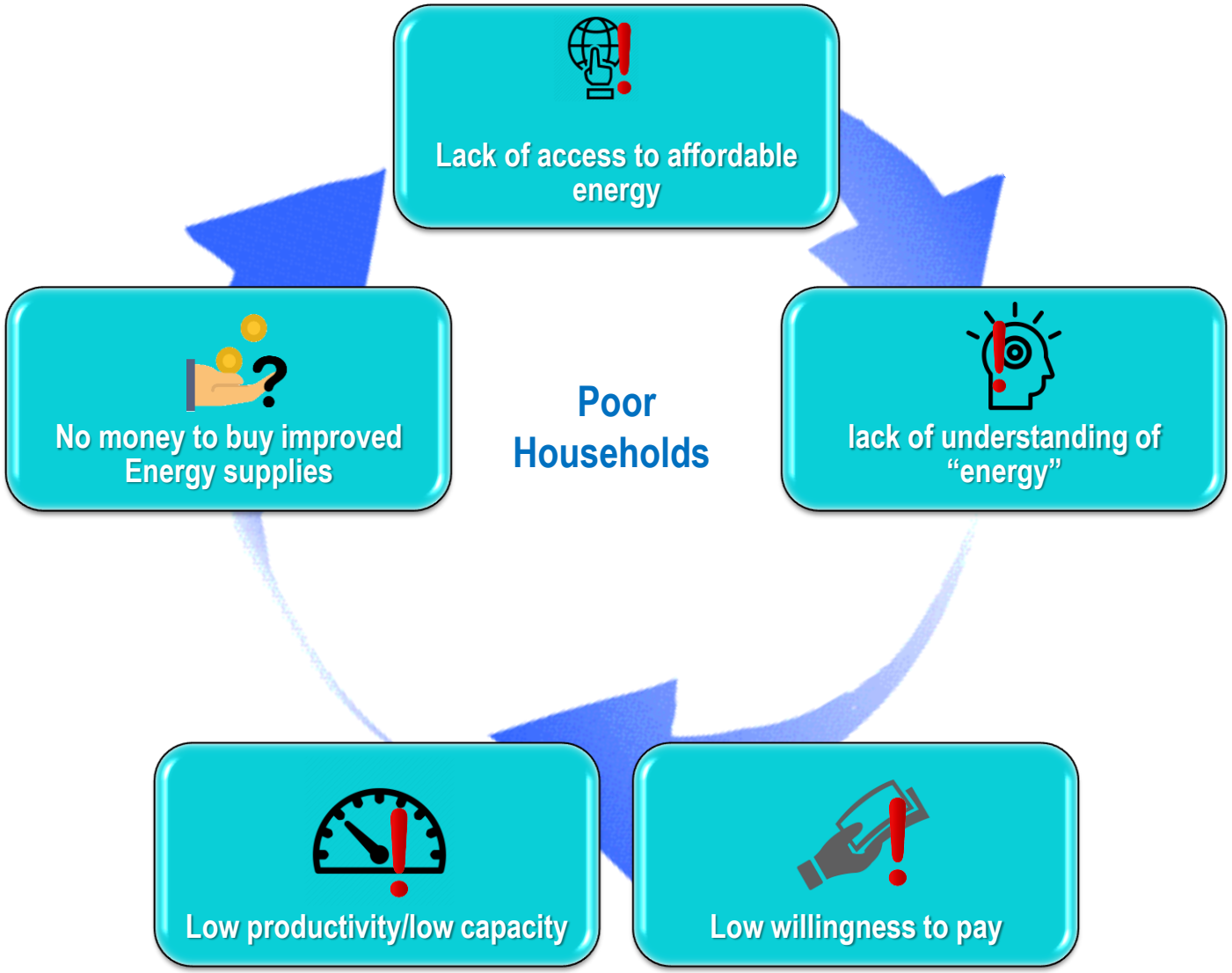


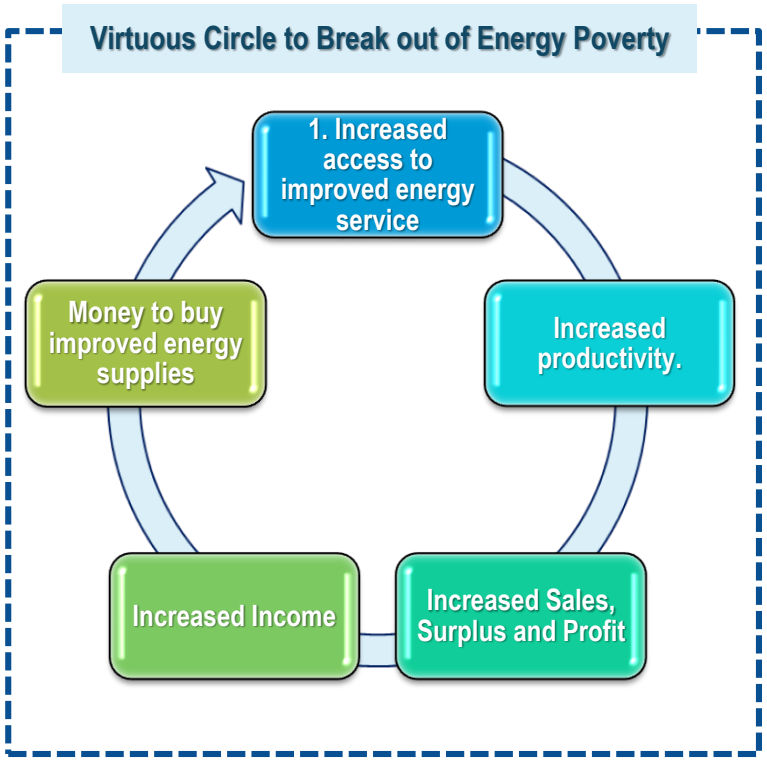
20 villages in Union Councils Dhabeji and Gharo in Sindh, Pakistan, assessed for energy access gaps and detailed energy audits and energy policy planning carried out….
Interesting results—HHs spending **2,670 PKR/month** on lighting alone...challenged the ESMAP numbers.

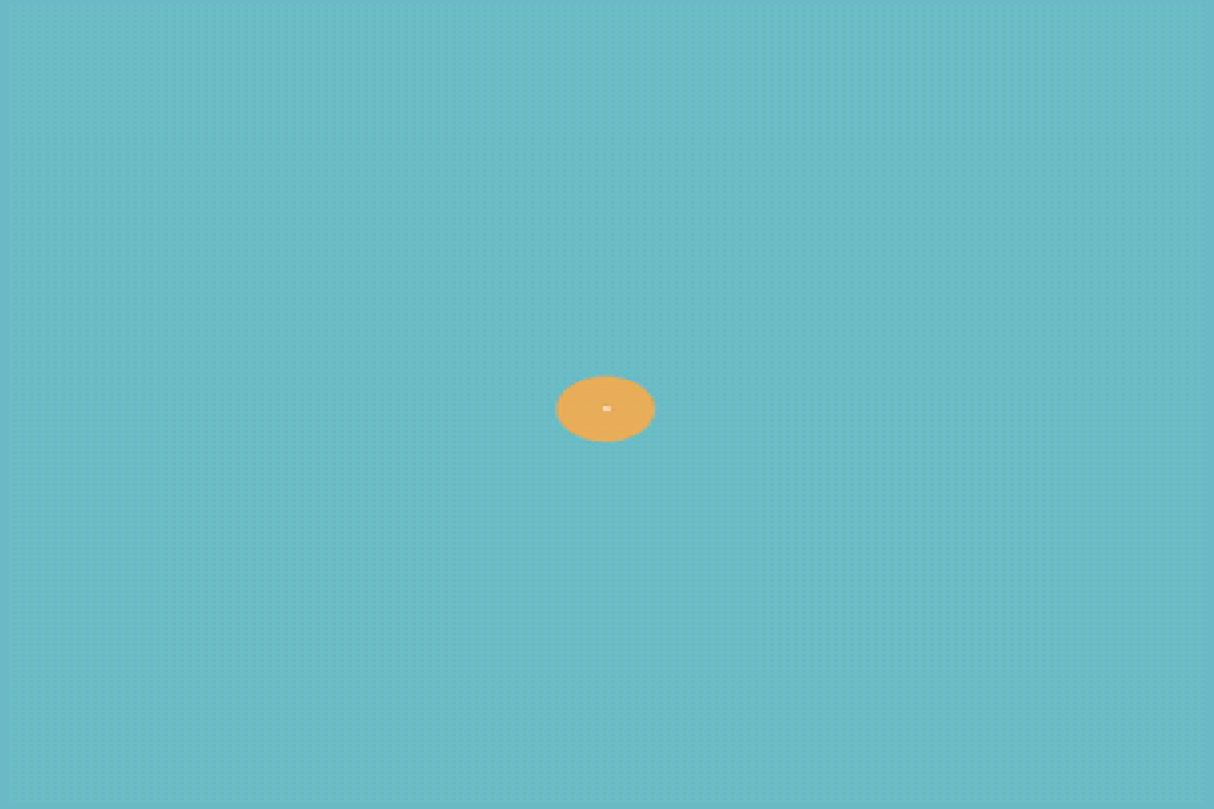




Vicious Cycle of Energy poverty







Lessons Learned….

- Energy access starts with ensuring provision of light
- Inability to visualize and realize economic returns
- Fluctuation in demand – due to pricing, quality, reliability, growth of supply
- Less electricity uptake→ depletion of natural resources in mountain economies
- Tremendous latent growth potential in the demand, even if restricted to purely non-commercial use
- Commercial demand attractors in mountain economies

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- Utilities in mountain economies – mostly hydropower including small hydro (30 kW – 10 MW)
- Production variation – seasonally and monthly and daily
- Water Flows - (turbidity, sediment, seasonal variations)
- Sub-optimal designs, equipment and management
- Sub-optimal operations & maintenance
- Non-availability of spare parts and skills
- Inadequate revenue collection, financial, operational, utility management shortfall

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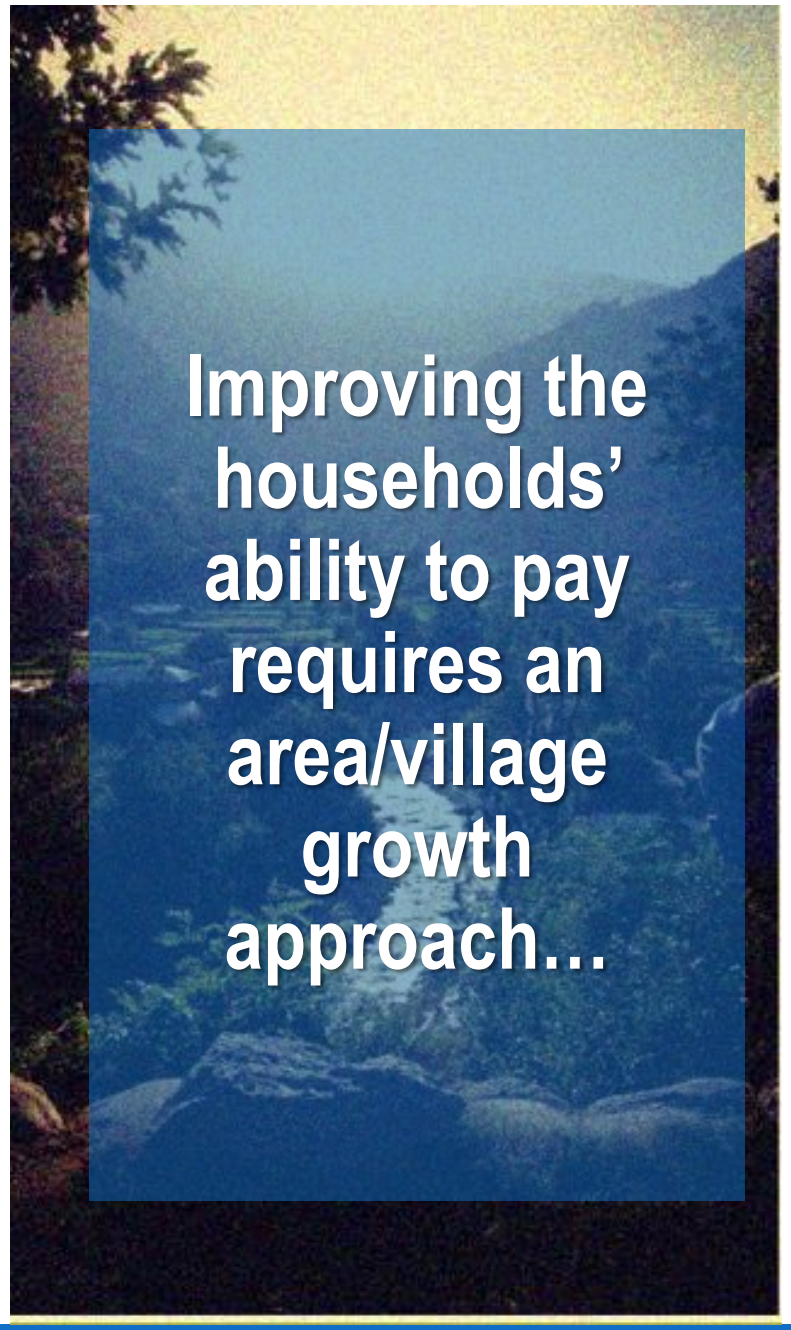

A dire need to uplift lives & finances of households. Two parts to the equation:

Increment in ***Community's Financial Wealth*** – enabling capacity to pay as commerce increases

Ensuring ***Community Awareness*** – understanding the externalities of not paying for clean energy

Procurement – Bulk procurement for all utilities will enhance the quality and lower the cost of procurements. Overall it will enhance the bargaining power with vendors and ensures reliability of supply.

Social and environmental Safeguards – Designing, implementing, ensuring, and monitoring environmental and social safeguards across a group of utilities by a management company centralizes responsibility, creates harmonization, and enables better monitoring and reporting where required by financiers and other stakeholders.

Data and analytics enabling research and development and technology infusion – Collective management and linkages will enable better technology diffusion [much required], improvement and harmonization of designs [thereby cost efficiencies], improved and harmonized delivery of utilities [construction and supervision], and centralized collection of analysis of data leading to improved research and development.

Finance and subsidies **–**An umbrella operating and owning company will improve financial management, help restructure current financial portfolios, improve access to and utilization of finance, allow for blended finance to be mobilized, the ability to provide targeted subsidies to deserving households, and increase returns to owners [including communities, NGOs and Private entities]. Community ownership will enable marketing of innovative financial instruments to donors and commercial entities alike.

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Risk mitigation – Centralize management of utilities will better manage risks relating to natural and man-made disasters. Risk mitigation strategies allowing for uninterrupted energy access cannot be done at single utility level and need scale.

Approaches to area/village growth and brining real returns to the community – A holding company can connect the proverbial dots across the various local utility catchment areas and strategize with local communities and NGOs how to better approach area/village growth with a view to increasing the financial strength of the communities. The scale of the company can better attract local and regional and global value and supply chains—both in and out bound.

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The economic impacts of investing in rural electrification in Ghana (2005 – 2013)

In Ghana, significant progress in extending electricity access across the country has been made, particularly in rural areas where access levels rose from **1% to 63%** of the population between 1991 and 2014.

Findings:

Income

Electricity access is found to improve the gross income of households compared to households without access.

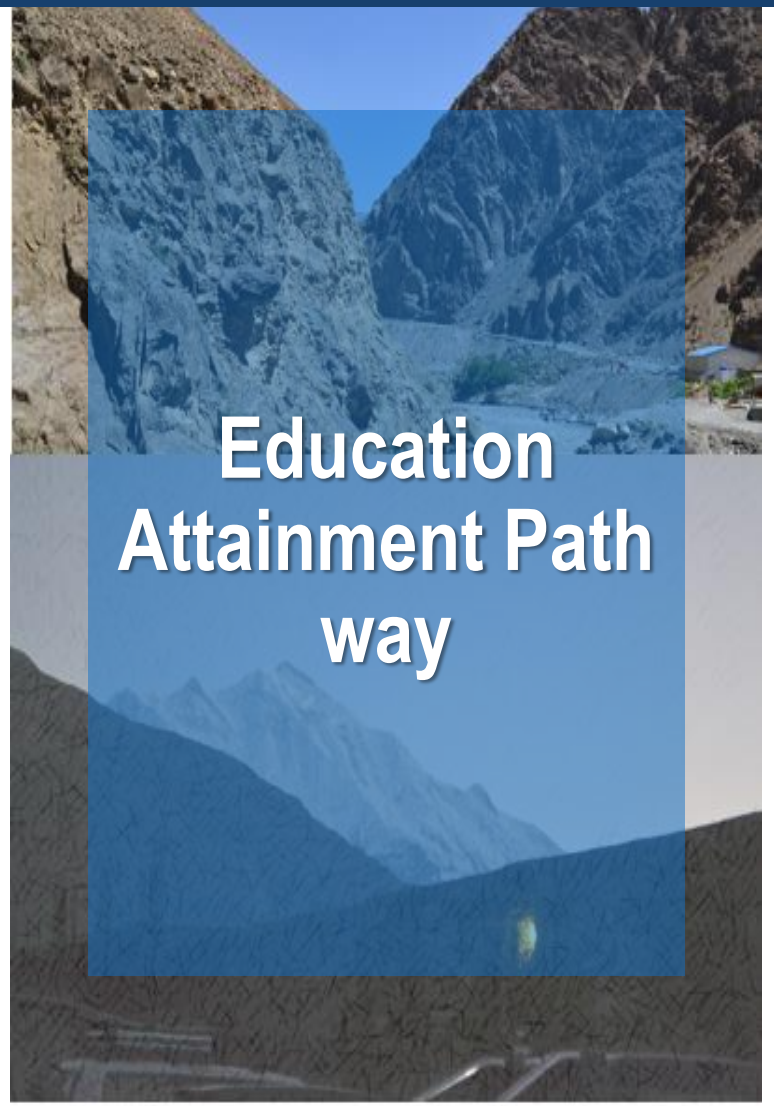
Welfare

Expenditure is about 63.7% higher for households in rural communities connected to the national grid compared to rural households living in areas without a grid connection.

Distributional impacts

Access to electricity improves the incomes of relatively high-income households more than low-income households

The economic impacts of investing in rural electrification in Ghana Lessons Learned



- Access to electricity increases **study hours for electrified communities** leading to improved educational attainment, higher earnings, and a reduction in poverty in the long run.
- **Schooling years** (representing educational attainment) is about half-a-year higher, on average, among members of rural households with electricity compared to rural households without electricity.
- Even though the study does not directly attribute the differences in income and welfare between households with access and those without access to education. However, **the effect of education on income and welfare** will be realized in the long-run.

The economic impacts of investing in rural electrification in Ghana Lessons Learned

- **Economic justification for investment in rural electrification**: potential for speeding the development of rural enterprises, lifting people out of poverty by extending electricity to the economically-vulnerable
- **Reducing poverty and unemployment** by establishing agriculture–support enterprises or factories (cottage industries) in rural areas; contributing to the modernization of agriculture, by allowing for the use of mechanized practices.
- **Enterprise development programmes** designed to encourage individual end-users in rural communities to utilize electricity productively through incentives such as subsidizing the costs of connection and appliances (Lee, 2016).

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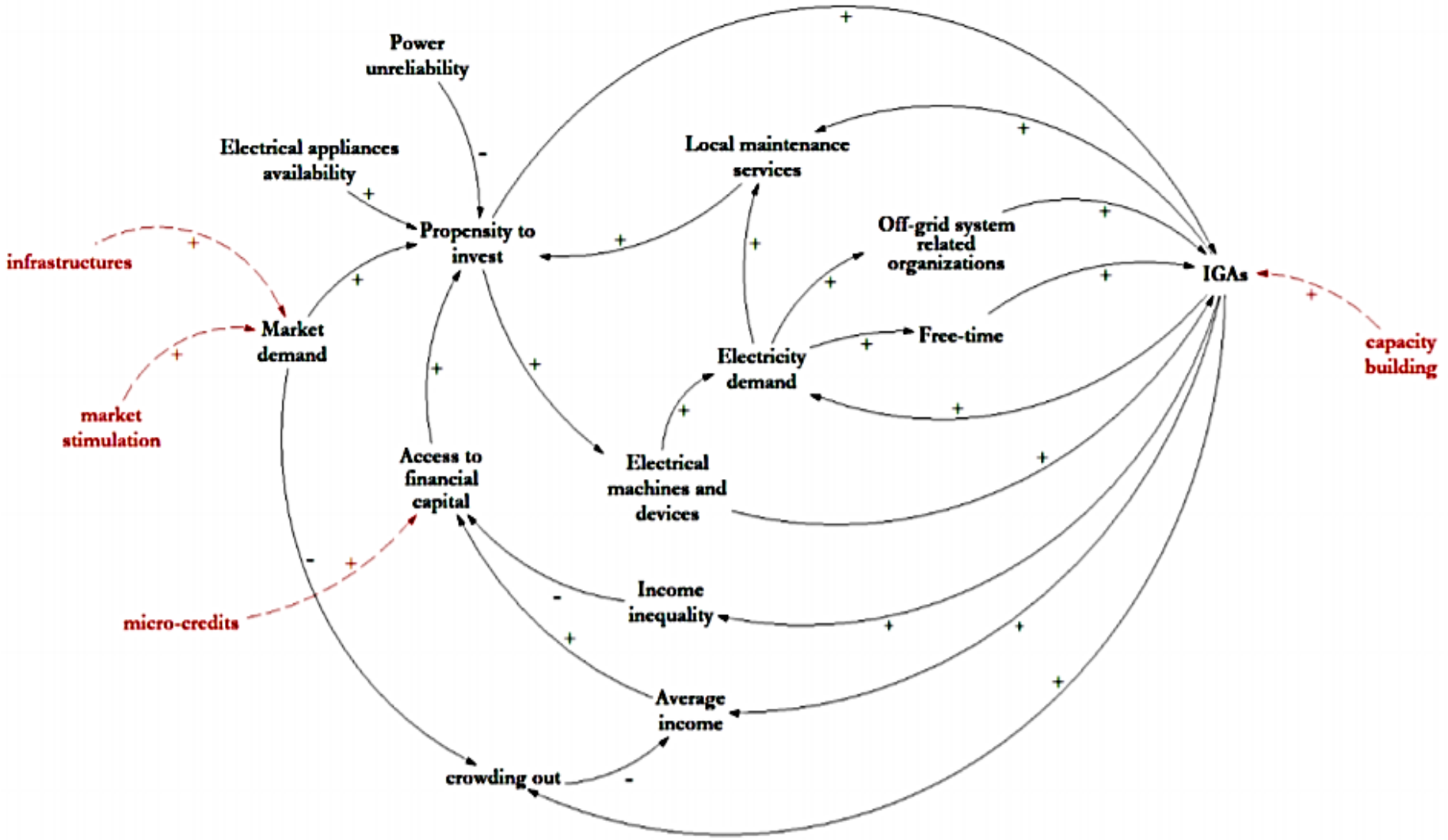
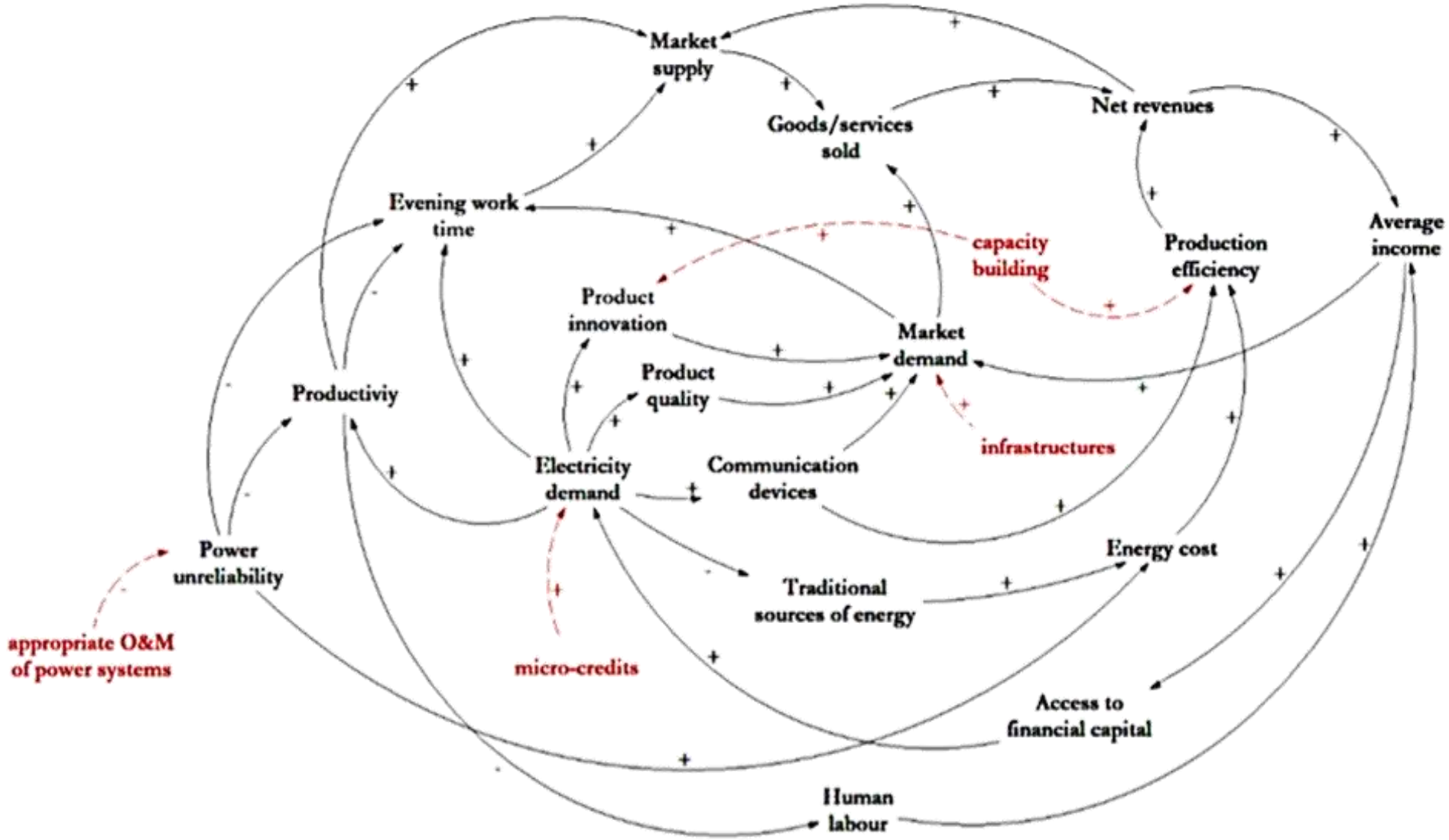
Electricity access and rural development: Review of complex socio-economic dynamics and causal diagrams for more appropriate energy modelling

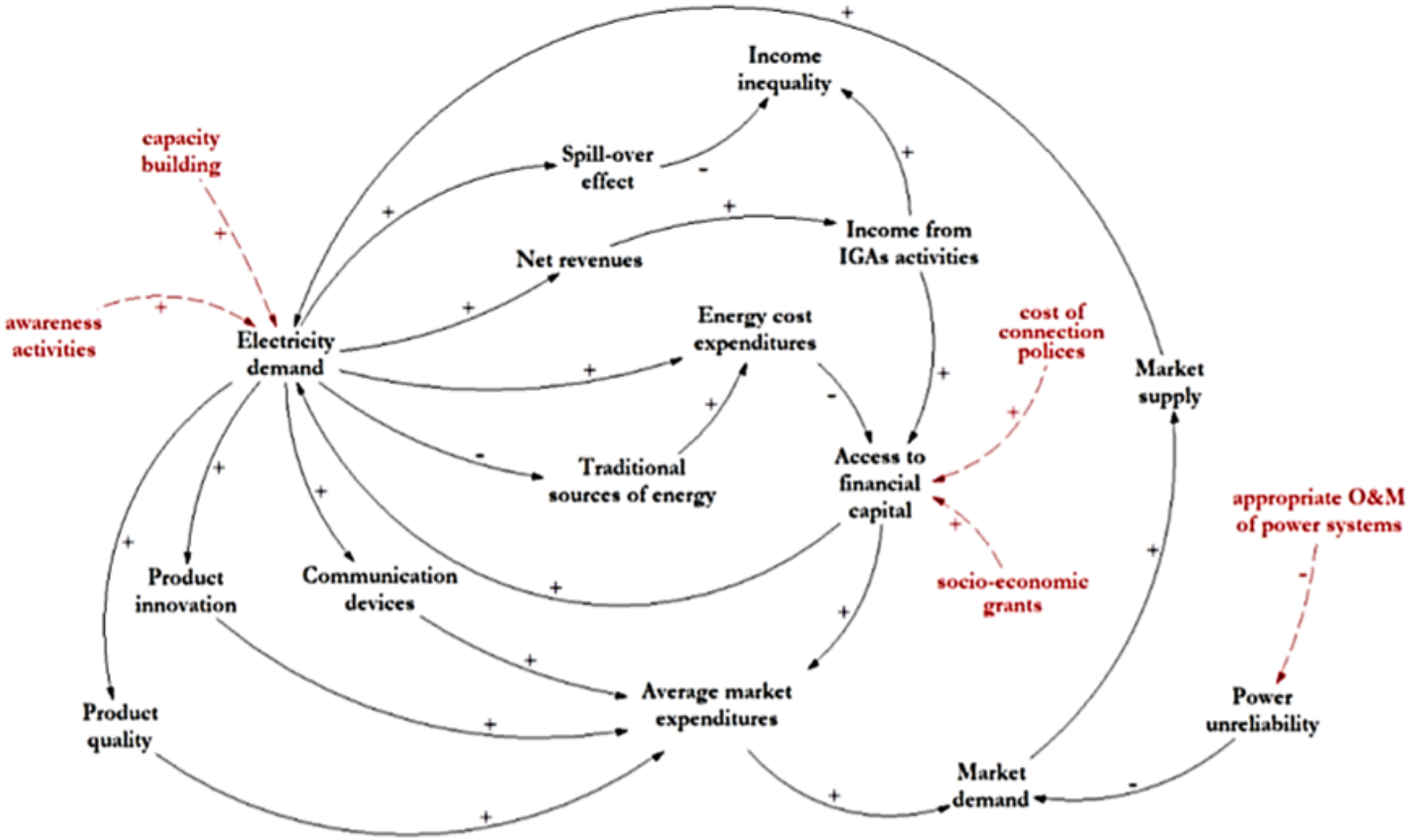
Causal Loop Diagram representing the Dynamics between Electricity Demand & Income Generating Activity



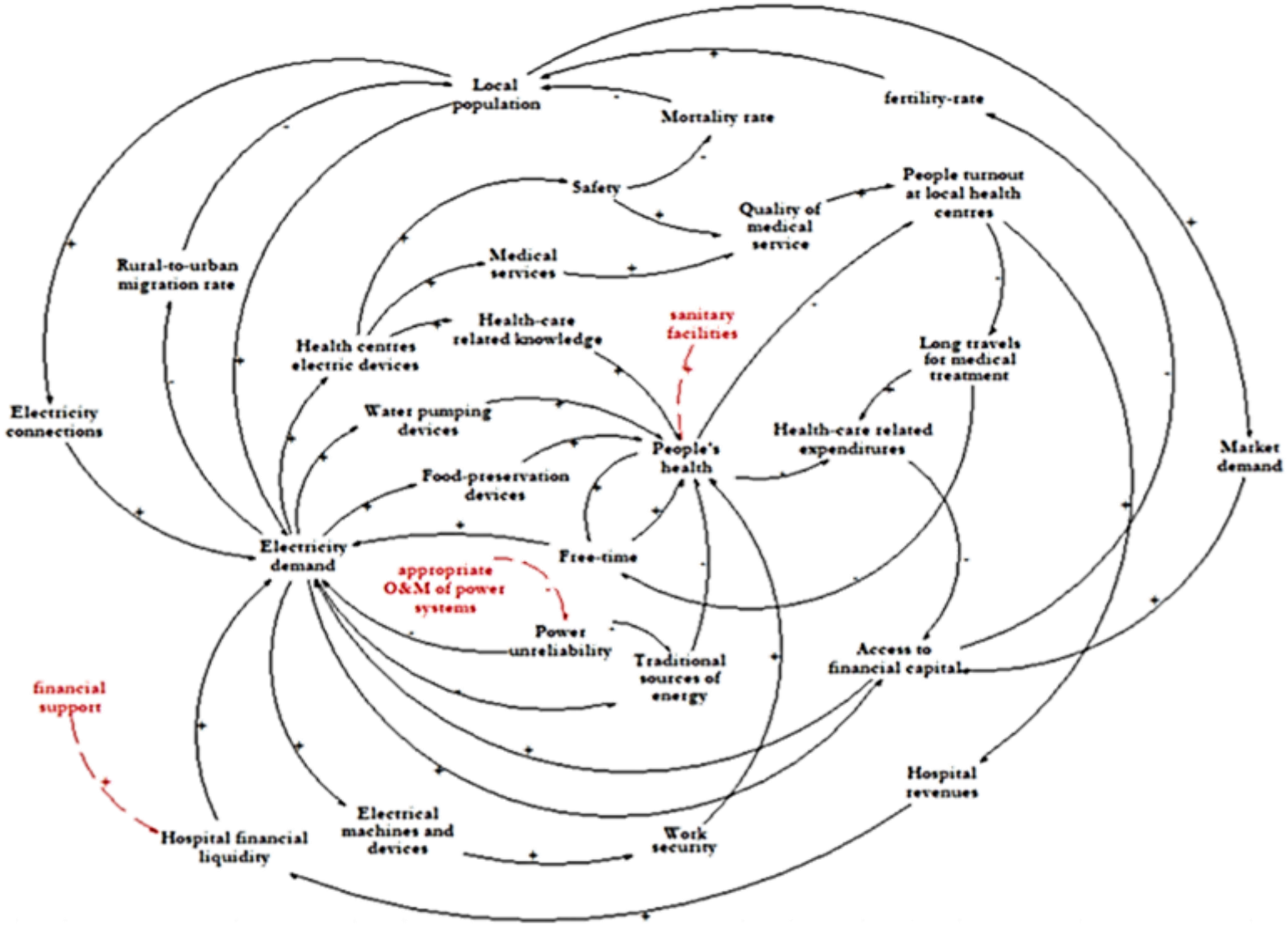
Causal Loop Diagram representing the Dynamics between Electricity Demand & Local Market Production



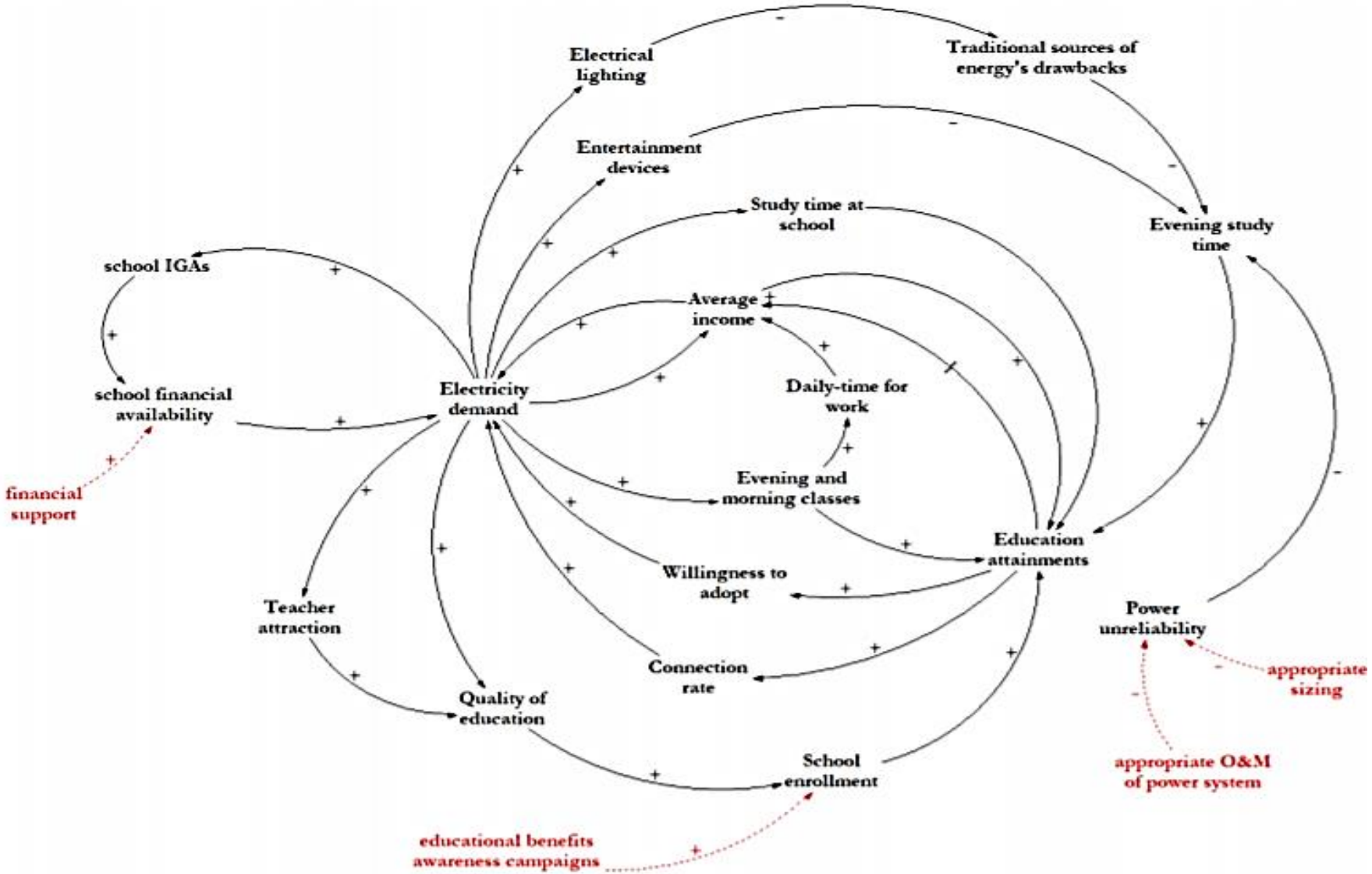
Causal Loop Diagram representing the Dynamics between Electricity Demand & Household Economic Availability



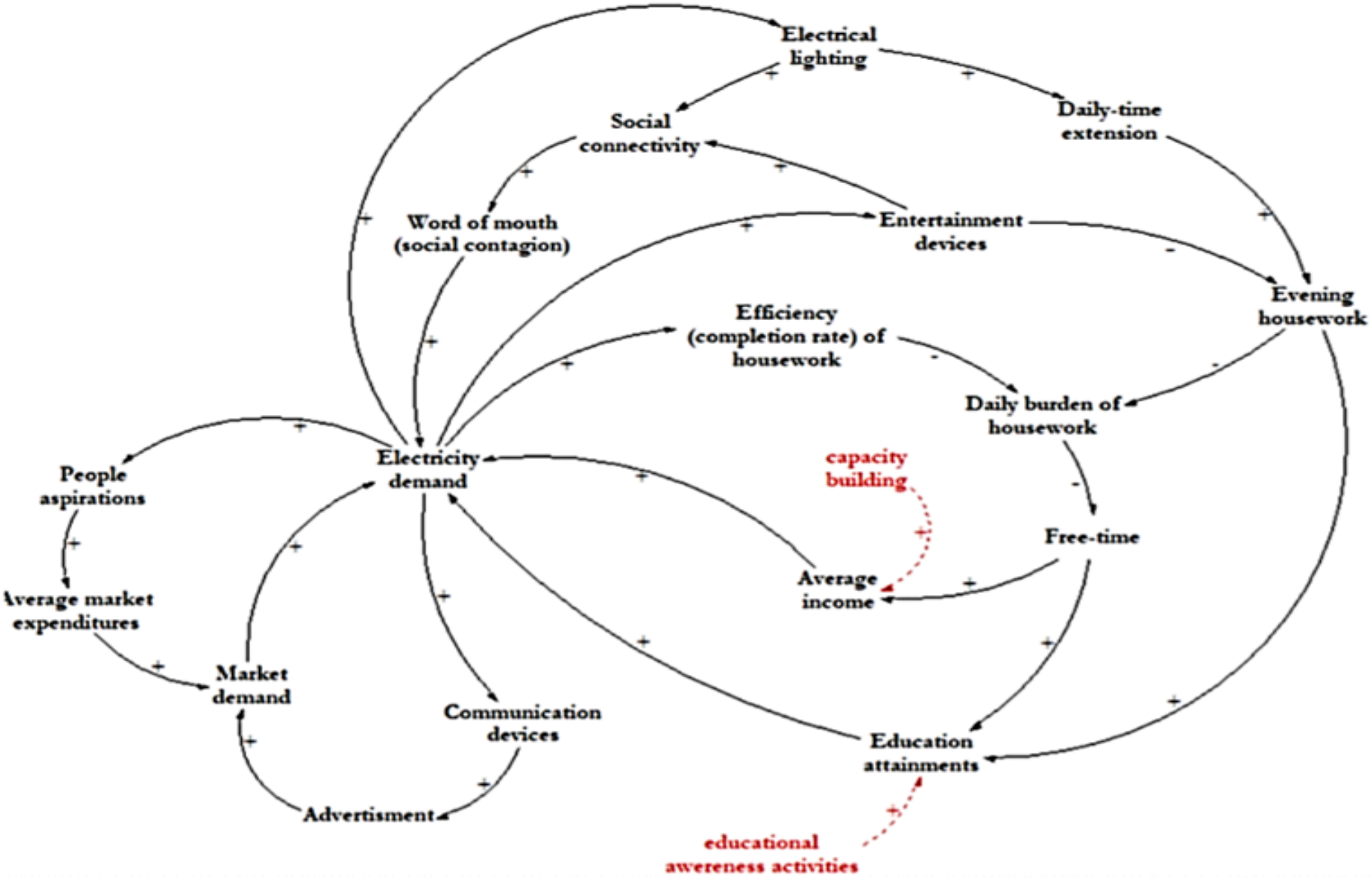
Causal Loop Diagram representing the Dynamics between Electricity Demand & Local Health & Population



Causal Loop Diagram representing the Dynamics between Electricity Demand & Education



Causal Loop Diagram representing the Dynamics between Electricity Demand & Habits & Social Network



SUMMARIZING

These four presentations over the 2 days..

Structure PPPs based on need—don't 'ape', innovate!

- PPPs to resolve energy poverty will require be-spoke designs
- Many of these PPPs will be in rural areas or in urban slums
- Will require community approaches to tap in social collateral for risk management
- Risk sharing appetite and structure of communities different than the traditional public sector
- Need to define clear models based on global and regional experience to date

Setting electricity markets to lower energy poverty

- Improve risk appetite in local financial markets
- Hedge risk by encouraging local RE products manufacturing finance
- Bespoke financial solutions for each demography and locality
- No off-take guarantees and capacity payments rather profit based subsidies for distributed generation
- Let markets define tariffs rather only regulate quality
- Renegotiate the overall energy mix—rethink 20th century models

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Scale through virtually aggregated DG portfolios

- Improving energy access is the need of the hour—despite apparent unreliability of DG and often localized recession in demand!
- NGOs and Communities cannot do this alone—scale is needed!
- Improving the households' ability to pay requires an area/village growth approach…
- Aggregation and scale will bring
  - procurement efficiencies
  - ensure social and environmental safeguards
  - enable better R&D, tech diffusion, and financing modalities
- Mitigate risks to DG and ensure area/village growth approach, bringing real return to communities

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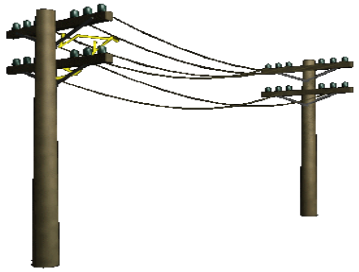
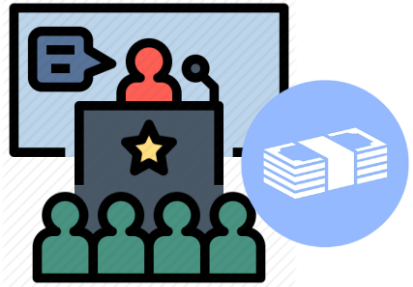
Decommission ‘bad’ power, watch the weather, and adapt

- Decommission bad power—sales of lots/cluster and reuse planning
- Focus on the meteorology and energy/electricity nexus—many gains in technology and AI and prediction are not being utilized for economic and human gains!
- Don’t forget the with RE people’s choices and therefore energy independence is inevitable—adapt traditional systems

Summary = 100% electrification: politics, policies, governance, tech

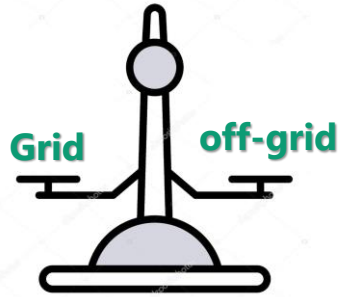




Sustained political commitment and financing

Enabling policies and incentives

Strong institutions



the right balance of grid and off-grid

THANK YOU.