Net Zero Plus

Deep Decarbonization, the Electricity Transition, and the Pursuit of Social Progress

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Place-based deep decarbonization is critical to both climate and economic futures

1. How can regional economies achieve net zero by 2050?

2. How can they create innovation ecosystems and empower people and organizations to do the work of net zero transitions?

3. How can they leverage net zero investments to create widespread societal thriving?

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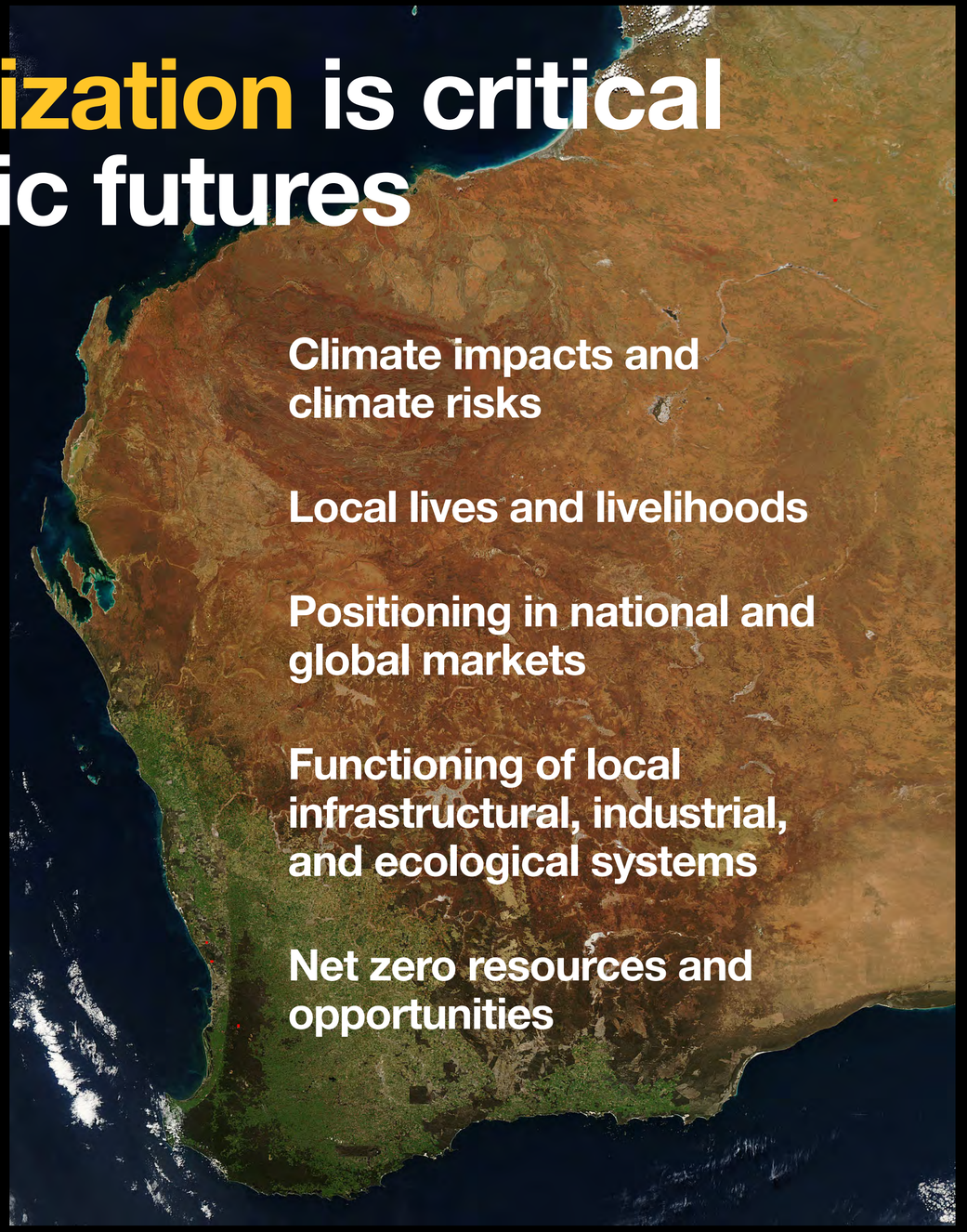

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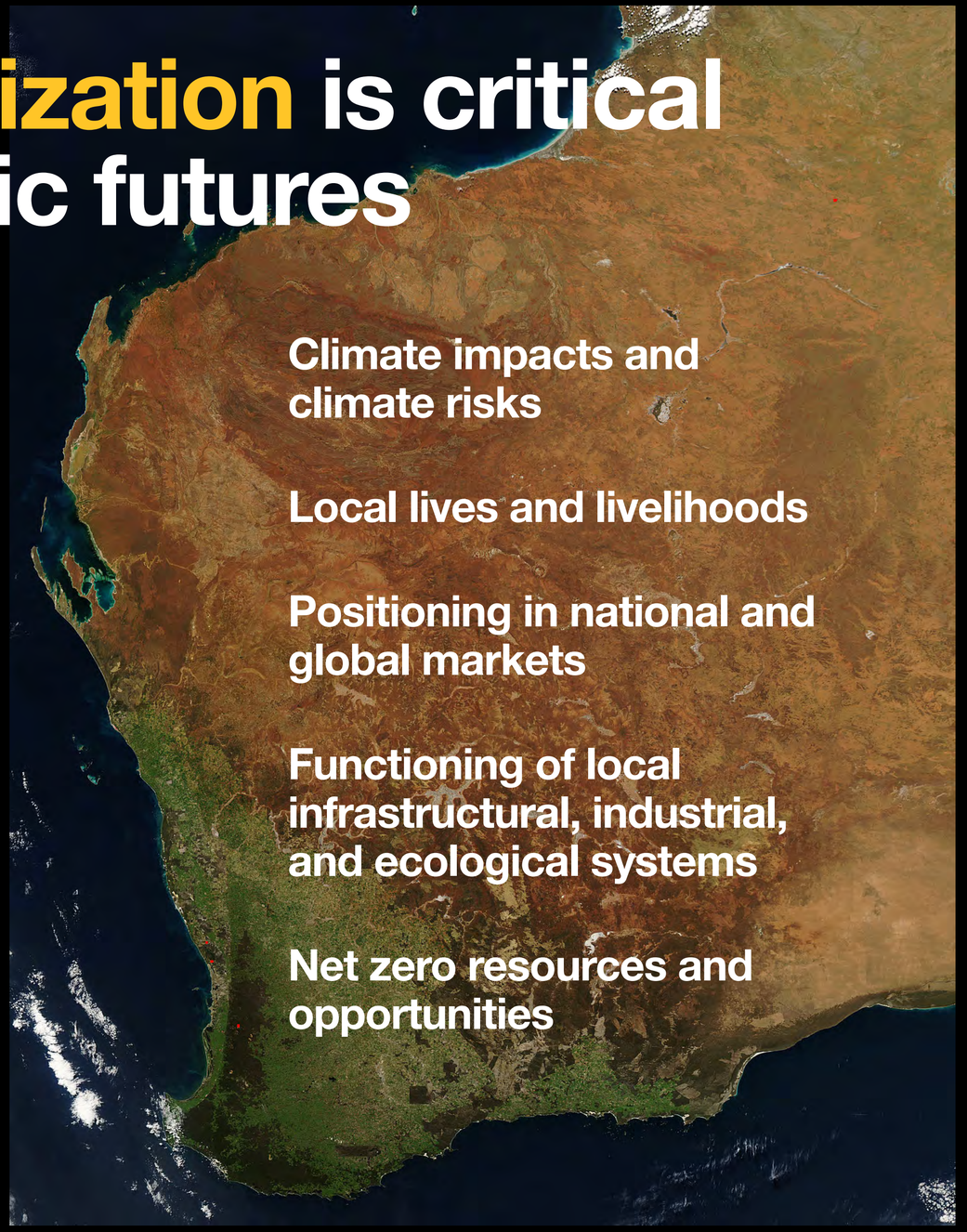

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The opportunity to creatively imagine, invest in, and advance **net zero futures** that catalyze social progress, uplift human lives and livelihoods, and ensure no on is left behind.

The Electricity Transition

A **multi-dimensional transformation** of the organization of electrical systems and their relationships with social, economic, industrial, infrastructural, and environmental systems.

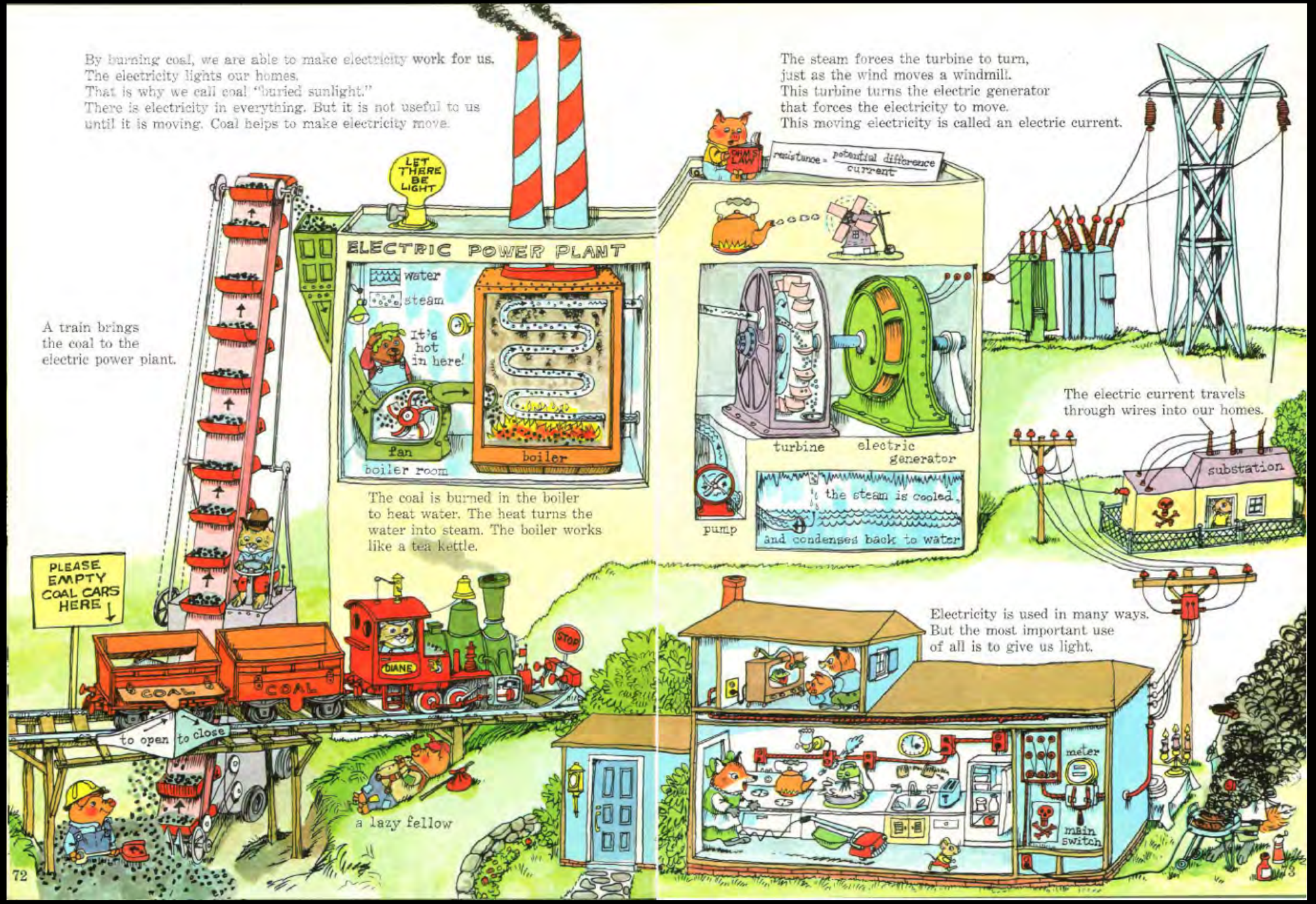
Dimensions of the electricity transition

- Low-carbon electricity generation
- Distributed generation and storage
- Electrification of industry and transport
- Smart grids, IOT, demand flexibility, and virtual power plants
- Prosumers
- “Buy electricity anywhere”
- New temporalities in production and pricing
- Racial and environmental justice
- Unprecedented climate and extreme weather

Electricity shifts from **40%** to **70-90%** of global energy

—

With a corresponding shift in the social power and responsibility of the electricity industry



The electrical system is **socio-technological**

Electrical technologies

Financial and administrative organization

Forms of work and employment

Forms of electrified life

Landscapes and ecologies

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Design Guide

There are many possible net zero futures — **design choices matter**.

Energy transitions occur across **the full complexity of interdependent systems**.

Technology changes drive **social, economic, and environmental outcomes**.

Go beyond co-benefits to identify people-centered goals to supplement net zero.

Three Quick Examples

Exploring the power of electrical decarbonization to transform human outcomes.

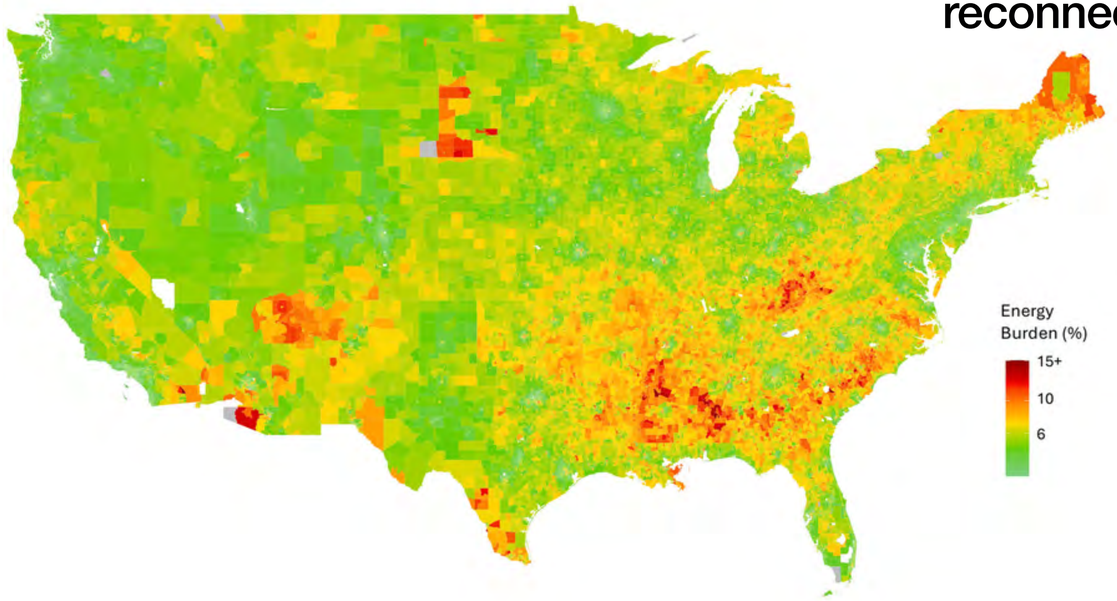
Can we end the nexus of energy and poverty?

20 million US households confront severe energy poverty, with monthly electricity and heating bills that exceed 10% of their monthly income.

- Unable to invest in efficiency
- Trade-off against food, health bills
- Higher health risks
- Disconnections, reconnection fees

Potential Solutions

- Redesign rate structures
- Create ownership of distributed energy assets
- Enhance the social and economic value of energy
- Substantially upgrade energy efficiency
- Universal basic income to cover essential infrastructure services
- Others?



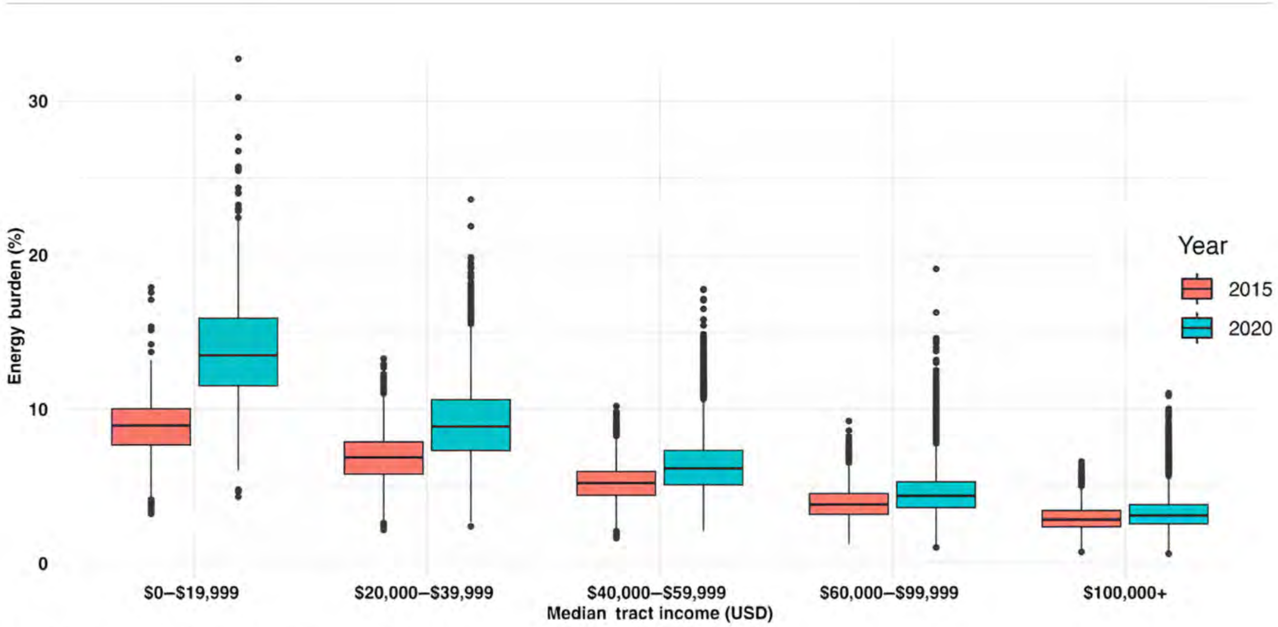
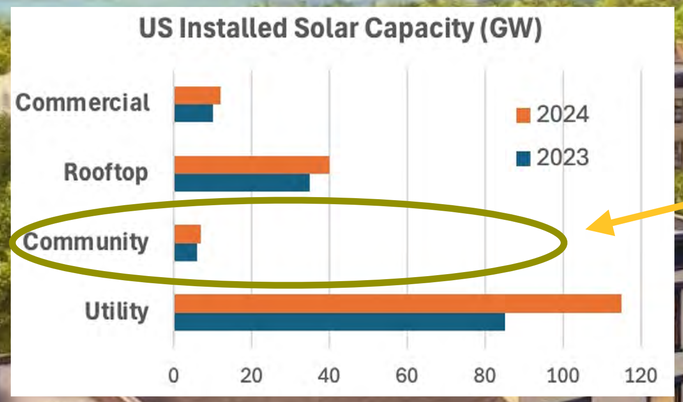


Fig. 2. **Energy burden by median tract income, 2015 and 2020.**

Carlos Batlle et al. ,US federal resource allocations are inconsistent with concentrations of energy poverty.Sci. Adv.10,eadp8183(2024).DOI:10.1126/sciadv.adp8183

Biswas, S., Echevarria, A., Irshad, N. et al. Ending the Energy-Poverty Nexus: An Ethical Imperative for Just Transitions. Sci Eng Ethics 28, 36 (2022). https://doi.org/10.1007/s11948-022-00383-4

Can we integrate solar into communities and landscapes?



Can we add a third pillar of solar deployment growth that creates substantial social and economic benefits for communities?

Potential Benefits Beyond Clean Energy of Integrated Solar and Storage

- Urban and rural aesthetics - design for artistry
- Creation and preservation of habitat - pollinators, birds, snakes, sheep, etc.
- Shade for humans, plants, and animals
- Integration into farm or building operations
- Revenue streams and coop ownership
- Jobs and small businesses
- Climate and heat resilient microgrids
- Low-cost EV charging
- Backup electricity generation
- Solar filtering for plants and creation of microclimates that retain soil moisture
- Surface area chemistry applications

Can we charge cars in the daytime?

Significant Upsides for the Grid and Beyond

- Cars serve as grid storage - and possibly providers of low-carbon grid services and home electricity backup generation
- No need for duplicate batteries - reduces supply chain, lifecycle, and recycling challenges
- Dramatically reduces future demand for nighttime, low-carbon electricity supply
- Low-cost solar electrons power low-cost, low-carbon transportation energy needs
- Can readily utilize high-availability locations like car parks
- Creates a perk for workforce in competitive labor markets
- Addresses the need for EV charging solutions for renters

So What's the Problem?

- **Multi-organizational problem-solving**: parking, building, electricity, charging, employer
- **Multi-dimensional problem-solving**: parking behavior, rate structures, charger profitability, regulatory policy, utility preferences, technological redesign

Thanks.

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