Devil's Advocate Discussion: From Scholar to Resident

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Disclaimer

- *All views are personal*
  - Built on experience spanning academia, advisory, consulting, and even entrepreneurship
- Background
  - Extensive RE background, including being part of the Clean Energy Finance Forum
  - Worked on Smart Grids before it was SG (aka Smart Meters)
    - Tech. Advisory Board for SmartConnect, $1.2B SG project of SCE
    - Set up the Govt's Smart Grid Task Force and the India Smart Grid Forum (Advisor to both bodies)
  - Interdisciplinary
  - Professor/Scholar/Advisor/Consultant/Troublemaker
  - Resident's Association Exec. Committee Member

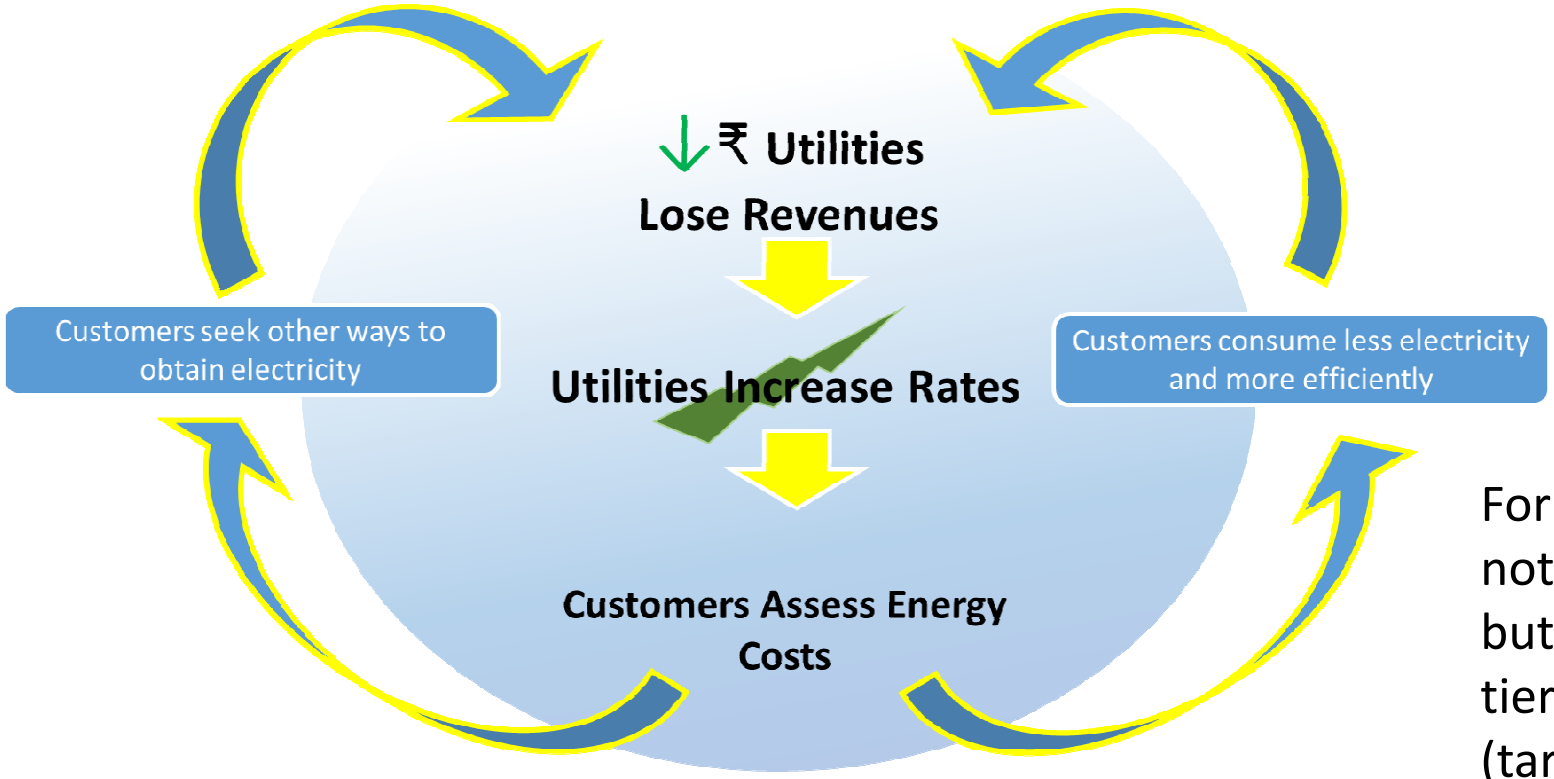
Simplifying the problem

- Is it about avoiding diesel?
  - Possibly, but solar will operate even when there is power supply
- Is it about a particular number? LCOE?
  - Buildings care about predictability
  - Their discount rates are also higher than EMI rates
- Fundamental issue – you WILL need a battery if its diesel you want to avoid
  - What is right-sizing?

Differentiating Diesel and solar

- Diesel
  - Could be 13-18 Rs./kWh marginal cost (depends on loading)
  - Contrary to popular belief, has a non-trivial fixed and O&M cost
  - Want to minimize its use
- Solar
  - Want to maximize its use
  - Adding a battery will ~double the costs for *said* kWh
    - 30% losses are there in the battery, raising costs 50% directly (excl. battery capex)
  - Much of its use may not align
    - Outages – can be long
    - Local demand – would you then feed it in?

India is (luckily) not YET the West



Adapted from : The Appalachian Voice

"Utility Death Spiral"

For India, it's not renewables but theft and tiered slabs (tariffs) that can have similar impacts

Sizing estimates for *my* 400+ sized apartment complex in Bengaluru

- Has gym, pool, etc. And LIFTS.
  - Not full back-up
- Lot of energy is spent for handling water
- Common area can go into hundreds of kW load
- Per apartment – minimal or full?
- Assuming 1:1 solar sizing (5 hours solar equiv.)
  - This property needs between 40,000-80,000 sq.ft. of panel
    - Even at very, very low per household backup, 10% of DG sanctioned, needs some 30,000 sq. ft. of PANEL.
      - Not assuming ACs
- How many hours? Average is very, very misleading
  - What does 20 min. mean? Lots of zeroes, some hours

Some constraints

- Maintenance and O&M (incl. cleaning) is non-trivial
  - Affects PLF
- Roof ownership/rights – can be a terrace sold to a penthouse
- Solar water heaters – mandatory in Bengaluru
- Helipad? Mandatory if property is taller than 60m
- How long are outages?
  - There are and will be outages longer than 5 hours, esp. repairs and faults
- NOTE: All official data on outages are …*incomplete*

How to make it happen…Options

- Bring in a truck with DG to fill in whenever solar isn't enough (3-5 days in a year??)
- If you have to have the battery anyways, why not charge it via mains?
  - ***Synergize with solar to the extent available and cost-effective***
- Reduce the demand when there is an outage – allow lifts, lighting but not swimming pool filters or borewells (unless water supply is down)?
  - **SMARTS go hand in hand with RE**

Parmenides Fallacy

"Comparing the future with the present, instead of alternative futures"

If we're being smart...

- Why not just be smart about power supply? Zero-load-shedding modes
- Only have to cater to issues of faults
  - Separate the *option* of power from the supply of power
  - 1 hour average backup (includes some no loss days and occasional longer)
    - This might be most cost-effective via diesel today

Solar costs and benchmarks

- Versus diesel
  - Must consider a battery, at the very least
- Rooftop
  - This becomes an unfair comparison of retail prices with production costs
  - One method of valuing intermittent RE is negative demand – procurement level is marginal cost of coal
- So why limit to rooftop? Any vacant land, even if nearby or outside town, can supply solar power
  - It's a pricing, policy, and coordination issue (technical loss reduction still happens)

We must end diesel!

- We might not need solar to make that happen