



Distributed Energy Resources And The “Utility Death Spiral”

what it is
why it is happening
what to do (and not do) about it

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Overview



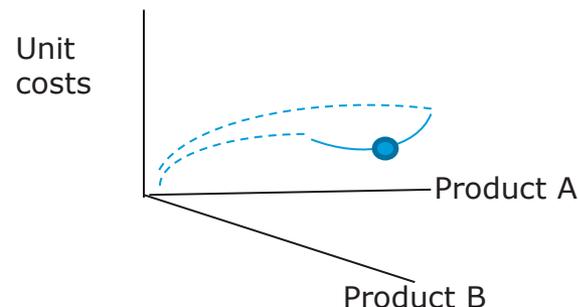
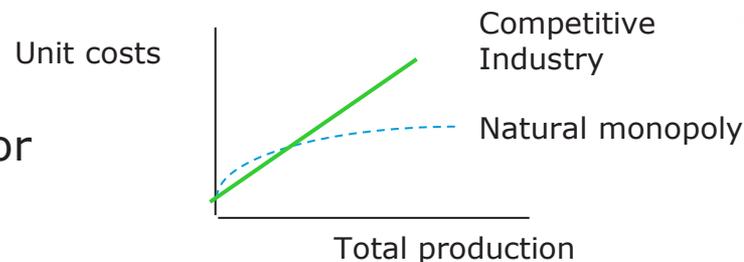
- Distributed energy resources (DER) -- solar, micro-CHP, storage, and efficient energy management systems -- are the focus of intense innovation, cost reductions, performance enhancement and business model innovation
- As a result, DER are increasingly eroding the volumetric sales of electricity by utilities, leaving utilities with fewer kWh and kW of sales over which to spread their fixed and operating costs
- At the same time, increasing utility investment in T&D assets for resilience, security, smart-grid and other purposes is increasing fixed costs
- The widely anticipated result is a feedback loop of increasing rates, accelerating loss of sales to DER, with the potential to render many utility investments in both core businesses and DER uneconomic
- This creates profound challenges to the deployment of clean tech and the current regulated utility business models

Our analysis suggests the best solution for all stakeholders is to use competitive business models to deliver DER and reserve cost-based regulation for core monopoly services.

Theory



- “Natural monopolies” are a market failure created by subadditive costs and transray convexity in cost structure across products or customers
- (In English, cheaper to make more than less; cheaper to serve multiple customers than single customers)
- Cheaper competitive ways to provide energy services (e.g., solar & efficiency) and firm capacity (e.g., distributed CHP) flatten out both curves and erode the natural monopoly market failure
- However, they may not fully eliminate another critical market failure – “public goods” – where the social value is greater than society’s revealed willingness to pay



- Addressing this emerging problem is especially important for key social values like universal service and decarbonization

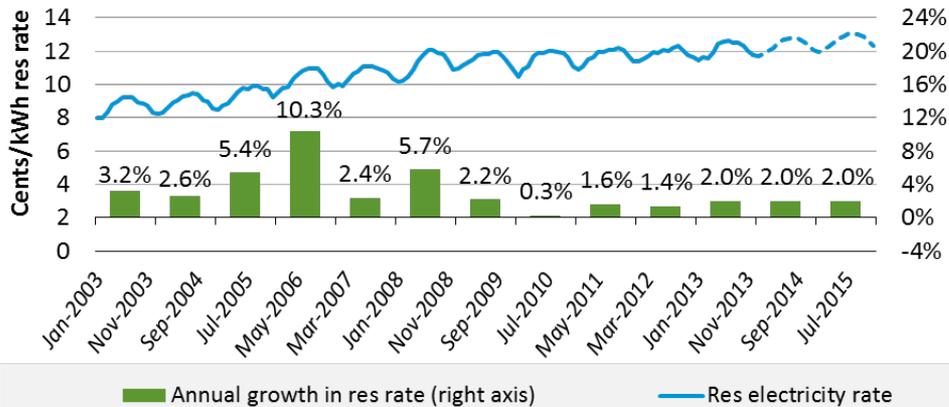


*We still need highways, the Post Office and the SPTN
but they are hard to pay for*



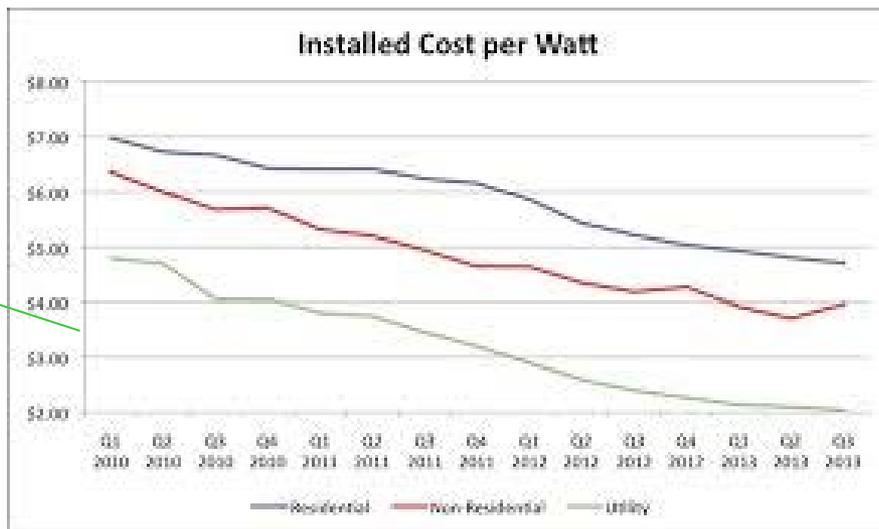
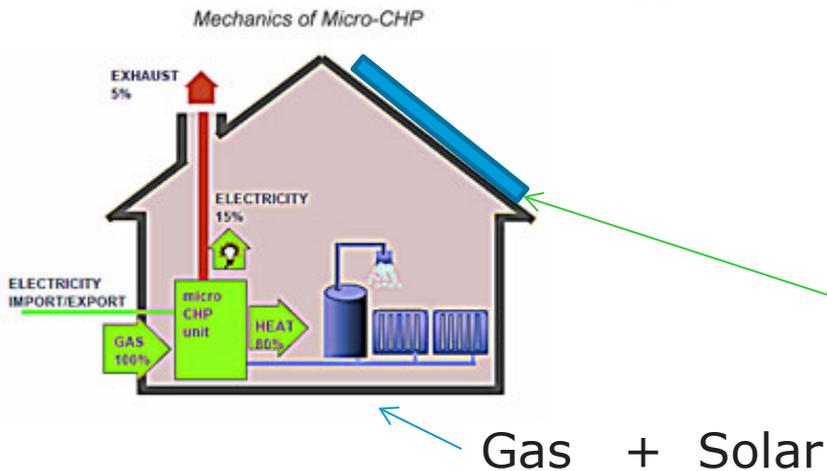
Facts

U.S. Residential electricity rate (left axis) and % annual growth (right axis)



EIA 2012

- Regulated utility rates growing
- Distributed solar costs falling
- End use efficiency is escalating
- MicroCHP can optimize home heating by co-producing electricity for ~5 cents/ kWh
- EV battery production scaling
- Resiliency is the new hot product

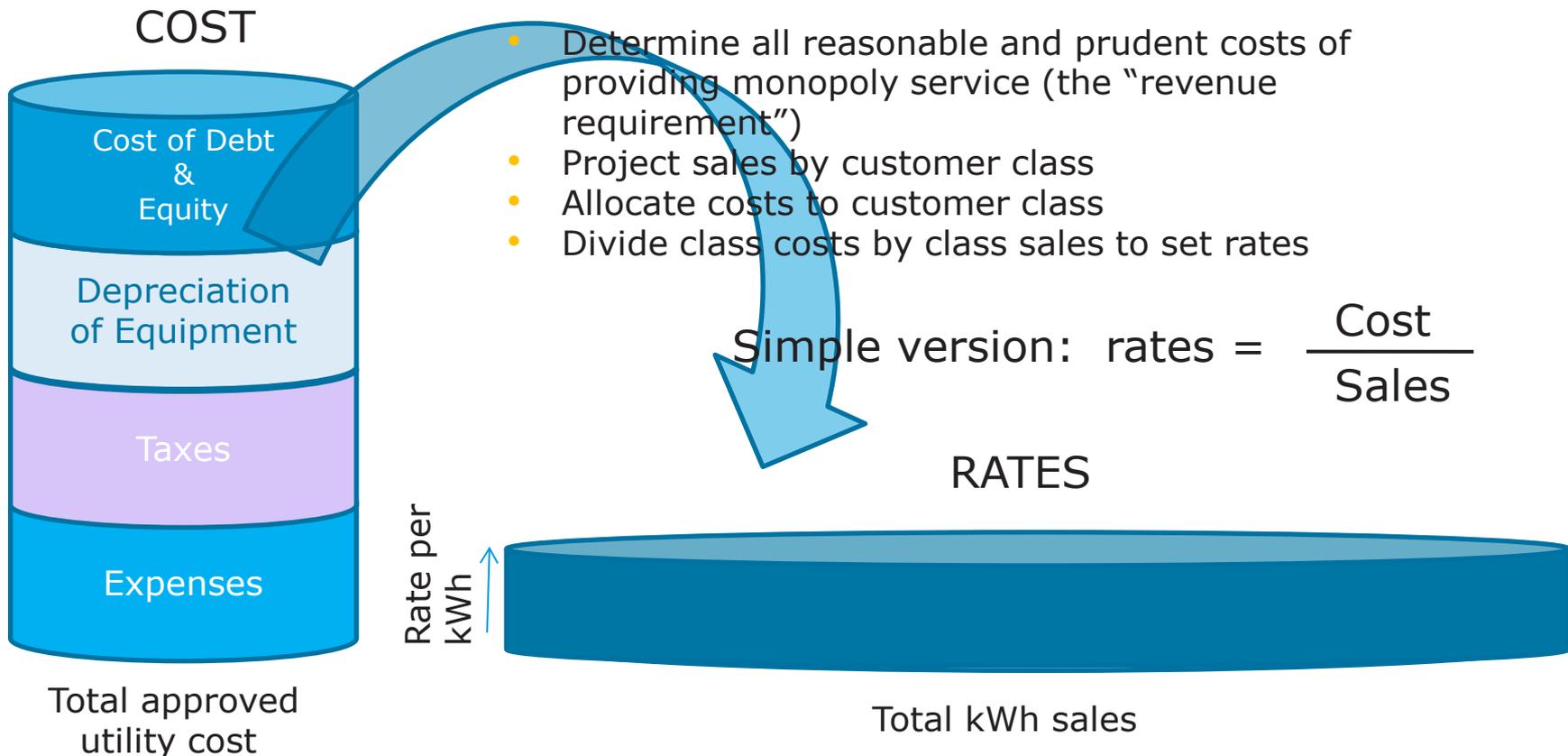


Monopoly costs are rising while competitive alternative costs are falling



Practice

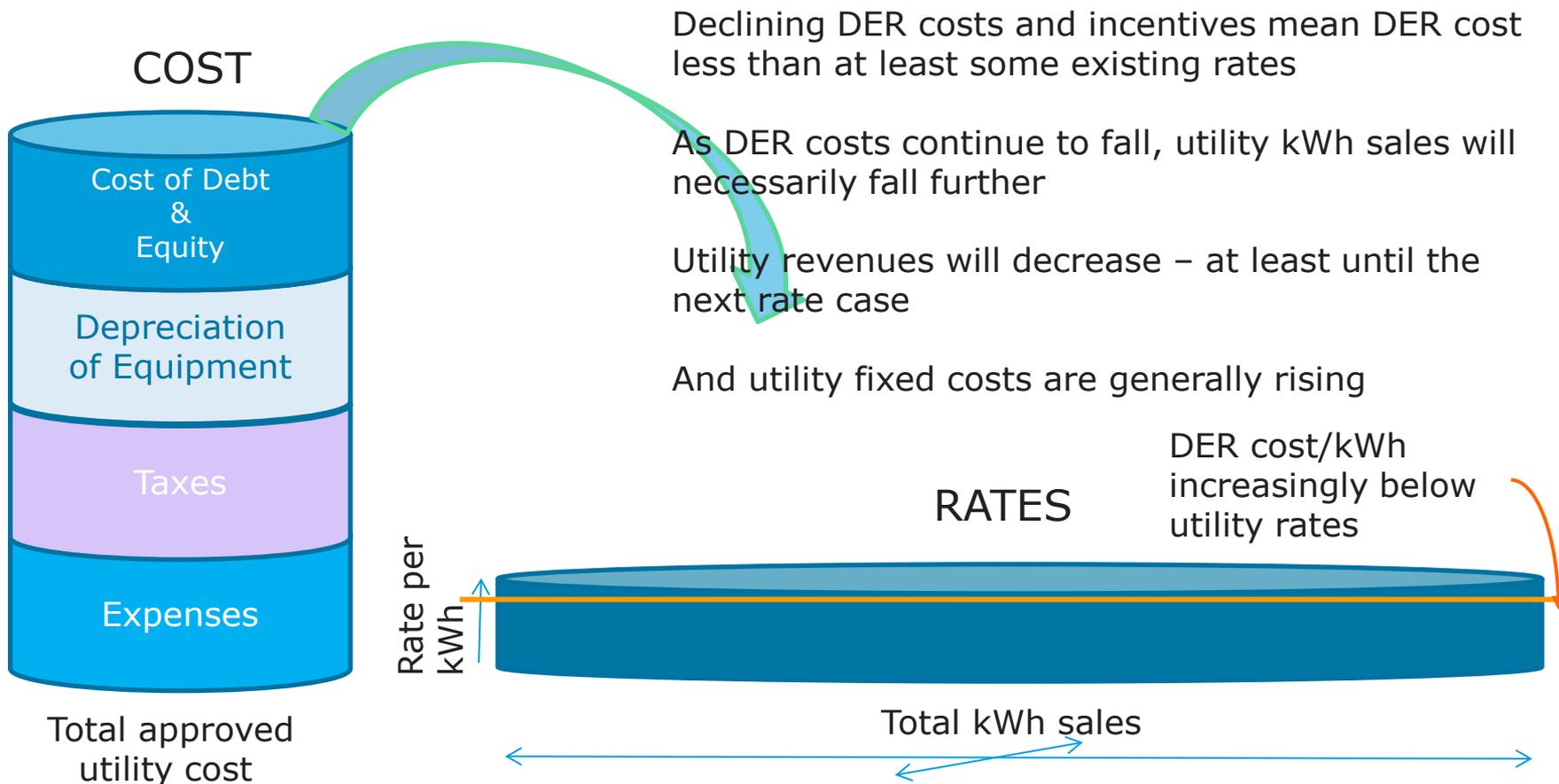
Traditional utility ratemaking -- costs and rates



Higher costs and lower sales both increase rates

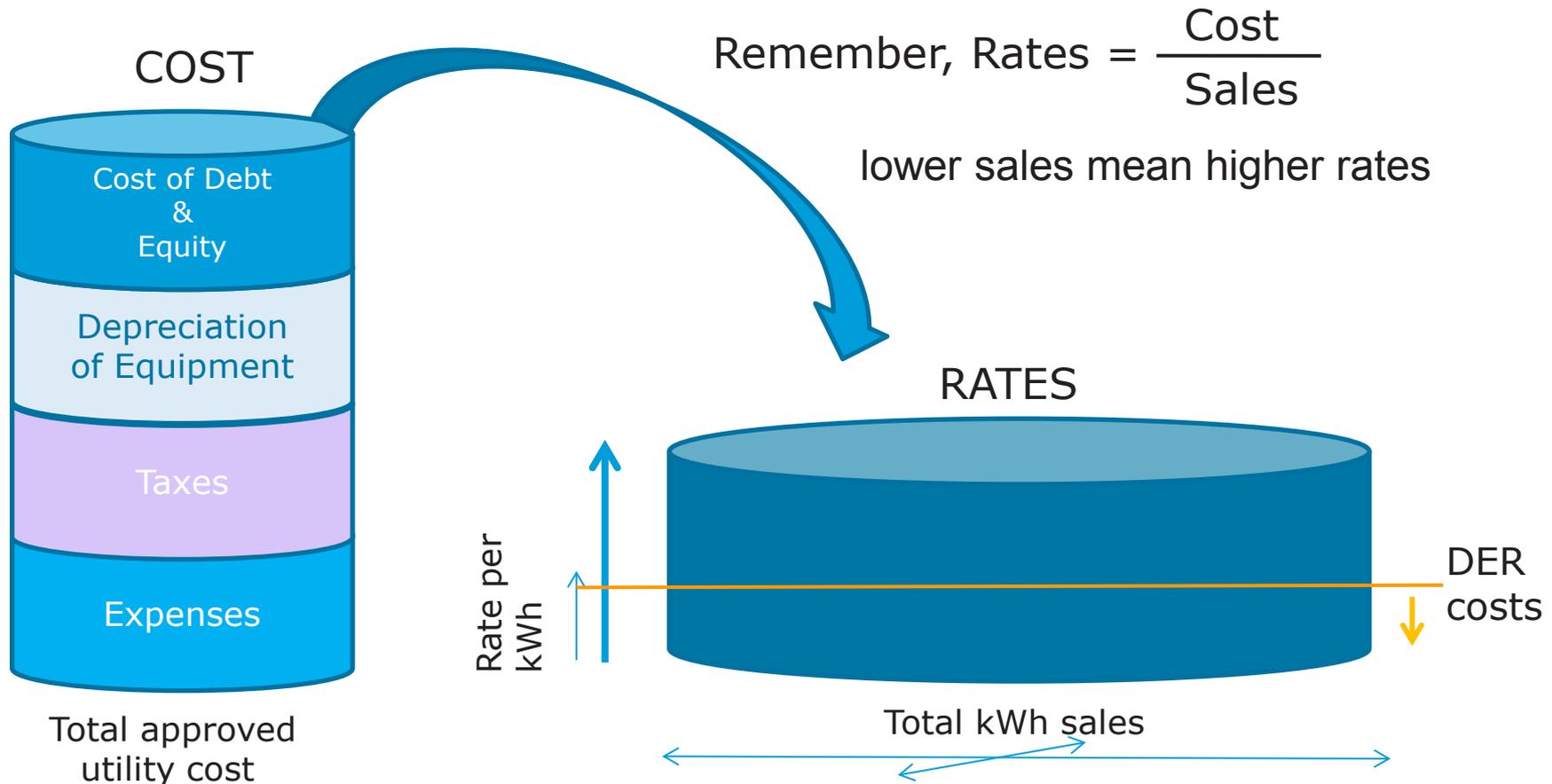


DER is becoming cheaper than regulated rates



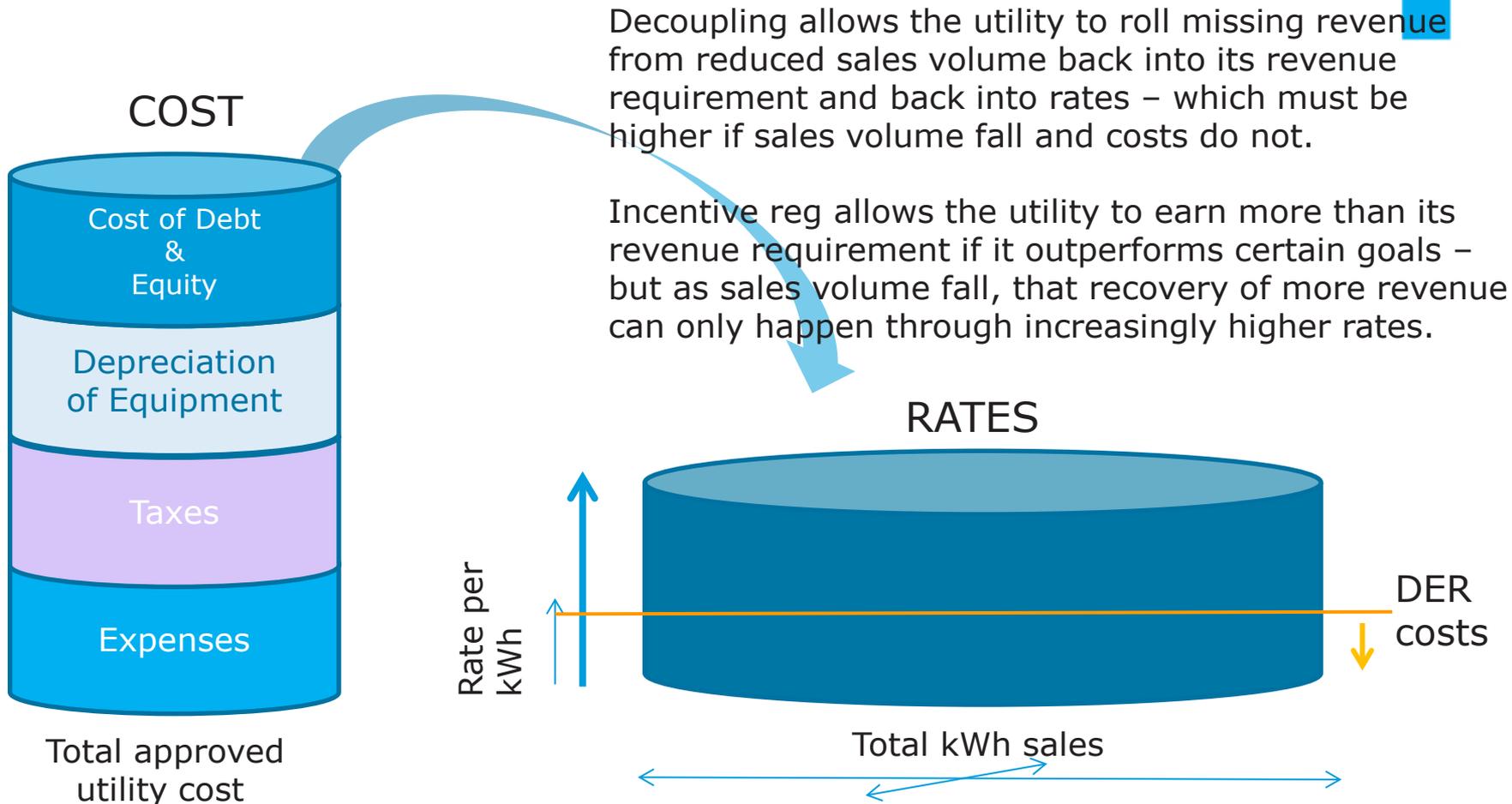
*Reactions include attacks on net metering, rate redesign (straight-fixed-variable rate design, and a widespread quest for the "Utility 2.0" -- usually providing more incentives for utilities **to do DER as part of their regulated natural monopoly***

The impact – a feedback loop of ever higher rates and cascading loss of sales to DER



These higher rates make DER even more attractive, induce more DER entry and economies of scale, leading to even higher rates, etc. The risk of under-recovery is widely expected to cause utility cost of capital to increase, accelerating the spiral even further.

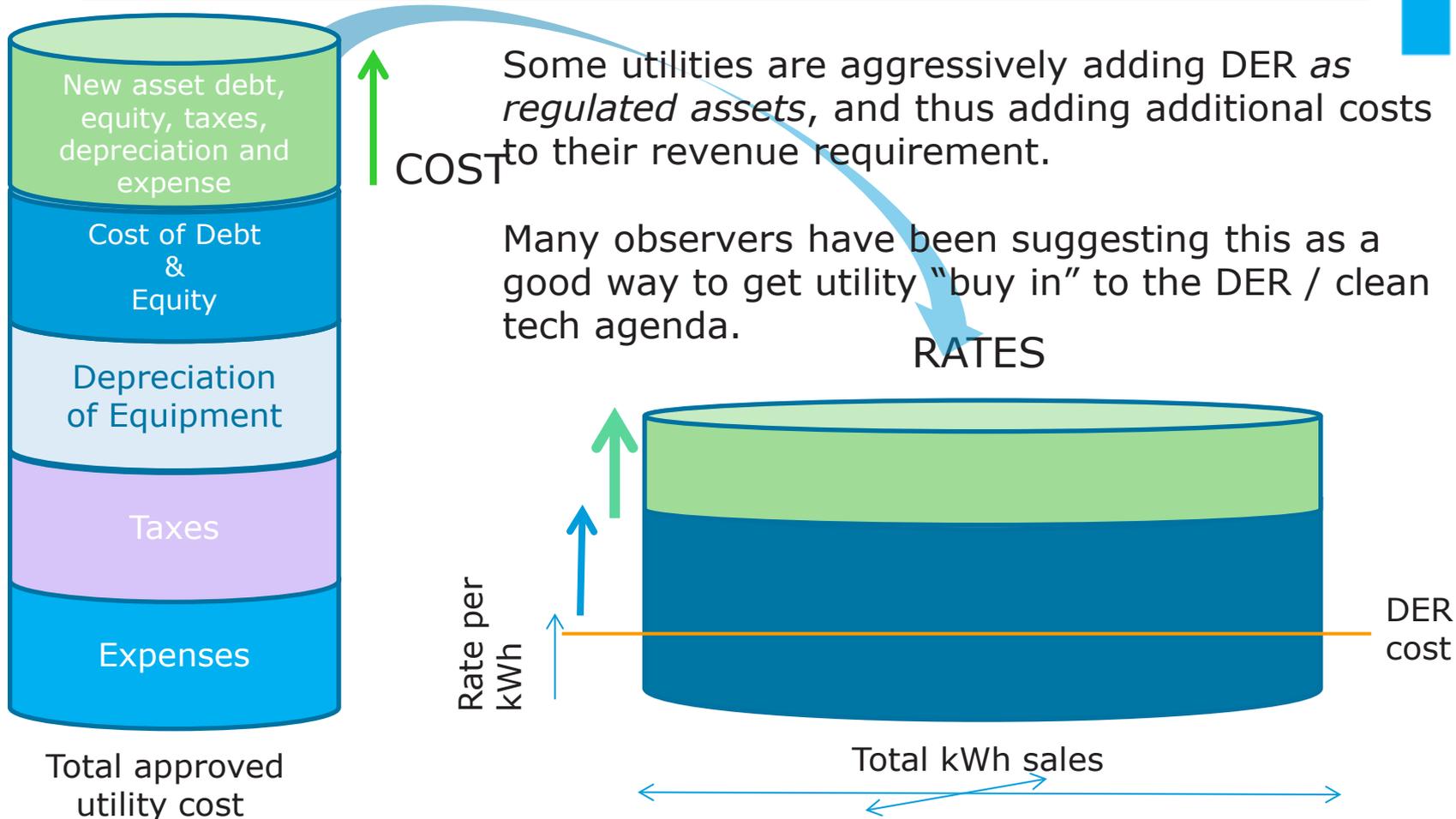
What about “decoupling” and “incentive regulation”?



Neither PBR nor decoupling change the basic math or avoid the “death spiral”



What about allowing (or requiring) the utility to grow by adding regulated DER to its ratebase?



Some utilities are aggressively adding DER as *regulated assets*, and thus adding additional costs to their revenue requirement.

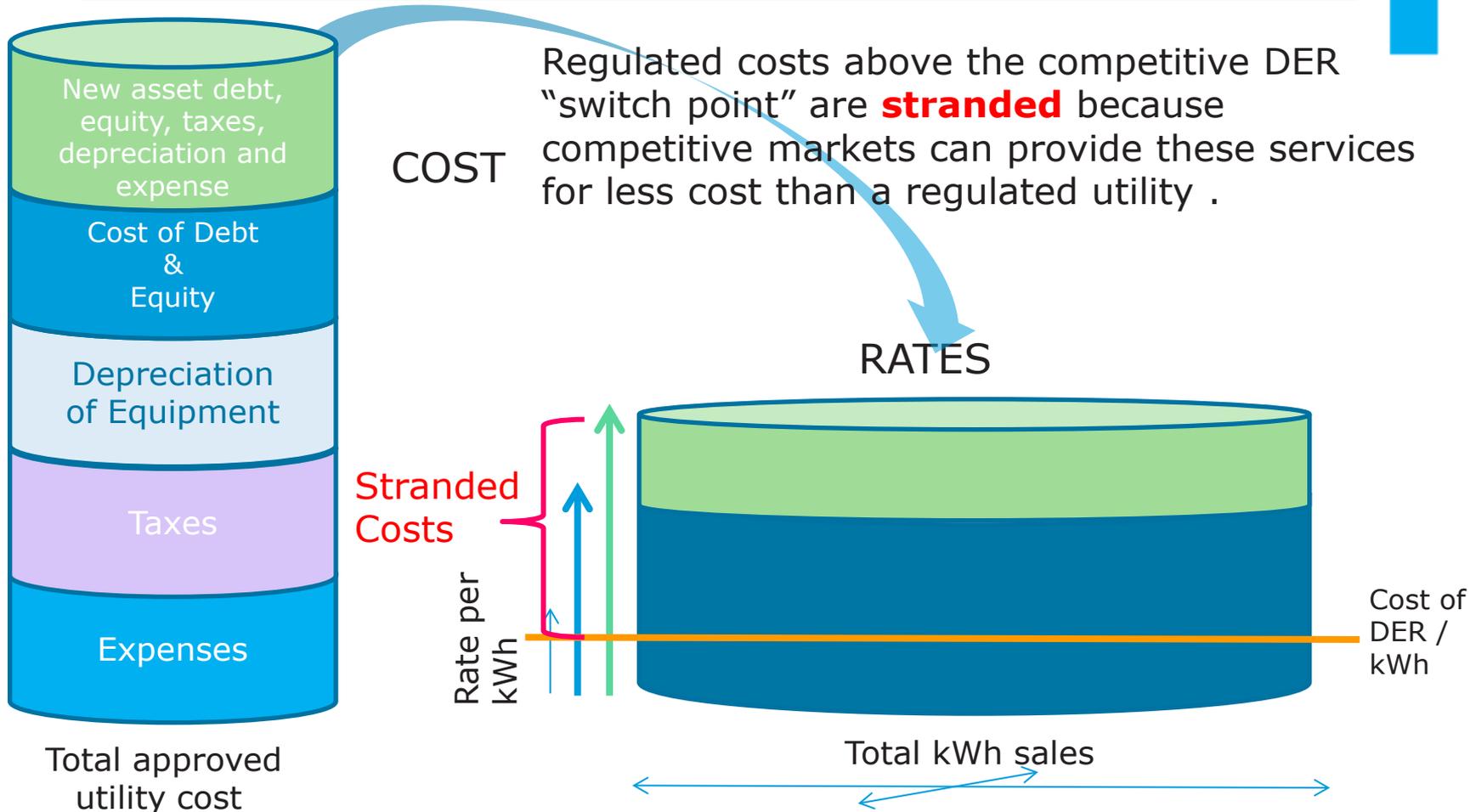
Many observers have been suggesting this as a good way to get utility “buy in” to the DER / clean tech agenda.

The arithmetic suggests this is a poor strategy: A even bigger numerator and a smaller denominator can only accelerate the death spiral.

A sustainable path must recognize that DER costs will constrain utility cost recovery, and hence its ratebase and revenue requirement



Regulated rates above the cost of competitive alternatives mean stranded costs and wealth destruction



COST Regulated costs above the competitive DER "switch point" are **stranded** because competitive markets can provide these services for less cost than a regulated utility .

RATES

Stranded Costs

Rate per kWh

Cost of DER / kWh

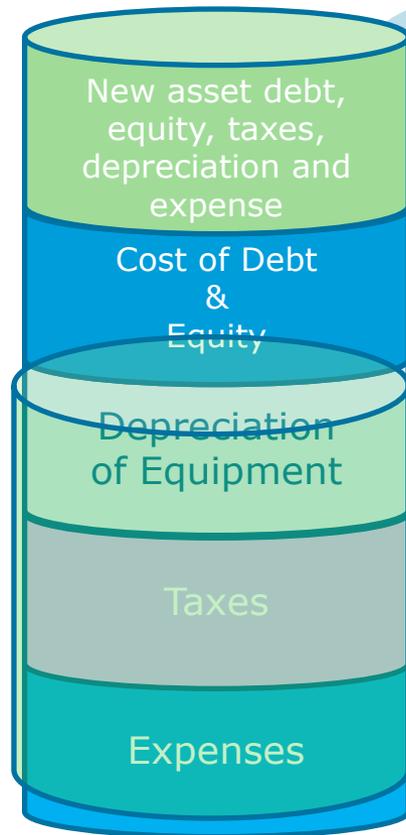
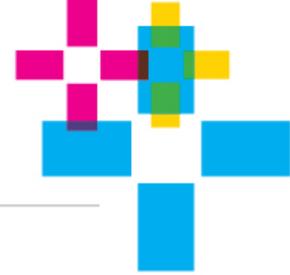
Total approved utility cost

Total kWh sales



The preferred strategy -- across the entire value chain -- should be to avoid and minimize regulated stranded costs. The alternative is political and legal fights over who should get stuck with them.

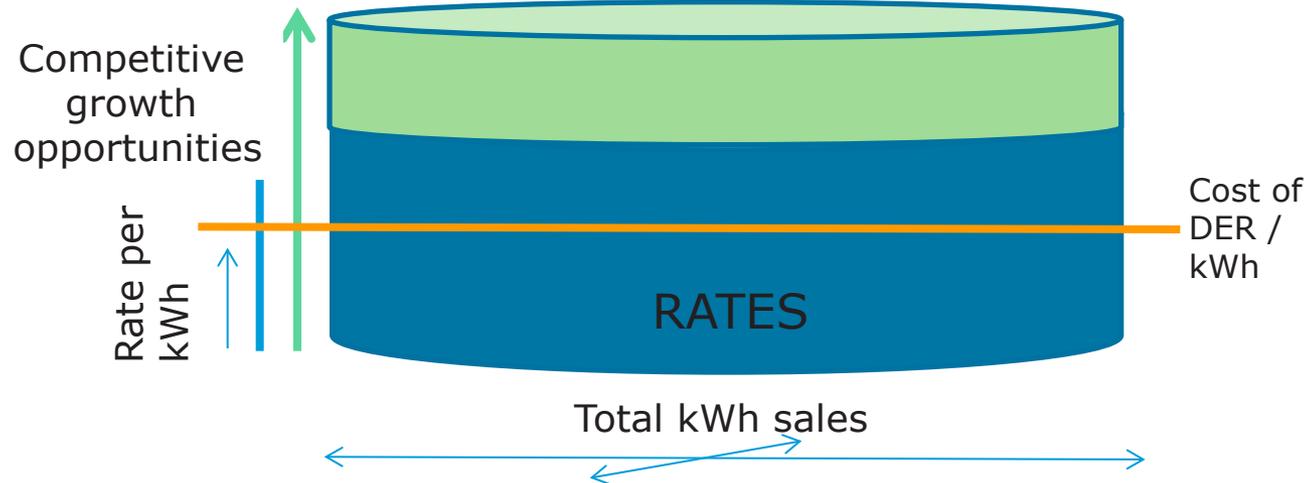
If regulated DER growth, incentive rates and decoupling don't work, what does?



Total approved utility cost

COST

1. Don't add DER to ratebase
2. Shrink existing ratebase to stay under the DER constraint
 - sell or spin regulated assets (microgrids and ESCOs) associated with DER to competitive DER providers
 - Focus on competitive investments that increase efficiency and reduce cost of grid
3. Use PBR & decoupling, not to grow, but to sustain core
4. Focus growth on DER through unregulated, arm's length affiliates, partnerships and innovative business models



A “right-sized” core of regulated assets that ensures universal service and a healthy return for investors, plus a vibrant competitive DER market that assures clean tech innovation, deployment and maximum customer value.