Community-scale Solar: Cost reduction & community ownership

Opportunities for Alberta to leverage community solar

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Roadmap

① The community-scale solar opportunity

② (Virtual) net metering

③ True cost of solar

④ Democratizing energy systems

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Community-scale solar can achieve costs comparable to utility-scale solar while providing distributed benefits

	BEHIND-THE-METER	COMMUNITY - SCALE	UTILITY - SCALE
TYPICAL SIZE	5 KW-0.5 MW	~0.5-5 MW	20-100MW
ENERGY USER	Households Businesses	1) Subscribers (residential, C&I, MUSH) 2) Utility Customers (coops, munis, and IOUs)	Utility Customers (Primarily IOUs)
INTERCONNECTION	Behind-the-Meter	Distribution Grid	Transmission Grid
DISTRIBUTED BENEFITS?	Yes	Yes	No
LEVELIZED COSTS	8–16 cents/kWh	4–9 cents/kWh	3–7 cents/kWh

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Net metering: a blunt tool for market establishment

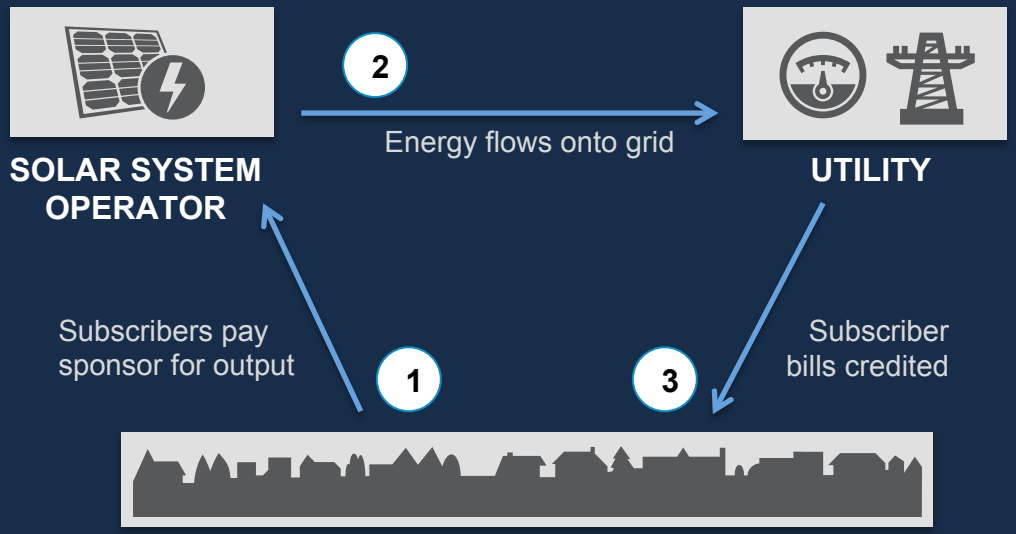
Net Metering
Solar systems are compensated for excess generation at the rate at which on-site customers purchase grid-supplied electricity

…& its cousins: blunter tools for market evolution

Iterations on net metering substitute for longer term policy & market development

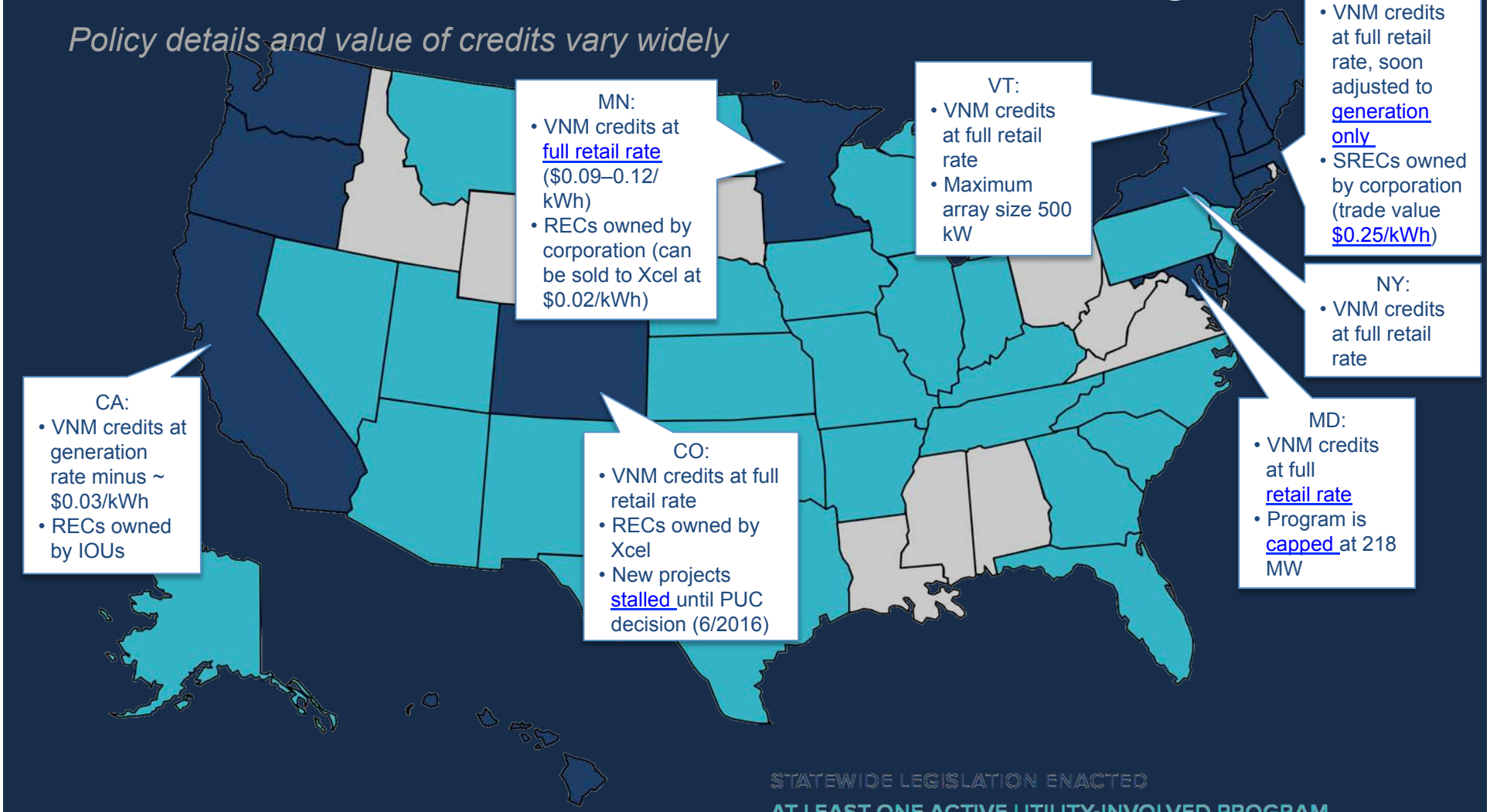
Virtual Net Metering

Solar systems are compensated for excess generation at the rate at which on-site customers purchase grid-supplied electricity… but on-site customers can be "virtual"



14 U.S. states have enacted virtual net metering

Policy details and value of credits vary widely



But…there's more to community-scale solar than VNM

Cooperatives and other utilities may be attracted by the economics of medium-scale, distributed solar electricity

		Counterparties
ELECTRICITY MARKET REGULATION	A) Wholly or self-regulated	***Vertically integrated IOUs***
		Munis or coops
	B) Deregulated generation & transmission	***G&T coops***
		Wholesale power producers (IPPs)
	C) Deregulated retail	***Distribution coops***
		Net metered or valued DER providers
		Wholesale power retailers

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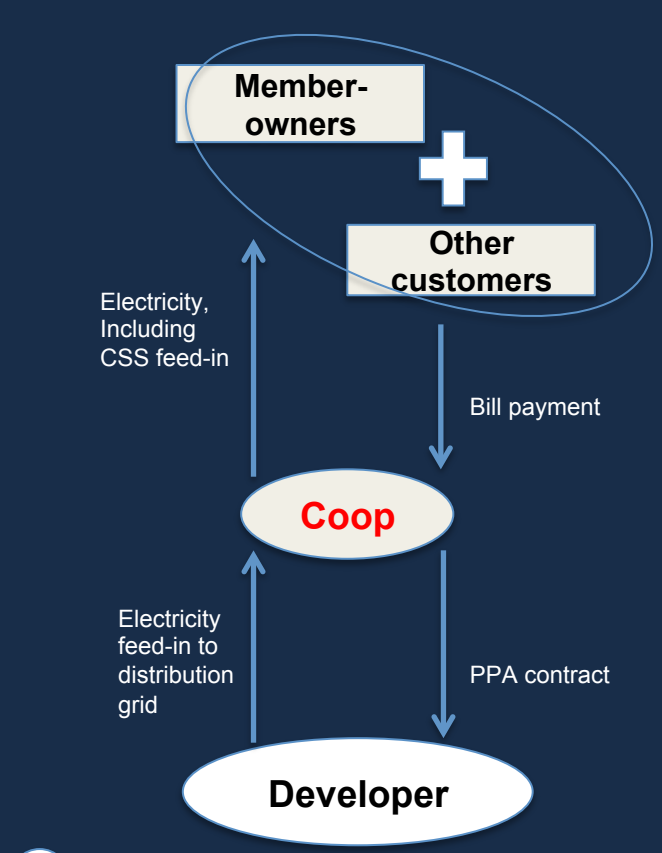
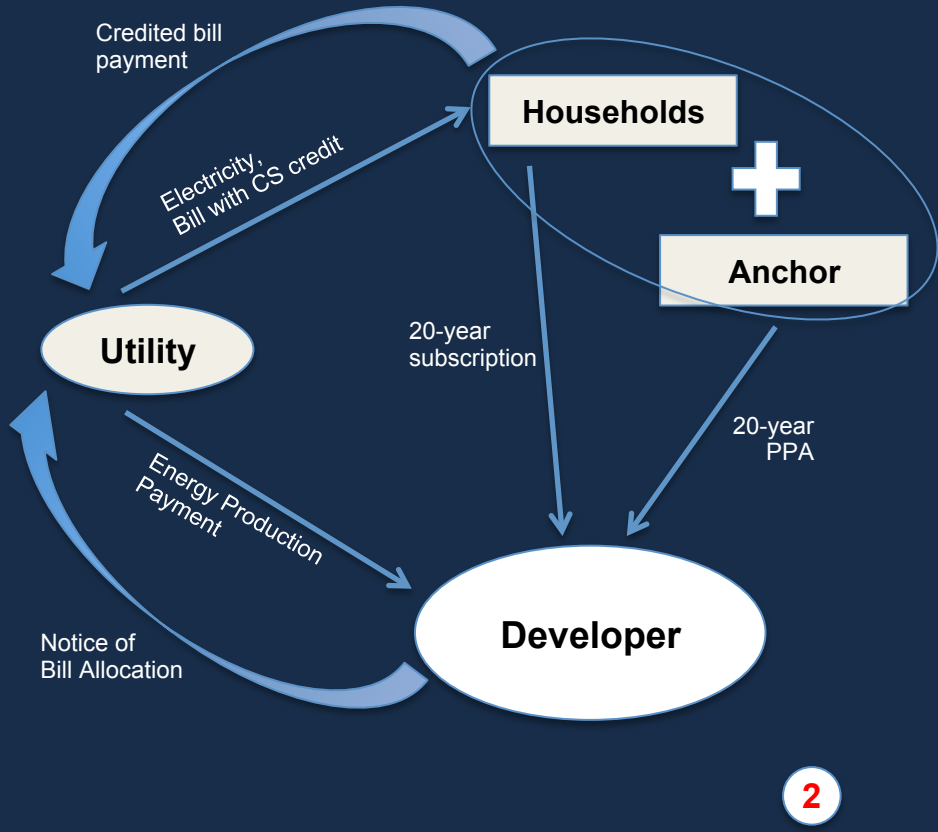
Economics may support progressive (cooperative) utilities

Especially if they band together to procure collectively, bringing down individual costs





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Are all electrons made equal?

Do retail rates adequately approximate the value of solar to the grid and society?

Net metering

Solar systems are compensated for excess generation at the rate at which on-site customers purchase grid-supplied electricity

Value of Solar Tariff (VOST)

Solar systems are compensated for any generation at a unique rate, while on-site demand pays for grid-based electricity at the traditional rate

Market catapult or catatonia?

Experimental valuations of solar have not been widely adopted in the United States

Net metering
Solar systems are compensated for excess generation at the rate at which on-site customers purchase grid-supplied electricity

Value of Solar Tariff (VOST)
Solar systems are compensated for <u>any</u> generation at a <u>unique rate</u>, while on-site demand pays for grid-based electricity at the traditional rate

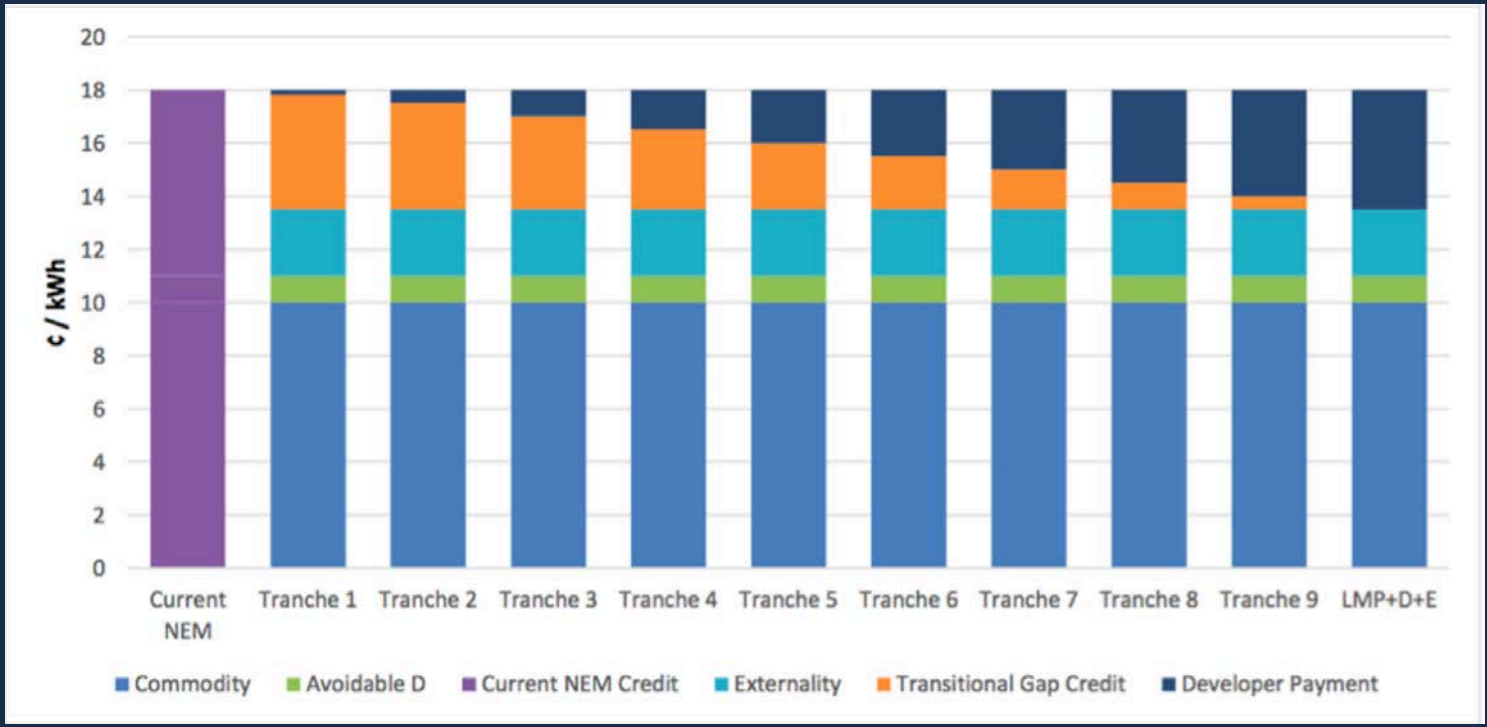
"Factors that affect VOS rate may include:

- Utility variable costs (fuel and purchased power)
- Utility fixed costs (generation capacity, transmission, and distribution)
- Distribution system and transmission line losses
- Ancillary services (to maintain grid reliability)
- Environmental impacts (carbon and criteria pollutant emissions)"[1]

[1] *From the National Renewable Energy Laboratory (NREL) – Value of Solar Tariffs*

NY REV process in search of "interim" NEM successor

New York State may be the first to break the bottleneck – but will it leverage the full potential value of community-scale solar?



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Defining energy democracy & ownership

Choice

Asset Ownership

Resilience

Buy-in

Voice

Access

Solar asset ownership is complicated in the U.S.

Federal solar incentives prefer to harness the power of tax liability

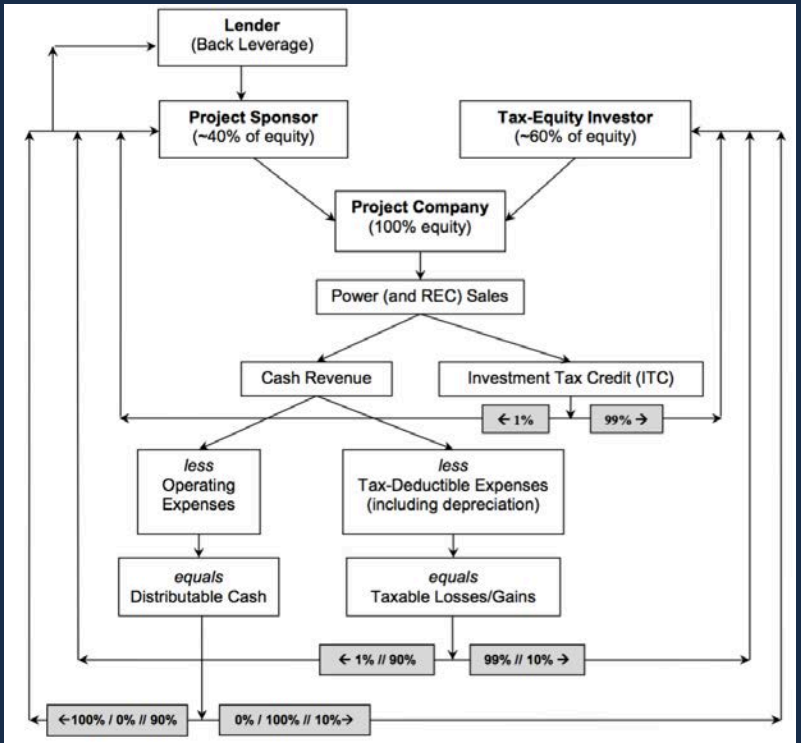


Figure 1. Schematic of the Partnership Flip structure (with back leverage)

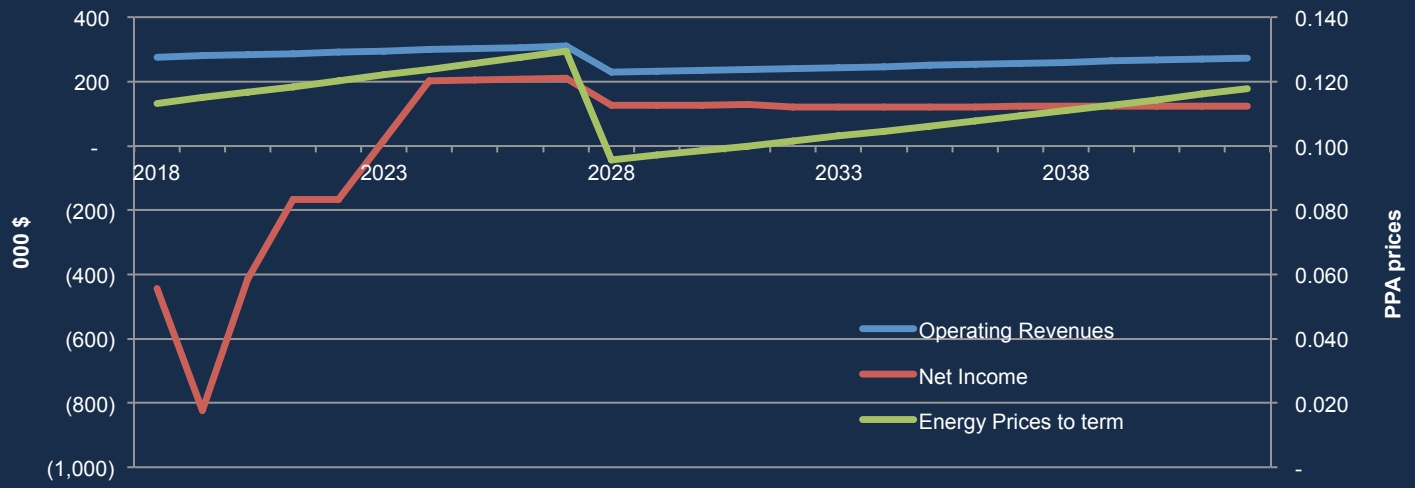
The single slash in the shaded boxes indicating the allocation of distributable cash signifies the end of the sponsor's initial investment-recovery period, while the double slash in those same boxes, as well as in shaded boxes indicating the allocation of taxable losses and gains, represents the return-based flip in allocations.

[1] *Figure adapted from Bolinger, Harper, 2009. Published in NREL* Emerging Opportunities and Challenges in Financing Solar, 2016

Local solar asset ownership even more so

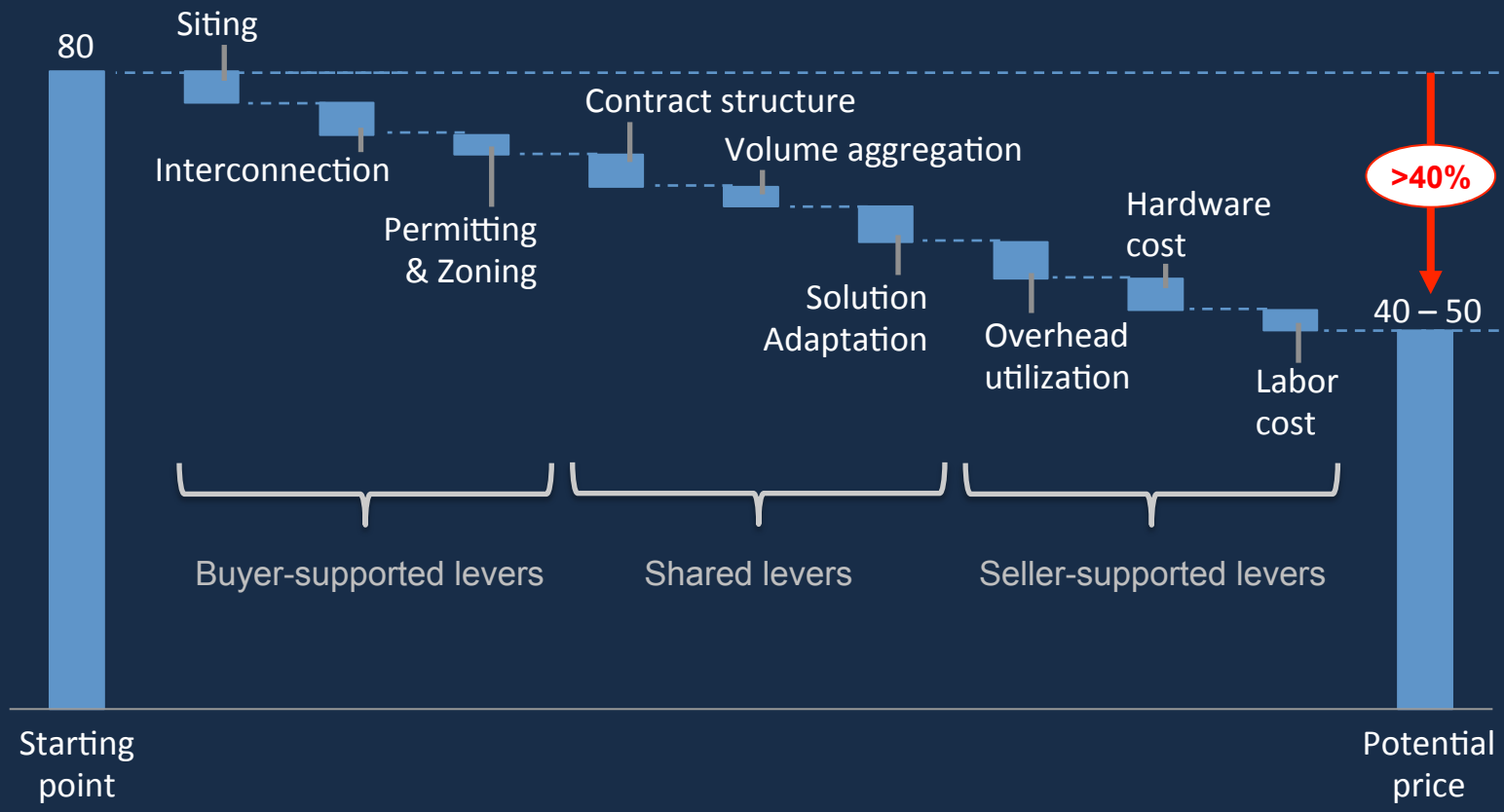
Uncertain whether tax incentive monetization is compatible with coop. LLC ownership

		All Equity Case		Equity + Debt Case	
c/kWh	**PPA price & Esc**	11.00	1.5%	10.50	1.5%
c/kWh	**Project LCOE**	9.70		9.15	
16$	**Community Value**	1,446,273		1,538,971	
	Depreciation	Bonus MACRS	Standard MACRS	Bonus MACRS	Standard MACRS
%	**Post-tax IRR**	8.76%	8.01%	12.71%	9.25%
years	**Flip Period**	10		10	
c/kWh	**Pre-Flip LCOE**	11.43		9.85	



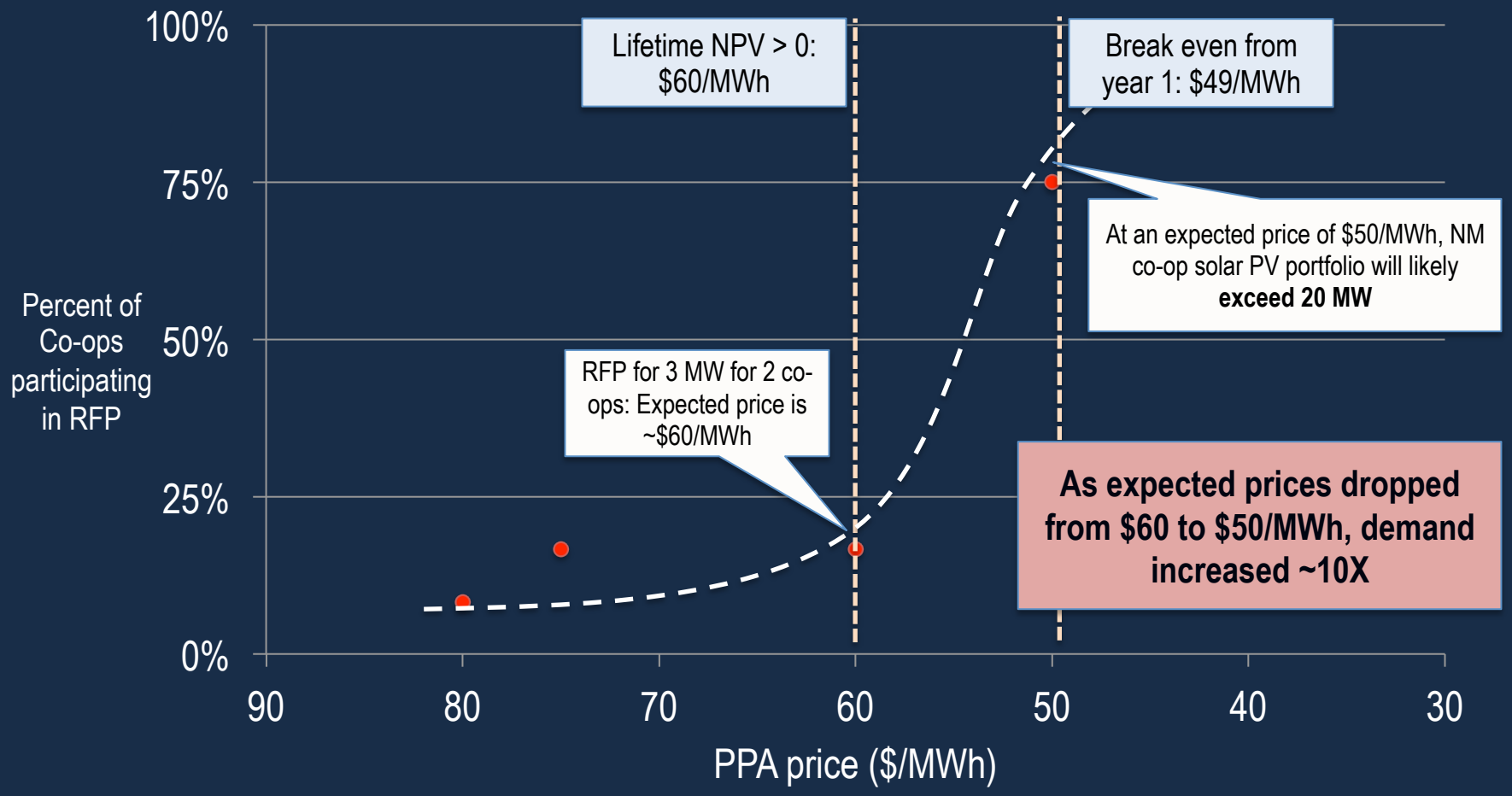
Effective cost reduction may engage whole system…

Buyer-owned, seller-owned and shared "levers" can deliver significant cost reduction

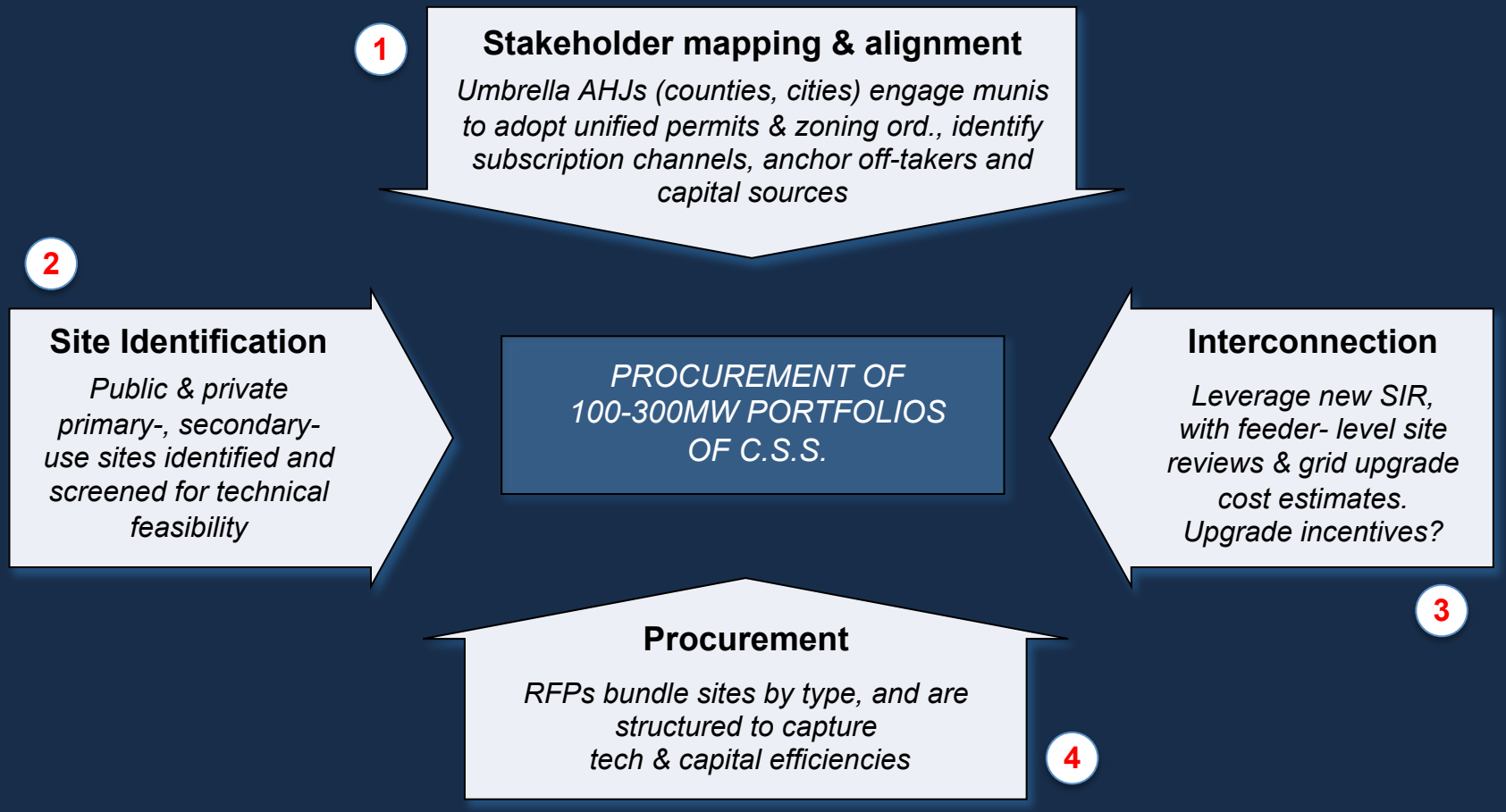


...to allocate risk & cost effectively, driving demand

Customer demand proves highly elastic at certain thresholds in cost reduction, i.e. access to value

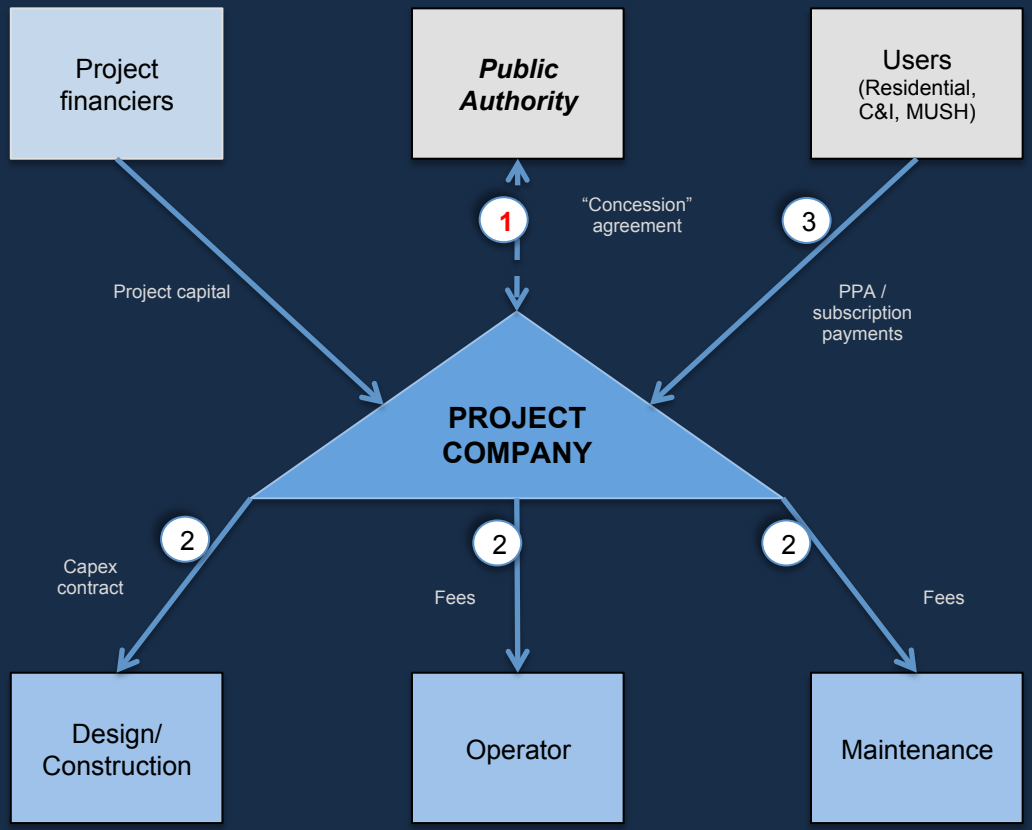


“Community”-supported development can generate participation in energy economy while reducing costs



Public-private partnerships can leverage public support

PPPs provide an organizing principle for reducing soft costs, minimizing customization and driving solar throughput at scale, dramatically reducing cost



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Risks borne by "Public Authority":

- Site quality – site identification & screen by dimensions, use type, titles, zoning, site prep required
- Permitting & re-zoning – Specify type-standard permit requirements; triaging sites for re-zoning
- Interconnection – identifying granular zones for site identification; screen and selection
- Price – if serving as anchor off-takers to C.S.S. arrays

Risks borne by Project Company:

- Comply with permit requirements
- Finalize (& capitalize) interconnection
- Construction & operations (BOO, DFBO)

Thank you!

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