Energy+Environmental Economics

South Carolina Act 236: 2.0

Rate Design Options and Considerations

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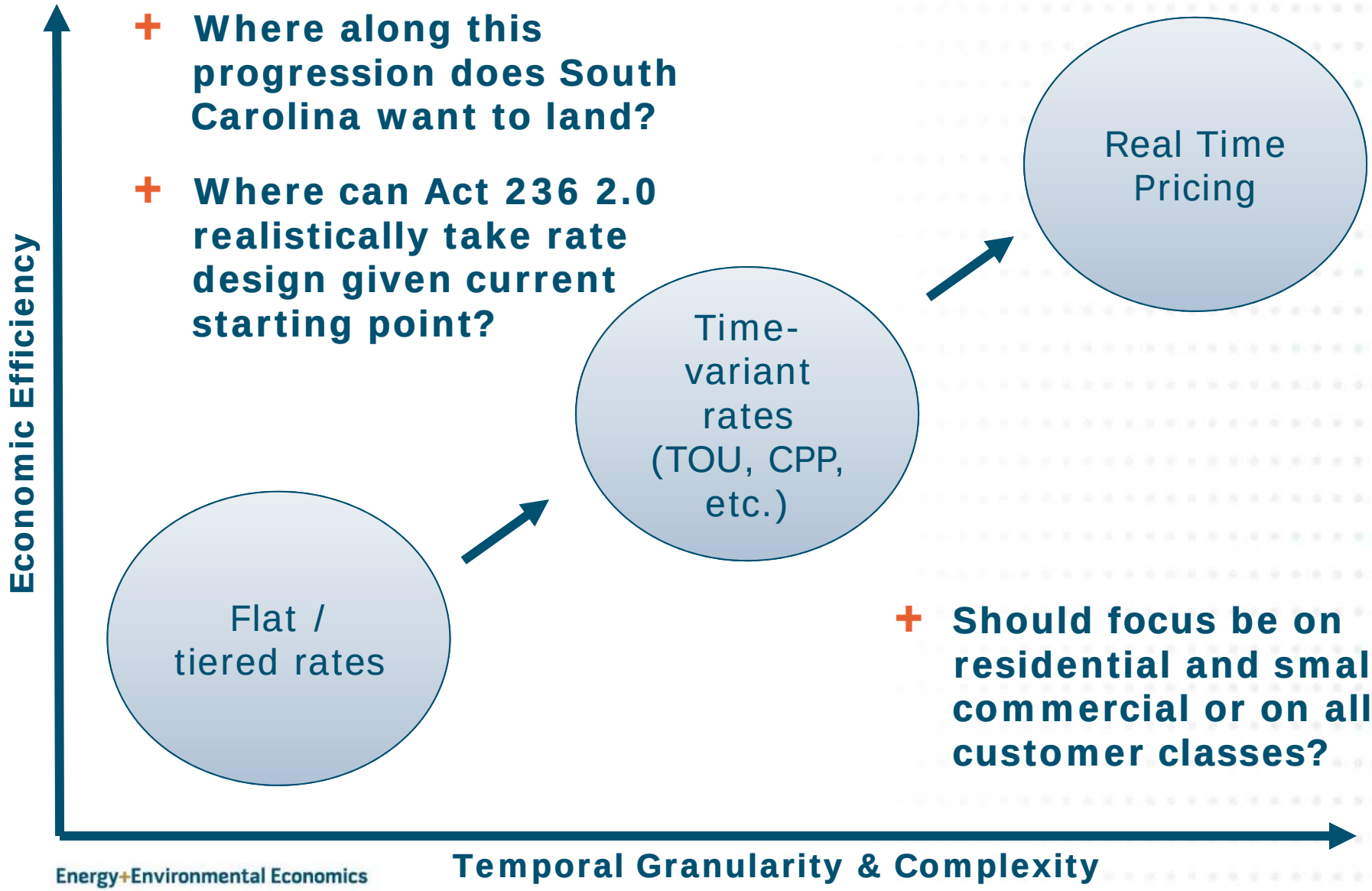
Energy rate efficiency increases w/ temporal granularity of pricing

- **Where along this progression does South Carolina want to land?**
- **Where can Act 236 2.0 realistically take rate design given current starting point?**



- **Should focus be on residential and small commercial or on all customer classes?**

Spectrum of Smaller Customer Rate Designs (illustrative)

Increasing Complexity & Economic Efficiency

Gradual Shift with Existing Structure	*Bigger Shift with Existing Structure*	*Large Structural Shift*
"The Quick Fix"	"Middle-ground"	"The Economist"
Increased customer charge	Size-differentiated **customer** charge	Customer charge
Decreased volumetric rate	Either existing volumetric energy rate, or mandatory TOU	**Demand** charge
		Time-varying energy rate

Issues to address

- **How to best collect embedded costs?**
  - [Customer charge] vs. [size-differentiated *customer* charge] vs. [customer charge + *demand* charge]
  - If size-differentiated customer charge or more traditional demand charge, how to calculate?
- **How granular / accurate should a time-variant energy rate be?**
  - Seasonal TOU? Critical Peak Pricing (CPP)? Real Time Pricing (RTP)?
- **In absence of a more "economic" 3-part rate, what proportion of embedded costs should be collected via fixed vs. variable charges?**
- **Should DER customers be placed in a separate class due to their lack of homogeneity with the rest of the class?**
- **Will customers be able to understand the proposed changes to their rates?**
- **What is the best way to pair the proposed rate with support for LMI customers?**

Need for stakeholder compromise may preclude most efficient rates

- **Maintaining 1:1 volumetric NEM "kicks the can down the road" which may be OK for market stability and transition**
- **A 3-part, more economically efficient rate structure takes the long-term view on rate design, but may not be practically implementable at this point**
- **One potential compromise is making the optional TOUs (current or revised) the default rate for all DER customers**
  - Lower energy rates and higher fixed charges would be more reflective of true system costs, without introducing unnecessary complexity
  - TOU rate can remain optional for other non-DER customers, further reducing complexity of rate design

One version of a SC compromise: Duke Residential TOU

- **Existing Duke TOU rate has relatively low energy charge, recovering embedded costs through on-peak demand charges and a higher BFC**
  - Current SCE&G TOU rate looks less economic as it relies more on energy charges for cost recovery
- **Making Duke's TOU structure (or a similar variant) mandatory for all DER customers may be the best middle-of-the-road option that still moves SC along the path to more economically-efficient rates**
- **DER compensation could take several forms**
  - 1:1 *within periods* (current approach); negotiated settlement (Retail (-)); Avoided Cost (+); etc.

Residential TOU Rates			
	SCE&G	DEC	DEP
TOU Peak Hours	S: 2-7pm W: 7am-12pm	S: 1-7pm W: 7am-12pm	S: 10am-9pm W: 6am-1pm, 4-9pm
Basic Facilities Charge ($/mo)	$ 14.00	$ 9.93	$ 11.91
Energy On-peak [Summer] ($/kWh)	$ 0.316	$ 0.066	$ 0.085
Energy Off-peak [Summer] ($/kWh)	$ 0.105	$ 0.054	$ 0.070
Energy On-peak [Winter] ($/kWh)	$ 0.284	$ 0.066	$ 0.085
Energy Off-peak [Winter] ($/kWh)	$ 0.105	$ 0.054	$ 0.070
On-peak demand charge [S] ($/kW)	N/A	$ 8.15	$ 5.38
On-peak demand charge [W] ($/kW)		$ 4.00	$ 4.14

Other options

+ Comprehensive reform of rate design

- Focus on economic efficiency and cost causation
- Single rate treats all distributed generation resources and customer load reductions equivalently, valued at true system cost

+ Negotiated settlement

- Retail (-), i.e., haircut to retail rates for DER generation

+ Avoided cost, plus adders

- Value of DER (+), i.e., individual value components, plus any negotiated incentives for DG / DER

Next Steps (E3)

Updated Cost Shift Analysis

- Currently collecting necessary data to refresh model and address additional stakeholder questions

Rate Design Analysis

- What effect will different proposed rate designs have on the economics of different DERs? (focus on BTM PV; w/ other DERs assessed as well)

Reporting of Results

- Final written report will incorporate results of both analytical exercises, along with recap of national trends and potential paths forward for SC

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APPENDIX A: ILLUSTRATIVE RATE DESIGN OPTIONS

Potential "Ideal" Rate Structures (1)

+ **<u>Key issues addressed:</u> Recommend that DER in separate class or a low-income rate be established given that in SC highest usage residential customers tend to be poorest**

Gradual shift from today		Bigger shift from today		Large structural shift from today	
2-part	*Proposal*	*2-part*	*Proposal*	*3-part*	*Proposal*
Customer Charge	Current $10 → $15-$30 with some demand related embedded costs	Customer Charge	Minimum of $10, with 3 tiers of sizes (Avg. of 5 monthly NCP kW demand or average of max 3-months kWh usage)	Customer Charge	Current $10 → $15-$20 for only customer related charges
Energy Charge	Seasonal 2-period (peak/off-peak) TOU for energy/capacity costs + some demand related embedded costs	Energy Charge	Seasonal 3-period TOU for energy/capacity costs + some demand related embedded costs	Demand Charge	Avg. of 5 monthly NCP kW demand (collects embedded demand related costs)
				Energy Charge	Seasonal 3-period TOU for energy/capacity costs

Potential "Ideal" Rate Structures (2)

+ **<u>Key issues addressed:</u> Separate prosumer class necessary to effectively address NEM cost-shift; *intentional* cost-shifts reasonable to support BTM policy goals; important to factor in standby and grid integration charges (not currently accounted for)**

Gradual shift from today		Bigger shift from today		Large structural shift from today	
2-part	*Proposal*	*2-part*	*Proposal*	*3-part*	*Proposal*
Customer Charge	Grid-usage fee, based on customer size (embedding demand w/out distinct demand charge)	Customer Charge	Grid-usage fee, based on customer size (embedding demand w/out distinct demand charge)	Customer Charge	Current $10 → $15-$20 for only customer related charges
Energy Charge	TOU w/ high evening peak charge (energy charges overall set lower than current levels)	Energy Charge	Standard tariff rate for net usage; net exports credited at wholesale + avoided cap. cost (ideally netting on hourly time-scale)	Demand Charge	Daily demand charges
				Energy Charge	Lower energy rate to reflect only marginal energy costs & losses

Potential "Ideal" Rate Structures (3)

- **Key issues addressed: NEM should not be thought of in isolation; create separate DER customer class; utilities should be buying a lot of utility-scale solar**

BTM compensated at full avoided cost; distinct DER class	
3-part	***Proposal***
Customer Charge	Current $10 → $20-$30?
Demand Charge	Rolling average daily demand charges
Energy Charge	Lower than current rates, representing marginal energy + losses

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APPENDIX B: EXISTING RATES IN SOUTH CAROLINA

Rate Summary

+ Residential

- Similar default structure across all IOUs (flat rate, no demand charge, some seasonally-based energy rates)
- TOU rates: SCE&G based on high energy charges (no demand charge); both Duke utilities employ seasonally-differentiated demand charges to recoup fixed costs

+ Commercial

- Variations on declining block energy rates, w/ demand charges*

+ Industrial**

- SCE&G: large fixed charge, low energy rate, moderate demand charge
- DEC: small fixed charge, higher energy rate

*DEP small commercial tariff does not include a demand charge; DEC commercial tariffs use kWh/kW billing demand blocks, in addition to a standard demand charge

** DEP does not appear to offer an industrial tariff

Residential

Residential						
	SCE&G		DEC		DEP	
	Default	TOU	Default	TOU	Default	TOU
TOU Peak Hours	N/A	S: 2-7pm W: 7am-12pm	N/A	S: 1-7pm W: 7am-12pm	N/A	S: 10am-9pm W: 6am-1pm, 4-9pr
Basic Facilities Charge ($/mo)	10	14	8.29	9.93	9.06	11.91
Energy (Summer) ($/kWh)	.137 (.15 above 800 kWh)	N/A	0.099 (.105 above 1,000 kWh)	N/A	0.116	N/A
Energy (Winter) ($/kWh)	.137 (.13 above 800 kWh)				0.116 (0.106 above 800 kWh)	
Energy On-peak (S) ($/kWh)	N/A	0.316	N/A	0.066	N/A	0.085
Energy Off-peak (S) ($/kWh)		0.105		0.054		0.070
Energy On-peak (W) ($/kWh)		0.284		0.066		0.085
Energy Off-peak (W) ($/kWh)		0.105		0.054		0.070
On-peak demand charge (S) ($/kW)	N/A	N/A	N/A	8.15	N/A	5.38
On-peak demand charge (W) ($/kW)				4.00		4.14

Small Commercial

Small Commercial					
	SCE&G		DEC	DEP	
	Default	TOU	Default	Default	TOU
TOU Peak Hours	N/A	S: 2-7pm W: 7am-12pm	N/A	N/A	S: 10am-10pm W: 6am-1pm, 4-9pm
Basic Facilities Charge ($/mo)	22.75	26.4	10.52	9.91	23.17
Energy (Summer) ($/kWh)	0.112 (0.120 above 3,000 kWh)	On-peak: 0.24625 Off-peak: 0.09922 (0.10464 over 1,000 kWh)	1st 125 kWh/kW billing demand: 0.118 for 1st 3,000 kWh 0.059 for next 6,000 kWh 0.052 for all over 9,000 kWh Next 275 kWh/kW billing demand: 0.06 for 1st 3,000 kWh 0.059 for next 6,000 kWh 0.051 for all over 9,000 kWh All over 400 kWh/kW billing demand: 0.044	1st 2,000 kWh: 0.123 Over 2,000 kWh: 0.088	On-peak: 0.06672 Off-peak: 0.05287
Energy (Winter) ($/kWh)	0.112 (0.105 above 3,000 kWh)	On-peak: 0.1877 Off-peak: 0.09922 (0.10464 over 1,000 kWh)			
Demand charge ($/KVA or kW)	3.44/kVA above 250 KVA in Summer	N/A	4.00/kW above 30 kW	N/A	On-peak: S: 11.55; W: 9.02 Off-peak: 2.95

Large Commercial

Large Commercial					
	SCE&G		DEC	DEP	
	Default	TOU	Default	Default	TOU
TOU Peak Hours	N/A	Jun-Sep: 1-9pm May & Oct: 1-9pm Nov-Apr: 6am-12pm & 5-9pm	N/A	N/A	S: 10am-10pm W: 6am-1pm & 4-9pm
Basic Facilities Charge ($/mo)	210	225	17.16	98	98
Energy ($/kWh)	Up to 75,000 kWh: 0.056 Above 75,000 kWh: 0.051	On-peak: S: 0.0976 W: 0.0672 Off-peak: 0.04965	1st 125 kWh/kW billing demand: 0.127 for 1st 3,000 kWh 0.065 for next 87,000 kWh 0.054 for all over 90,000 kWh Next 275 kWh/kW billing demand: 0.066 for 1st 3,000 kWh 0.065 for next 87,000 kWh 0.057 for all over 90,000 kWh All over 400 kWh/kW billing demand: 0.050	0.053	On-peak: 0.05316 Off-peak: 0.01816
Demand charge ($/KVA or kW)	16.82/KVA	On-peak: S: 24.5 W: 16.55 Off-peak: 5.25	4.11/kW above 30 kW	1st 5,000 kW of billing demand: 12.8/kW Next 5,000 kW of billing demand: 11.8/kW All billing demand over 10,000 kW: 10.8/kW	On-peak (1st 5,000 kW) - S: 19.60, W: 14.57 On-peak (next 5,000 kW) - S: 18.60, W: 13.57 On-peak (over 10,000 kW) - S: 17.60, W: 12.57 Off-peak: 1.25

Industrial

Industrial		
	SCE&G	DEC
Basic Facilities Charge ($/mo)	2,050	22.97
Energy charge ($/kWh)	0.049	1st 125 kWh/kW billing demand: 0.118 for 1st 3,000 kWh 0.060 for next 87,000 kWh 0.044 for all over 90,000 kWh Next 275 kWh/kW billing demand: 0.60 for 1st 3,000 kWh 0.055 for next 87,000 kWh 0.050 for all over 90,000 kWh All over 400 kWh/kW billing demand: 0.048 for 1st 1,000,000 kWh 0.047 over 1,000,000 kWh
Demand charge ($/kW)	16.08	4.72/kW over 30 kW

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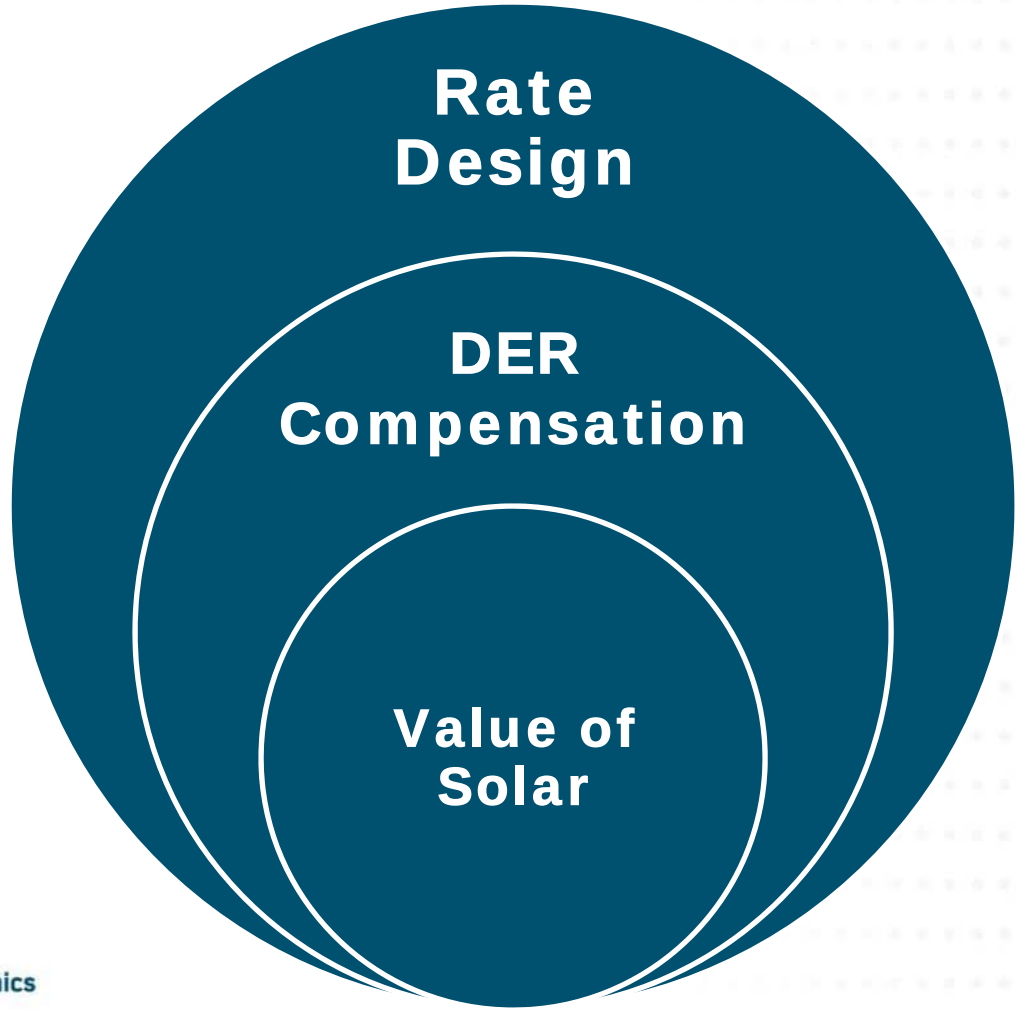
APPENDIX C: RATE DESIGN PRINCIPLES IN THE CONTEXT OF DER COMPENSATION

First Principle:

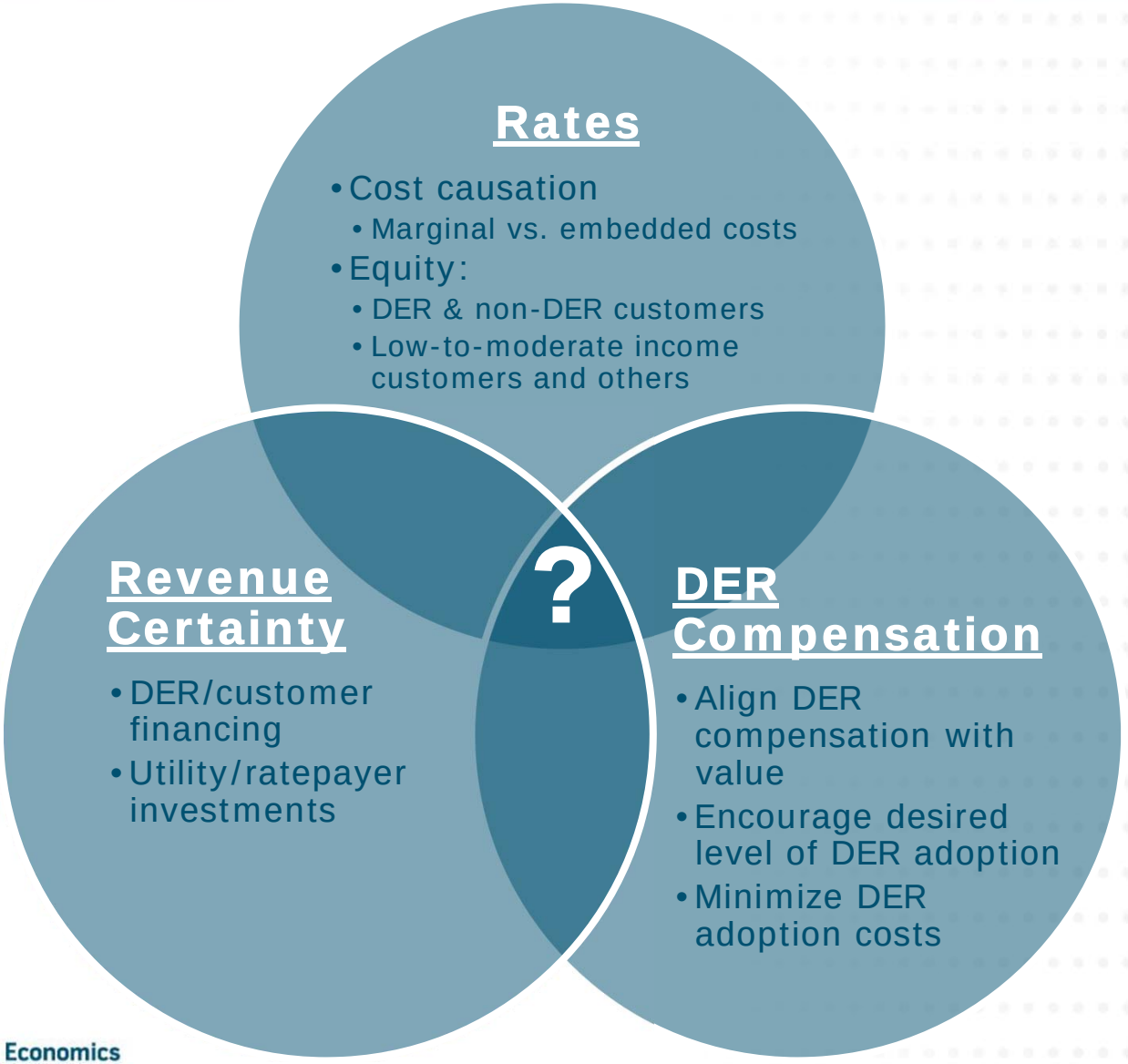
Rate design encompasses many issues; some of which are related, while many others are not

- **DER compensation and the value of solar are embedded issues within the larger set of general rate design concerns**



Second principle:

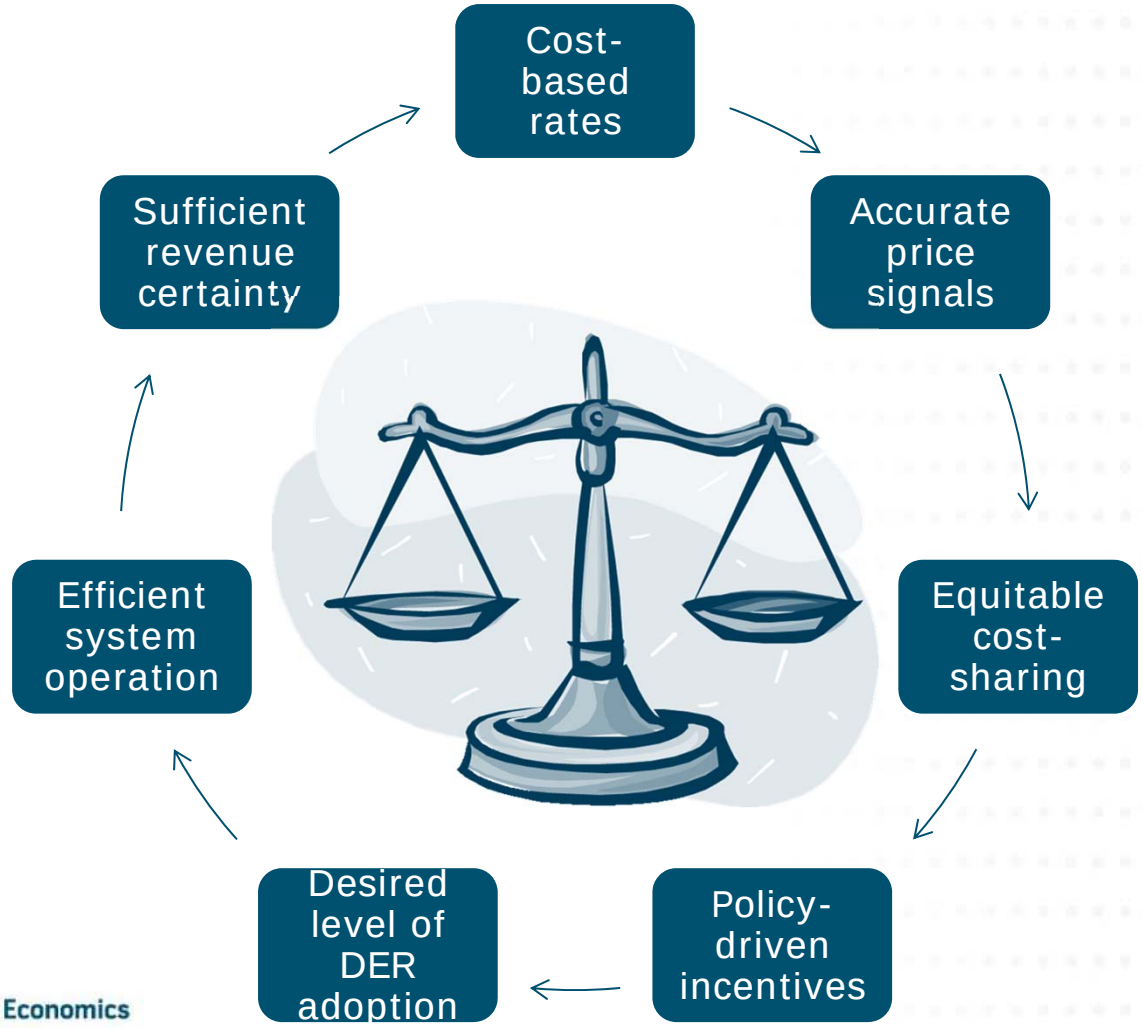
There is <u>no</u> perfect intersection between the "right" retail rate and the "best" type of DER compensation



Third Principle:

Compromise and balance is needed for equitable and sustainable DER compensation within rate design

- ***Goal:*** **Retail rates and DER compensation mechanisms that accurately reflect South Carolina values**



Here's one set of illustrative retail rate / DER compensation principles

- **Efficiency:**
  - Rates should promote efficient investment and consumption decisions by customers, which if tied to the utility avoided costs minimize the total costs of delivered energy to customers
- **Equity:**
  - Costs should be allocated fairly and equitably among customer classes and customers within the class when rate components are based on embedded costs
- **Rates should be simple, stable, understandable, acceptable to the public, and easily administered**
- **Innovative rate designs should be tested prior to full scale implementation**
- **Rates should support public policy, as applicable**