

# Cal TF Data Charette Total System Benefit



**SEPTEMBER 28, 2023**  
**SPENCER LIPP**

# Agenda

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- **What is TSB**
- **Implementer's Perspective**
- **Measure Examples**
- **Potential Solutions**

**Useful link: [CPUC Final TSB Technical Guidance](#)**

# What is Total System Benefit?

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- Definition: “The sum of the benefit (in dollars) that a measure provides to the electric and natural gas system”

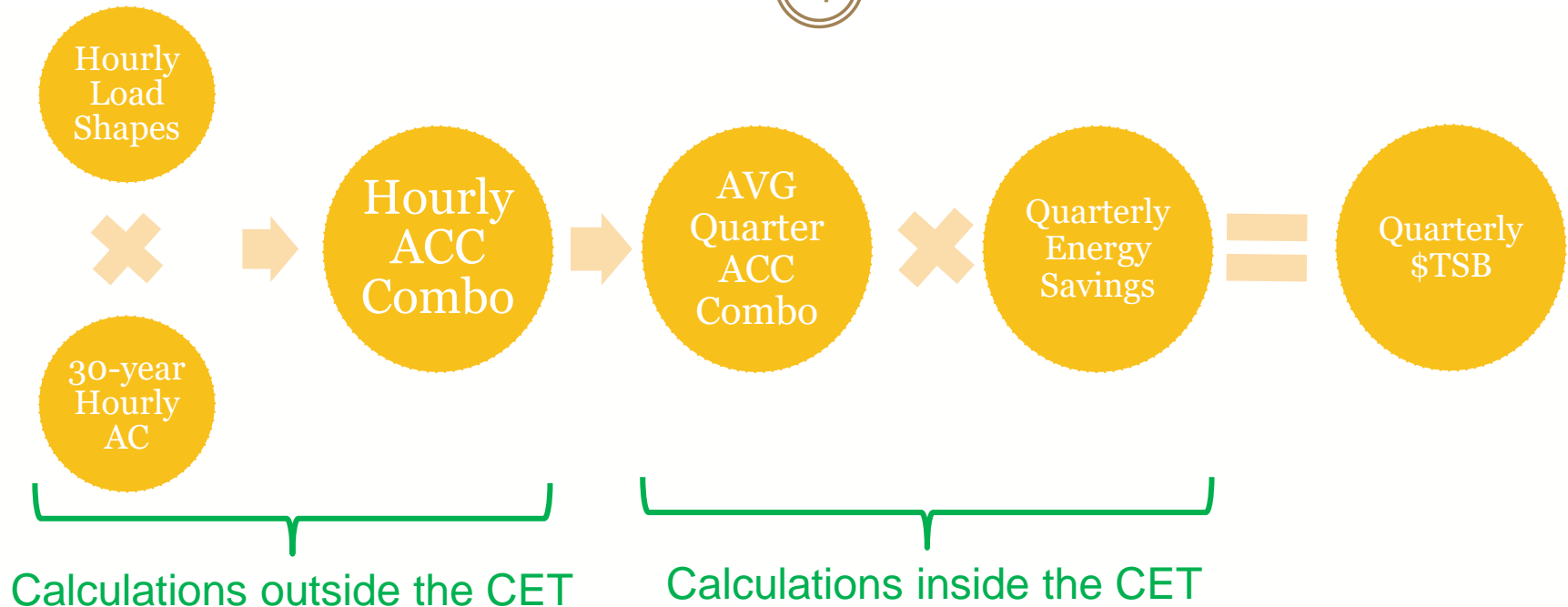
$$TSB = (NTG)(\sum Benefits - \sum Increased Supply Costs)$$

NTG = Net to Gross Ratio

All but GWP Leakage calculated with the Avoided Cost Calculator and Load Shape (ACC Combo)

# TSB Calculation in the CET

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- ACC Combo is \$/kWh or \$/Therm
- TSB changes based on quarterly impacts

# What is Total System Benefit?

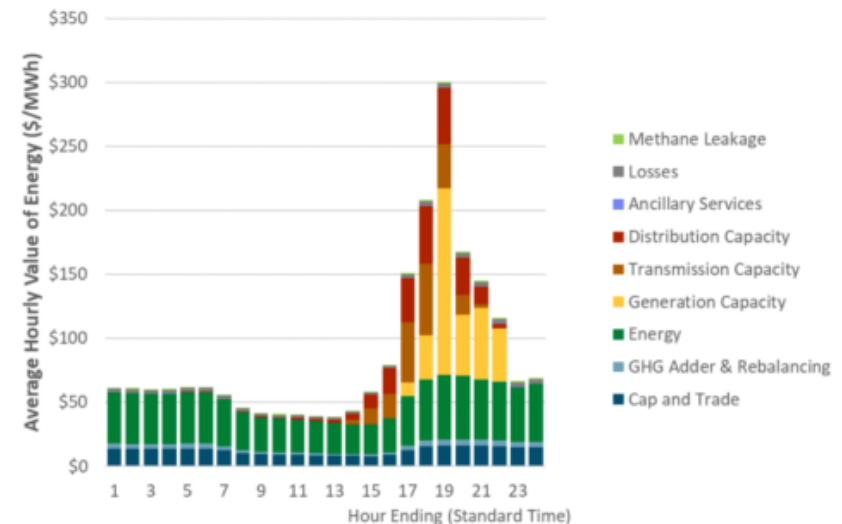
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$$TSB = (NTG)(\sum Benefits - \sum Increased Supply Costs)$$

Category	TSB Component	TSB Term
Energy	Energy Savings	Benefit
	Interactive Effects	Supply Cost
GHG Impacts	GHG Cap and Trade (Marginal Emissions)	Benefit
	GHG Adder (Marginal Emissions)	Benefit
	GHG Portfolio Rebalancing	Benefit
	Methane Leakage	Benefit
	GWP Leakage (from RACC)	Supply Cost
	Generation Capacity	Benefit
Grid Impacts	Transmission	Benefit
	Distribution	Benefit
	Avoided AS Procurement	Benefit
	Losses	Benefit
	Fuel Substitution	Supply Cost

Figure 2. Average Hourly Avoided Costs (PG&E Climate Zone 12 in 2030)

2022 ACC



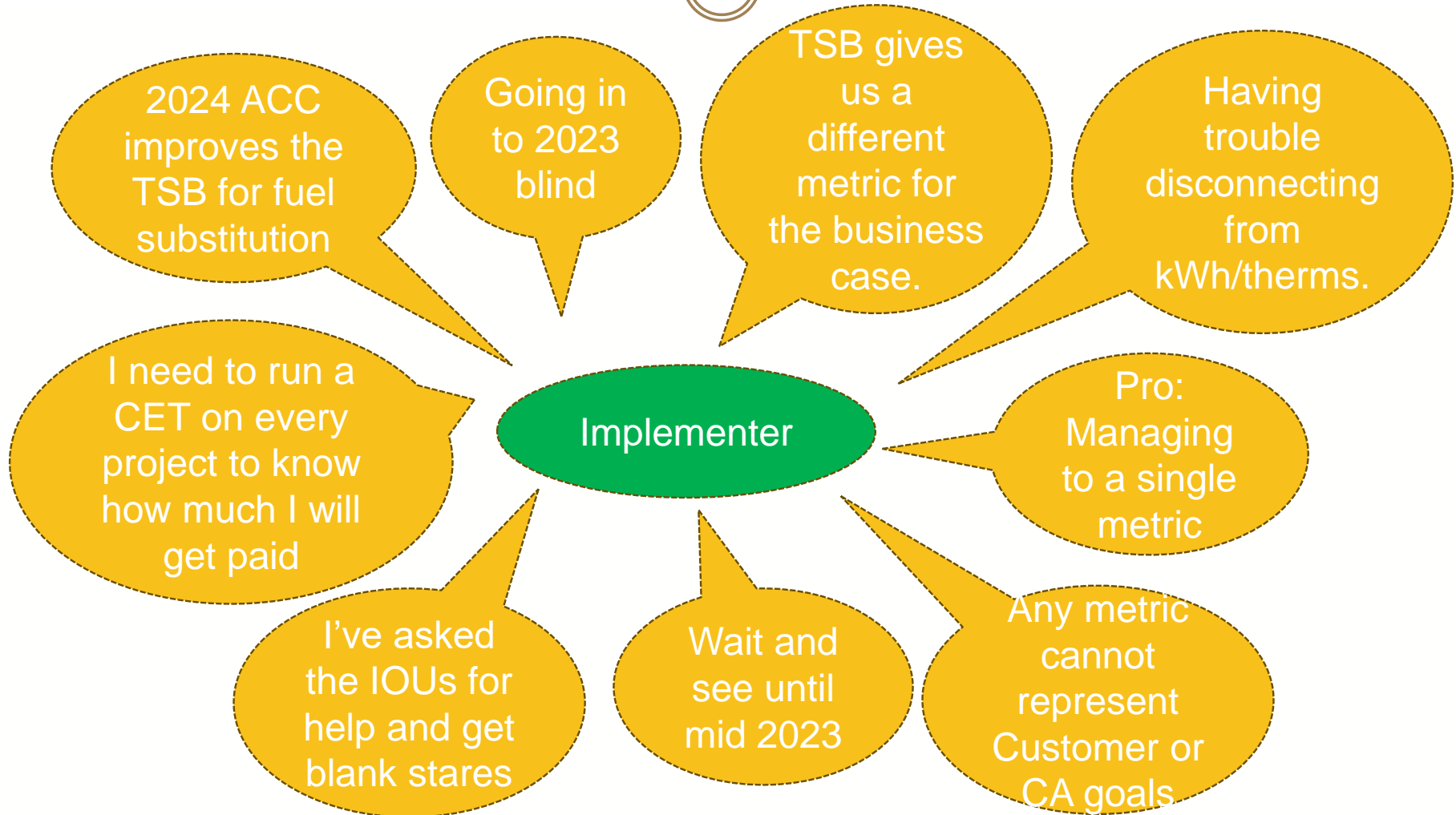
# Total System Benefit Myths

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- **TSB replaces cost effectiveness**
  - False
  - D.21-05-031 ordered TSB to replace energy savings as program goals but TRC requirements remain
- **TSB is based on the measure EUL and ACC Combo**
  - Partially true
  - GWP leakage is calculated with the Refrigeration Avoided Cost Calculator (RACC)
- **TSB drives programs to target measures that save energy during high value hours**
  - Partially true
  - Limitations in program claims does not allow full credit for IDERM measures
  - Normalized TSB for refrigeration (~14%) and chiller systems (~9%) slightly better than lighting

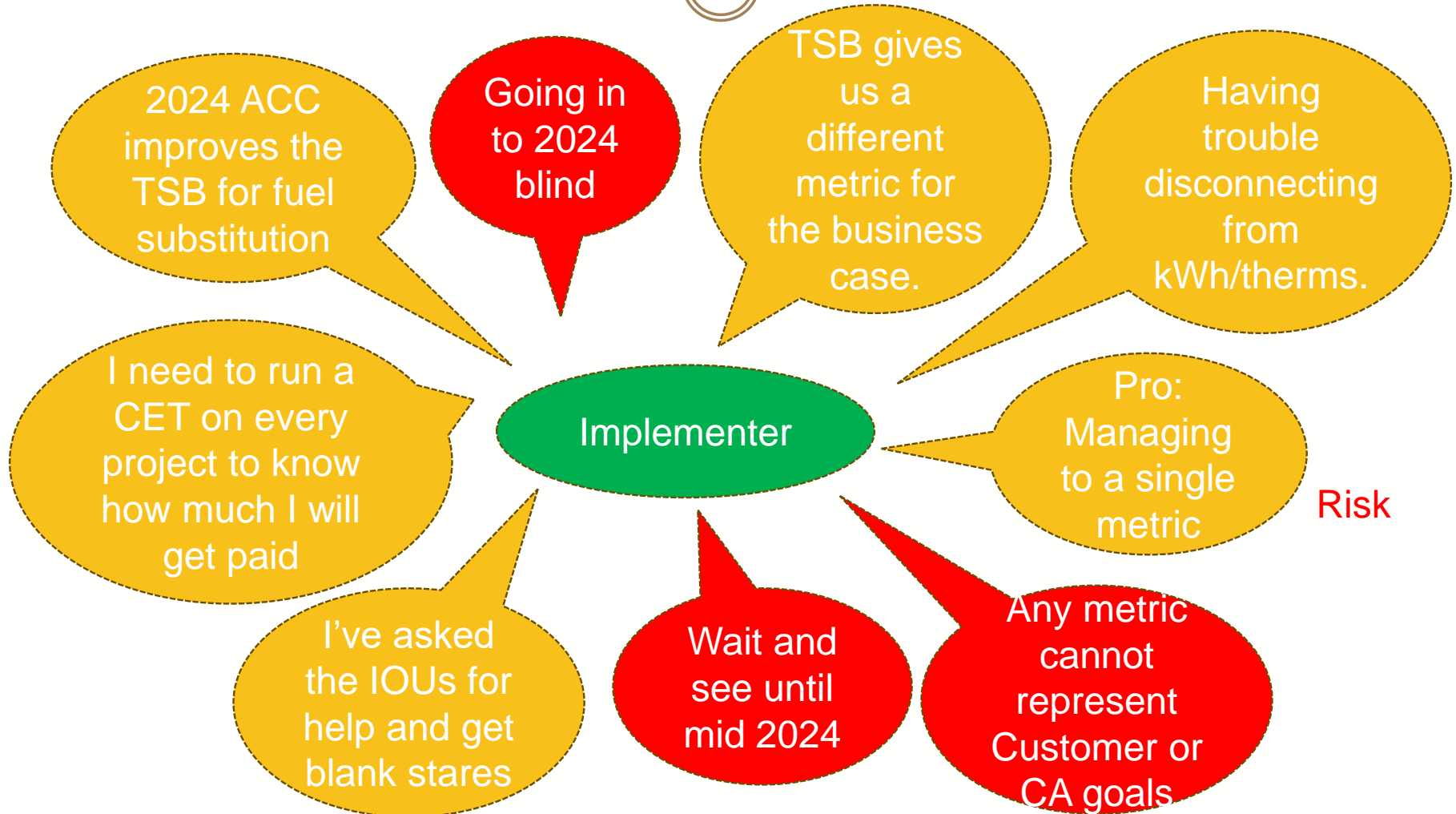
# Implementer Views on TSB

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# Implementer Views on TSB

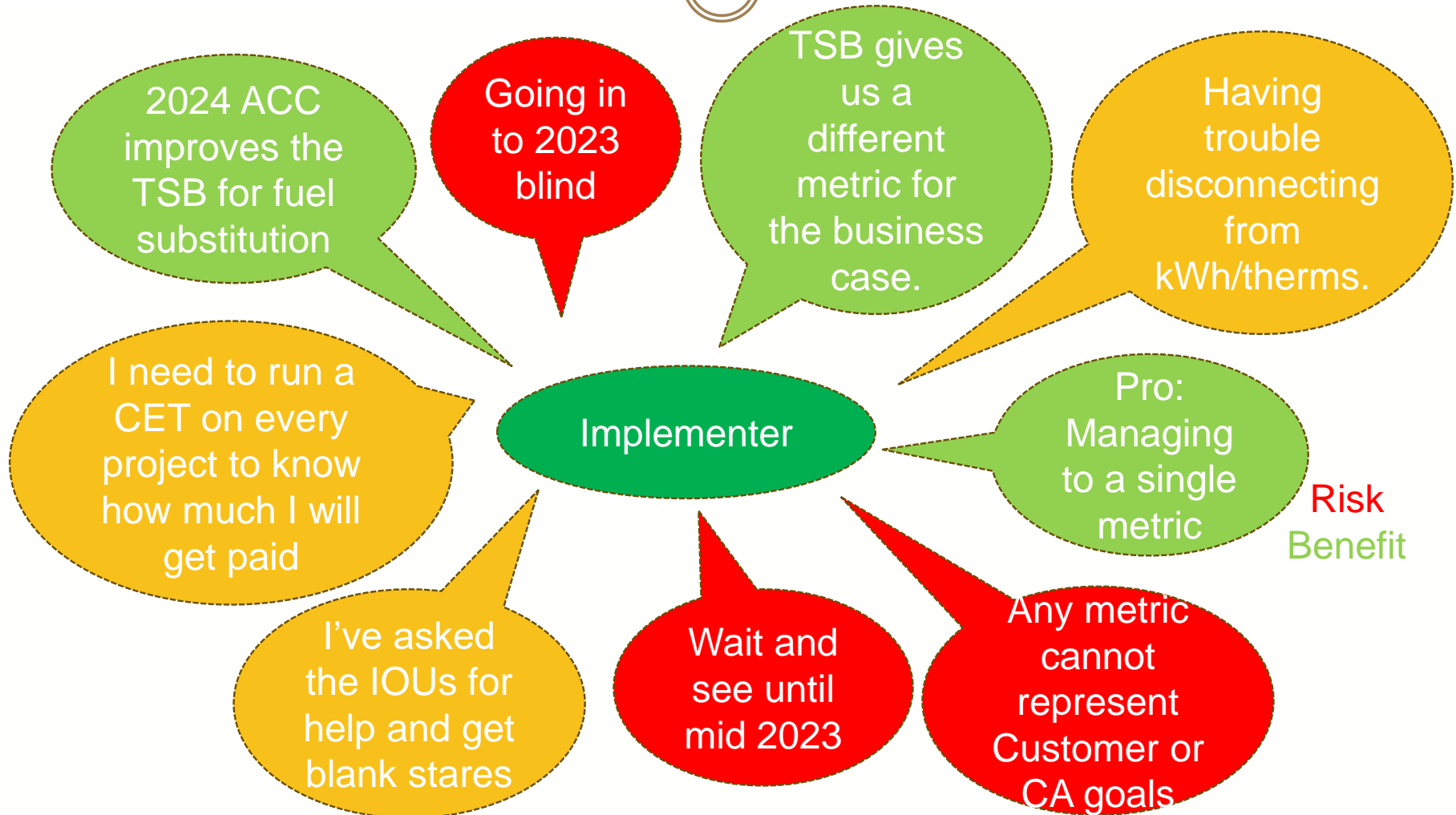
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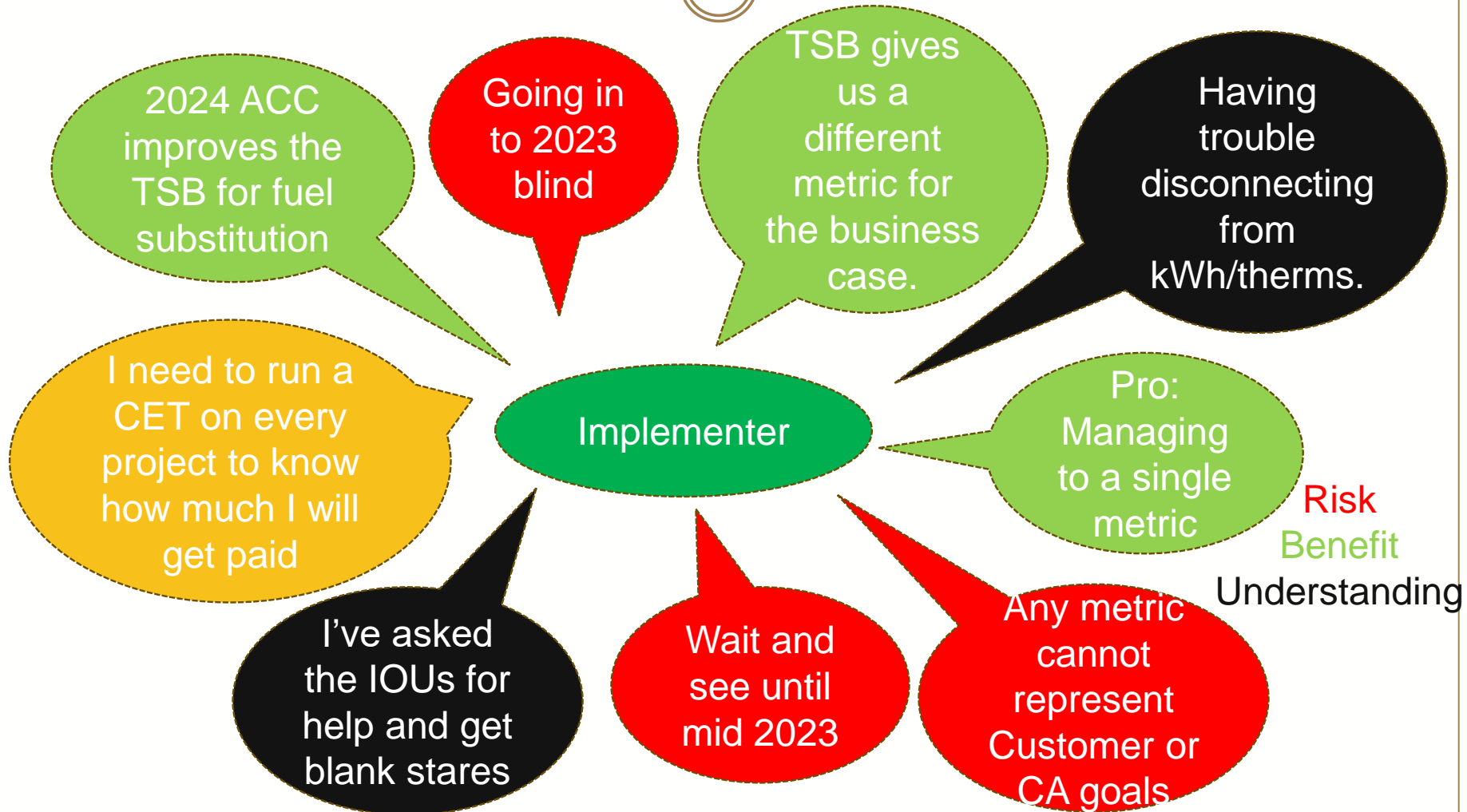
# Implementer Views on TSB

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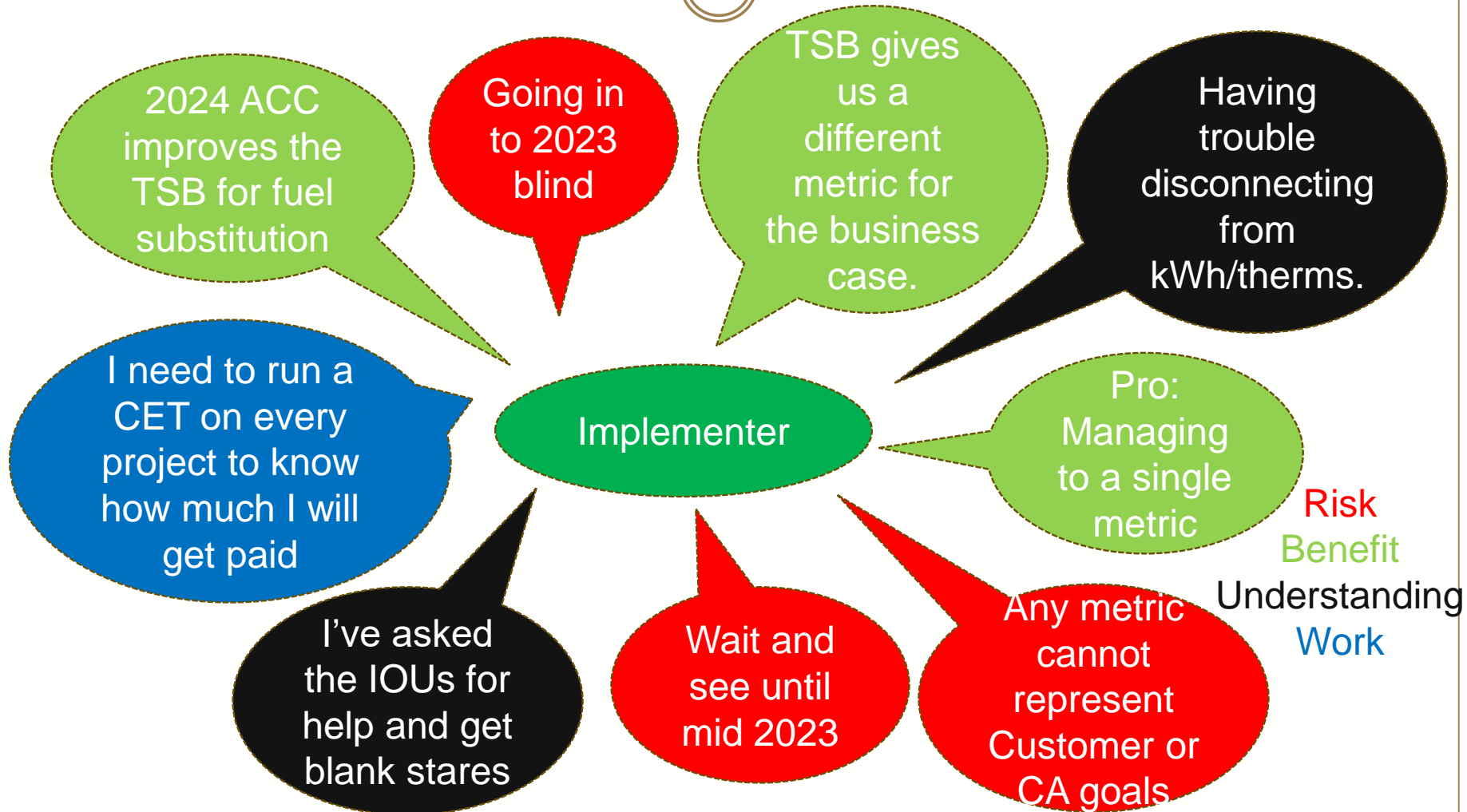
# Implementer Views on TSB

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# Implementer Views on TSB

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# 50 Gallon Residential WH Example

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eTRM	Fuel Sub?	Baseline Equipment	Retrofit Equipment	AVG TSB	AVG TRC (no_admin)
SWWH014	No	Electric Storage	HPWH 3.3 UEF	\$ 770	1.33
SWWH014	No	Electric Storage	HPWH 3.5 UEF	\$ 795	1.37
SWWH014	No	Electric Storage	HPWH 3.75 UEF	\$ 846	1.35
SWWH025	Yes	Gas Storage	HPWH 3.3 UEF	\$ 272	0.69
SWWH025	Yes	Gas Storage	HPWH 3.5 UEF	\$ 317	0.70
SWWH025	Yes	Gas Storage	HPWH 3.75 UEF	\$ 411	0.70
SWWH012	No	Gas Storage	Gas 0.64 UEF	\$ 123	0.63
SWWH012	No	Gas Storage	Gas 0.68 UEF	\$ 153	0.91
SWWH012	No	Gas Storage	Gas 0.78 UEF	\$ 243	0.36

Take aways?

# 50 Gallon Residential WH Example

## DRIVES PROGRAMS TO IMPLEMENT STRATEGIES TO TARGET ELECTRIC EE FIRST

eTRM	Fuel Sub?	Baseline Equipment	Retrofit Equipment	AVG TSB	AVG TRC (no_admin)
SWWH014	No	Electric Storage	HPWH 3.3 UEF	\$ 770	1.33
SWWH014	No	Electric Storage	HPWH 3.5 UEF	\$ 795	1.37
SWWH014	No	Electric Storage	HPWH 3.75 UEF	\$ 846	1.35
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### Take aways?

1) Electric baseline highest TSB and TRC

# 50 Gallon Residential WH Example

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## DRIVES PROGRAMS TO REPLACE WITH GAS 0.68 UEF

eTRM	Fuel Sub?	Baseline Equipment	Retrofit Equipment	AVG TSB	AVG TRC (no_admin)
SWWH014	No	Electric Storage	HPWH 3.3 UEF	\$ 770	1.33
SWWH014	No	Electric Storage	HPWH 3.5 UEF	\$ 795	1.37
SWWH014	No	Electric Storage	HPWH 3.75 UEF	\$ 846	1.35
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### Take aways?

- 1) Electric baseline highest TSB and TRC
- 2) Fuel Substitution is better TSB than gas replacement but is not cost effective

# CZ13 Com HVAC Example

eTRM	Fuel Sub?	Baseline Equipment	Retrofit Equipment	MAT	TSB	AVG TRC (no admin)
SWHC046	Yes	<65 kbtuh AC w/ gas	HP 16 SEER	AR	\$ 753	0.74
SWHC046	Yes	<65 kbtuh AC w/ gas	HP 16 SEER	NR	\$ 694	1.47
SWHC046	Yes	<65 kbtuh AC w/ gas	HP 17 SEER	AR	\$ 825	0.57
SWHC046	Yes	<65 kbtuh AC w/ gas	HP 17 SEER	NR	\$ 767	0.86
SWHC014	No	55<65 kbtuh AC w/ gas	Package AC 16 SEER	NR	\$ 280	2.69
SWHC014	No	55<65 kbtuh AC w/ gas	Package AC 16 SEER	NR	\$ 308	1.98

Take aways

# CZ13 Com HVAC Example

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## PROGRAMS DEVELOP STRATEGIES FOR NR

eTRM	Fuel Sub?	Baseline Equipment	Retrofit Equipment	MAT	TSB	AVG TRC (no admin)
SWHC046	Yes	<65 kbtuh AC w/ gas	HP 16 SEER	AR	\$ 753	0.74
SWHC046	Yes	<65 kbtuh AC w/ gas	HP 16 SEER	NR	\$ 694	1.47
SWHC046	Yes	<65 kbtuh AC w/ gas	HP 17 SEER	AR	\$ 825	0.57
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### Take aways

1) Metrics do not support AR



# CZ13 Com HVAC Example

## PROGRAMS DO NOT INSTALL MOST EFFICIENT EQUIPMENT

eTRM	Fuel Sub?	Baseline Equipment	Retrofit Equipment	MAT	TSB	AVG TRC (no admin)
SWHC046	Yes	<65 kbtuh AC w/ gas	HP 16 SEER	AR →	\$ 753	0.74
SWHC046	Yes	<65 kbtuh AC w/ gas	HP 16 SEER	NR →	\$ 694	1.47
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### Take aways

- 1) Metrics do not support AR
- 2) Increases in efficiency lower cost effectiveness

# CZ13 Com HVAC Example

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## PROGRAMS WILL NOT SOLELY PROMOTE FUEL SUBSTITUTION

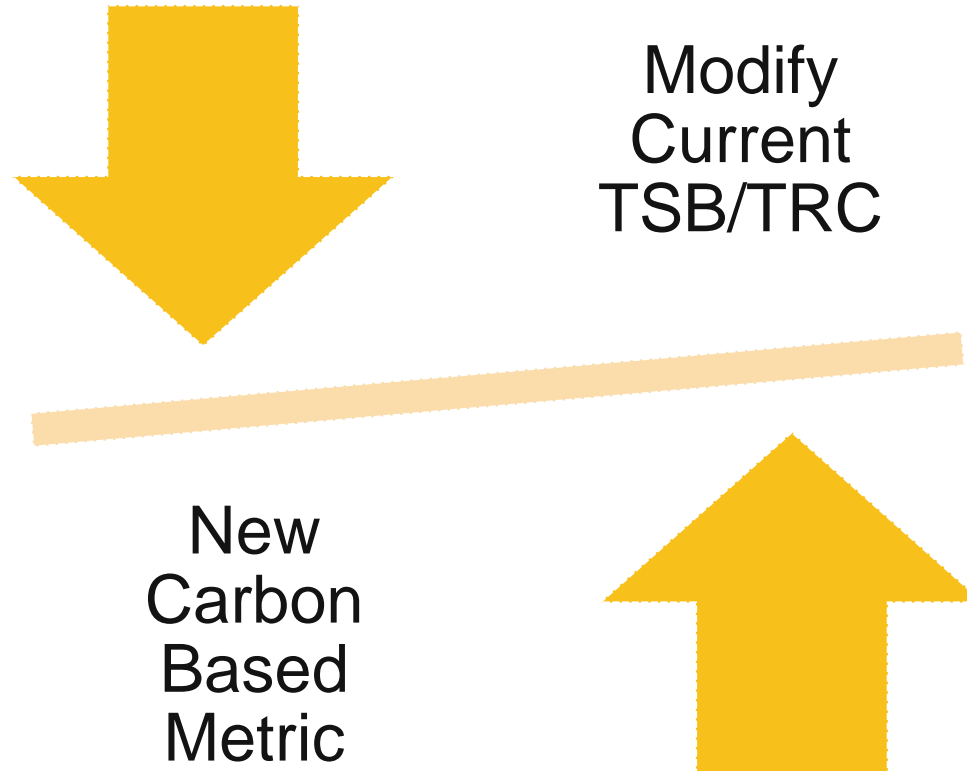
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### Take aways

- 1) Metrics do not support AR
- 2) Increases in efficiency lower cost effectiveness
- 3) High TRC for Like for Like gas replacement

# Options for Alignment to CA Goals

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# Least Cost Carbon Metric

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- Puts a price on carbon emissions
  - Precedence with CARB Cap and Trade
- Alignment with CA goal to decarbonize and reduce GHGs
- Blends initiatives to achieve a 100% decarbonized state
- Allows comparison between solutions with equal metric
  - Efficiency
  - Demand response
  - Energy storage
  - Local generation
  - Large generation
- May not fully align with customer goals/needs

# TSB Proposed Solutions

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## Maximizing Benefits

**Solution: Include all benefits in the metrics**

- Future localized system constraints should be considered
- Societal costs due to climate change should be counted
- **Result: True program impacts are counted.**

## Modeling Today's Technology

**Solution: Incorporate hourly avoided cost analysis**

- Products include advanced controls and energy storage strategies
- CPUC D.23-06-055 - Integrates SGIP, transportation electrification, and EE
- **Result: Opportunities for known grid solutions are not lost.**

## Valuing a \$TSB

**Solution: Align TSB weighting to highlight carbon**

- Energy, GHG, and grid dollar benefits are not equally impactful.
- Energy and grid components have a reducing value to carbon
- **Result: Impactful technologies are pursued.**

## Timing of Updates

**Solution: Match ACC updates with solicitation cycles**

- Multiple ACC updates in a program cycle
- Historically wide shifts in ACC values
- Nebulous process
- **Result: Decreases program uncertainty/risk**

# Questions/Comments?

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Spencer Lipp, PE  
Cal TF Staff