

# Potential and Goals Studies: Top-Down Stakeholder Presentation 2

Top-Down Study Part 2

April 1<sup>st</sup>, 2022



California Public  
Utilities Commission



# Agenda

- Introduction & Goals
- Overview of Pathways
- Pathway 1: Context & Credibility
- Pathway 2: Complete Replacement
- Pathway 3: Hybrid (Combine & Allocate)
- Summary of Pathways
- Questions to Stakeholders

# Introduction & Goals

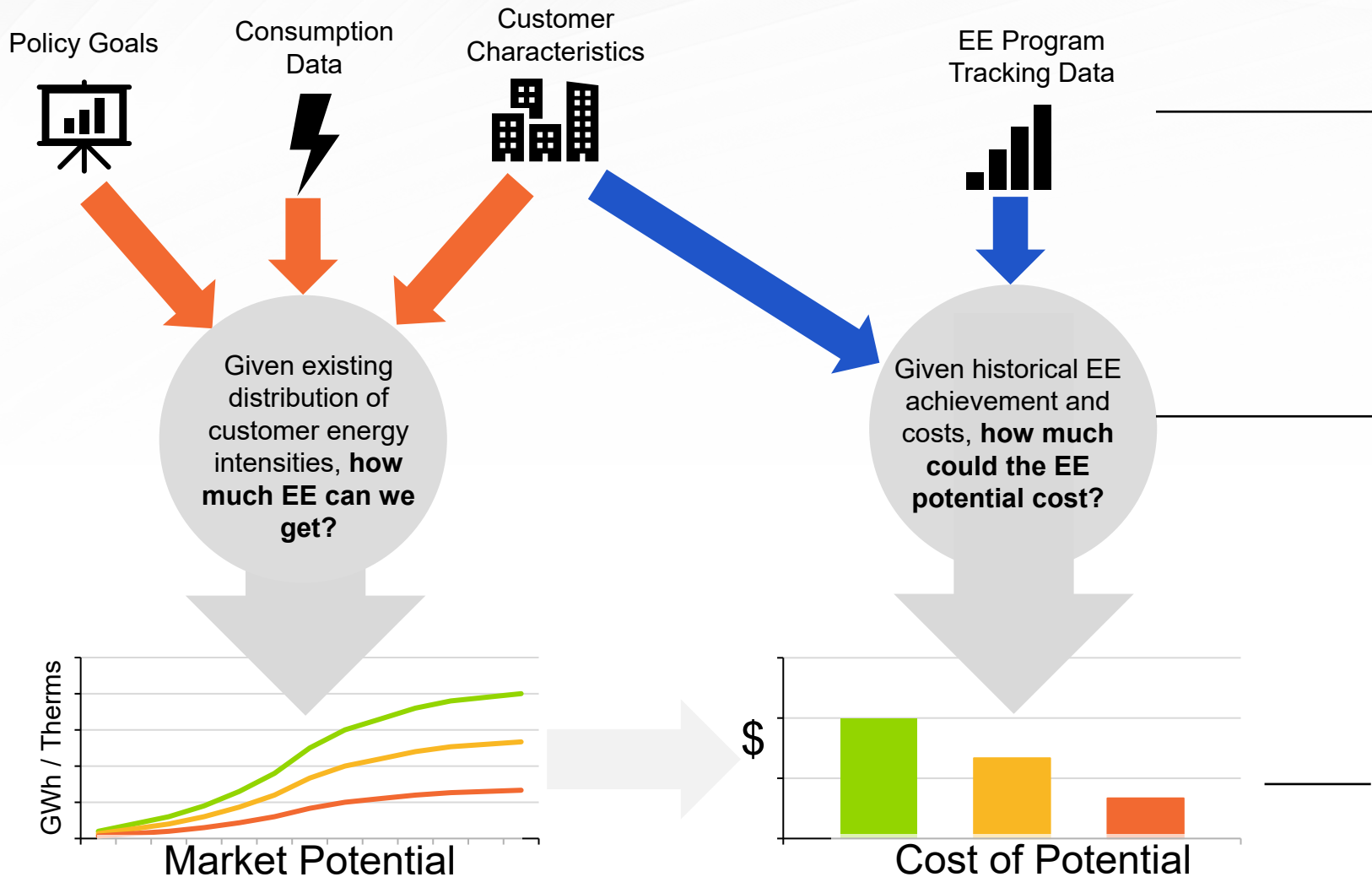
# Context and Timeline





# What is a “top-down” potential estimation approach?

A top-down approach puts more weight on empirical analysis vs. bottom-up focus on engineering analysis.



Rely as much as possible on observed data (characteristics, consumption, EE acquisition).

Use observed data to estimate relationships between:

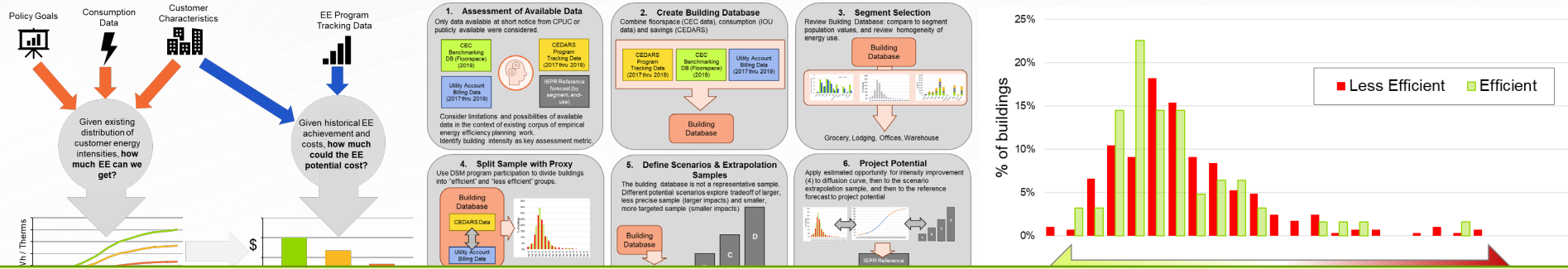
1. Program participation and individual customer energy efficiency (intensity);
2. Tracked savings (or observed consumption) and incremental expenditures.

Carry estimated relationships forward to project different EE potential scenarios and estimate cost of those scenarios.

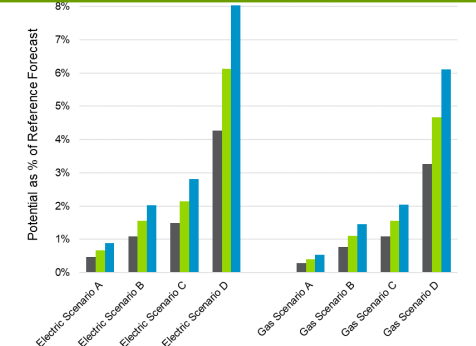
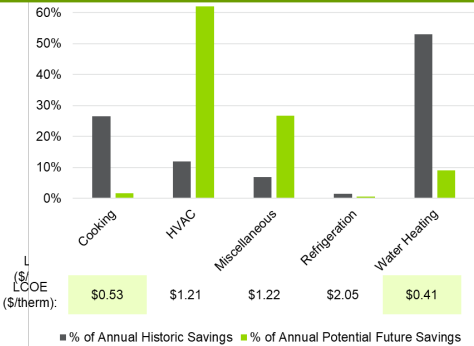
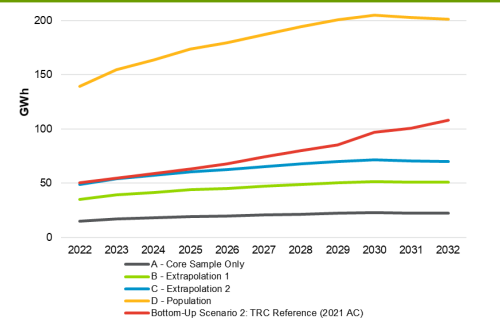
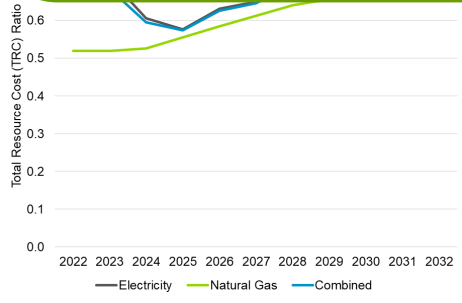
# What are the biggest differences?

Bottom-Up	Top-Down	The Trade-Off: Precision vs. Transparency
<b>Measure-Level (“Widget”) Characterization</b>	<b>Aggregate End-Use/Segment</b>	<b>Output Granularity</b> <ul style="list-style-type: none"> <li>• Bottom-up: measure-level detail</li> <li>• Top-down: segment/end-use-level detail</li> </ul> <b>Program Cost Analysis</b> <ul style="list-style-type: none"> <li>• Bottom-up costs are forward-looking</li> <li>• Top-down costs reflect historic programs</li> </ul>
<b>Deterministic Market Dynamics</b>	<b>Energy Intensity Comparison &amp; Scenario Projection</b>	<ul style="list-style-type: none"> <li>• Bottom-up identifies specific pathway to achievement.</li> <li>• Top-down identifies the consequences of achievement but is agnostic on pathway.</li> </ul>

# In Part 1 of Guidehouse's report, a prototype top-down potential analysis was developed.



*A key question coming out of that analysis was: What are the possible paths forward for a top-down potential analysis?*



# Goals of today's presentation

1

Identify three potential pathways forward for enhancing potential projection with top-down techniques.

2

Present the pros, cons, and value of the activities in each pathway.

3

Get feedback from stakeholders on the value you perceive in these activities.



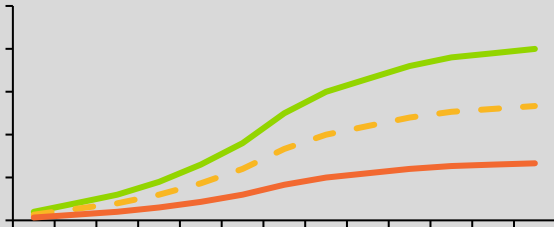
# Overview of Pathways

# Guidehouse has identified three pathways for ongoing use of top-down techniques.

## Context and Credibility

*Path of Least Resistance.*

Informational enhancement of bottom-up approach.

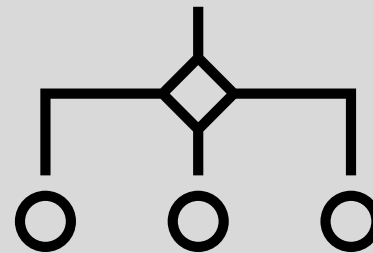
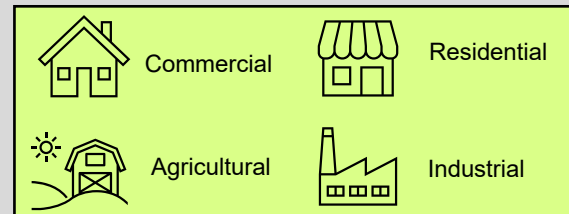


- Identify and analyze discontinuities between history and projection.
- Better characterize segments with poorly understood EE opportunities (Ind/Ag)

## Complete Replacement

*Most Disruptive Path*

Gradually replace bottom-up modeling with top-down analysis for all sectors and segments



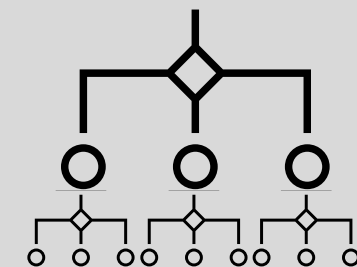
No measure-level outputs

## Hybrid (Combine and Allocate)

*Compromise: The Best of Both Worlds?*

- Top-down analysis delivers segment potential.
- Bottom-up modeling allocates segment potential across measures.

Segment Potential



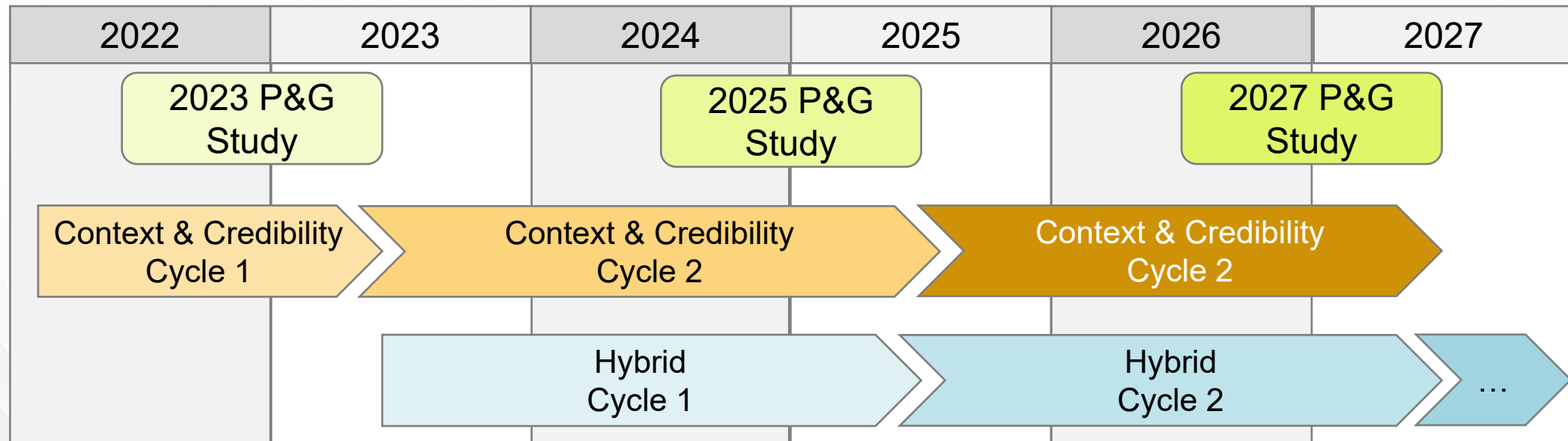
Measure Level Detail

# Each pathway has been mapped out over three Potential and Goals Study cycles.

The cycles are *relative* timelines for each pathway. For example:

- Cycle 2 activities cannot take place until Cycle 1 activities are complete.
- Cycle 1 activities for Context and Credibility could begin in one year of a P&G study and Cycle 1 of Hybrid or Complete Replacement could begin in the next.

## Example Possible Timeline – ILLUSTRATIVE ONLY

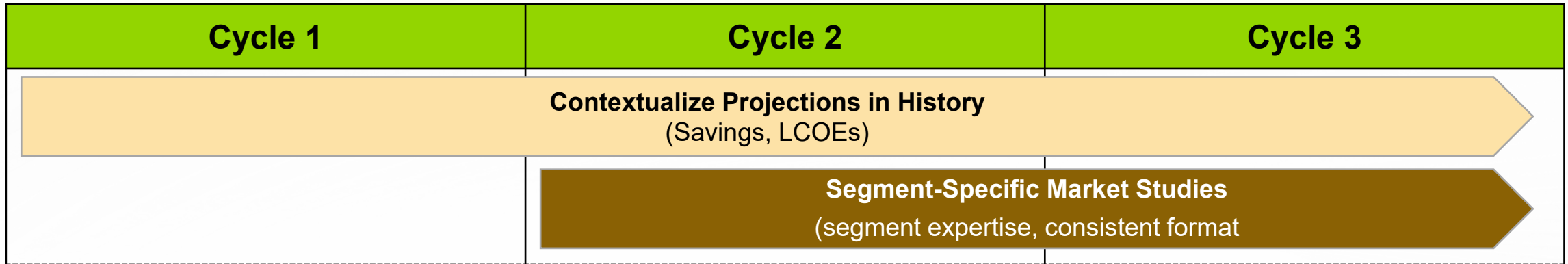


# Pathway 1: Context & Credibility

**Comparison of historical achievement to  
projected potential to support planning and  
provide QA**

# Pathway 1: Context & Credibility (1)

## Pathway Overview



### *Path of Least Resistance*

- Informational enhancement of bottom-up approach.
- Identify and analyze discontinuities between history and projection.
- Better characterize segments with poorly understood EE opportunities (Ind/Ag)



# Pathway 1: Context & Credibility (2)

## Pathway Activities

### Contextualize Projections in History

**Compare historical and projected values of:**

- LCOEs
- Absolute savings
- Relative savings (% of consumption)

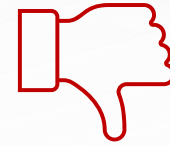
By segment and end-use.

**Identify and diagnose discontinuities** to provide quality assurance and helpful planning context.

### Segment-Specific Market Studies

- **Prioritize** Ind & Agr segments by magnitude of consumption and uncertainty in EE implementations.
- **Engage** segment expert consultants (not EE experts) to assist in report development.
- **Adhere** to formal output reporting formats – each report is not stand-alone, but a chapter in a state-wide reference manual.
- **Maintain** consistent team of EE experts to support segment experts & ensure continuity.

# Pathway 1: Context & Credibility (3)





## Activities

## Pros

## Cons

## Value

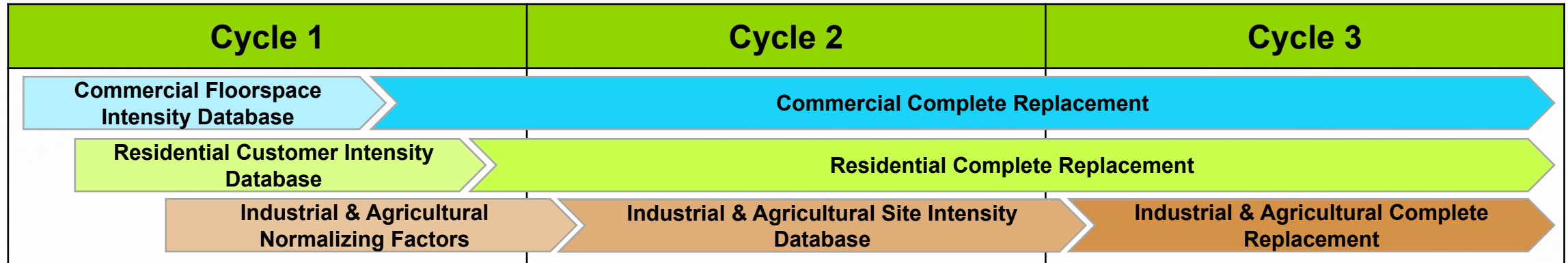
<p><b>Contextualize Projections in History</b></p>	<ul style="list-style-type: none"> <li>No incremental data collection required.</li> <li>Provides additional quality assurance.</li> <li>Can assist with program planning &amp; segment forecasting</li> </ul>	<p>Modest incremental consultant costs.</p>	<p><u>HIGH</u></p> 
<p><b>Segment-Specific Market Studies</b></p>	<ul style="list-style-type: none"> <li>Measure specificity for complex/challenging segments.</li> <li>Better information to identify program opportunities.</li> <li>Improved calibration for long-term forecasting.</li> </ul>	<ul style="list-style-type: none"> <li>Significant incremental consultant costs.</li> <li>Incremental stakeholder and CPUC staff time.</li> </ul>	<p><u>MODERATELY HIGH</u></p> 

# Pathway 2: Complete Replacement

**Replace potential projection by bottom-up modeling with top-down analysis**

# Pathway 2: Complete Replacement (1)

## Pathway Overview



### *Most disruptive path*

- Gradually replace bottom-up modeling with top-down analysis for all sectors and segments
- Complete Replacement pathway results in loss of measure-level outputs.

# Pathway 2: Complete Replacement (2)

## Pathway Activities

### Com Floorspace & Res Customer Intensity Database

#### **Commercial**

Acquire commercial floorspace data from CEUS and 3<sup>rd</sup> party vendors.

#### **Residential**

Segment individual customers by structural dwelling type (residential segment)

#### **Both**

Develop representative geo-tagged database of individual customer intensities.

### Com, Res, Ind & Ag Complete Replacement

#### **Develop top-down analysis to project potential for P&G study.**

Outputs available only at end-use and segment level – total replacement of bottom-up modeling by top-down analysis.



# Pathway 2: Complete Replacement (3)

## Pathway Activities

### Industrial & Agricultural Normalizing Factors

**Identify normalizing factor appropriate for each segment.** Equivalent to use of floorspace for commercial sector.

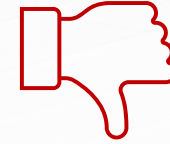
- Identify available data and reasonable proxies.
- Review available data for completeness and assess most appropriate normalizing factors.
- Prioritize based on consumption metrics.

### Industrial & Agricultural Site Intensity Database

- **Acquire** representative sample of normalizing factors by segment.
- **Apply** normalizing factors to individual customer utility data.

Based on above, develop representative database of individual customer site intensities.

# Pathway 2: Complete Replacement (4)





## Activities

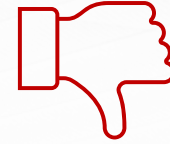
## Pros

## Cons

## Value

<p><b>Com Floorspace &amp; Res Customer Intensity Database</b></p>	<ul style="list-style-type: none"> <li>• Required for Complete Replacement.</li> <li>• Intensity DB enables customer targeting for programs</li> <li>• Geo-logged intensities enhance forecasting and planning.</li> </ul>	<ul style="list-style-type: none"> <li>• Data acquisition costs</li> <li>• Incremental analysis costs (DB creation).</li> <li>• Incremental CPUC staff support time for data acquisition</li> <li>• Ongoing DB maintenance costs</li> </ul>	<p><b><u>HIGH</u></b></p> 
<p><b>Industrial &amp; Agricultural Normalizing Factors</b></p>	<ul style="list-style-type: none"> <li>• Required to develop intensity DB</li> <li>• Can provide additional intelligence for projection and analysis (synergy w/ Context &amp; Credibility reports).</li> </ul>	<ul style="list-style-type: none"> <li>• Incremental analyst and specialist industry consultant costs.</li> <li>• Data acquisition costs</li> <li>• Risk that for some segments no reliable factor or proxy may be reliably available.</li> </ul>	<p><b><u>MODERATE</u></b></p> 

# Pathway 2: Complete Replacement (5)


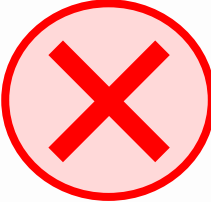


## Activities

## Pros

## Cons

## Value

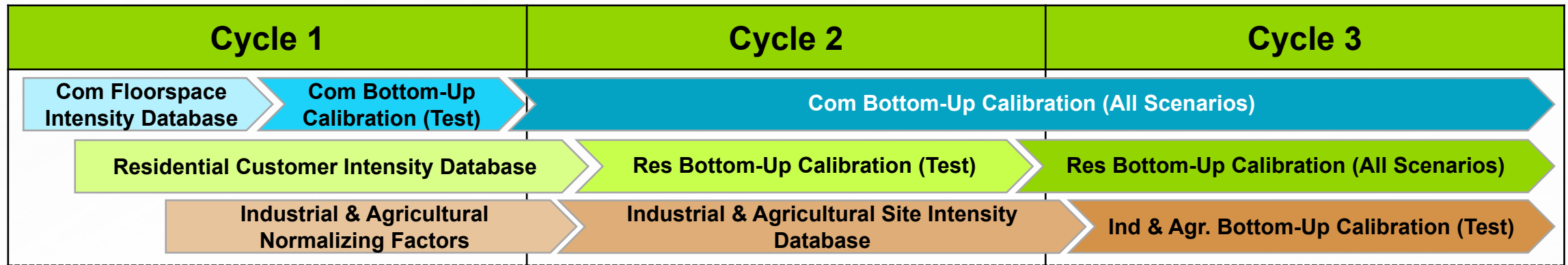
<p><b>Industrial &amp; Agricultural Site Intensity Database</b></p>	<ul style="list-style-type: none"> <li>• Required for Complete Replacement.</li> <li>• Intensity DB enables customer targeting for programs</li> <li>• Geo-logged intensities enhance forecasting and planning.</li> </ul>	<ul style="list-style-type: none"> <li>• Data acquisition costs</li> <li>• Incremental analysis costs (DB creation).</li> <li>• Incremental CPUC staff support time for data acquisition</li> <li>• Ongoing DB maintenance costs</li> </ul>	<p><b>HIGH</b></p> 
<p><b>Com, Res, Ind &amp; Ag Complete Replacement</b></p>	<ul style="list-style-type: none"> <li>• Conditional on data, top-down less costly to perform than bottom-up.</li> <li>• Reduce reliance on “black-box” deterministic model of market dynamics – improved methodological transparency.</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of measure-level detail means reduced output transparency. Major concern for stakeholders.</li> <li>• Disruption of downstream workflows due to change in output format.</li> </ul>	<p><b>LOW</b></p> 

# Pathway 3: Hybrid (Combine & Allocate)

**Top-down analysis delivers projected potential by segment, bottom-up modeling allocates potential out to individual measures.**

# Pathway 3: Hybrid (Combine & Allocate) (1)

## Pathway Overview



## *Compromise: The Best of Both Worlds?*

- Top-down analysis delivers segment potential.
- Bottom-up modeling allocates segment potential across measures.



# Pathway 3: Hybrid (Combine & Allocate) (2)

Pathway Activities (Part 1 of 2) *Same activities as Pathway 2*

## Commercial Floorspace & Residential Customer Intensity Database

### Commercial

Acquire commercial floorspace data from CEUS and 3<sup>rd</sup> party vendors.

### Residential

Segment individual customers by structural dwelling type (residential segment)

### Both

Develop representative geo-tagged database of individual customer intensities.

## Industrial & Agricultural Normalizing Factors

**Identify normalizing factor appropriate for each segment.**  
Equivalent to use of floorspace for commercial sector.

- Identify available data and reasonable proxies.
- Review available data for completeness and assess most appropriate normalizing factors.
- Prioritize based on consumption metrics.

## Industrial & Agricultural Site Intensity Database

- **Acquire** representative sample of normalizing factors by segment.
- **Apply** normalizing factors to individual customer utility data.

Based on above, develop representative database of individual customer site intensities.

# Pathway 3: Hybrid (Combine & Allocate) (3)

## Pathway Activities (Part 2 of 2)

### Com, Res, Ind & Ag Bottom-Up Calibration (Test)

#### Side-by-side testing of Hybrid approach.

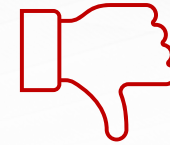
- Goals remain determined by bottom-up model.
- Additional scenario modeled using Hybrid approach:
  - Segment-level potential projected by top-down analysis
  - Bottom-up model outputs calibrated to meet top-down projection for one scenario.
- Comparative review of test outputs, confirmation that assumptions and outputs fit/align with downstream stakeholder workflows.

### Com and Res Calibration (All Scenarios)

#### Top-down analysis delivers segment-level projection of potential, bottom-up modeling allocates potential across measures.

Top-line potential values are all defined by the top-down analysis – complexity of market dynamic modeling may be scaled back.

# Pathway 3: Hybrid (Combine & Allocate) (4)





## Activities

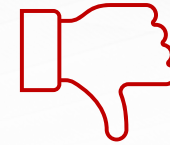
## Pros

## Cons

## Value

Activities	Pros	Cons	Value
<b>Com Floorspace &amp; Res Customer Intensity Database</b>	<ul style="list-style-type: none"> <li>• Required for Complete Replacement.</li> <li>• Intensity DB enables customer targeting for programs</li> <li>• Geo-logged intensities enhance forecasting and planning.</li> </ul>	<ul style="list-style-type: none"> <li>• Data acquisition costs</li> <li>• Incremental analysis costs (DB creation).</li> <li>• Incremental CPUC staff support time for data acquisition</li> <li>• Ongoing DB maintenance costs</li> </ul>	<p><b>HIGH</b></p> 
<b>Industrial &amp; Agricultural Normalizing Factors</b>	<ul style="list-style-type: none"> <li>• Required to develop intensity DB</li> <li>• Can provide additional intelligence for projection and analysis (synergy w/ Context &amp; Credibility reports).</li> </ul>	<ul style="list-style-type: none"> <li>• Incremental analyst and specialist industry consultant costs.</li> <li>• Data acquisition costs</li> <li>• Risk that for some segments no reliable factor or proxy may be reliably available.</li> </ul>	<p><b>MODERATE</b></p> 

# Pathway 3: Hybrid (Combine & Allocate) ()





## Activities

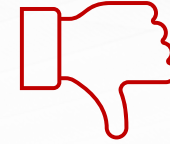
## Pros

## Cons

## Value

<p><b>Industrial &amp; Agricultural Site Intensity Database</b></p>	<ul style="list-style-type: none"> <li>• Required for Complete Replacement.</li> <li>• Intensity DB enables customer targeting for programs</li> <li>• Geo-logged intensities enhance forecasting and planning.</li> </ul>	<ul style="list-style-type: none"> <li>• Data acquisition costs</li> <li>• Incremental analysis costs (DB creation).</li> <li>• Incremental CPUC staff support time for data acquisition</li> <li>• Ongoing DB maintenance costs</li> </ul>	<p><b>HIGH</b></p> 
<p><b>Com, Res, Ind &amp; Ag Bottom-Up Calibration (Test)</b></p>	<ul style="list-style-type: none"> <li>• Provides opportunity for side-by-side testing both to evaluate outputs and how they flow through downstream workflows</li> <li>• Preserves output granularity required by stakeholders.</li> </ul>	<ul style="list-style-type: none"> <li>• Incremental analysis costs associated with developing alignment/calibration.</li> <li>• Incremental CPUC staff and stakeholder time required for review and comment on side-by-side outputs.</li> </ul>	<p><b>MODERATELY HIGH</b></p> 

# Pathway 3: Hybrid (Combine & Allocate) (6)



## Activities

## Pros

## Cons

## Value

**Com and Res Calibration  
(All Scenarios)**

- Database require for complete replacement.
- DB of site intensities can enable customer targeting by IOU programs (reduce costs)
- Geo-logged intensities can enhance forecasting and distribution planning.

- Data acquisition costs
- Incremental analysis costs (DB creation).
- Incremental CPUC staff support time for data acquisition
- Ongoing DB maintenance costs
- Additional complexities if data availability makes comprehensive DB completion impossible.

**MODERATELY HIGH**



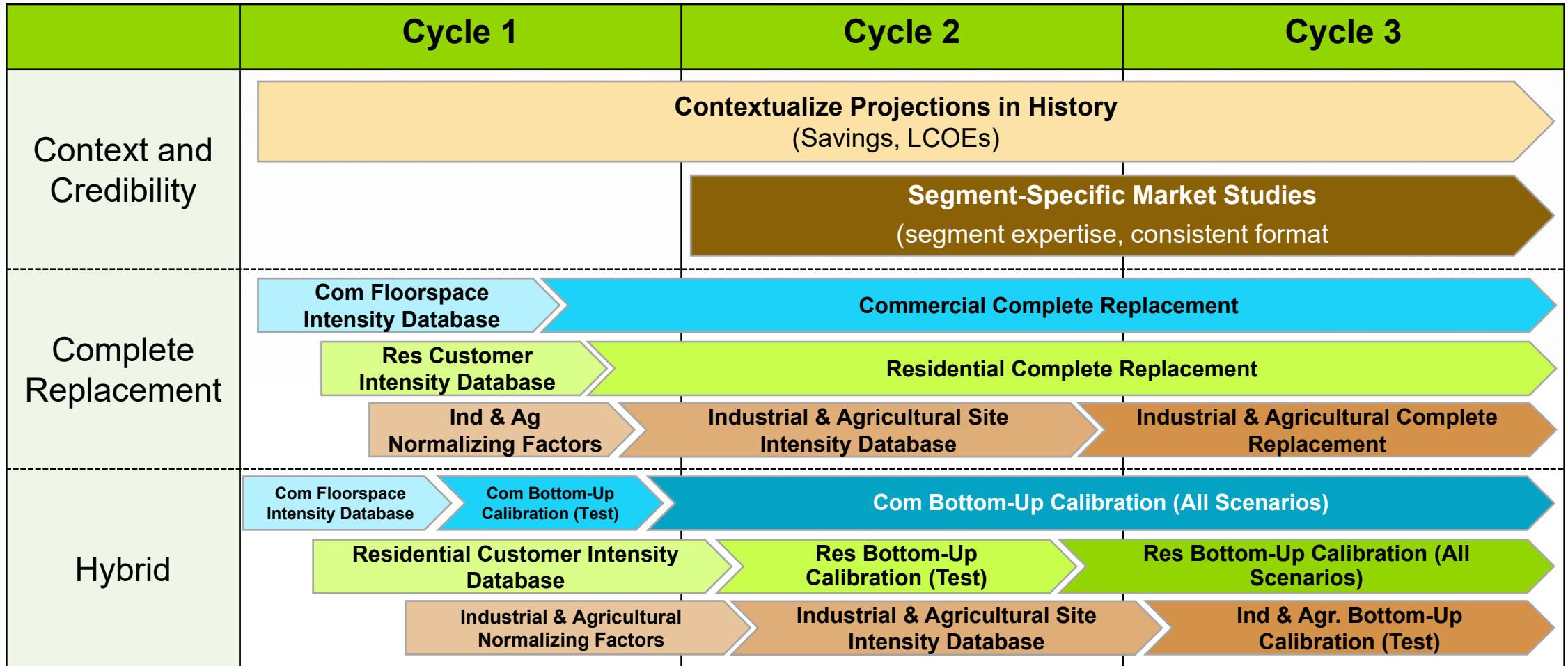
*Note: Guidehouse has mapped out only three cycles of the Potential and Goals study, and so the complete migration to Hybrid for Industrial and Agricultural is not explicitly identified, but would be assumed to follow the Cycle 3 testing phase (analogous to Commercial and Residential).*






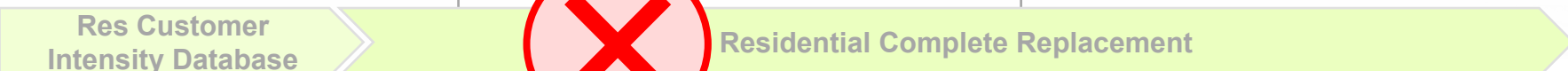
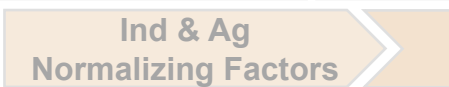

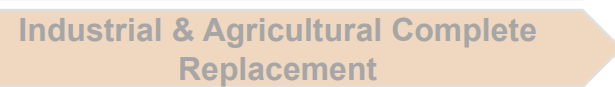




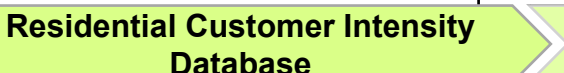






# Summary of Pathways



# Summary of Pathways by Cycle



# Value Assessment of Activities by Pathways & Cycle

	Cycle 1	Cycle 2	Cycle 3
Context and Credibility	 <b>Contextualize Projections in History</b> (Savings, LCOEs)		
		 <b>Segment-Specific Market Studies</b> (segment expertise, consistent format)	
Complete Replacement	 <b>Commercial Complete Replacement</b>		
	 <b>Residential Complete Replacement</b>		
	 <b>Ind &amp; Ag Normalizing Factors</b>	 <b>Industrial &amp; Agricultural Site Intensity Database</b>	 <b>Industrial &amp; Agricultural Complete Replacement</b>
Hybrid	  <b>Com Floorspace Intensity Database</b>		
	 <b>Com Bottom-Up Calibration (All Scenarios)</b>		
	  <b>Residential Customer Intensity Database</b>	 <b>Res Bottom-Up Calibration (Test)</b>	 <b>Res Bottom-Up Calibration (All Scenarios)</b>
	  <b>Industrial &amp; Agricultural Normalizing Factors</b>	 <b>Industrial &amp; Agricultural Site Intensity Database</b>	 <b>Ind &amp; Agr. Bottom-Up Calibration (Test)</b>

# Questions to Stakeholders

# Pathway Specific

- **Commercial Floorspace & Residential Customer Intensity Database.** Guidehouse has identified this as a very “low regrets” action base partly on belief that such a database would be very helpful to other stakeholder planning and forecasting activities.

*Would a set of intensity databases, identifying individual customer average energy intensity be a useful resource to your organization?*

- **Segment-Specific Market Studies.** Guidehouse believes that the on-going development of segment-specific market reports with consistent format and outputs such that they effectively form chapters in a larger reference work supported by sector-specific expertise would provide significant value to stakeholders as well as to potential projection.

*Could such reports provide your organization with value? What key characteristics or content would such reports need to include to be most valuable to your organization?*

# General Top-Down

- **Scope of the pathways explored.** Guidehouse has identified three possible pathways to integrating top-down analysis techniques into the P & G study process.

*What do you think of the pathways identified? Are there any additional pathways that CPUC should consider?*

- **Value of the top-down perspective.**

*Do you believe the top-down techniques provide sufficient value and that any of the activities identified above should be considered in more detail? Are there other activities related to top-down analysis not listed that you believe could add value?*

- **Transition timelines.** Guidehouse has provided only *relative* timelines for each of the pathways.

*Would you recommend a timeline for the implementation of one or more of the pathways, or of any of the pathway activities?*



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