2018 AND BEYOND POTENTIAL STUDY

NOVEMBER WORKSHOP

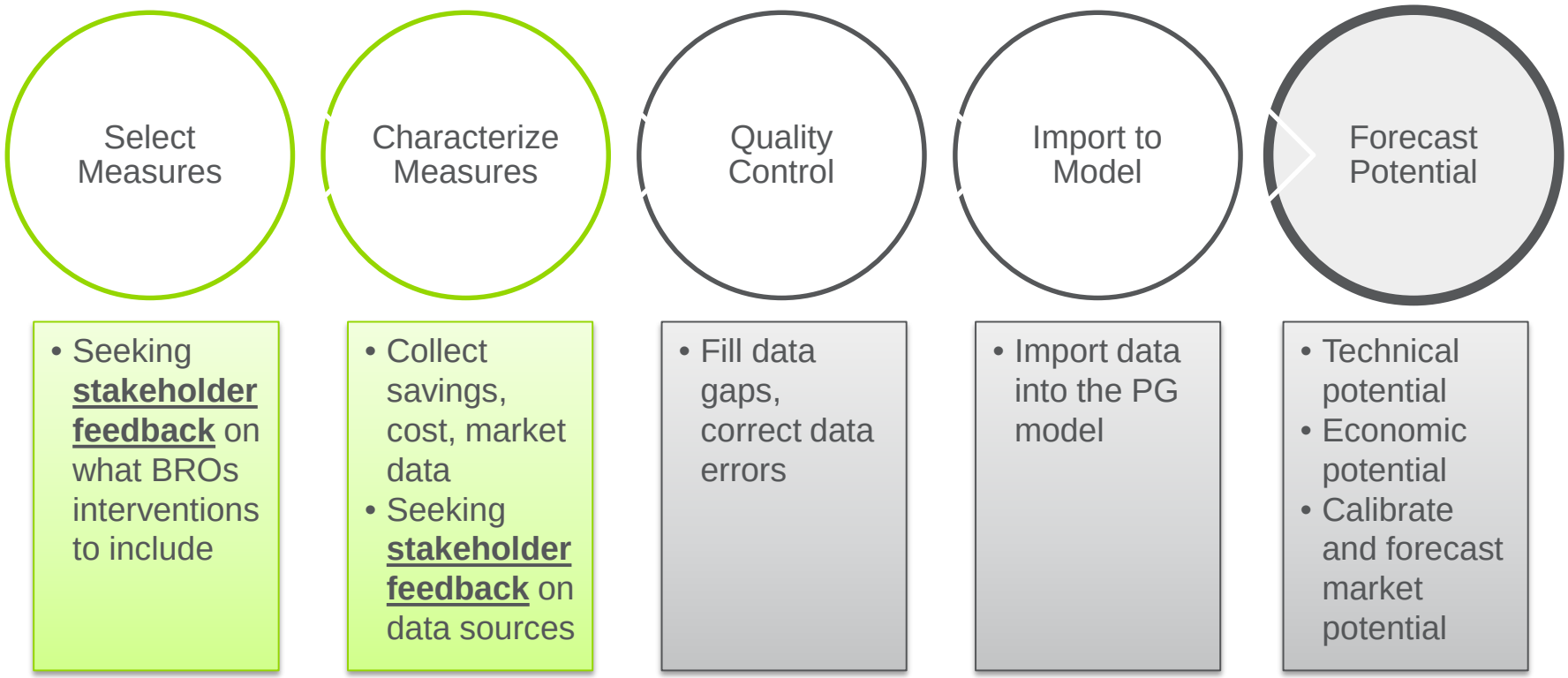
NAVIGANT

TABLE OF CONTENTS

OBJECTIVE FOR TODAY'S MEETINGS

- Introduce members of the Navigant team
- Review Navigant's approach to Behavioral, Retrocommissioning, Operational Savings (BROS); and Whole Building Packages
- Discuss data sources to be used for characterizing BROs and Whole Building
- Introduce a methodology for removing Double Counted Savings from IOU goals
- Solicit stakeholder feedback

THE PROCESS OF FORECASTING POTENTIAL



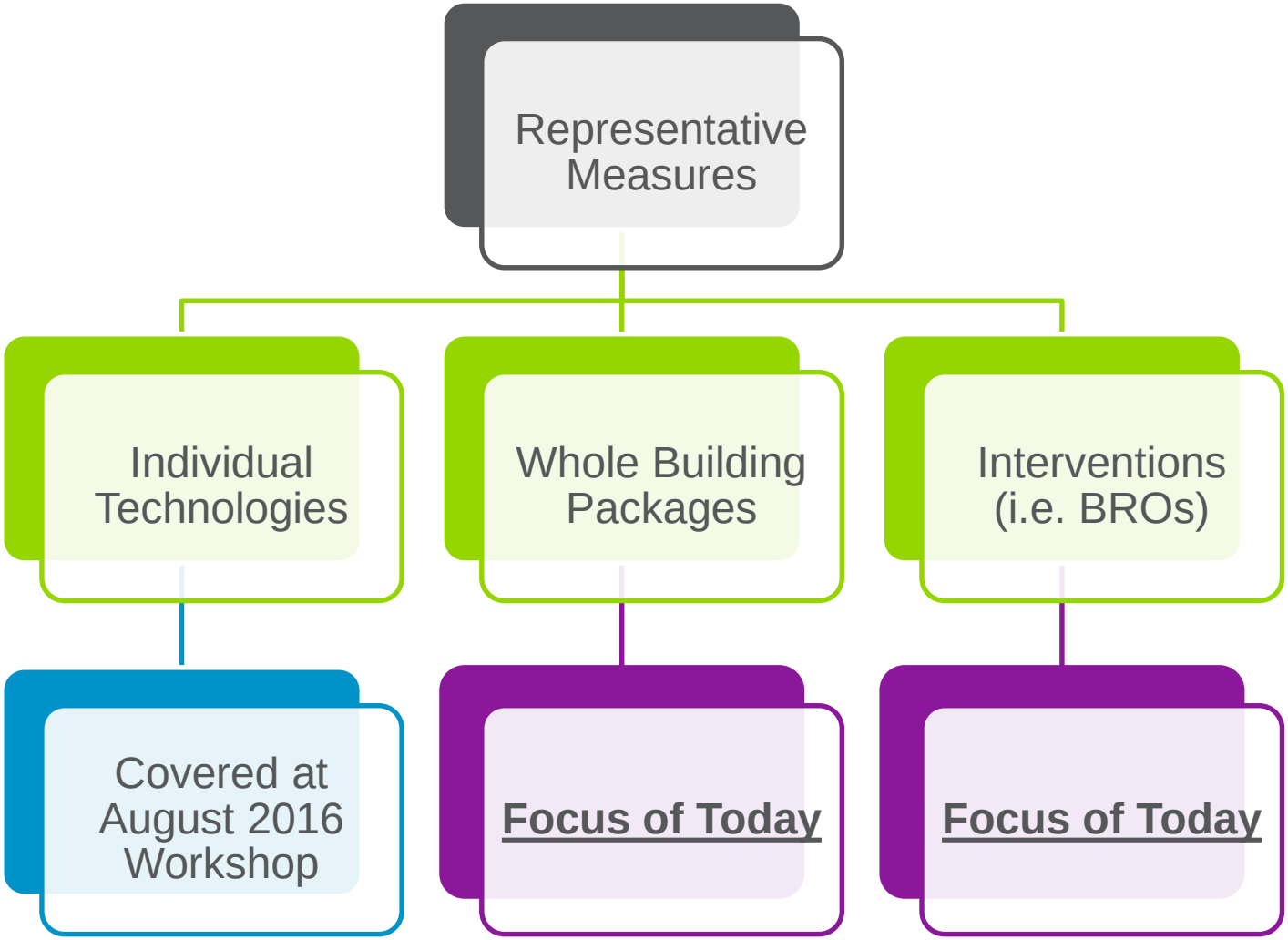
NAVIGANT

MEASURES VS REPRESENTATIVE MEASURES

- PG study models representative measures, **not** every single measure possible
  - All major end uses are represented
  - Allows for more efficient project timeline and budget

NAVIGANT

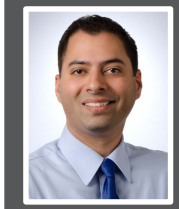
SPECTRUM OF REPRESENTATIVE MEASURES



NAVIGANT

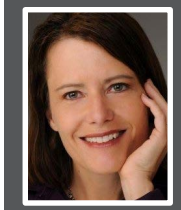
NAVIGANT TEAM MEMBER ROLES

Greg Wikler - Project Director



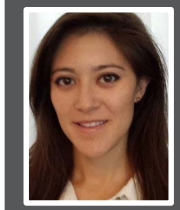
Amul Sathe - Project Manager

Surya Swamy - Lead Modeler



Karen Ehrhardt-Martinez - Res/Com BROs

Floyd Keneipp - Ind/Ag BROs



Kristin Landry - Whole Building

TABLE OF CONTENTS

SCOPE OF BROS IN PAST PG STUDIES

Past PG Studies	Residential	Commercial	Industrial
2011	• Home energy reports (HER)	• Building Operator Certification/training (BOC)	-
2013	• No update)	• No update	• Forecast based on Industrial Assessment Center
2015	• HER (revised data)	• BOC (no update) • Updated RCx and some operational measures	• No update
2016 – AB802 Technical Analysis	• HER (no update)	• BOC (no update) • Monitoring-based RCx • Lighting Controls • Occupant Engagement	• No update
2018 (proposed)	• **TBD based on stakeholder feedback**	• **TBD based on stakeholder feedback**	• **Refresh based on Strategic Energy Management (SEM)**

RESIDENTIAL AND COMMERCIAL BROS SCOPE AND TOPICS

Scope of this discussion:

Specific 2018 PG Model Updates for BROs in the residential and commercial market segments.

- Topics include:
  - Defining BROS in the residential and commercial markets
  - Defining market drivers
  - New approaches

DEFINING BROS IN RESIDENTIAL AND COMMERCIAL MARKETS

Modelling Framework

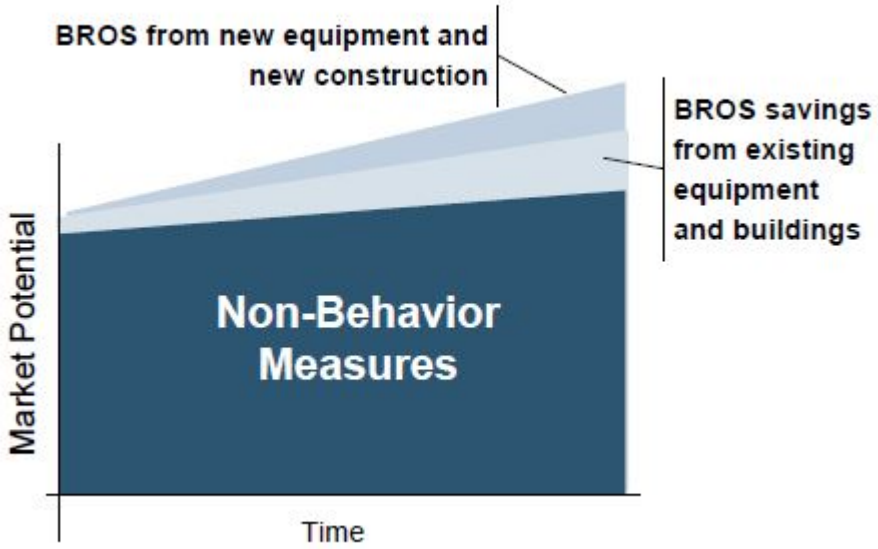
- Savings can apply to both existing equipment and retrofits/new construction
- Savings will be incremental to savings from equipment change-outs

Behavioral Approaches

- Changes in efficient technology purchasing behavior
- Reducing or avoiding the use of technologies
- Technology operating practices
- Changes in technology settings

Potential Actors

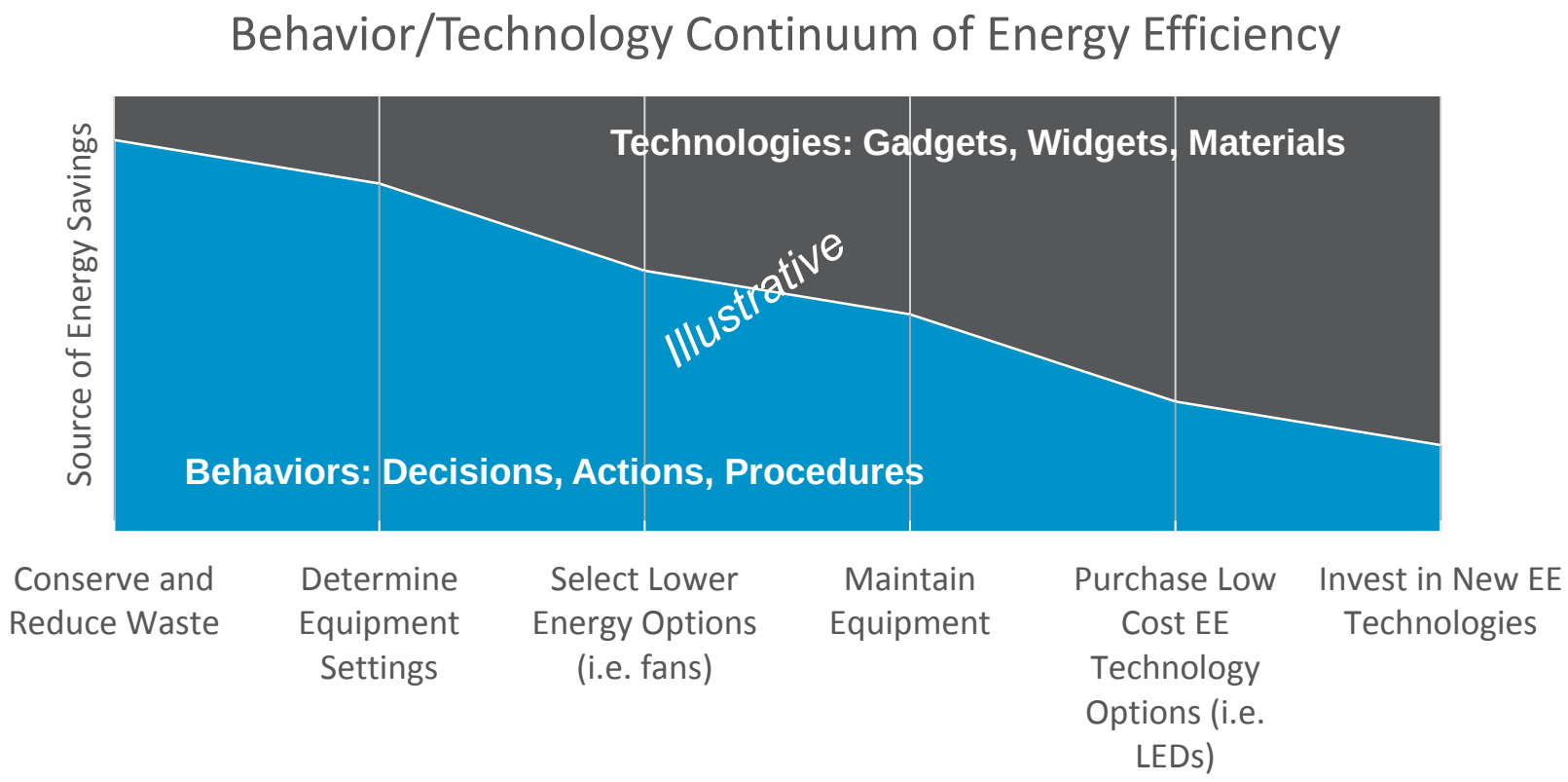
- Building occupants
- Building operators
- Building managers
- Company leadership
- Others



Source: Illustrative, Navigant

NAVIGANT

DEFINING BROS IN RESIDENTIAL AND COMMERCIAL MARKETS



Source: Human Dimensions Research

NAVIGANT

DEFINING BROS IN RESIDENTIAL AND COMMERCIAL MARKETS

A simple definition:

Doing the same work more efficiently versus doing less work.

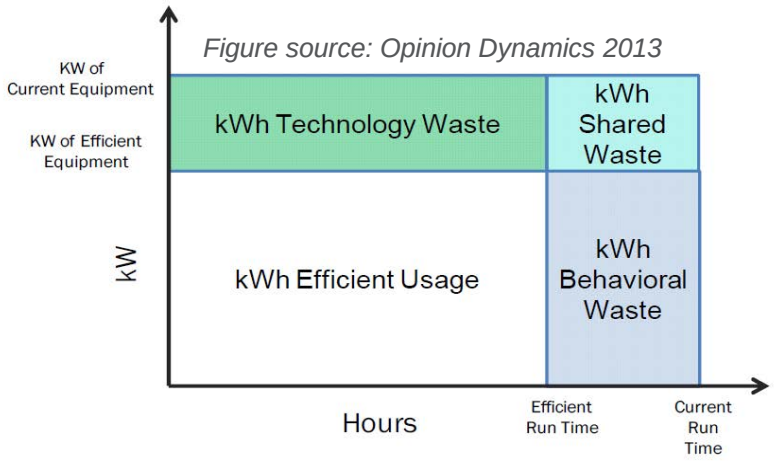


Figure source: Opinion Dynamics 2013

A more nuanced definition:

Do work more efficiently: Use patterns unchanged

- Install EE technologies
- Maintain equipment

Reduce/eliminate wasteful use practices (maintain benefit)

- Use energy efficient settings
- Reduce run time
- Choose alternative approaches

Curtail Use (lose benefit – deprive)

- Eliminate technologies
- Reduce run time

Questions for stakeholders:

1. Do stakeholder have alternative views on BROS savings definition?

NAVIGANT

KEY BROS MARKET DRIVERS

Utility Drivers

- Increased availability of energy information
- Internet of Things - Increasing products and services for Residential and Commercial
- Grid management – Wide scale deployment of DERs
- Utility focus on customer service and satisfaction

Legislative and Regulatory Drivers

- AB802
- SB350
- AB793
- AB758
- AB1103 (sunset in 2015 and subsumed into AB802)
- 2016 Existing Buildings Energy Efficiency Action Plan

IDENTIFICATION OF BEHAVIORAL MEASURES

Review of Literature

- Currently limited to 140 programs in CEE Behavior program data base.
- Will be reviewing additional literature.

Key Data Points

- Breadth of utility experience with different program types
- Data Availability
  - Types of data needed for measure characterization – savings, cost, measure life, applicable market size, current saturation, saturation ramp rate, etc.
- Size of savings

Questions for stakeholders:

1. What additional sources would you recommend?

BEHAVIOR-BASED MEASURES: RESIDENTIAL

Representative Measures Source: Based on a review of CEE data	# of Programs in CEE Database	Data Availability	Relative Size of Savings	Likelihood of Inclusion
Audit	Moderate	+	Large	High
Mailed Feedback	Large	+	Large	High
Real-time Feedback	Small	+	Small	Moderate
Prepay (e.g. mPower)	Small	+	Large	Moderate
Smart Thermostat	Moderate	+	n.a.	Moderate
Challenge/Competitions	Small	-	n.a.	Low
Community Based Social Marketing	Moderate	-	n.a.	Low
Web-based Feedback	Small	-	n.a.	Low
Social Media	Moderate	-	n.a.	Low

Questions for stakeholders:

1. Additional measures that should be considered?
2. Thoughts on criteria for inclusion?

BEHAVIOR-BASED MEASURES: COMMERCIAL

Representative Measures	# of Programs in CEE Database	Data Availability	Size of Savings	Likelihood of Inclusion
Audit	Small	-	n.a.	High
Building Operator Training	Moderate	-	n.a.	High
Feedback/ Bus. Energy Rpts/ BEIMS	Small	-	n.a.	High
Challenges/Competitions	Small	-	n.a.	Moderate
CBSM	Large	-	n.a.	Unknown
Strategic Energy Management	Small	-	n.a.	Unknown
Green leases	Small	-	n.a.	Unknown
Building Benchmarking	Small	-	n.a.	Unknown
Tenant-Operator Engagement (COMFY)	Small	-	n.a.	Unknown

Questions for stakeholders:

1. Additional measures that should be considered?
2. Thoughts on criteria for inclusion?

QUESTIONS FOR STAKEHOLDERS

Additional Questions:

1. For the purpose of net goals, we are considering using an NTG value of 1 for SEM forecasts. If not, can stakeholders provide data for an alternative starting NTG?
2. What data can stakeholders provide for: 1) savings, 2) market saturation, 3) persistence, 4) net-to-gross, 5) program costs

BROS Definition:

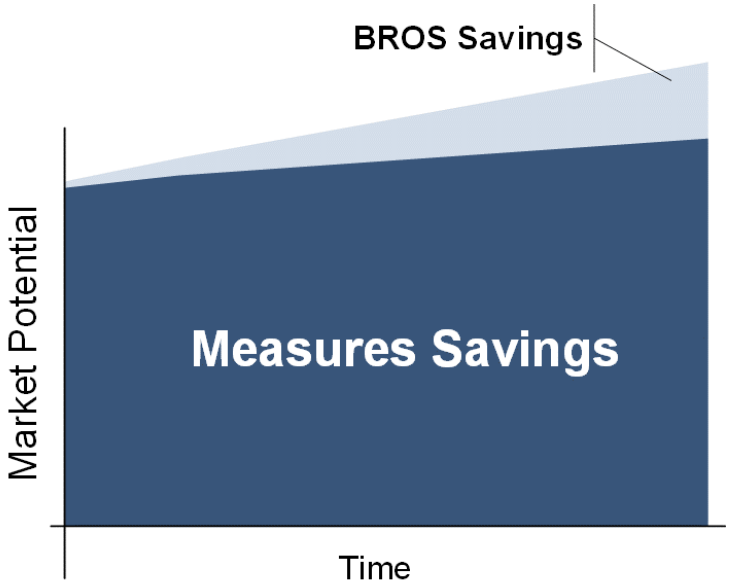
1. Do stakeholder have alternative views on BROS savings definition?

Representative Residential and Commercial Measures:

1. What additional sources would you recommend?
2. Are there others measures that should be included
3. Do stakeholders agree with the rating in the table?

INDUSTRIAL AND AGRICULTURAL BROS

- 2018 PG Model Scope:
  - Industrial and Agricultural sector updated will include estimate of **BROS (Behavioral, Retrocommissioning, Operational Savings).**
  - TBD if Mining and Street Lighting will be updated, these sectors will not include BROS.
- BROS Overview:
  - Will focus on Operation & Maintenance (O&M) savings achieved through SEM.
  - Will be forecasted separately from measure savings.
  - Will result in incremental/additional savings above measure savings.
  - Will not be forecasted through a diffusion model.

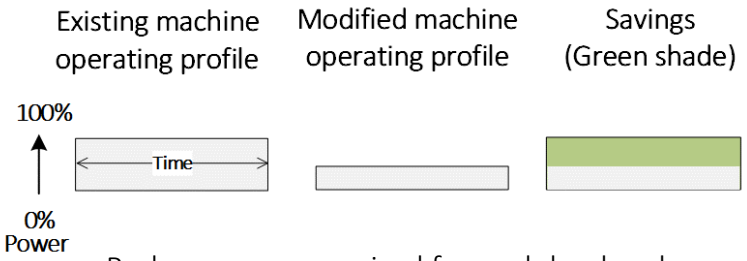


Source: Illustrative, Navigant

DEFINING BROS IN THE INDUSTRIAL AND AGRICULTURAL SECTORS

The simple BROS definition: Doing less work versus doing the same work more efficiently.

Examples: Doing the same work more efficiently



Reduce power required for each load cycle.

Examples: Doing less work

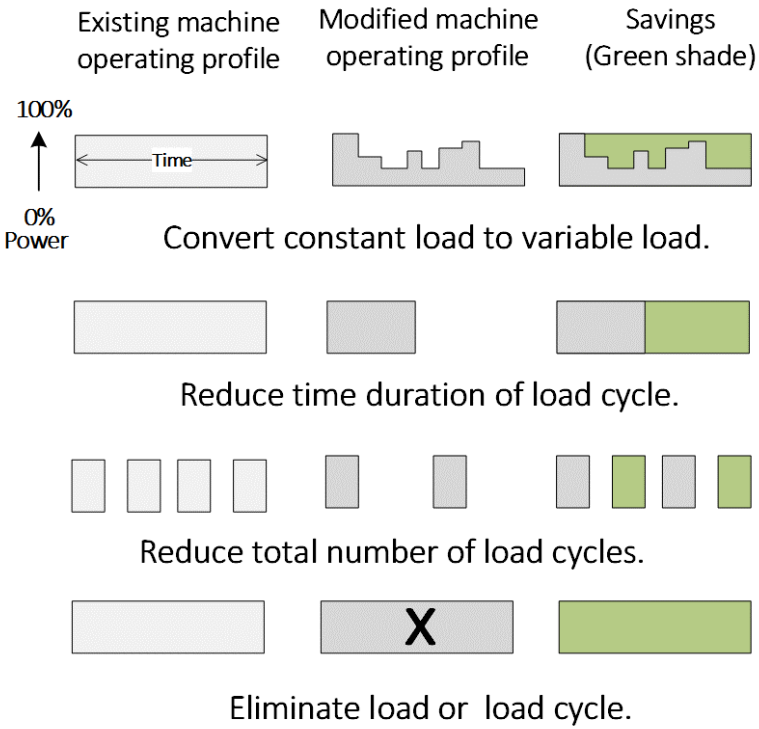


Figure source: Navigant

NAVIGANT

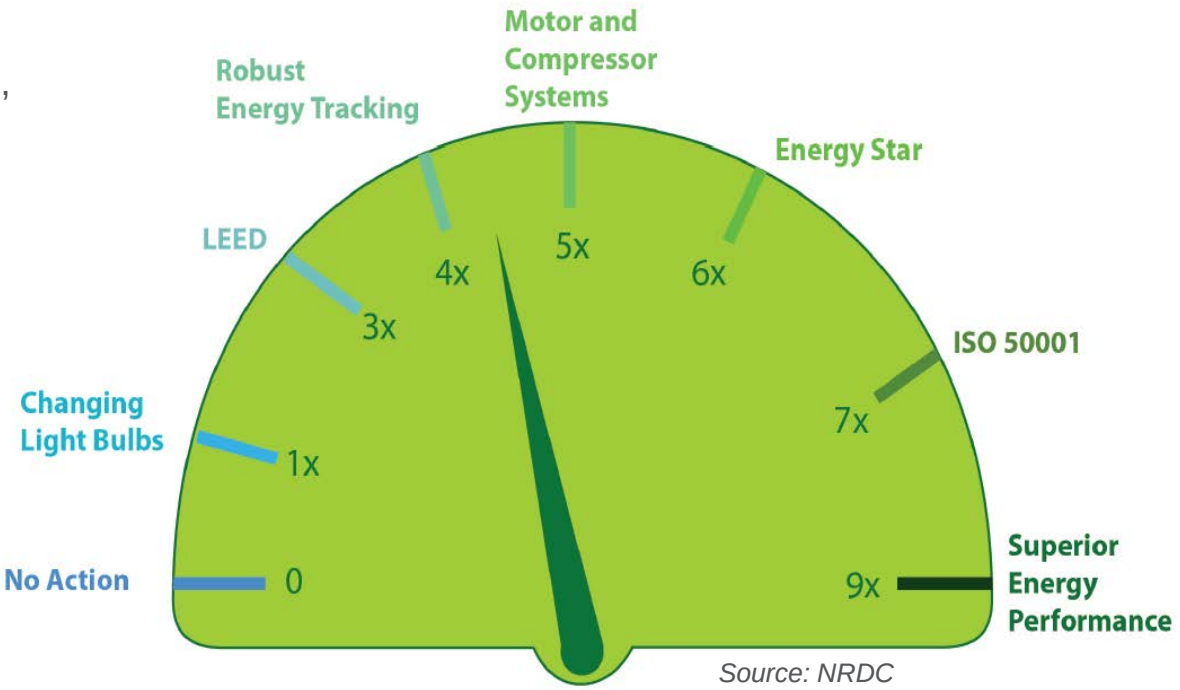
FORECASTING POTENTIAL: POTENTIAL BROS INITIATIVES

Examples of BROS type initiatives

- ***Strategic Energy Management (SEM, similar to Superior Energy Performance)*** invests in developing organizational capacity to achieve holistic improvements in the ways that energy is used.
- ***ISO 50001*** is a standard intended to provide a framework to help organizations use their energy consuming assets in a more sustainable way.
- ***Energy Star*** requires participants to keep track of data, establish baselines, analyze patterns, conduct technical assessments, and reassess overall performance and established goals.

SEM is common theme in IOU industrial sector business plans.

2018 AIMS update will focus on SEM as the forecasting platform for BROS savings.



Source: NRDC

NAVIGANT

FORECASTING POTENTIAL: SEM DEFINITION

Defining SEM:

- **Strategic Energy Management** is a 'holistic' approach to managing energy use in order to continuously improve energy performance.
- Focuses on business practice change affecting organizational culture to reduce energy waste and improve energy intensity.
- SEM emphasizes equipping and enabling plant management and staff to impact energy consumption through ***behavioral and operational change***.
- Includes 3 key elements:
    1. Commit to establishing energy performance policies and objectives; commit staff and financial resources.
    2. Establish energy performance metrics and goals.
    3. Implement a system for continually measuring and reporting energy performance against stated goals through a detailed energy model.

Questions for stakeholders:

1. Is SEM the appropriate platform to forecast BROS saving across all Industrial and Agricultural customers?
2. Can SEM incorporate results from other initiatives, such as Energy Advisor for audit and benchmarking services?

FORECASTING POTENTIAL: SEM SAVINGS POTENTIAL

Examples of SEM type program results:

- **Bonneville Power Authority:** 4.4% reduction over 16 SEM sites.
  - *An average of 2.7% of site level savings are from O&M (61% of SEM program savings).*
- **DOE Superior Energy Performance (SEP) program:** Average reduction in energy intensity is 4% per year. That increased over time to 10% for 70% of participant sites.
  - *An average of 3.1% of site level savings are from O&M (77% of SEP program savings).*
- **Energy Trust of Oregon Industrial Energy Improvement (IEI) program:** Indicates savings ranged from 1.8% to 15.9% across 10 participants from various market segments.
  - *An average of 7.9% of site level savings are from O&M.*
- **Our general forecast approach will be based on the following model:**
  - **EE Potential = [% site level O&M savings] x [% market participation] x [market forecast usage]**

Questions for stakeholders:

1. Research indicates that site level O&M savings range is 1.8% to 7.9% for participants. What do stakeholders estimate is an acceptable range for site level O&M savings?

FORECASTING POTENTIAL: SEM UPTAKE AND ATTRIBUTION

Examples of SEM type program uptake and scale:

- DOE Energy Star Challenge program[1] indicates only 1 of 500 eligible facilities participate (0.2%) after several years of program operation.
- Other studies reviewed by Navigant suggest that SEM type programs penetrate the market at a rate of ~0.75% of available participants per year.
- Anecdotal indicators suggest that industrial customers do not undertake active SEM type initiatives in the absence of program interventions.

Questions for stakeholders:

1. Modeling team assumption: Current SEM saturation is 0% across the industrial and agricultural sectors. Do stakeholders agree? If not, can they provide an alternative starting saturations and associated data?
2. Participation rates for programs similar to SEM appear to grow at about 1% per year across eligible participants. Can stakeholders provide sources of participation data?
3. Do the IOU's have SEM participation rates associated with their business plan and upcoming filings?

[1] *Source: https://www.energystar.gov/buildings/facility-owners-and-managers/industrial-plants/earn_recognition/energy_star_challenge_industry2*

FORECASTING POTENTIAL: IOU PERSPECTIVES - SCG

- SCG Business Plan intends to “Leverage Support for O&M/Behavioral Savings” through:
  - Program Offerings & Technologies
  - Program Design
  - Program Outreach & Delivery

- Behavioral energy savings measures such as operations and maintenance improvements (O&M) require little capital expenditure, but are **not recognized as net energy efficiency measures.**

Source: SCG EE Business Plan Stage 2, Industrial

Questions for stakeholders:

1. BROS savings associated with SEM will be primarily associated with O&M. How are O&M savings to be expressed in a goal setting process?

FORECASTING POTENTIAL: IOU PERSPECTIVES - SCE

SEM solves multiple customer problems, but the scale and adoption rate differs by customer size.

	Problems	Potential Solutions/Strategies	Metrics
LARGE	• Dispositions and ISPs may be artificially limiting measure availability • Strategic Energy Management (SEM) adoption differs by size • Metered approaches to savings may not be universally appropriate • Customers have differing levels of financial resources	• Determine applicability of ISPs and Dispositions across segment • Site-specific SEM • Use Whole Building & Whole Facility metered savings approach • Utilize OBR and OBF	% Large customer penetration
MID.		• Limited program w/metered approach for high-potential medium size customers • Explore "cohort" SEM • Utilize OBF (OBR where applicable) • Midstream delivery for most customers • Explore co-funding approaches	% Mid-size customer penetration
SMALL		• Promote cost-effective direct install, midstream, and deemed programs • Self-help tools for SEM • Utilize OBF (OBR where applicable)	% Small customer penetration

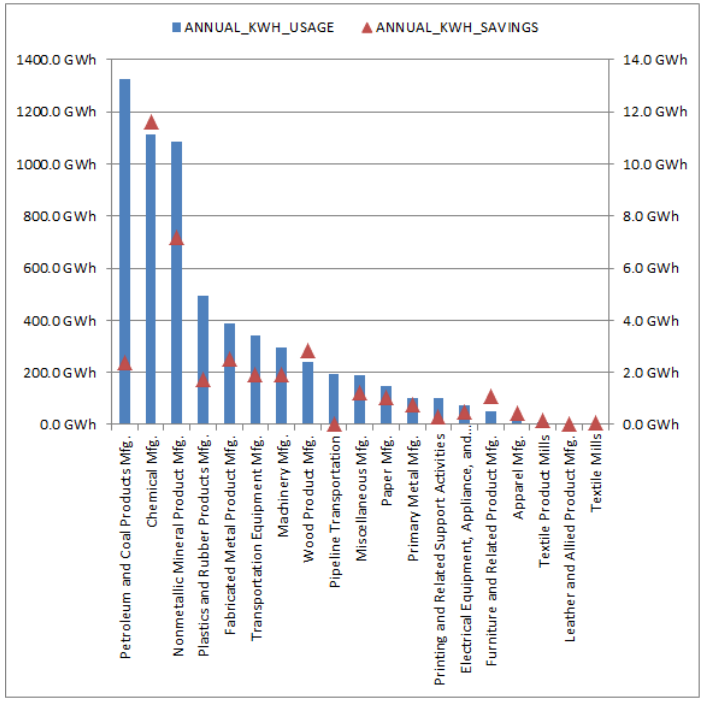
Source: SCE EE Business Plan Stage 2

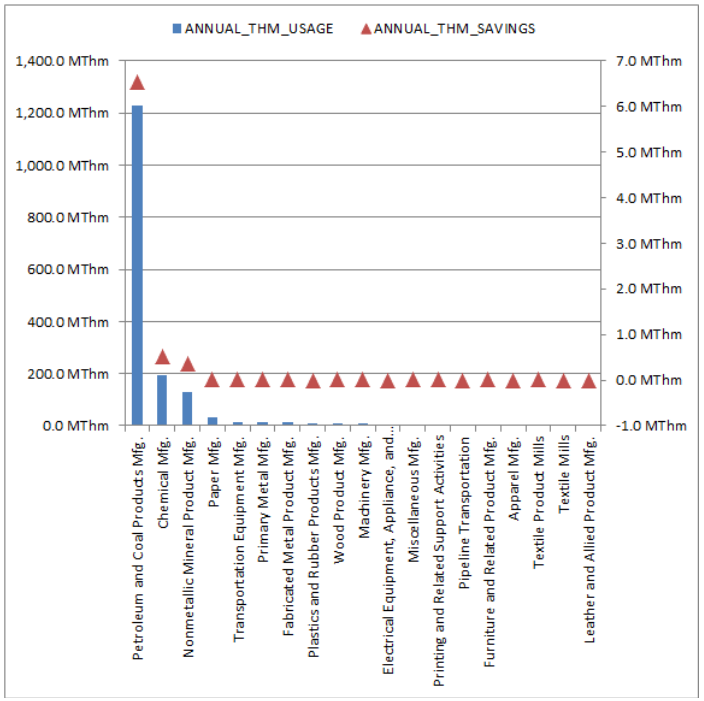
Questions for stakeholders:

1. Potential approach: Modeling BROS savings through SEM by small, medium, and large customer size. Can stakeholders provide guidance on binning customers by size?

FORECASTING POTENTIAL: IOU PERSPECTIVES - PG&E

Difficult to deliver scalable energy efficiency projects for all industrial customers because of highly specialized operations. Load concentrates in select market segments.





Source: PG&E EE Business Plan Stage 2

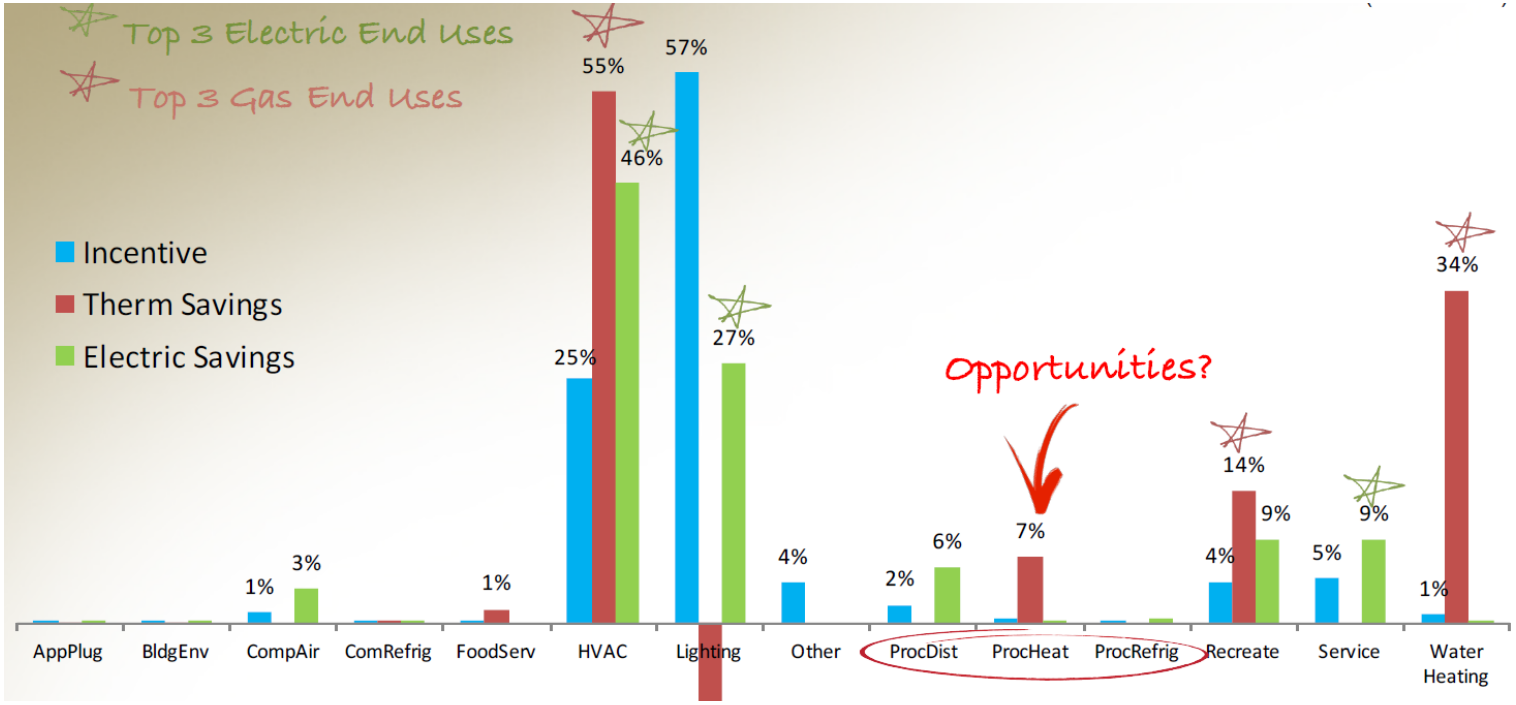
Questions for stakeholders:

1. Potential approach: Modelling SEM for high impact customer segments. Can stakeholders provide guidance on how to prioritize customers by segment?

NAVIGANT

FORECASTING POTENTIAL: IOU PERSPECTIVES – SDG&E

Potential opportunities in process related end uses.



Source: SDG&E EE Business Plan Stage 2

Questions for stakeholders:

1. Potential approach: Modeling SEM will impact 'generic' measures, e.g., 'Process' related activities. Can stakeholders provide guidance on how to define and prioritize generic measures?

NAVIGANT

SUMMARY OF QUESTIONS FOR STAKEHOLDERS

SEM Definition

1. Is SEM the appropriate platform to forecast BROS saving across all Industrial and Agricultural customers?
2. Can SEM incorporate results from other initiatives, such as Energy Advisor for audit and benchmarking services?

SEM Savings Potential

1. Research indicates that site level O&M savings range is 1.8% to 7.9% for participants. What do stakeholders estimate is an acceptable range for site level O&M savings?

SEM Uptake and Attribution

1. Modeling team assumption: Current SEM saturation is 0% across the industrial and agricultural sectors. Do stakeholders agree? If not, can they provide an alternative starting saturations and associated data?
2. Participation rates for programs similar to SEM appear to grow at about 1% per year across eligible participants. Can stakeholders provide sources of participation data?
3. Do the IOU's have SEM participation rates associated with their business plan and upcoming filings?

SUMMARY OF QUESTIONS FOR STAKEHOLDERS

IOU Perspectives

1. BROS savings associated with SEM will be primarily associated with O&M. How are O&M savings to be expressed in a goal setting process?
2. Potential approach: Modeling BROS savings through SEM by small, medium, and large customer size. Can stakeholders provide guidance on binning customers by size?
3. Potential approach: Modelling SEM for high impact customer segments. Can stakeholders provide guidance on how to prioritize customers by segment?
4. Potential approach: Modeling SEM will impact ‘generic’ measures, e.g., ‘Process’ related activities. Can stakeholders provide guidance on how to define and prioritize generic measures?

TABLE OF CONTENTS

NAVIGANT

DATA NEEDS AND CONSIDERATIONS ACROSS ALL WHOLE BUILDING PACKAGES

- **Savings**
  - New Construction savings are relative to current building codes
  - Renovation savings are relative to existing consumption baseline
  - Savings can vary by climate zone (CZ)
- **Cost**
  - New Construction – incremental cost to exceed code
  - Renovation – full cost of renovation
  - Cost can vary by building type and CZ
- **Measure Life**
  - Weighted average EUL representative of the typical measures being installed
- **Saturation**
  - Current saturation: what portion of homes/buildings already meet these levels of efficiency?
  - Maximum saturation: what portion of the building stock is the target market for the program/package?

PAST PACKAGES

Res - New Construction

- Level 1: 2008 T24 Compliant
- Level 2: 2013 T24 Compliant
- Level 3: 2013 T24 Stretch Goal Compliant
- ZNE: 40-50% less energy than 2013 T24

Com - New Construction

- Level 1: 2008 T24 Compliant
- Level 2: 2013 T24 Compliant
- 19% less energy than 2013 T24
- ZNE: 35-60% less energy than 2008 T24

Whole Building

Res - Retrofit

- Multi-Family - EUC Basic: 5-10% less energy than average existing
- Single Family
  - EUC Flex: 15-20% less energy than avg existing
  - EUC Advanced: 30% less energy than avg existing

Com - Retrofit

- Level 1: 20% less energy than average existing
- Level 2: 35% less energy than average existing

PROPOSED PACKAGES

Res - New Construction

- ZNE: savings relative to 2016 T24

Com - New Construction

- ZNE: savings relative to 2016 T24

Whole Building

Res - Retrofit

- EUC Basic: savings relative to average existing
- EUC Advanced: savings relative to average existing

Com - Retrofit

- Savings relative to average existing
- Methods:
  - Measure Bundles
  - Use PG&E Whole Buildings Demo Data
  - Percent Reduction by End-Use

NEW CONSTRUCTION - ZERO NET ENERGY (ZNE)

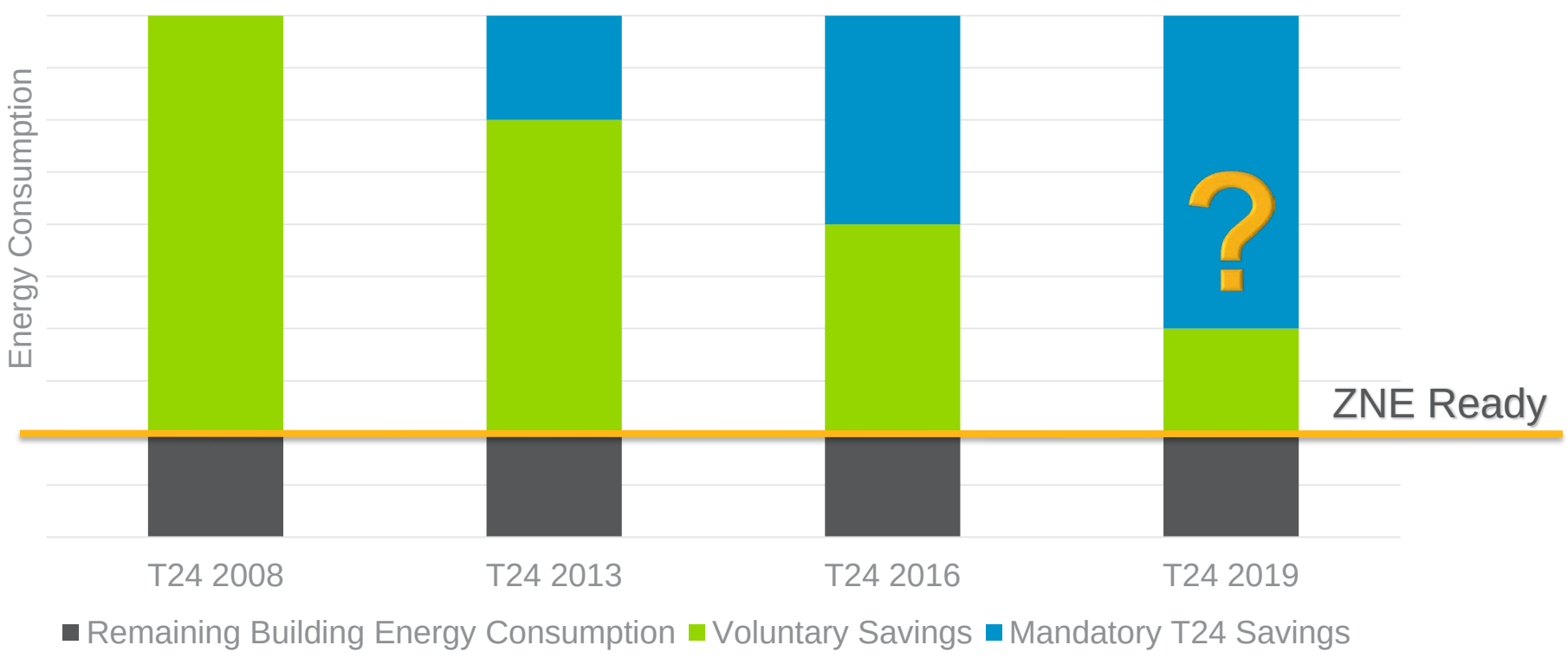
- For this study, we examine what it takes to get buildings to “ZNE-ready”
  - Includes the energy efficiency portion of ZNE
  - Excludes the generation portion of ZNE

- Past PG Study relied on the ARUP study: “The Technical Feasibility of Zero Net Energy Buildings”
- ARUP has made a version of the tool available online
  - Allows users to select a building type and climate zone
  - Enables the adjustment of various end-use efficiency parameters and their associated costs
    - Example: Window Solar Heat Gain Coefficient and cost per 0.01 reduction / sq.ft.
  - Calculates the energy use (kWh and kBtu), peak demand (kW), and lifecycle cost / sq.ft. / yr

Questions for stakeholders:

1. What additional data can stakeholders point us to for costs, savings, and market saturation?

RESIDENTIAL - NEW CONSTRUCTION: ZERO NET ENERGY

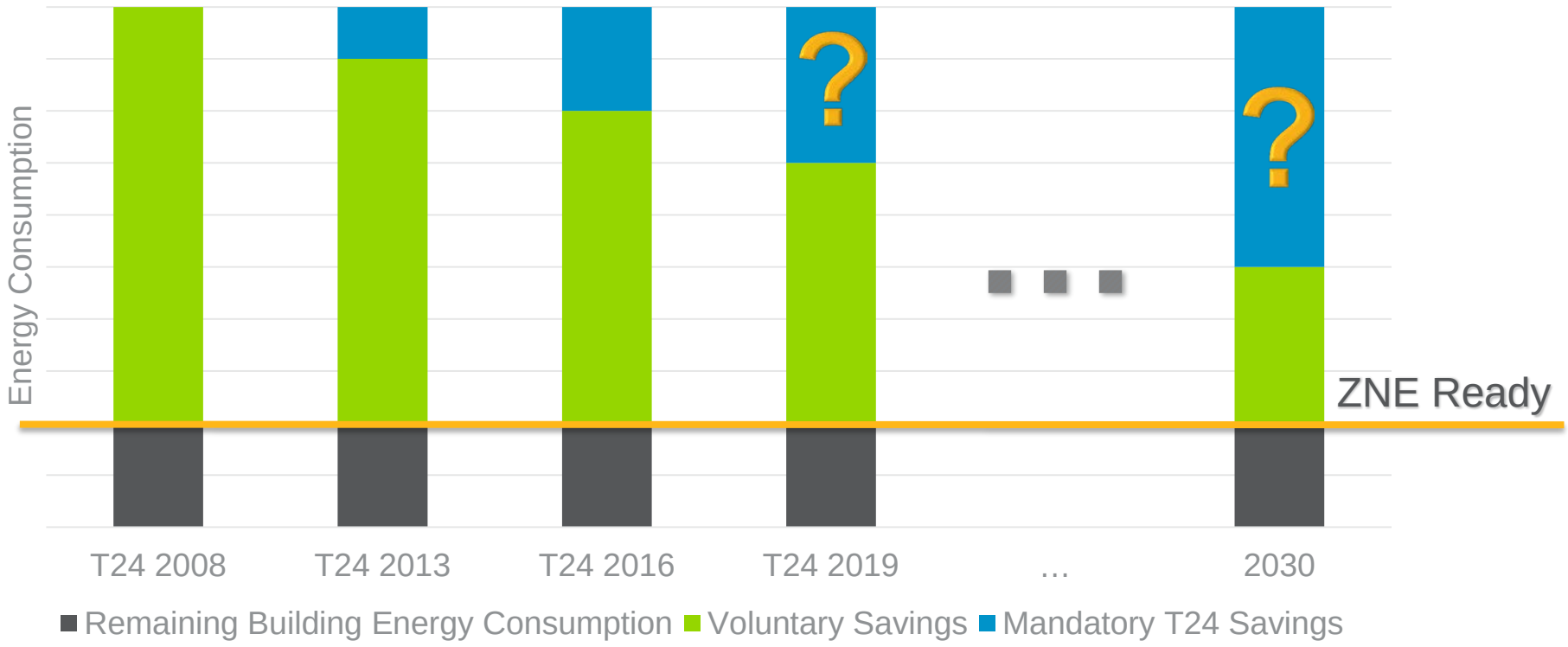


Outstanding Question:

1. What level of efficiency is expected to be mandated in future iterations of Title 24?

NAVIGANT

COMMERCIAL - NEW CONSTRUCTION: ZERO NET ENERGY



Outstanding Question:

1. What level of efficiency is expected to be mandated in future iterations of Title 24?

NAVIGANT

RESIDENTIAL – RETROFIT: ENERGY UPGRADE CALIFORNIA

Home Upgrade

- Basic pathway
- Deemed savings
- Measures are given point values
- 100-300 points per project
- $100 incentive for every 10 points
- Example measures:
  - Duct sealing
  - Duct replacement
  - Attic insulation
  - Air conditioner

Source: EUC – Home Upgrade Program Process Evaluation 2014-2015

Advanced Home Upgrade

- Advanced pathway
- Custom savings
- “Test-in” and “test-out” assessments required
- 10% expected improvement in performance minimum
- 3 measures minimum
- $1,000 for 10% to $4,500 for 45% or greater energy savings
- Additionally, $2/therm and $0.75/kWh of modeled energy savings
- Additional example measures:
  - Pool pump
  - Cool roof

RESIDENTIAL – RETROFIT: EXISTING EUC DATA

- 2013-2014 Impact Evaluation
  - Reports consumption and savings for electric energy and demand and natural gas energy
  - Limited to Home Upgrade (**Basic Pathway**)
  - Limited to **Single Family** homes
  - No cost data

Program Administrator	Participant Sample Size	Normalized Energy Use Pre Upgrade	Normalized Energy Use Post Upgrade	Estimated Savings	Standard Error of Savings	kWh Savings (%)
Total	619	7,418	7,191	227	9	3%
BayREN	455	6,952	6,789	163	8	2%
PG&E	96	9,617	9,009	608	9	6%
SCE	21	8,255	8,122	133	9	2%
SoCalGas	NA	NA	NA	NA	NA	NA
SoCalREN	17	8,780	8,568	212	9	2%
SDG&E	30	6,166	6,100	66	8	1%

Note:
Values are rounded. The savings estimates were computed using weather data associated with a typical meteorological year (TMY). The day-level predictions were summed to obtain the estimates presented in this table.

Source: Focused Impact Evaluation of the 2013-2014 Home Upgrade Program

RESIDENTIAL – RETROFIT: POTENTIALLY AVAILABLE EUC DATA

- Home Upgrade (Basic Path - Deemed Savings): 2015 Impact Analysis
  - Final Report: March 2017 (Draft Results: ?)
  - May be a source for splitting out single vs. multi-family
- Advanced Home Upgrade (Custom Savings): 2015 Study on RENs by Apex
  - Final Report: Q2 2017 (Draft Results: End of 2016)
- Multi-family considerations
  - Impact analysis defines MF at the property level (can be multiple buildings) – will need to be converted to a per-unit basis for the model
  - Programs were pilots limited in budget and participation
    - Results can be used for savings
    - Market Scalability Study on RENs underway to understand non-participant pool
      - Results: December?

Questions for stakeholders:

1. Do the IOUs intend to continue offering the Advanced Home Upgrade Program?
2. What data can stakeholders provide (are there any workpapers)?

COMMERCIAL – RETROFIT: OPTIONS TO REVISE APPROACH

- **2015 Study Methodology: Bundled Measures**
  - Requires that all individual technology measures be characterized before whole buildings bundles can be generated (budget intensive)
  - Assembling bundles requires many assumptions

- **Alternative Option 1: Use Whole Buildings Demonstration Data**
  - PG&E is running a demonstration of a pay for performance program on twelve facilities
  - Twelve facilities provides limited data that may not be representative of the full potential
  - Only covers five building types: mixed use office, public facility, k-12 school, office, and grocery

- **Alternative Option 2 (recommended): Percent Reductions at the End-Use Level**
  - Estimate savings potential for each end-use, then add them up to a whole building value
  - Use Commercial End-Use Survey (CEUS) data as baseline – represents existing stock
  - Will attempt to validate results from this top-down analysis with data from other sources

COMMERCIAL – RETROFIT: PROPOSED APPROACH ILLUSTRATIVE EXAMPLE

Large Office in PG&E Territory, Climate Zone 2

End Use	EI Energy Intensity (kWh/sq.ft.)	Estimated Savings (Illustrative)	Energy Savings (kWh/sq.ft.)
Heating	0.15	10%	0.02
Cooling	2.26	10%	0.23
Ventilation	1.67	10%	0.17
Water Heating	0.08	0%	0.00
Cooking	0.30	0%	0.00
Refrigeration	0.15	0%	0.00
Exterior Lighting	0.43	10%	0.04
Interior Lighting	3.69	10%	0.37
Office Equipment	1.57	0%	0.00
Miscellaneous	1.56	0%	0.00
Process	0.00	0%	0.00
Motors	0.57	0%	0.00
Air Compressors	0.20	0%	0.00
Segment Total	**12.64**	**7%**	**0.83**

Question for stakeholders:

1. Do stakeholders have comments/concerns on this proposed approach?
2. What end uses are whole building renovations targeting?
3. What savings % by end use is reasonable?

NAVIGANT

SUMMARY OF QUESTIONS

New Construction - Zero Net Energy:

1. What data additional can stakeholders provide for costs, savings, and market saturation?
2. What levels of efficiency are expected to be mandated in future iterations of Title 24?

Residential Retrofit – Energy Upgrade California:

1. Do the IOUs intend to continue offering the Advanced Home Upgrade Program?
2. What data can stakeholders provide (are there any workpapers)?

Commercial Retrofit – Potential for Revised Approach:

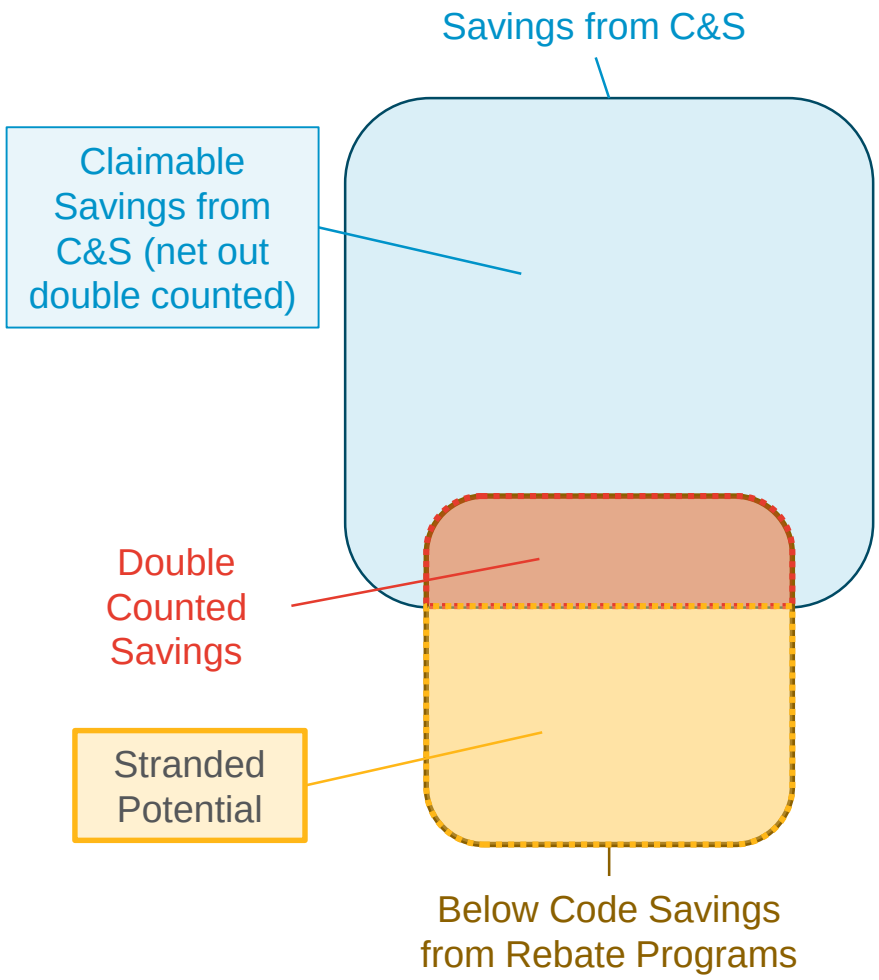
1. Do stakeholders have comments/concerns on this proposed approach?
2. What end uses are whole building renovations targeting?
3. What savings % by end use is reasonable?

TABLE OF CONTENTS

TYPES OF BELOW CODE PROGRAM SAVINGS

- Codes and Standards (C&S)
  - Below code savings currently being claimed by IOUs and embedded in the CEC baseline forecast
- Double Counted
  - Below code savings claimed by PAs but are already included in C&S claims and in the CEC demand forecast
- Stranded Potential
  - Below code savings not currently being captured through programs

- D.16-08-19 requires DAWG to recommend the options for eliminating double-counting of below-code savings from the utilities savings goals. (p.30)



NAVIGANT

DEFINITION OF DOUBLE COUNTED SAVINGS

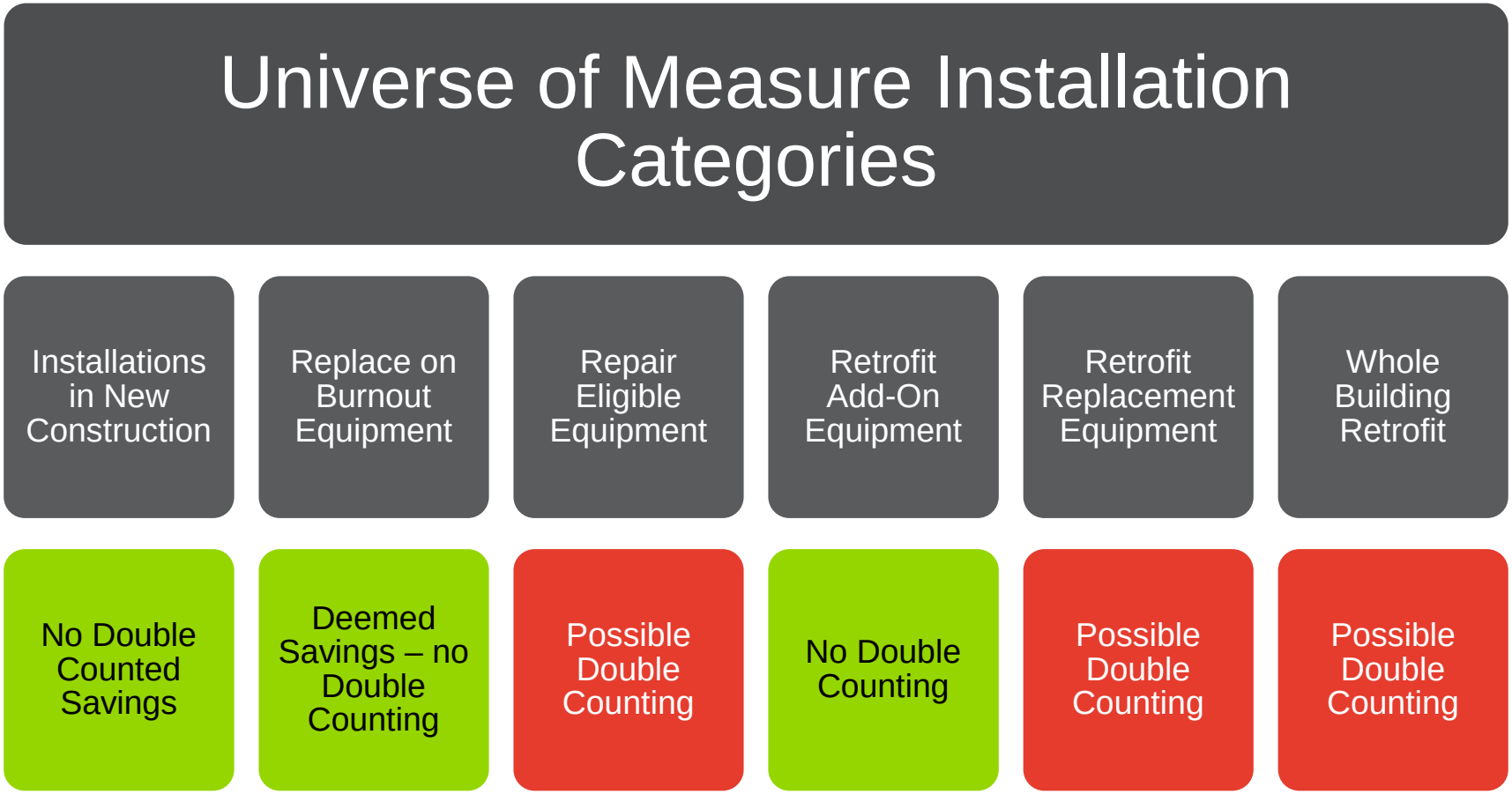
- Double Counted savings is:
  - Below-code savings generated from rebated equipment that would be realized even in the absence of rebate programs.
  - Equipment that naturally turns over and is replaced with code-compliant equipment.
  - Already embedded and accounted for in the IOU C&S claims and CEC Demand Forecast

Important note: Double counted savings means PAs claim below-code savings from equipment that fails, is no longer functional and has been replaced with new equipment.

METHODOLOGY FOR DOUBLE COUNTED SAVINGS

	Old Approach	Proposed New Approach
Question we are/were trying to answer	How much of the **savings already being attributed to C&S** is at risk of being double counted?	How much of the **savings being claimed by PA programs** is at risk of being double counted?
General Approach	Calculated top-down based on the savings expected from C&S	Focus on "below code free ridership" from program participants
Result	Was inherently a large value because it considered **all change-outs** of equipment in the market	Will inherently be a smaller number since we are **just focusing on program participants**

FOCUS ON CATEGORIES OF MEASURES

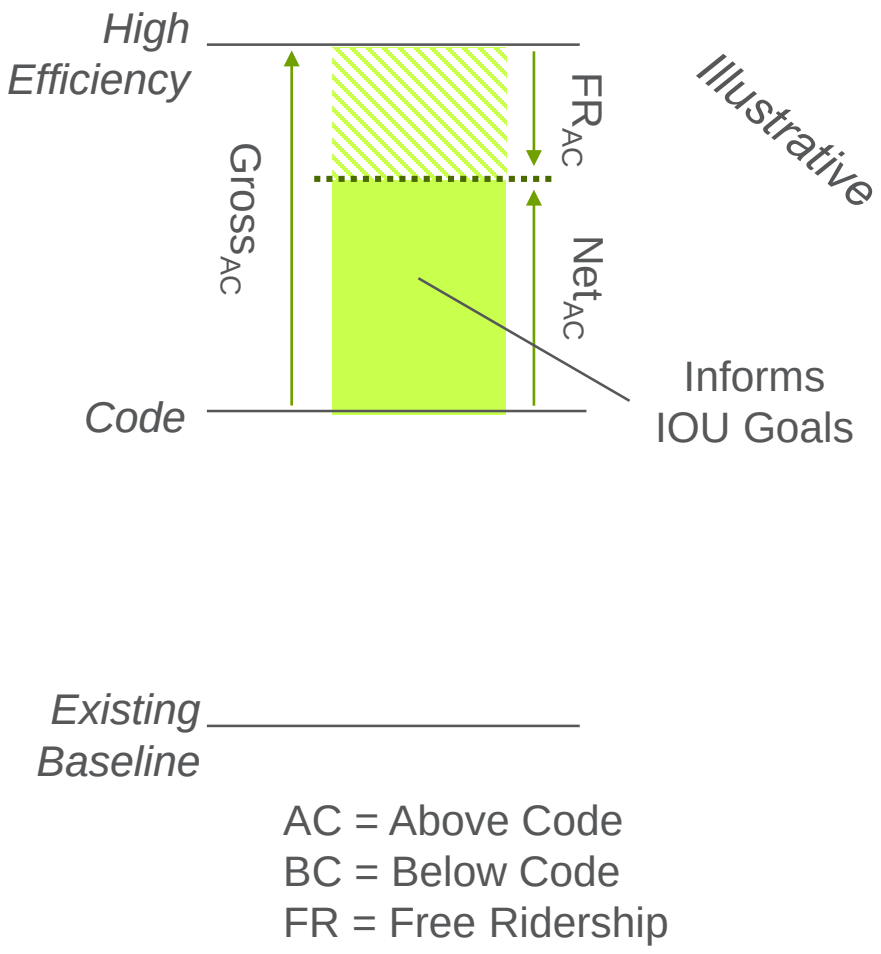


NAVIGANT

REPLACE ON BURNOUT EQUIPMENT

- Equipment will have a deemed savings
- Individual installations only claim above code savings
- Below code savings is already captured in C&S claims

- **No double counted savings since the PAs aren't claiming any below code savings**



NAVIGANT

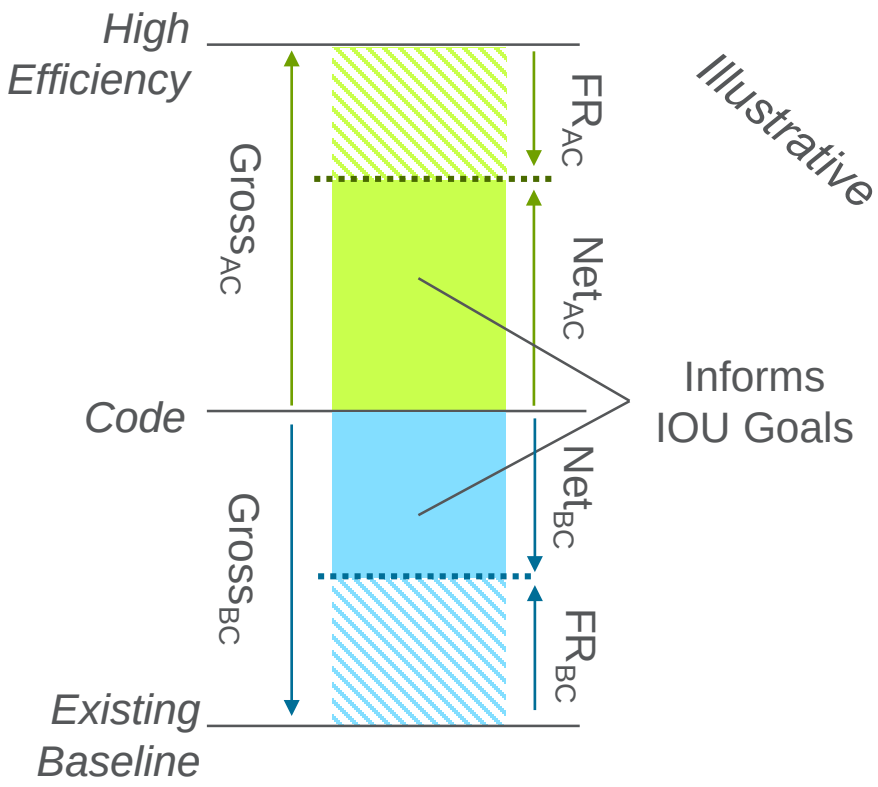
REPAIR ELIGIBLE AND RETROFIT REPLACEMENT EQUIPMENT

- Equipment will have both above and below code claimable savings
- The net below code savings are real, incremental savings as they would not have happened without PA rebates

- **Below code free riders = double counted savings**

Question:

What is the appropriate below code NTG assumption?



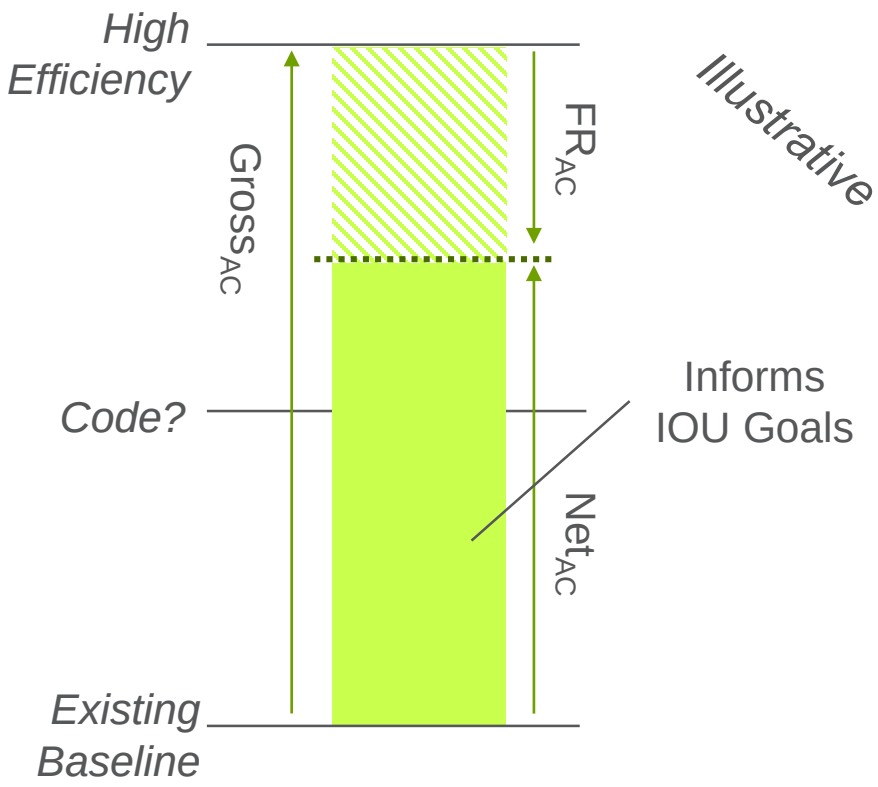
AC = Above Code
BC = Below Code
FR = Free Ridership

NAVIGANT

RETROFIT ADD-ON EQUIPMENT

- Equipment that is added on to existing equipment (i.e. controls, VFDs, etc)
- Baseline = existing system (unless otherwise noted by standard practice policies)
- Often no code, therefore no distinction of above vs. below-code savings

- **No double counted savings**



AC = Above Code
BC = Below Code
FR = Free Ridership

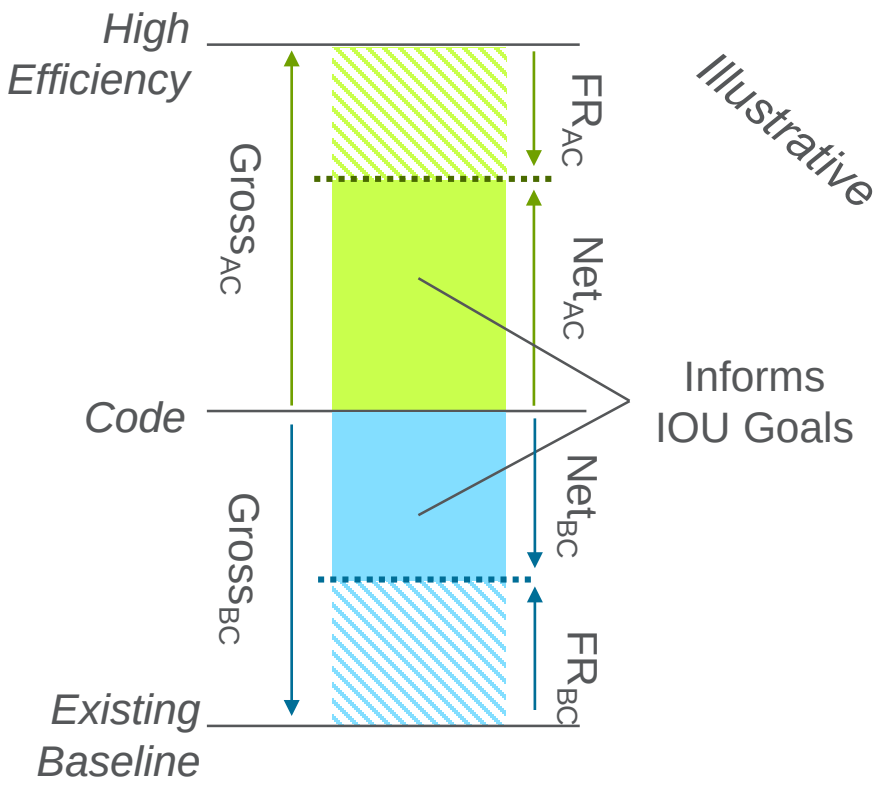
NAVIGANT

WHOLE BUILDING RENOVATION

- Projects can have both above and below code claimable savings
- The amount of below-code free-ridership is dependent on the amount of replace on burnout equipment that is bundled into the project (unknown at this point)
  - The more ROB measures that go through an NMEC program, the lower the below code NTG would (in theory) be

Question:

Will NMEC distinguish between above and below-code savings?

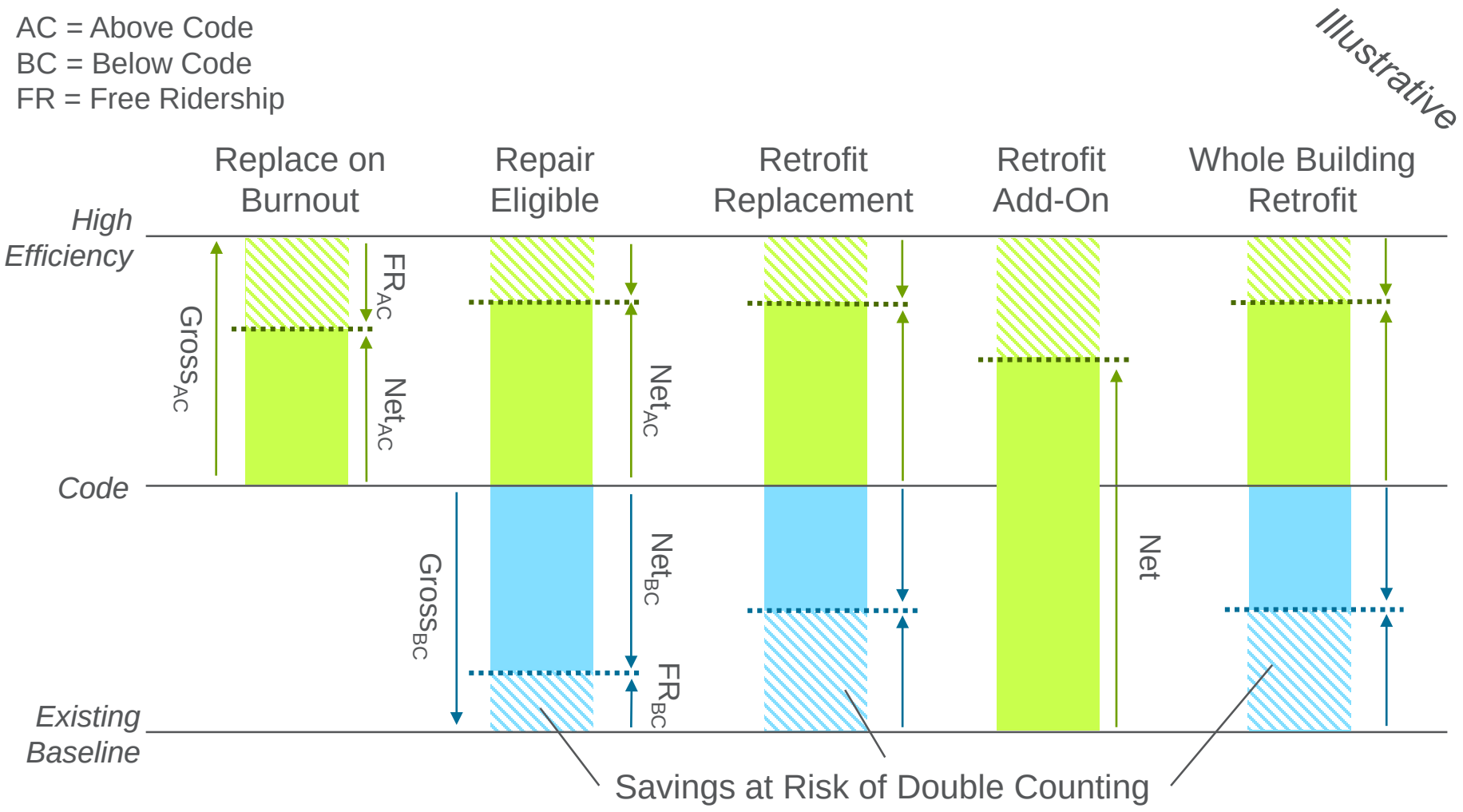


AC = Above Code
BC = Below Code
FR = Free Ridership

NAVIGANT

SUMMARY EQUIPMENT TYPES

AC = Above Code
BC = Below Code
FR = Free Ridership



NAVIGANT

QUESTIONS FOR STAKEHOLDERS ON DOUBLE COUNTED SAVINGS

1. Does it make sense the risk of double counting savings resides in below code free riders?

2. What is the appropriate below code NTG to assume (assumption may vary by measure type)?
   a. $NTG_{BC} = 1$
   b. $NTG_{BC} = NTG_{AC}$
   c. $NTG_{AC} < NTG_{BC} < 1$
   d. $NTG_{BC} < NTG_{AC}$

3. What types of equipment are whole building NMEC programs targeting?

TABLE OF CONTENTS

INFORMAL WRITTEN COMMENTS

- CPUC staff welcome additional informal, written comments.
- Due date: November 18, 2016
- E-mail to **all three**:
  - Paula Gruendling paula.gruendling@cpuc.ca.gov
  - Amul Sathe amul.sathe@navigant.com
  - Chris Ann Dickerson cadickerson@cadconsulting.biz

- PowerPoints will be available online: http://www.cpuc.ca.gov/General.aspx?id=2013

- No need to e-mail the entire service list, these are not formal comments.

STAKEHOLDER ENGAGEMENT

☑ **Measure Selection (Res/Com/AIMS)**

☑ **Other Technical and Methodology Topics –** BROs, Whole Building/NMEC, Double Counted Savings

- **Factors Impacting Market Potential:** Calibration, Scenarios, etc. - **December 2016**
- **Draft Results** – **Q2 2017**

CONTACTS

GREG WIKLER
Project Director
415.399.2109
Greg.wikler@navigant.com

AMUL SATHE
Project Manager
415.399.2180
Amul.sathe@navigant.com

FLOYD KENEIPP
Tierra Resource Consultants
BROs Co-Lead
925.954.7363
Floyd.Keneipp@tierrarc.com

KAREN EHRHARDT-MARTINEZ
BROs Co-Lead
415.399.2109
karen.ehrhardt.martinez@navigant.com

KRISTIN LANDRY
Whole Building Lead
415.399.2109
Kristin.landry@navigant.com