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Opinion Dynamics

Measure Characterization and Data Collection Studies

June 2, 2020

Agenda

01 Introduction

10:30-10:40

02 Measure Characterization

10:40-11:40*

03 Market Adoption Study

11:45-12:15

04 Industrial and Agricultural Study

12:15-12:45

05 Closing

12:45-1:00

*5 minute break

Conference Call Etiquette During Q&A Sessions

- We know everyone is working from home; don't feel bad about noise from kids, dogs, etc. if you are actively asking a question or making a comment

…BUT, after you speak please re-mute your microphone.

- Please do not place the line on hold
- We are actively monitoring the chat window; consider submitting questions/comments via chat

CPUC EE Potential & Goals Study Team

- **Coby Rudolph,** Senior Regulatory Analyst
- **Genesis Tang,** Regulatory Analyst
- **Paula Gruendling,** Project and Project Supervisor

Potential & Goals Next steps (Subject to Change)

Activity	Track / Venue	When
ALJ Kao Ruling Questions (from 3/12/20)	Policy / formal comment	Comments submitted, Replies by 6/5
Study launch Workshop & Workplan	Study / informal comment	April 2020
Measure characterization, data inputs	Study / informal comment	Today
Modeling, Data collection findings	Study / informal comment	Q3 2020
Scenarios, Top-down scoping, Low income modeling	Study / informal comment	Q4 2020
EE/DR/IRP Integration, Locational post-processing, Draft results	Study / informal comment	Q1 2021
Proposed Decision on Goals Adoption for 2022 and Beyond	Policy / formal comment	Q2 /Q3 2021
Decision on Goals Adoption for 2022 & Beyond	Policy / formal comment	Q3 2021
Additional Policy Activities TBD	Policy / formal comment	TBD

Complete / Nearly complete

Speakers Today

Karen Maoz

Project Manager

Guidehouse

Rebecca Legett

Measure Characterization Lead

Guidehouse

Melanie Munroe

Market Adoption Characteristics Study Lead

Opinion Dynamics Corporation

Christopher Dyson

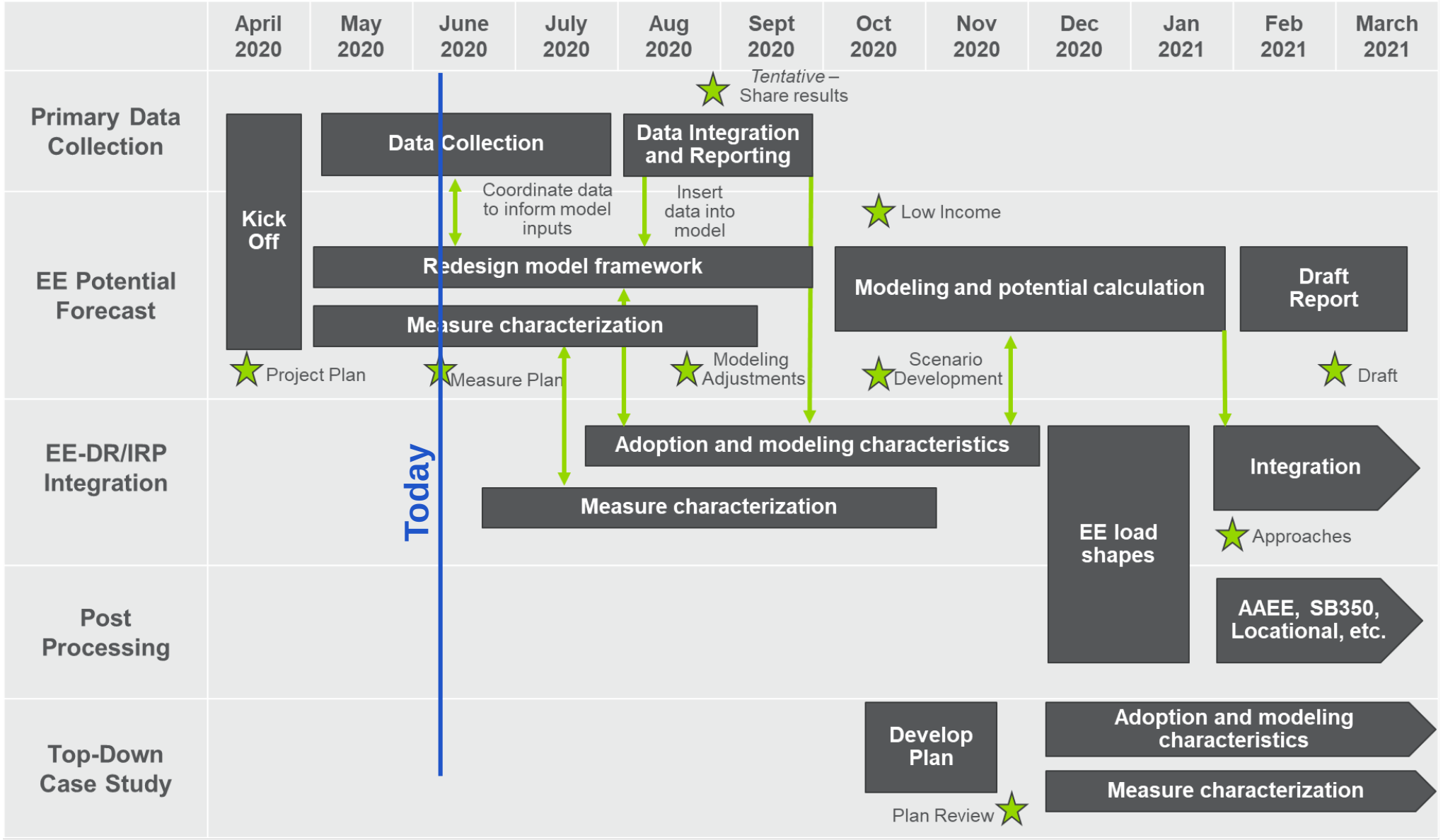
Industrial and Agricultural Measure Study Lead

DNVGL

We want your feedback!

Green callout boxes indicate questions we have for stakeholders. However, please feel free to comment on any aspect of the presentation.

PG Study Workflow



PG Study COVID-19 Adjustments

To be discussed in Modeling webinar (~Mid July)

Issues

- Baseline consumption forecast has changed
- Market adoption forecasts based on customer willingness to pay under existing market conditions
- General uncertainty of the future

Questions for stakeholders

Please share your ideas on forecast adjustments and questions you may have.

Objectives for today

- Provide the PG study approach for measure characterization
  - Changes compared to previous study
  - Measure list (list of significant changes in appendix)
  - New considerations: NMEC, EE-DR, and fuel substitution

- Data collection studies
  - Market adoption characteristics for residential and commercial
  - Industrial and agricultural technology characterization

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Measure Characterization

Stakeholder Presentation

Rebecca Legett, Guidehouse

June 2, 2020

Measure Characterization Agenda

01 Introduction

02 Residential & Commercial Sectors

03 Agricultural & Industrial Sectors

04 NMEC Approach

05 Fuel Substitution

06 Questions

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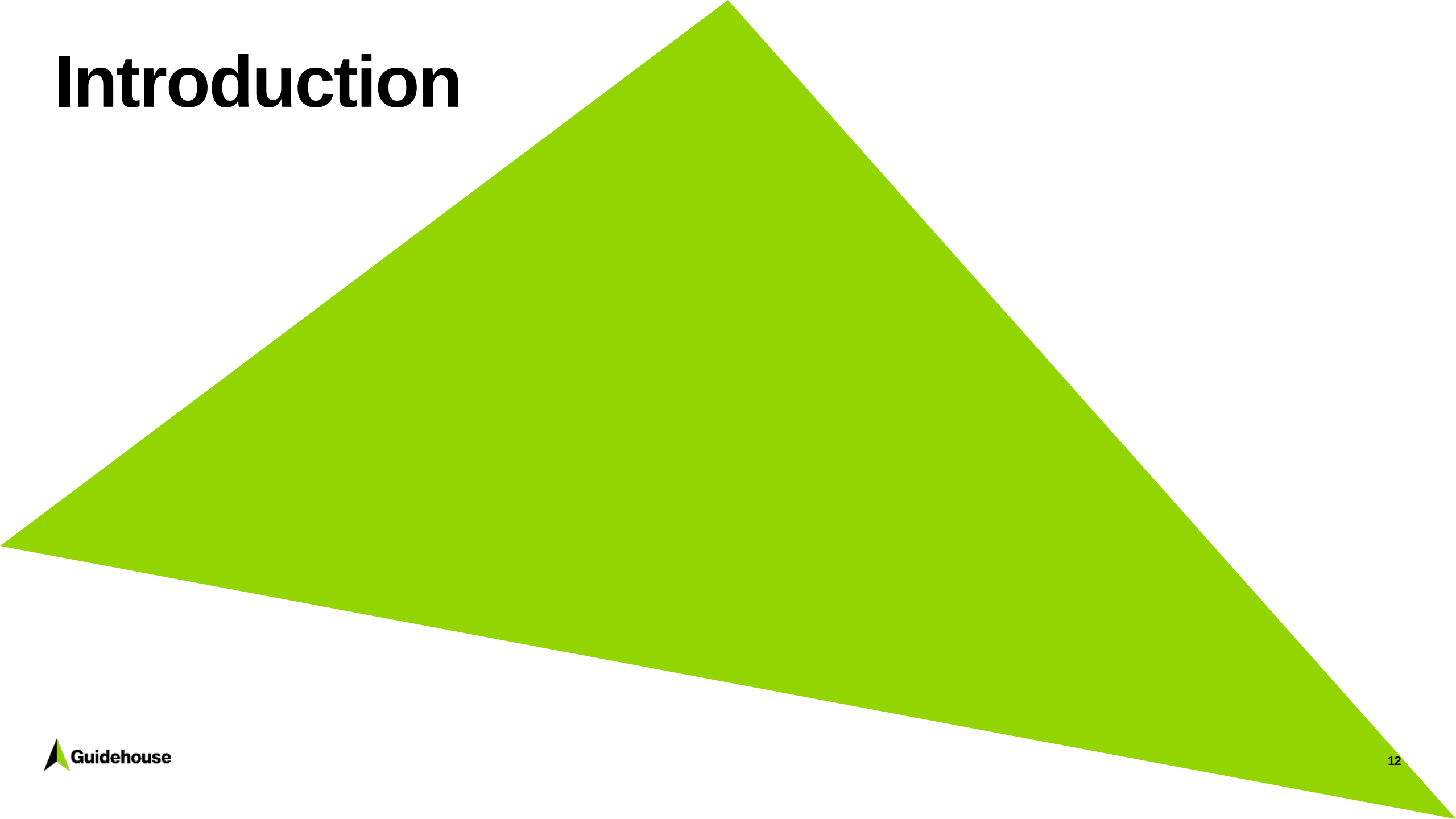
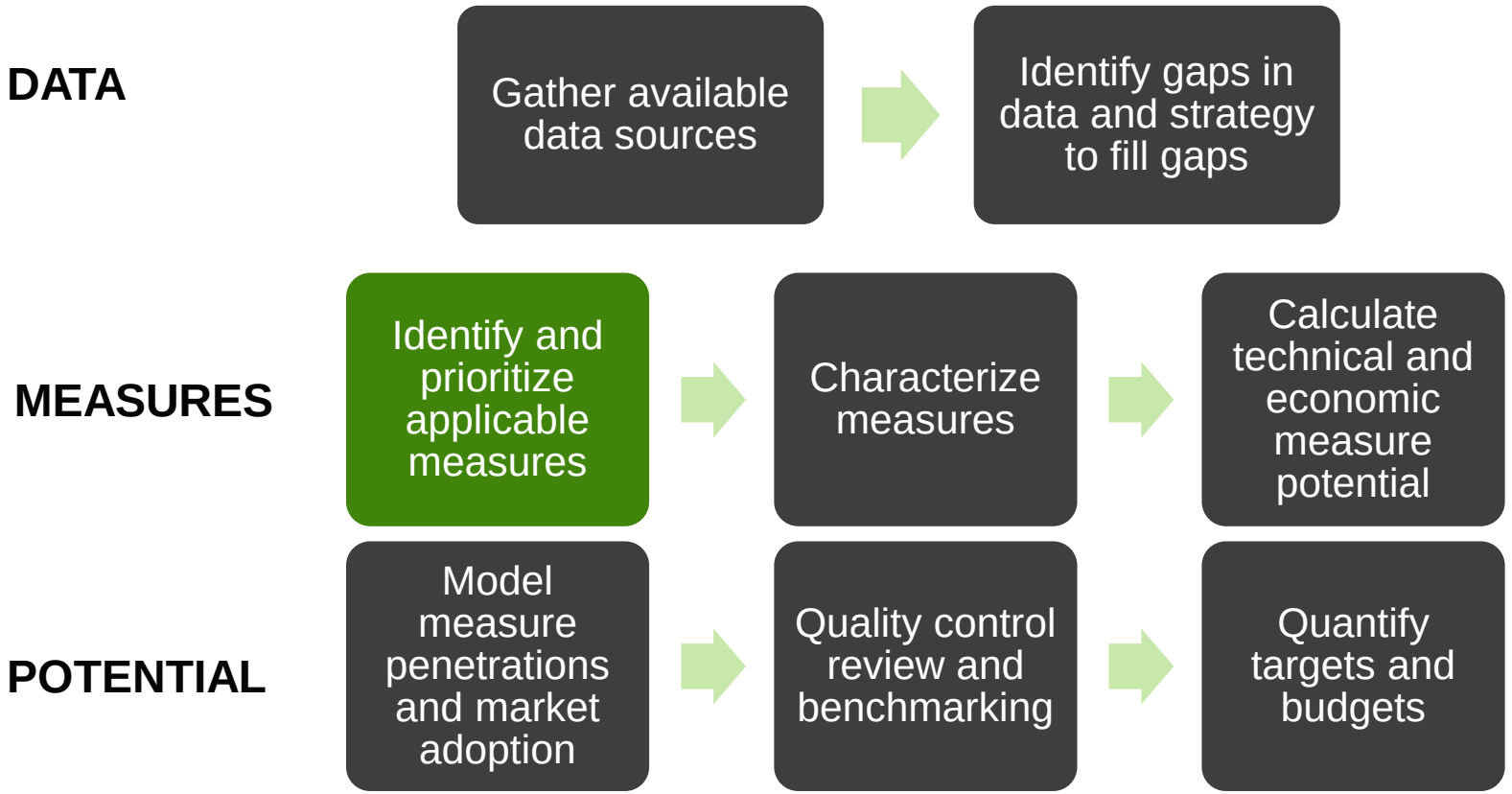
Introduction

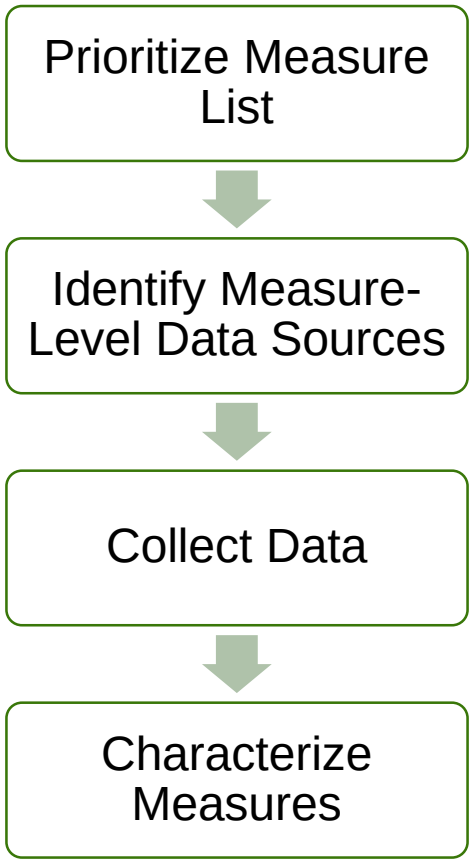


Data and analysis structure



Measure Characterization Process and Data Needs

Measure Characterization Steps



Key Measure Data Required for Characterization

- Electric energy, demand, and/or gas savings
- Measure cost
- Replacement type (replace-on-burnout, retrofit add-on, etc.)
- Density (e.g. products per household)
- Saturation (percentage of market that is already efficient)
- Technical suitability of measure for each building type (expressed as percentage)
- Measure lifetime
- Net-to-gross ratio
- Greenhouse gas emissions

Market Sectors and End Uses

- Forecast savings potential for each market segment
- Within each market segment, define the appropriate building types and end uses
- End use characterization will consider load shapes aggregated from the 2019 CEC load shape study

Mining is a low priority due to size, so no changes proposed from last study.

Proposed Market Sectors

- Residential
- Commercial
- Industrial
- Agricultural
- *Mining*
- ~~*Street Lighting*~~

The street lighting sector has limited remaining potential. We propose to remove it from this study.

Residential & Commercial Sectors

Measure Selection and Prioritization Approach

- We are right-sizing the measure list to focus on high-impact measures and eliminate or aggregate low-impact measures.
- Prioritization of measures will consider:
  - Past study results
  - IOU savings claims in CEDARS
  - Market baseline shifts (e.g. lighting)
  - Stakeholder input
  - Future, emerging technologies

Measure Data Updates

- We will consider recent data sources when identifying and updating measures.
- Examples include:
  - Latest DEER updates
    - *If feasible*, will consider updates from the draft and final resolutions for this year's DEER update cycle
  - New and pending (in the pipeline) workpapers
  - 2019 Residential Appliance Saturation Survey (RASS)
    - Preliminary data expected by August/September 2020
  - Emerging technology evaluation studies by CPUC Group B team

Question: What other recent data sources should we consider?

Measure Characterization Changes

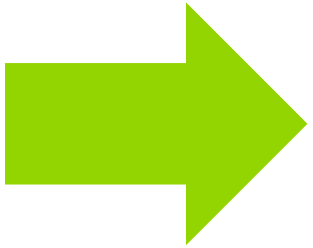
- Key changes to measure selection and characterization include:
  - Aggregate efficiency levels where additional granularity does not provide high value
  - Bundle similar measures or typical groupings of measures in implementation into a single representative measure
  - Remove or replace many lighting measures
  - Better capture influence of climate variation on measure potential
- Each of these items will be discussed in the following slides.
- Further details on measure changes are listed in the appendix.

Measure Characterization Changes

Measure Group Aggregation

- For some measures, we have historically characterized a large number of efficiency levels.
- We plan to remove any levels that are below code as of 2019 for replace-on-burnout (i.e., normal replacement) or new construction measures.
- We also plan to consolidate above-code levels, where appropriate.
- Example consolidation for residential clothes washers:

Previous Study Technology Levels
Clothes Washer - 1.04 MEF
Clothes Washer - 1.26 MEF (1.0 IMEF)
Clothes Washer - 1.46 IMEF
Clothes Washer - 1.65 IMEF
Efficient Clothes Washer - Tier 1 - 2.2 IMEF
Efficient Clothes Washer - Tier 2 - 2.4 IMEF
Efficient Clothes Washer - Tier 3 - 2.92 IMEF



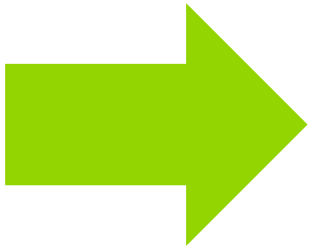
Updated Study Technology Levels
Code Level Clothes Washer - 1.65 IMEF
Efficient Clothes Washer - 2.92 IMEF

Measure Characterization Changes

Measure Bundling

- We propose to bundle similar measures or measures that are typically implemented together.
- Example bundling for residential HVAC measures:

Previous Study Technology Levels	Updated Study Technology Levels
No HVAC Maintenance	
HVAC Quality Maintenance	Existing HVAC System
Incorrect Refrigeration Charge	
Refrigeration Charge to Factory Levels	HVAC System Maintenance, Ref. Charge, Duct Sealing
Leaky Ducts	
Duct Sealing	



Question: What measures are typically bundled in implementation?

Measure Characterization Changes

Lamps & Fixtures Measures

- We are considering changes to lamps and fixtures measures now that LEDs are considered standard practice baseline.
  - One option is to update these measures to calculate incremental potential from higher-efficiency LEDs.
  - Another option is to remove these measures entirely.
- Most recent residential lighting workpapers are from 2019 and may not longer be valid.
- Some commercial workpapers have been approved for program year 2020.

Question: Do stakeholders anticipate significant future savings potential from higher-efficiency LED lighting measures?

Measure Characterization Approach

Climate-Dependent Measures

- Revised approach to climate-sensitive measures allows for location-targeted potential.
- The previous study characterized measure savings for individual climate zones, but aggregated costs and benefits before performing cost-effectiveness screen.
- Simplified example of **previous approach** for one measure:

Utility	Illustrative Climate Zone	Savings	Cost Effective?
A	1	500	Yes
	2	400	Yes
	3	300	No
	4	200	No
	5	100	No

Aggregation Step

Cost Effective Overall?	Achievable Savings
No	0

Measure Characterization Approach

Climate-Dependent Measures

- New approach: categorize climate zones into “climate types” (Desert, Inland, Coastal, Mountain)
- Model achievable savings for each climate type
  - Downside: lose some granularity at the characterization level.
  - Upside: account for differences in cost-effectiveness across climate types.
- Simplified example of **new approach**:

Utility	Illustrative Climate Zone
A	1
	2
	3
	4
	5

Aggregation Step

Climate Type	Savings	Cost Effective?	Achievable Savings
Desert	500	Yes	500
Inland	300	No	0
Coastal	100	No	0

Measure Characterization Approach

Climate-Dependent Measures

- For measures with energy savings in DEER, the DEER energy savings are given at the climate zone level.
- We plan to choose one climate zone to represent each climate type for each IOU for purposes of characterizing the measures using DEER.
- Example map of representative climate zones to climate type (based on # of residential & commercial accounts in 2019):

Climate Type	PG&E	SCE	SCG	SDG&E
Coastal	CZ03 - Oakland	CZ06 - Los Angeles	CZ06 - Los Angeles	CZ07 - San Diego
Inland	CZ12 - Sacramento	CZ09 - Pasadena	CZ09 - Pasadena	CZ10 - Riverside
Desert	N/A	CZ14 - China Lake	CZ14 - China Lake	CZ14 - China Lake
Mountain	CZ16 - Mt Shasta	CZ16 - Mt Shasta	CZ16 - Mt Shasta	N/A

Agricultural & Industrial Sectors

Measure Types and Approach

- There are 4 types of measures under consideration.

Measure Type	Approach
Characterized Custom	Deemed measure characterization process using CEDARS, new primary data collection*, and secondary source data
Generic Custom	Top-down analysis leveraging historical program trends and consumption forecasts
Emerging Technologies	
Strategic Energy Management (Including Retrocommissioning and Optimization)	BROs approach

*Primary data collection process will be discussed later in this webinar.

Normalized Meter Energy Consumption (NMEC) Approach

Our understanding of NMEC

- NMEC-based programs calculate project savings from normalized meter data instead of a bottom-up approach using deemed or custom calculated values for energy savings.
- The NMEC rulebook allows for two types of NMEC programs: Site-level and population-level.
  - For site-level programs, NMEC methods are customized to a specific site using a project-specific M&V plan.
  - For population-level programs, the NMEC measurement and calculation approach is established before the program begins and is uniformly applied to every site in the program.
- California is transitioning towards a higher penetration of NMEC-based programs and portfolios, but there are only a few documented site and population studies at this time.
- Recent NMEC-based programs include PG&E Pay-for-Performance (P4P) and On-bill Financing (under High Opportunity Programs or Projects (HOPPs)).

The NMEC rulebook can be found here: https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442463694

How will we approach NMEC in the PG study?

- We propose not to adjust energy savings to account for NMEC in the measure characterization work, because:
  - NMEC is an M&V approach/program platform, not a measure category; and
  - There is a lack of submitted claims data that shows savings that are significantly different.
- Questions for stakeholders: Should we consider the possibilities that:
  - Using an NMEC approach delivers more savings per site by encouraging sites to implement more measures with to-code and BROs-type savings, and/or
  - Using an NMEC approach allows programs to deliver savings to more customers by reducing the administrative burden of calculating and reporting savings?
- We expect the parallel “top-down” proof of concept study activity to use a consumption/NMEC-based approach, and we will engage stakeholders further at that time.

Energy Efficiency/ Demand Response Integration

Approach for Selecting Measures with EE and DR Benefits

In collaboration with the DR study team (Lawrence Berkeley Lab)

Identify measures with EE and DR co-benefits

- Review energy efficiency (EE) measures in the Potential and Goals study
- Identify EE measures that can provide DR benefits (co-benefits) including new/emerging technologies

Categorize identified measures with co-benefits

Categorize measures into two broad groups:

- Measures that directly enable DR (e.g., smart thermostats, advanced lighting controls)
- Measures that provide load flexibility but do not directly enable DR (e.g., HVAC with VFDs)

Proceed with measure characterization

- Focus on measures that directly enable DR by sector and end-use
- Proceed with joint EE-DR characterization of these measures

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Examples of Measures with EE and DR Co-Benefits

Sector	End-Use	Measures with EE and DR Co-Benefits (examples)
Residential	• HVAC • Water Heating	• Smart thermostat • Water heating controls
Commercial	• HVAC • Lighting	• Energy Management System • Advanced lighting controls
Industrial	• HVAC • Lighting • Machine Drives • Process	• HVAC system controls • Lighting controls • Air compressor control and optimization • Process optimization controls
Agriculture	• Irrigation Pumping	• Irrigation Pump Controls

Question: Do stakeholders have specific measures of interest? Please provide any supporting data with your recommendations. (note: above table is not an exhaustive list)

Fuel Substitution

Fuel Substitution Measures

- Approved or pending deemed fuel substitution measures include:

Sector	End Use	Gas Measure	Electric Measure	Workpaper Approval Status
Residential	App/Plug	Clothes dryer	Heat pump clothes dryer	Approved
		Gas cookstove	Induction cookstove	Submitted for approval
	HVAC	Furnace	Heat pump	Approved
	Water Heat	Water heater	Heat pump water heater	Approved
Commercial	App/Plug	Clothes dryer	Heat pump clothes dryer	Use residential info
	HVAC	Furnace	Heat pump	?
	Water Heat	Water heater	Heat pump water heater	?
	Food Service	Fryer	Electric fryer	Submitted for approval
		Convection oven	Electric convection oven	Submitted for approval

Question: What other fuel substitution measures should we consider?
Question: What ancillary costs should we account for (e.g. wiring and panel upgrades)?

Appendix: Proposed Res & Com Measure Changes

Basis and Criteria for Updating Measure List

- We are right-sizing the measure list to focus on high-impact measures and eliminate or aggregate low-impact measures. The following slides contain details of our proposed measure list changes.
- Proposed updates include:
  - Adding measures with significant CEDARS claims.
  - Bundling similar measures or measures typically implemented together into a single representative measure.
  - Removing any measure levels that are below code as of 2019 for replace-on-burnout (i.e., normal replacement) or new construction measures and consolidating above-code levels, where appropriate.
  - Removing measure groups that meet **ALL** of the following criteria:

Low market potential in 2019 study (<0.5% of total 2019 market potential)

AND

Low technical potential in 2019 study (<1% of total 2019 technical potential)

AND

Low 2019 CEDARS claims (<0.5% of total 2019 CEDARS claims after removing lighting, ESA, C&S, and Energy Advisor Program savings)

The removed measures collectively add up to <3% of the last study's total market potential for electric and gas.

Question: Are the measure list criteria appropriate?
Question: Do you have any comments on our proposed changes to the measure list?

Proposed Measure Changes

Residential Sector

End Use	Measure or Measure Group	Proposed Change
App/Plug	Clothes washers & clothes dryers	Reduce # of technology levels
App/Plug	Power strips	Reduce # of technology levels
App/Plug	Refrigerators & freezers	Remove due to low potential & low CEDARS claims
App/Plug	Audio equipment	Remove due to low potential & no CEDARS claims
App/Plug	Televisions	Remove due to low potential & no CEDARS claims
Bldg Env	Attic duct insulation	Remove due to low potential & no CEDARS claims*
Bldg Env	Crawlspace duct insulation	Remove due to low potential & no CEDARS claims*
Bldg Env	Cool roof	Remove due to low potential & no CEDARS claims*
Bldg Env	Floor insulation	Remove due to low potential & no CEDARS claims*

*Some building envelope measures are mentioned in CEDARS as part of whole building retrofit claims. Accordingly, we will account for these via a whole building retrofit measure.

Proposed Measure Changes

Residential Sector

End Use	Measure or Measure Group	Proposed Change
HVAC	Central air conditioners	Reduce # of technology levels
HVAC	Heat pumps	Reduce # of technology levels
HVAC	Maintenance measures (incl. refrigerant charge adjustment, duct sealing, etc.)	Consolidate maintenance measures that are usually performed at the same time. Characterize as BRO (except duct sealing for pre-2005 homes)
HVAC	Quality HVAC installation	Remove due to low potential & no CEDARS claims
HVAC	Ceiling fans	Remove due to low potential & no CEDARS claims
HVAC	Room air conditioners	Remove due to low potential & low CEDARS claims
HVAC	Whole house fan	Remove due to low potential & no CEDARS claims
HVAC	HVAC motors	Change to retrofit-only measure
HVAC	Gas Furnaces	Reduce # of technology levels

Proposed Measure Changes

Residential Sector

End Use	Measure or Measure Group	Proposed Change
Lighting	Lamp & fixture measures	Remove due to change in baseline to LEDs or recharacterize as low-efficiency LED to high-efficiency LED measure
Lighting	Lighting controls	Recharacterize to account for higher penetration of LEDs
Water Htg	Water heaters (elec & gas)	Reduce # of technology levels
Water Htg	Water heating controls	Change to retrofit-only to avoid double-counting with new water heaters with built-in controls
Whole Bldg	Whole building new construction	Reduce # of technology levels

Proposed Measure Changes

Commercial Sector

End Use	Measure or Measure Group	Proposed Change
App/Plug	Clothes washers	Recharacterize as process laundry (large CEDARS claims)
App/Plug	Clothes dryers	Remove due to low potential & no CEDARS claims
App/Plug	Computer measures (power management, server efficiency, server virtualization)	Consolidate into one office computer measure
App/Plug	Vending machine controls	Remove due to low potential & low CEDARS claims
App/Plug	Pool pumps	Remove due to low potential & low CEDARS claims
App/Plug	Refrigerators & freezers (residential type)	Remove due to low potential & low CEDARS claims
App/Plug	Televisions	Remove due to low potential & no CEDARS claims

Proposed Measure Changes

Commercial Sector

End Use	Measure or Measure Group	Proposed Change
Bldg Env	Ceiling/roof insulation	Remove due to low potential & no CEDARS claims
Bldg Env	Windows	Characterize as a window film retrofit measure for existing buildings
Com Refrig	Display case replacement	Reduce # of technology levels
Com Refrig	LED display case lighting	Change to retrofit-only to avoid double counting savings with display case replacement measure
Com Refrig	Doorway protection (auto door closers)	Remove due to low potential & low CEDARS claims
Com Refrig	Strip curtains	Remove due to low potential & no CEDARS claims
Com Refrig	Add doors to open display case	Include gas savings (reduces space heating load)

Proposed Measure Changes

Commercial Sector

End Use	Measure or Measure Group	Proposed Change
Data Center	All data center measures	Bundle all data center measures together and characterize as data center energy intensity reduction
Food Svc	Electric steamers	Remove due to low potential & low CEDARS claims
Food Svc	Electric convection ovens	Remove due to low potential & low CEDARS claims
Food Svc	Electric hot food holding cabinets	Remove due to low potential & low CEDARS claims
Food Svc	Gas combination ovens	Add due to high CEDARS claims
HVAC	Split system air conditioner	Reduce # of technology levels
HVAC	Packaged rooftop air conditioner	Reduce # of technology levels
HVAC	Split system heat pump	Reduce # of technology levels
HVAC	Packaged rooftop heat pump	Reduce # of technology levels
HVAC	Ductless mini-split heat pump	Reduce # of technology levels

Proposed Measure Changes

Commercial Sector

End Use	Measure or Measure Group	Proposed Change
HVAC	Chiller	Reduce # of technology levels
HVAC	Gas furnace	Reduce # of technology levels
HVAC	Gas boiler	Reduce # of technology levels
HVAC	Steam pipe insulation	Add due to high CEDARS claims
HVAC	Package terminal air conditioner (ROB and NEW)	Remove due to low potential & low CEDARS claims (retain separate PTAC controls retrofit measure)
HVAC	HVAC maintenance measures (e.g. ref charge adjustment)	Consolidate maintenance measures that are usually performed at the same time. Characterize as BRO.
HVAC	Duct insulation	Remove due to low potential & no CEDARS claims
HVAC	Air distribution multi-zone	Remove due to low potential & no CEDARS claims
HVAC	Thermostats	Remove due to low potential & low CEDARS claims (EMS measure serves similar function)

Proposed Measure Changes

Commercial Sector

End Use	Measure or Measure Group	Proposed Change
Lighting	Lamp & fixture replace-on-burnout/new construction measures	Remove due to change in baseline to LEDs or recharacterize as low-efficiency LED to high-efficiency LED measure
Lighting	Lamp & fixture retrofit measures	Recharacterize from individual lighting types to one LPD measure each for indoor and outdoor lighting
Water Htg	Water heaters (elec & gas)	Reduce # of technology levels
Whole Bldg	Whole building new construction	Reduce # of technology levels

CPUC Market Adoption Study Research Plan

Stakeholder Presentation

Melanie Munroe, Opinion Dynamics Corporation

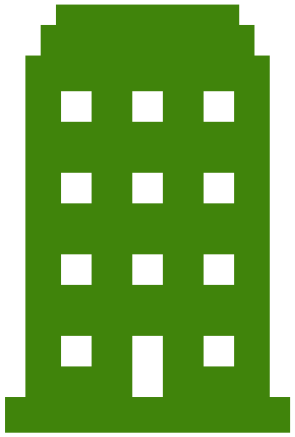
June 2, 2020

Market Adoption Study Overview

- Provides inputs for the core adoption algorithms within the EE potential model.
- Data collection includes motivators, barriers, awareness, willingness-to-adopt, as well as other adoption characteristics.
- Customer segments include:

Single Family

(Less than 5 units)



Multifamily

(5+ units)

Small & Large Commercial

Single-Family Residential

Technologies	Applicability	Adoption Factors	Approach
End-uses/EE Measures			
• **HVAC systems** • **Heat pump water heater** • **Major appliances** • **Insulation**	• Residential customers who have the end-use/measure and have decision-making authority	▪ Rebate levels ▪ Pay-For-Performance ▪ Value of non-energy benefits, intrinsic motivators, and barriers	▪ Less than 5 units ▪ Customer sample from IOUs ▪ Web survey ▪ Mail-to-web and email outreach ▪ $10 gift card ▪ 600 completes
DR Controls			
• **EE Technology/DR Controls**	• Residential customers who have or are interested in the specified EE technology		
Fuel Substitution			
• **Space/water heating equipment**	• Single-family customers who own their homes		

Multifamily Residential

Technologies	Applicability	Adoption Factors	Approach
End-uses/EE Measures			
• **HVAC systems** • **Water heater equipment** • **Insulation/Weatherization**	• Multifamily building owners and managers who have the end-use/measure and have decision-making authority	▪ Levelized cost/payback period ▪ Pay-For-Performance ▪ Value of non-energy benefits, intrinsic motivators, and barriers	▪ 5 or more units ▪ Building owners/managers ▪ Customer list from D&B Hoovers ▪ Web survey ▪ Mail-to-web outreach ▪ $25 gift card ▪ 100 completes
DR Controls			
• **EE Technology/DR Controls for common areas**	• Multifamily building owners and managers who have or are interested in the specified EE technology		
Fuel Substitution			
• **Space/water heating equipment**	• All multifamily building owners and managers who have equipment type and decision-making/purchasing control		

Small & Large Commercial

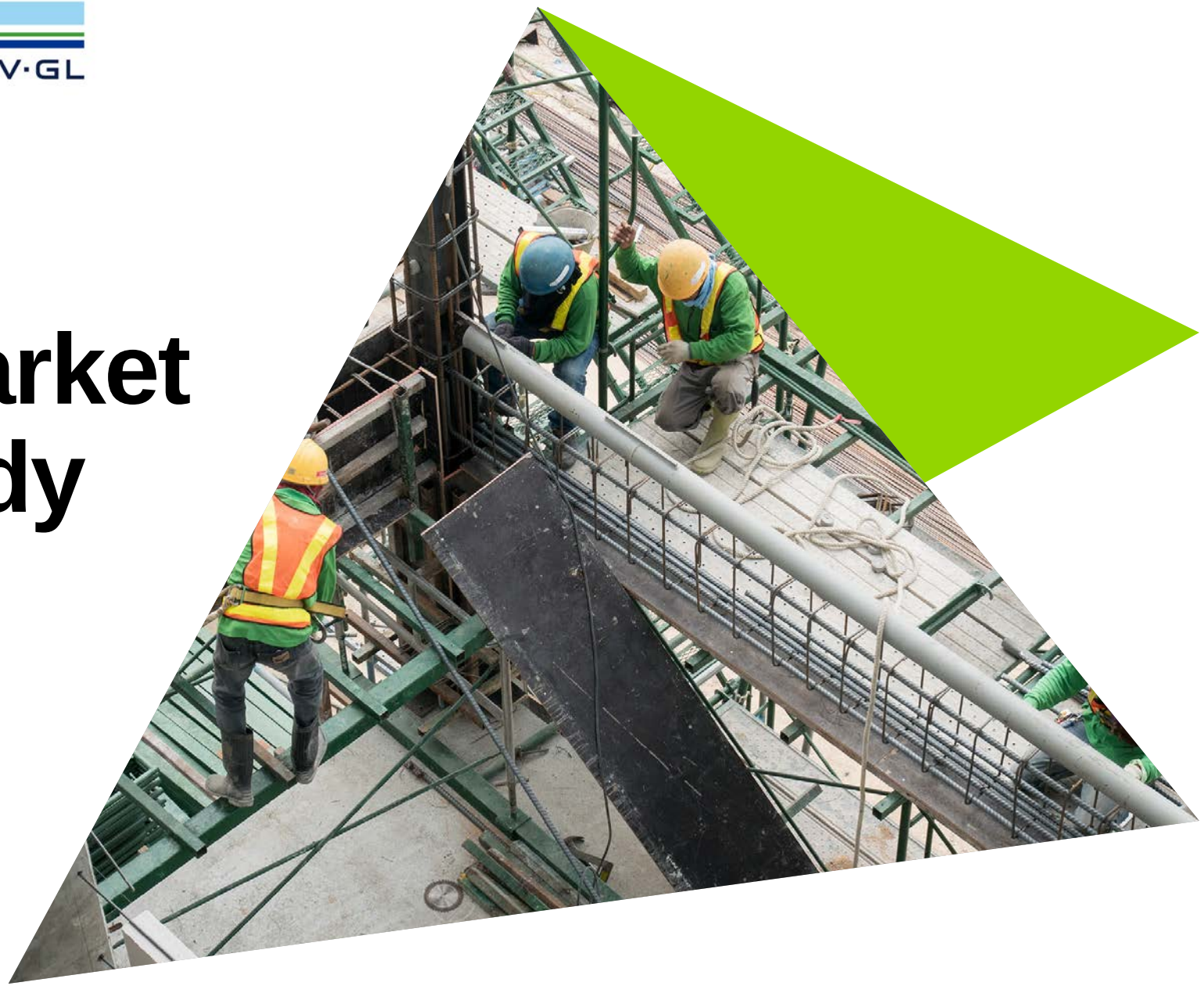
Technologies	Applicability	Adoption Factors	Approach
End-uses/EE Measures			
• **HVAC equipment** • **Water heating equipment** • **Refrigeration equipment** ***(major vs. minor changes)***	• Non-Residential customers who have the end-use/measure and have decision-making authority	▪ Levelized cost/payback period ▪ Rebate levels ▪ Pay-For-Performance ▪ Value of non-energy benefits/intrinsic motivators/barriers	▪ Energy decisionmakers ▪ Sample by kWh, ask about revenue and employees in survey ▪ Customer list from IOUs ▪ Web survey ▪ Mail-to-web and email outreach ▪ $25 gift card ▪ 400 small commercial completes ▪ 200 large commercial completes
DR Controls			
• **Customized load control** • **EE Technology/DR controls**	• Large non-residential customers • Small non-residential customers who have or are interested in the specified EE technology		
Fuel Substitution			
• **Space/water heating equipment**	• All non-residential customers who have equipment type and decision-making/purchasing control		

COVID-19 Considerations

- Outreach considerations
  - Increase email outreach, as available
  - Postal delivery of letters may be slightly delayed in some areas but remains a viable outreach method
  - Businesses that are closed or have reduced hours are likely still monitoring email and physical mail at this time
  - We will send additional invitations to specific segments as needed
- Survey design considerations
  - Opinion Dynamics and Guidehouse are currently working on additional COVID-19-specific survey questions and adjustments to the potential model inputs

Questions/Feedback?

The California Industrial/ Agricultural Market Saturation Study



Stakeholder Presentation
Christopher Dyson, DNV GL

June 2, 2020

Industrial and Agricultural Market Saturation Study Agenda

01 Research Objectives, Subsector Targets

02 EE Technology/ System Identification Stage

03 Market Penetration Estimation Stage

Research Objectives, Subsector Targets

Research Objectives

- Identifying up to 3 technologies/systems with greatest potential for future energy savings in 6 prioritized subsectors
- Quantifying market penetration of selected technologies/systems
- Determining factors preventing their wider adoption including whether customers opt for other demand-side options such as self-generation
- Projecting customer willingness to adopt EE technologies w/ and w/o program interventions

Market penetration forecasts will feed into the PG study.

Targeted Subsectors

- **Industrial**
  - Food services/production
  - Chemical manufacturing
  - Electronics/semiconductor

- **Agricultural**
  - Greenhouses
  - Dairies
  - Water pumping (agricultural sector only)

- **Selection Informed by:**
  - CEC forecasts for future energy consumption (IEPR)
  - Subsectors of interest to CPUC (e.g., ag water pumping)
  - Subsectors with wide variety of EE measure options (e.g., greenhouses, dairies)
  - Removal of subsectors that might be too heterogeneous (e.g., Stone-Glass-Clay)
  - Removal of subsectors currently facing unique economic challenges (e.g., Petroleum, Aerospace)

Project Schedule and Major Tasks

Task	2020														
	March		April		May		June		July		Aug		Sep		Oct
Task 1: Work Plan & Project Management															
Draft and final work plan															
Project management															
Task 2: Technology/System Identification Stage															
Interview guide development & approval															
Literature review															
Industry expert interviews															
Memo on target technologies/systems							D	F							
Task 3: Market Penetration Estimation Stage															
Vendor and customer interviews															
Market penetration estimation															
Reporting													D	F	

Inputs into PG model available in September 2020

EE Technology/ System Identification Stage

EE Technology/ System Identification

Literature/database review

- CPUC/CEC reports
- IAC database
- MECS
- DOE advanced manufacturing and better plants initiatives
- Federal energy research labs
- Conference papers, white papers

Subsector expert interviews

- CA evaluators/implementers
- Experts with industry-specific expertise
- Practitioners / experts on Strategic Energy Management (SEM)
- Trade association representatives
- CA IOUs industrial/ag product leads and key account representatives

Question: Any specific recommendations on experts to interview?
Question: Any specific technologies to recommend?

Expert Interview Plan and Topics

Interview topics for up to 10 expert interviews per subsector

- Which technologies/systems currently use most energy in subsectors
- Which EE measures have greatest potential for future energy savings
- What would be baseline/standard efficiency versions of these EE measures
- What equipment vendors we should interview in next stage
- What factors/barriers might delay/discourage promising EE measures (including end user consideration of other demand side options)
- Prevalence of non-EE demand-side options (DG, DR) in subsector

Market Penetration Estimation Stage

Vendor & Customer Interview Plan

Up to 50 equipment vendor interviews for each subsector

10 end user interviews for each subsector

Sources for vendor/end user sample frames

- InfoGroup company databases for industry specific NAICS codes
- PA lists of participating vendors and vendor marketing lists
- Program tracking data for industrial and agricultural programs
- Membership lists from relevant trade associations (if available)

Question: Do the PAs have vendor lists they could share?
Question: Could the PAs help the evaluation team (e.g. through key account managers) identify the key decision-makers at the end user sites?

Interview Topics for Equipment Vendors

- Which measures have the greatest potential for future EE
- Current estimates of CA market penetration
- Relative impacts of EE program interventions on sales
- Average energy savings for the EE versions of these technologies or processes
- Relative costs differences b/w EE and baseline efficiency models
- Barriers to EE adoption
- How EE fits into the larger picture of whole facility DSM (e.g. compared to other options like renewables and DR)

Interview Topics for End Users

If they use EE technology X in their facility

- What % of their current equipment/processes uses this technology
- What % of their end use/total facility's energy consumption is accounted for by these equipment/processes

If they don't use technology X in their facility

- Whether they have heard of the technology
- Whether they considered installing the technology
- What factors/barriers prevented them from installing the technology
- What factors/drivers would get them to install the technology
- Whether program incentives or tech assistance would increase likelihood of installation
- What industry-wide barriers might stall the adoption of the EE technologies

How EE fits into the larger picture of whole facility DSM (e.g. compared to other options like renewables and DR).

Market penetration estimation

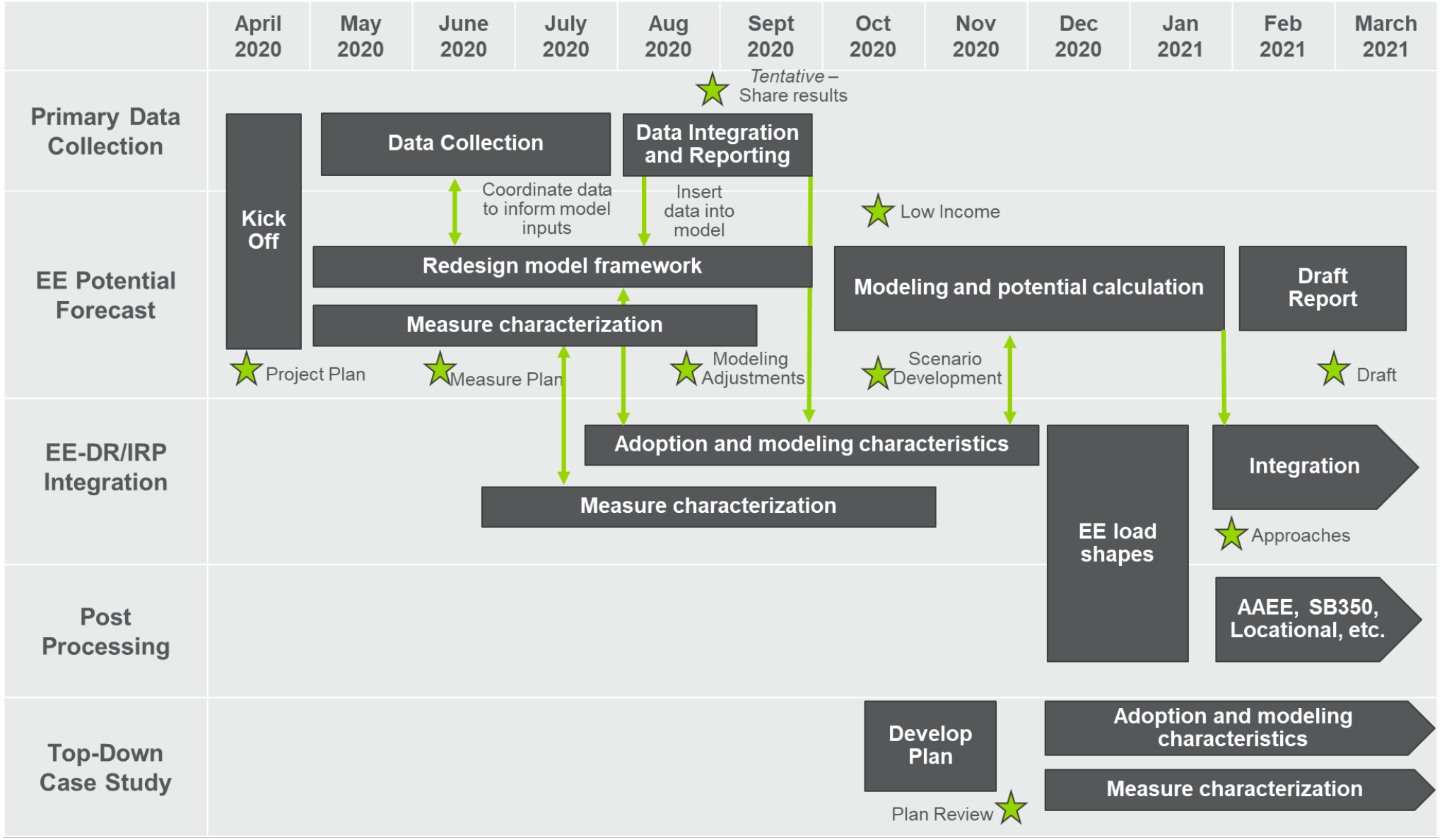
- EE market penetration initially at equipment level (e.g., % of motors with VFDs or % of boilers that are high EE)
  - Some EE improvements may involve changes in processes or systems that may not lend themselves to a “widget-based” approach
  - Since equipment can vary in size/capacity, will try to get interviewees to allocate their estimates into different size/capacity bins
- Vendors will likely give CA market level estimates
- For end users, we use ratio estimation methods to expand findings from samples to CA market
- To convert market penetration estimates into energy savings potential, we will use estimates from end user/vendor interviews along with info from secondary sources

Key deliverables

- **Technology/System Identification Stage**
  - Industry expert interview guides
  - Memo listing the target technologies/systems identified, the justifications for including them, and a brief summary of the evidence
- **Market Penetration Estimation Stage**
  - Equipment vendor and end user interview guides
  - Draft and final reports with the following contents
    - A summary of the data collection approach
    - A list of the targeted technologies/systems along with the justifications for including them;
    - A matrix showing the 3 key technologies for each industrial/ag sector and containing the estimated current EE market shares, projected market shares for 5 years in the future, associated energy savings potential estimates, and barriers to EE adoption
    - A cross-cutting summary section discussing issues, themes, and trends
    - Conclusions and recommendations for future research.

Next Steps

Overall Schedule Reminder



Reminders and Next Steps

Stakeholder engagement is critical and CPUC and the Potential and Goals Study team values the input and direction provided.

- Study-related comments are informal.
- Study-related comments on the topics covered today are due **June 16** via e-mail to: coby.Rudolph@cpuc.ca.gov & genesis.tang@cpuc.ca.gov.

We suggest comments be focused on the questions posed throughout this slide deck

Stay Informed

CPUC's 2021 Energy Efficiency Potential & Goals Webpage:

https://www.cpuc.ca.gov/General.aspx?id=6442464362

CEC's Demand Analysis Working Group:

https://www.energy.ca.gov/programs-and-topics/topics/energy-assessment/demand-analysis-working-group-dawg

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