Integrated Grid Planning

Forecast Assumptions Working Group

March 13, 2019

Hawaiian Electric
Maui Electric
Hawai'i Electric Light

Agenda

- Welcome and Introductions
- Integrated Grid Planning Overview
- Ground Rules
- Our Community
- Forecasting Overview
- Forecast Assumptions Working Group
- Next Steps and Schedule

Integrated Grid Planning Process (*IGP*)

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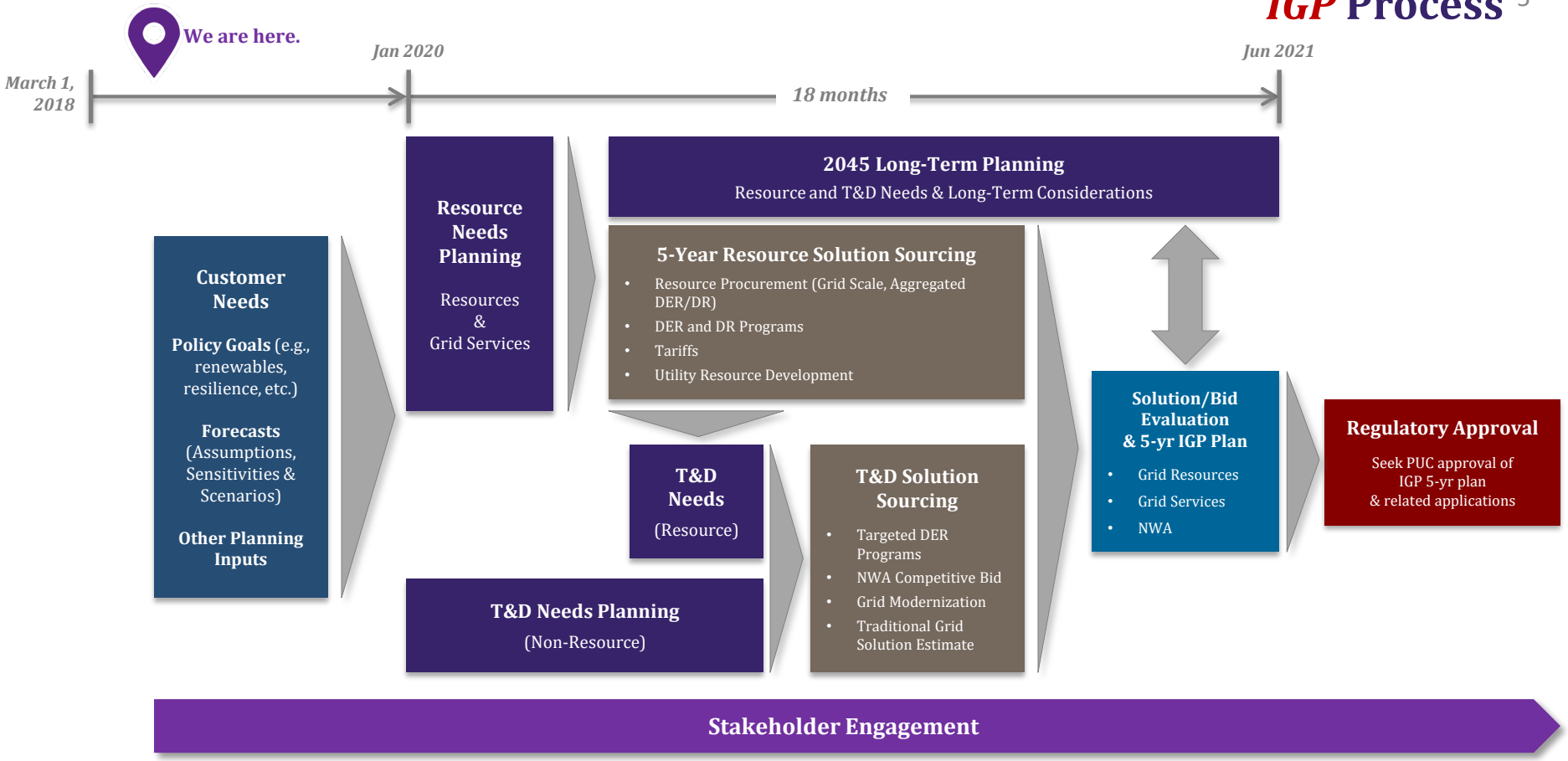
A Planning process that will

- ✓ appraise the total **needs of the system**;
- ✓ **consider all alternatives** from customers, independent providers and the utility;
- ✓ integrate **market-based solutions**;
- ✓ determine the **best resource and grid options for customers**;
- ✓ be inclusive through **stakeholder review and input**;
- ✓ **synchronize** and unify resource, transmission, and distribution planning processes;
- ✓ streamline process that will **optimize energy portfolio.**

IGP Process



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Source: Integrated Grid Planning Report, figure 3, page 14.

The Groups of *IGP* – Their Roles

Stakeholder Council

- Provides strategic input and feedback on developing IGP process.

7 Working Groups

- Address specific topics
- Focus on
  - ✓ Competitive Procurement
  - ✓ Distribution Planning
  - ✓ Evaluation & Optimization
  - ✓ Forecast Assumptions
  - ✓ Grid Services
  - ✓ Resilience
  - ✓ Standardized Contracts

Technical Advisory Panel

- Independent peer assessment by industry experts of planning process, methodology, tools and results.

Ground Rules

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Ground Rules

1. Chatham House Rule will apply – no personal or organizational attribution will be made to any comments/feedback provided during the meeting by any participant nor in written documentation.

2. Working group meetings, and other information exchanges are intended solely to provide an open forum or means for the expression of various points of view in compliance with antitrust laws.

3. Under no circumstances shall engagement activities be used as a means for competing companies to reach any understanding, expressed or implied, which tends to restrict competition, or in any way, to impair the ability of participating organizations to exercise independent business judgment regarding matters affecting competition or regulatory positions.

4. Proprietary information shall not be disclosed by any participant during any industry engagement meeting or information exchange. In addition, no information of a secret or proprietary nature shall be made available to industry engagement participants.

5. All proprietary information which may nonetheless be publicly disclosed by any participant during any industry engagement meeting or information exchange shall be deemed to have been disclosed on a non-confidential basis, without any restrictions on use by anyone, except that no valid copyright or patent right shall be deemed to have been waived by such disclosure.


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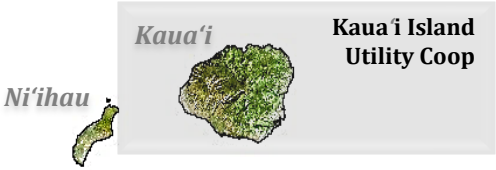
Hawai‘i’s Electric Utility Service Territories

4 Electric Utilities, 6 Separate Grids

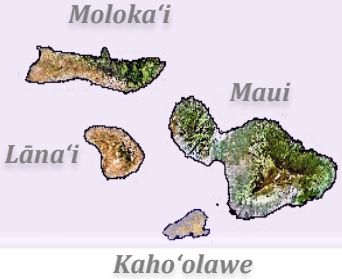


Hawaiian Electric

Customers: ***305,285***
Renewable Energy Percentage***: 22%***

Total Firm Capacity: ***1,784.5 MW***
Variable Generation: ***117.2 MW***
Customer-Sited Solar: ***460 MW***

Maui Electric



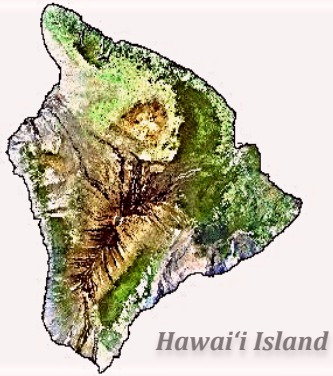
Customers: ***71,650***
Renewable Energy Percentage***: 37%***

Total Firm Capacity: ***274.1 MW***
Variable Generation: ***79.5 MW***
Customer-Sited Solar: ***109 MW***

Hawai‘i Electric Light

Customers: ***85,811***
Renewable Energy Percentage***: 44%***

Total Firm Capacity: ***213.3 MW***
Variable Generation: ***47.7 MW***
Customer-Sited Solar: ***93 MW***



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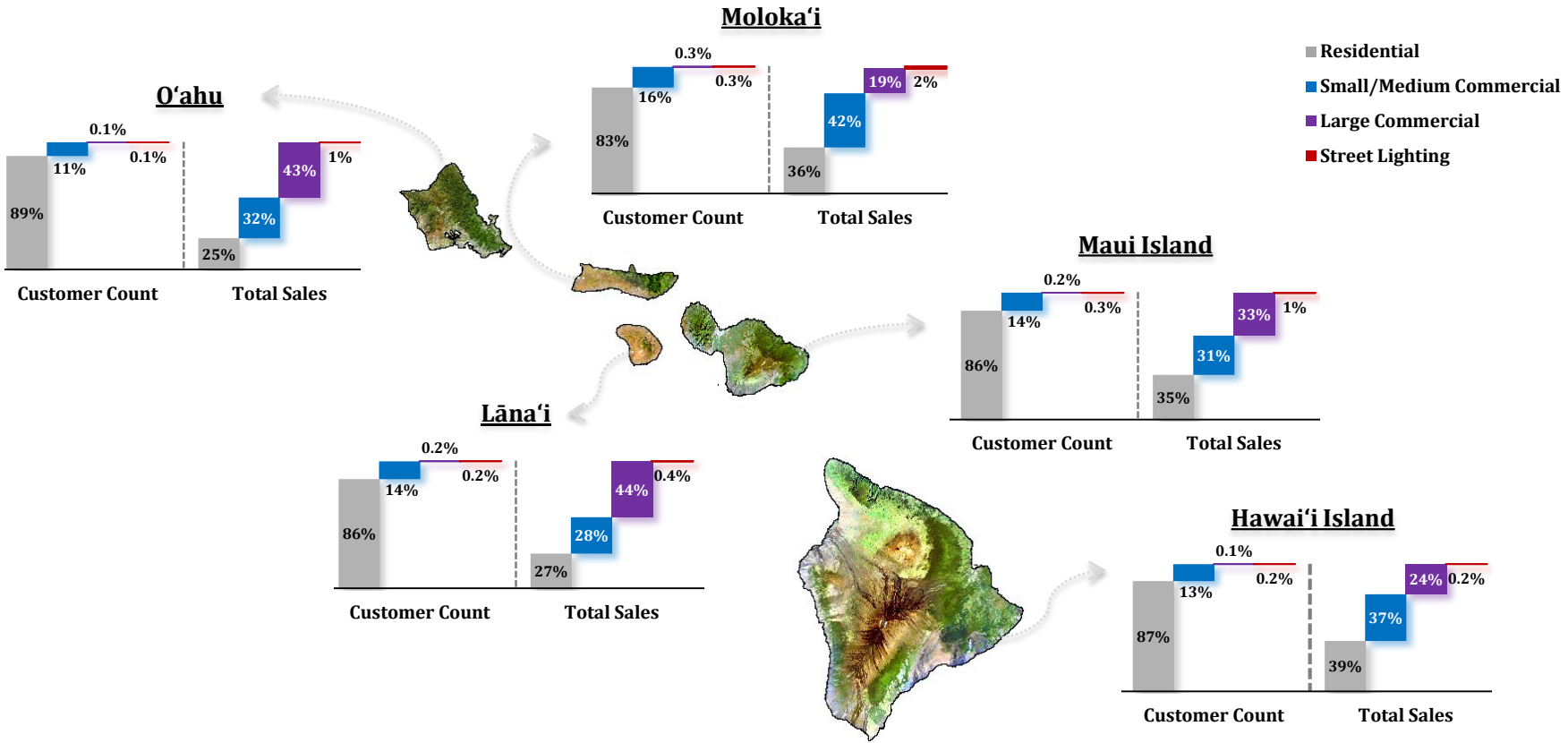
Notes: Number of customers is an average customer count in 2018. Renewable energy percentages as defined by Hawaii Revised Statutes 269-91 as of 11/30/2018. Generation projects in service as of 1/1/2019. Generation capacity figures in gross megawatts.
Source: Power Facts, www.hawaiianelectric.com

Different Customer Mix → Different Sales Mix



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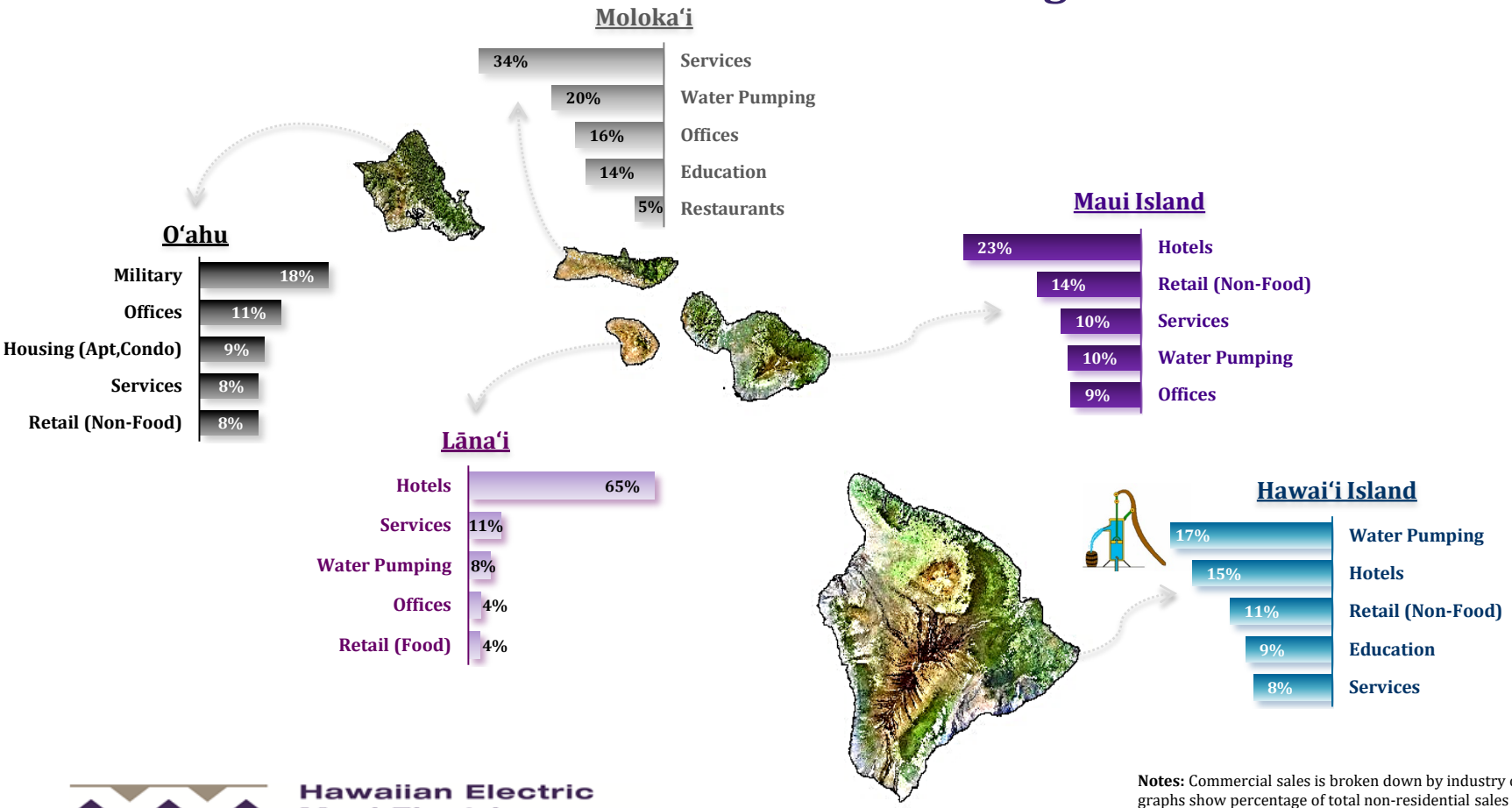
Notes: The above figures show annual average customer count and total sales in 2018.
Source: HECO

5 Largest Commercial Sectors



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Notes: Commercial sales is broken down by industry codes. The above graphs show percentage of total non-residential sales by industry codes.
Source: HECO

Forecasting Overview

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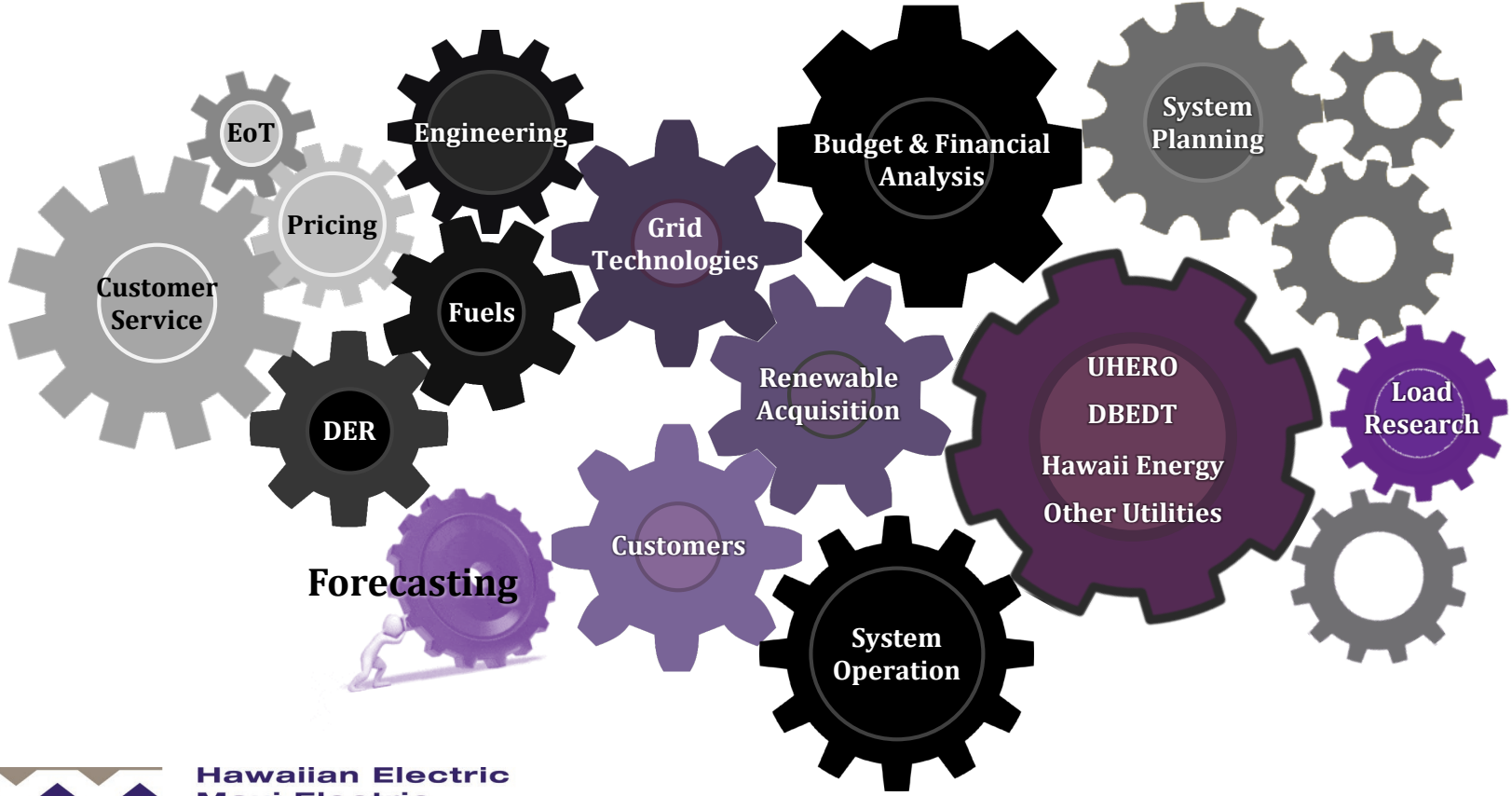
It takes a village to raise a forecast.



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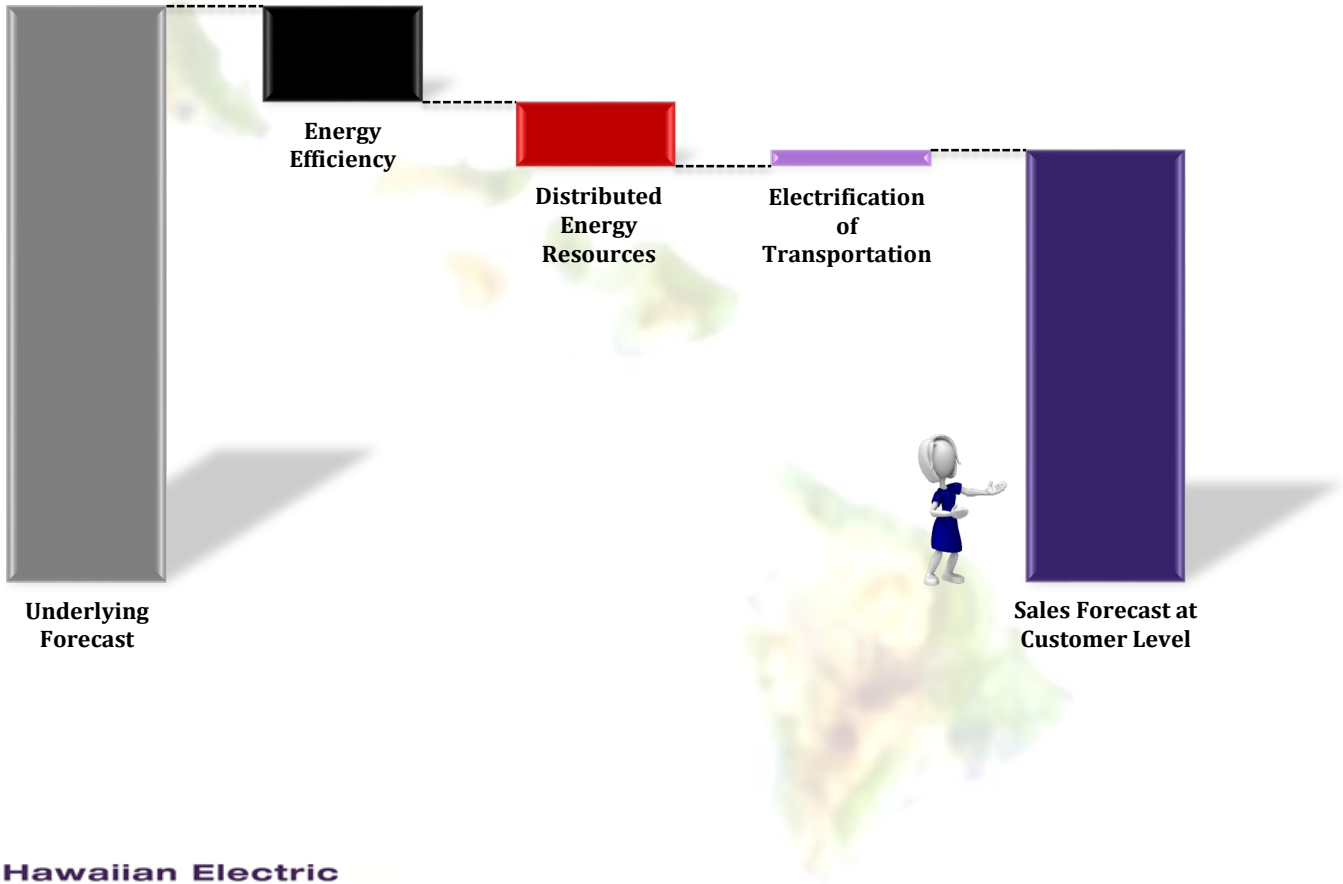
What do we forecast?

- ✓ Number of customers
- ✓ Energy our customers use (GWh or MWh sales)
- ✓ Peak demands (MW)

Our forecast is developed in layers.



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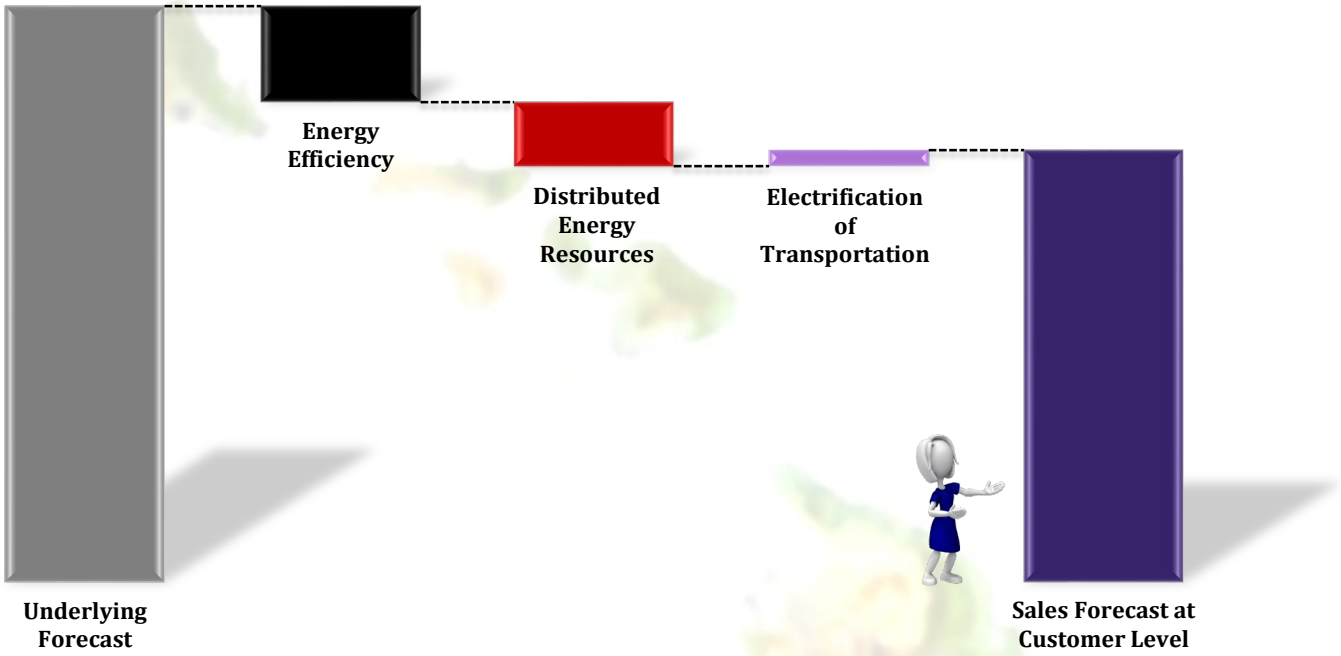
Illustrative Example

Our forecast is developed in layers.



Forecast will be further modified by demand response (DR) and controllable DER.

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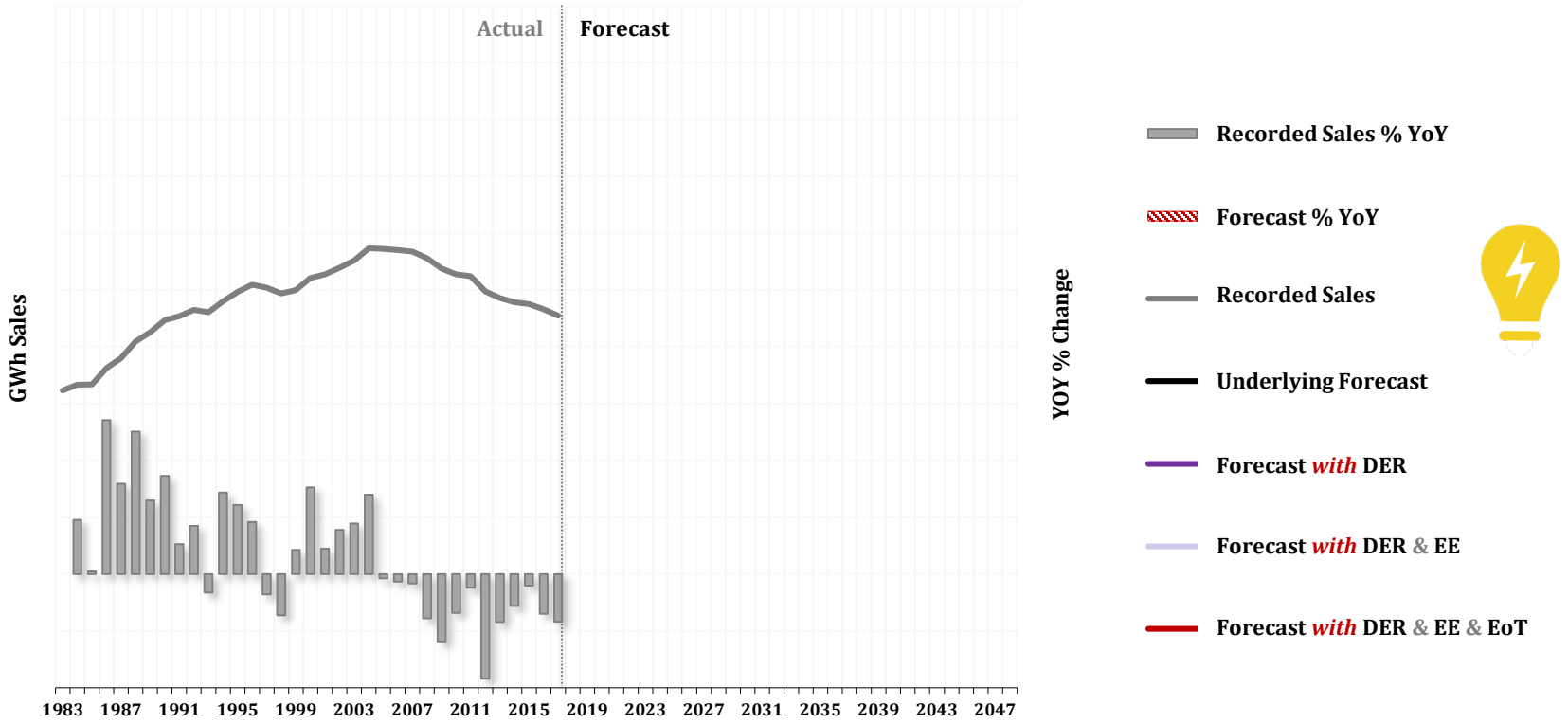
Illustrative Example

Forecast Assumptions

1. Economic Drivers	Population, Jobs, Income, Visitor Arrivals, etc.	
2. Weather	Dry Bulb, Dew Point and Wet bulb Temperature, Precipitation, Humidity, etc.	
3. Electricity Price	Mix of resources, fuel prices, capital expenditures	
4. Energy Efficiency	**Near-Term:** Sales reduction from Hawaii Energy and % of Codes & Standards from EEPS Potential Study.	**Long-Term:** Assume reach EEPS target goal of 30% reduction of sales in 2030 and 40-45% by 2045 is achieved.
5. Distributed Energy Resources	Distributed PV and Battery Storage	
	Near-Term: Based on planned projects and build-out of existing programs.	**Long-Term:** Based on economic uptake model.
6. Electrification of Transportation	Light-Duty Electric Vehicles, Electric Buses, and Mass Transit	
7. Other	Adjustments based on known large projects (+/-).	

Sales Forecast with Layers



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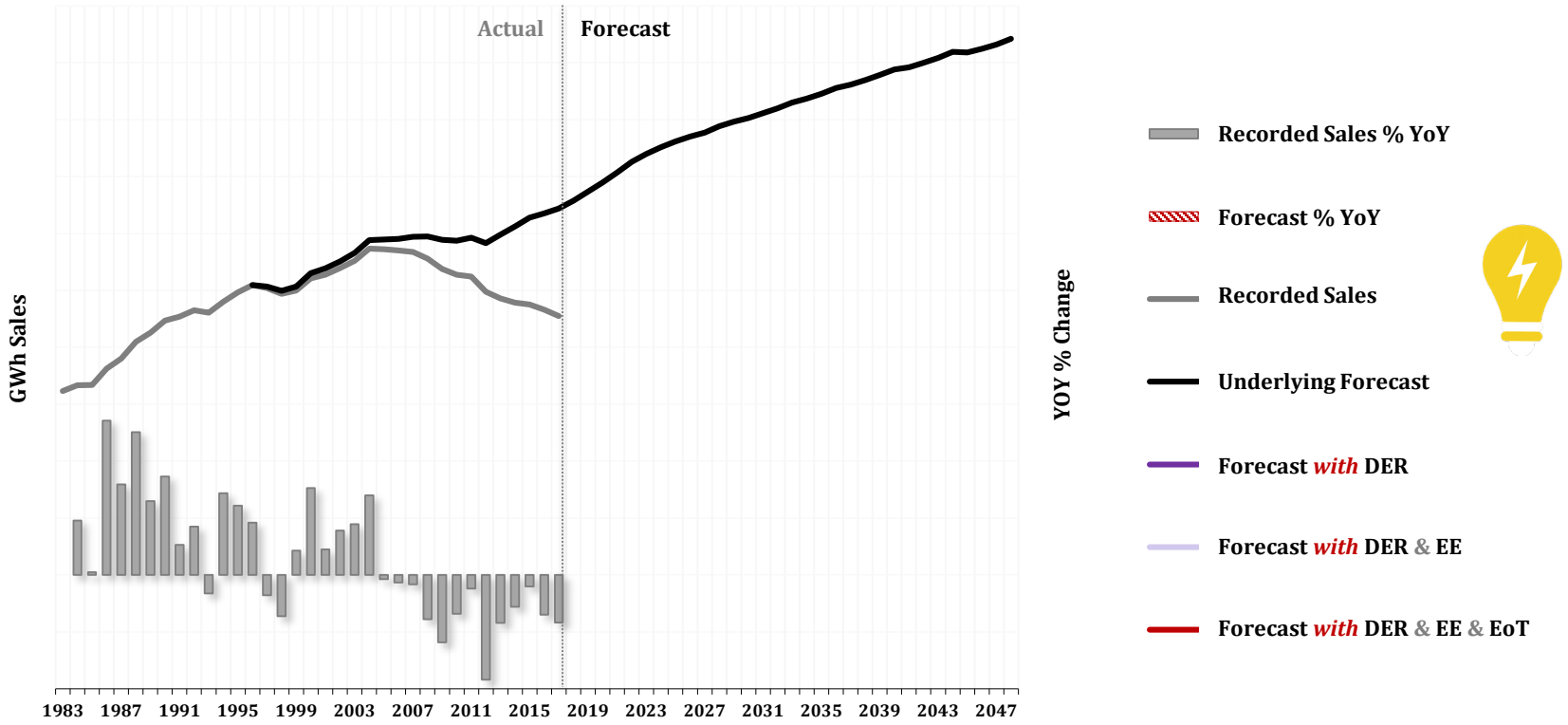
Illustrative Example

Sales Forecast with Layers



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Illustrative Example

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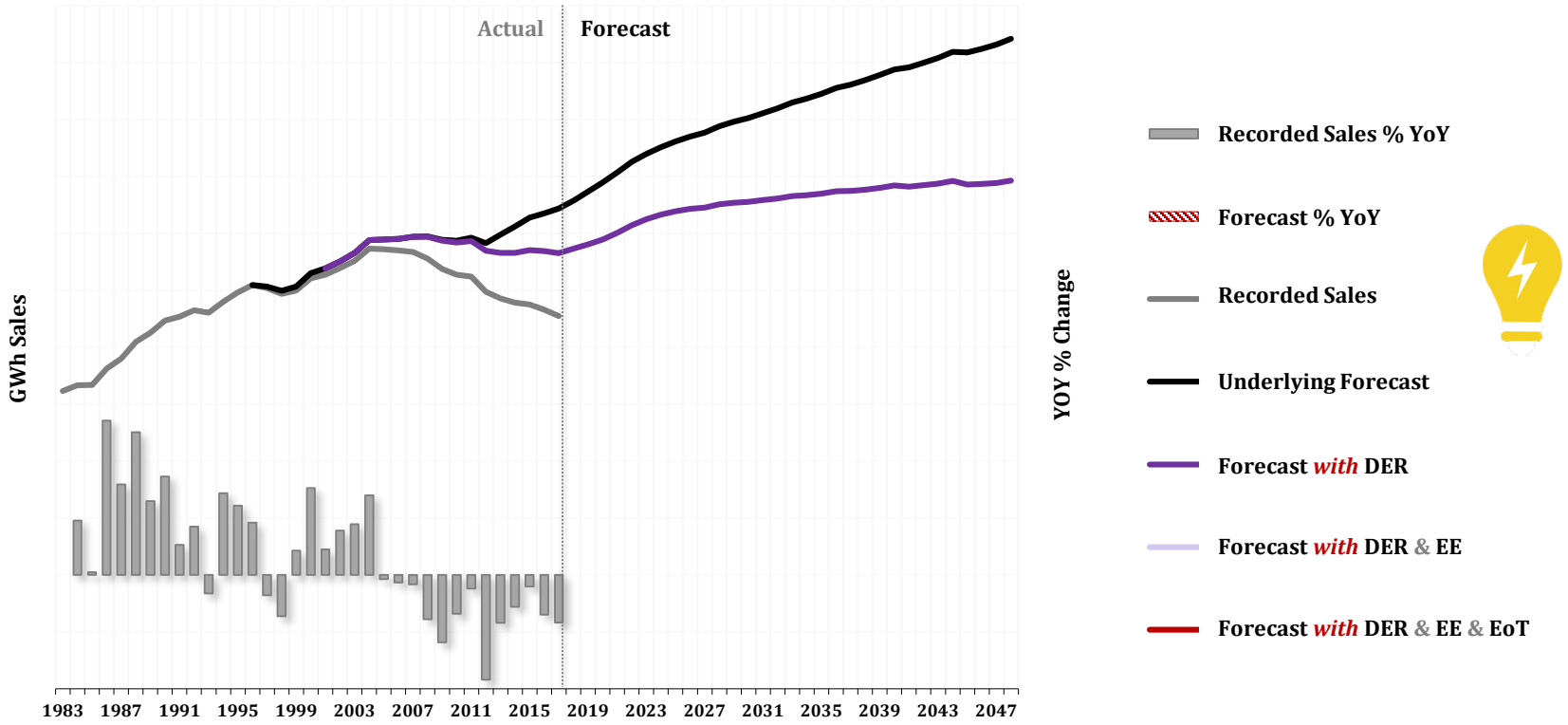

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Illustrative Example

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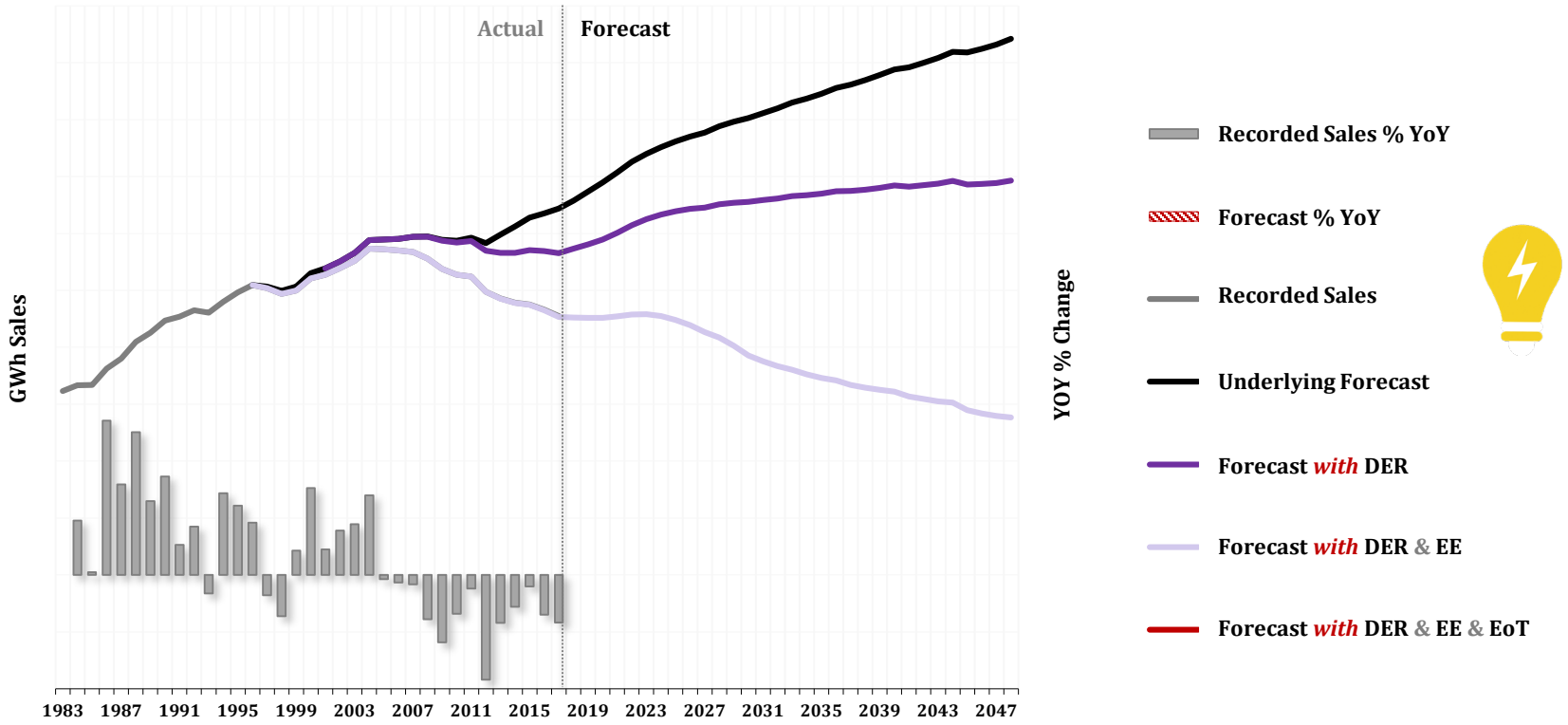

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Illustrative Example

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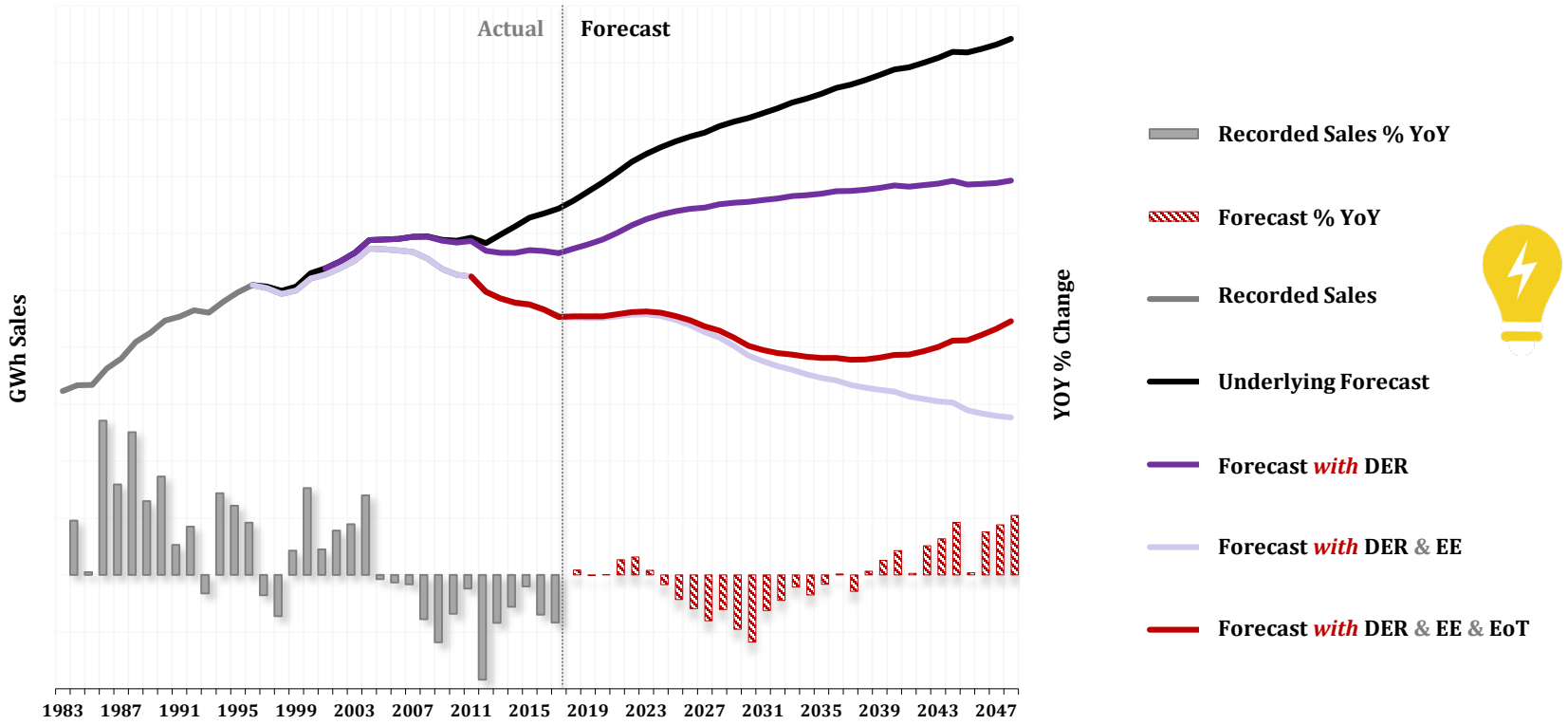

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Illustrative Example

Peaks Forecast with Layers

- Recorded Peaks % YoY
- Forecast % YoY
- Net MW Peak
- Underlying Forecast
- Forecast *with* Battery
- Forecast *with* Battery & DER
- Forecast *with* Battery & DER & EE
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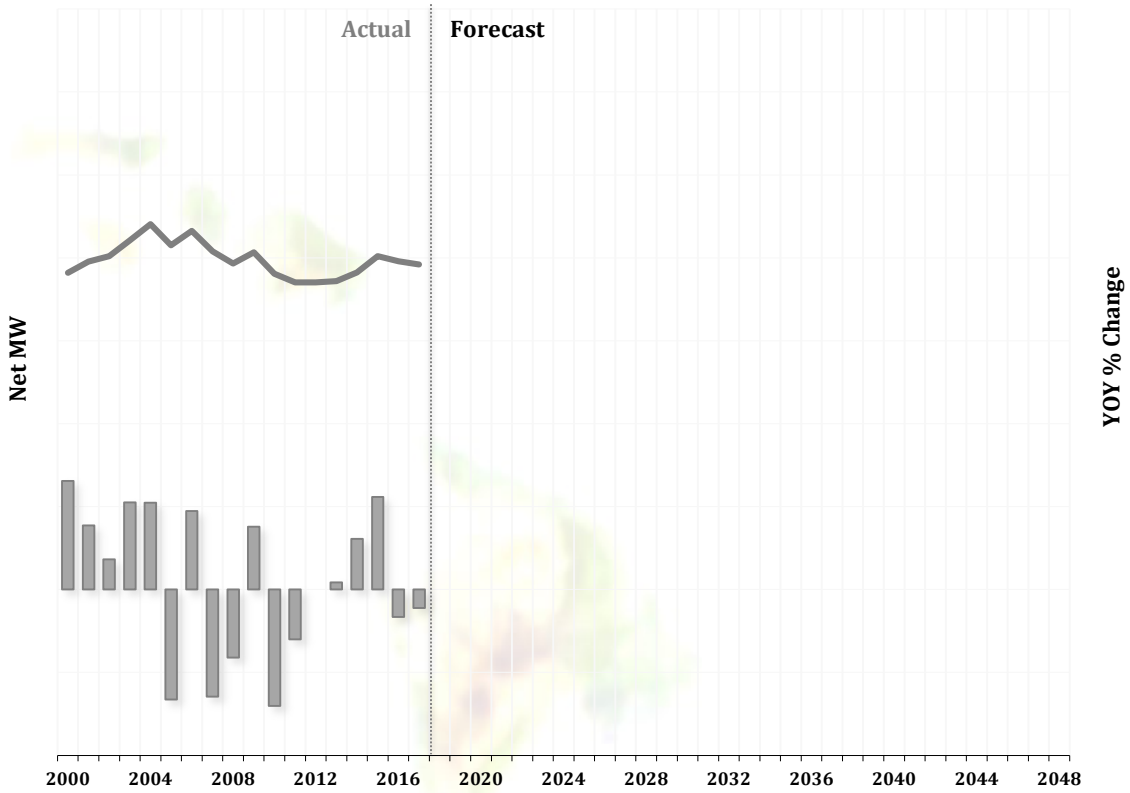
- Forecast *with* Battery & DER & EE & EV & E-Buses



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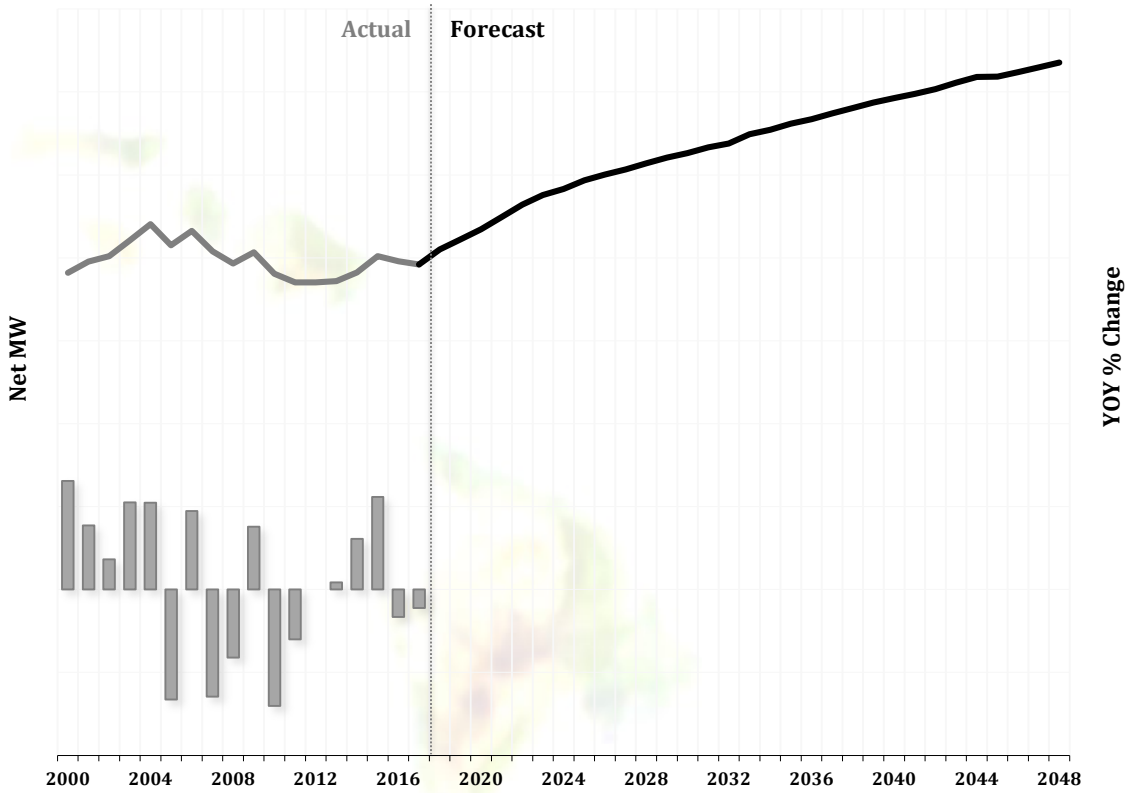

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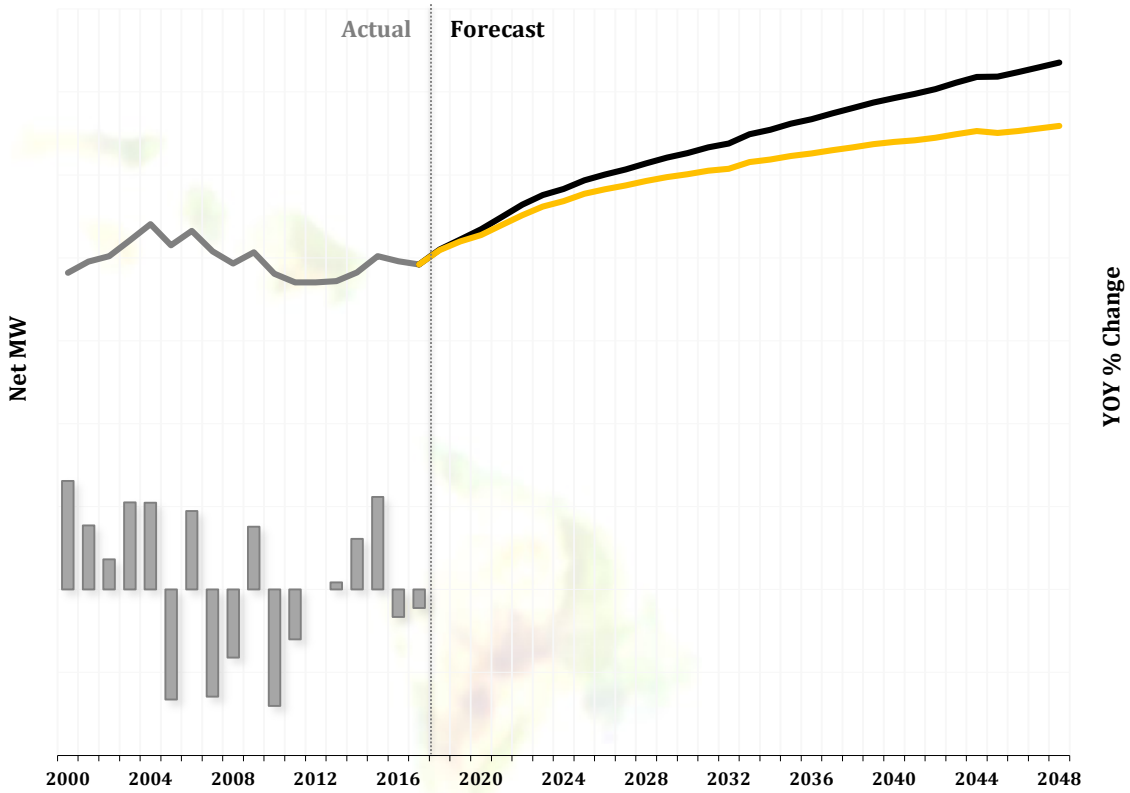

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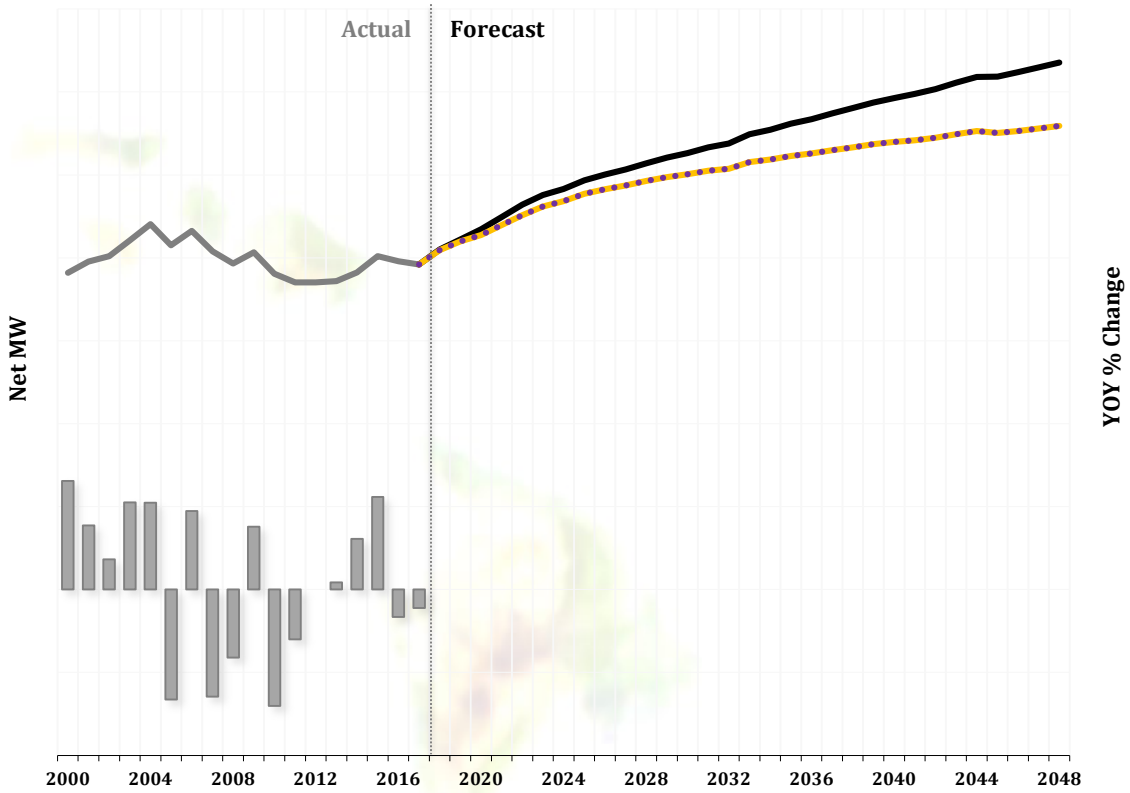

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Illustrative Example

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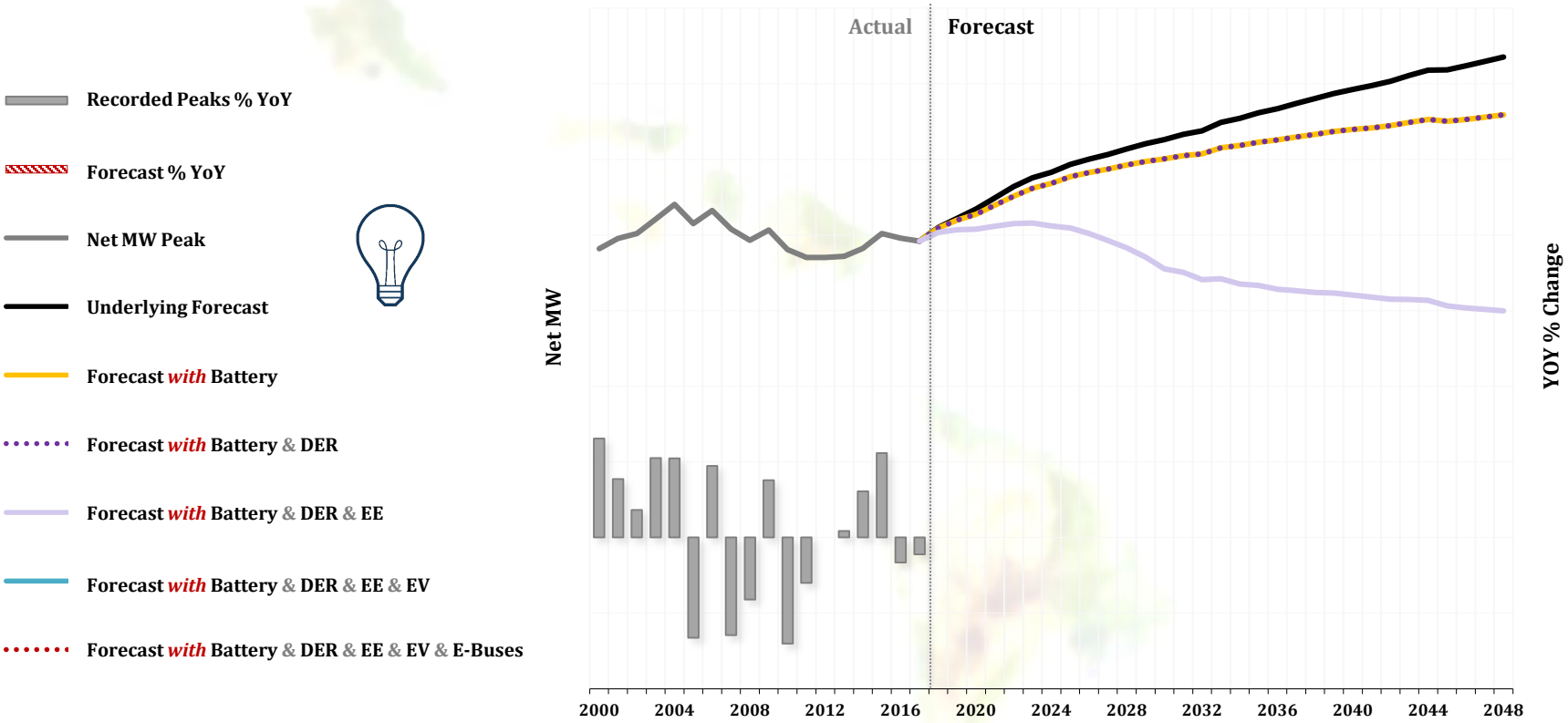

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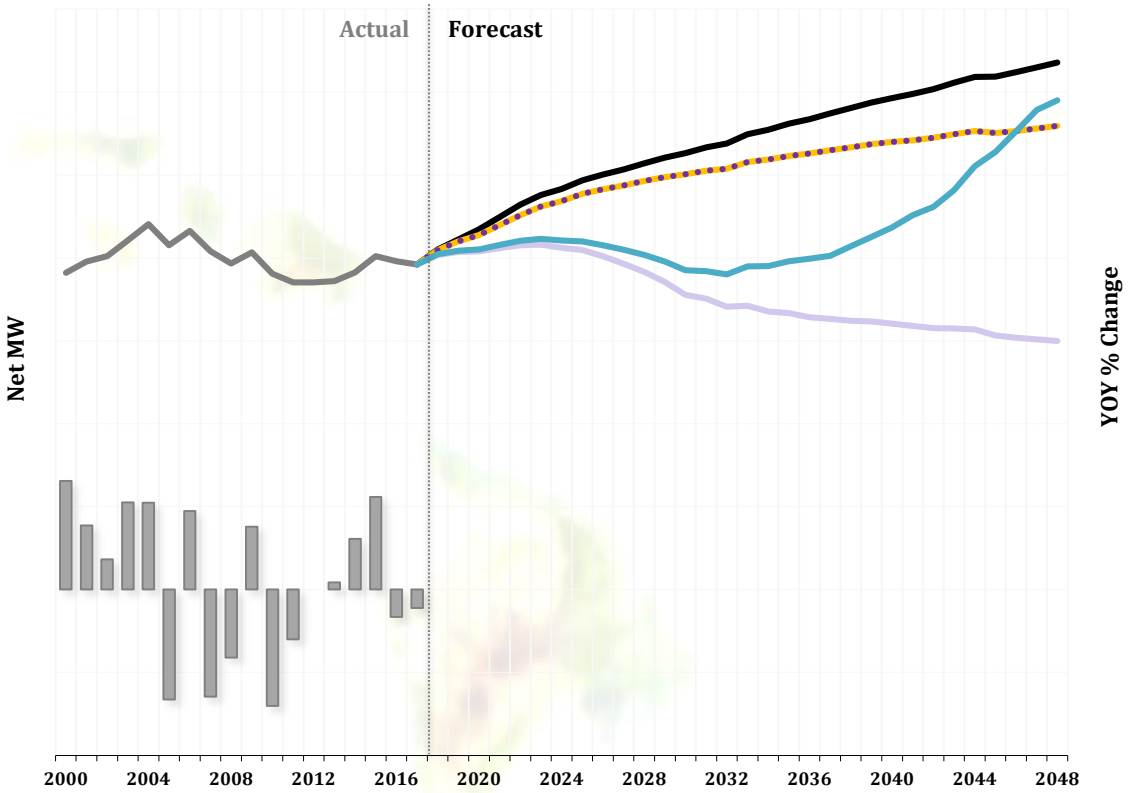

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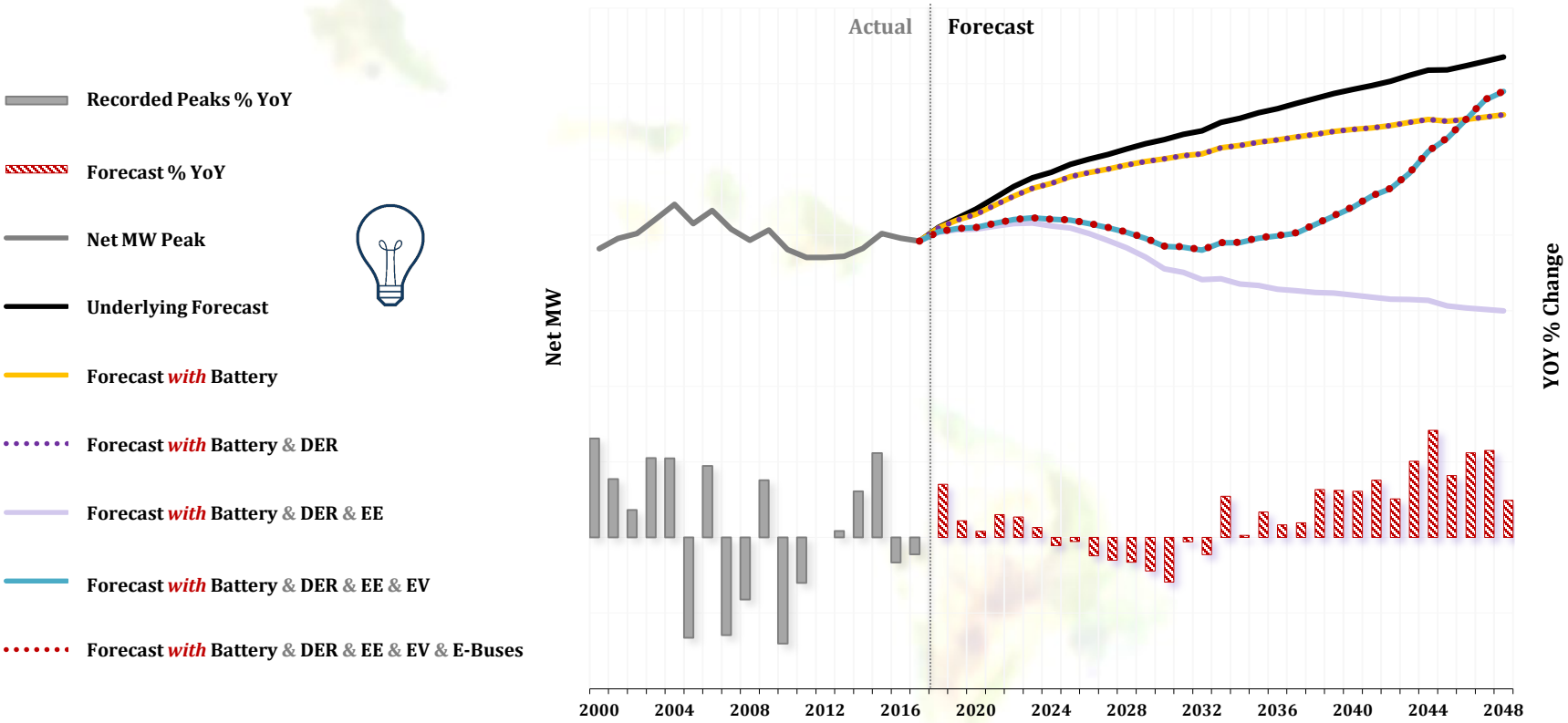
Illustrative Example

Peaks Forecast with Layers



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Illustrative Example

Forecast Assumptions Working Group

(FAWG)

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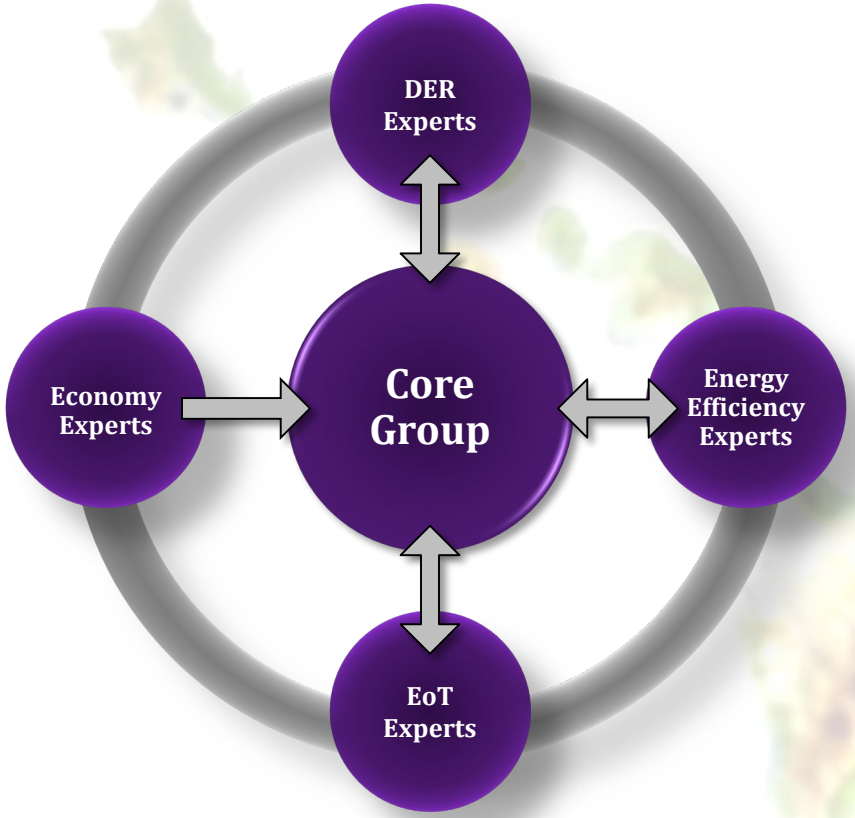
Your input is very valuable.

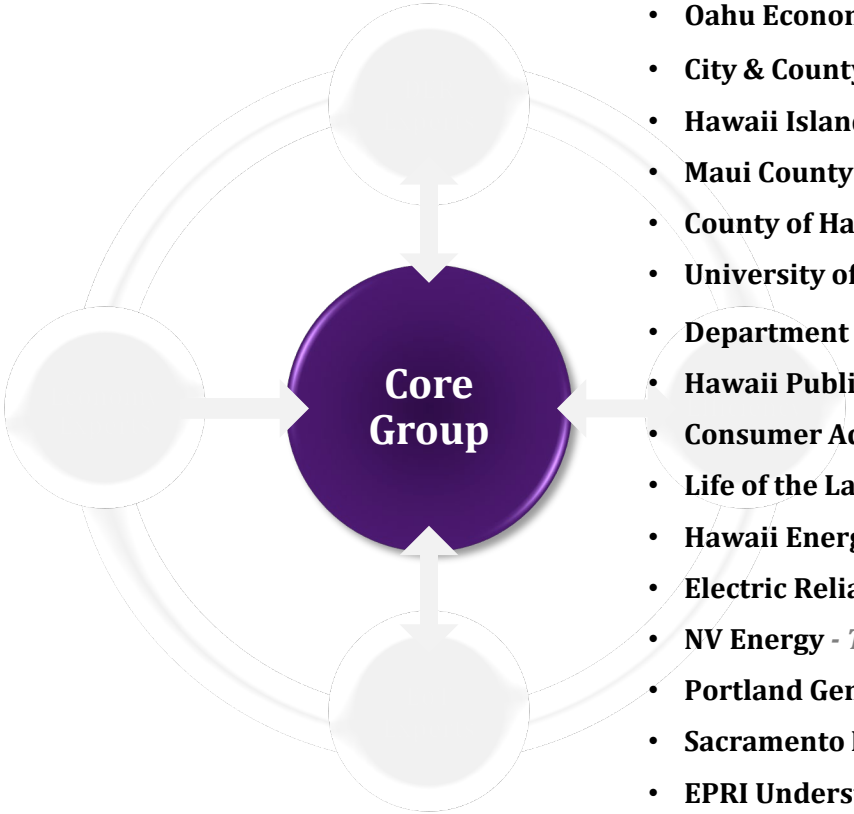
FAWG – Purpose

Provide strategic inputs and feedback on assumptions and methodologies used for load forecast development and results.

FAWG – Composition

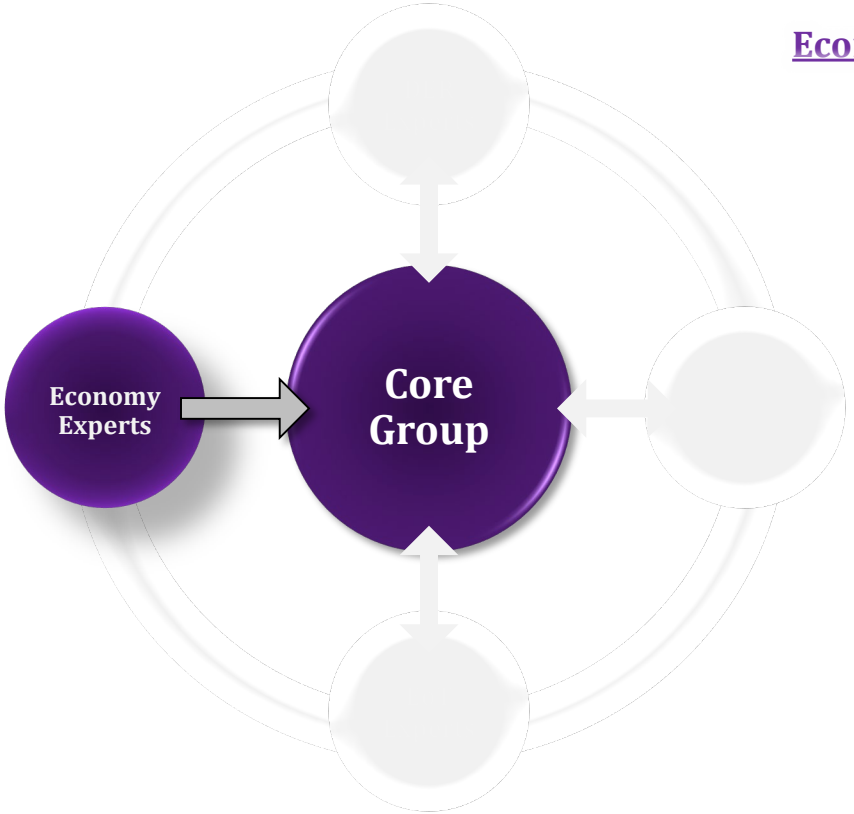


Core Members



- **Oahu Economic Development Board** – *Pono Shim*
- **City & County of Honolulu** – *Rocky Mould*
- **Hawaii Island Economic Development Board** – *Jacqui Hoover*
- **Maui County** - *Teena Rasmussen*
- **County of Hawaii, Department of Research and Development** - *Ron Whitmore*
- **University of Hawaii Economic Research Organization (UHERO)** – *Carl Bonham*
- **Department of Business, Economic Development & Tourism (DBEDT)**– *Binsheng Li*
- **Hawaii Public Utility Commission** – *Jay Paul Lenker, Ashley Norman, Dave Parsons*
- **Consumer Advocate** – *Rene Kamita*
- **Life of the Land** – *Henry Curtis*
- **Hawaii Energy** – *Ramsey Brown*
- **Electric Reliability Council of Texas (ERCOT)** - *Calvin Opheim*
- **NV Energy** - *Terry Baxter*
- **Portland General Electric** - *Amber Riter*
- **Sacramento Municipal Utility District (SMUD)** - *Patrick McCoy*
- **EPRI Understanding Electric Utility Customers** - *Omar Saddiqui*
- **Applied Energy Group** – *Ingrid Rohmund*

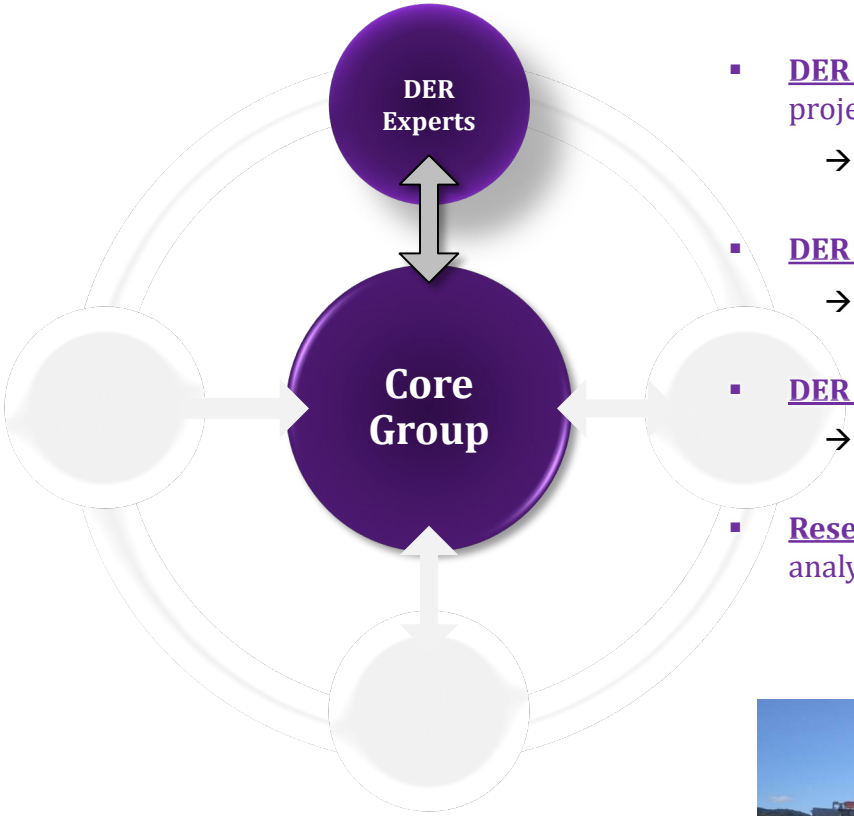
FAWG – Economy Experts



Economy Experts Meet Through Annual Business Forums

- UHERO
- Government & County
- Military
- Water Pumping/Board of Water Supply
- Resort & Hotels & Timeshare
- Visitor Industry
- Construction
- Real Estate
- Retail
- Tech Research
- Manufacturing

FAWG – Distributed Energy Resources (DER) Panel



- **DER Industry Experts** – Provide insights into residential & commercial projects.
  - → Developers and companies with experience in design and installation of DER.
- **DER Program Experts** – Provide perspective on successes and challenges.
  - → DER program administrators from the companies.
- **DER Customers** – Provide perspectives of DER adoption.
  - → DER customers from the companies.
- **Research & Consultancy Groups** – Provide insights into DER market analytics.

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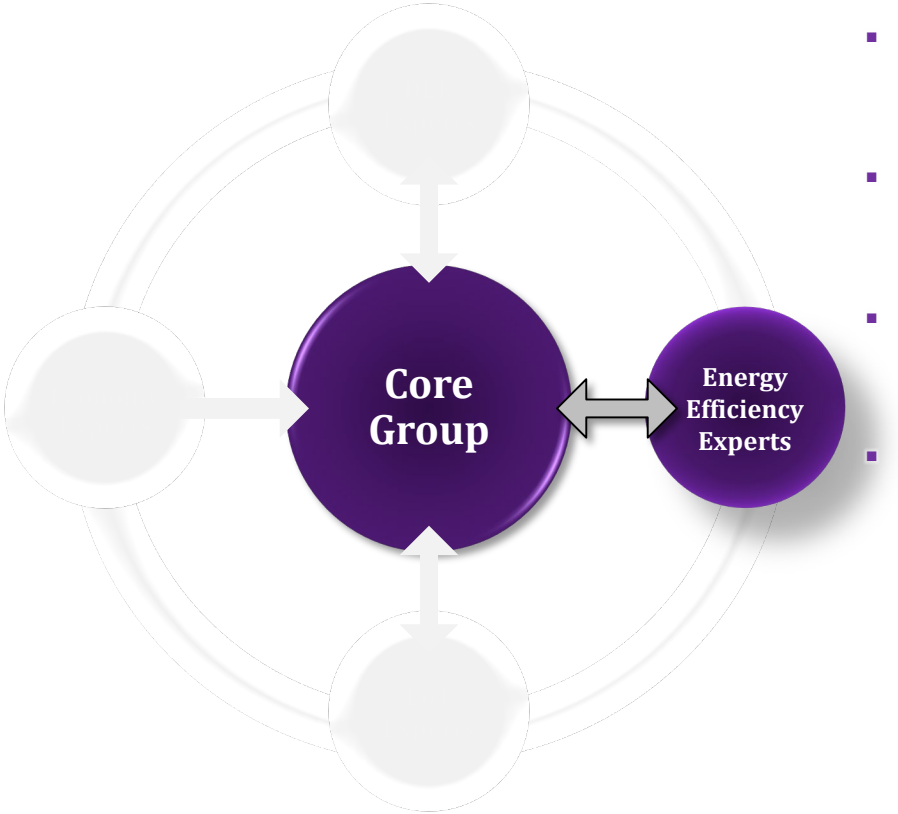
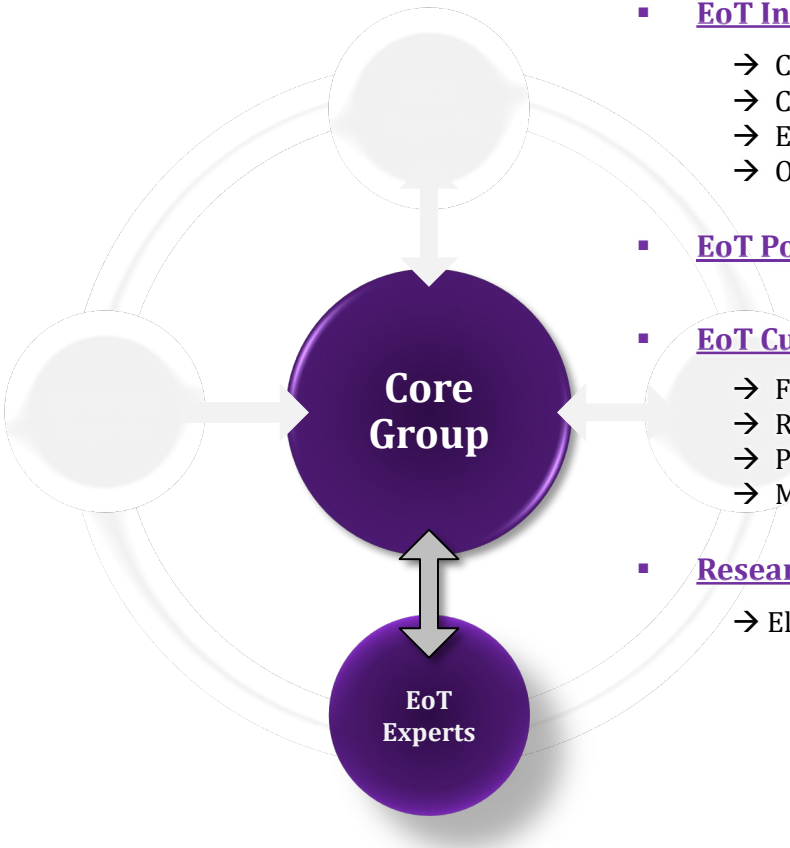
FAWG – Energy Efficiency (EE) Panel



- **EE Industry Experts** – Provide insights into EE projects.
  - → Developers, retailers and wholesalers, etc.
- **EE Program Experts** – Provide insights into successes & challenges.
  - → Hawaii Energy
- **EE Customers** – Provide perspectives of EE adoption.
  - → EE customers from the companies.
- **Research & Consultancy Groups** – Provide insights into EE market analytics.
  - → DBEDT Energy Office

FAWG – Electrification of Transportation (EoT) Panel



- **EoT Industry Experts** – Provide insights into auto market and charging solutions.
  - → Car dealers
  - → Charging solution providers
  - → EoT Division
  - → Other Utilities
- **EoT Policy Experts** – Provide perspectives on policies and challenges.
- **EoT Customers & Infrastructure** – Provide perspectives of EoT in Hawaii.
  - → Fleet experience
  - → Ride Sharing
  - → Parking structure
  - → Multi-Unit Dwelling
- **Research & Consultancy Groups** – Provide insights into EoT market analytics.
  - → Electric Power Research Institute (EPRI)

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Next Steps & Schedule

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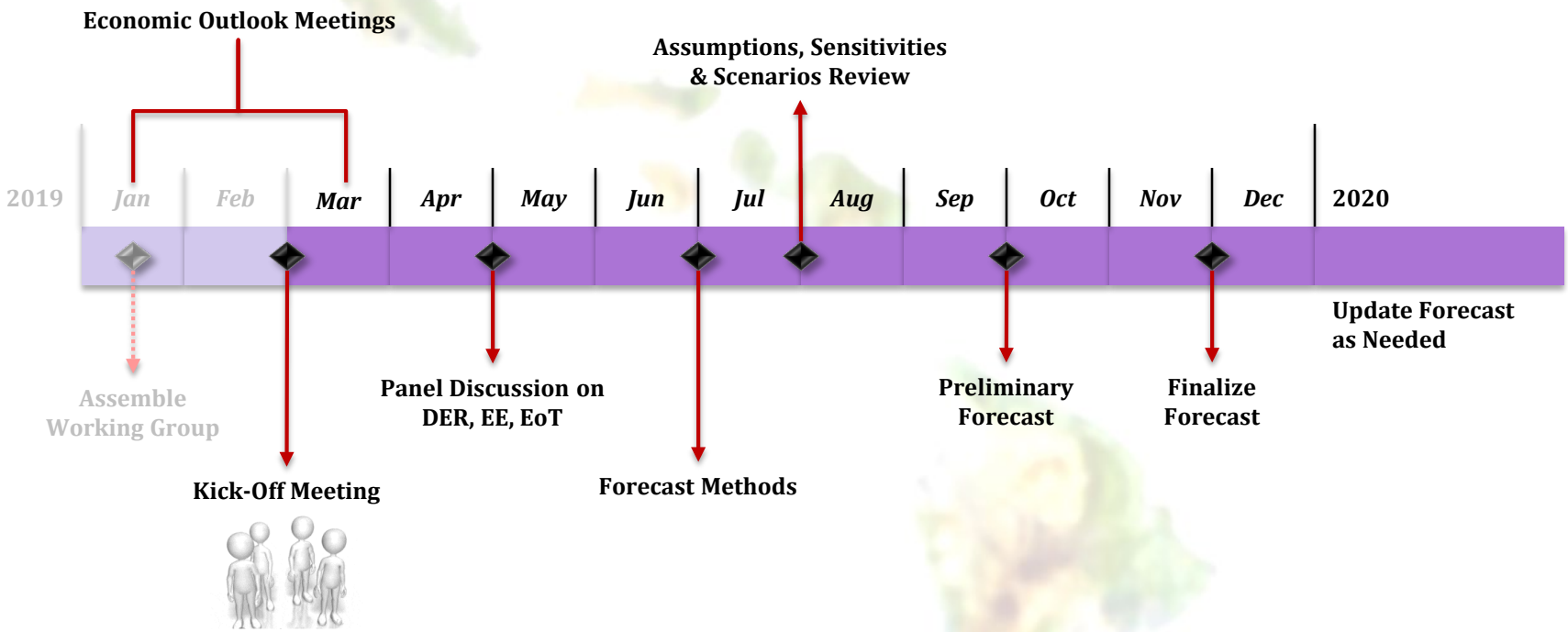
Next Step


Economic Outlook Meetings
Assumptions, Sensitivities & Scenarios Review
2019
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2020
Update Forecast as Needed
Assemble Working Group
Panel Discussion on DER, EE, EoT
Preliminary Forecast
Finalize Forecast
Kick-Off Meeting
Forecast Methods

Through our **combined efforts**

customers will benefit from
a **reliable and resilient grid** prepared to meet **Hawaii's future needs**.

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Mahalo!
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