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State of Hawaii
Market Potential Study

AEG performed a comprehensive market potential study (MPS) to assess the potential for future savings from energy efficiency programs and other interventions for The Hawaii Public Utilities Commission (HPUC).

The goals for this study were:

- Evaluate the State's energy efficiency savings to date relative to the current Energy Efficiency Portfolio Standard (EEPS) target.
- Evaluate the State's progress toward future EEPS goals.
- Quantify the landscape of energy efficiency and demand side management (DSM) over the next 20 years.
- Provide a foundation to consider future programs and other interventions holistically.

Hawaii Considerations

Some of the most important considerations for the MPS are Hawaii's unique market needs and the transforming landscape of energy efficiency, distributed energy resources (DERs), and policy that will define the State's energy future regarding the 2030 EEPS target, as well as beyond 2030.

Customer Segmentation

- By island
- Sector, housing/building type, income level for residential
- Presence of distributed energy resources (DER) by tariff

Technologies & Measures

- Cast a wide net
- Included integrated demand-side management (iDSM), emerging technologies, electric vehicles (EVs), and DERs

Codes & Standards (C&S)

- Building codes and appliance standards
- Include those "on the books"
- Consider additional C&S as sensitivity

Non-Energy Benefits (NEBS)

- Use the total resource cost (TRC) as the primary cost-effectiveness test
- Includes NEBS that can be easily quantified

Annual & Hourly Analysis

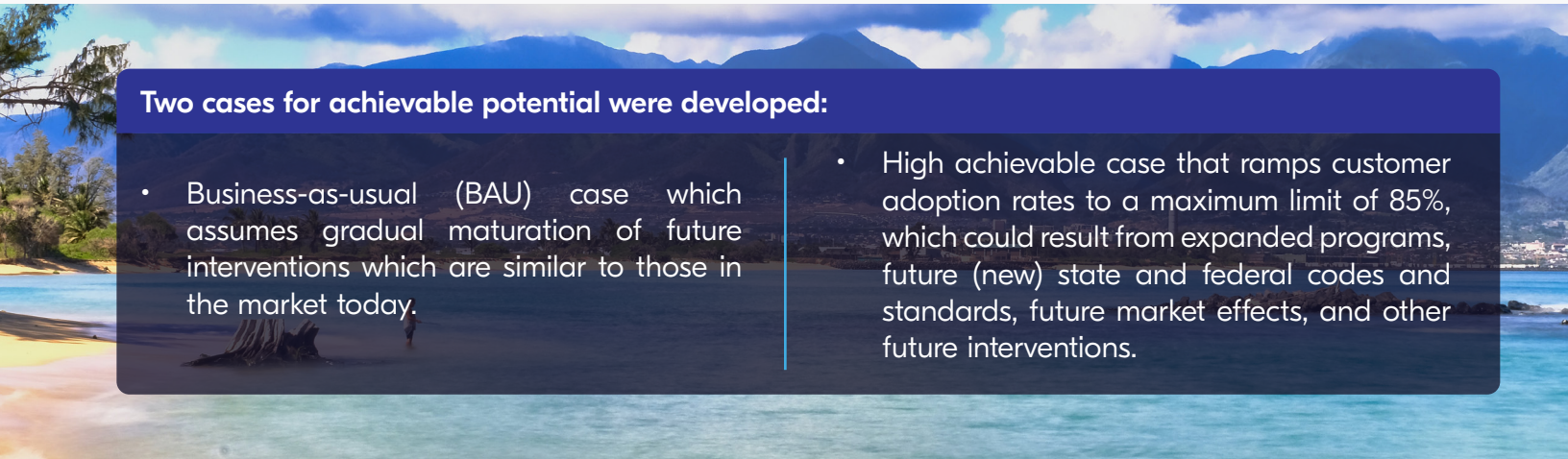
- Technical, technical achievable, economic, and economic achievable
- Estimate impacts of various DSM resources at the hourly level

Expanded Set of Metrics

- 1st year & cumulative persistent energy savings
- Load shapes and impact shapes by day-type
- Peak demand savings

Results

The report documents the MPS and provides estimates of the historic and future potential reductions in annual cumulative persistent energy savings for the time periods of 2009-2030 (EEPS horizon) and 2020-2040 (twenty-year forecast of energy efficiency potential).



Two cases for achievable potential were developed:

- Business-as-usual (BAU) case which assumes gradual maturation of future interventions which are similar to those in the market today.
- High achievable case that ramps customer adoption rates to a maximum limit of 85%, which could result from expanded programs, future (new) state and federal codes and standards, future market effects, and other future interventions.

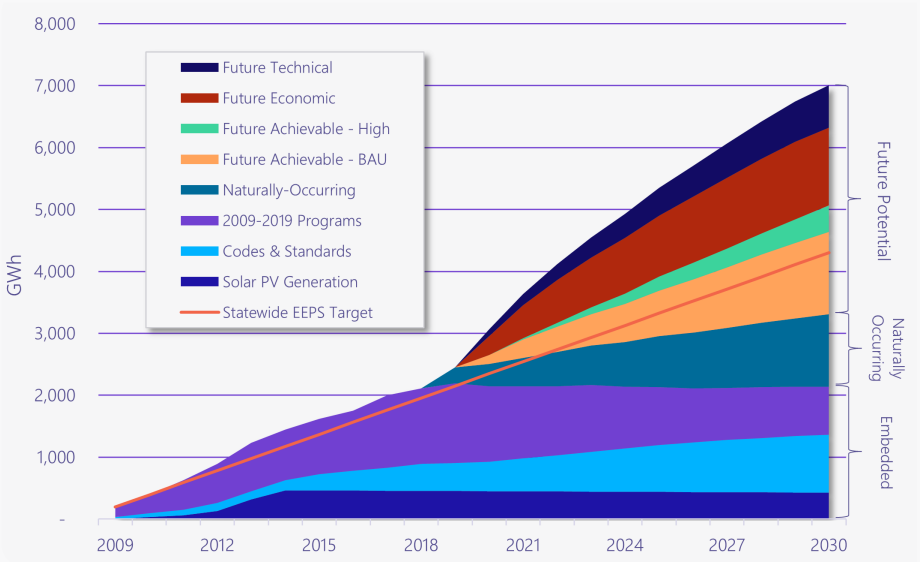
Additional outcomes from the study include end-use load shapes and 8760 hourly models of potential impacts from energy efficiency, advanced rate designs, and demand response and grid services (DR/GS), as well as an assessment of policy and / or program interventions to optimize savings. Analysis was performed, and results are available, for each island.

Key Insights

Continuing with the BAU approach to energy efficiency should be sufficient to meet the EEPS target by 2030. The figure below presents the cumulative persistent savings over the entire EEPS horizon of 2009 through 2030. The graph shows that the interim EEPS target was met through 2018 and the 2030 target is projected to be reached under the achievable potential — BAU scenario.

Results from the "high" achievable potential scenario suggest that a substantial amount of additional cost-effective savings are available, beyond the BAU strategy, to help achieve the EEPS goal by 2030. This high achievable case provides a buffer to offset setbacks due to COVID-19.

Cumulative Persistent Energy Savings (GWh), 2009-2030, EEPS Perspective



The Achievable - High Potential by sector showed that commercial sector savings projections are greater than those for the residential sector. This is consistent with trends in the industry as a result of impactful savings from a long list of appliance standards. These sector-level results include military facilities. While absolute savings potential is higher for the commercial sector, savings as a percent of the baseline are higher in the residential sector. This means that potential savings as a percent of overall usage could have a greater impact on customer bills in the residential sector.

Residential sector | The residential measure with greatest savings is solar water heaters, which pass the cost-effectiveness test throughout the study time horizon even though the federal tax credit is phased out. However, even with the tax credit, solar water heaters require a substantial investment, which limits adoption and achievable potential. The high growth in baseline cooling saturations through 2030 in regular-income homes is driving the air conditioning potential. All but the most efficient ductless air conditioners pass the cost-effectiveness test. In addition, connected home control systems include connected thermostat savings, which are cost-effective in most applications.

Commercial sector | Lighting end uses are represented in four of the top six commercial measures. A combination of high end-use intensity and popularity in programs is driving the lighting savings. The top measures include linear LED lamps (TLEDs) and LED fixtures plus controls.

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