



Dynamic Reserves Implementation & Impacts

June 9, 2020

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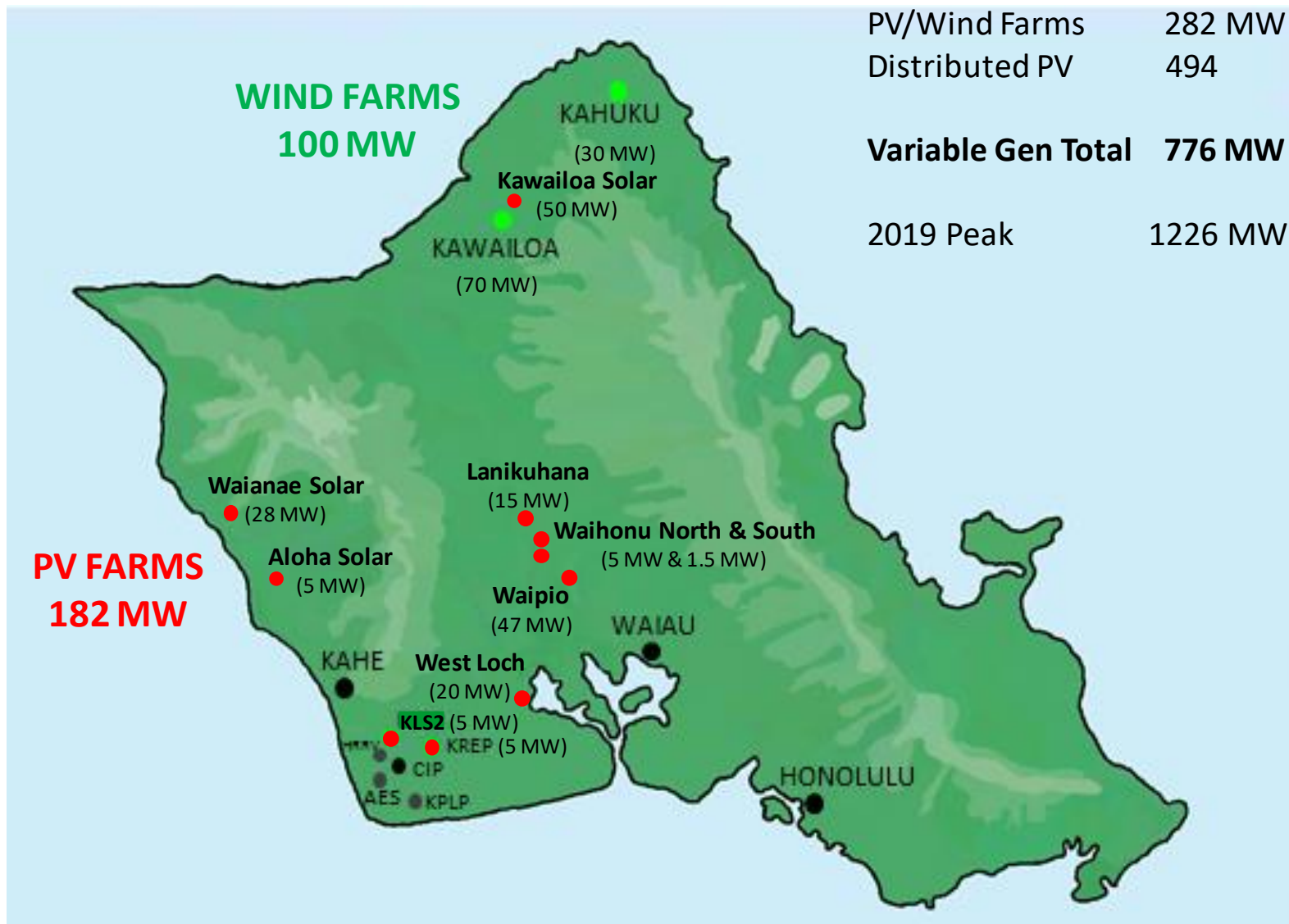
Director, System Operation

Hawaiian Electric Company



Hawaiian Electric
Maui Electric
Hawai'i Electric Light

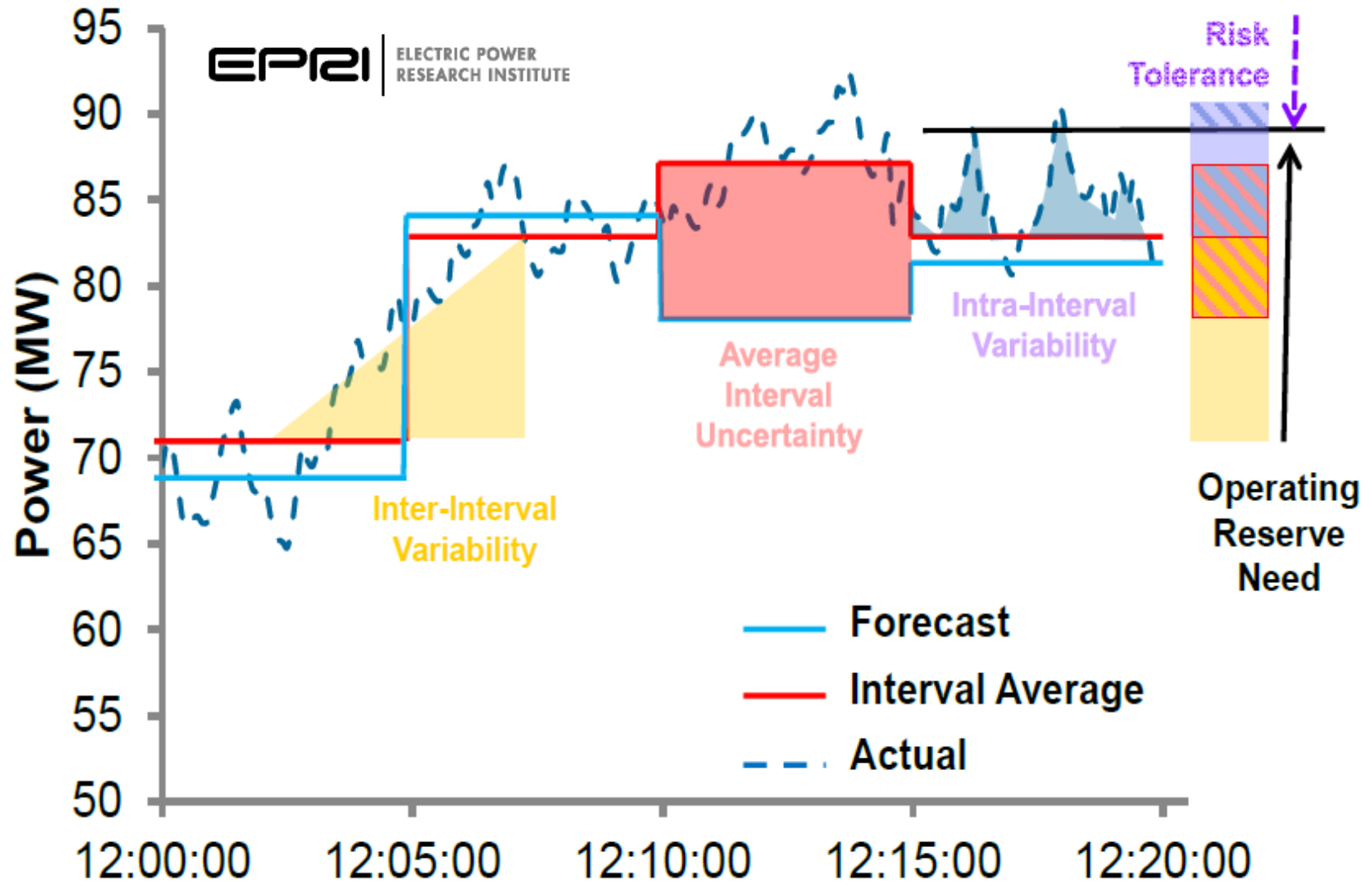
Oahu Variable Generation

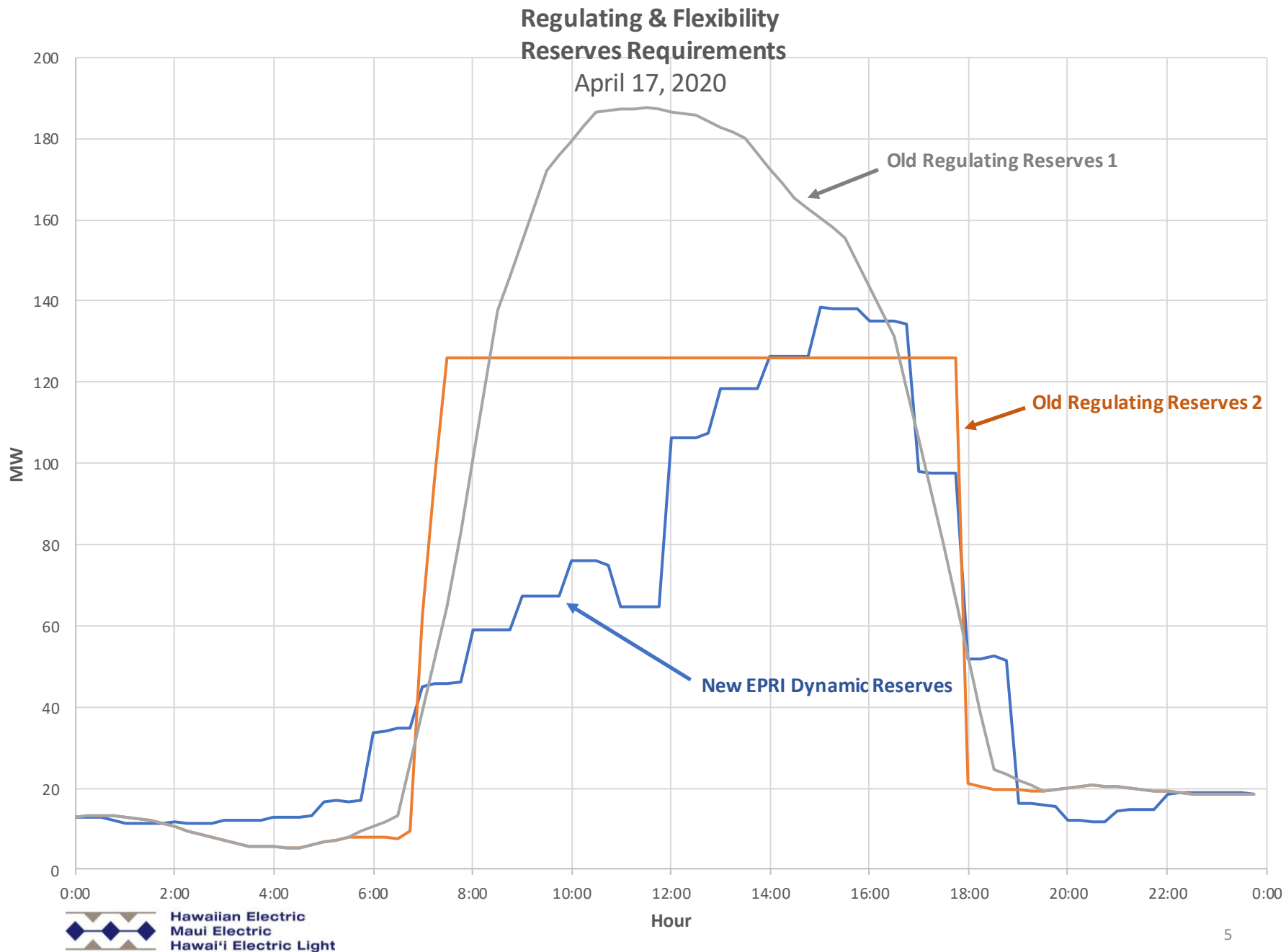


Dynamic Reserves

- *PV & Wind -> Variable Resources*
 - *Uncertainty & Variability*
- *EPRI Dynamic Reserves Method (E. Ela)*
 - *Regulating & Flexibility (uncertainty) Reserves*
 - *Considers time, time frame, & system conditions*
 - *Confidence-based reserve estimation based on historic balancing needs & forecasts and current forecasts.*
 - *UL/AWS renewable forecasts*
 - *EPRI DynADOR and NREL/EPRI FESTIV software*
- *Old "Static" Methods*
 - *Historic worst-case variability over large period*
 - *Time (?), time frame, uncertainty, system changes not considered*

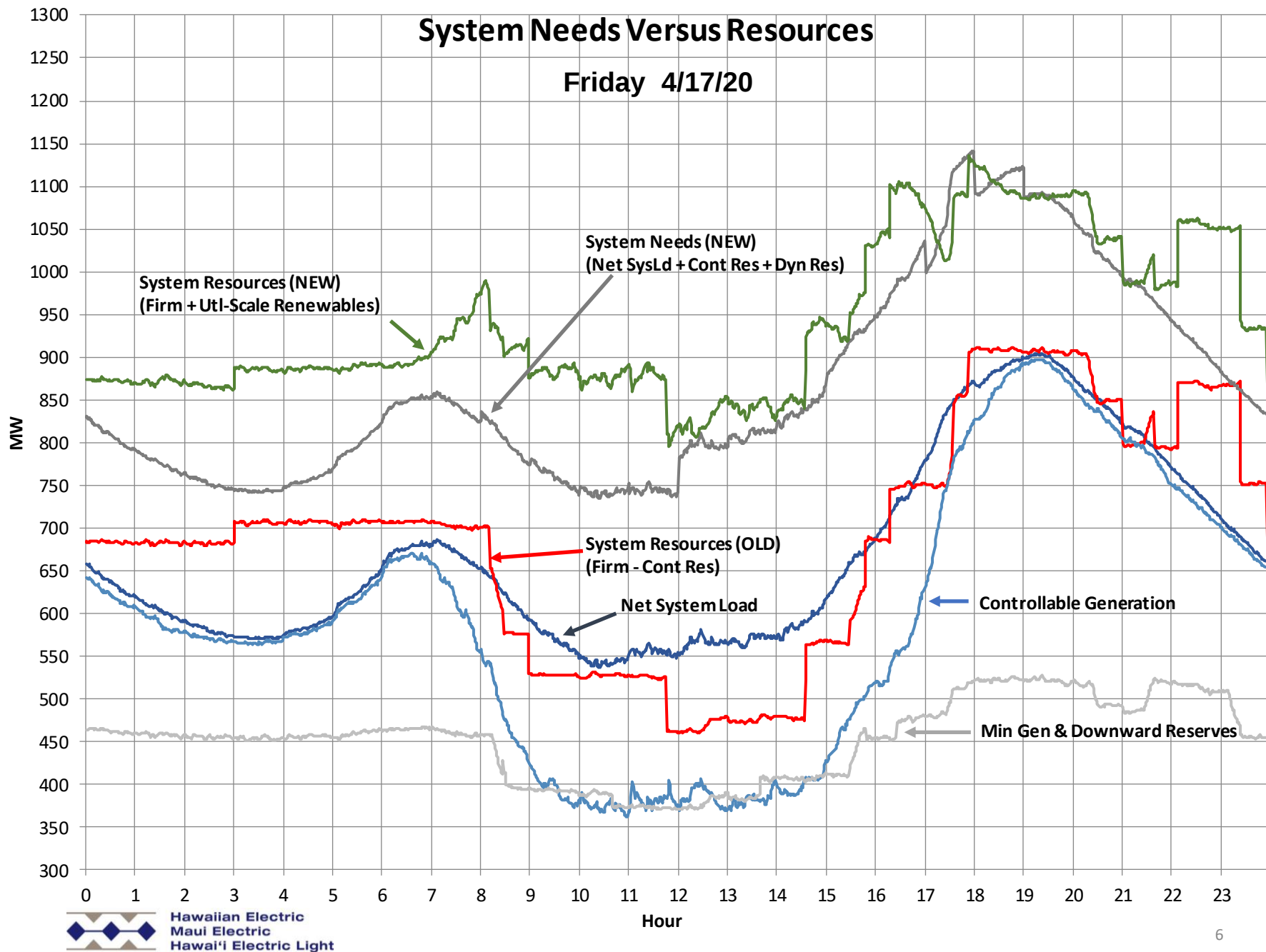
Dynamic Reserves - Time Frames





System Needs Versus Resources

Friday 4/17/20



Dynamic Reserves Impacts

- *Lower Resource Requirements*
 - *Apr-May, 56 of 61 days, old method would require additional online capacity.*
- *Control-Frequency Performance Compliance*
 - *Feb-May, 98.7% (new) versus 99.2% (old), decreased 0.5% (?); within compliance limit of 98.1%.*
- *Curtailement Impact*
 - *April 17, avoided 30 MW curtailment for 5 hours of take-or-pay PV.*

Future Direction

- *DOE FOA 1649, stochastic optimization.*
- *HECO/EPRI project to add renewable plants with storage.*

Questions



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