Energy+Environmental Economics

Long-term System Planning with Demand Side Participation

Grid Integration Workshop

9/19/2017

Presented by

Jeremy Hargreaves

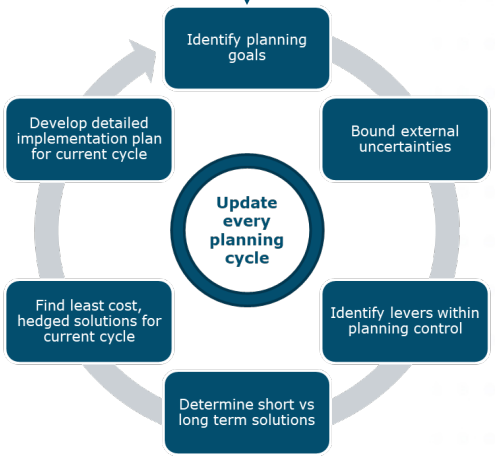
The Planning Challenge

Drivers of Change
Why we can't stick with the status quo

Where do we want to go?
How should the electricity grid serve customers in the future

How do we get there?
Stakeholdering and implementation of most effective grid solutions

How do we integrate DER into long term planning?



This is the process we used to get HECO a favorable PSIP after their previous plans were rejected

Electricity Planning Framework

What are the drivers of change?

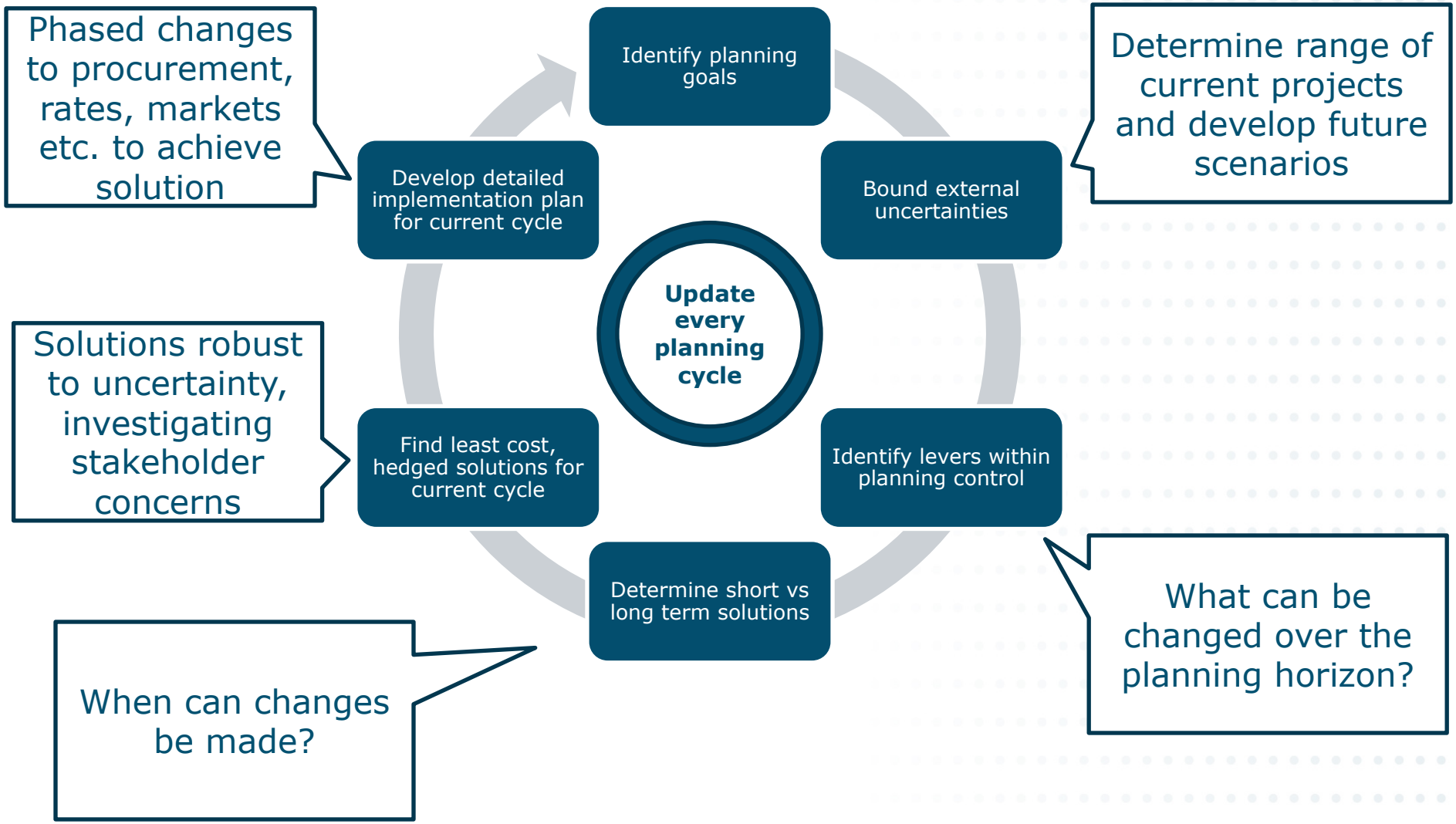
+ Future rapid change driven by:

- **Policy.** The electricity grid will be part of any policy to tackle emissions
- **Economics.** Renewables and new resource types are getting cheaper, with the potential to drive dramatic change in procurement and operations
- **Demand Side.** New end uses and technology-enabled customer participation may lead to significantly different and more responsive loads
- **Uncertainty.** Policy development, fuel price, technology price, technology availability, exchange rate risk, credit risk, customer participation, nuclear future, biofuel availability, implementation challenges, longer planning horizons… Planners will look to find shelter

+ Why do we need a new way to plan our energy future?

- So many options, how do we navigate through them all?
- Significant uncertainty, yet sticking with the status quo may be very expensive
- Increasing demand side participation is complex to model but part of our energy future

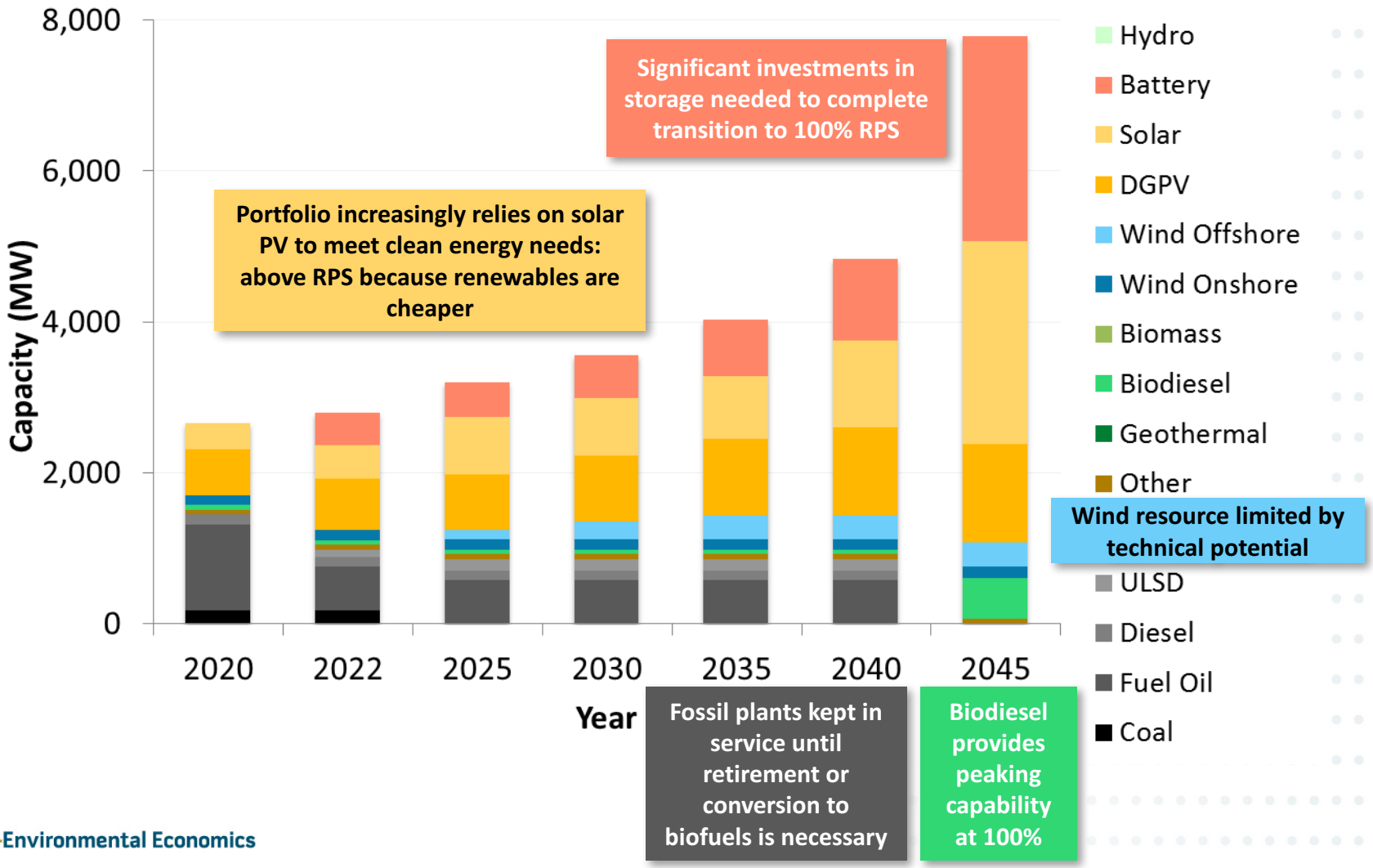
Framework for Electricity Planning



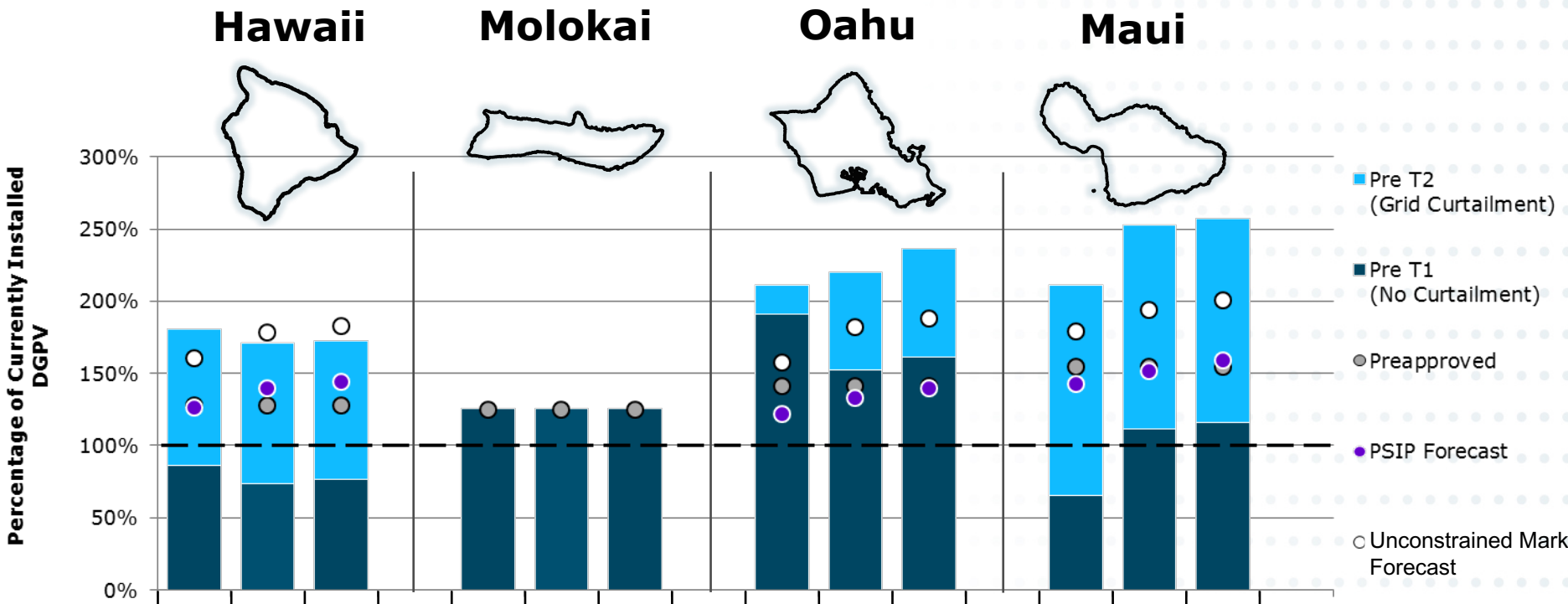
Hawaii Example

PSIP: Oahu's Transition to 100% RPS

+ Key insights on resource additions and timing



Hawaii DGPV Integration Potential



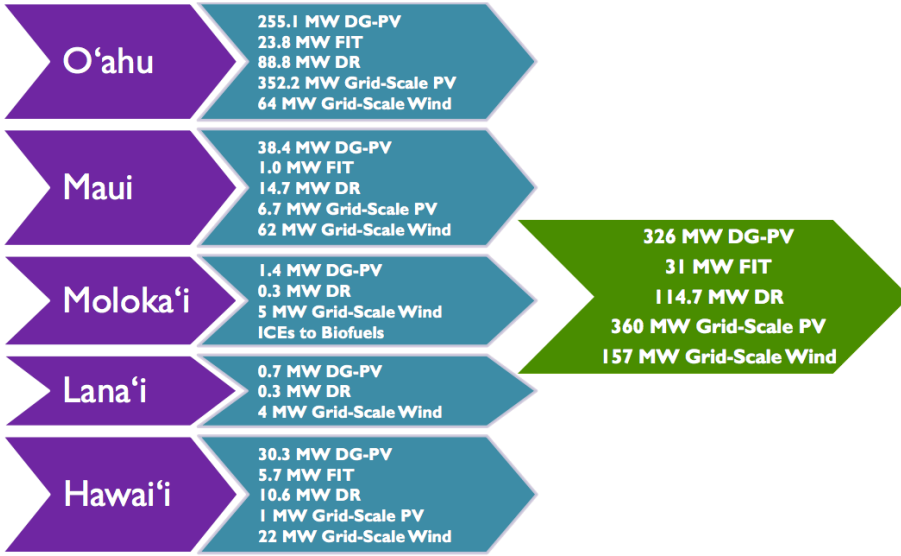
	Hawaii			Molokai			Oahu			Maui		
Year	16	17	18	16	17	18	16	17	18	16	17	18
Incremental MW until T2	50	44	45	0.4	0.4	0.4	345	373	422	70	96	99
Incremental MW until T1	(8)	(16)	(14)	0.4	0.4	0.4	282	162	191	(22)	7	10
Incremental Preapproved	17.2			0.4			128.8			34.6		
Jun '15 DG PV Capacity (MW)	61.4			1.7			310.1			63		

Hawaii Example

Power Supply Improvement Plan

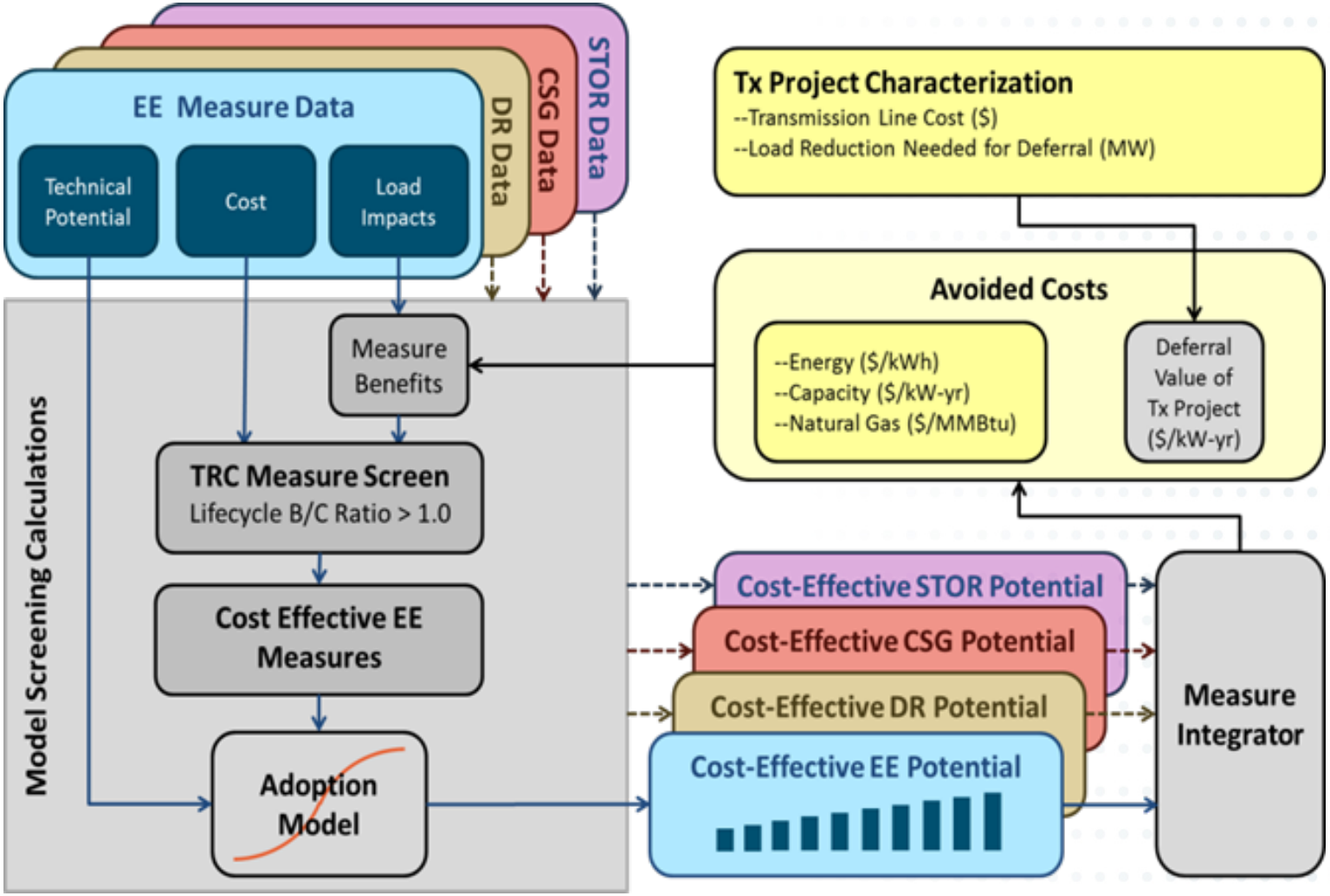
- **Near-term action plan – how do we get there?**
- **Least regrets across multiple future scenarios**
- **Key takeaways:**
  - Full speed ahead on renewables – far exceeding RPS
  - No new thermal investments
  - Open proceedings on rates and grid modernization to incentivize, accommodate and best utilize customer resources

2017–2021 Renewable Energy and Demand Response Additions

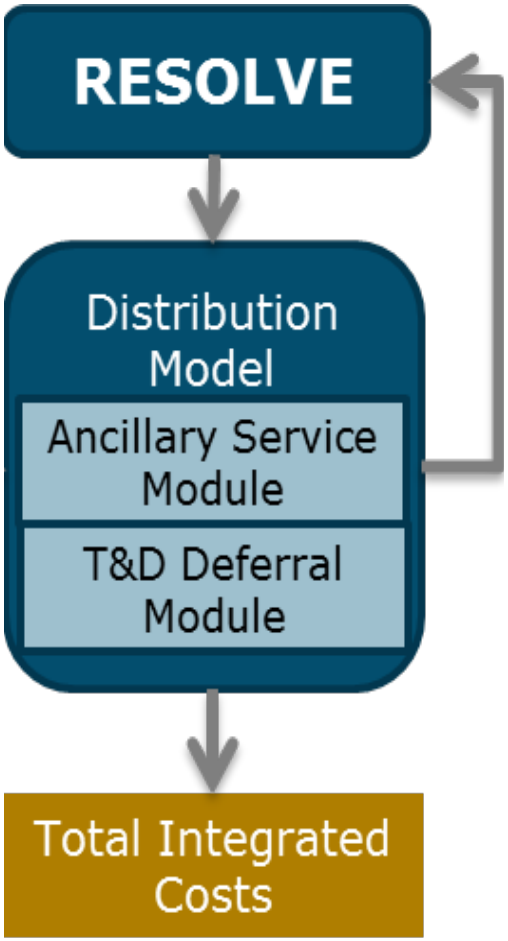


From HECO PSIP Executive Summary

Planning for DER



Integrating DER into Planning: My Thoughts



- **Assume cost reflective rates**
  - Shortcut, but is it inevitable?
- **Selected DER is therefore part of a least total cost solution**
- **But will customer paybacks be favorable enough to get all of it adopted?**
  - Perhaps not, DER may only be a little better than a supply side alternative
- **If not, how much should we pay in incentives?**
  - Up to the difference between the DER solution and the best supply side only solution
  - Non participants remain at least as well off as under the supply side only solution

Energy+Environmental Economics

Thank You!

Energy and Environmental Economics, Inc. (E3)
101 Montgomery Street, Suite 1600
San Francisco, CA 94104
Tel 415-391-5100
Web http://www.ethree.com

Jeremy Hargreaves (jeremy@ethree.com)