



Docket No. 14-035-114
Net Metering Workgroup

Distributed Generation in 2015 IRP

May 12, 2015

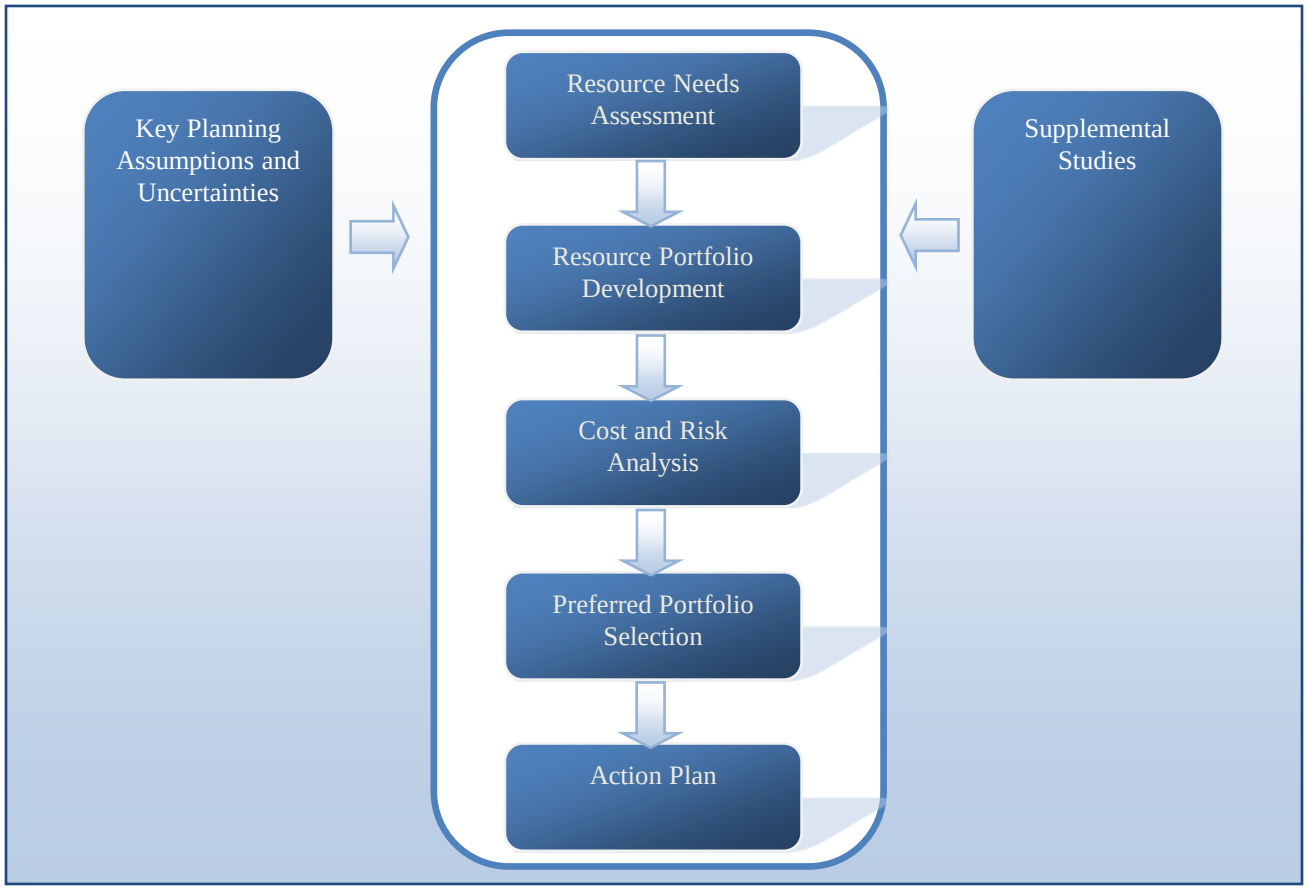
PACIFICORP | Rocky Mountain Power
Pacific Power
PacifiCorp Energy

Introduction

- 2015 Integrated Resource Plan (IRP) filed March 31, 2015:

  Identifies future resources needed to provide reliable, reasonable-cost service with manageable risks to its customers and outlines specific resource actions PacifiCorp will implement over the next two to four years. (2015 IRP, page 1)
- Worked with stakeholders including regulatory staff, advocacy groups and other interested parties
- The public process started with June 2014 Kickoff meeting
  - Meetings in five states
  - Seven Public Input Meetings
  - Two technical workshops

Introduction to the IRP



- Twenty year planning horizon 2015-2034
- Distributed Generation – Supplemental Study
- Incorporated in Resource Needs Assessment

Distributed Generation Study – Overview

- Navigant Consultant Inc conducted assessment of DG penetration levels in PacifiCorp's service territory.
  - Technical potential (maximum)
  - Market penetration (expected)
  - Levelized costs of DG resources
- Examined both commercial and residential applications
- Technologies covered included:
  - Solar photovoltaic
  - Small scale wind
  - Small scale hydro
  - CHP for both reciprocating engines and micro-turbines
- Maximum of 2 MW capacity for the technologies

DG Study – Technologies

- All technologies at or under 2 MW
- Consistent with net-metering regulations

Distributed Generation Technology		2013 Net Meter Customers	Included this DG Study?	Comment
Photovoltaic		~94%	Yes	Highest level of DG market penetration
Small Scale Wind		~6%	Yes	Technical potential is potentially high, especially in WY
Small Hydro			Yes	Technical potential is relatively high in the Pacific Northwest
Combined Heat and Power	Reciprocating Engines		Yes	Largest market penetration, commercial technology
	Micro-turbines		Yes	Newer technology
	Natural Gas Turbines		No	Turbine sizes generally larger than 2 MW
	Fuel Cells		No	Non-commercial with limited market penetration
	Industrial Biomass		No	Large scale, does not apply to DG
	Anaerobic Digester (AD) Biogas		No	Similarly, AD is not generally economic on a small scale
Solar Hot Water			No	Solar Hot Water is included in the Demand Side Management study

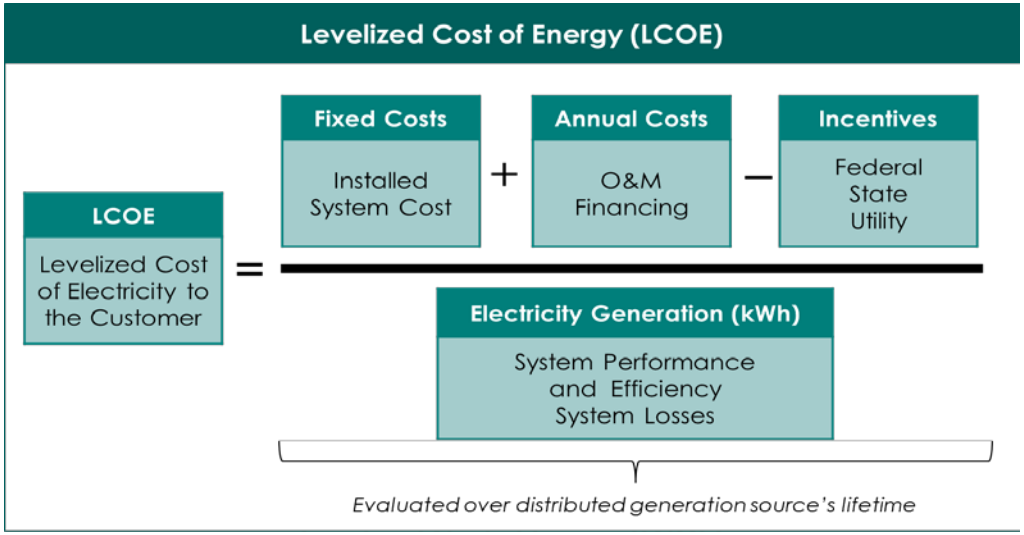
DG Study – Five Step Process

1. **Assess a Technology's Technical Potential:** Technical potential is the amount of a technology that can be physically installed without considering economics.
2. **Calculate First Year Simple Payback Period for Each Year of Analysis:** From past work in projecting the penetration of new technologies, Navigant has found that Simple Payback Period is the best indicator of uptake. Navigant used all relevant federal, state, and utility incentives in its calculation of paybacks, including their expiration dates.
3. **Project Ultimate Adoption Using Payback Acceptance Curves:** Payback Acceptance Curves estimate what percentage of a market will ultimately adopt a technology, but do not factor in how long adoption will take.
4. **Project Market Penetration Using Market Penetration Curves:** Market penetration curves factor in market and technology characteristics to project how long adoption will take.
5. **Project Market Penetration under Different Scenarios.** In addition to the Base Case scenario, a High and Low Case scenarios were evaluated that used different 20-year average cost assumptions, performance assumptions, and electricity rate assumptions.

From page 1-3 of Navigant Study contained in Appendix O of 2015 IRP

DG Study – Cost Analysis

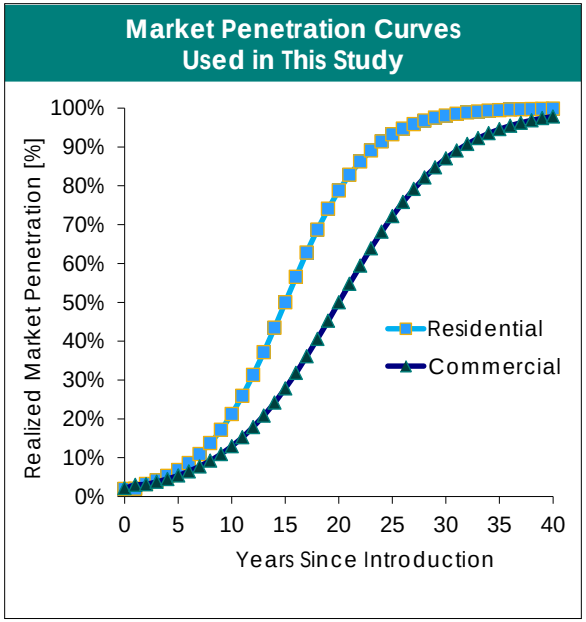
- Navigant examined cost of electricity from customer perspective
- Customers can choose between self-generation or approved tariff rates
- Levelized cost of energy (LCOE) on $/kWh basis is compared with tariff rates

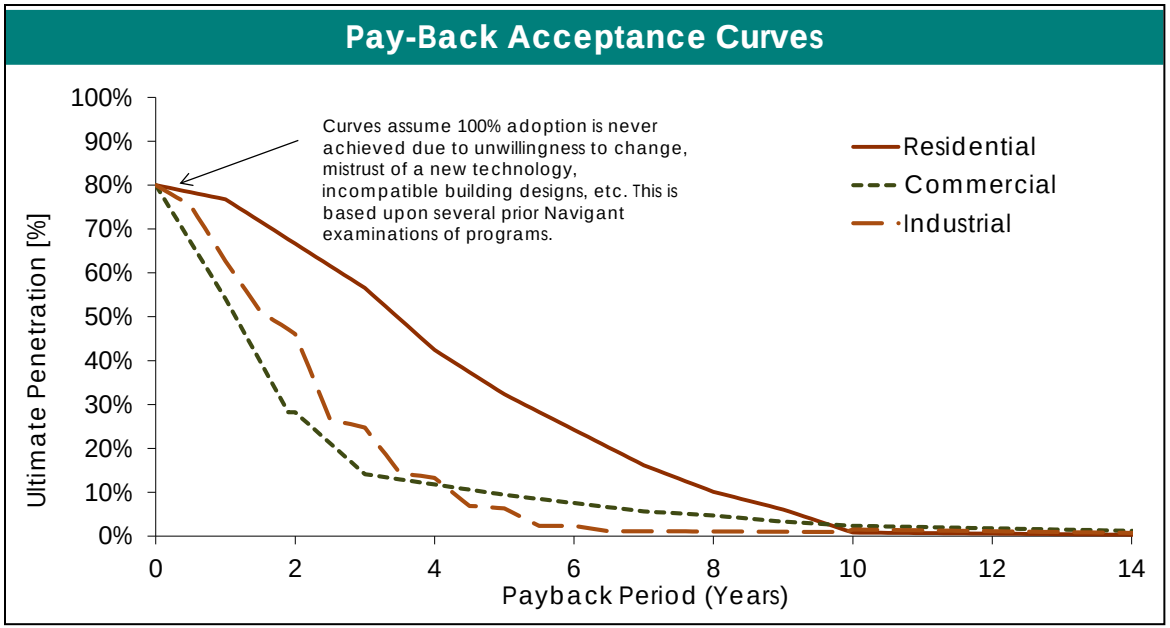


- Simple payback calculation involves the same analysis conducted for year 1, and calculates the first year costs divided by first year energy savings to see how long it will take for the investment to pay for itself

DG Study – Method

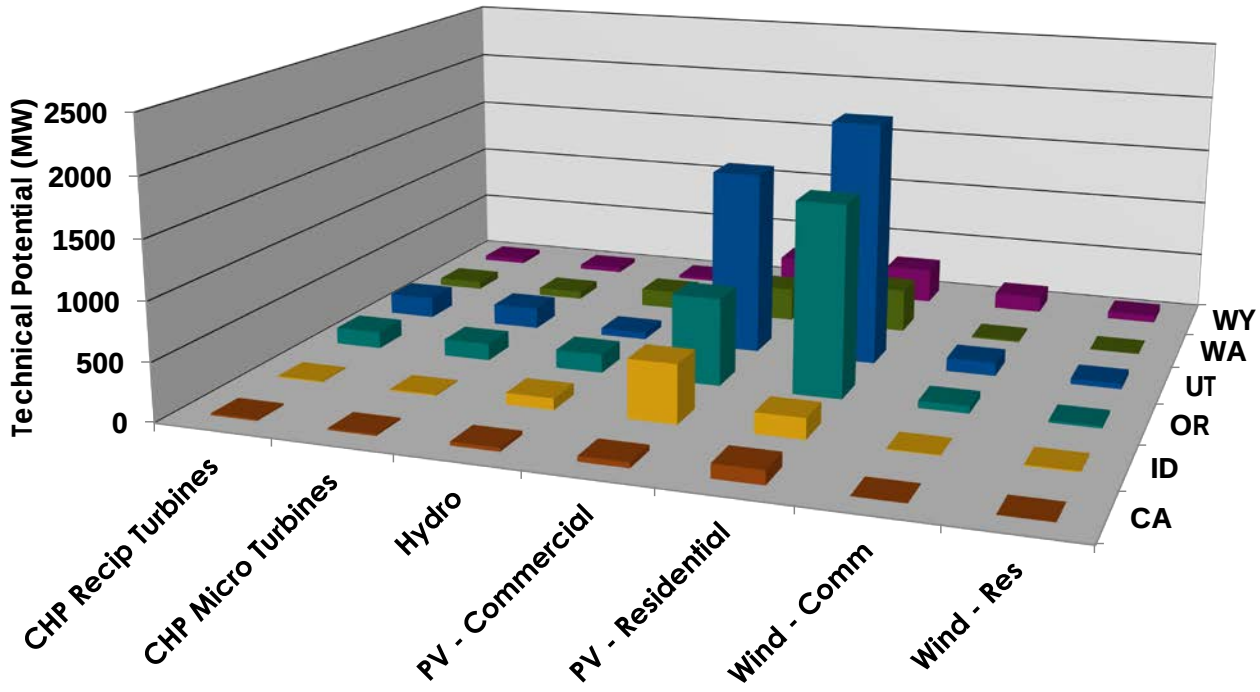
- Base market penetration estimates based on Fisher-Pry payback analysis
  - S-curves measuring how long takes products to enter market
  - Driven by time to recoup initial investment costs with energy savings





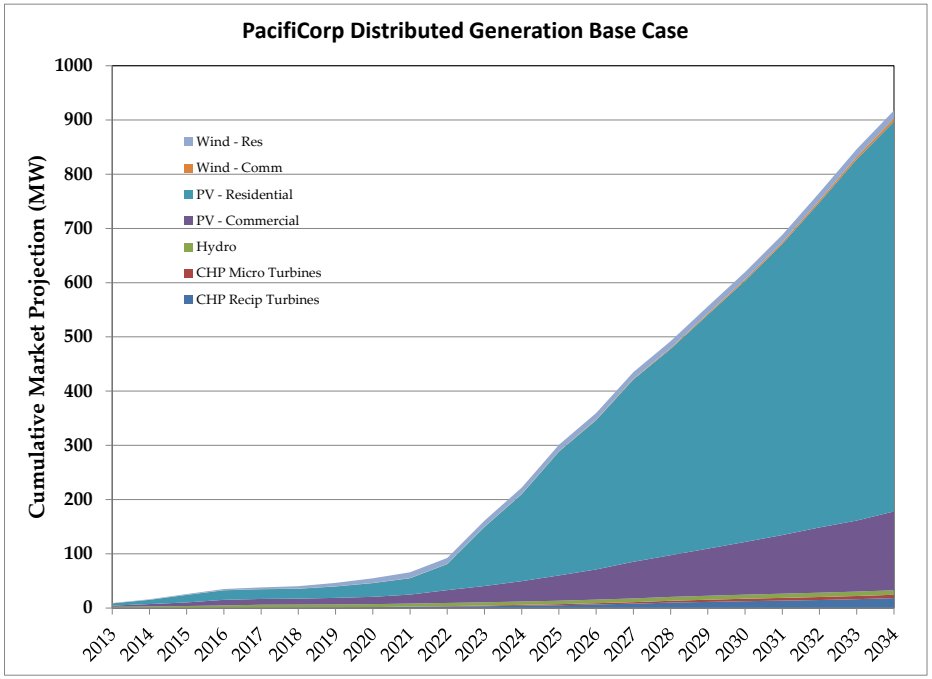
DG Study – Results

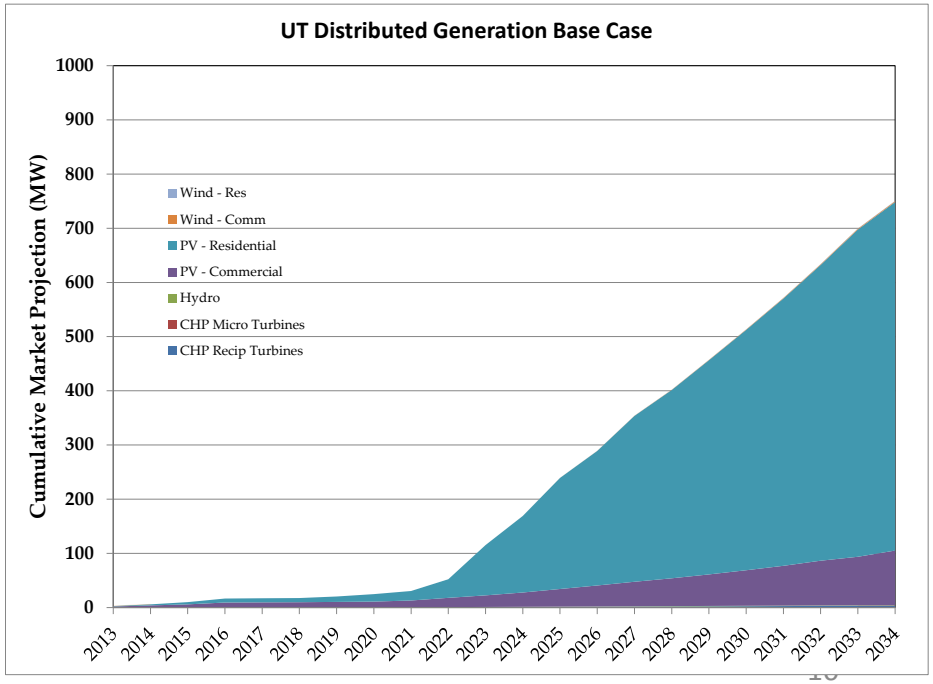
- Estimate of technical potential for entire study period
- Approximately 10 GW technical potential
- Maximum amount available without consideration of costs, or adoption rates
- Solar photovoltaic contains highest technical potential



DG Study – Results

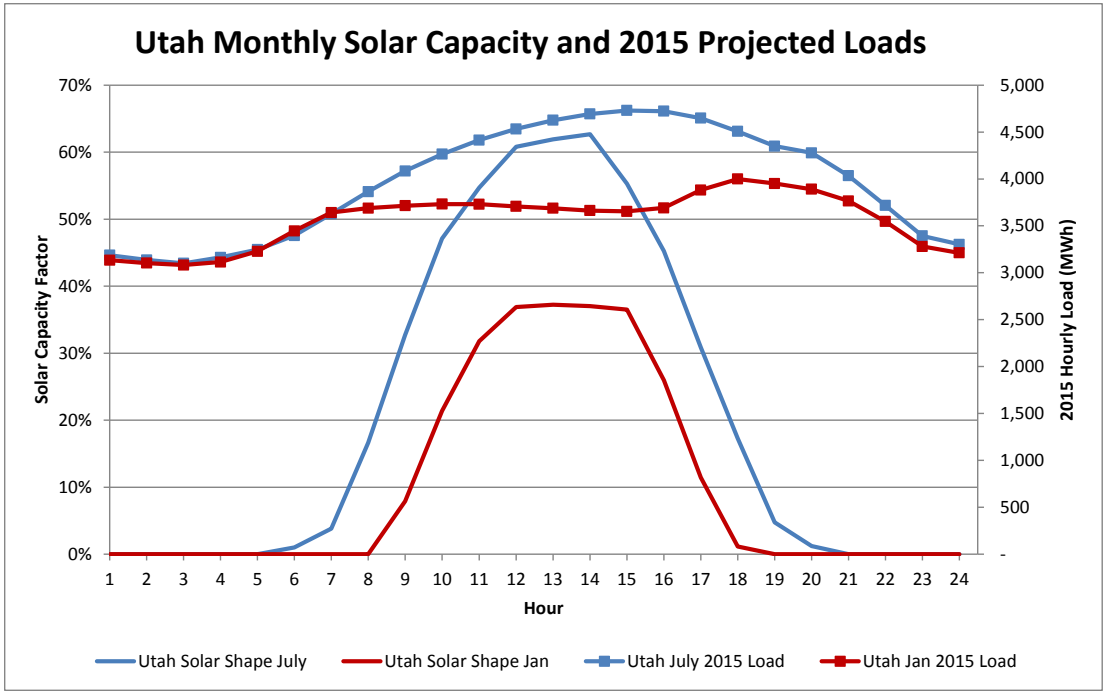
- Base market penetration results through 2034
- As with technical potential, solar photovoltaic makes up vast majority of DG installation across PacifiCorp system
- Utah DG installations also driven by solar





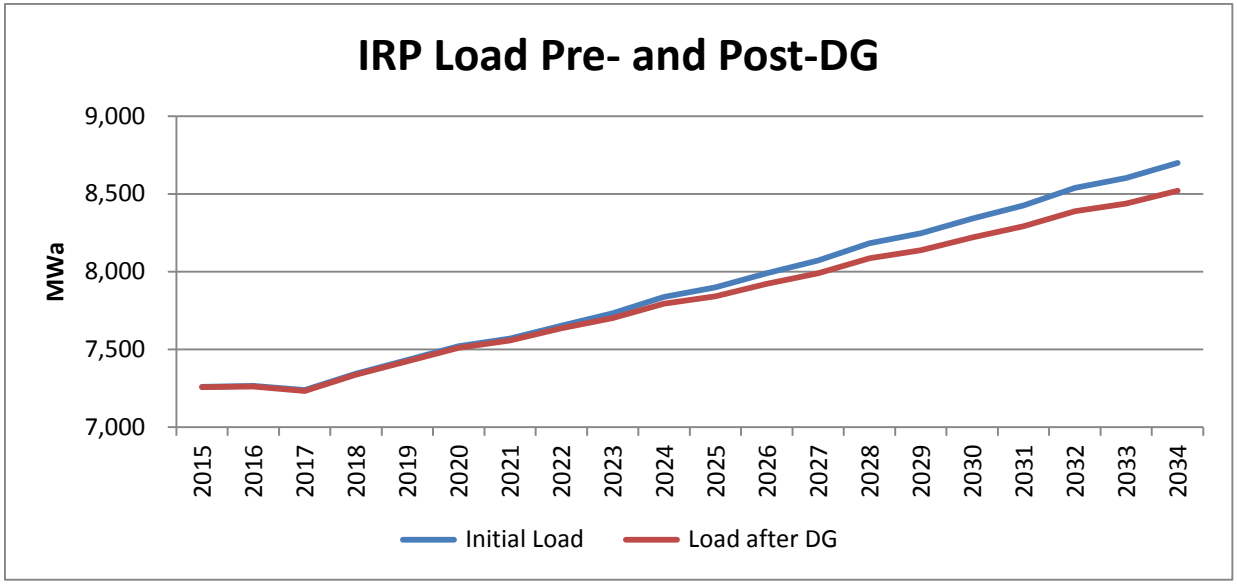
DG Study – Application to IRP

- Resource needs assessment incorporates DG expectations
- Hourly levels of customer-sited DG netted against IRP load forecast on state-by-state basis
- Navigant study includes DG shapes in addition to expected penetration levels

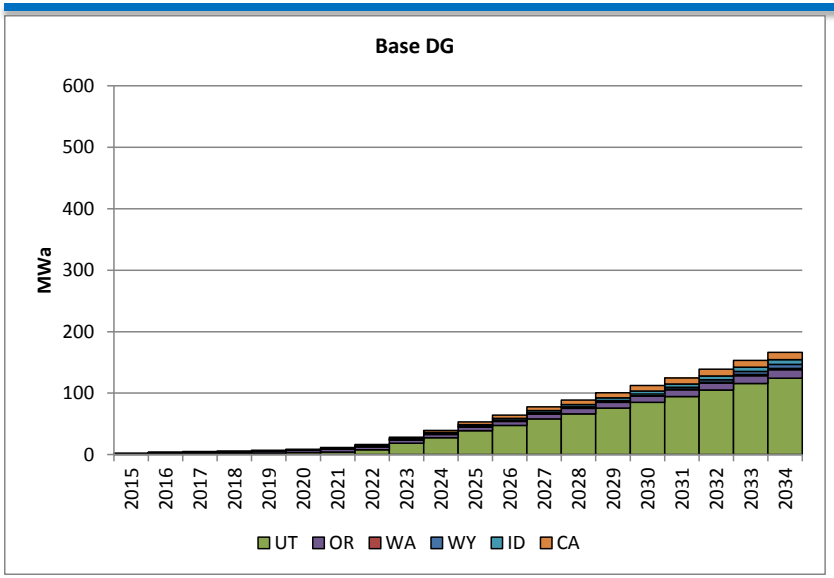


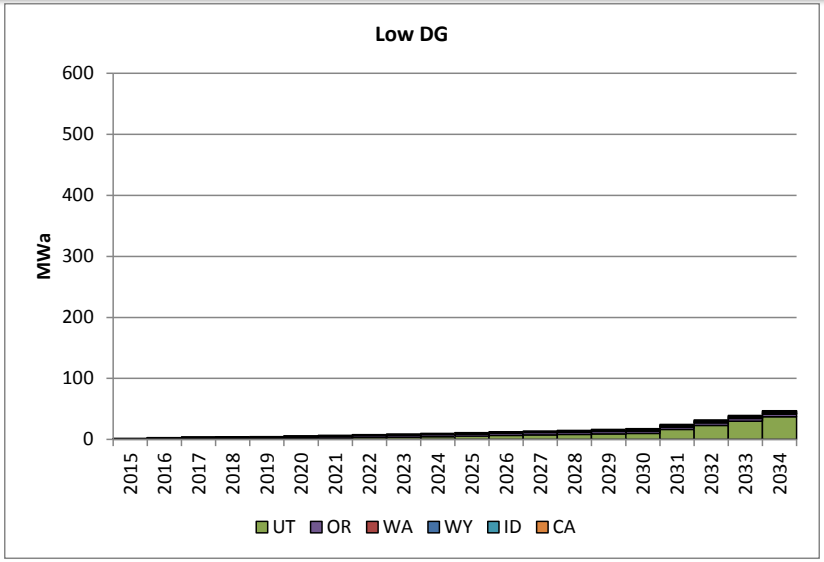
DG Study – Application to IRP

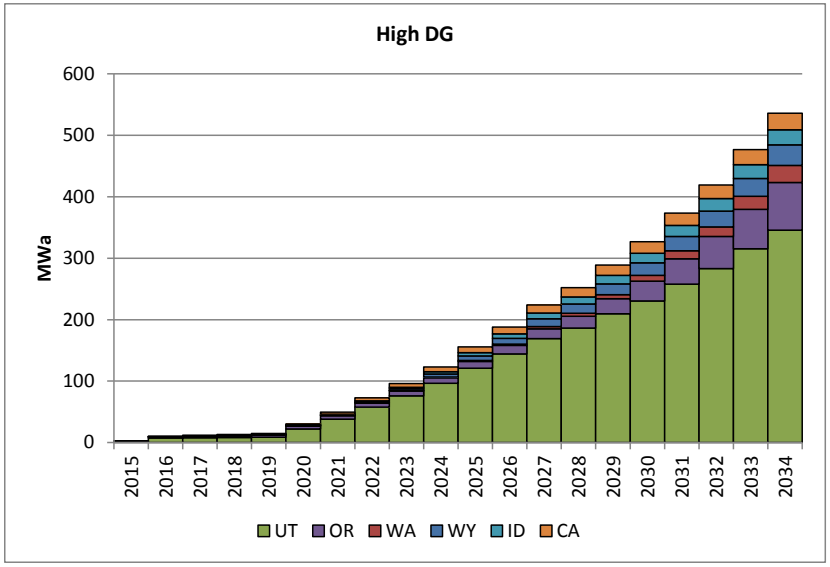
- Base DG lowers energy requirement
- Larger declines seen in out years
- Portfolios developed to meet remaining needs after netting of DG



DG Sensitivities







- IRP examined sensitivities around amount of new DG.
- Preferred Portfolio - first deferrable thermal resource in 2028
- Changes to the timing of the first deferrable thermal resource and change in total deferrable thermal resources by 2034 are as follows:
  - Low DG = no change in timing, overall increase of new thermal resource of 212 MW by 2034
  - High DG = deferred by 3 years, decreased by 423 MW by 2034

Conclusion

- Please see 2015 IRP on PacifiCorp's IRP website:

  http://www.pacificorp.com/es/irp.html
- See Volume 2 – Appendix O for complete DG study
- See also August 17-18 PIM for Navigant Presentation