

GENERAL CAPACITY WORKSHOP Phase 2

October 24, 2019



FORWARD LOOKING STATEMENT

This and other presentations made by NW Natural from time to time, may contain forward-looking statements within the meaning of the U.S. Private Securities Litigation Reform Act of 1995. Forward-looking statements can be identified by words such as “anticipates,” “intends,” “plans,” “seeks,” “believes,” “estimates,” “expects” and similar references to future periods. Examples of forward-looking statements include, but are not limited to, statements regarding the following: including regional third-party projects, storage, pipeline and other infrastructure investments, commodity costs, competitive advantage, customer service, customer and business growth, conversion potential, multifamily development, business risk, efficiency of business operations, regulatory recovery, business development and new business initiatives, environmental remediation recoveries, gas storage markets and business opportunities, gas storage development, costs, timing or returns related thereto, financial positions and performance, economic and housing market trends and performance shareholder return and value, capital expenditures, liquidity, strategic goals, carbon savings, gas reserves and investments and regulatory recoveries related thereto, hedge efficacy, cash flows and adequacy thereof, return on equity, capital structure, return on invested capital, revenues and earnings and timing thereof, margins, operations and maintenance expense, dividends, credit ratings and profile, the regulatory environment, effects of regulatory disallowance, timing or effects of future regulatory proceedings or future regulatory approvals, regulatory prudence reviews, effects of regulatory mechanisms, including, but not limited to, SRRM and the Company’s infrastructure investments, effects of legislation, including but not limited to bonus depreciation and PHMSA regulations, and other statements that are other than statements of historical facts.

Forward-looking statements are based on our current expectations and assumptions regarding our business, the economy and other future conditions. Because forward-looking statements relate to the future, they are subject to inherent uncertainties, risks and changes in circumstances that are difficult to predict. Our actual results may differ materially from those contemplated by the forward-looking statements, so we caution you against relying on any of these forward-looking statements. They are neither statements of historical fact nor guarantees or assurances of future performance. Important factors that could cause actual results to differ materially from those in the forward-looking statements are discussed by reference to the factors described in Part I, Item 1A “Risk Factors,” and Part II, Item 7 and Item 7A “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” and “Quantitative and Qualitative Disclosure about Market Risk” in the Company’s most recent Annual Report on Form 10-K, and in Part I, Items 2 and 3 “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and “Quantitative and Qualitative Disclosures About Market Risk”, and Part II, Item 1A, “Risk Factors”, in the Company’s quarterly reports filed thereafter.

All forward-looking statements made in this presentation and all subsequent forward-looking statements, whether written or oral and whether made by or on behalf of the Company, are expressly qualified by these cautionary statements. Any forward-looking statement speaks only as of the date on which such statement is made, and we undertake no obligation to publicly update any forward-looking statement, whether as a result of new information, future developments or otherwise, except as may be required by law.



Agenda

- Introduction
- Identify Need
- Approach to Acquiring Capacity
- Demand Response/EE
- Acquiring capacity in general
- RNG/Power to Gas (Anna)

Who is NW Natural?

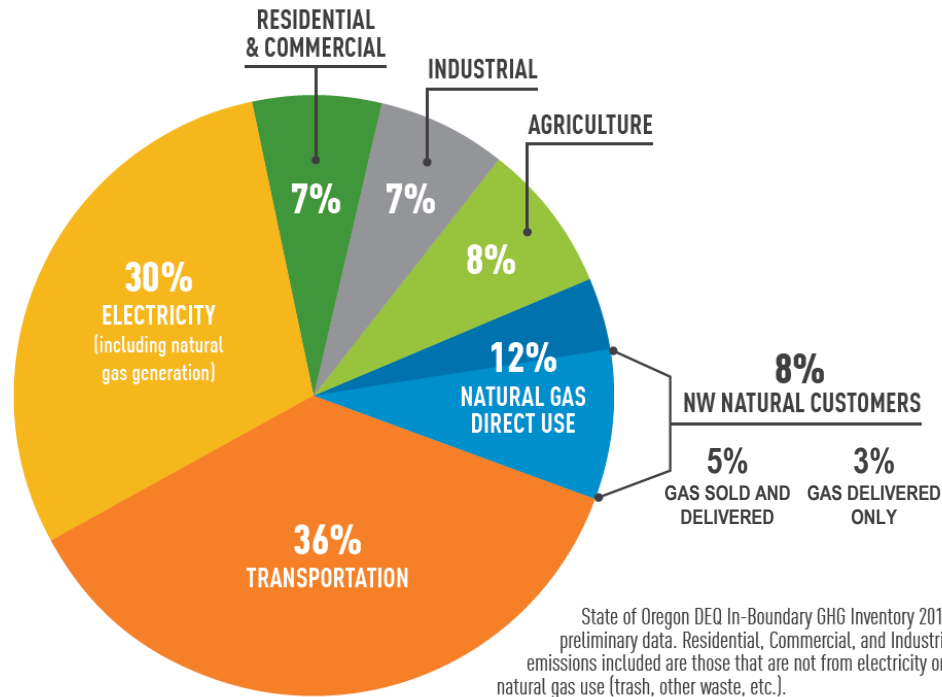


Quick Stats

- Over 750,000 customers
 - 89% Oregon
 - 11% Washington
 - More than 140 communities
 - 18 counties
 - Serving over 2 million people
- Over 14,000 miles of distribution and transmission mains and service lines

NWN System Highly Efficient

Oregon's Greenhouse Gas Emissions

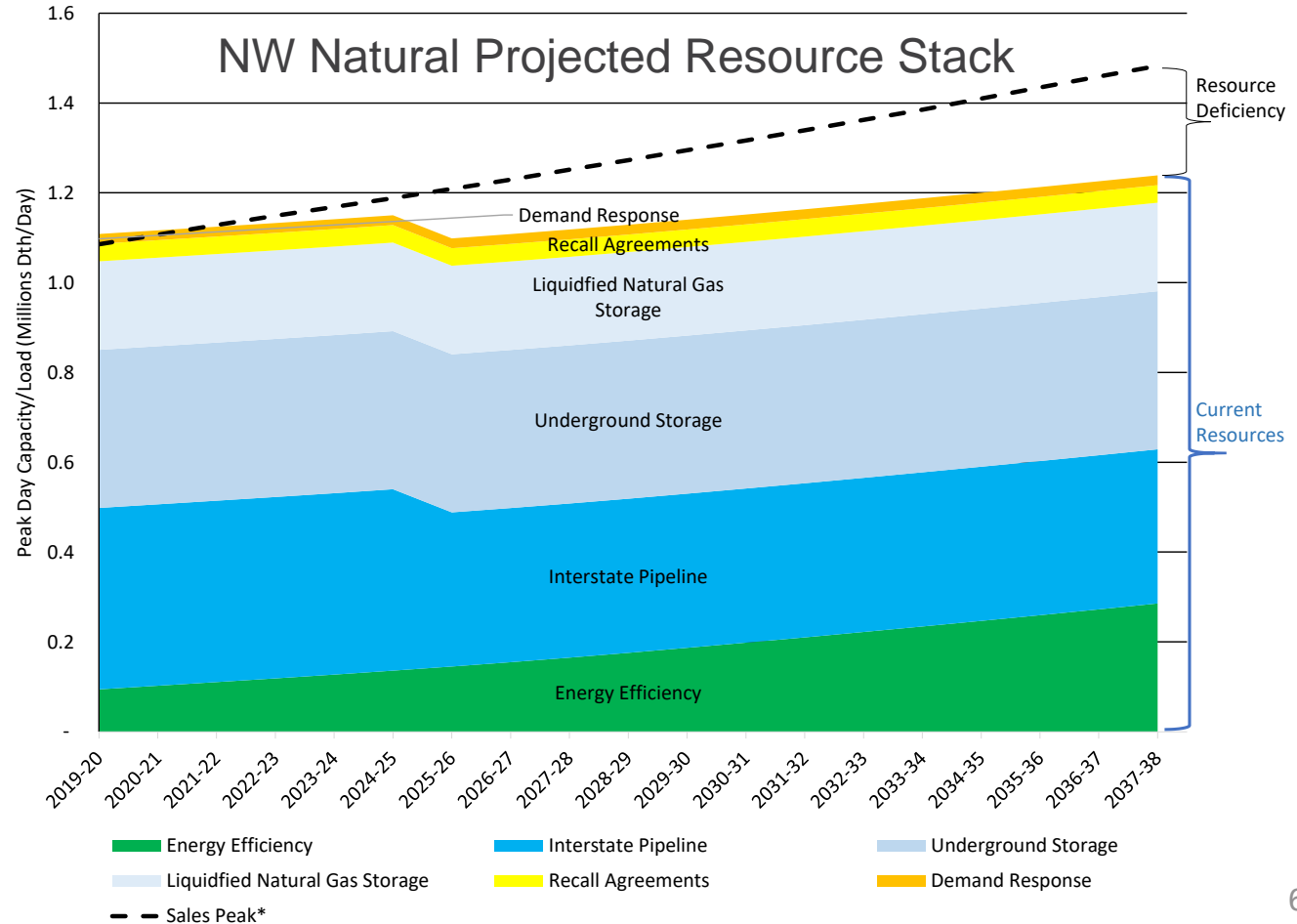


NW Natural's System

- Heats 74% of residential square footage in the areas we serve
- Provides 90% of peak day energy needs for our residential space and water heat customers
- Accounts for 5% of Oregon's total GHG emissions

Identifying Need

- Current mix of capacity resources to meet peak day need
- Demand response figures shown for customers on interruptible rates
- Industrial Recall agreements allow NW Natural to obtain pipeline capacity controlled by other parties for a limited number of days during heating season
- EE demonstrates an increasing contribution to meet peak needs



Approach to Acquiring Capacity

- IRP process identifies long-term capacity resources
 - Plan firm resources to meet the highest demand day with 99% certainty for any given winter
 - Resource portfolios evaluated on least-cost/least risk approach
 - Preferred portfolio is selected
- Supply capacity (similar to transmission)
 - Traditional supply capacity acquisitions are done via pipeline capacity and/or storage resources (contracted or owned)
 - Short-term capacity can be acquired through city-gate deals for a limited window (e.g., five-day) – generally cover upcoming heating season.
- Capacity resources with additional **distribution capacity value**
 - Cost effective energy efficiency acquired through Energy Trust
 - Demand response via interruptible tariffs
 - New opportunities – such as on-system renewable natural gas (RNG), or Power-to-gas (P2G)
- IRP Guideline 1(a) - Analysis in IRP treats supply-side and demand-side resources “on a consistent and comparable basis”

2018 Statewide Avoided Costs

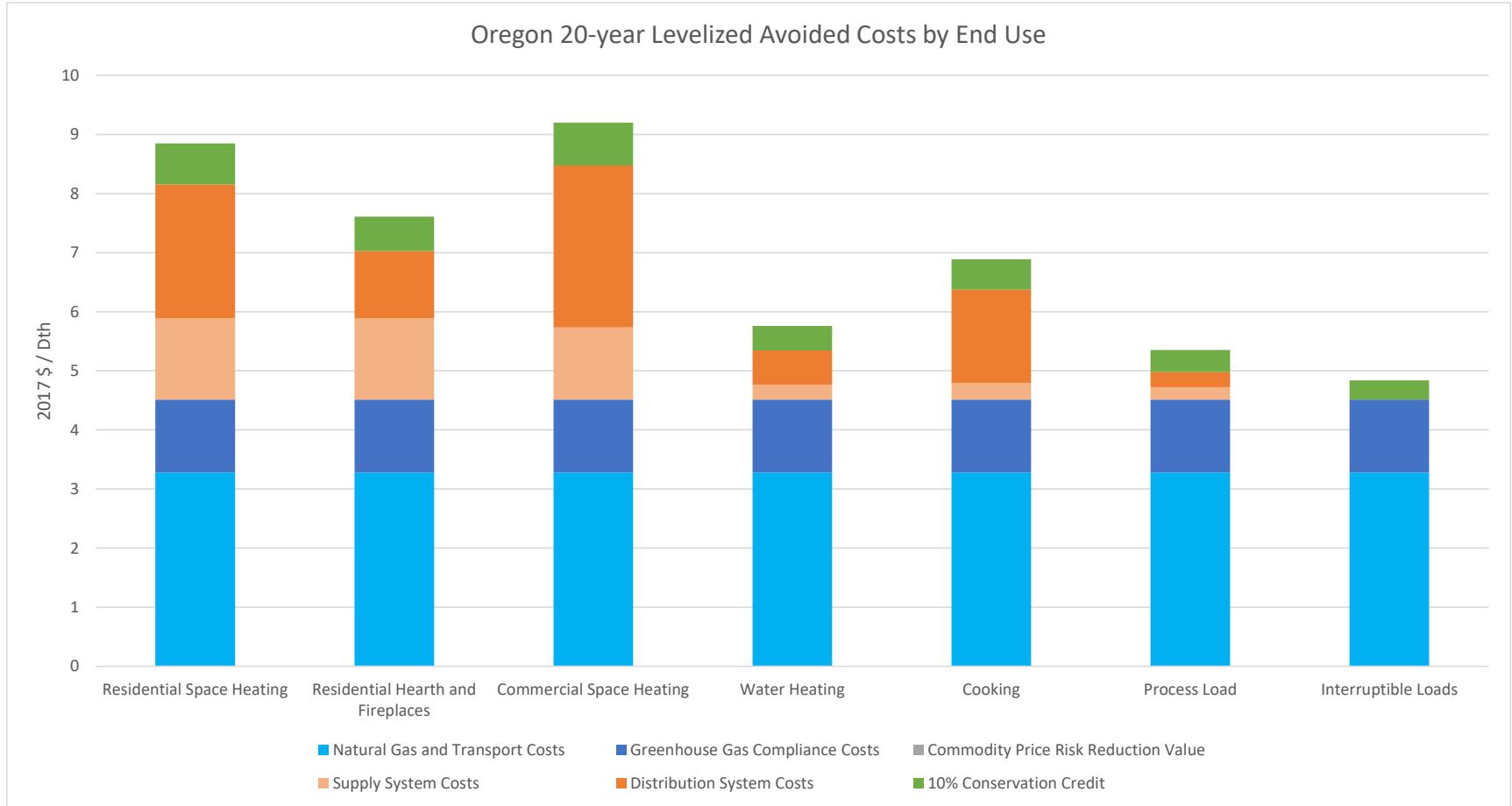
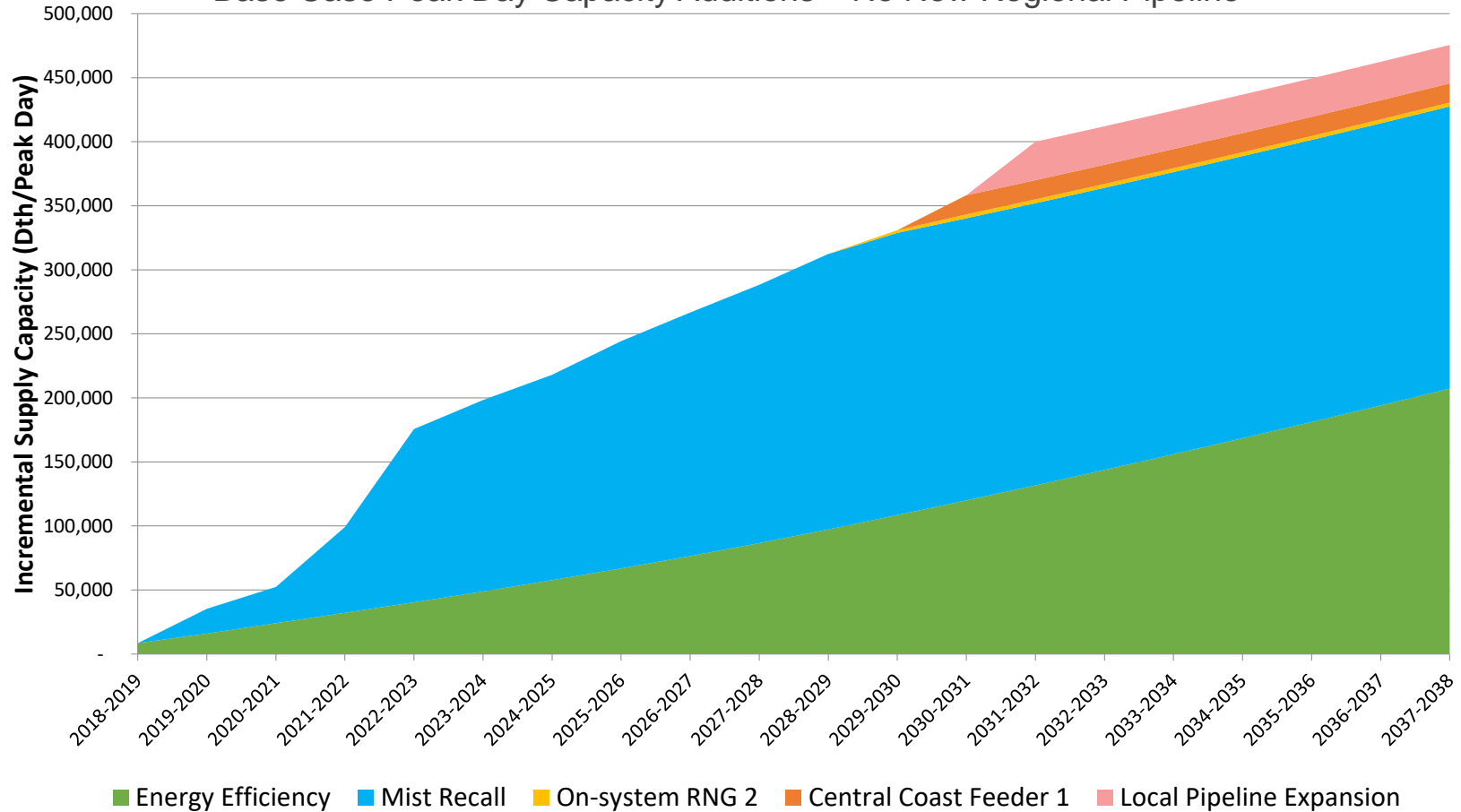


Figure 4.4 from 2018 IRP

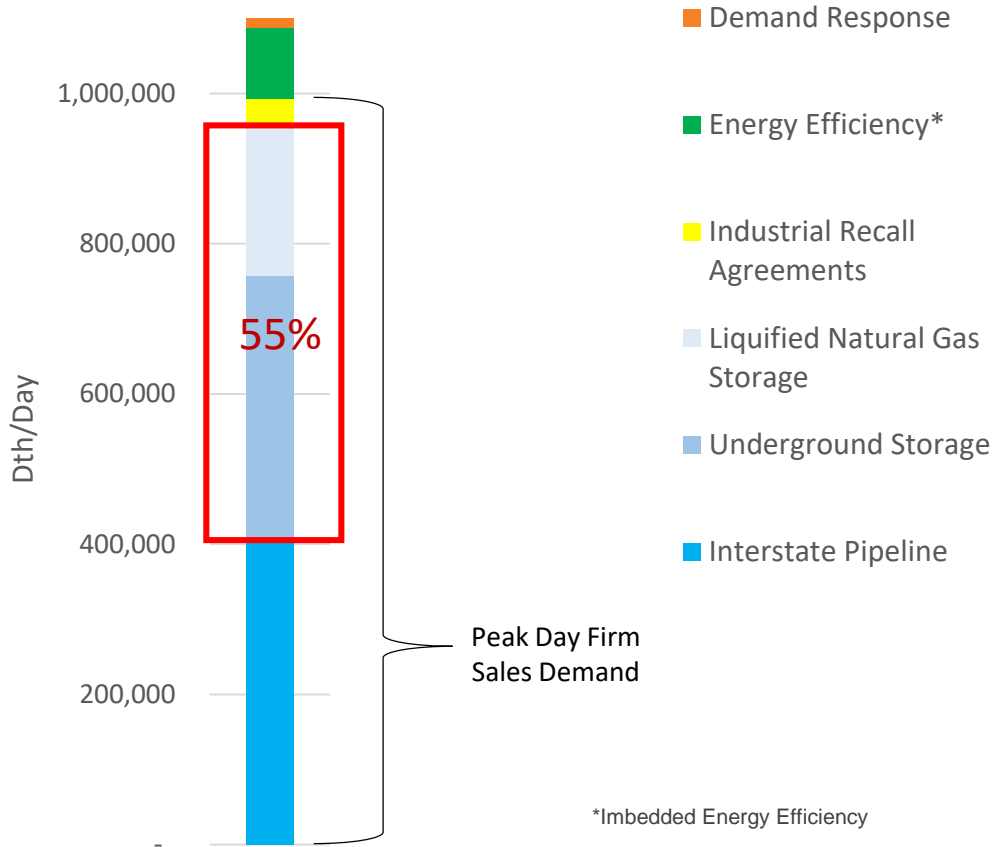
IRP Analysis

Base Case Peak Day Capacity Additions – No New Regional Pipeline



NW Natural's Current Capacity Resources

2019-2020 resources



*Imbedded Energy Efficiency

- NW Natural's current capacity resources provide just over 1 Bcf/day of deliverability
- Gas storage resources store energy seasonally and currently accounts for 55% of the capacity to serve Firm Sales customers
- Along with DSM, underground storage via Mist Recall is the marginal supply-side capacity resource to meet NW Natural's resource deficiency over the next 10 years

Acquiring Capacity in General



Potential Capacity Resources

Capacity Resources	Capacity Resources	Description
Underground Storage	Mist Recall	Transferring Mist storage from interstate customers to Core Utility
	Mist Expansion	Completing new storage wells and building takeaway pipeline capacity
	External Storage Contract	Acquiring up stream storage contracts and the corresponding interstate pipeline capacity
Pipelines	Local Pipeline Expansions	Interstate pipeline capacity suppliers would complete an expansion specifically for NW Natural
	Regional Pipeline Expansions	Interstate pipeline capacity suppliers would hold an open season for shippers to bid on capacity expansions
LNG	Uprate Existing Facility	Increase vaporization capacity or takeaway capacity from existing facility (e.g., Newport LNG)

New Renewable Resources Being Considered

Resources	Description
On-system wastewater-based RNG	Purchase RNG at market value inclusive of the environmental attributes and deliver to customers – project is directly interconnected to our distribution system
On-system landfill-based RNG	
On-system dairy-based RNG	
On-system food waste-based RNG	
Power-to-gas hydrogen	Purchase hydrogen at market value injected directly into our distribution system

Demand-Side Resources

Demand-Side Capacity Resources		Option currently considered for cost-effectiveness evaluation
Demand Response	Interruptible schedules (DR by rate design)	✓
	Geographically targeted interruptibility agreements	✓
	Geographically targeted demand-response programs	
	Time-of-use pricing	
Energy Efficiency	Peak hour savings from normal statewide EE programs	✓
	Geographically targeted energy efficiency (GeoTEE)	

RNG and P2G



Renewable Natural Gas (RNG)



Photo source Portland Tribune

RNG is *pipeline-quality gas* derived by cleaning up the biogases emitted as organic material chemically breaks down. Material such as:

- Food waste
- Wastewater treatment plants
- Landfills
- Dairy and other manures
- Mill and forest residues

POWER TO GAS (P2G)



EXCESS
RENEWABLE
GENERATION



ELECTROLYSIS



H₂



RENEWABLE
STORAGE ON
DISTRIBUTION
SYSTEM

Viabale Seasonal Renewable Storage Solution

- Create hydrogen and blend up to 5-20% into the natural gas pipeline system without any impacts on end-use equipment
- Can also methanize the hydrogen prior to injecting it into the pipeline system by adding carbon dioxide, making it interchangeable with conventional natural gas

Value of Distributed Energy Resources



- Distributed energy resources (DER) - behind the gate station RNG and P2G
- Distributed gas resources provide additional pressure to the distribution system
- DER may forestall system reinforcement investments on gas transmission and distribution lines

Stars included to illustrate hypothetical examples of beneficial sites where distributed gas resources could help support pipeline pressures. These are not actual projects.

Thanks – Questions?

