Puget Sound 2015 IRP

Presented to:
Washington Utilities and Transportation Commission

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JDRP IRP Comment Summary

EQL ENERGY

1. We are concerned that the PSE planning culture for both resource and transmission, reflects
    - if you don't like the answer then change the planning standard, model or assumptions.
2. WUTC should have a proceeding on DR and DER cost effectiveness. Oregon PUC is doing this in 2016.
3. We approve PSE doing an RFP for DR system wide, suggestions (slide 4)
4. We recommend an all source Distributed Energy Resources (DER) RFP for Eastside (e.g., energy efficiency, demand response, storage, distributed generation, dispatchable standby generation, CHP, etc.). This would provide better information for alternatives. (slides 5,6,7)
    - Eastside load growth is driving PSE IRP resource requirements, until coal leaves the system.
    - Energize Eastside DER alternatives assessment has many flaws.

Energy Storage is cost effective for PSE (PSE report: Strategen 2015)

Benefits (avoided capital costs)			
Transmission Deferral cost	155	$/kW-yr	4 year deferral of $220MM capital cost for Energize Eastside (E3 2014)
Generation Capacity Cost	184	$/kW-yr	SCCT $190/kW -yr levelized cost (E3 2014)
Distribution costs	31	$/kW-yr	Northwest Power and Conservation Council 2016
Flexibility (Ancillary Services)	99	$/kW-yr	2015 Strategen report EE EIS (PSE)
Oversupply	1.4	$/kW-yr	
Storage Benefit	**470.4**	**$/kW-yr**	
Storage Cost	**218**	**$/kW-yr**	2015 Strategen report EE EIS (PSE)
Benefit/Cost ratio	**216%**		

Sources:
2014 E3, Energize Eastside Screening Study (non-wire alternatives), 4 year deferral, $220MM capex
http://www.energizeeastsideeis.org/uploads/4/7/3/1/47314045/attachment_5_-_screening_study.pdf

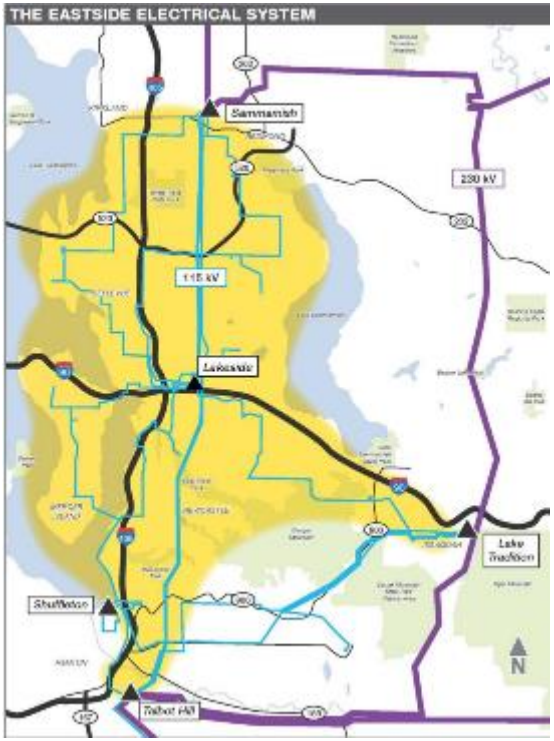
2015 Strategen, Eastside System Energy Storage Alternatives Screening Study
http://www.energizeeastsideeis.org/uploads/4/7/3/1/47314045eastside_system_energy_storage_alternatives_screening_study_march_2015.pdf

Demand Response RFP and all source DER

Resource Characteristic	High Value Capacity	Generic Capacity	Load Modifying
Response Time	10-20 minutes	Day-ahead	None
Duration	1-3 hours	3 hours	None
Availability	3 consecutive days	3 consecutive days	Measured Capacity
Hours per year	40	60	dependent
Supply Curves	$20/kW-yr to $400/kW-yr	12$/kW-yr to $210/kW-yr	$/kW-yr and $/kWh
Firmness	Fixed amount	hr forecast	Baseline M&V
Examples	Storage, DSG, DR 10 min, CHP w/storage	Day ahead DR, EV charging	EE, CHP, pricing

- Longer term contracts = Lower Annual Cost (>5 yrs)
- Don't limit technology
- Financially support standards, Incentives (OpenADR, IEEE1547, 61850)
- Access to customers and customer data
- Look for customer segment expertise (Grocery, Office, Residential,
- Integrate with Energy Efficiency programs and marketing (e.g., Smart thermostats, BMS, VFD, lighting, Water Heating, Industrials SEM, etc.)

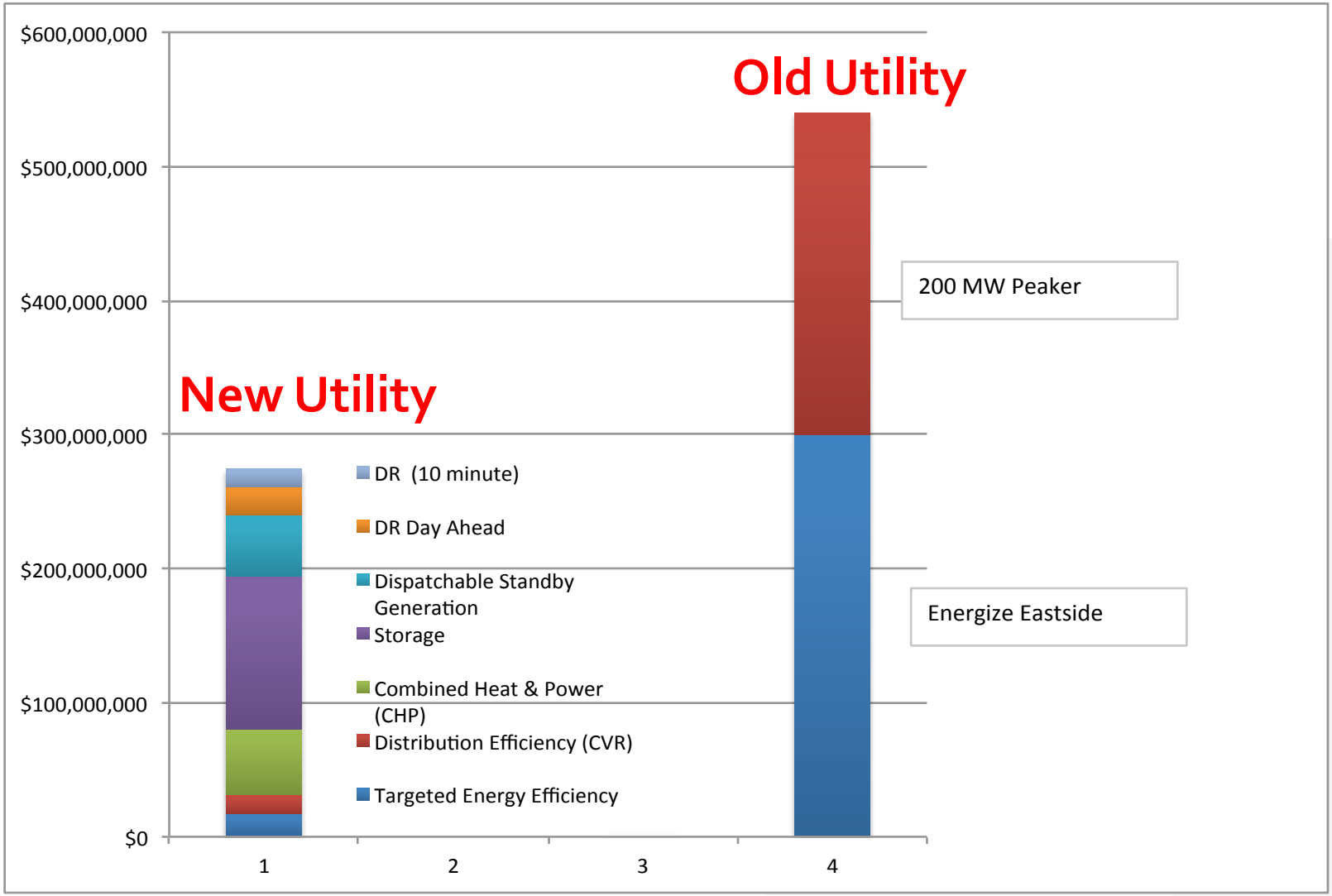
Eastside Local Capacity Area



1. Issue RFP for capacity:
    - Load Modifying
        - Energy efficiency/ CHP
    - Generic
        - Day-ahead DR
    - Dispatchable
        - 10-minute DR
        - Storage
        - DSG

Eastside Local Capacity Avoided Cost		
Transmission deferral	155 $/kW-year	4-year transmission deferral (E3)
Generation capacity cost	184 $/kW-year	PSE IRP Frame Peaker
Total	339 $/kW-year	

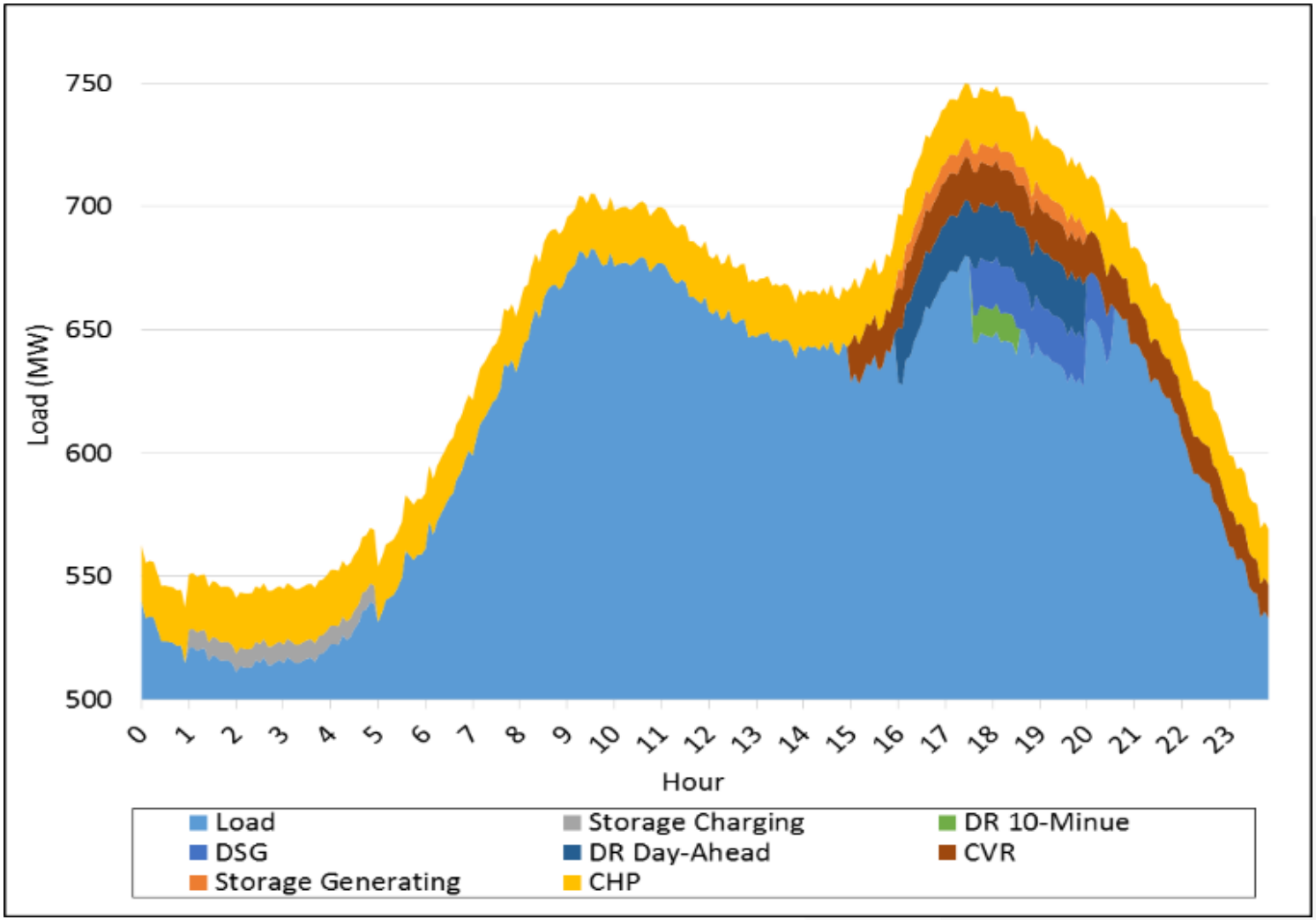
200 MW DER is less than half the cost of Energize Eastside plus Peaker Plant



Eastside All Source RFP: Example

DER Measure	% of peak load	PSE Eastside DER Capacity Estimate	Cost	units
System Winter Peak load		***874.0***	$/kW-yr	
Solar	0.0%	0.0		
Targeted Energy Efficiency	4.0%	35.0	$20 to $50	$/MWh
Distribution Efficiency (CVR)	2.0%	17.5	$30 to $80	$/MWh
Combined Heat & Power (CHP)	3.0%	26.2	$185	$/kW-yr
Storage	6.0%	52.4	$218	$/kW-yr
Dispatchable Standby Generation (10 minute)	2.5%	21.9	$210	$/kW-yr
DR Day Ahead	4.0%	35.0	$25 to $100	$/kW-yr
DR (10 minute)	1.5%	13.1	$60 to $300	$/kW-yr
Total	23.0%	201.0		
Sources				
874 winter peak from PSE forecast 2024				

DER portfolio addresses Eastside peaks and Transmission Reliability



Source: representative BPA winter load shape applied to PSE Eastside 2024 forecast

DER Capacity Categories

Category	Class	Description	Examples
Supply-Side	Class 1	Fully dispatchable firm capacity	Firm DR, Storage, DSG, CVR, dispatchable CHP
Load-Modifying	Class 2	Non-dispatchable energy efficiency	Energy Efficiency, permanent load shift, CHP, Solar
	Class 3	Price-responsive energy and capacity	TOU, CPP, PTR
	Class 4	Non-incented energy and capacity through market transformation, customer education & communication	NEEA, strategic energy management, education

SCE DER projects to replace capacity from San Onofre Nuclear (2015)

Seller	Resource Type	MWs	Number of Contracts
NRG	Energy Efficiency	102.5	8
Onsite Energy Corporation	Energy Efficiency	11	11
Sterling Analytics LLC	Energy Efficiency	16.7	7
NRG	Demand Response	75	7
SunPower Corp.	Behind-the-Meter Renewable	44	4
Ice Energy Holdings, Inc.	Behind-the-Meter Thermal Energy Storage	25.6	16
Advanced Microgrid Solutions	Behind-the-Meter Battery Energy Storage	50	4
Stem	Behind-the-Meter Battery Energy Storage	85	2
AES	In-Front-of-Meter Battery Energy Storage	100	1
TOTAL:		**410**	**63**