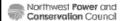
## Residential Draft Savings

### Conservation Resource Advisory Committee November 13, 2014





## Measures (hopefully) Covered Today

- Lighting
- Computers
- Microwaves
- Refrigerators
- Showerheads
- Bathroom Aerators
- Dishwashers

- Electric Ovens
- Drain Water Heat Recovery
- Advanced Power Strips
- SF Weatherization

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# General Service Lighting

ENERGY STAR LED increase in efficacy/decrease in cost

Year	Efficacy	Cost
2014	76	\$11.40
2015	81	\$8.73
2016	86	\$6.79
2017	90	\$5.34
2018	90	\$5.34
2019	90	\$5.34



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# What Happens in 2020?

- EISA standard is 45 lumens/watt
- CFLs currently ~60 lumens/watt
- LEDs ~90 lumens/watt
  - There are lower quality CFLs/LEDs at 45 lumens/watt
- Forecast assumes 45 lumens/watt

Proposal: Use 45 lumens/watt in 2020, assuming cost and EUL of a CFL





# Lighting - Scenarios

- 2016 2019, zero savings/cost after 2020
- 2016 2019, savings persist after 2020 with 45 lumen/watt baseline
- In 2020, with 45 lumen/watt baseline



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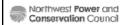
# LED Levelized Costs (\$/MWh)

Post -2020 Baseline	90 I	m/W LEI	)		45 lr	n/W (El	SA s	td)		lm/W SA std)
Pre-2020 Baseline	Mar	ket Avg	CFI	L	Mark	ket Avg	CFI	_	NA	
2016	\$	33	\$	469	\$	(4)	\$	69		
2017	\$	16	\$	343	\$	6	\$	30		
2018	\$	82	\$	505	\$	(2)	\$	26		
2019	\$	160	\$	990	\$	(3)	\$	25		
2020									\$	55

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# Source of Key Parameters

Parameter	Source(s)
Unit Savings at busbar (kWh)	RTF, DOE TSD, secondary sources
Levelized Cost (\$/MWh)	Incremental cost: RTF, DOE TSD, secondary sources
Baseline EE Saturation	RBSA, ENERGY STAR, secondary sources
Number of Units (20 years)	Load forecast, RBSA, ENERGY STAR, secondary sources
Achievable Technical Potential (aMW over 20 years)	Product of # Units * Unit Savings







# **Desktop Computers**

Parameter	Sixth Plan	Seventh Plan (draft)
Unit Savings at busbar (kWh)	185	72
Levelized Cost (\$/MWh)	\$71	\$49
Baseline EE Saturation	10%	25%
Number of Units (20 years)	8.6M	12M
Achievable Technical Potential (aMW over 20 years)	183	93

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# Microwaves

Unit Savings at busbar (kWh)  Levelized Cost (\$/MWh)  \$784  \$41  Baseline EE Saturation  0%  Number of Units (20 years)  Achievable Technical Potential (aMW over 20 years)  10  \$784  \$41  0%  7	Sixth Plan	Seventh Plan (draft)
Baseline EE Saturation 0% 0%  Number of Units (20 years) 6.6M 5.8M  Achievable Technical Potential 8 7	11	10
Number of Units (20 years) 6.6M 5.8M  Achievable Technical Potential 8 7	\$784	\$41
Achievable Technical Potential 8 7	0%	0%
	6.6M	5.8M
	8	7
		11 \$784 0% 6.6M

### Showerheads

Parameter	Sixth Plan	Seventh Plan (draft)
Unit Savings at busbar (kWh)	127 (1.8 GPM) for electric water heater	206 (avg 1.35GPM) for any water heater
Levelized Cost (\$/MWh)	-\$92	-\$149
Baseline EE Saturation	5%	42-66%, varies by bldg type
Number of Units (20 years)	5.8M (electric water heaters, >=2.5 GPM)	5.5M (any water heater, >=2.5 GPM)
Achievable Technical Potential (aMW over 20 years)	85	130

 Although we are now looking at all water heaters, total number of units is ~same, since saturation of low flow showerheads is higher



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#### Dishwashers **Parameter Sixth Plan** Seventh Plan (draft) Unit Savings at busbar (kWh) 17 for electric water 1.1 for single family, 3.8 for manufactured, heater any water heater Levelized Cost (\$/MWh) \$101 \$99 **Baseline EE Saturation** Savings based on market Savings based on market baseline, EF = 0.79baseline, EF = 0.71 Number of Units (20 years) 4.3M 5.6M Achievable Technical Potential 46 9.0 (aMW over 20 years) Northwest Power and Conservation Council

#### Bathroom Aerators (1.0 GPM) **Parameter Sixth Plan** Seventh Plan (draft) Unit Savings at busbar (kWh) Not included 43 for single family, 73 for MH/MF, any water heater Levelized Cost (\$/MWh) Not included \$1.5 **Baseline EE Saturation** Not included 65% Number of Units (20 years) Not included 3.7M Achievable Technical Potential Not included 20 (aMW over 20 years) Northwest Power and Conservation Council

# Advanced Power Strips

Parameter	Sixth Plan	Seventh Plan (draft)
Unit Savings at busbar (kWh)	Not included	34 (load sensing) – 284 (infrared)
Levelized Cost (\$/MWh)	Not included	\$45 (infrared) – \$226 (load sensing)
Baseline EE Saturation	Not included	1%
Number of Units (20 years)	Not included	30M
Achievable Technical Potential (aMW over 20 years)	Not included	185

Number of units includes all TVs and Computers in homes, 34% feasibility for SF (based on Energy Trust study); 25% for MF/MH (assumption)



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# Wastewater Heat Recovery

Parameter	Sixth Plan	Seventh Plan (draft)
Unit Savings at busbar (kWh)	407 (electric resistance WH)	239 (ERWH), 115 (HPWH)
Levelized Cost (\$/MWh)	\$100-\$400	\$146-\$388
Baseline EE Saturation	0%	0%
Number of Units (20 years)	2.3M (existing & new)	392k (new only)
Achievable Technical Potential (aMW over 20 years)	106	5.1

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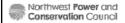


#### Electric Ovens **Parameter Sixth Plan** Seventh Plan (draft) Unit Savings at busbar 69 (non-self-cleaning) 73 (non-self-cleaning) (kWh) 56 (self cleaning) 59 (self cleaning) Levelized Cost (\$/MWh) \$365 (non-self-cleaning) \$359 (non-self-cleaning) \$432 (self cleaning) \$423 (self cleaning) Baseline EE Saturation 0% 10% Number of Units (20 years) 4.8M 4.6M Achievable Technical 33 34 Potential (aMW over 20 years) Northwest **Power** and **Conservation** Council 15

Refrigerators				
Parameter	Sixth Plan	Seventh Plan (draft)		
Unit Savings at busbar (kWh)	15-70 (ENERGY STAR, depends on config)	95 (CEE Tier 3)		
Levelized Cost (\$/MWh)	\$15-\$24 (depends on config)	\$267 (CEE Tier 3)		
Baseline EE Saturation	Savings based on market baseline	Savings based on market baseline		
Number of Units (20 years)	6.5M	5.7M		
Achievable Technical Potential (aMW over 20 years)	41	58		
Northwest Power and Conservation Council	16	SEVEN'		

# Single-Family Weatherization

Parameter	Sixth Plan	Seventh Plan (draft)
Unit Savings at busbar (kWh)	316-10,190 depending on measure	35 - 2176
Levelized Cost (\$/MWh)	-\$5.63 – 202; ~\$62 weighted avg	\$0 – 280 ~\$94 weighted avg
Baseline EE Saturation	Varies by measure	Varies by measure
Number of Units (20 years)	1.4M	2.3M
Achievable Technical Potential (aMW over 20 years)	219	100



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### SF Weatherization

- Includes:
  - Attic, floor, and wall insulation
  - Windows
  - Infiltration Control (not in 6P)
- Levels of insulation and associated savings & cost taken from recent RTF workbook
- Number of units based on RBSA for 7P
  - For 6P, based on pre-1980 vintage cohort



3 E V E N T H HORTHUIST POWER PLAN

### SF Weatherization

- RTF measures are by climate zone, HVAC system type
  - E.g. Insulate Attic R0 to R38 Heating Zone 1 (Electric FAF)
  - For 7P, RBSA data are not robust at this level of granularity for baseline saturations
- In 7P, measures are bundled by HVAC system type
  - In 6P, measures are bundled by climate zone



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