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Northwest **Power** and **Conservation** Council

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November 9, 2021

MEMORANDUM

TO: Power Committee

FROM: Massoud Jourabchi

SUBJECT: State of Regional Economy and Utilities in 2020 with brief overview of 2021 heat-dome.

BACKGROUND:

Presenter: Massoud Jourabchi

Summary: Region continues to recover from economic slowdown resulting from Covid-19 mitigation strategies implemented. Regional employment dipped significantly for the low-income employees. Regional temperatures continue to break records. Regional demand for electricity and natural gas were reduced significantly. Region continues to produce more goods and services with reduced natural gas and electricity consumption. Region continues to have low electric and natural gas bills. Growth in Summer peaks continue to outpace winter peaks. Heat-dome experienced in June 2021 caused large number of fatalities for humans, marine life, and damage in other eco-systems. June peak demand increased by 4500 MW from historic average of about 28,000 MW.

Relevance: Continued monitoring of the economy and energy markets in the region are critical for load forecasting.

Workplan: On-going activity in preparation of next plan

State of Regional Economy & Electric Utilities In 2020

with a Quick Overview of Impact of 2021 Heat-dome

Massoud Jourabchi

November 16th 2021

In this presentation

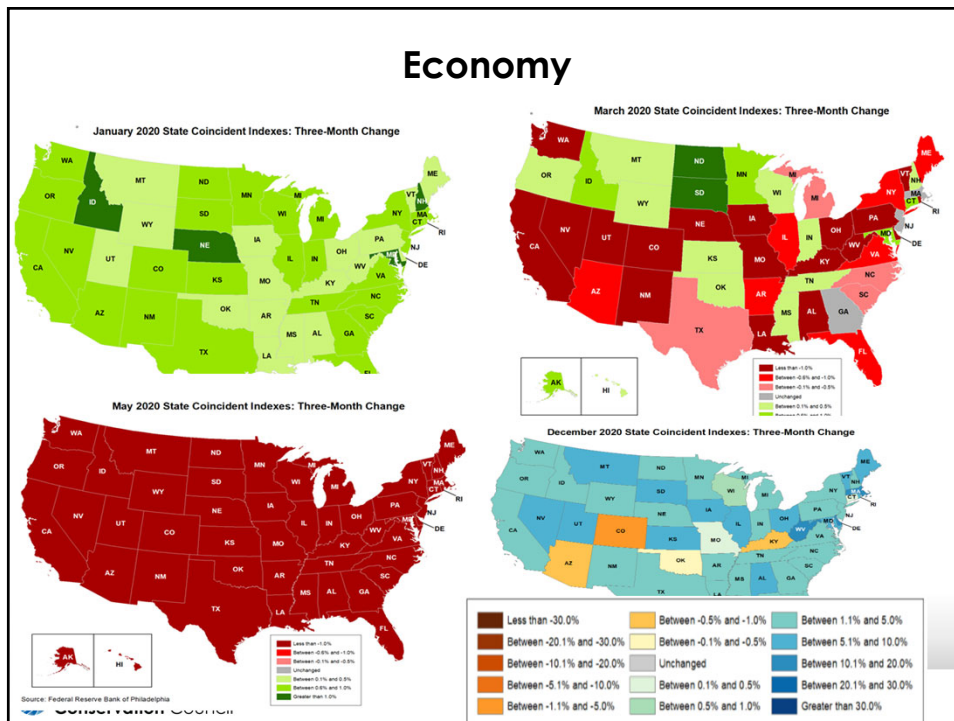
- Determinants of Demand for Energy
- Snapshots of Regional Conditions
 - Economic output
 - Climate impacts
 - Employment
 - Trends (EV, Solar)
- Temperature Conditions
 - Summer
 - Winter
- Demand for Electricity and Natural Gas
- Energy and Peak Loads
- Electric Utilities Revenues and Consumer Bills
- Behind-the-Meter Solar, Demand Response and T.O.U Rates
- Doing more with less
- Natural gas consumption and Bills
- Heat-dome of June 2021

Determinants of Demand For Energy

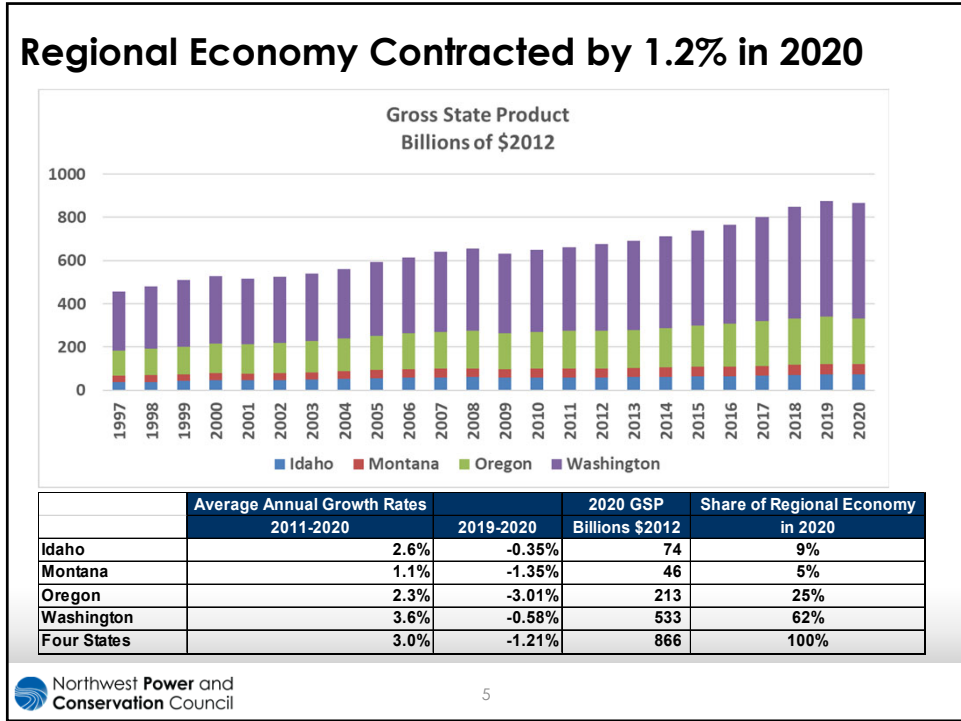
- Demand for Energy is Driven by Demand for Goods and Services in homes, buildings and transportation.
- Factors impacting demand for Electricity are
 - Long-term Trends Impacting Energy
 - Demographic Conditions
 - Economic Conditions
 - Inter-fuel Competition
 - Building Codes and Appliance Standards
 - Climate (weather)
 - State and Federal Policies on electrification of transportation
 - Short-term Trends Impacting Peaks
 - Change in regional daily and hourly temperatures

3

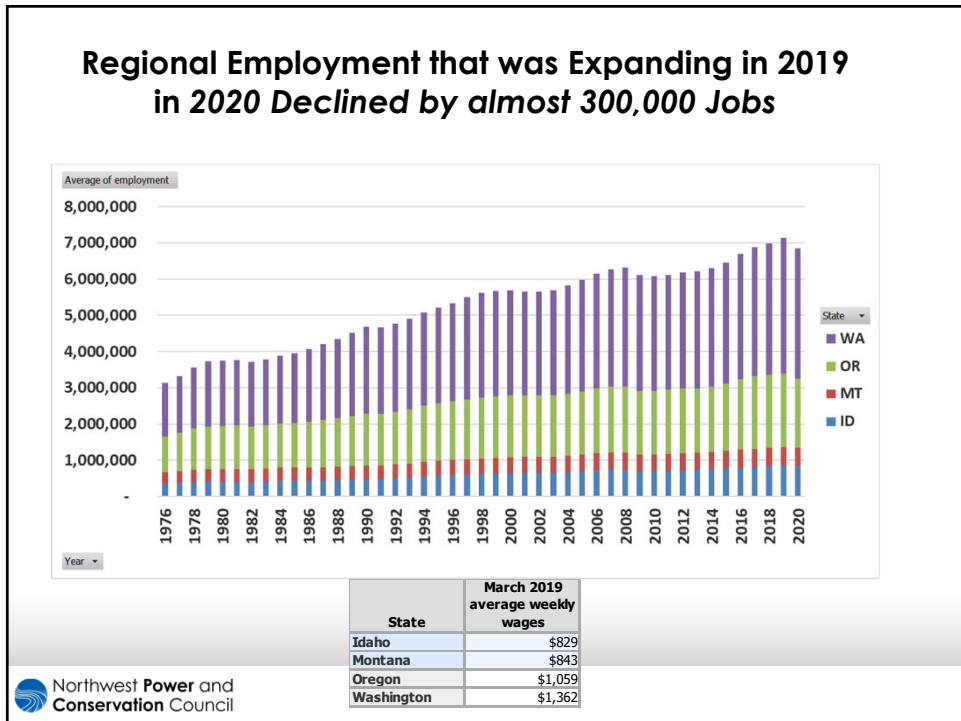
Economy



4



5



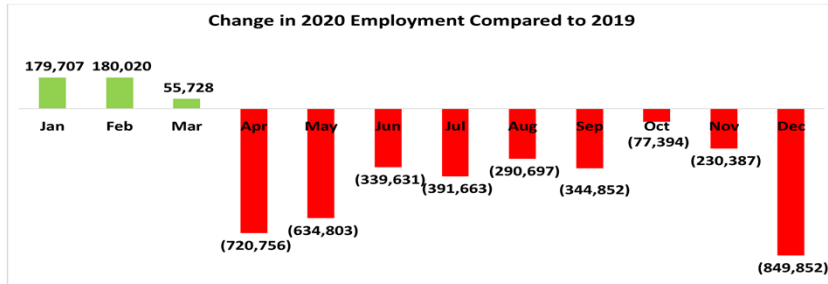
6

Regional Hospitality Industry Output Were Reduced about 30% While information industry expanded by 15%

Sectors with Declining Output (Millions of \$2012)	2019	2020	% change
Air transportation	5,805	2,635	-55%
Rail transportation	2,255	1,906	-15%
Transit and ground passenger transportation	1,949	1,485	-24%
Motion picture and sound recording industries	1,223	1,068	-13%
Educational services	5,582	4,795	-14%
Accommodation	6,027	4,381	-27%
Food services and drinking places	18,019	12,822	-29%
Sectors with Expanding Output (Millions of \$2012)	Sum of 2019	Sum of 2020	% change
Paper manufacturing	2,106	2,270	8%
Agriculture, forestry, fishing and hunting	22,211	26,242	18%
Retail trade	72,090	74,685	4%
Information	104,504	120,058	15%

7

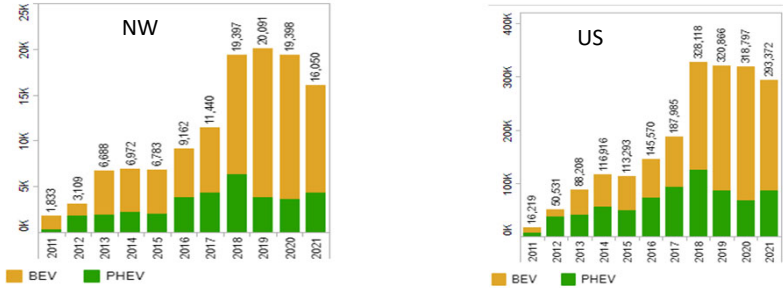
Compared to 2019, In the first Quarter of 2020, regional employment was on an expansionary path, but in the next three quarters it contracted



8

Fast growth in Electric Passenger Vehicle ownership continued

Globally Electric Vehicles sales reached 3.2 million vehicles or about 4.2% market share
 In US 2020 Sales were up 19% compared to 2019 and as of June 2021 over 293,000 new Battery Electric and Plug-in hybrids were sold

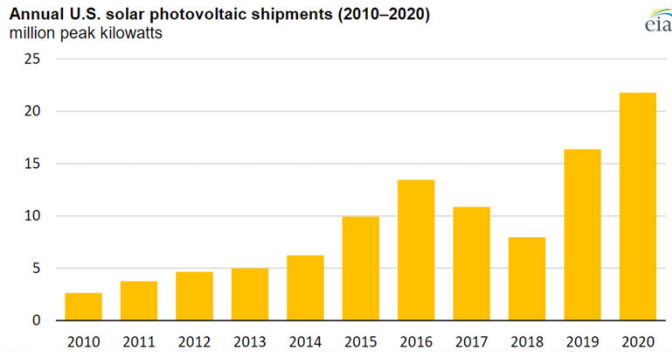


Vehicle Type	Idaho	Montana	Oregon	Washington	Region	US	Region as percent of Nation
Battery Electric	1,954	1,134	26,646	56,717	86,451	1,257,215	7%
Plug-in Electric	1,440	878	13,885	18,269	34,472	722,660	5%
Sum	3,394	2,012	40,531	76,986	122,923	1,979,875	6%

<https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/>

Solar installations continue to grow rapidly

U.S. solar photovoltaic module shipments up 33% in 2020



Source: Graph by U.S. Energy Information Administration, *Annual Solar Photovoltaic Module Shipments Report*

Despite the global COVID-19 pandemic, U.S shipments of solar photovoltaic (PV) modules (also referred to as solar panels) reached a record high of 21.8 million peak kilowatts (kW) in 2020, 5.4 million peak kW more than in 2019.

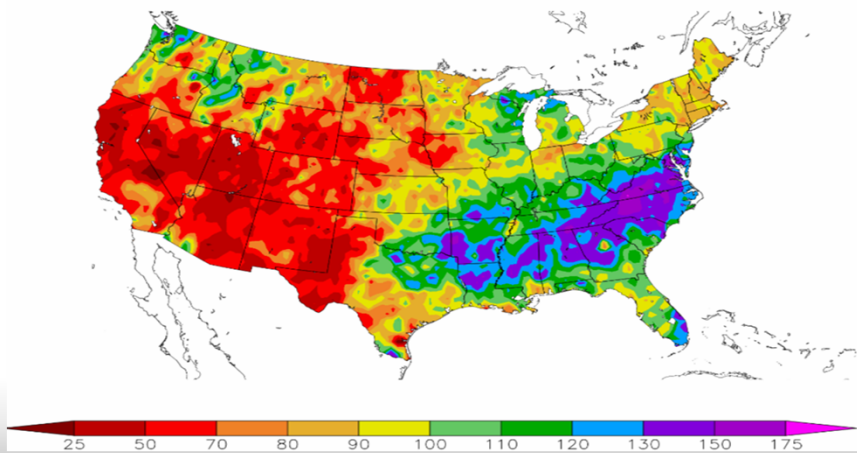
Climatic Events

- **Fires in the West and Rain in the East**
- **Billion-dollar weather and climate disasters**

11

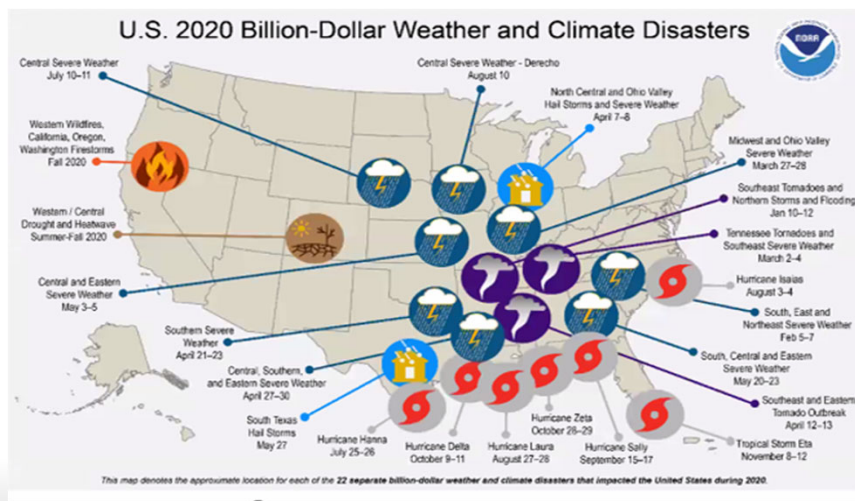
Climate: Fires in the West and Rain in the East

Percent of Normal Precipitation (%)
1/1/2020 – 12/31/2020



12

In 2020, the U.S. experienced 22 separate billion-dollar weather and climate disasters valued at \$95 billion in damages

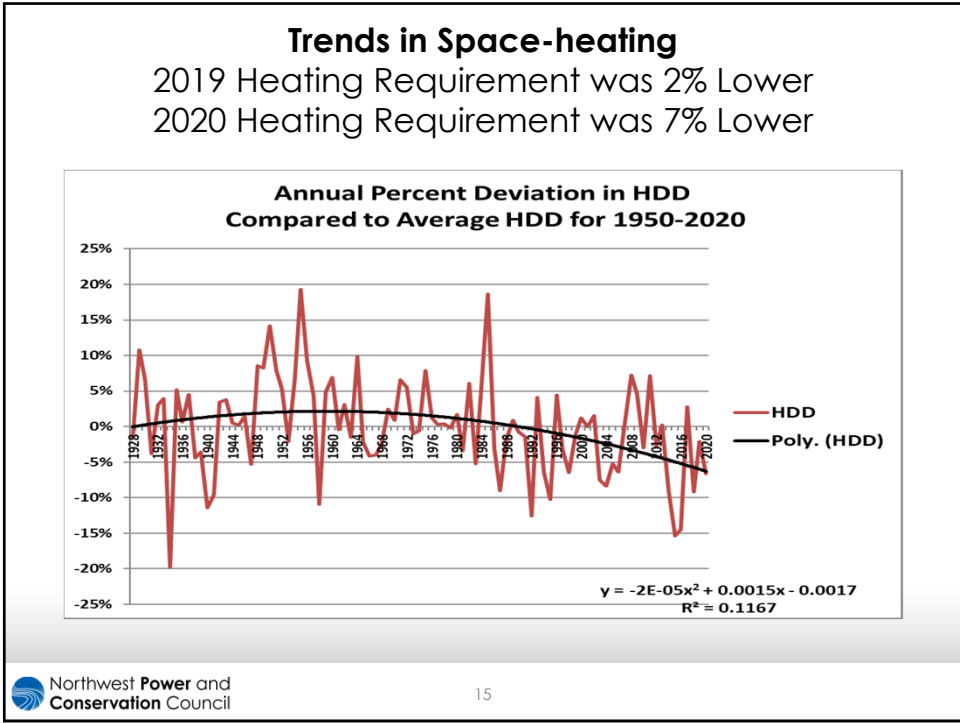


13

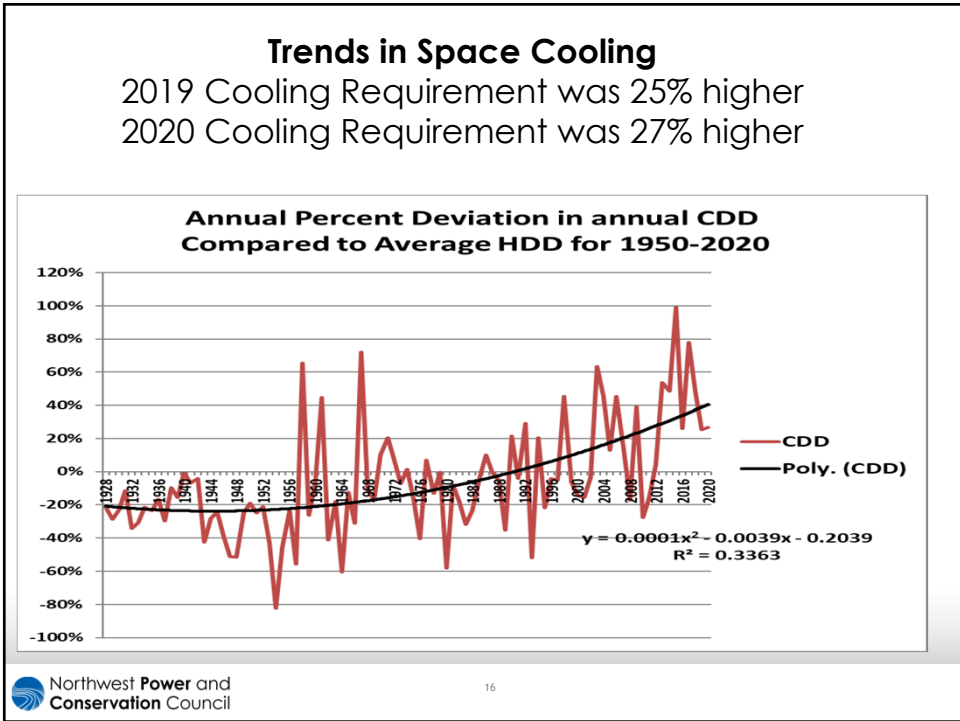
Impact of Temperature on Loads

- Regionwide Heating and Cooling Requirements represent about 30% of total load.
- 2019 Winter heating requirements decreased by 2%
- 2020 Winter heating requirements decreased by 7%
- 2019 Summer cooling requirements increased by 25%
- 2020 Summer cooling requirements increased by 27%

14



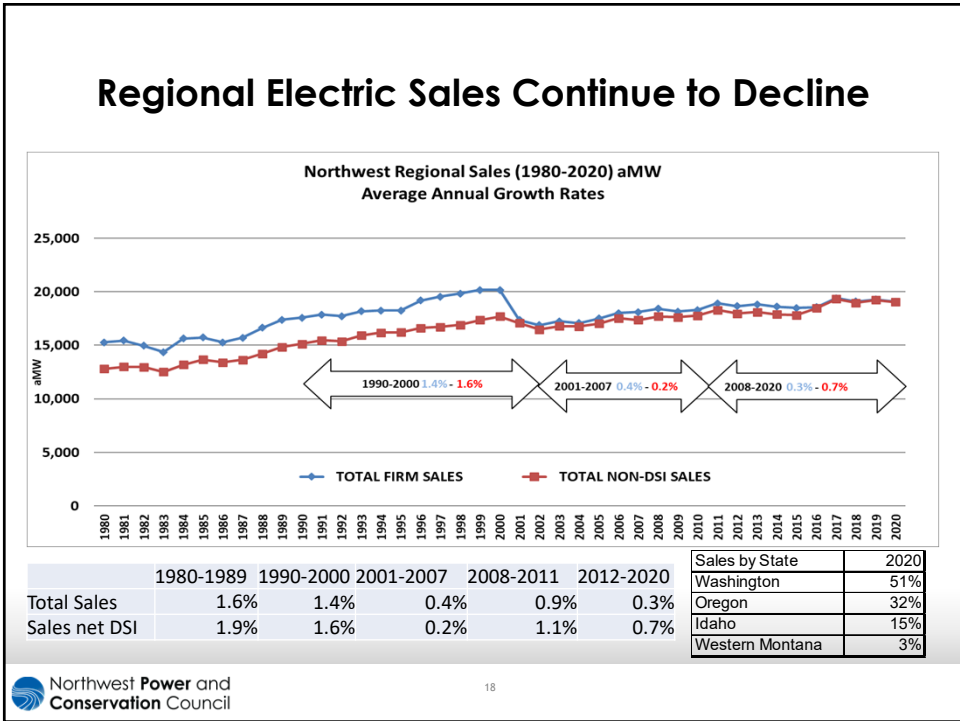
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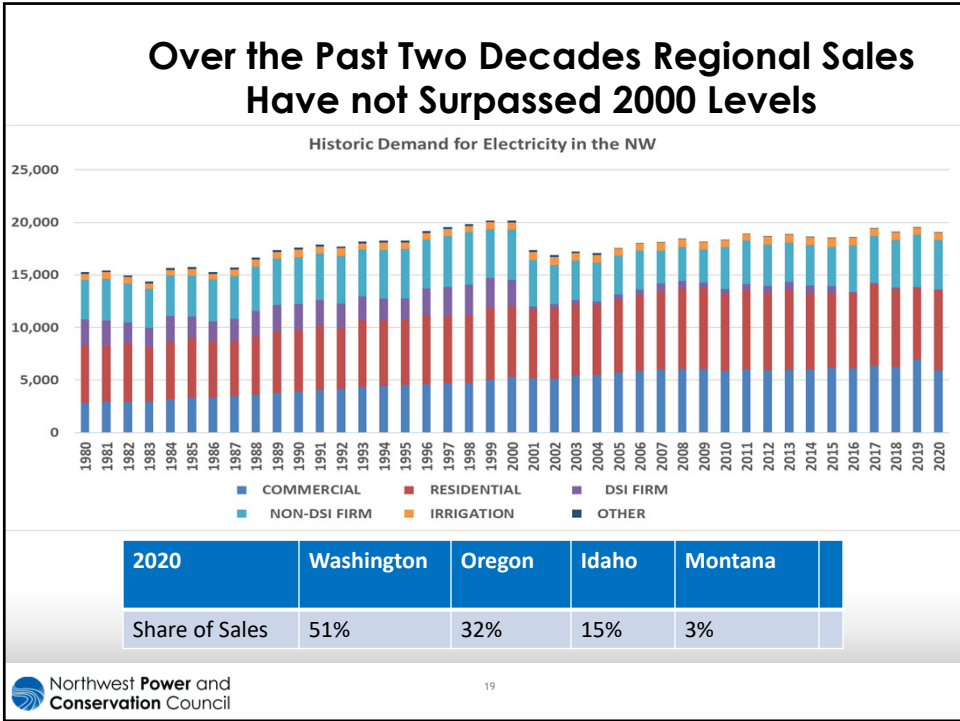


16

Regional Electricity Sales, Bills and Loads

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19

2020 Regional Demand Decreased by about 500 aMW

All Utilities	2019	2020	Year-over-year change	AAGR 2011-2020
COMMERCIAL	6,987	5,904	-1,083	-0.14%
RESIDENTIAL	6,799	7,685	886	0.16%
DSI FIRM	60	11	-49	-35.96%
NON-DSI FIRM	4,998	4,706	-292	1.56%
IRRIGATION	682	732	50	1.32%
Transportation	25	14	-11	
TOTAL FIRM SALES	19,551	19,052	-499	0.08%

Northwest Power and Conservation Council

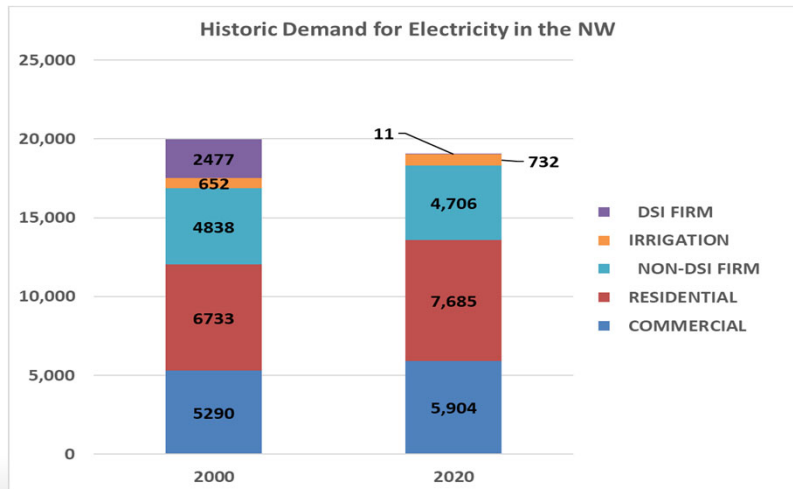
20

POU Demand Decreased More than IOUs

	2019	2020	Year-over-year change	AAGR 2011-2020
Public Utilities				
COMMERCIAL	3,434	2,560	-874	0.55%
RESIDENTIAL	2,686	3,502	816	0.18%
DSI FIRM	60	11	-49	-35.96%
NON-DSI FIRM	3,317	3,119	-198	3.44%
IRRIGATION	332	355	23	1.03%
Transportation	21	11	-11	
TOTAL FIRM SALES	9,850	9,558	-292	0.53%
IOUs				
COMMERCIAL	3,553	3,344	-209	-0.63%
RESIDENTIAL	4,113	4,183	70	0.15%
INDUSTRIAL FIRM	1,681	1,587	-94	-1.36%
IRRIGATION	350	377	27	1.60%
Transportation	4	3	0	
Total Firm Sales	9,701	9,494	-207	-0.35%

21

By 2020 DSI Electrical Demand is an sliver of 2000 levels

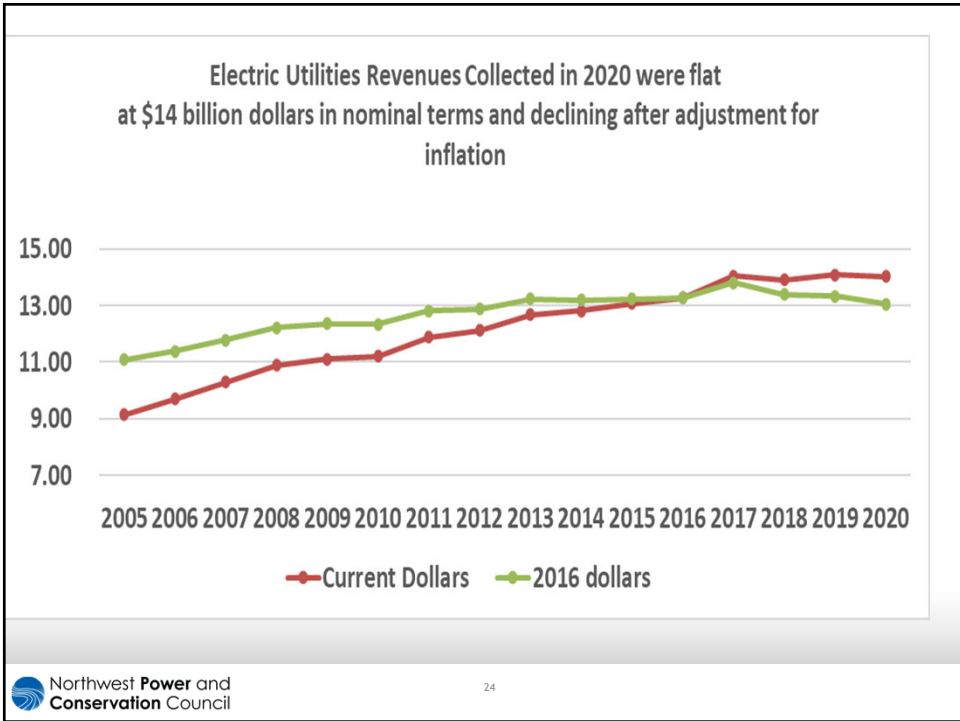


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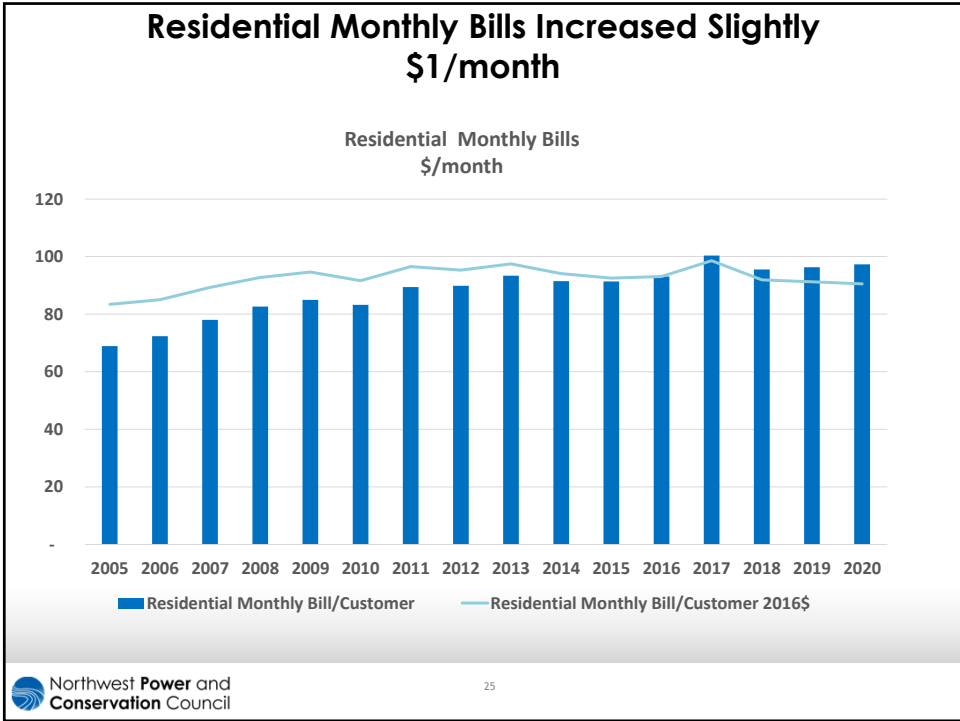
Electric Revenues and Rates

Northwest Power and Conservation Council

23



24



25

POU Customers Electric Bills were lower than IOUs (2016 constant dollars per MWH)

Category	2019	2020
Residential	89	89
Publics	89	89
IOUS	101	100
Commercial		
Publics	76	72
IOUS	86	82
Industrial		
Publics	45	43
IOUS	54	49

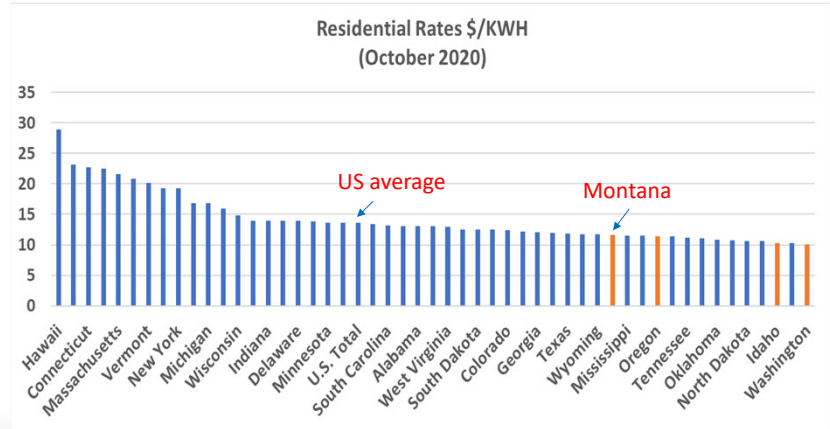
But average Consumption was Higher in Publics compared to IOUs

MWH/Customer	Public Utilities	IOUS
Residential	12	11
Commercial	72	64
Industrial	775	505

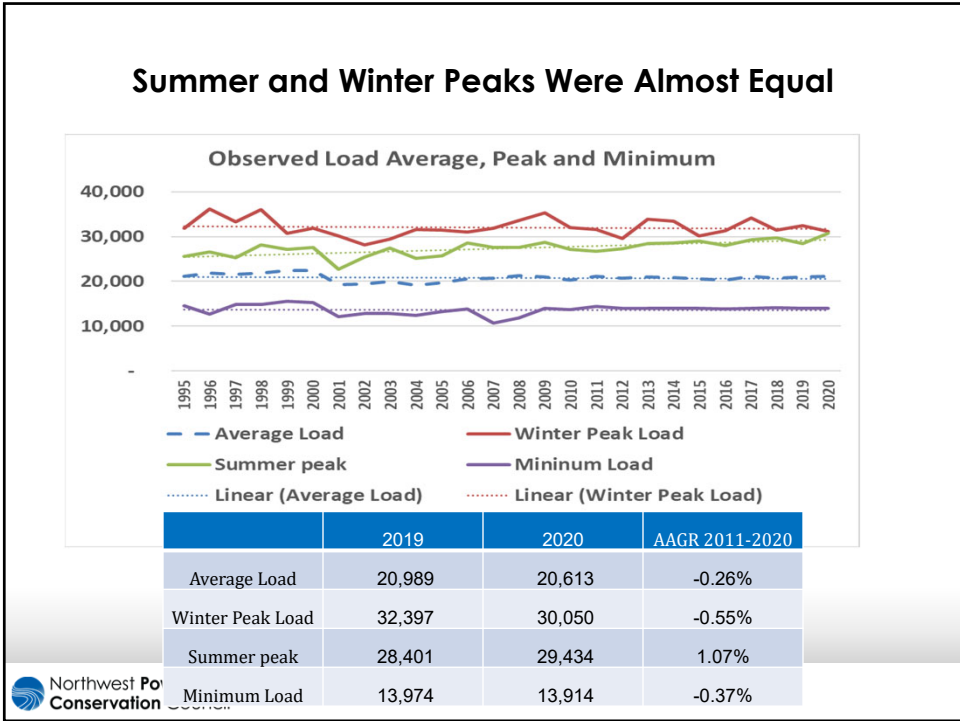
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26

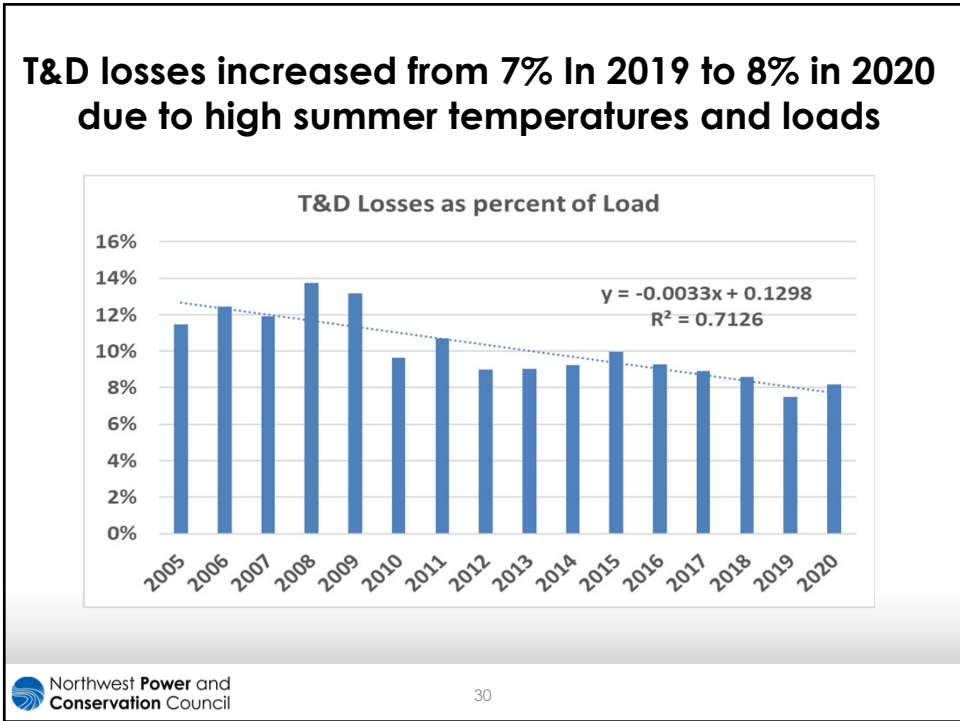
In 2020 Regional Electricity Rates Continue to Represent Some of the Lowest Rates in the Nation



Loads



29



30

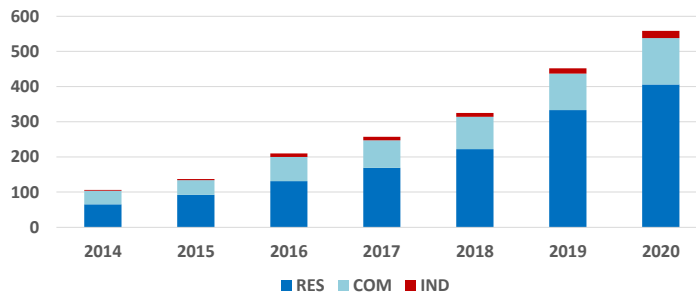
Behind-the-meter

- **Solar installs (energy and peak)**
- **Demand Response (peak load)**
- **Time-of-use Rates**
- DR and TOU rates represent consumer options to reduce peak load.

31

BTM solar continues growing at an average Annual Rate of 31% since 2014

Behind-the-meter solar installations
MW DC Capacity installed



	RES	COM	IND	TOTAL
2014	65	39	2	106
2015	92	42	3	137
2016	131	69	10	210
2017	169	78	10	257
2018	222	92	11	325
2019	333	104	15	452
2020	406	132	21	538

32

**In 2020
DR Programs in the region lowered peak
demand by about 390 MW**

	Northwest
# DR customers	145,431
Potential Peak Savings MW	1,656
Actual Peak Savings MW	389
Customer Incentives (\$1000)	\$ 9,975
All other costs (\$1000)	\$ 13,291

2020 DR programs reported to EIA

2020 Time-of-Use Rate Schedules

- 27 TOU rate schedules were offered in the region.
- Number of participating customers declined.
- Idaho power, Flathead electric, PacifiCorp, PGE had the largest number of customers on TOU.
- PGE was the only utility to offer Real Time Pricing to Commercial and Industrial customers
- Majority of these were voluntary opt-in rates.
- None of the utilities offered peak pricing.
- One small utility offered real time pricing.

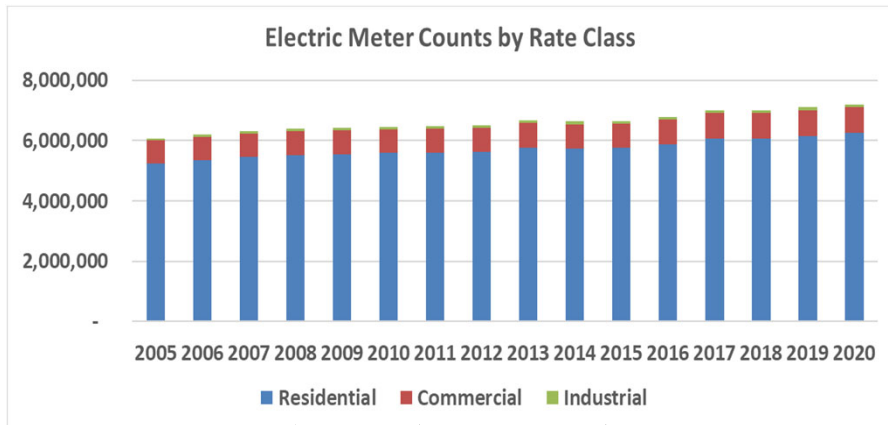
Number of Enrolled Customers	Residential	Commercial	Industrial	Total	percent of total customers
2015	17,346	1,612	1,933	20,893	0.33%
2016	16,903	2,958	2,152	22,015	0.34%
2017	16,290	1,099	2,105	19,496	0.30%
2018	15,060	859	1,723	17,644	0.27%
2019	72,616	1,209	2,088	75,913	1.10%
2020	72,802	1,224	668	74,697	1.17%

Type of Dynamic Pricing Offered	
Time of Use Pricing	Yes
Real Time Pricing	Yes
Variable Peak Pricing	None
Critical Peak Pricing	None
Critical Peak Rebate	None

Doing More with Less

35

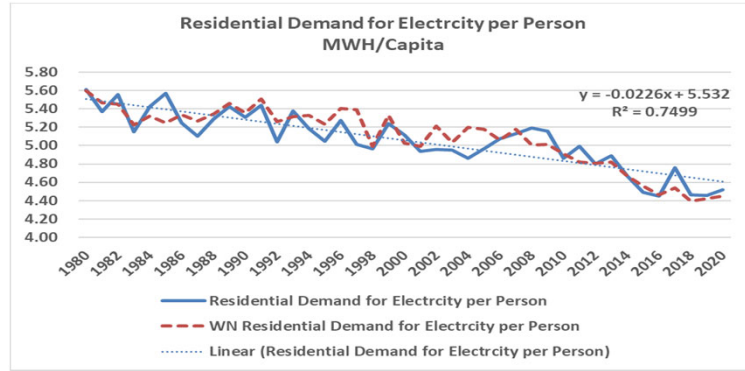
Number of Customers are growing faster than Population



	% change 2019-2020
Residential	1.4%
Commercial	1.2%
Industrial	3.2%
Total	1.5%

36

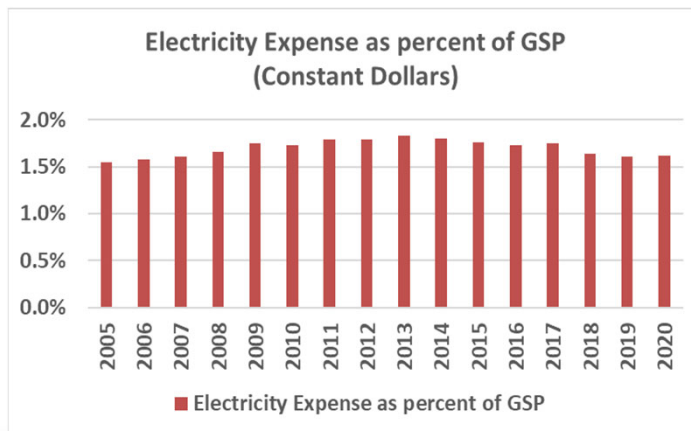
Use per Person Has Declined by 20% since 1985



	Per capita Usage MWH
1985	5.57
2000	5.12
2010	4.86
2020	4.52

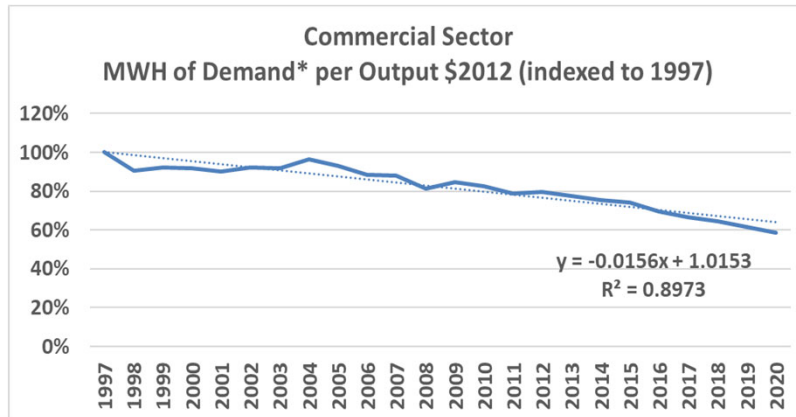
37

Region continues to produce goods and services with increased efficiency



38

Commercial Sector Customers Continue Improving their Electricity Demand Efficiency



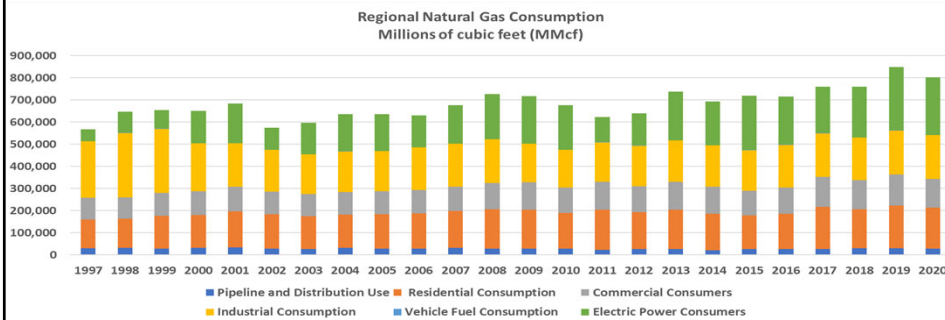
Natural Gas Demand and Prices

About half of Residential Customers have access to Natural Gas

# of Residential Accounts in 2020	Natural Gas	Electric	Customers with Access to Natural Gas
Washington	1,232,852	3,166,766	39%
Oregon	776,811	1,785,260	44%
Montana	284,373	638,398	45%
Idaho	428,374	780,080	55%
total 4 states	2,722,410	6,370,504	43%

41

Natural Gas Consumption dropped by 50 MMcf in 2020



	2019	2020	AAGR 2011-2020
Billions of Cubic Feet			
Total Consumption	853	805	2.9%
Pipeline and Distribution Use	29.5	28.5	2.0%
Residential Consumption	193	185	0.3%
Commercial Consumers	142	129	0.3%
Industrial Consumption	198	197	1.1%
Vehicle Fuel Consumption	0.28	0.22	-13.0%
Electric Power Consumers⁷²	287	262	9.8%

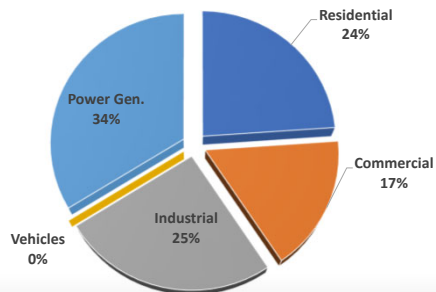
42

2020 Demand for Natural Gas Decreased by 6% with commercial sector decreasing by 9%

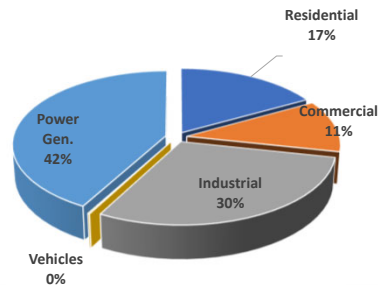
Consumption (BMcft)	Residential	Commercial	Industrial	Vehicles	Power Gen.	Total
Regional - 2019	193	142	198	0.3	287	819
Regional - 2020	185	129	197	0.2	262	774
% change from previous year	-4%	-9%	-0.3%	-20%	-9%	-6%
Sector Market share 2020	24%	17%	25%	0.03%	34%	
USA- 2019	5,019	3,515	8,417	53	11,288	28,291
USA- 2020	4,674	3,170	8,151	49	11,616	27,660
% change from previous year	-7%	-10%	-3%	-8%	3%	-2%
Sector Market share 2020	17%	11%	29%	0.18%	42%	
Region as Share of US						
2019	3.8%	4.0%	2.3%	0.5%	2.5%	2.9%
2020	4.0%	4.1%	2.4%	0.5%	2.3%	2.8%

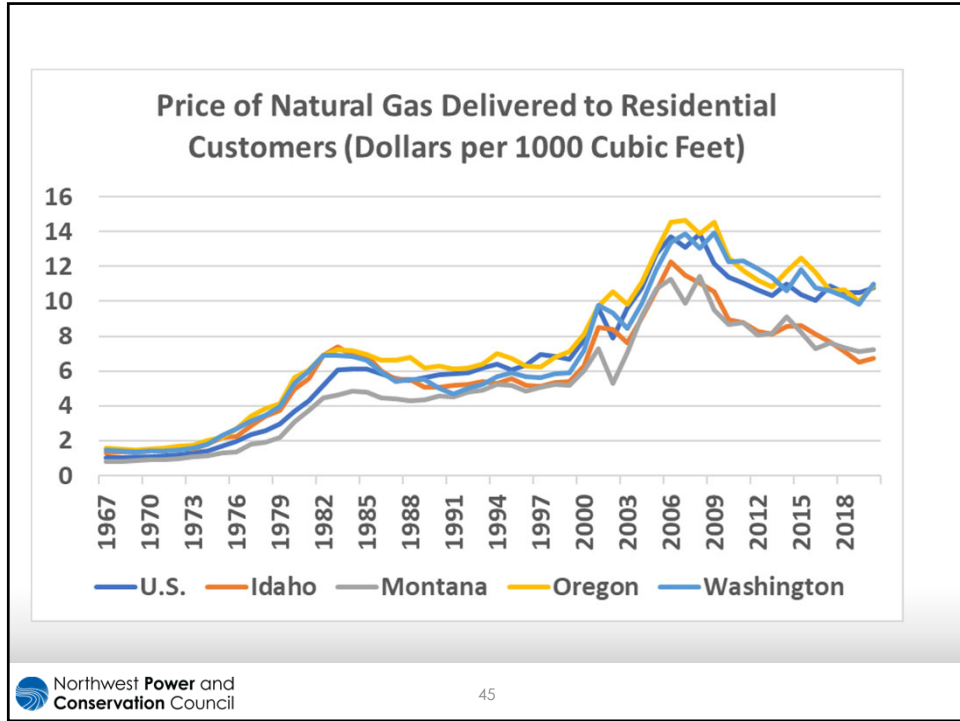
Residential and Commercial Sectors have a larger market share of Natural Gas – Compared to Nation

Regional Market Share by Sector

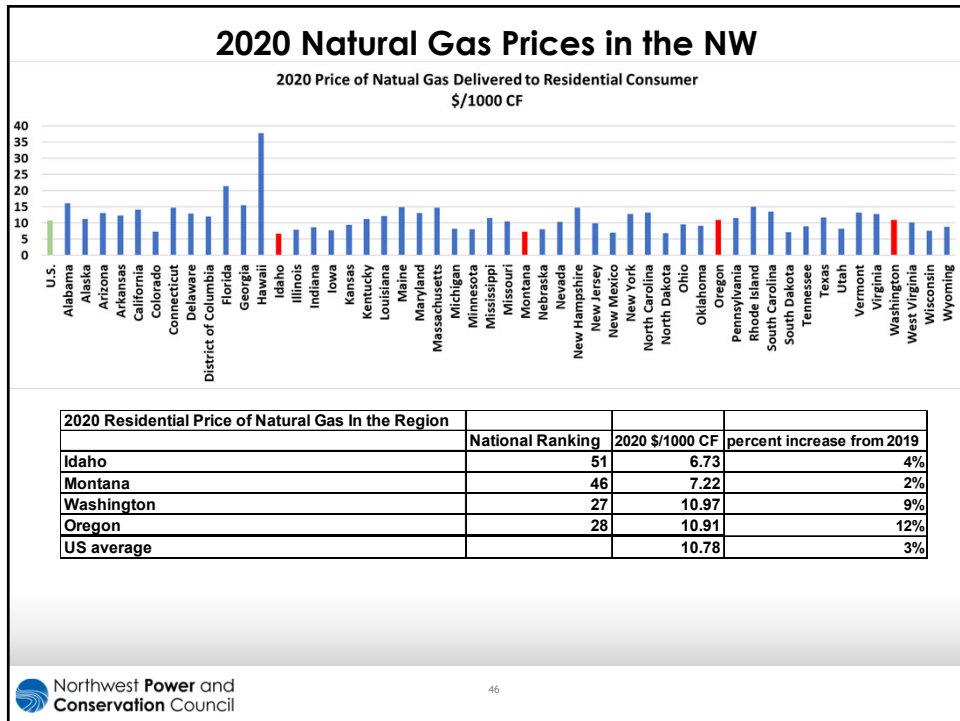


National Market Share by Sector





45

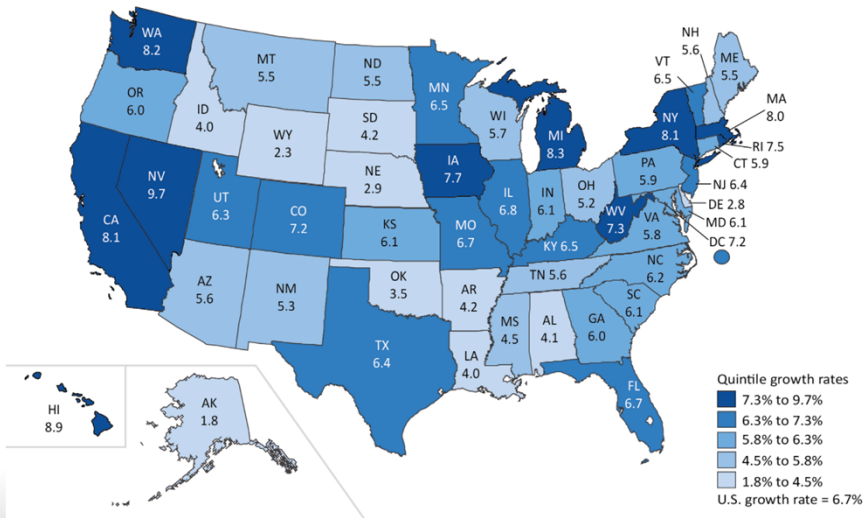


46

Quick Overview of 2021

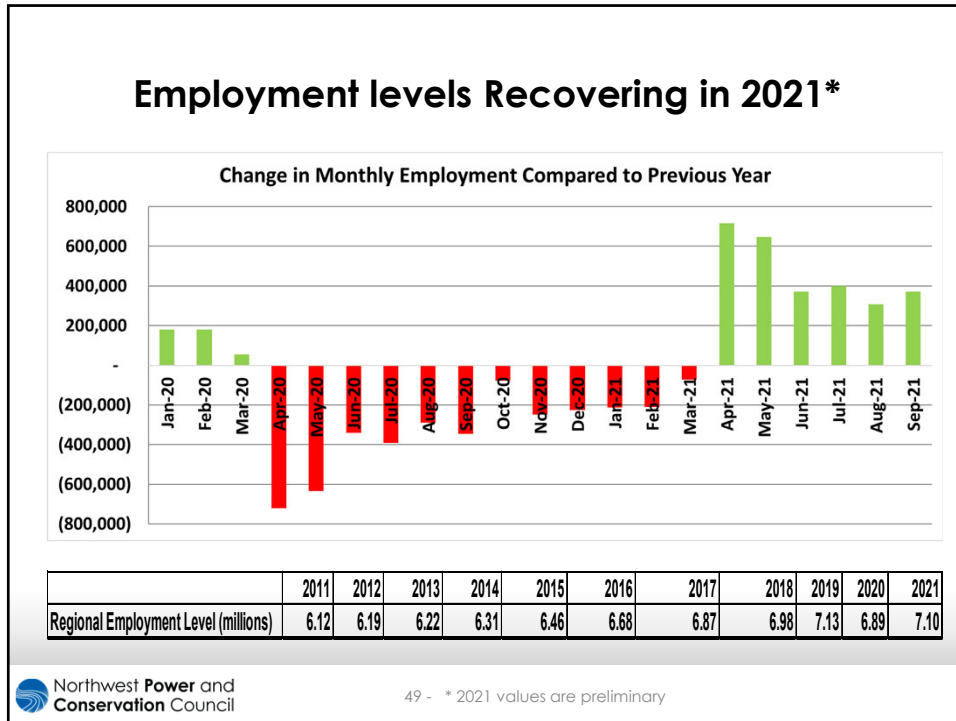
47

Real GDP: Percent Change at Annual Rate, 2021:Q1–2021:Q2



U.S. Bureau of Economic Analysis

48



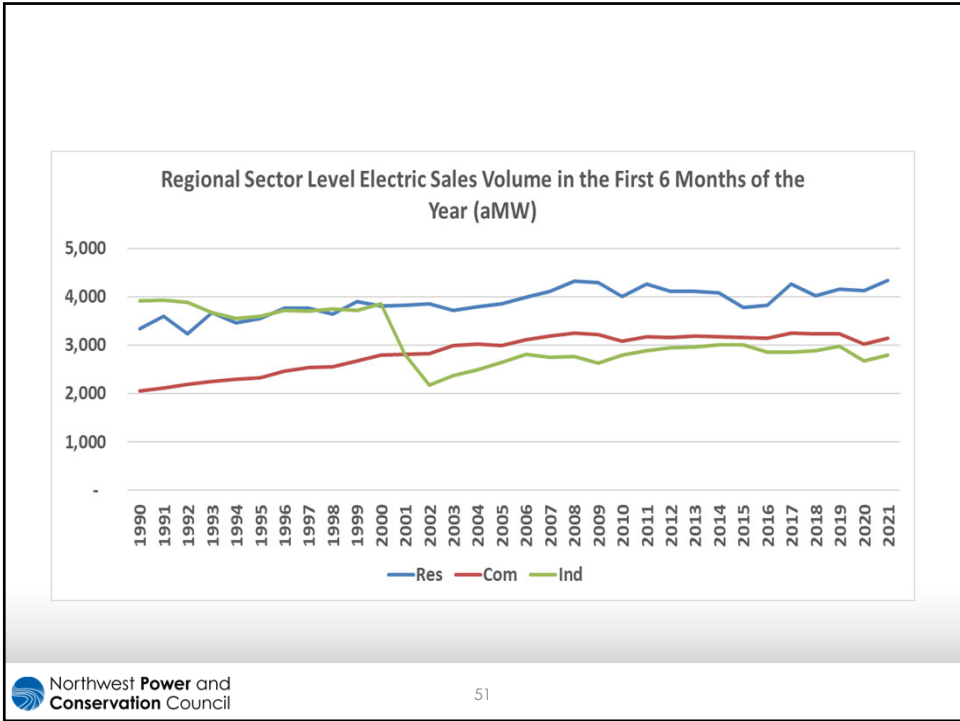
49

Summer of 2021 Heat-Dome

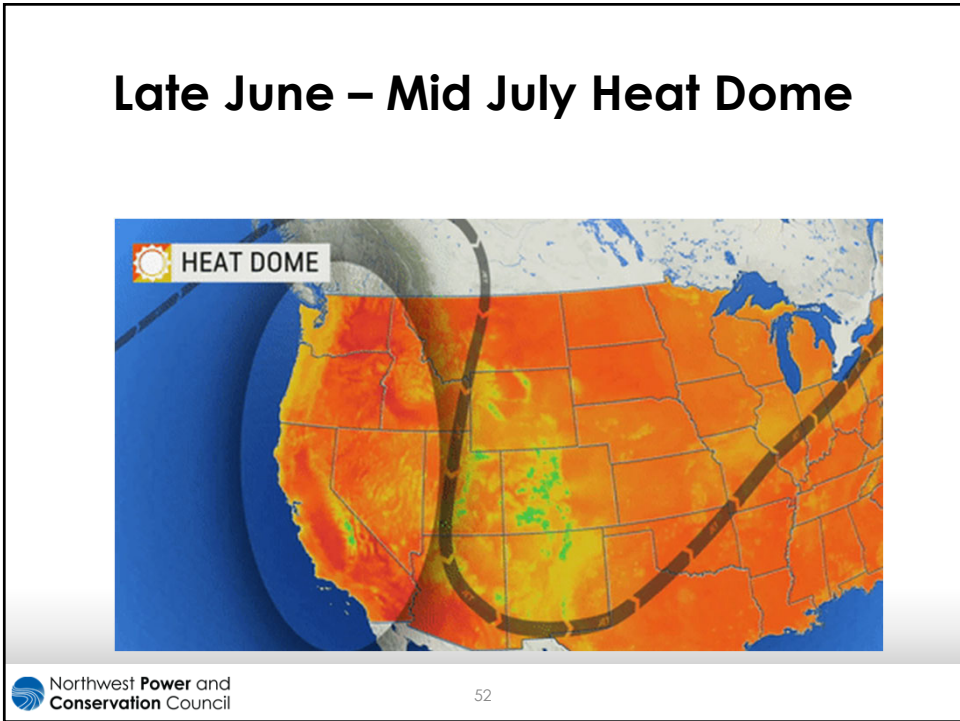
- **2020 was a year when Southern states drown in rain and Western States baked in the record heat. Disaster after disaster caused massive losses. However, regional economy was on rebound from 2020 slowdowns and 2021 electric sales were recovering the ground they lost in 2020.**
- **A massive heat-dome pushed up temperatures from British Columbia to Southern California to highest levels seen in the past or projected into the future.**
 - It caused:
 - Significant loss of life
 - Significant loss of marine life
 - Damaged infrastructures
 - Significantly increased peak load.

50

50



51



52

ALL-TIME RECORD HIGHS BROKEN

MONDAY, JUNE 28

City	Temp	Old Record
Salem, OR	117°	113° 2021
Redmond, OR	110°	108° 2021
Quillayute, WA	110°	99° 1981
Olympia, WA	110°	105° 2021
Bellingham, WA	99°	96° 2009

RECORD HIGHS

TUESDAY, JUNE 29

City	Temp	Old Record
Hermiston, OR	118°	105° 1948
Pendleton, OR	117°	102° 1904 2008
Walla Walla, WA	116°	105° 2008
Lewiston, ID	115°	108° 1939
Yakima, WA	113°	103° 1948

The all-time record high for the state of Oregon was 118° in Hermiston, OR on Tuesday, June 29, 1948.

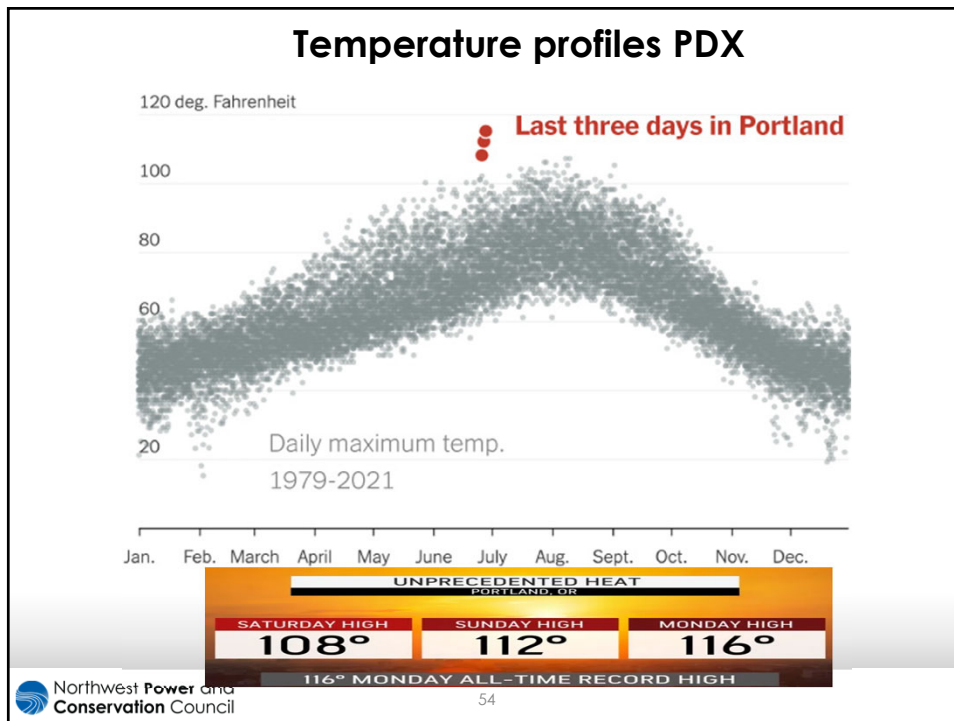
RECORD HIGHS

WEDNESDAY, JUNE 30

City	Temp	Old Record
Omak, WA	114°	107° 1924
Lewiston, ID	113°	108° 1924
Pasco, WA	113°	106° 1924
Hermiston, OR	109°	105° 1924
Yakima, WA	108°	102° 2008

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53



54

Damage to Public Transport Infrastructure



4:07 PM · Jun 27, 2021



Damage to Transport Infrastructure



8:31 PM · Jun 27, 2021



The intense Portland heat has caused streets and sidewalks to buckle. (AccuWeather/Bill Wadel)

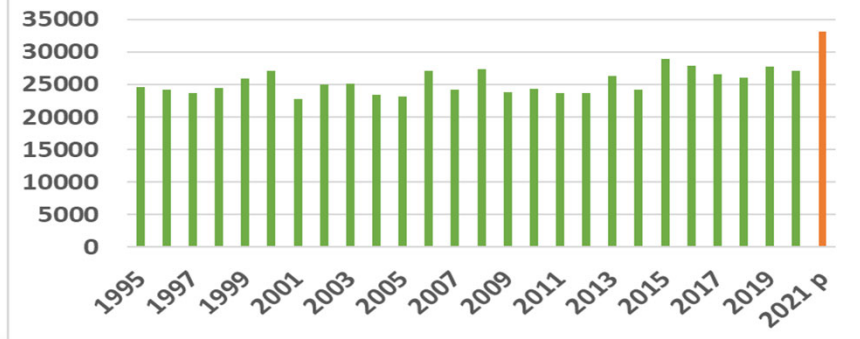
Billions of Sea life Lost over 4 day period



Rockweed, mussels, and other intertidal species
Officials in [Washington State](#) also say that salmon in the Columbia and Snake Rivers are at risk.

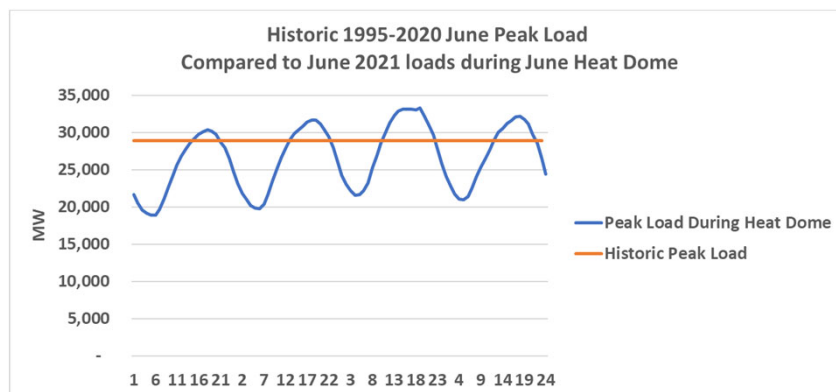
57

Regional Peak Loads in Month of June MW



58

Peak loads Jumped by about 4500 MW



Summary

- Regional economy continued to improve.
- Electric and natural gas sales declined in 2020.
- Electricity sales decreased in 2020 by about 500 aMW.
- Regional electricity and natural gas bills continue to be below national average.
- Electric revenues were flat.
- Winters and Summers temperatures continue to drive average and peak loads.
- Electric Vehicles and Solar installation continue expanding their market share.
- Regional T.O.U rates are available in very few utilities.
- Region continues to do more with less electricity
- Heat-dome increased June peak loads by over 4500 MW.

Questions