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May 5, 2020

## **MEMORANDUM**

**TO: Full Council**

**FROM: Ben Kujala**

**SUBJECT: The Impact of Covid-19 on the Regional Economy and Power System**

### **BACKGROUND:**

Presenters: Power Division Staff

Summary: Covid-19 has impacted many things in the region. We will focus primarily on the high-level economic impacts and impacts to the power sector. While we are uncertain about the long-term impacts, staff has collected data where possible to describe some of the near-term impacts. We have also followed the trade press and expert analysis of potential long-term impacts and will synthesize these perspectives. And staff will also indicate what data and sources we will be watching to quantify the impacts of Covid-19 going forward.

One of the substantial impacts in the region has been orders and encouragement for citizens to stay at home and avoid gathering in groups. As a result, many normal business activities have been substantially changed or suspended. We see some indication of this in a regional load shift from the commercial and industrial sectors to the residential sector. To illustrate this staff will provide some preliminary analysis that shows that load impact has been minimal, about 1% for March 15 through end of April.

We will also discuss the impact on the fossil fuel and transportation sectors. The sales of new vehicles in 2020 will likely be impacted and the price of oil entered unprecedented territory in the month of April.

We will also discuss some challenges and potential opportunities for Energy Efficiency programs in the region resulting from the Covid-19 impacts.

And finally, we'll touch on the impacts on generating resources including the impacts on GHG emissions and the development of new resources.

# Impact of Covid-19 on the Regional Economy and Power System

A preliminary analysis

May 2020



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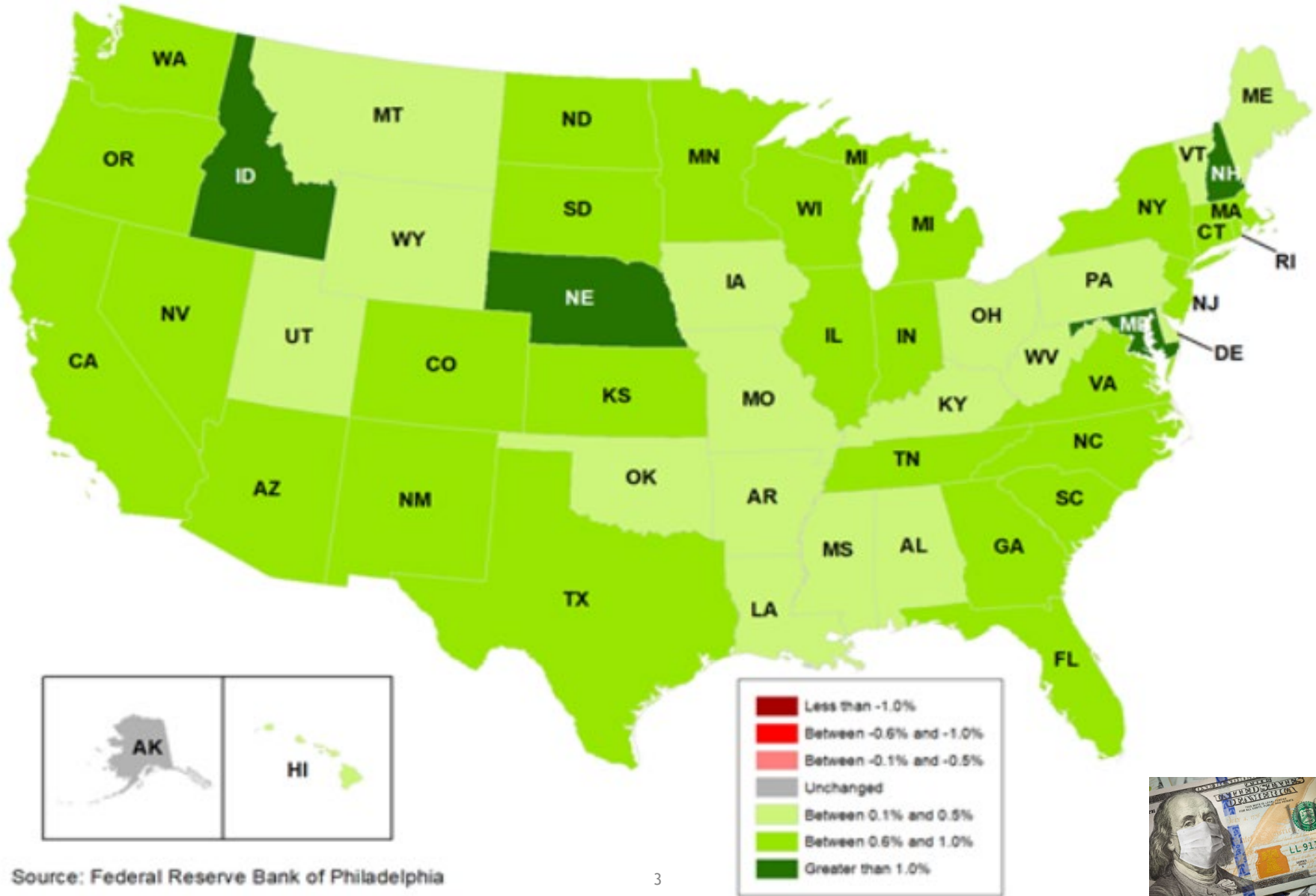
THE 2021  
NORTHWEST  
POWER PLAN

FOR A SECURE & AFFORDABLE  
ENERGY FUTURE

An abstract graphic composed of several overlapping geometric shapes. On the left, there is a small light green trapezoid. Next to it is a large teal pentagon. To the right of the teal shape is a light blue trapezoid. Further right is a large light green rectangle. The shapes are layered, with the teal and light blue shapes appearing in front of the light green ones.

# Economic Impacts

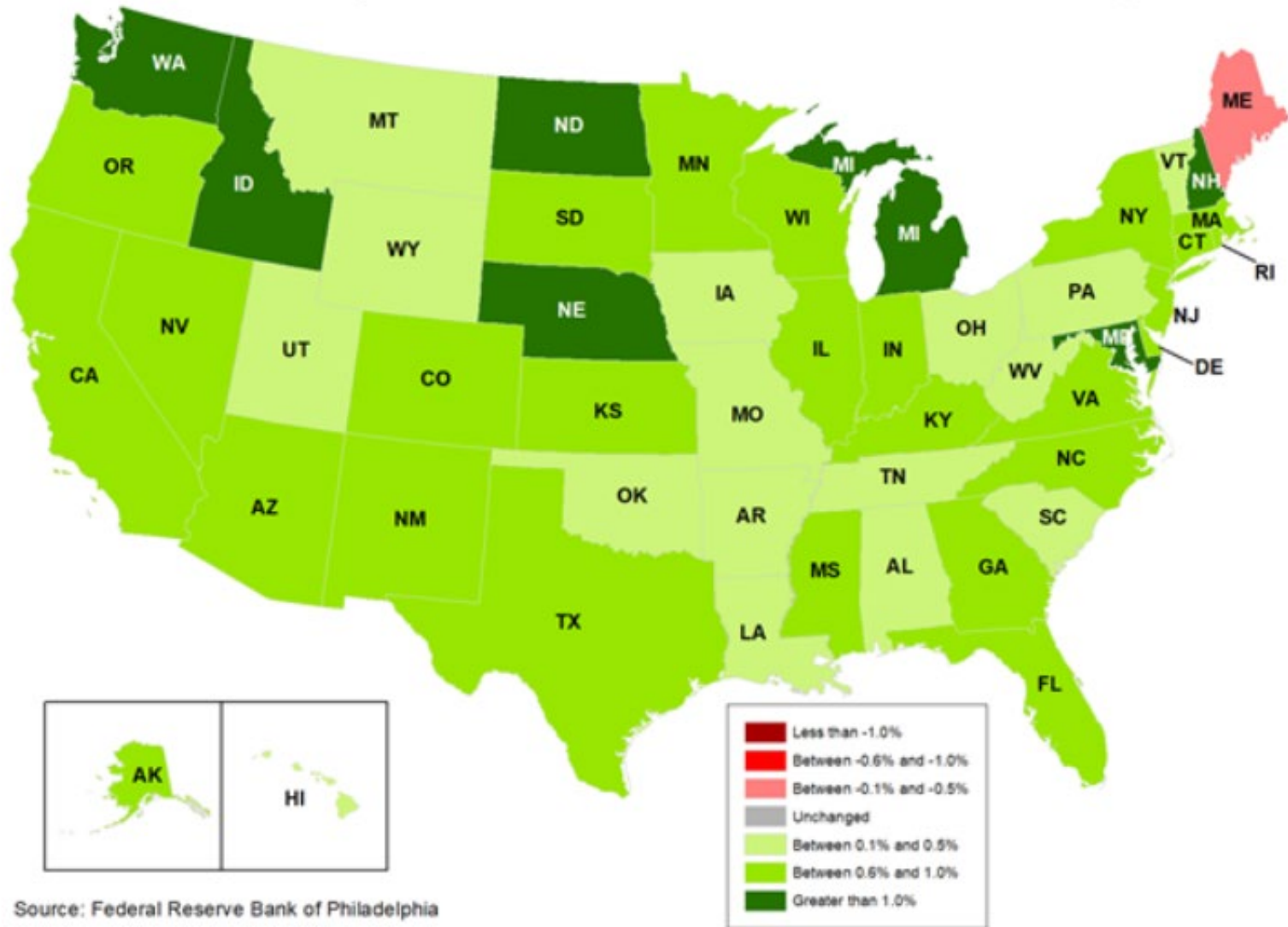
# January 2020 State Coincident Indexes: Three-Month Change



Source: Federal Reserve Bank of Philadelphia



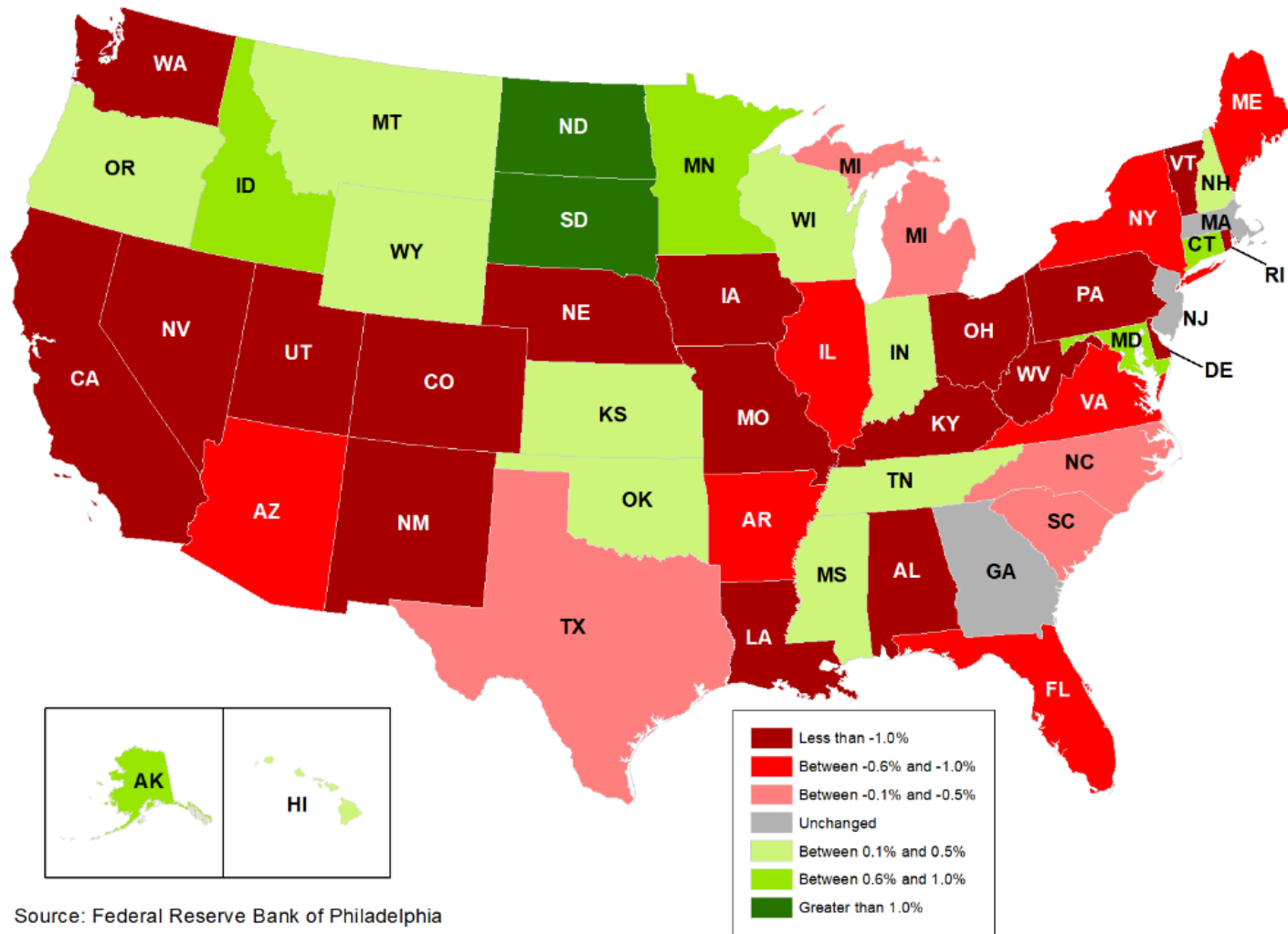
## February 2020 State Coincident Indexes: Three-Month Change



Source: Federal Reserve Bank of Philadelphia



### March 2020 State Coincident Indexes: Three-Month Change



Source: Federal Reserve Bank of Philadelphia







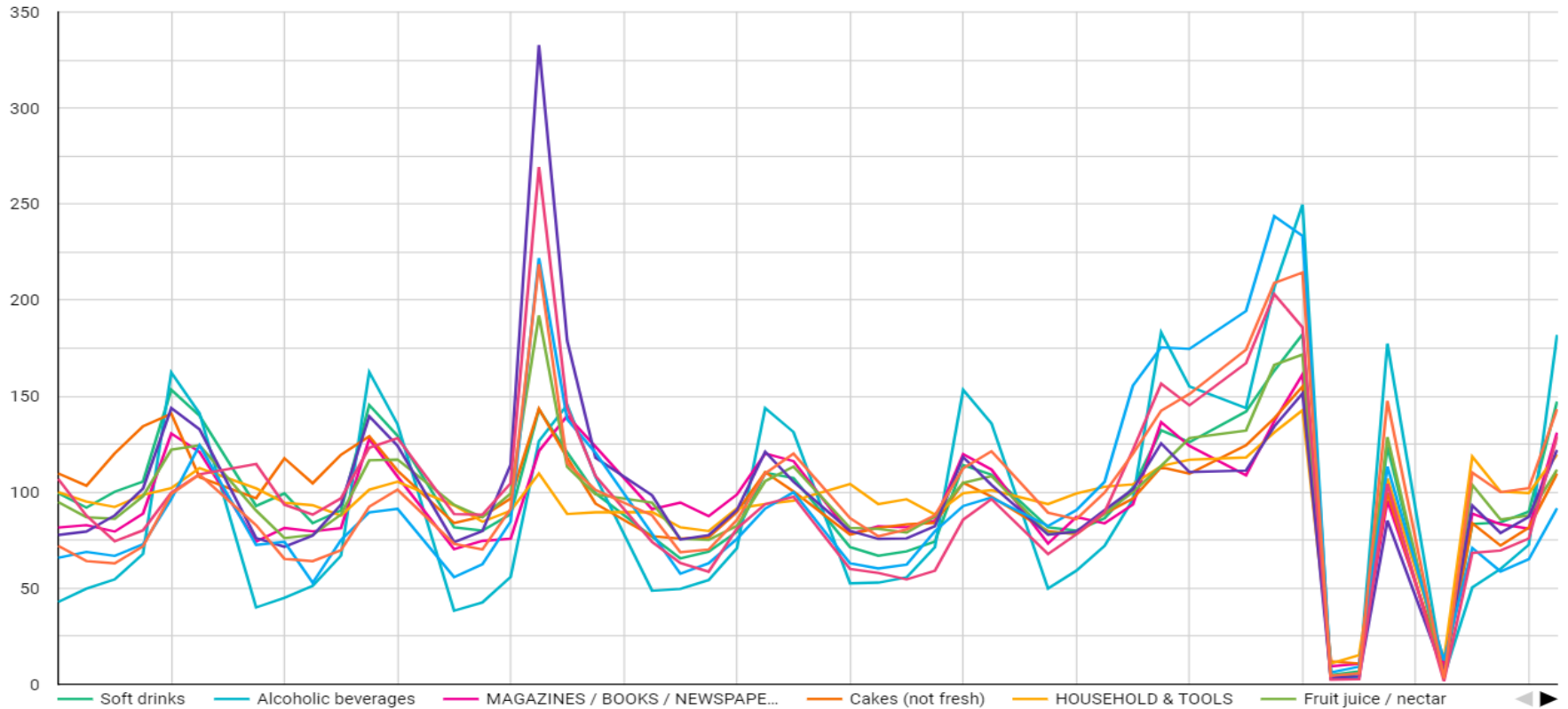


# R.E.A.C.H of Covid-19

- Among first businesses impacted by pandemic and Stay-a-home strategy were:
- Restaurants,
- Entertainment,
- Airlines,
- Cruises, and
- Hotels were Non-essential retail establishment were impacted next
- Basically businesses that have consumer density.
- Shifting load from Commercial to Residential
- Case of PGE shows immediate reach of Covid-19.



# Consumer Reaction (Purchasing for Pandemic)



Volumes are normalized so that the average volume per product across the time range is 100. Percent changes are computed as the average for all products in the selected categories.



Lift, surge week  
**26.86%**

Lift, surge day  
**148.64%**

Lift, week 1 post-surge  
**-5.52%**

Lift, week 2 post-surge  
**-5.01%**

# Consumer purchase priorities changed

## Top purchase changed from Diapers and Frozen Pizza to Alcoholic Beverages

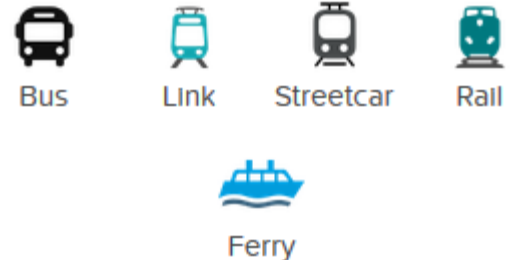
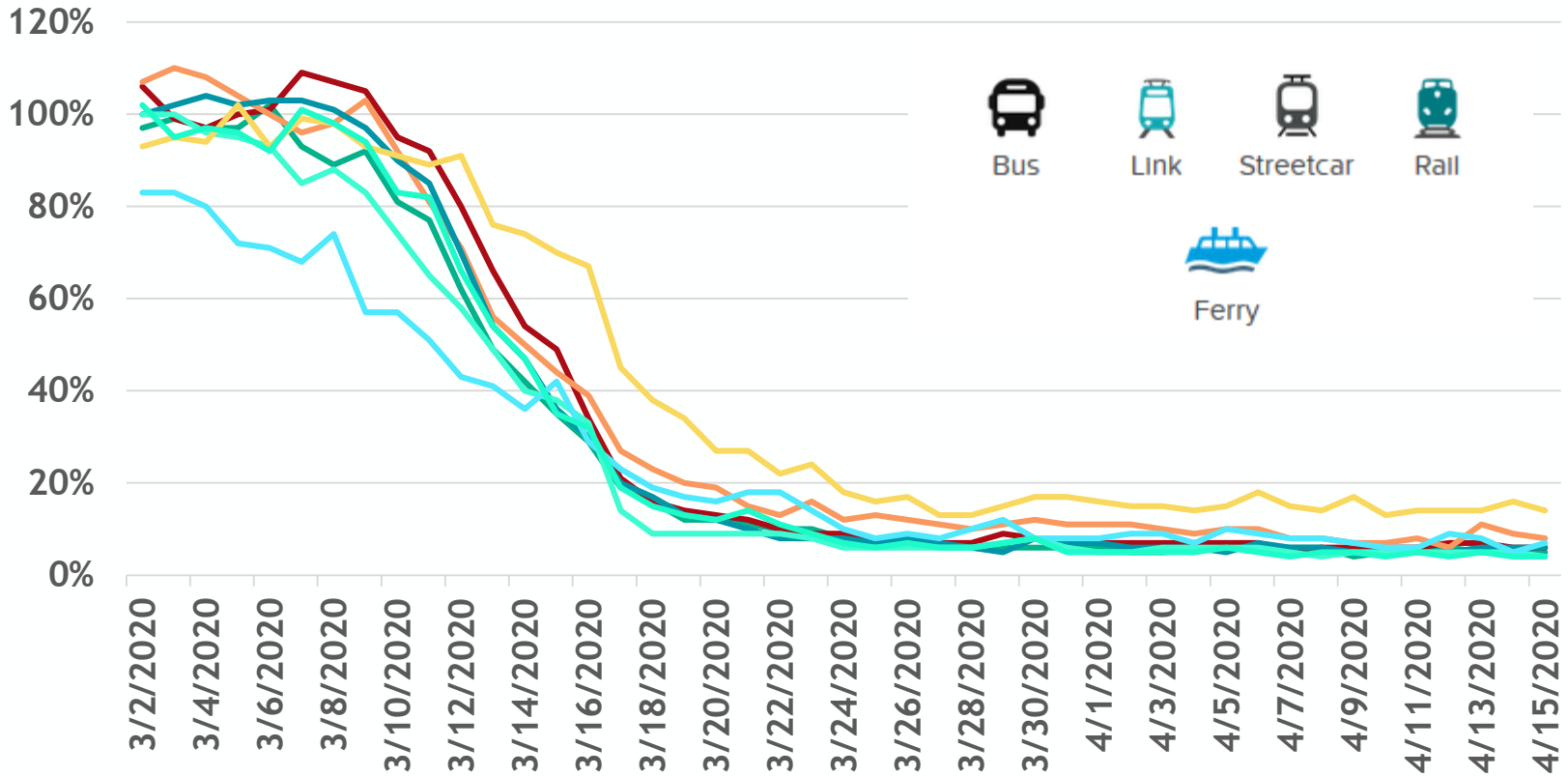
Average Purchase Normal week =100	March 12h	April 9th
Diaper	588	166
Frozen Pizza	333	151
Pork products	270	185
Frozen Meat	222	233
Oils	219	214
Fruit Juice	192	171
Cakes	143	155
Soft Drink	143	182
Alcoholic beverage	126	<b>250</b>
Book/	121	161
Household items	110	142

 **53%**  
 Cannabis Consumers Purchased More  
 Than a Two-Week Supply of Cannabis



# Percent of within city moving declined heavily

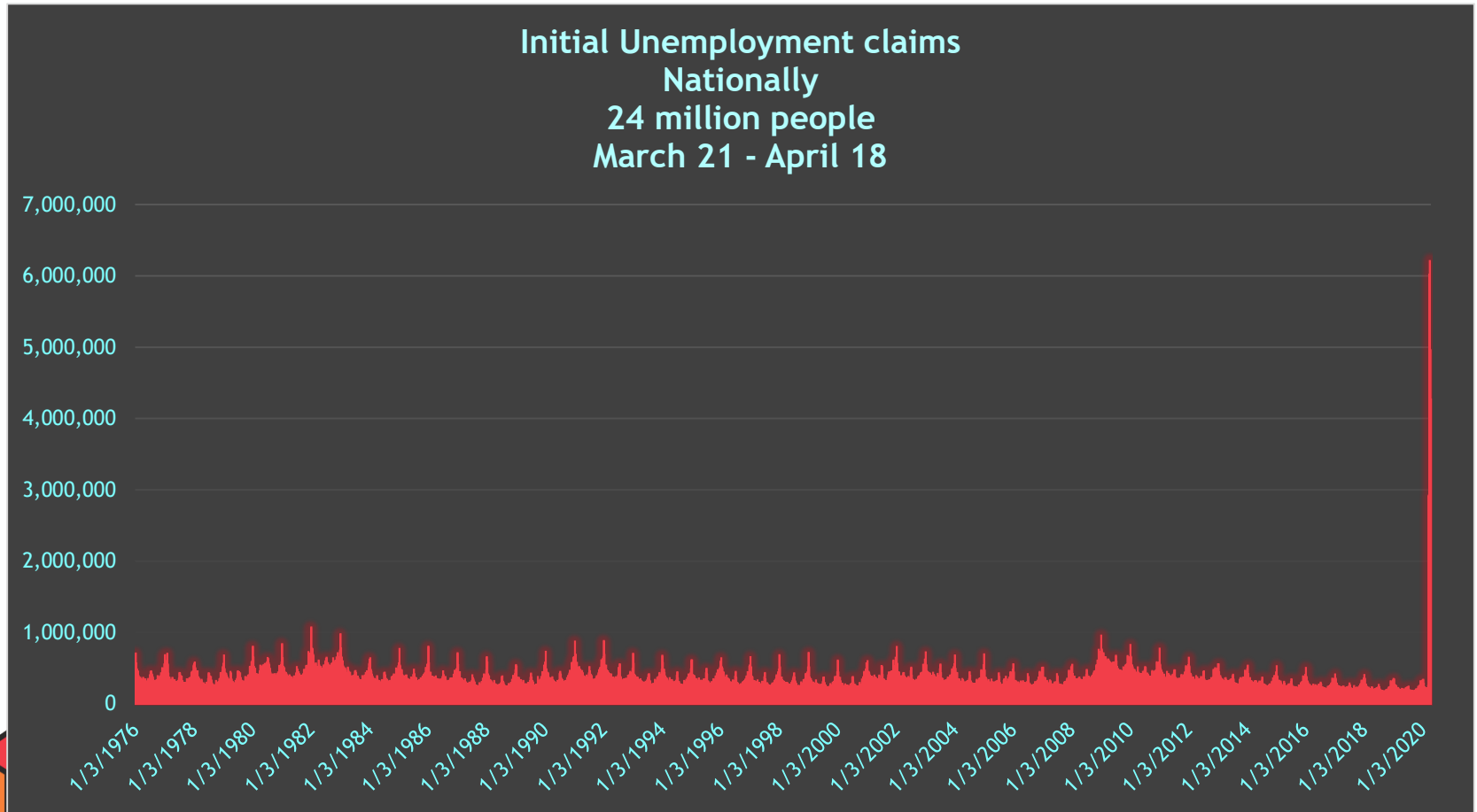
CityMapper Mobility Index\*  
March 2- April 15 2020



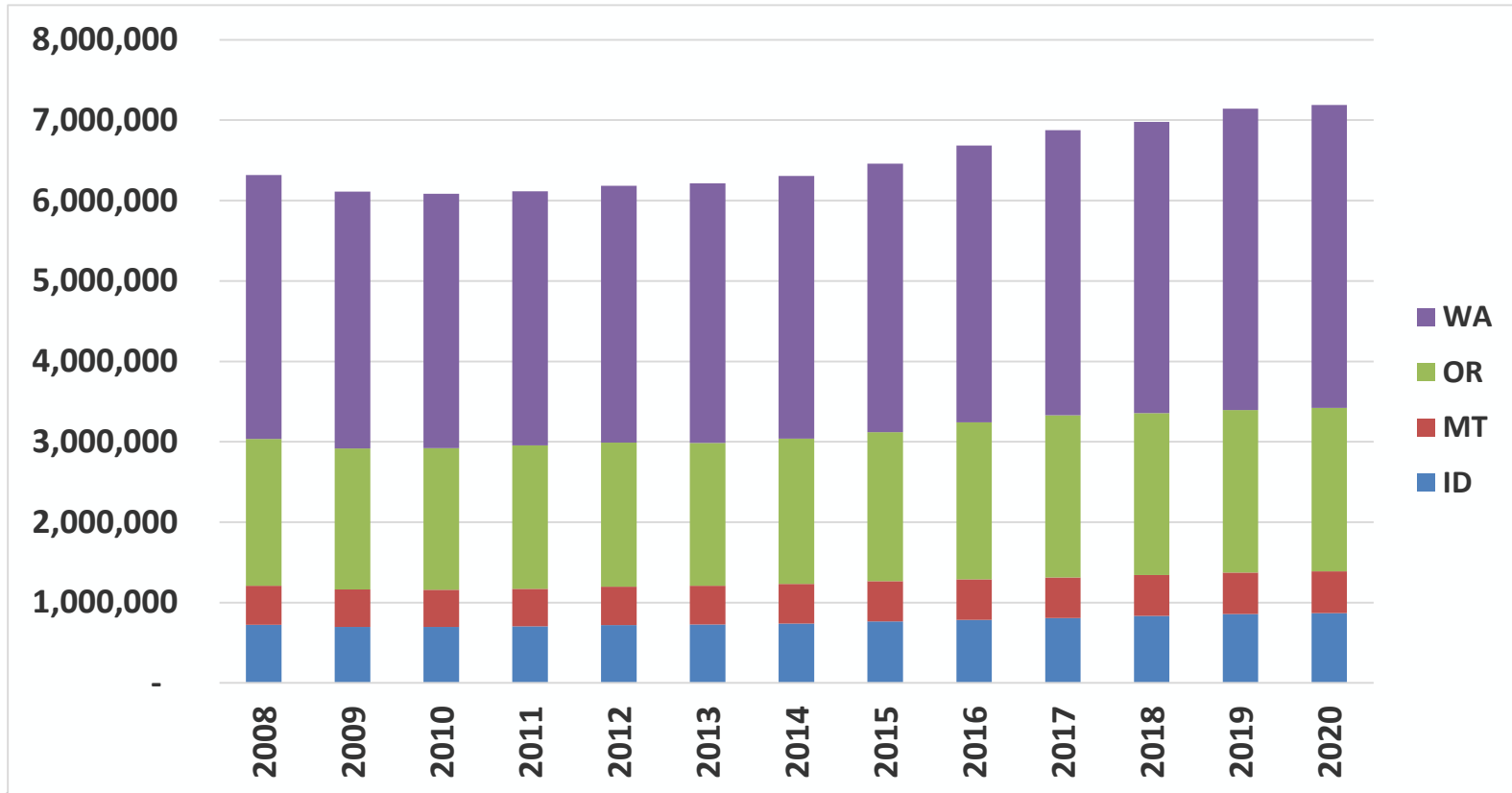
- Boston
- Chicago
- Los Angeles
- New York City
- San Francisco
- Seattle
- Vancouver
- Washington DC



# Nationally one out of 7 workers went on unemployment ~ 18% unemployment rate

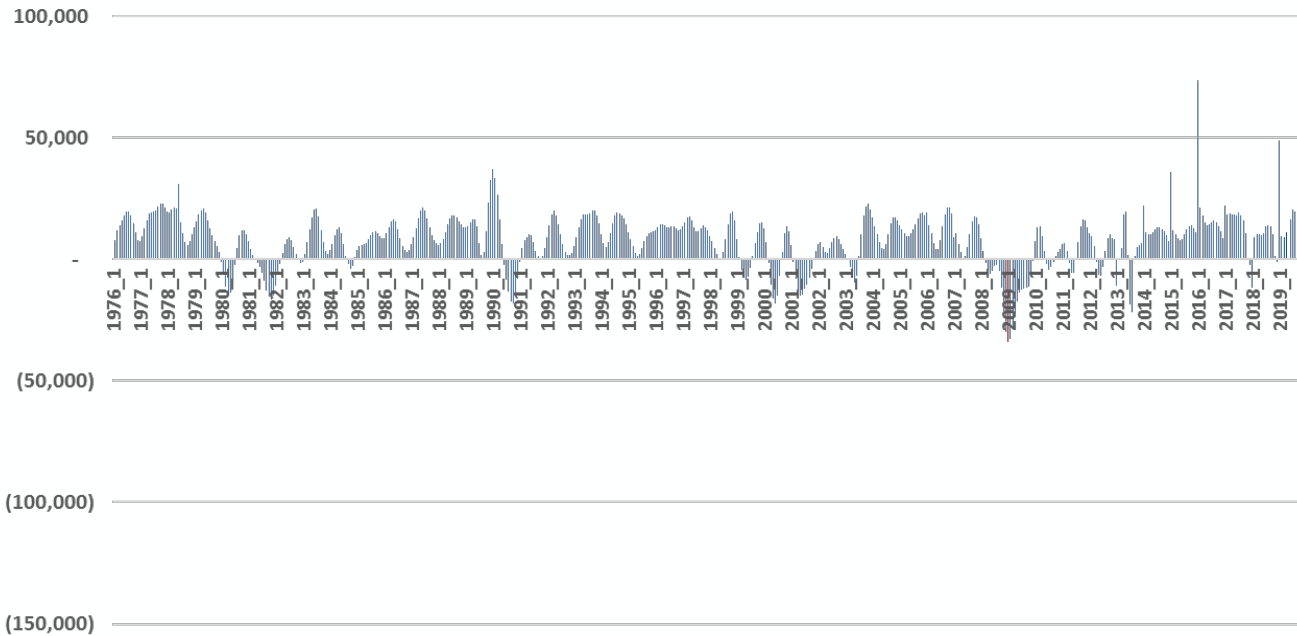


# Regional Employment Before COVID-19 pandemic was on an upswing



# March 2020 saw the largest single month drop in regional employment of the past 44 years – (April numbers maybe worse)

Change in Employment from prior month



- Decline in one month employment
- March 2020 ~ 113,000
- Past recession
- All of 2009 ~ 170,000

Except for WA, the other states show employment gains in March 2020

Four States	Employment Level	Change from Prior Month
Dec-19	7,198,552	
Jan-20	7,217,279	18,727
Feb-20	7,233,915	16,636
Mar-20	7,120,112	(113,803)

2020	ID	MT	OR	WA	4 states
Feb-Mar	2,442	687	1,922	(118,854)	(113,803)



# Near-term Economic Impacts

- S&P Global is predicting a global recession this year, and estimates the United States economy will see a 6% seasonally adjusted second quarter contraction before beginning to recover in the second half of the year.



# Impact on 2021 Power Plan

Currently available forecasts suggest:

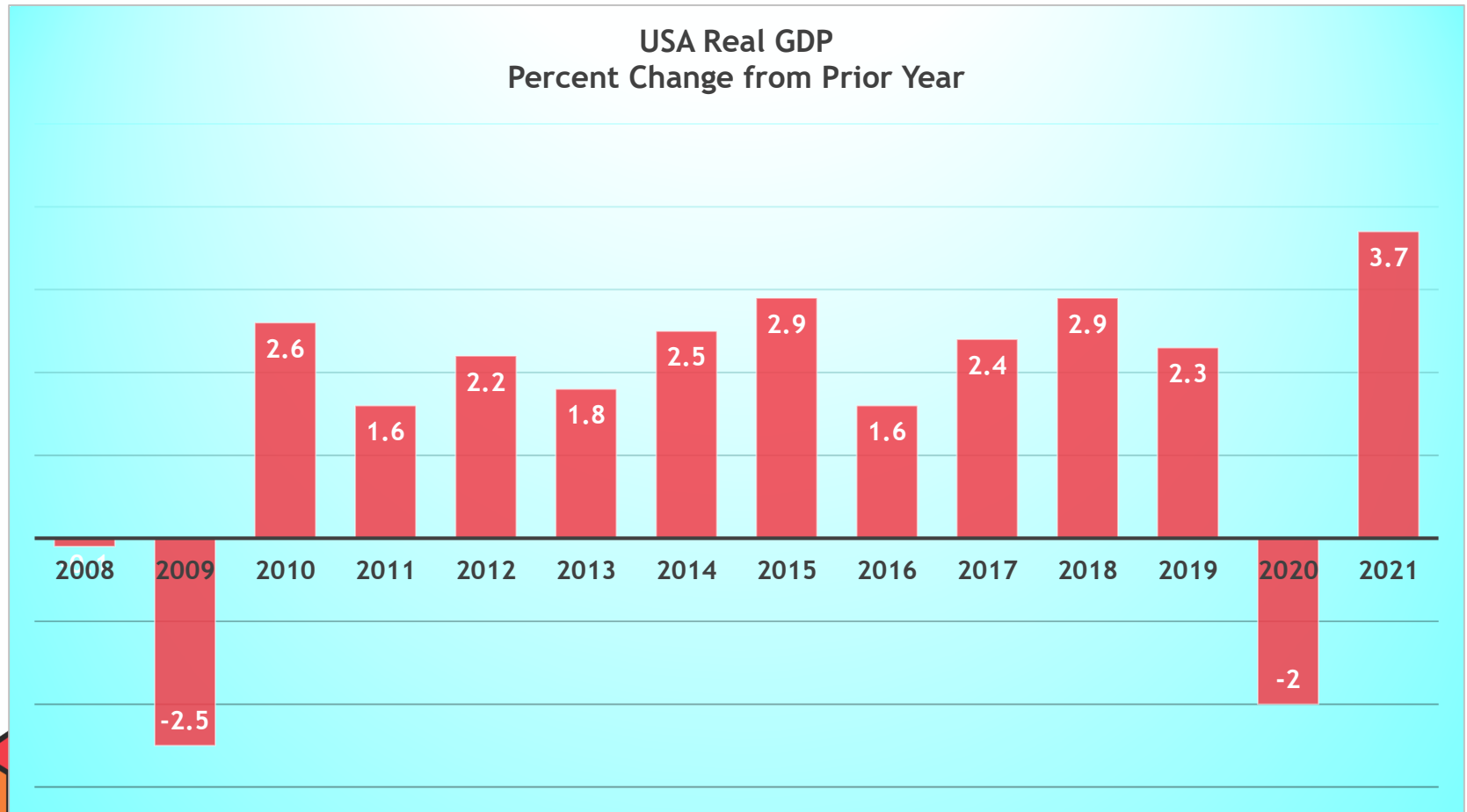
- Significant slowdown in Q1 and Q2 of 2020
- Some recovery in 2021
- Full 2022 forecast not available yet.
- Depends on shape of Recovery : V shape , U shape, L shape, or ....

	April 7th Forecast for Pacific and Mountain Regions			Growth Rate from Prior year		Long-term Impact on	
		2019	2020	2021	2020		2021
Total non-farm employment	Millions	35	34	34	-3.1%	0.9%	Commercial sector
# of households	1000's	28,585	28,884	29,212	1.0%	1.1%	Residential sector
Personal income	Billions 2009 dollars	4,011	3,999	4,080	-0.3%	2.0%	Transportation
Industrial Output	indexed to 2012	223	215	223	-3.4%	3.5%	Industrial sector
Real GSP	Billions 2009 dollars	4,995	4,901	5,113	-1.9%	4.3%	

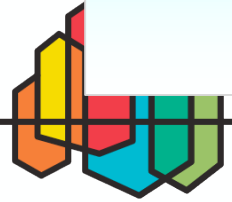
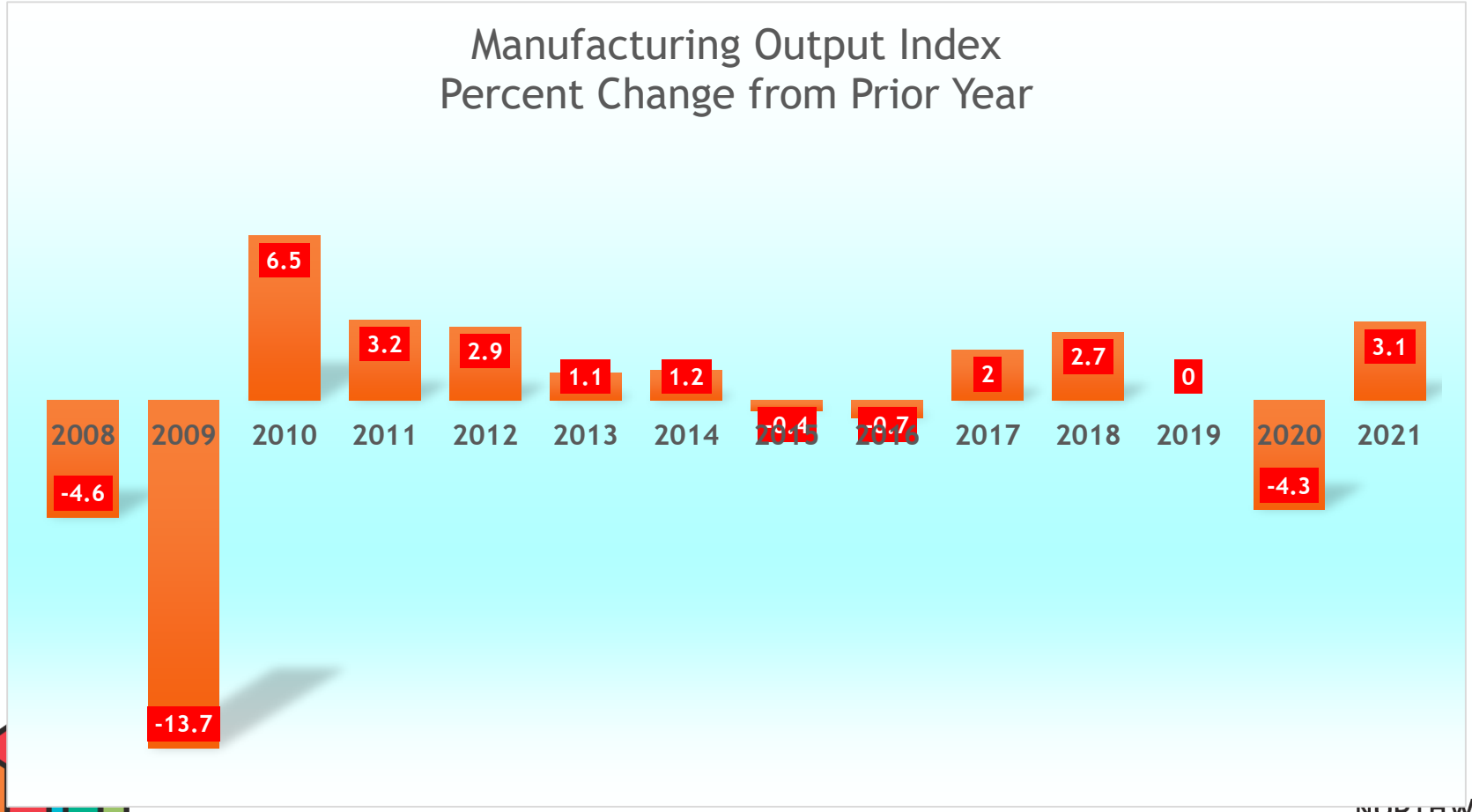
Pacific region covers, California, Oregon and Washington.  
Mountain region covers all other US states in WECC.



# Forecasted 2% Decline in GDP in 2020 with strong recovery in 2021

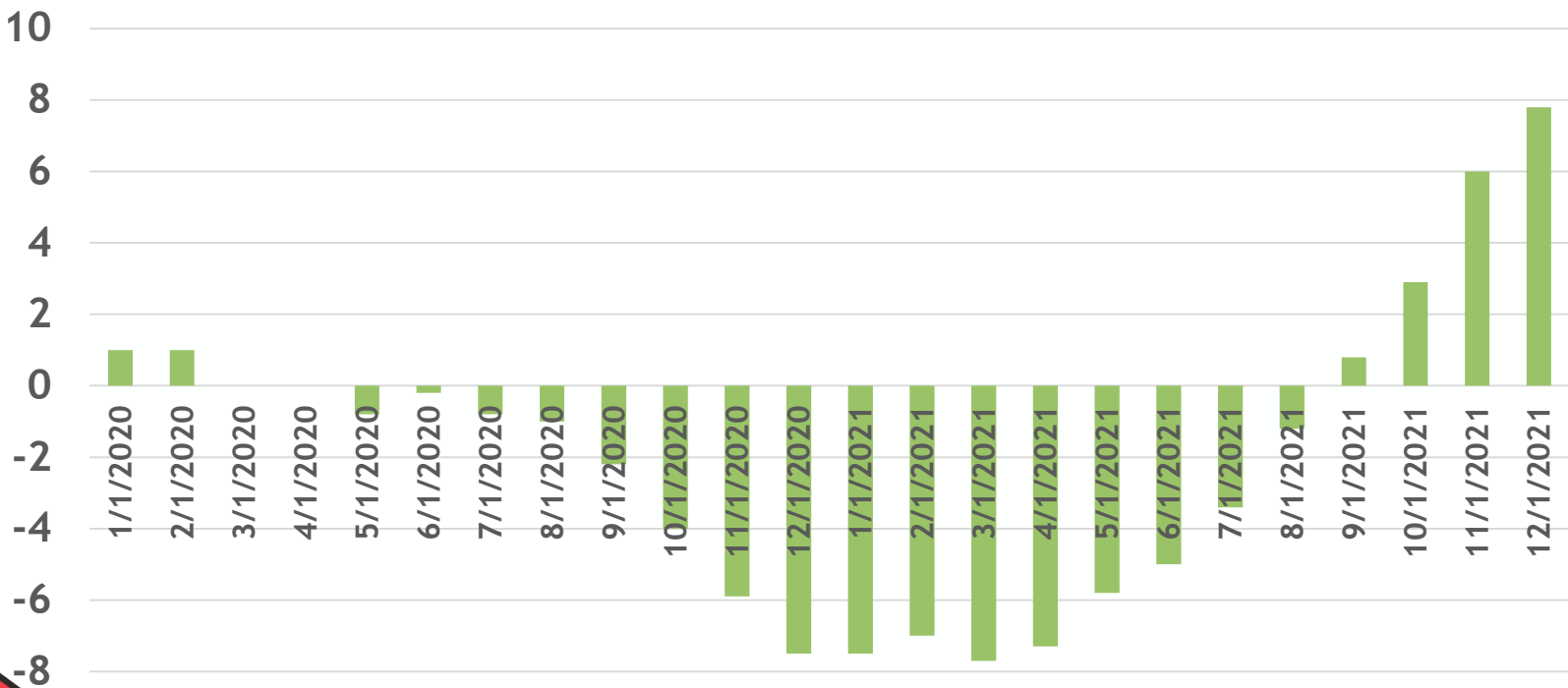


# Four percent decline in Manufacturing Output Forecasted for 2020 compared to 2019



# From EIA Short-term Forecast contraction in Manufacturing Production index until September 2021

Percent change from prior year Manufacturing Production Index  
2020 compared to 2019



The image features an abstract graphic composed of several overlapping shapes. On the left, there is a small light green trapezoidal shape. To its right is a large teal pentagon with a pointed top. Further right is a light blue trapezoidal shape with a white outline, which is partially overlapped by a larger light green trapezoidal shape on its right side. The text 'Electric Load' is positioned in the lower-left area, overlapping the teal and light green shapes.

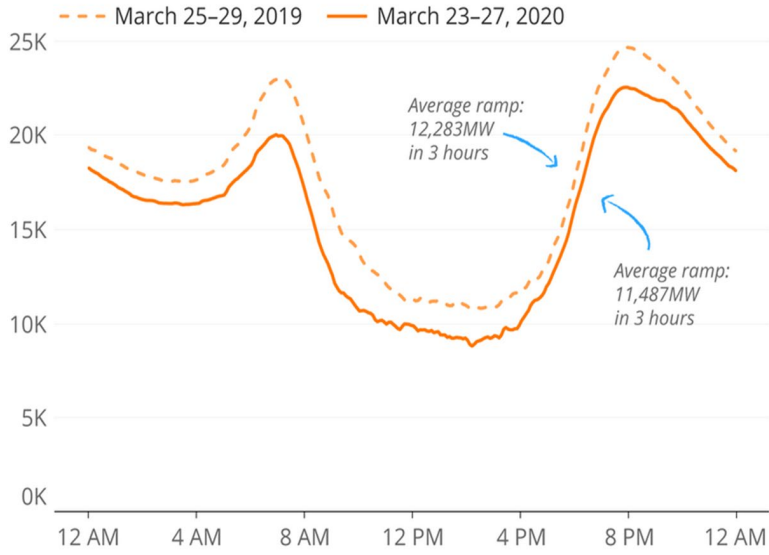
# Electric Load

# Load Impact of Strategies to Combat Covid-19

- There has been a number preventative measures initiated by state and local governments.
- How do these initiative impact regional loads?
  - In short-term
  - In long-term
- Long-term impacts will be felt through changes in economic conditions at the national and state level.
- Once duration and severity of the pandemic is better known, long-term impacts will be assessed.
- In this portion of presentation we will focus on February-April load impacts.
- Utility load impact varies, depending on the particulars of their customers.



## California average daily net electricity demand, megawatts

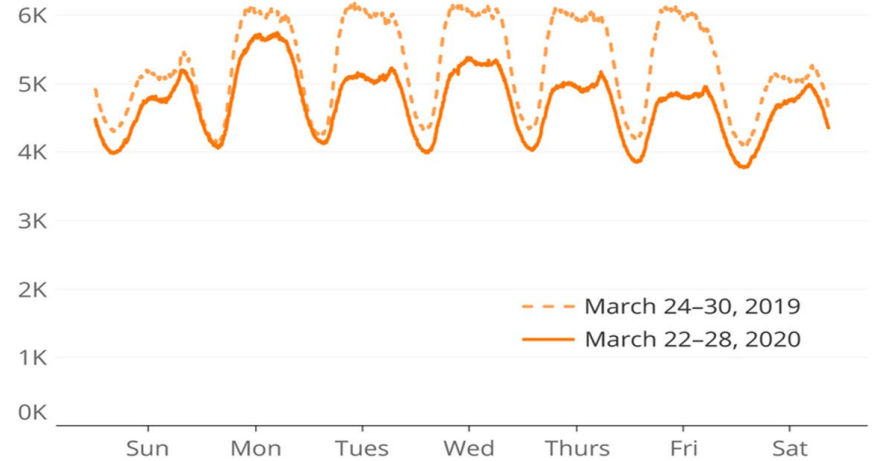


Source: California Independent System Operator   
 Net demand refers to demand minus solar and wind.

grist

## Powering down

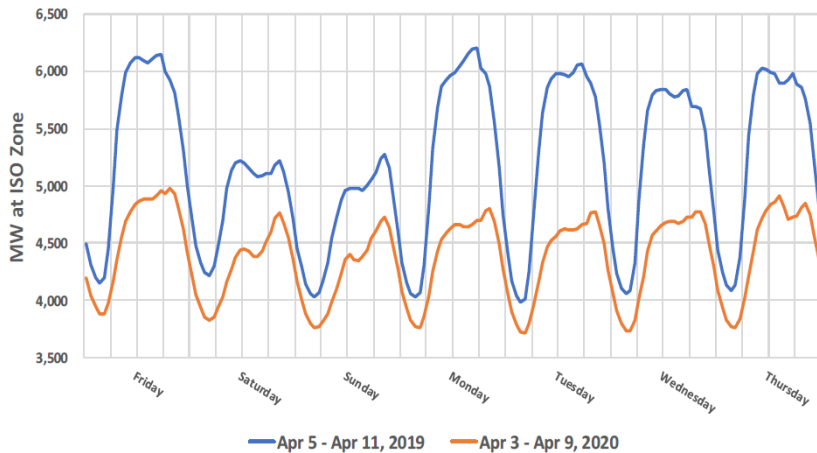
### New York City load, megawatts



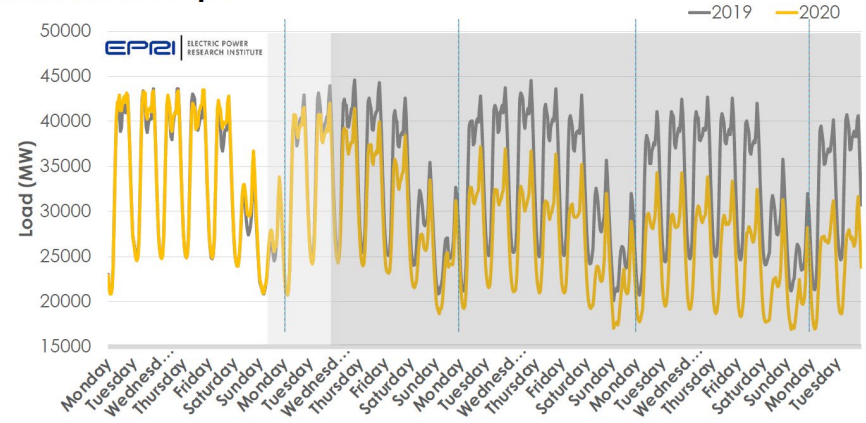
Source: New York Independent System Operator

grist

### Zone J - NYC System Loads (from ISO) - Last 7 days of 2020



## Italian Example



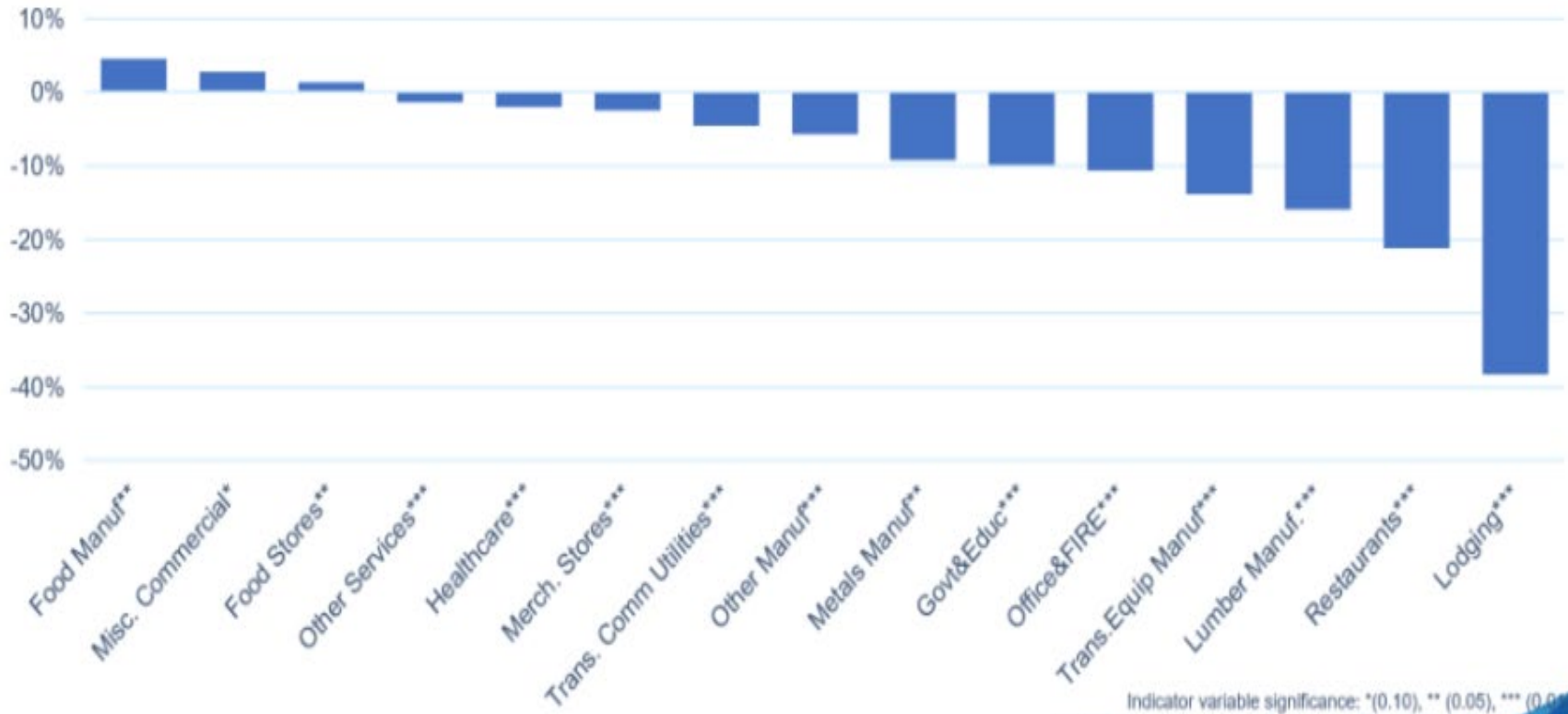
Weather and economic growth impacts not considered but clear trend observable

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# Preliminary- Daily Load Response by Segment: March 22-April 1



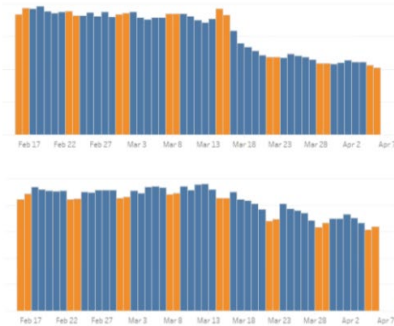
Indicator variable significance: \*(0.10), \*\* (0.05), \*\*\* (0.01)  
 Insignificant change: Other Trade, High Tech Manuf., Paper Manuf.



## Selected segments: heavy-impact

- Lodging
  - Currently down ~30%
- Restaurants
  - Currently down ~20%

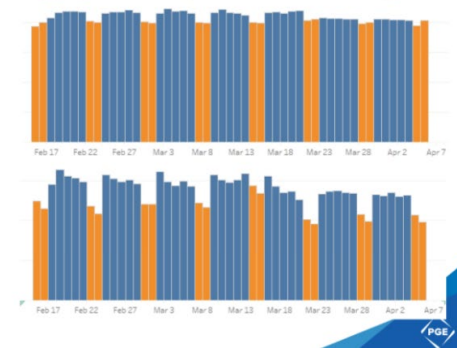
Aggregation of 15 top Service Points in the Segment



## Selected segments: heavy-impact

- Government & education
  - Currently down ~10%
- Other offices (“Office, Finance Insurance & Real Estate”)
  - Currently down ~10%

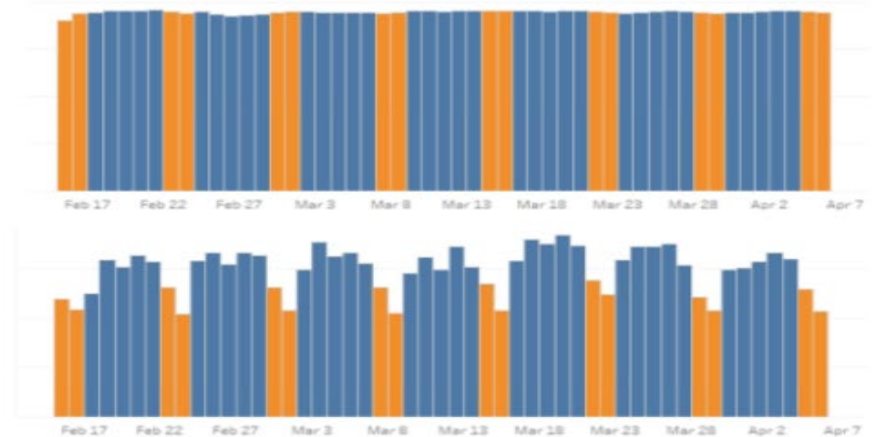
Aggregation of 15 top Service Points in the Segment



## Selected segments: no impact

- High tech manufacturing
  - No decrease
- Food manufacturing
  - No decrease. Perhaps slight increase
- Construction and manufacturing excluded from stay home order

Aggregation of 15 top Service Points in the Segment



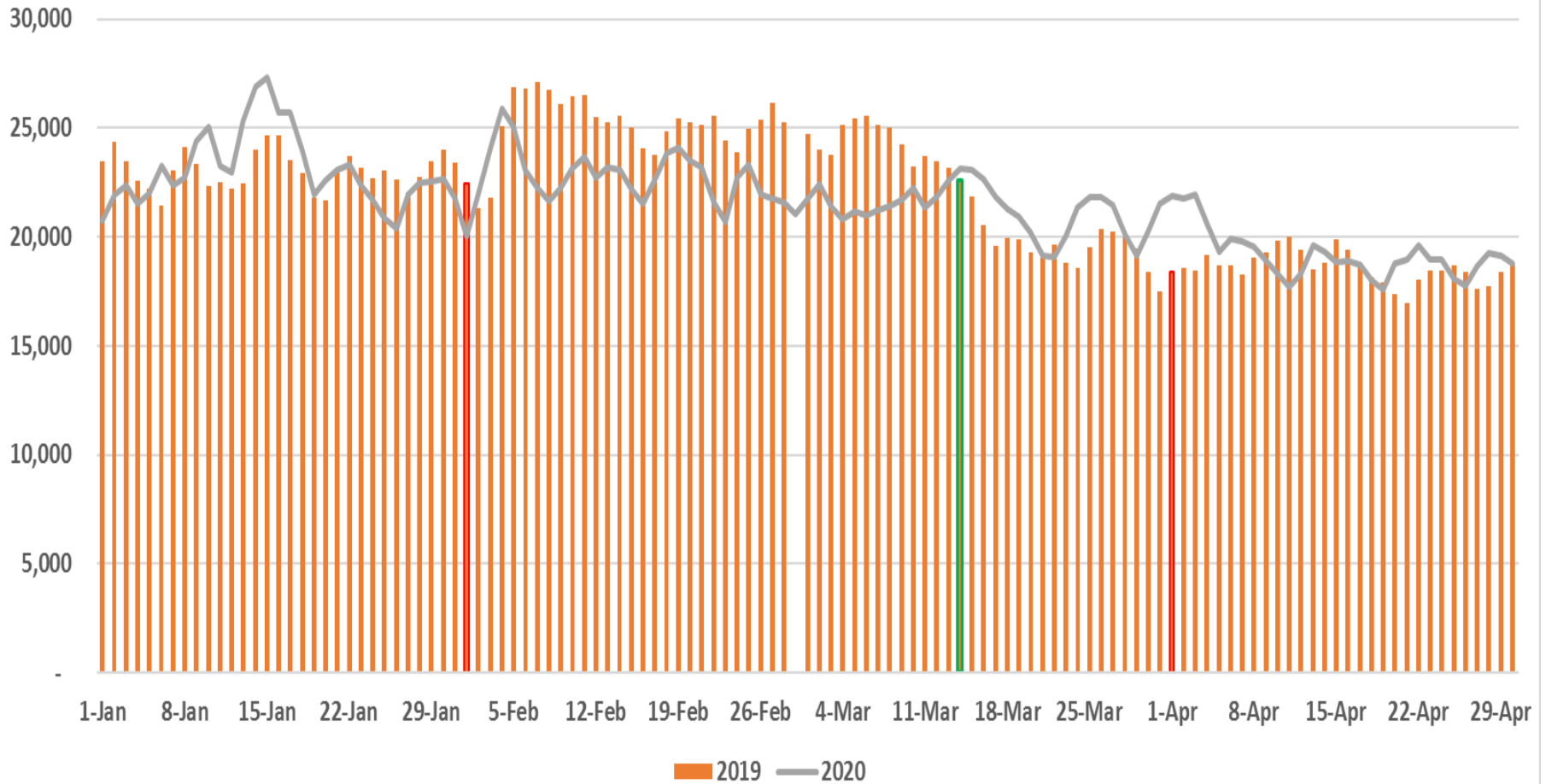
# Estimating Load Impact at Regional Level

## Data Source and Assumptions

- We typically use Balancing Authorities hourly load data that are submitted to WECC, this data is usually about a year behind.
- For this analysis we used EIA 930 used in compilation of Grid Monitor database. EIA 930. This data set is not as clean as final WECC data we receive.
- We also brought in data on daily temperatures, and monthly employment levels to weather normalize loads.



Regional Observed Daily Load  
 Prior to adjustment for weather  
 January 2020 Through April 2020 Compared to Prior Year



Preliminary- subject to change



# IOUs Loads had a Larger Swing than POUs

*March and April 2020 compared to prior year*

Observed Loads aMW	March 2019	March 2020	April 2019	April 2020	% Change Mar-20	% Change Apr-20
Council footprint	21,681	21,289	18,604	19,211	-1.8%	3.3%
IOUS	12,191	11,903	10,378	10,904	-2.4%	5.1%
POUs	9,490	9,386	8,225	8,307	-1%	1%



# March 15-April 2020 observed Loads grow by 5% compared to 2019

prior to adjust. In weather	2019	2020	% change
January	23,060	23,071	0%
February	25,098	22,738	-9%
March	21,673	21,289	-2%
April	18,604	19,196	3%
<b>March 15-April 30th</b>	<b>18,954</b>	<b>19,824</b>	<b>5%</b>



Preliminary- subject to change

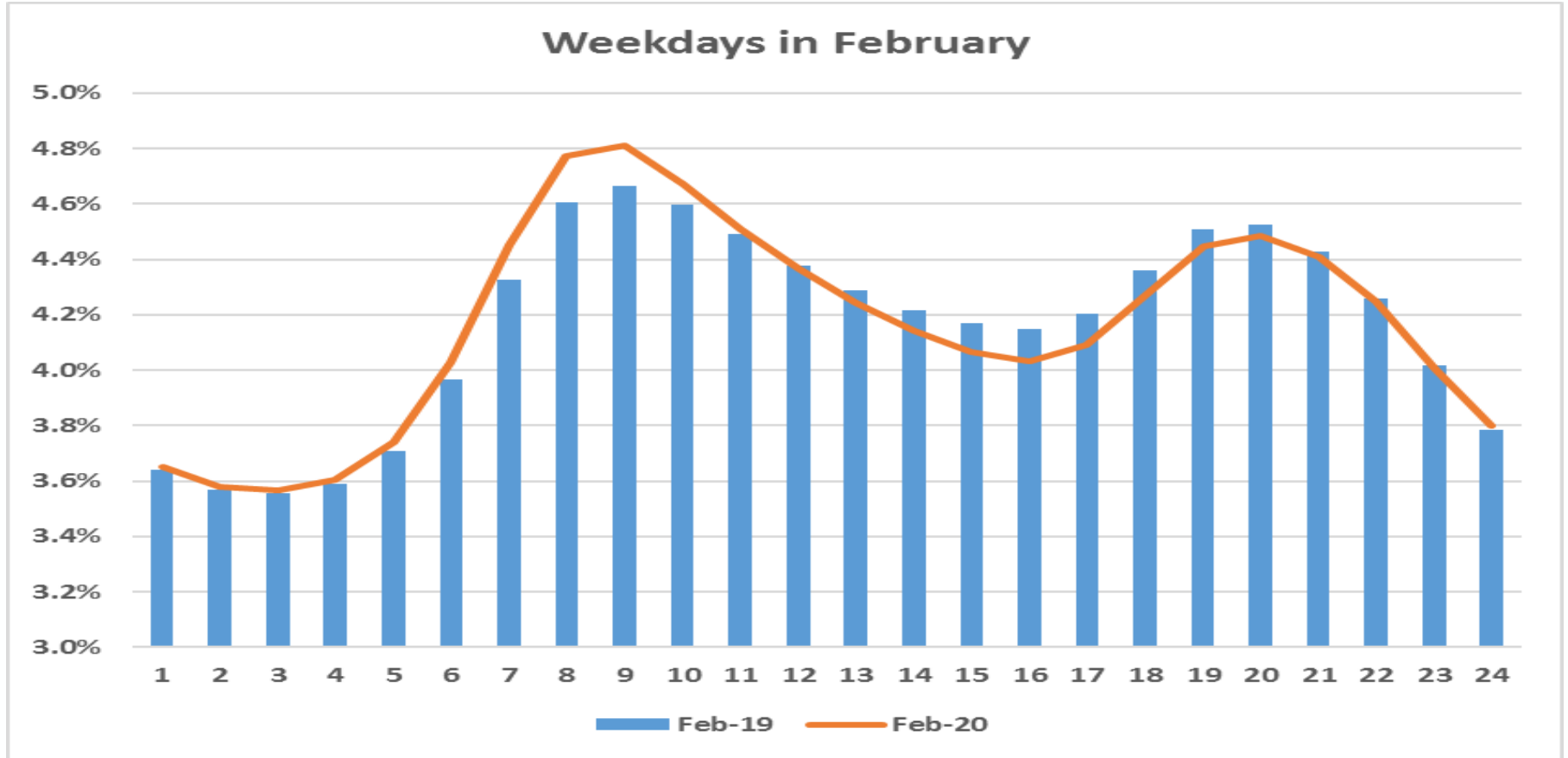
## Most of decline in March loads occurred on Weekdays

2020 compared to 2019	Percent Change in observed Loads
SUNDAY	-0.9%
MONDAY	-4.1%
TUESDAY	-6.6%
WEDNESDAY	-7.8%
THURSDAY	-8.6%
FRIDAY	-10.5%
SATURDAY	-5.5%



Preliminary- subject to change

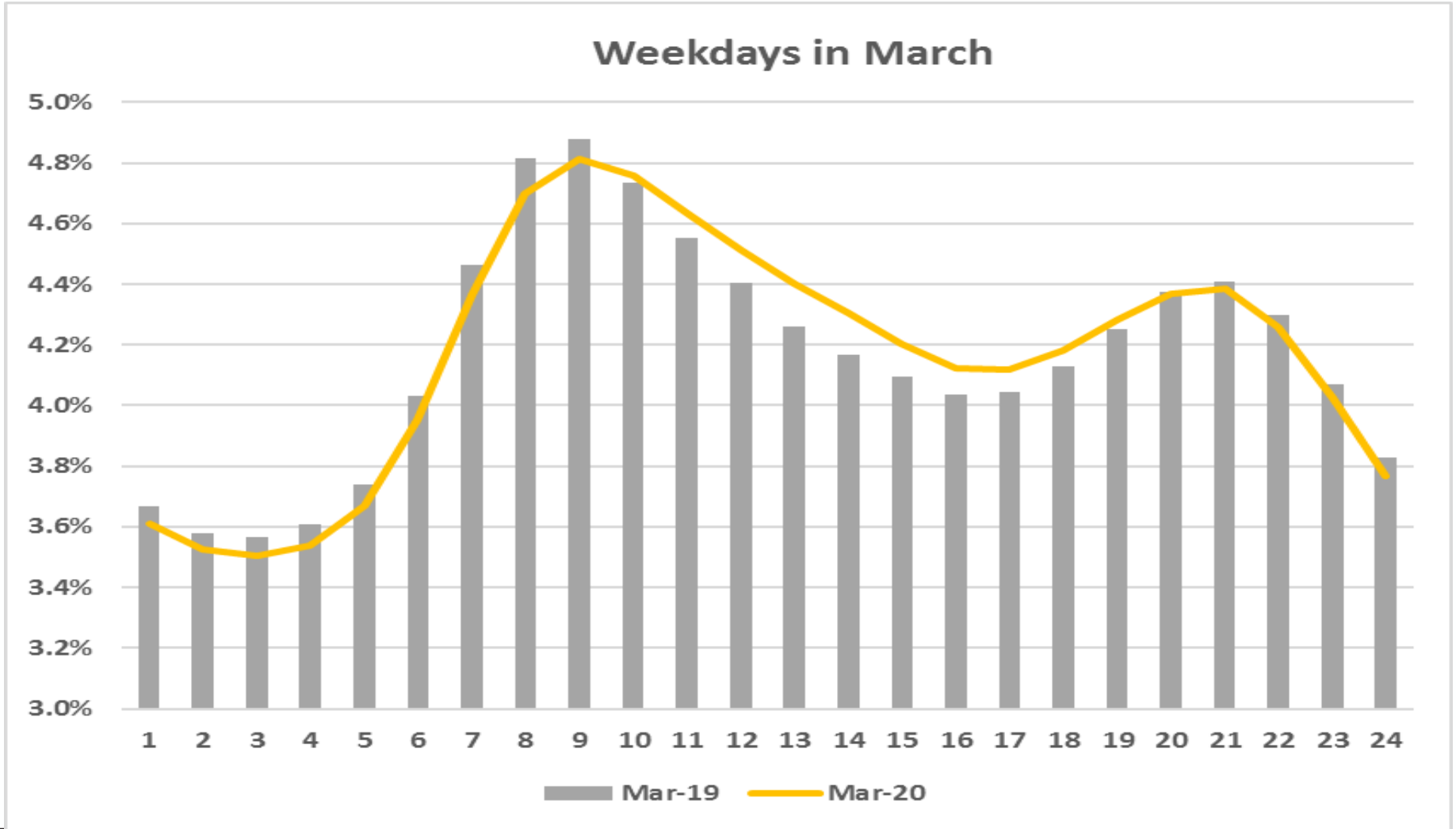
# Daily use patterns in February



Subject to change



# March hourly load shapes



Subject to change

# Was the change in loads solely due to reactions to Covid-19?

Typically these factors influence short-term loads

1. Changes in economic conditions (Employment)
2. Change in weather conditions (cooling or heating needs)

To isolate load impact of COVID-19 and stay-at-home strategy

We need to hold constant employment and weather conditions.

We started with:

- Re-estimating structural equations used in our short-term model. (1/1/1995- 2/29/2020)
- Held employment levels for March and April 2020 at February 2020 levels (removed drop in employment in March and April).
- Provided normal temperatures for March and April (removed weather variations).
- Compared the simulated loads and observed loads for period March 15-April 29<sup>th</sup> 2020.
- Simulated WN loads for March 15-April 29<sup>th</sup> 2020 were 1.2% lower than they would have been absence stay-at-home directive.

Statistical analysis of daily loads suggests that Stay-at-home directives has had limited impact on regional loads. Well within range of range of uncertainly in inputs.



# Regional Temperatures in Pandemic period has been very close to normal

Degree F	Observed monthly Average Regional Temperatures-2020	Normal Historic monthly Average Regional Temperatures 1928-2020	% Above Normal
January	35.39	34.60	2.28%
February	38.88	38.01	2.30%
March	43.35	43.22	0.29%
April	48.74	48.60	0.30%



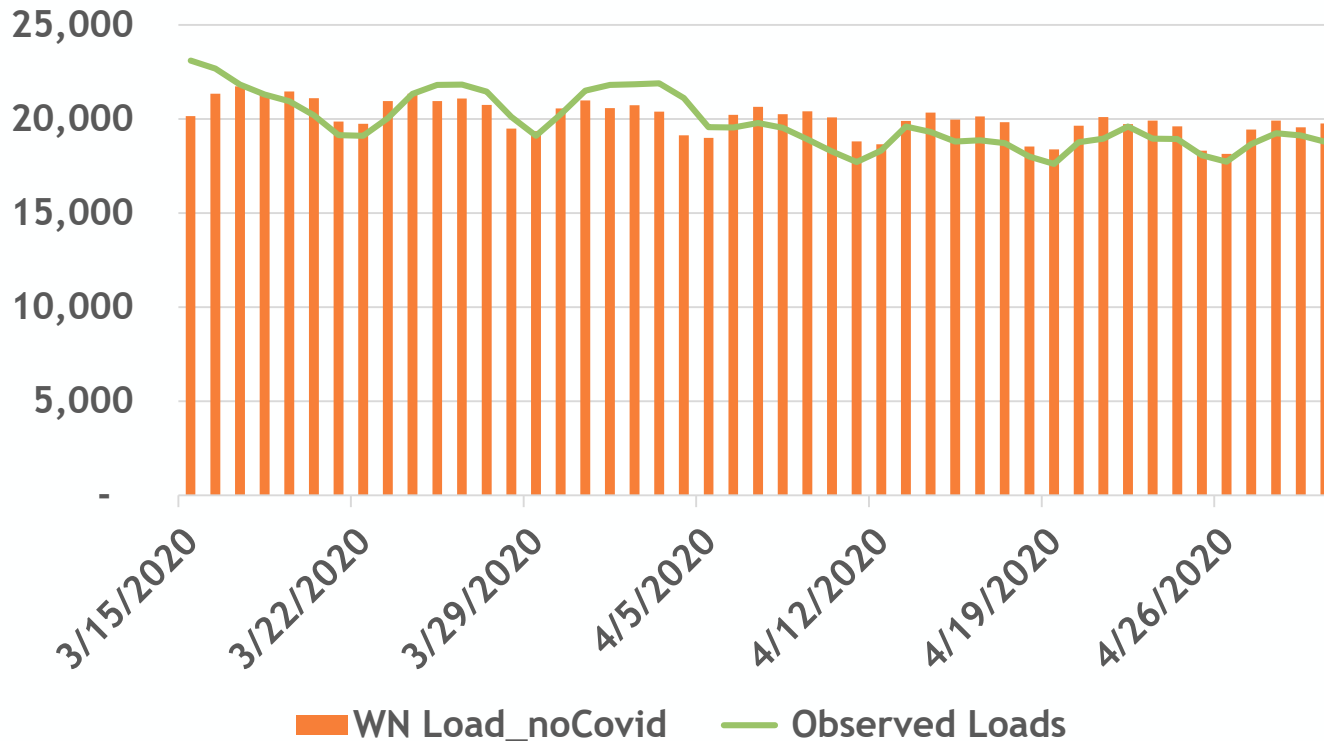
# For isolating impact of Covid-19 we Kept employment levels for March and April at February Levels

	Regional Employment (1000)	Employment with levels held at Feb 2020 level
Jan-20	7217	7,217
Feb-20	7234	7,234
Mar-20	7120	7,234
*Apr-20	7120	7,234



# Holding Temperature at Normal levels and employment levels at February levels On Average Regional Loads were Lower by about 200 aMW due to Covid-19 policies

Load Impact of Covid-19



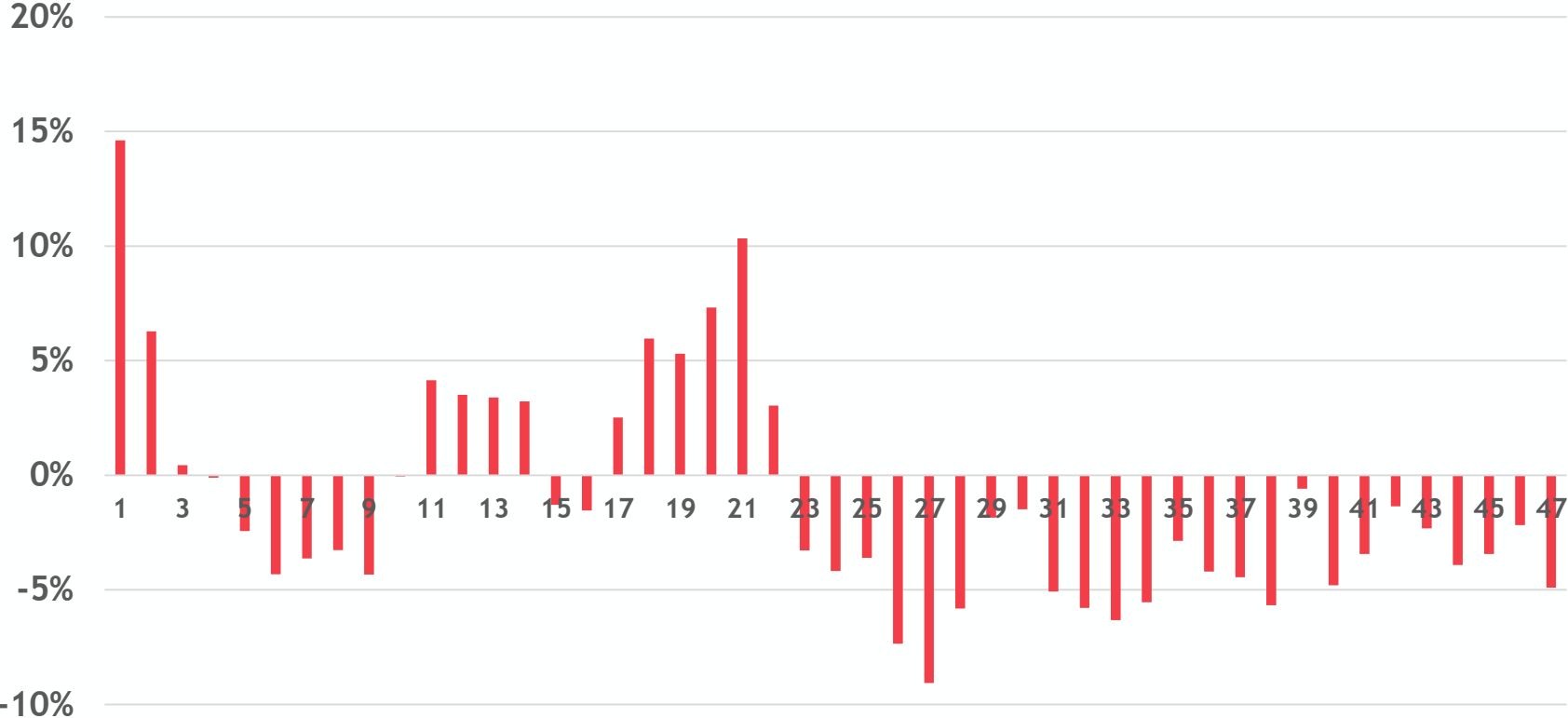
Subject to change



	Simulated Load	Observed Loads	% change
March 15-April 30h	20,062	19,854	-1.0%

# Percent Change Observed load to WN Simulated

March 15- April 30th 2020



**Subject to change**



# Change in Load compared to Prior Year (EIA Short-term Forecast)

Pacific and Mountain	2020	2021
Residential	1.2%	0.3%
Commercial	-3.2%	-0.7%
Industrial	-0.5%	-0.2%
Total	-0.9%	-0.2%



CA, OR and WA	2020	2021
Residential	0.4%	0.3%
Commercial	-4.7%	-1.9%
Industrial	-2.0%	-1.9%
Total	-2.2%	-1.0%

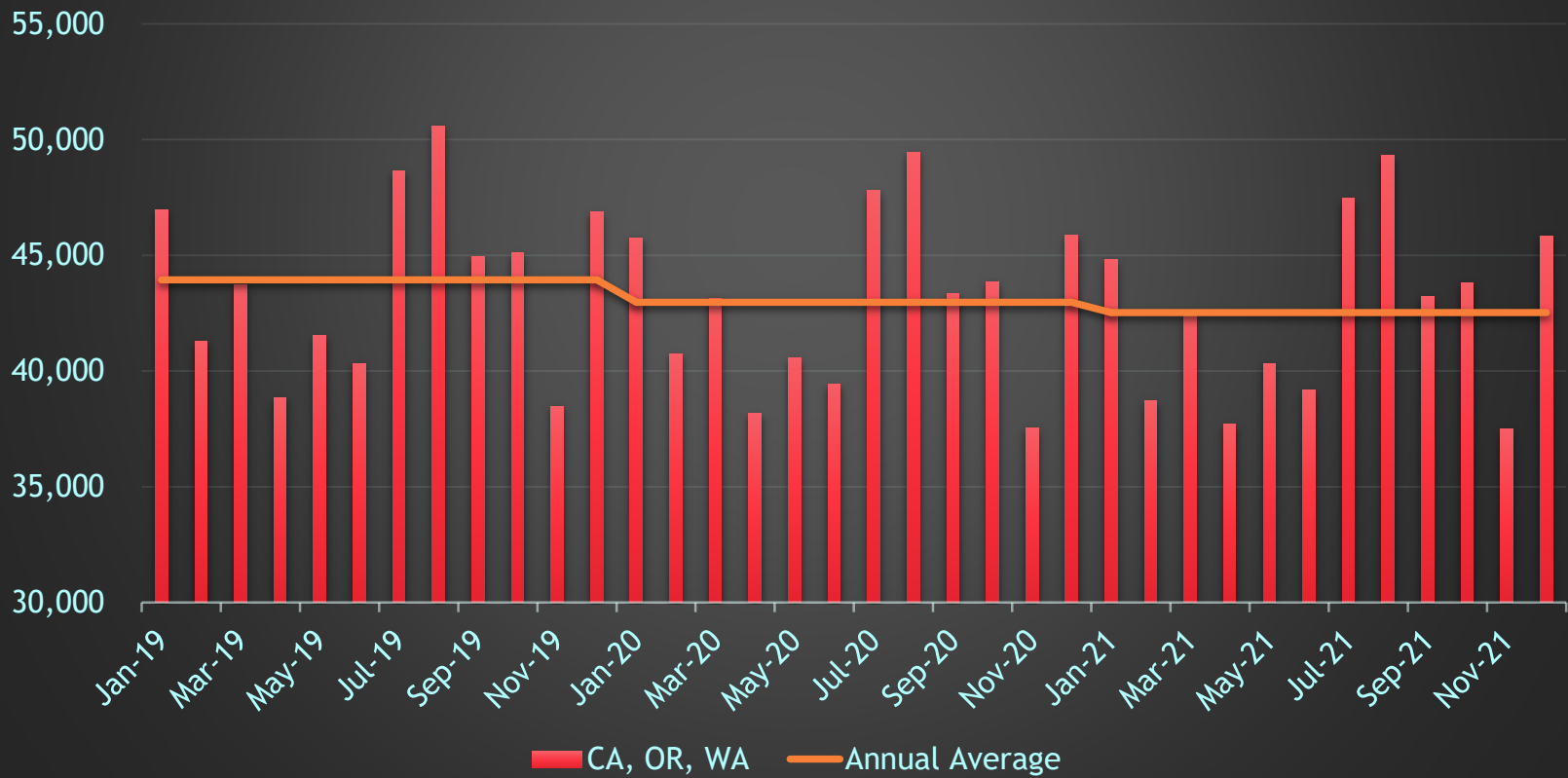


# Annual & Monthly Electrical Demand in California, Oregon and Washington States

## EIA Short-term forecast

### April 2020

#### aMW



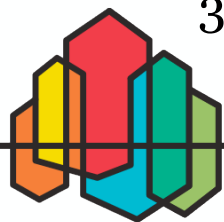


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# Electric Vehicles Natural Gas & Other Fuels

# Transportation – Electric Vehicles

1. Expect to see a significant drop-off in **all** sales of cars and light duty trucks/SUVs in 2020 as compared to 2019
2. Wood Mackenzie has projected that global sales of **electric vehicles** will drop 43% in 2020 due to the pandemic
3. The pandemic has impacted production of electric vehicles – battery factories in China and the US (Tesla) have cut back or temporarily closed
4. Past 2020 – it's hard to say
  1. Oil supply glut should result in lower gas prices at the pump for traditional ICE vehicles
  2. Continued strong support for electric vehicles
  3. Future stimulus projects could focus on electric infrastructure build out



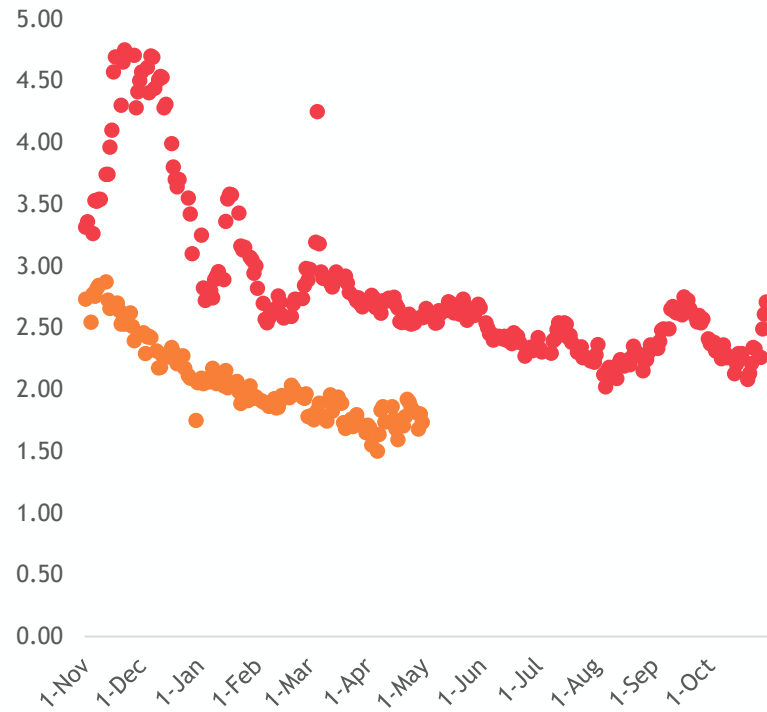
# Natural Gas Summary

1. Prices have remained at historic lows nationally so far in 2020
2. Futures are inching up – indicating that prices are expected to rise over the next 12 months
3. Production was at all time highs in 2019 - meanwhile the winter of 2019/2020 has been warm across the country. In fact January 2020 was the fifth warmest January for the US – so demand has declined
4. The number of active natural gas rigs have dropped from 123 at the start of the year to 85 today



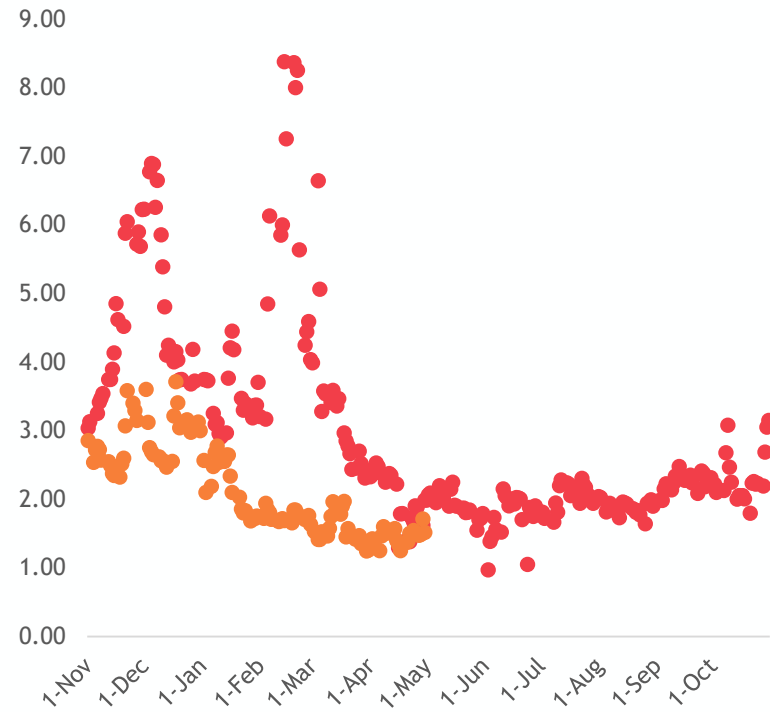
# Natural Gas Prices

Daily Natural Gas Prices  
Henry Hub \$/MMBtu



● Henry Hub (18/19) ● Henry Hub (19/20)

Daily Natural Gas Prices  
Opal \$/MMBtu

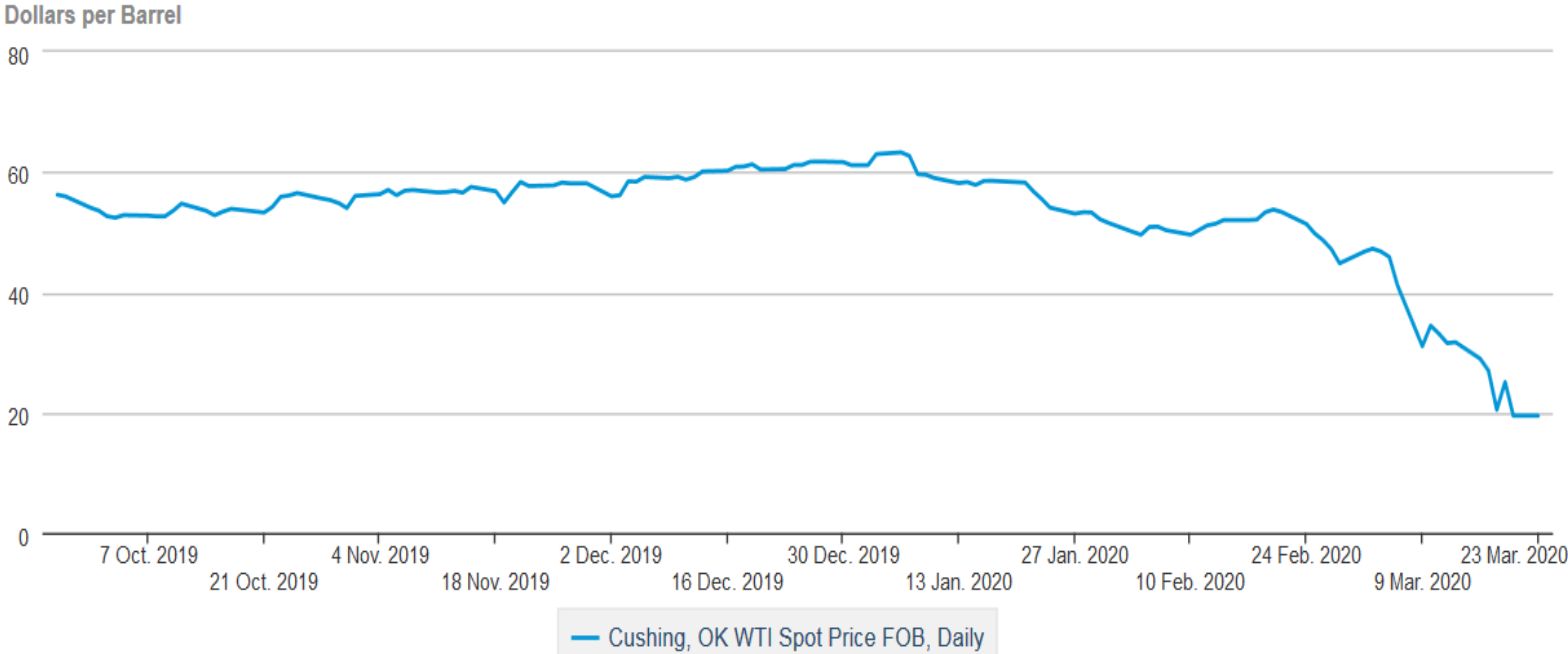


● Opal (18/19) ● Opal (19/20)



# Oil Price Crash added to Economic uncertainty

Cushing, OK WTI Spot Price FOB, Daily



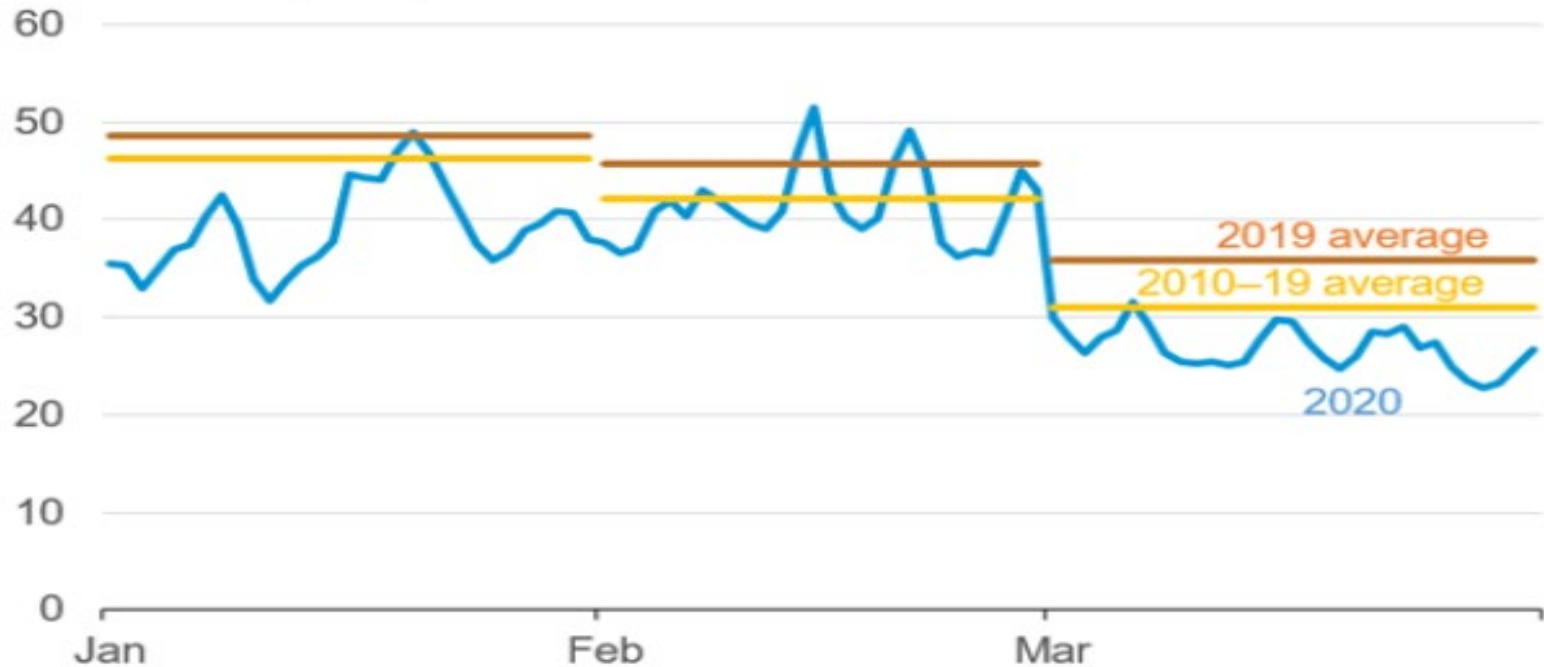
THOMSON REUTERS [Source: U.S. Energy Information Administration](#)



# A clear decline in National Demand for Natural Gas

**U.S. residential and commercial natural gas consumption (Jan—Mar)**

billion cubic feet per day



Source: IHS Markit (2020), U.S. Energy Information Administration (other years)



# Natural gas – what's next?

1. Fall out from the oil price war & supply glut
2. Natural gas well shut-ins, rig counts, financial health
3. Demand for gas is down – but this may be more weather related than anything else
4. Would reasonably expect prices to be higher than where they are now.... But how much higher?
5. LNG Market



An abstract graphic composed of several overlapping geometric shapes. On the left, a small light green trapezoid is partially visible. Next to it is a large teal pentagon. To the right of the teal shape is a light blue trapezoid. Further right is a large light green rectangle. The shapes are layered, with the teal and light blue shapes appearing in front of the light green ones. The text 'Energy Efficiency' is centered over the teal and light blue shapes.

# Energy Efficiency



# Two Important Notes

1. Too soon to say what the overall impacts will be on efficiency savings
2. It is a mixed bag, varying by region, utility, and program

2019 Regional Conservation Progress Survey will be collecting more information to help inform potential impacts on programs



# Trends from Programs

Potential Opportunities

Messaging about lowering bills with EE; essential industries align with EE opportunities

Closed facilities allows for some projects to proceed (ex: schools or ice skating rink)

Experimenting with new approaches (ex: DIY thermostat installs, remote engagement with SEM)

Exploring remote verification tools

Direct install programs are halted

Programs requiring contractors to enter homes are seeing slow downs (ex: weatherization)

Some utilities need to shift focus to other priorities (ex: low-income customers)

Some evaluation/research data collected during this time is not usable (ex: thermostat research, billing analysis)

Challenges for Efficiency



# Trends from Supply Chain

## Manufacturers

- Hard to get concrete information, but many are signaling they plan to meet targets
- Shifting to ensure safe working distances
- Some concern about downstream impacts

## Wholesalers

- Shifting to do what they can do remotely
- Not all are set up for remote work, resulting in some slow down
- Seeing some ramping up in online sales for some market (ex: lighting)

## Retailers

- Seeing big shifts towards online sales
- Some are doubling down on the messaging of efficiency (ex: Home Depot)
- Some products are becoming important (ex: freezers and air purifiers) creating an opportunity

## Trade Allies

- Significant impact to this industry as they work in homes and business
- Many are essential industries and are trying to transition to ensure safe working distances
- Some unable to get necessary continuing education requirements

An abstract graphic composed of several overlapping geometric shapes. On the left, a small light green trapezoid is partially visible. Next to it is a large teal pentagon with a pointed top. To the right of the teal shape is a blue trapezoid with a white outline. Further right is a large light green rectangle. The text 'Generating Resources' is centered over the bottom portion of these shapes.

# Generating Resources

# Coronavirus Effect on GHG Emissions



- International Energy Agency predicts that global energy-related carbon emissions will fall 8% in 2020
  - Largest annual decrease on record
- Early indications show as industry resumes, emissions “bounce” back to normal, before Covid-19
- Long-term, no suggestions of change in overall trends without structural and societal changes
  - Regional emissions may reflect a temporary decrease in load, however effect will likely be minimal
    - 2020 is a below-average hydro year



# Covid-19 Effect on Resource Development

Currently substantial development of and demand for renewable projects at the regional, WECC and nationwide level due to:

- Renewable portfolio standards, clean policies, utility, jurisdiction goals
- Phase-down and expiration of existing tax credits
- Wind and solar industry groups seeking amendments to investment tax credit and production tax credit
  - Indirect effect of covid-19 on financial health and profitability of tax-equity partners
- Construction delays – largely dependent on state guidelines and requirements on social distancing
- Some supply chains effected more than others, depending on state or country of production and export/import rules
  - In general, solar supply chain has in inherent element of uncertainty as-is with primary components imported from China (e.g. tariffs)
- Too soon to tell extent of Covid-19 impact on regional utility-wide renewable construction, however developments at the rooftop and commercial level have slowed

