

# COVID-19 Impacts and Preparations

## Preliminary Analysis of Italian Load and Summary of Actions Taken by Members

EPRI Transmission Operations and Planning  
March 20, 2020

**WORKING DRAFT v1.3 – SUBJECT TO CHANGE**



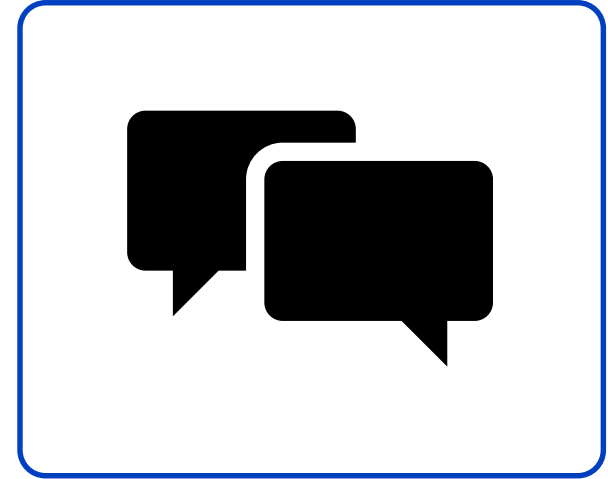
# Webcast Introduction



**We are NOT recording**



**Poll**



**Webex Chat**

**You are muted on entry. Please use chat for questions**

# STOP THE SPREAD OF GERMS

Help prevent the spread of respiratory diseases like COVID-19.

Avoid close contact with people who are sick.



Cover your cough or sneeze with a tissue, then throw the tissue in the trash.



Avoid touching your eyes, nose, and mouth.



Clean and disinfect frequently touched objects and surfaces.



Stay home when you are sick, except to get medical care.



Wash your hands often with soap and water for at least 20 seconds.



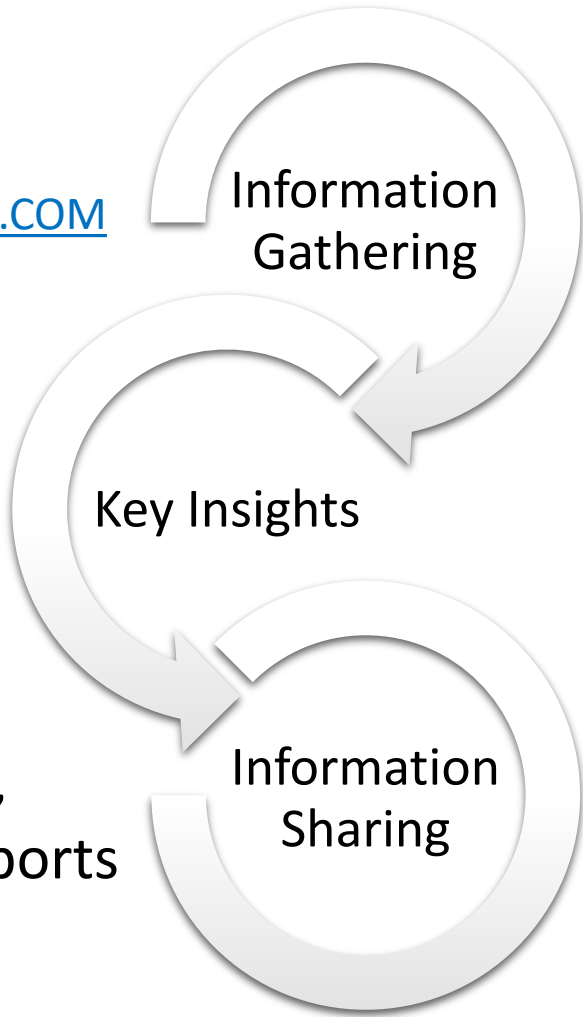
For more information: [www.cdc.gov/COVID19](http://www.cdc.gov/COVID19)

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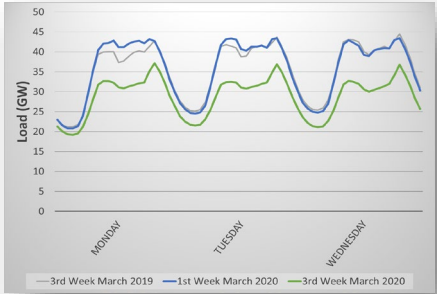
# EPRI Response to COVID19



[COVID19-GRID-IMPACT@EPRI.COM](mailto:COVID19-GRID-IMPACT@EPRI.COM)



Technical data analysis



Webcast updates, technical brief reports



**Using global reach to gain insights and share with wider audience**

# What's New from Previous Update (3/19 to 3/20)

Email any insights related to COVID-19 on electricity systems to our confidential inbox: [covid19-grid-impact@epri.com](mailto:covid19-grid-impact@epri.com)

# Ongoing work on demand impacts

- Dashboard setup to be able to monitor impacts on load in regions across the world – will update regularly
  
- Further analysis beginning on demand impacts
  - Normalizing year on year demand impacts with respect to temperature and underlying load growth/changes
  - Extrapolating what this may mean for other regions with different load mix and public COVID-19 management strategies
  - Extrapolating what it might mean into the future – summer loads, etc

**EPRI continue to work on this and will update**

# Operational impacts

- Questions/comments raised during March 19 call
  - Voltage management with reduced load
  - Power flow changes
  - Excess energy in high PV regions
  - TSO-DSO coordination
  - Rectifying faults with personnel is taking longer
- Other impacts might start to appear – need to share

**As we move from preparation to operations, need to consider impacts to ops**



# Control Center Practices Updates Since 3/19 Webcast

- Control Center strategies:
  - Day to night swap between facilities. Empty CC is deep cleaned when other CC is in operation.
  - Definite need to engage cleaning companies / contractors to assess protocols. Some companies have started self cleaning the facilities.
  - Some operating out of remote backup facilities, isolated from all other facilities and company offices.
- Some locations: operations staff asked to stay at home when not on shift, limit contacts to only family and not to use public transportation.
  - A few utilities reported checking individuals entering the facility or office.
  - One utility asking operators to self test themselves prior to coming to work. (100 F as the threshold)
- Splitting of engineering and technical staff into separate groups with no mixing.
- Europe – focus shifted to core activities:
  - grid monitoring, congestion management, operations planning, voltage control, load frequency control, asset management etc.
  - In some cases maintenance work is being cancelled or postponed due to travel restrictions.



# Control Center Practices Questions from 3/19 Webcast

- Questions on sequestering operators and the ability to test?
  - We have not heard reports of covid test kits being made available to electricity companies. Some mentioned working with local authorities.
  - Lack of test kits should not impair temperature monitoring as a first step for key staff in the organization and operators.
  - We have not heard reports of power plants being shut because of out breaks. If you have heard reports, please let us know
  - Companies should speak with power stations, asset owners, distribution owners, telecomms etc. to ensure precautions for working and contingency plans are being put in place
  - Postponing vacation: We have heard that leave has been cancelled in Europe, but this is expected. Companies have refunded cost of vacations for operators.

# Other questions from 3/19 webcast we are investigating

- Impact of drop in demand on system voltage / constraints.
  - To date load drop has not being below yearly valley load, continental European systems are summer peaking. Will be system dependent.
- Training and certifying staff
  - Need to engage wider on this, especially NERC.
- What happens for infected staff
  - At the moment following expert advise (isolate, contact trace etc)
  - Need to engage wider on how to mitigate and stop spread within office.
- Italy specific questions on control centers
  - We are engaging to see if there are lessons to be learned from Italy, but at this point most companies are taking major precautions.

# Agenda

**Impact of COVID-19 shutdown on load in Italy**

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**Summary of COVID-19 Related Operations Actions Taken by Various EPRI Members (Transmission and Distribution)**

**Disclaimer:** The information presented here is based on information gathered from EPRI members. We do not present these as recommended or best practices, but we do present these as potentially useful information for utilities and system operators as they implement their own practices

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**Aim to keep the webcast and discussion focused on operations**

# Impact of COVID-19 shutdown on load in Italy

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# Information and disclaimers about analysis

- **We used publicly available data from ENTSO-E for analysis:**
  - <https://transparency.entsoe.eu/> (account needed to download)
- **Compared the period since shutdown begun (March 11-18)**
  - One week prior (March 4-10)
  - One year prior (weeks 11 and 12 in 2019)
  - As time goes on, comparison with prior weeks become less relevant
- **Other factors are not considered but likely to impact load levels**
  - Temperature
  - Underlying non-COVID economic factors
  - Behind the meter resources, etc
- **We are continuing to monitor and update this information**

# Key insights from Italy on demand impacts

PHASE	Partial shutdown	Day 1-2 (Thurs, Fri)	Day 3-4 (Weekend)	Day 5-8 (Mon- Wed)
PEAK REDUCTION	<b>3%-4%</b>	<b>10%-14%</b>	<b>6%-8%</b>	<b>18%-21%</b>
NOTES	Only North Italy shut down and people adjusting	Reduction in weekday peak, and energy usage, year-on-year and compared to previous week	Min. demand, energy use reduction. Weekend demand still lower than weekdays	Peak and daily energy usage down year on year compared to same week last year

**Analysis does not account for weather differences or non-COVID-19 economic factors.**

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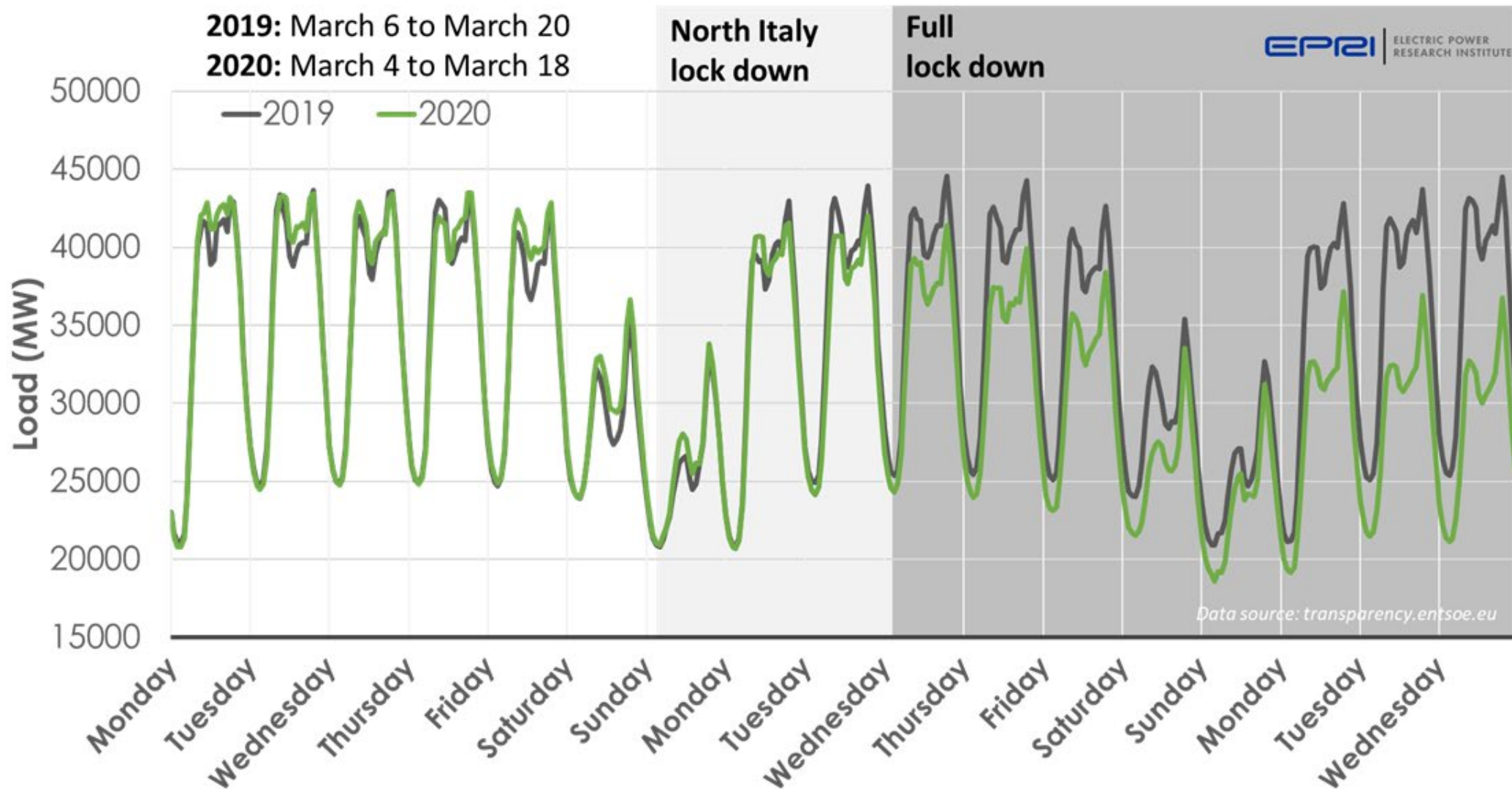
# Key insights from Italy on demand impacts

- **Load shapes stay much the same** with reduction in magnitude, but some indications of lower morning peaks in last few days
- Day ahead **forecast mean absolute error 1%** worse Thursday, seems to be getting better in last few days

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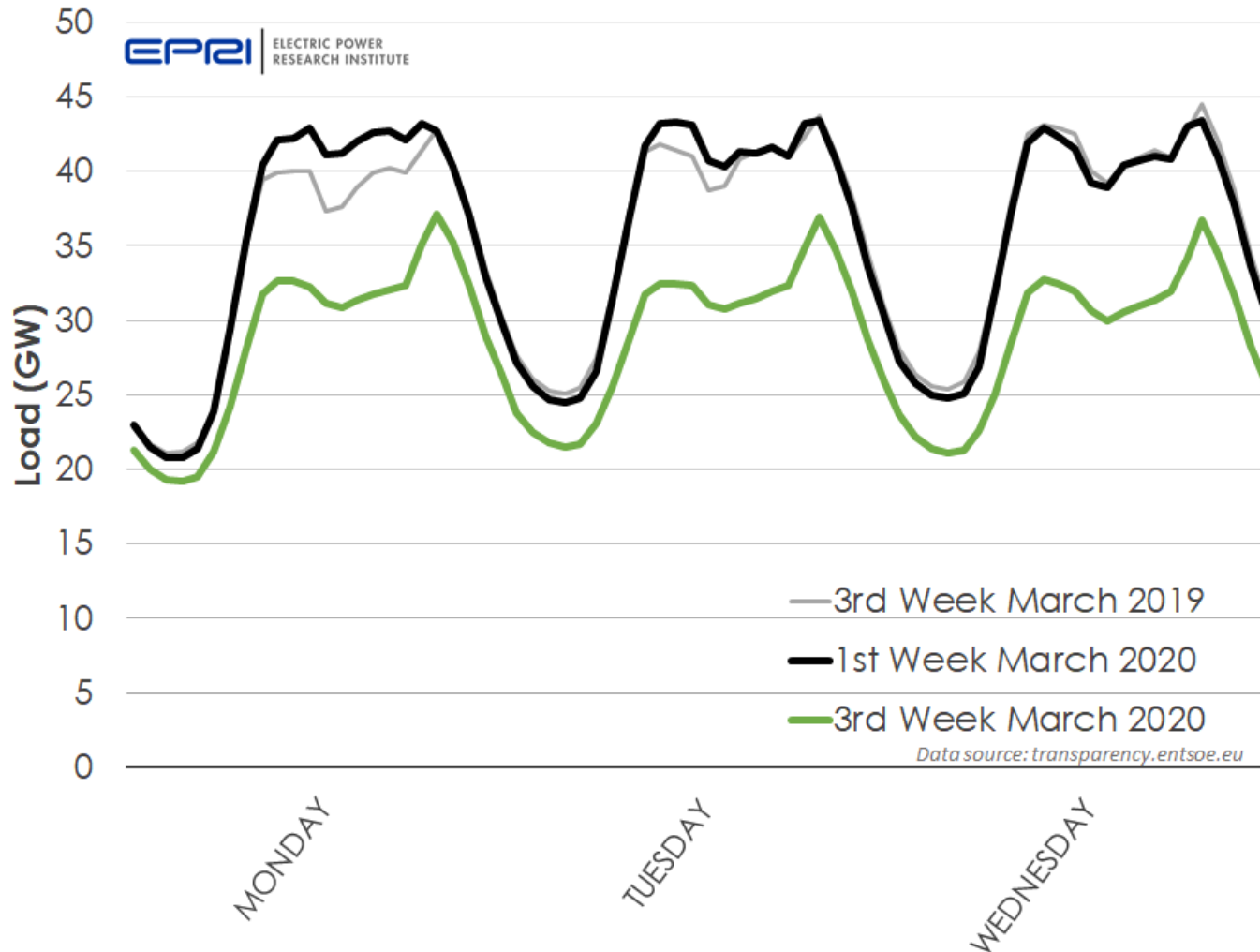
# Italian load in last 2 weeks – 2019 vs 2020



**Weather and economic growth impacts not considered but clear trend observable**

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# Impact of shutdown (5-7 days in – March 16-18)



## Peak Demand

- Mon: 15%-16%
- Tues: 18%
- Wed: 18%-21%

## Daily Energy Demand

- Mon: 16%-18.5%
- Tues: 19%
- Wed: 20%-21%

## Min Demand

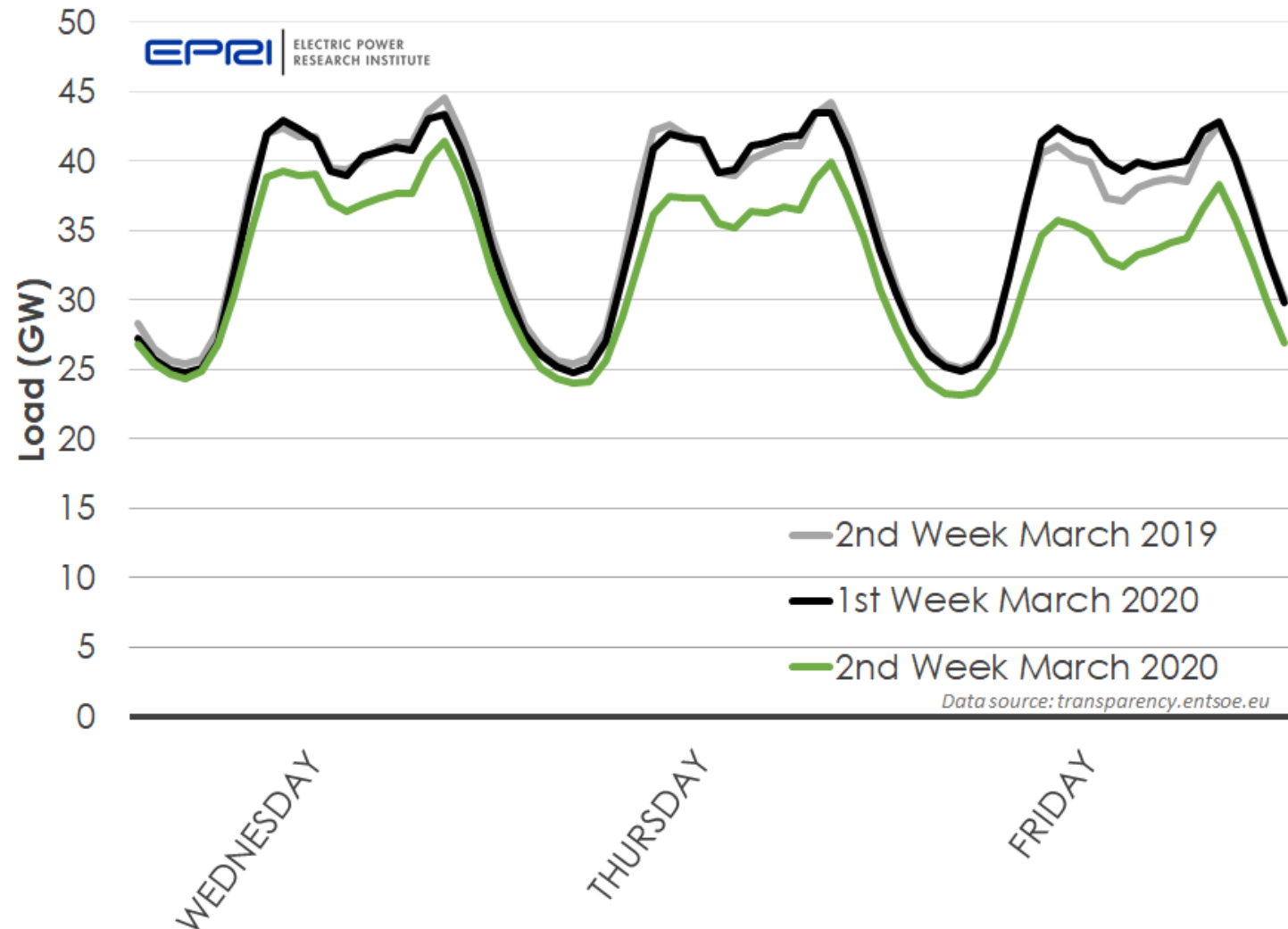
- Mon: 8-10%
- Tues: 14-16%
- Wed: 17-20%

Reduction varies depending on whether comparing with 2 weeks previous or last year

## Reduction in demand got larger in last few days

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# Impact of nationwide shutdown (first 3 days)



Weather, change in underlying load mix, etc. not considered

## Peak Demand

- W: 5%-7% lower
- Th: 10%-11% lower
- Fr: 11%-11.5% lower

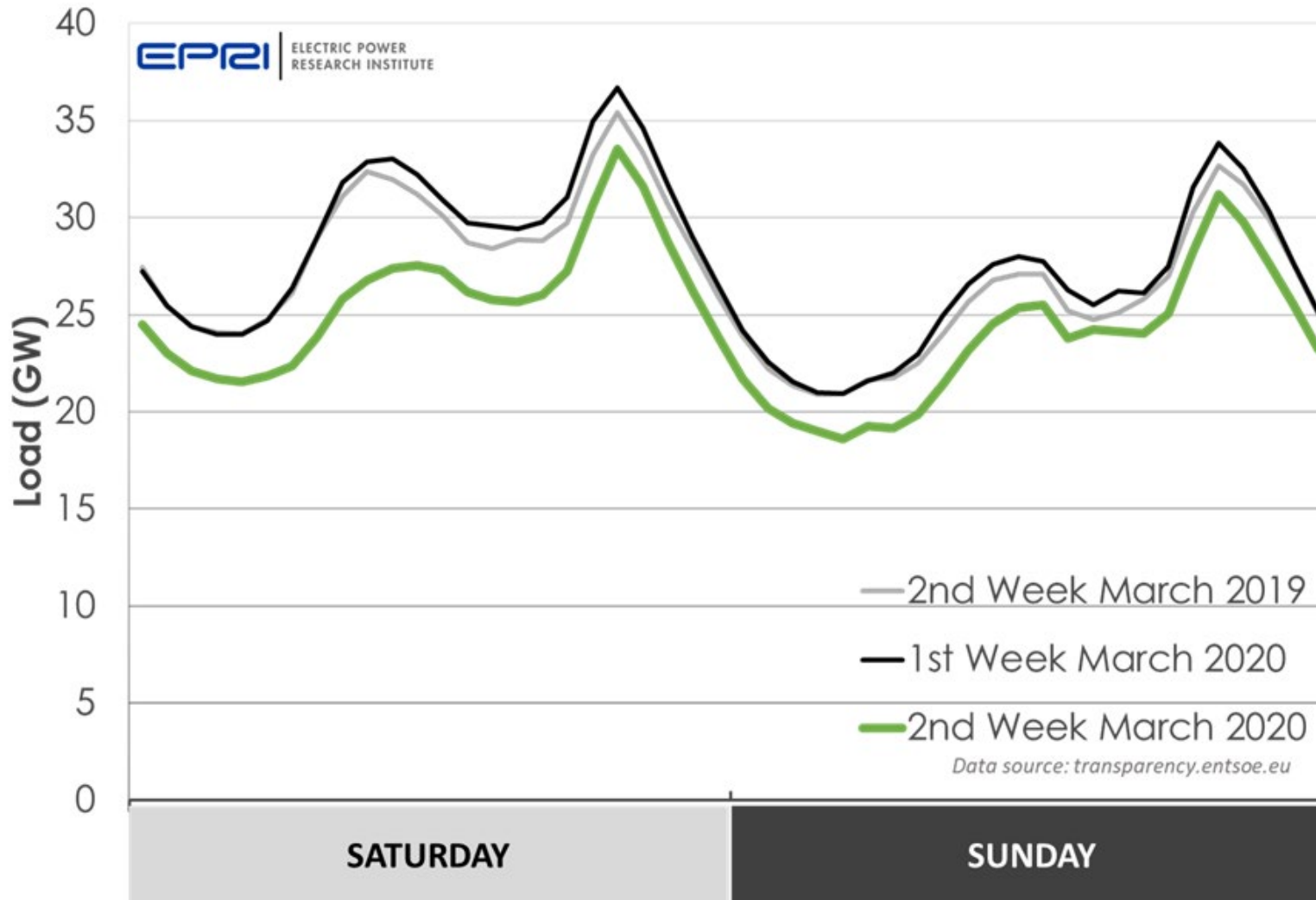
## Daily Energy Demand

- W: 4%-6% lower
- Th: 10%-12% lower
- Fr: 13%-14% lower

Reduction varies depending on whether comparing with previous week or year

**Reduction in demand increased across first few days**

# Impact of shutdown (first weekend)



**Weather, change in underlying load mix, etc. not considered**

**Peak Demand**

- Sat: 6%-9%
- Sun: 5%-8.5%

**Daily Energy Demand**

- Sat: 12%-14%
- Sun: 8%-11%

**Min Demand**

- Sat: 11%
- Sun: 12%

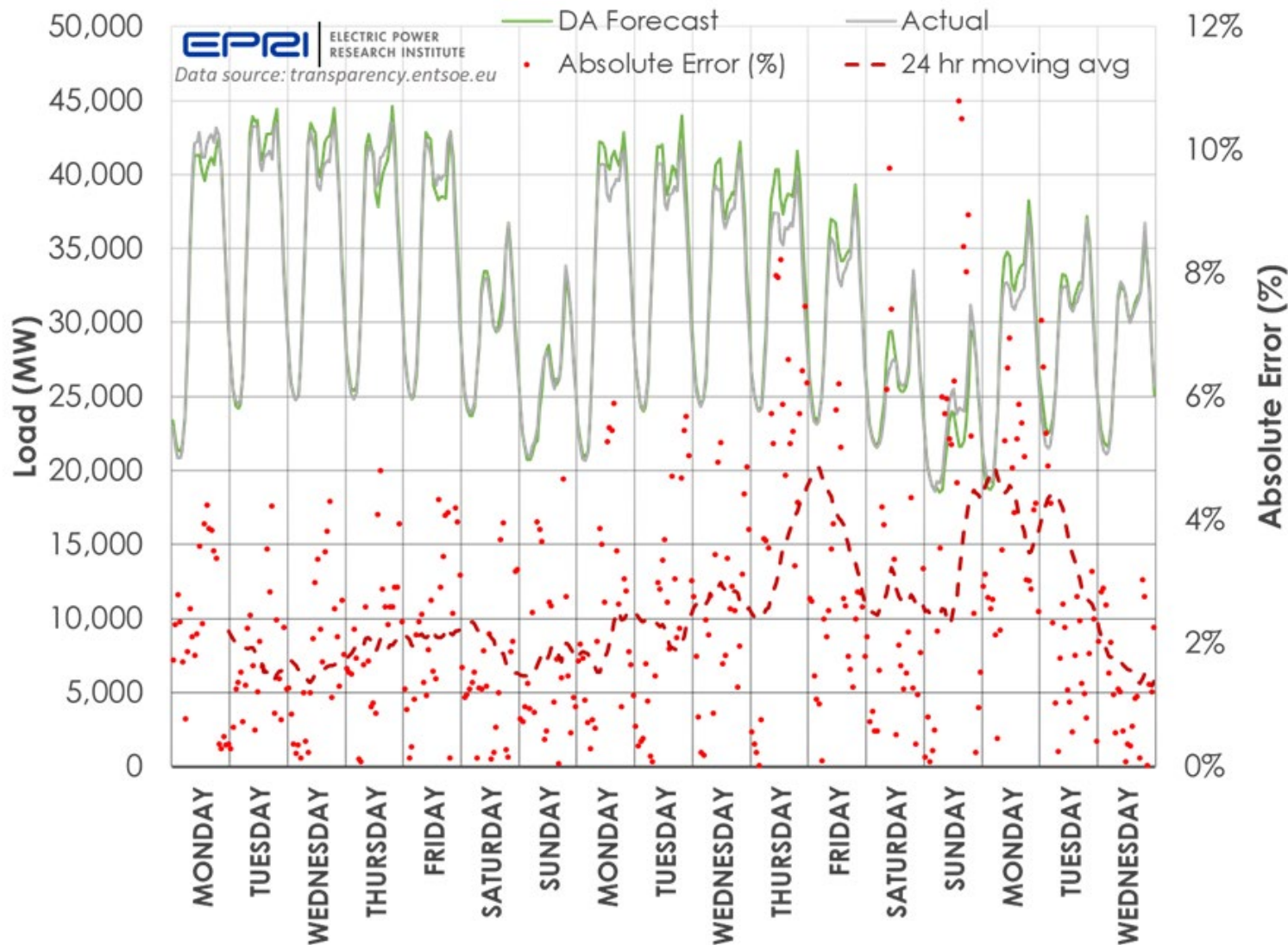
Reduction varies depending on whether comparing with previous week or year

**Reduction in demand over weekend as well as weekdays**

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# Day ahead forecast performance

March 2-18, 2020



Weather, change in underlying load mix, etc. not considered

## Mean Absolute Error

- **3.1% in the last week**
- **2.2% in previous week**
- **1.9% same week 2019**

Day ahead forecasts got worse initially, but may have improved since weekend

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# Italian System Context (based on available public info)

- Italian elec. consumption about 2.5 times lower per capita than the US
- Residential load is about 20% of total load in Italy (30%+ in US)
- Large amounts of industry in the north of the country, but didn't see notable reflection in load profile until entire country was shut down
- More information at [ENTSO-E statistical factsheet](#)

# Ongoing Monitoring of Demand Impacts in US, Europe

## US & EU Public Demand Data Monitoring



### EPRI: COVID-19 Impacts on Demand

This page provides an overview of the demand in megawatt-hours [MWh] for different areas of the United States and Europe. For each area, the past 7 days of demand are compared against the historical median demand of different years, matched by the day of the week (e.g. Sunday March 15th, 2020 is compared to the median demand of all Sundays in March 2019; Monday March 16th, 2020 is compared to the median demand of all Mondays in March 2019; etc.).

**NOTE:** The data in these plots is based on what is publicly-available and does not include any data quality control beyond what is performed by the original source of the data. Therefore, some of the plots may show spikes or other outlier behavior.

Contact: Aidan Tuohy, Eamonn Lannoye, Adam Wigington, David Larson

#### United States

Data source: [EIA](#)

#### Regions

- United States Lower 48 (region): [plot, data](#)
- California (region): [plot, data](#)
- New England (region): [plot, data](#)
- New York (region): [plot, data](#)
- Northwest (region): [plot, data](#)
- Southeast (region): [plot, data](#)
- Southwest (region): [plot, data](#)
- Texas (region): [plot, data](#)

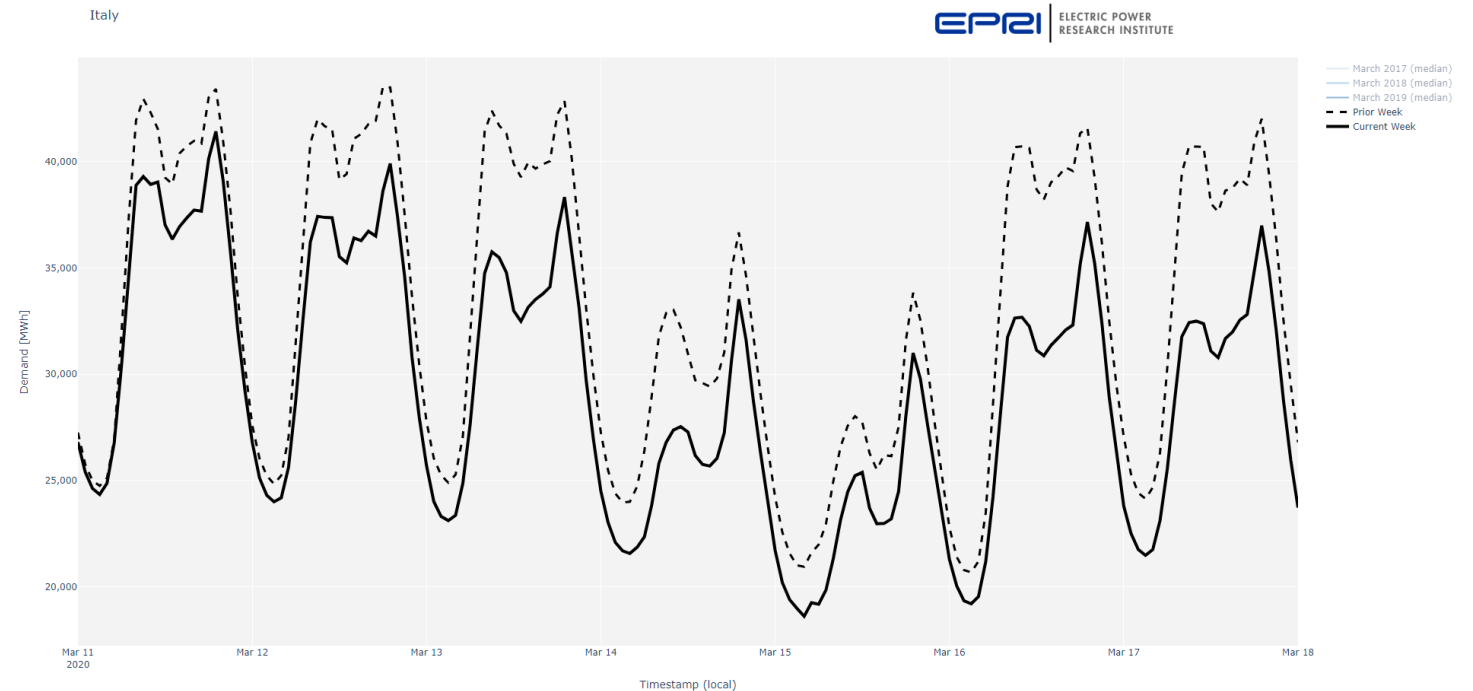
#### ISOs/RTOs

- California Independent System Operator (CISO): [plot, data](#)
- Electric Reliability Council of Texas, Inc. (ERCOT): [plot, data](#)
- ISO New England (ISNE): [plot, data](#)
- New York Independent System Operator (NYIS): [plot, data](#)
- Midcontinent Independent System Operator, Inc. (MISO): [plot, data](#)
- PJM Interconnection, LLC (PJM): [plot, data](#)

#### Utilities

- Arizona Public Service Company (AZPS): [plot, data](#)
- Bonneville Power Administration (BPAT): [plot, data](#)
- Duke Energy Carolinas (DUK): [plot, data](#)
- Duke Energy Florida, Inc. (FPC): [plot, data](#)

## Example Trending - Italy



Daily review of previous day's data – will send updates when relevant

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# Summary of COVID-19 Related Operations Actions Taken by Various EPRI Members (Transmission and Distribution)

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# Steps that Control Centers Have Implemented (US/EU)

## Sanitary and Hygiene Basics

- **Alcohol sanitizing gels, sprays, wipes** available throughout control center and office
- Regular handwashing and hand sanitation emphasized for all staff, especially operators. **20 seconds per handwash**
- **Limit or restrict use of common equipment** such as phone receiver or mouse, keyboards which are particularly susceptible to germs
- Consider **standard issue equipment** for operators. Each operator responsible for their own equipment:
  - Wireless computer mouse and keyboards
  - Phone headsets
- **Wipe all equipment** pre and post shift. Reports of desks being disinfected 3 or more times per day
- Consider **“clean turnovers”** – turnover is given with operators on adjacent desks. When person leaving shift finishes, they wipe down desk and equipment and unplug headset / mouse USB point.
  - Person starting shift begins by wipe down of desk and plug in own headset and mouse
- **Keep at least 1 meter distance** during interactions with essential staff members in TCC and during turnover
- Consider operators wearing surgical masks during shifts (one member report)

# Cleaning / Disinfecting / Sterilizing

Note the subtle difference in terminology:

- **Cleaning** - Removes debris
  - **Disinfecting** - Removes most organisms from surfaces
  - **Sterilizing** - removes all life including viruses, bacteria, fungi from workspace
- Engage external experts on the best solutions for workspaces and control center disinfecting and sterilizing



[The Greek TSO IPTO released this image of their control center](#)

# Steps that Control Centers Have Implemented

## Staffing Within the Company

- If staff have been **in an affected area** in the past two weeks leave work and **self isolate** for 2 weeks.
- Identify key operational staff in the company. All illnesses immediately reported to management for further advise, **no matter how small**. Report of a company implementing a dashboard to track staff sickness.
- Monitor body temperature for fever of every person entering building.
- **Managerial briefings given electronically** by company preferred means (email, IM, text, video conference)
- Most companies have:
  - Instructed all **non essential staff to work remotely**
  - Restricted access by **external people to offices**
  - **Restricted access** to floors that Control Centers, IT, market systems are on.
  - **No meetings, no walk throughs** on these floors, unless person's desk is on the floor. Controlled by security personnel. Reduce meetings & interactions generally.

# Staffing in the Control Center – One Approach



## Control Center A (main)

- Shift crew A with age and experience diversity
- EMS/IT support A
- Shift Supervisors A
- Key system ops staff A

## Control Center B (backup)

- Shift crew B with age and experience diversity
- EMS/IT support B
- Shift Supervisors B
- Key system ops staff B

- Body temperature screening prior to access control center site
- Crews are not mixed. Multiple shifts in each site and/or handover to alternate site at end of shift crew cycle.
- Utilizing additional operator workstations in Storm Operations Centers, Backup Control Centers, Mobile Command Centers or regional control centers.
- Some CCs have adjusted the shift pattern to 2 x 12 hour from 3 x 8 to reduce turnovers and lengthen the cycles in each control center 8-15 days depending on staff
- Pre planning for critical staff (such as operators) for extended stays within the CC for up to 2 weeks.
  - Backup stock of food or clear supply line to food in each control center.
  - Plan for familial / child care impacts and mental health aspects of this approach.
  - Some utilities are restricting CC common area access. So this should be carefully managed.

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# Staffing in the Control Center – Another Approach



## Control Center A (main)

- Normal operations
- Shift crew
- EMS/IT support
- Shift Supervisors
- Key system ops staff  
A



## Control Center B (backup)

- Sterile site
- Locked down
- If outbreak in center  
A -> move  
operations to center  
B

- Body temperature screening prior to access control center site
- Sterile, locked down backup control center and offices if the main center gets infected or a staff member gets sick.
- Maintains continuity in main control center
- Hybrid approach is worth considering, two operational centers and a sterile, locked down site.

# Steps that Control Centers Have Implemented (US/EU)



## Emergency Response Planning

- Most companies have enacted business continuity plans and/or pandemic response plans, if available.
- Communicate to power stations and advise on emergency response operations. Ensure proper business continuity procedures are in place in critical power stations.
- Test critical station staffing protocols (from blackstart and storm restoration plan)
- Test external communications protocols (from blackstart and storm restoration plan).
- Distribution Operations is adapting storm restoration plans for the potential that Mutual Assistance will be unavailable.

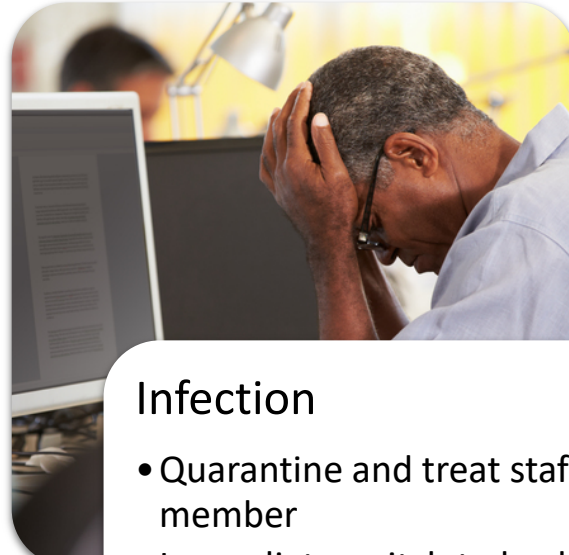


# Preparing for an Infectious Outbreak



## Pre Planning

- Grid operator new staff pipeline
- Accelerated training programs or certification if this is possible



## Infection

- Quarantine and treat staff member
- Immediate switch to backup Control Center
- Sterilization of infected control center
- Contact tracing with operations staff who interacted



## Post Event

- Continued monitoring of operations staff health
- Communicate to appropriate crisis response agencies if required

**Any other plans in place for grid operations in the event of infection? (Enter in Chat)**

# Other Publicly Available European News and Insights

Many companies proactively engaging the wider public to assure continued electricity operation and contingency planning

- [Statnett Norway](#): only TSO we have monitored to publicly report a case of Covid-19 among one member of staff
- [Swissgrid](#): Publicly state they are monitoring (temperature) of staff for fever.
- [RTE France](#): Launched their official business continuity plan as of Monday 16<sup>th</sup> March
- [National Grid UK ESO](#) have posted a blog post by the Director explaining the response
- [Red Eléctrica Spain](#): very active on LinkedIn with news updates to public; operating across three autonomous control centers, each capable of independently controlling full system; have deployed hygiene teams to work with staff
- [AEMO Australia](#): Implemented full Pandemic Response Plan



**We will continue to monitor and update with new information**

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# Distribution Operations Workshop – March 26

- EPRI P200C (dist. ops) staff will facilitate the discussion.
- Participating utilities will share the strategies they have implemented. This should take about five minutes per utility.
- The group will discuss strategies as necessary, similar to what happens during the DOIG conference.



**WEBCAST  
INVITE**

***EPRI WebEx to Discuss Distribution Control Center Contingency Plans***

# Coronavirus COVID-19 in RT Operations

- Email setup for providing information or if you have questions on operations related issues: [COVID19-GRID-IMPACT@epri.com](mailto:COVID19-GRID-IMPACT@epri.com)
- Looking to setup information sharing microsite
- Open discussion on Coronavirus impacts – please share comments, thoughts or questions for EPRI SMEs or EPRI members on mitigating impacts of virus



**Medium term: EPRI planning to develop a set of guidelines for TCC business continuity for a serious health issues or pandemics**



# Together...Shaping the Future of Electricity

Prepared by [Aidan Tuohy](#), [Adrian Kelly](#), [Brian Deaver](#), [Eamonn Lannoye](#), [Daniel Brooks](#)

EPRI COVID Operations Helpline: [COVID19-GRID-IMPACT@epri.com](mailto:COVID19-GRID-IMPACT@epri.com)