COVID-19 Bulk System Impacts

Demand Impacts and Operational and Control Center Practices

EPRI Transmission Operations and Planning
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Impact of COVID-19 Shutdown on Demand
Key Insights: COVID-19 Shutdown Demand Impacts
Compared to data from previous week and year

3-15% reduction of peak demand and energy use in first two to three weekdays

- Italy
  - 10-21% reduction in peak demand and energy use, increasing over first week
  - Load shapes remained largely unchanged with reduction in magnitude

- Spain
  - Up to 15% reduction in peak demand and energy use during first week
  - Lesser impact during second week – 7-10% reduction
Key Insights: COVID-19 Shutdown Demand Impacts
Compared to data from previous week and year

- United States
  - New York and California
    - 3-7% reduction in peak demand and energy use in the days following city- and statewide lockdowns
    - Greater impact during morning peak
  - Other regions are starting to show significant energy demand reduction as they enter shutdowns, including regions such as Seattle, WA
Comparison: Electricity Consumption Mix

- Residential demand lower in Italy than other countries examined → Potential increase observed in that sector may be less noticeable than other regions

- Commercial very similar for Italy, Spain and U.S. as a whole, higher in NY and CA → May result in greater impact due to commercial load reductions in those regions

- Industry shutting down in Italy may have greater impact in the region

NOTE: Comparison based on annual data. Monthly, state-level U.S. data reflects similar mix (higher industry in CA in summer months).
Comparison: Electricity Consumption Mix

<table>
<thead>
<tr>
<th>Type</th>
<th>New York</th>
<th>Washington</th>
<th>Spain</th>
<th>Italy</th>
<th>USA</th>
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</thead>
<tbody>
<tr>
<td>Commercial</td>
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<tr>
<td>Residential</td>
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<td>Transport</td>
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<td>Industrial</td>
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Percentage of Electricity Mix
Key Insights on Demand Impacts in Italy

PHASE
- Partial shutdown
- First Days
- Weekend
- Day 5-10

PEAK REDUCTION
- 3%-4%
- 10%-14%
- 6%-10%
- 18%-22%

NOTES
- Lockdown limited to North Italy, as people adjusted to the change
- Reduction in weekday peak and energy usage compared week-to-week and year-over-year
- Minimal demand, energy use reduction
- Weekend demand still lower than weekdays
- Peak and daily energy usage down compared to same week last year

NOTE: Analysis does not account for weather differences or non-COVID-19-related economic factors
Italy Load – past 3 weeks (2019 vs. 2020)

NOTE: Analysis does not account for weather differences or non-COVID-19-related economic factors

Data source: transparency.entsoe.eu
Key Insights on Demand Impacts in Spain

### PHASE

<table>
<thead>
<tr>
<th>First Work Week</th>
<th>First Weekend</th>
<th>Second Week</th>
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<tbody>
<tr>
<td>PEAK REDUCTION</td>
<td>0%-15%</td>
<td>2%-4%</td>
</tr>
</tbody>
</table>

### NOTES

- Demand held initially before dropping substantially as industry closed
- Within range of normal weekend load
- Monday showed signs of following first week with ~10% reductions initially

**NOTE:** Analysis does not account for weather differences or non-COVID-19-related economic factors
Daily Peak Demand in Spain

NOTE: Analysis does not account for weather differences or non-COVID-19-related economic factors
NYISO Load: March 10-23

NOTE: Analysis does not account for weather differences or non-COVID-19-related economic factors

Might have been some impact on Friday, but very warm in NY (70F+)
Information and disclaimers about analysis

- Analysis based on publicly available data from ENTSO-E and EIA:
  - https://transparency.entsoe.eu/ (account needed to download)
  - https://www.eia.gov/opendata/

- Other factors are not considered but likely to impact load levels
  - Temperature
  - Underlying, non-COVID economic factors
  - Behind-the-meter resources, etc.

- EPRI continues to monitor and update this information
Summary of COVID-19-Related Operations Actions
Disclaimer

- The following information is based on information provided by EPRI member companies.

- This summary is intended to help inform operational decisions by utilities, system operators, and other industry stakeholders.

- Certain utility and system operator practices are highlighted for informational purposes only.

- Inclusion of information does not represent a recommendation by EPRI.

- EPRI continues to gather information and will update if appropriate.
Summary of COVID-19-Related Operations Actions
(Transmission and Distribution)
Examples of T&D Operations Actions

Sanitary and Hygiene
- Limit common equipment usage and direct interactions
- Standard issue computer/phone/stationary equipment for operators. Consider paperless control center
- Clean turnovers with no physical interactions
- Cleaning/disinfecting/sterilizing. Regular deep cleaning of control center facilities during the day

Staffing
- Identify key operational staff and monitor health
- Temperature checks at building or control center are being implemented
- Non-essential staff work from home
- Cancel all face-to-face meetings
Examples of T&D Operations Actions

Control Center Strategies

- Split crews and key operational staff into groups
- Utilize main and backup control centers, either actively or to maintain a sterile site
- Change shift cycles to limit number of turnovers
- Prepare for extended stays / sequestration for control center staff

Communications and Management

- Form leadership team to report up to country/state response team.
- Review business continuity plans and pandemic response plans.

Planning for infectious outbreak

- Speed up training
- Quarantine and contact trace sick member
- Communicate impacts with crisis response team
Control Center Buildings and Staffing
Control Center Staffing – First Approach

Control Center A (main)
- Shift crew A with age and experience diversity
- EMS/IT support A
- Shift supervisors A
- Key system operations staff A

Control Center B (backup)
- Shift crew B with age and experience diversity
- EMS/IT support B
- Shift supervisors B
- Key system operations staff B

- Crews are not mixed. There are multiple shifts in each site and/or handover to an 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 control centers have adjusted the shift pattern to 2x12 hour from 3x8 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 control center for up to two weeks.
  - Backup stock of food or clear supply line to food in each control center.
  - Plan for familial/childcare impacts and mental health aspects of this approach.
  - Some utilities are restricting control center common area access. This should be carefully managed.

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Control Center Staffing – Second Approach

- The second approach involves two control centers with daily changeover.
- When changeover occurs, the empty site is deep cleaned and disinfected.
- One clean site is always clean in the event of an outbreak. Full sterilization of the site is possible every day.
- There is an increase in facility switchover and associated risks.

Control Center A (main)
- Shift crew A with age and experience diversity
- EMS/IT support A
- Shift supervisors A
- Key system operations staff A

Control Center B (backup)
- Shift crew B with age and experience diversity
- EMS/IT support B
- Shift Supervisors B
- Key system operations staff B
Control Center Staffing – Third Approach

- If the backup center is not suitable for an extended period of regular operations, some companies are using a sterile, locked down backup control center and offices in the event the main center is contaminated or a staff member gets sick.

- This approach maintains continuity in the main control center.

- A hybrid approach is worth considering if available, with two operational centers and a sterile, locked down site.
Field Operations
Examples of Industry Field Crew Operations Practices

- **Reporting to work:**
  - Utilities sending crews directly to remote worksites at staggered times, with some dispatched from home
  - Staggering start times at plants and facilities to avoid unnecessary congregation

- **Driving:**
  - Limiting to one person per vehicle or maximizing distance between two occupants in a vehicle
  - Eliminating carpooling
  - Allowing use of personal vehicles by field crews (reimbursing for mileage)
  - Requiring enhanced cleaning of work vehicle interior

- **Contractors for field work (non-company employees):**
  - Screening contractors with questions prior to entry
  - Storing materials away from offices and pre-planning pickup and drop off
Impacts on Generation Plants
Examples of COVID-19 Generating Plant Actions (U.S. and Canada)

- Plant outages
  - Postponing where possible
  - Minimizing staff and interactions for essential work
- Plant operations
  - Minimal staff onsite, non-essential employees work from home
  - Control rooms locked down
  - Personnel entering site are screened using IR thermometer
  - Sequestering personnel and obtaining backup staffing
  - Turnovers and interactions performed remotely (Skype, Facetime)
  - Issuing personnel their “own” equipment (keyboards, mice, headsets, etc.)
Sanitary and Hygiene Basics
Examples of Steps Taken by Control Centers (U.S./E.U.)

- **Alcohol sanitizing gels, sprays, and/or wipes** are made available throughout control center and office.
- Regular handwashing and hand sanitation emphasized for all staff, especially operators. **20 seconds per handwash.** See government guidelines on correct hand washing practices.
- **Limit or restrict use of common equipment** such as phone receiver, mouse, and keyboard, which are particularly susceptible to germs.
- Consider **standard issue equipment** for operators. Each operator responsible for own equipment:
  - Wireless computer mouse and keyboards
  - Phone headsets
  - Personalize stationary in control center (calculators, etc.)
- **Wipe all equipment** pre- and post-shift. Reports of desks being disinfected three or more times per day.
- Consider **“clean turnovers”** – Turnover is given with operators on adjacent desks. When person leaving shift finishes, he or she wipes down desk and equipment and unplugs headset/mouse from USB point.
  - Person starting shift begins by wipe down of desk and plug in own headset and mouse
  - Turnover can also be given between operators on a large screen between the operators or remotely
Examples of Steps Taken by Control Centers (U.S./E.U.)

- Keep at least two meters (six feet) distance during interactions with essential staff members in TCC and during turnover.
- Some utilities considering portable handwashing facilities in control centers. No reports of implementation.
- Avoid touching faces, and cover coughs and sneezes.
- Masks would have to be changed several times daily due to saliva. With restrictions in place, most companies are not opting for using masks at this point.
- Consider paperless control centers. Documents and paper can be vectors.
- No eating or food at control center workstations.
Examples of Practices Related to Office Work

- If staff have been in an affected area in the past two weeks, leave work and self isolate for two weeks.

- Managerial briefings conducted 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 housing control centers, IT, and market systems
  - Disallowed meetings and walk-throughs on these floors, unless a person’s desk is there. Controlled by security personnel. General reduction in meetings and interactions.
Emergency Response Planning and Communications
Examples of Steps Taken by Control Centers (U.S./E.U.)

Emergency Response Planning

- Most companies have enacted business continuity plans and/or pandemic plans.
- Communicate to power stations and advise on emergency 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 adapting storm restoration plans for the potential that mutual assistance will be unavailable.
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