

# Impacts on switching off lights at the time of Covid-19: lessons learnt

## 1. Introduction

A n appeal was made by the honourable Prime Minister of India to the citizens on 3rd April 2020 for switching off only lights at their respective homes on 5<sup>th</sup> April 2020 at 21:00 hrs for 9 minutes. It was a symbolic gesture to show the resolve and commitment of the nation towards fighting the pandemic with light and hope. Various state governments and other government agencies also suggested only to switch off the lights in a phased manner in order to keep the power distribution system through the grids in stable condition.

## 2. Concerns

Since such an action as undertaken for the first time at all India level through the appeal by the honourable Prime Minister of India it was expected a wide participation. It was not very clear what could be the actual quantum of lighting load at that time under lockdown condition. Obviously, concerns were raised about the grid stability due to sudden reduction of load and then sudden increase of load, within a span of about 30 minutes, on the grid leading to grid voltage and frequency fluctuations. Therefore, grid stability became a cause of concern under such situation for the power engineers working in power generation, transmission and distribution sectors across the country. Managing the 31 GW sharp variation in demand by the Ministry of Power and its officers had called for adequate reserves and flexibility of resources.

## 3. Actions taken

The Government of India particularly the Power Ministry took note of these concerns and swung into actions to take the preventive measures and issue necessary advisories under such circumstances. Therefore, many actions run-up to the event took place as summarised in Fig.1.

Accordingly the Government also issued an advisory regarding the general operation, power plants operations and voltage and frequency control procedures as summarized in Fig.2.

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## 4. Observations

1. There was a massive response to Hon'ble Prime Minister's appeal and millions of Indians across the country switched off lights at their homes and lit candles or lamps on Sunday (5th April) night. As anticipated the load reduction was recorded low across the country in a similar manner justifying huge participation by the people across all regions. The main observation about the load shuffling is summarised below.

The total reduction in all India demand recorded during the event was 31089 MW. All India demand started reducing from 116887 MW at 20:45 hrs and the lowest demand of 85,799 MW was recorded at 21:10 hrs. Subsequently, from 21:10 hrs, the demand started picking up and settled around 114400 MW at 22:10 hrs.

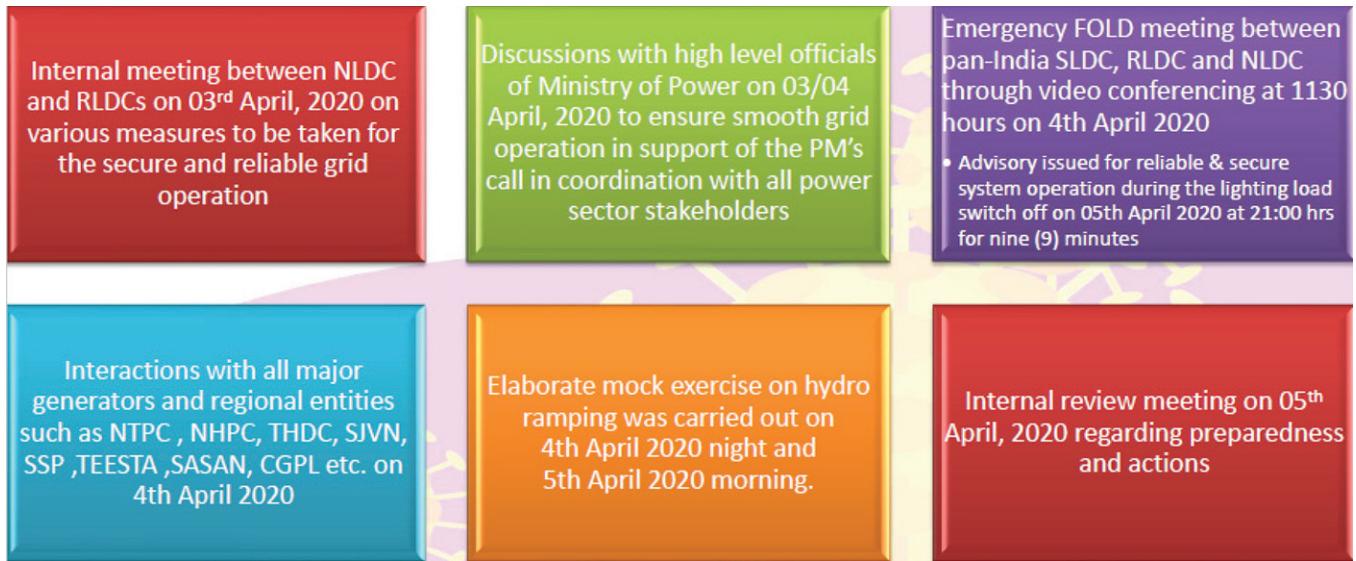
The all India and region-wise demand details during the event are as in Fig.3.

2. There was a significant fluctuation in grid frequency before and during the event. Grid frequency during the event remained in the range of 50.26 Hz to 49.70 Hz with maximum and minimum frequency of 50.259 Hz and 49.707 Hz recorded at 20:49 hrs. and 21:08 hrs. respectively. Frequency profile comparison between 4th and 5th April 2020 is given in Fig.4.
3. There was significant fluctuation in grid demand before and during the event. Demand profile comparison between 4th and 5th April 2020 is given in Fig.5.
4. During the entire period of the event, Indian power system was operated as a single control area with all the major stakeholders in online video or tele-conferencing mode with real time grid operators at NLDC and RLDCs. The coordinated and timely actions of all the stakeholders managed the event successfully maintaining all power system parameters within limits.

## 5. Learnings

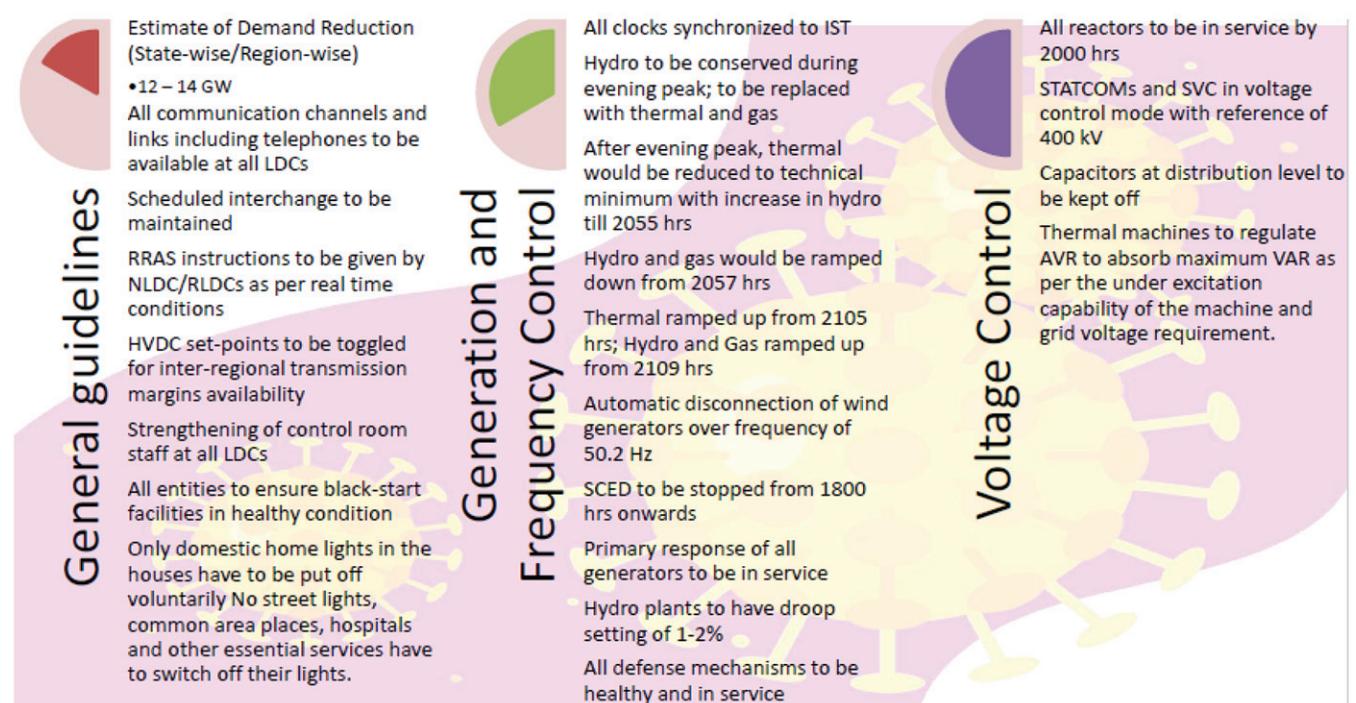
### 5.1 A. DIRECT

1. Timely proactive actions help in preparing better leading to confidence building.
2. Modernisation and digitization of operations makes it easy to handle such situations.



Reference: POSOCO report

Fig.1



Reference: POSOCO report

Fig.2

3. Unambiguous communication between all levels helps in avoiding any unwarranted situations even if such sensitive projects are undertaken at a national level.
4. Technical robustness of the system for reliability during such events matter.
5. Updating human skills for such emergency situations and motivation boost confidence.
6. The total reduction in all India demand recorded during

the event was 31089 MW.

#### 5.2 B. INDIRECT

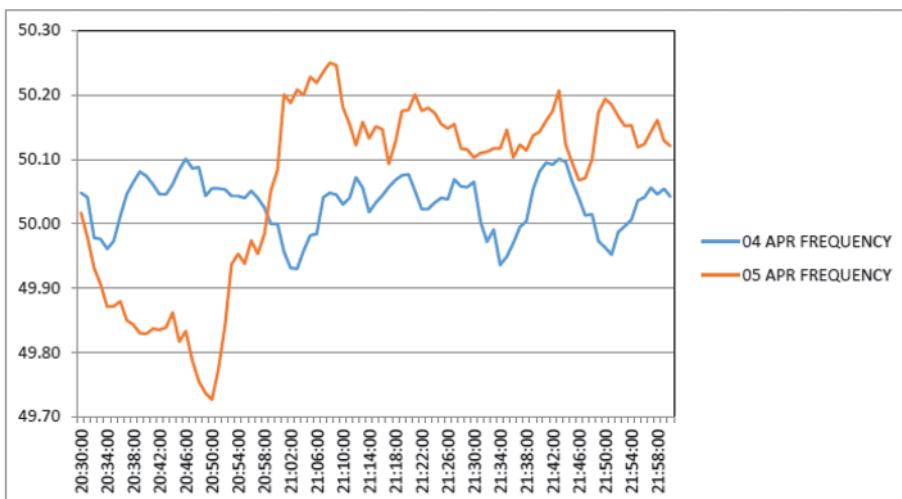
1. Such unprecedented events act as a source of inspiration to the entire Indian power sector which acted in unison to successfully manage the scenario.
2. Opens a window of opportunity for demand side management (DSM) by controlling morning and evening peaks through lighting load.

| Time<br>(Hrs) | Demand (MW) |       |       |       |      |           | Reduction<br>w.r.t. All India<br>Demand at<br>20:45 Hrs |
|---------------|-------------|-------|-------|-------|------|-----------|---|
|               | NR          | WR    | SR    | ER    | NER  | All India |   |
| 20:45         | 31791       | 32474 | 35012 | 15815 | 1796 | 116887    | 0   |
| 20:50         | 31339       | 32113 | 35109 | 15452 | 1761 | 115775    | -1113   |
| 20:55         | 30148       | 31462 | 35019 | 14928 | 1693 | 113251    | -3637   |
| 21:00         | 26683       | 28091 | 32688 | 12752 | 1453 | 101667    | -15220  |
| 21:10         | 22061       | 24010 | 29034 | 9679  | 1015 | 85799     | -31089  |
| 21:15         | 24956       | 26992 | 30665 | 11879 | 1303 | 95795     | -21092  |
| 21:30         | 28433       | 30777 | 33394 | 14689 | 1515 | 108808    | -8080   |
| 21:45         | 28633       | 32403 | 34096 | 15140 | 1523 | 111796    | -5092   |
| 22:00         | 28544       | 32944 | 34647 | 15231 | 1437 | 112803    | -4084   |



Reference: POSOCO report

Fig.3



Reference: POSOCO report

Fig.4

3. Switching off light does not cost any money and yet can help in reducing electricity demand significantly.
4. Holds good the saying “A drop in ocean may look insignificant but many such drops can make huge difference”.
5. Very good energy saving measure at no cost.

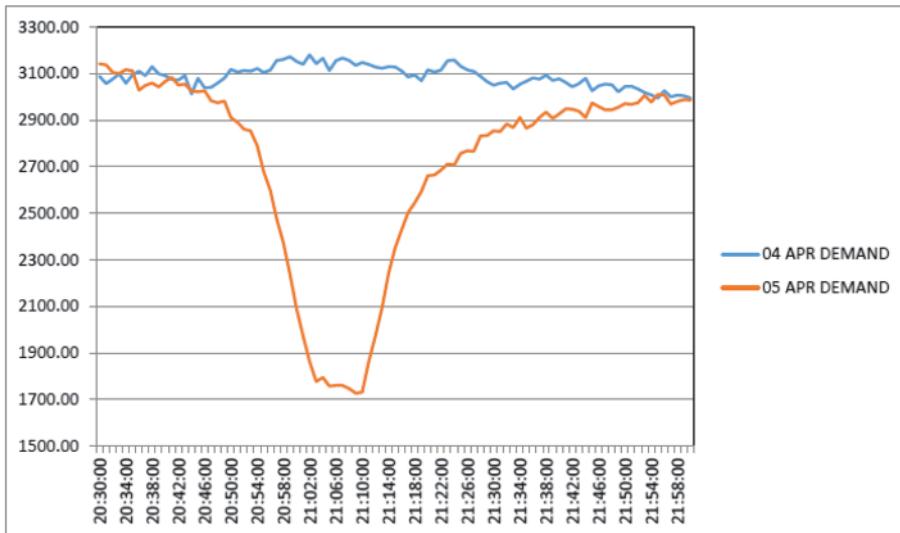
6. Such exercise can pave ways to formulating energy saving strategies in future by encouraging consumers to curtail down their peak hours consumption at an incentive. That would be a win-win situation.

7. Utilities may consider running a pilot project on “time-of-the-day-tariff” in some areas to see if peak hours demand can be controlled thus avoid adding to their existing generation capacity.

8. Similar initiatives can be encouraged for other consumption categories as well e.g. commercial and industrial loads to control their maximum demand.

## 6. Post Covid-19 likely scenario

The pandemic has adversely affected the operational efficiency of electric utilities particularly the distribution companies (Discoms) primarily due to a shortfall of revenue collection as the spot prices of power declined up to 25 per cent. The demand for power fell sharply due to the drop in



Reference: POSOCO report

Fig.3

demand from commercial and industrial sectors. It is time that the government and other stakeholders use the learnings from the crisis to overhaul the sector sustainably. Policy changes, modification in business operations, and technological innovations can make the sector more sustainable, and resource efficient.

Some of the key reform measures that could be critical for the power sector in post COVID-19 scenario to move towards a strong and resilient recovery are as listed below.

1. Adequate financing for expanding and modernising the electricity infrastructure at least for the next five years.
2. Digitalisation across the board for utilities both from an internal and external perspective for business continuity and effective functioning.
3. Customers are becoming more demanding and would appreciate customer friendly services. Customer centric approach will be the key to success for the utilities.
4. Focus on energy efficiency and regulatory changes are going to be more critical. The focus should be on improving efficiencies across the value chain. On the regulatory side, better tariff design reflective of market changes and efficiency in subsidy delivery can be very encouraging for the consumers.
5. Building resilience across the power sector based on secure, reliable and affordable services. Power systems are

vulnerable to natural calamities, technological fiasco or threats caused by humans. There is genuine need for resilience planning in the power sector to manage and mitigate the impact of such an event in the future because the after effects are huge.

## 7. Conclusions

The following conclusions can be derived based on the experience.

1. Lighting load in Indian homes has the potentials to help in managing electricity demand during the peak hours.
2. Going by thumb rule (BEE) similar exercise in future can help in reducing the generation by about 62000 MW at the time of national power crises.
3. Additional loads at national level can be augmented by tapping energy saving in Indian homes only in lighting and possibly in other applications too.
4. It has the potentials to help the nation in saving fuel bills for power plants along with the reduction in CO<sub>2</sub> emission.
5. The event has given a new prospective to limit maximum demand by energy conservation.
6. Post-Covid-19 challenges are plenty for the power sector and needs a systematic, planned, and time bound approach for a sustainable recovery.

## Reference

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2. ETEnergyWorld; (June 21, 2020); OPINION: Post COVID-19 era - Strategic priorities for India's power sector; The Economic Times.
3. Choudhary Sidharth, (2020); COVID-19 and the Indian power sector: Effects and Revival; Invest India, June 15.,

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