

DEMAND SHIFT POTENTIAL FOR INDIA'S COOLING SECTOR



Overview

Being a sub-tropical country, the cooling challenge in India is significant. It has among the most cooling degree days in the world – more than 3000 per year¹. With rising temperatures and exposure to heat waves, the need for cooling becomes ever more critical. Along with the climatic characteristics, the evolving socio-economic drivers such as rising population, rapid urbanization, and economic growth imply that the country's need for cooling as well as an exponential rise in cooling is inevitable. If this growing cooling needs is not managed in a sustainable manner, country's electricity infrastructure will bear the strain.

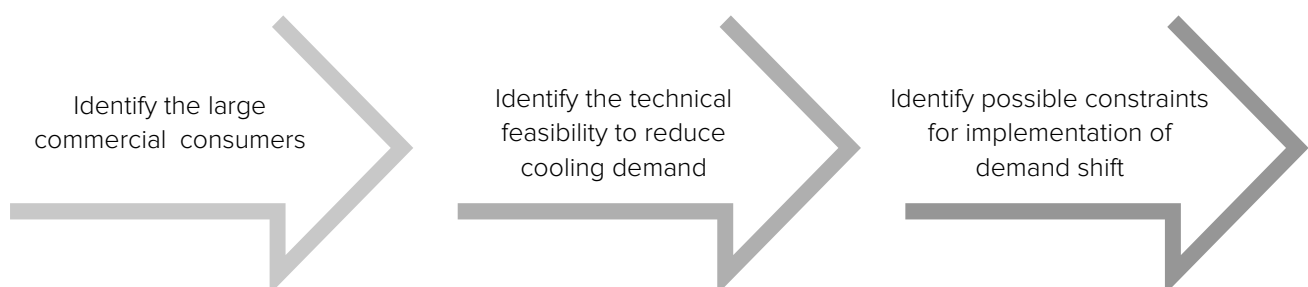
The peak demand during summer season is observed during evening when there is co-incident high usage of ACs in the residential sector as people return to their homes. Due to the limited availability of solar and wind energy during evening, the peak demand is generally supplied with fossil fuel plants, resulting in high emission factors and environmental impacts. A viable solution in managing the peak demand, stemming from increasing cooling needs, lies in an effectively designed demand response program. By providing incentives for inducing lower electricity use at times of peak demand, the stress on electricity networks can be reduced.

The present assignment aims to identify the demand shift potential in cooling sector. The key focus area is the commercial sector where significant demand reductions seem more promising.

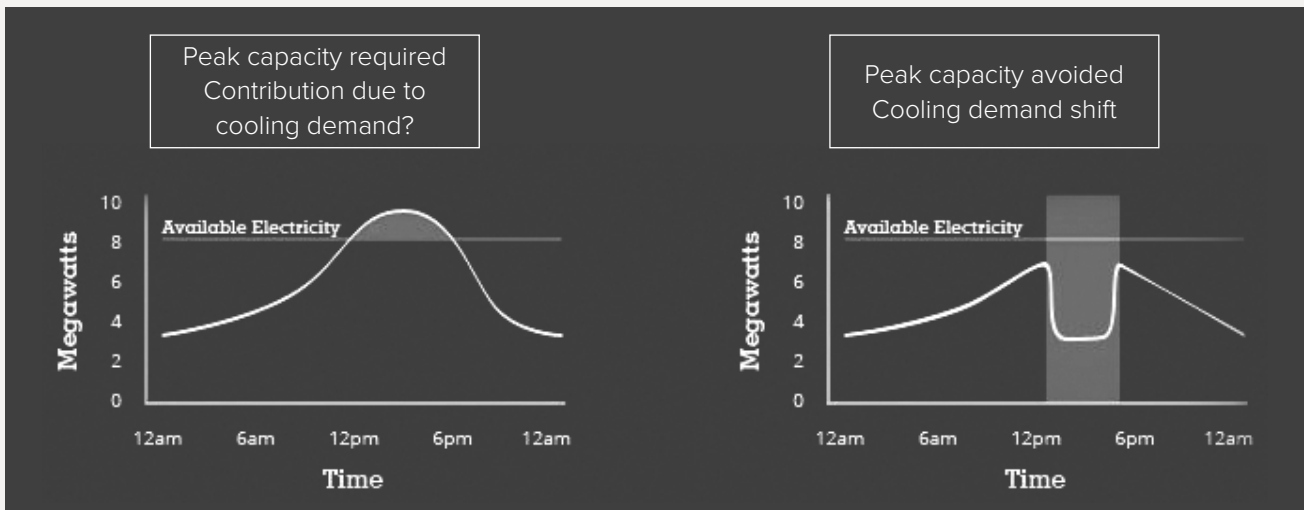


Approach

In order to identify the demand shift potential in cooling sector, the study shall begin with the identification of commercial sectors with the highest contribution to the cooling peak loads and then proceed to assess the feasibility to reduce cooling demand for a stipulated time period. The detailed approach has been identified as below:



¹ World Economic Forum, 2019 (<https://www.weforum.org/agenda/2019/05/india-heat-cooling-challenge-temperature-air-conditioning>)



1. *Identify the large consumers in the commercial sector*

- Amongst the different categories of commercial end-users in the country, the first step is to identify those consumers which have significant cooling demand. These could include airports, large scale cold storage, large scale cooling in IT parks, large scale cooling in shopping centers, hotels and hospitals. The final selection of the consumers that would be studied will be based on current and future impact on peak load as well as the viability of a DR program in these sectors.
- Once the consumers have been identified (ideally 3-4), the objective is to estimate their current (2020) and projected peak load in 2030.

2. *Identify the technical feasibility to reduce demand*

- If incentivized, the technical feasibility to reduce the cooling load among the selected consumers will be assessed. The feasibility shall be determined as - by what percentage and how fast (MW per minute) the demand can be reduced.
- The total easily possible demand reduction at 10:30 pm for at least 30 minutes will be determined.
- It would also be identified if any additional investments are required for the demand reduction.

3. *Identify possible constraints for implementation of demand shift in the cooling sector.*

- Technical constrains from the cooling system design and equipment selection perspective shall be identified.
- Operational constrains from the facility managers prerogative such as any potential conflict with the service level agreements (SLAs) shall be investigated.



Expected Outcome

Estimation of the total national cooling capacity which can be ramped down and up again on a short notice to reduce peak load requirements of the country during peak demand in the evening/nighttime.

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