



**ENERGY EFFICIENCY SERVICES LIMITED**  
A JV of PSUs under the Ministry of Power

# INNOVATING ENERGY

May 2021  
EDITION 28

## Combating air pollution: Improving air quality & pathogen control

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**Mr. Bhawanjeet Singh**  
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**Soumya Prasad Garnaik**  
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## EDITOR'S NOTE

Dear Reader,

We are currently in the midst of the second wave of the COVID-19 pandemic, which has left a significant upheaval in its wake. With new mutations, the virus has spread across the nation, unabated. It is now the time for us to be even more diligent in our efforts to prevent the spread of this deadly menace.

Double masking, strict social distancing and adhering to local curfew guidelines is now particularly critical.

In the current situation, prevention and mitigation of airborne diseases has become even more imperative, especially indoors. The need of the hour is to actively implement comprehensive solutions that can maintain and enhance indoor air quality by retrofitting building air-conditioning and ventilation systems. Herein, technology can be a great enabler. Our **"Retrofit of Air-conditioning to improve Indoor air quality for Safety and Efficiency"** (RAISE) initiative, which can simultaneously improve indoor air quality (IAQ), energy efficiency (EE) and thermal comfort; and mitigate the spread of pathogens can be truly indispensable. This edition of our newsletter focuses on the potential applications and various benefits of RAISE.

In "RAISE: A comprehensive solution for maintaining good air quality & curbing pathogen spread indoors", we discuss how poor air quality, a concern for quite some time, has become more important in light of the pandemic. Thus, maintaining good indoor air-quality and controlling pathogen spread indoors is a key imperative. In "Maintaining good air quality & curbing pathogen spread indoors is the need of the hour", we discuss the need for solutions that reduce the spread of pathogens and improve the air quality in places like hospitals, airports and metro stations, along with spaces with high footfalls. In "Improving energy efficiency and combating the risk of airborne transmission of pathogens", we deep dive into the merits of RAISE, and look at how it can enhance indoor air quality, thermal comfort, and energy efficiency in air-conditioning systems in building complexes. The section on "Top energy trends from India & across the globe" traces the new happenings in the energy sector, focusing particularly on renewable energy and energy efficiency.

Our entire nation has come together in this skirmish against COVID-19. Innovative measures such as RAISE have an enormous role to play in the prevention of similar diseases, now and in the future. The time is ripe for us to proactively adopt new and effective ways to keep our indoor spaces clean and microbe-free.

With Regards,

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## **RAISE: A comprehensive solution for maintaining good air quality & curbing pathogen spread indoors**

The current pandemic has laid bare the vulnerability of our public spaces, especially the hospitals. The SARS-COV2 virus can spread unabated in enclosed spaces, especially if the ventilation is inadequate. This makes hospitals particularly vulnerable, as the transmission droplets of the disease can linger in the air and remain infectious for long periods of time. We urgently need ways to curb the spread of zoonotic diseases indoors, to ensure the safety of our workforce. The approaching winter season too, does not bode well for the respiratory health of our nation. The rising level of pollutions further aggravate the issue, as clean air and good respiratory health go hand in hand.

The unpredictable nature of SARS-COV2 virus means that we need solutions beyond run-of-the-mill air filters. Poor ventilation increases the risk of the virus concentrating in enclosed spaces and chances of being super-spreading events even if they are small gatherings at any given time. Reduction of the exposure to the virus at the time of infection can have a beneficial outcome in both transmission control and in patients during hospitalisation

Thus, maintaining good indoor air-quality and controlling pathogen spread indoors, especially in hospitals is a key imperative. However, there has been a dearth of comprehensive solutions to deal with the issue. Air filters, while necessary are ill-equipped to curb the spread of pathogens that are miniscule in size. EESL has presented a compelling solution to maintain and enhance indoor air quality by retrofitting office air-conditioning and ventilation systems, as a part of its "Retrofit of Air-conditioning to improve Indoor air quality for Safety and Efficiency" initiative.

The initiative was devised for keeping indoor spaces clean, healthy and energy efficient. Under this initiative, which EESL is implementing in partnership with USAID's MAITREE programme, the focus is on improving indoor air quality (IAQ) and thermal comfort, along with mitigating the spread of pathogens and enhancing energy efficiency (EE) in the air conditioning systems. With increased ventilation, smart motorized outside air control, high efficiency filters, UV disinfection and cooling coils, RAISE can make indoor spaces cleaner, safer and energy efficient. The Ultraviolet light (UV-C) disinfection or UV Germicidal Irradiation (UVGI) is highly effective against a broad range of microbes, bacteria, and fungi. Air disinfection also enables ventilation of enclosed spaces, which is not permitted in virus infected air.

EESL is currently exploring a partnership with All India Institute of Medical Studies (AIIMS) to study effective control of pathogens indoors and aims to take its RAISE solution pan-India. By combining filtration, disinfection and ventilation into one solution, RAISE has remarkable potential for pathogen control and enhancing patient safety in hospitals



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### **Maintaining good indoor air quality and curbing pathogen spread is the need of the hour**

The Covid-19 pandemic has forced most of India's population to shelter indoors against the growing number of infections across the country. While we know that transmission of the SARS-CoV-2 virus is particularly high in crowded public places, it must be remembered that confined indoor spaces with poor or no ventilation pose an equally potent threat. It is thus necessary to have a healthy indoor environment in homes, offices, and all other places that accommodate multiple people under one roof. However, Covid-19 isn't the only airborne disease that can spread in such places; we cannot discount the threat posed by tuberculosis, influenza, and new strains of other common diseases. Air quality and respiratory health go hand-in-hand. We must therefore ensure that pollution levels – both indoor and outdoor – are kept to a minimum even when economic, industrial, and transportation activities return to near-normal levels once the pandemic abates.

For long, there has been a dearth of comprehensive solutions to deal with the issue of indoor air quality and pathogen control. This is a matter of worry, because proper ventilation and air filtration are extremely important in places such as hospitals, which are high-risk zones for the spread of viruses, and where visitors, patients and staff are vulnerable to hospital-acquired infections. <sup>1</sup> There is a strong need for solutions that reduce the spread of pathogens and improve the air quality not only in hospitals but also in other crowded places such as airports and metro stations. This holds true even for smaller indoor spaces such as shops and offices, which see large numbers of footfalls every day.

Air filters are inadequate to curb the spread of pathogens that are the size of bacteria or viruses. Worse, if there is poor ventilation, it increases the risk of pathogen concentration in enclosed spaces. There is a clear and urgent need to modify existing the HVAC systems used in indoor spaces by integrating mechanical ventilation with air-purifying techniques such as UV Germicidal Irradiation (UVGI) to offer greater protection and comfort to occupants.

Ultraviolet radiation is one of the more effective methods for killing bacteria, fungus, virus, and other micro-organisms. UV-C is the preferred ultraviolet frequency band for this purpose. <sup>2</sup> Irradiation using UV-C has proven effective against SARS-CoV-2. It must be noted that excessive or long-term UV exposure is harmful to health. However, when the air purification system is designed properly, the negative effects of UV-C can be minimized or eliminated. UVGI has now gained industry-wide understanding, and there are standards available for using it correctly.

EESL has developed a compelling solution to improve and maintain indoor air quality by retrofitting air-conditioning and ventilation systems in buildings. This is a part of the company's RAISE (Retrofit of Air-conditioning to improve Indoor air quality for Safety and Efficiency) initiative. RAISE focuses on improving indoor air quality and thermal comfort, while enhancing energy efficiency and mitigating the spread of pathogens in air conditioning systems. It increases ventilation and uses smart motorized external air control, high-efficiency filters, UV disinfection, and cooling coils to make indoor spaces cleaner, safer, and energy-efficient.

As it combines filtration, disinfection, and ventilation into one solution, RAISE needs to be implemented across the country on a large scale, especially in the light of the Covid-19 pandemic. While clean and healthy buildings alone won't solve the problem, they certainly will play a crucial role in minimizing viral transmission and providing an additional layer of protection for millions of people.

<sup>1</sup> <https://www.newindianexpress.com/states/kerala/2020/nov/19/indoor-air-quality-key-to-check-covid-spread-in-hospitals-say-experts-2225149.html>

<sup>2</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8049211/>



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# **Time to RAISE the energy efficiency of buildings and ensure pathogen-free indoor air**

The Covid-19 pandemic has underlined, more strongly than ever, the need for ensuring good indoor air quality in homes, offices, and enclosed public spaces such as airports and shops. It is common knowledge that concentration of pathogens and pollutants in the air can trigger headaches, allergies, asthma, and other respiratory conditions. Now, with large sections of the population preferring to stay indoors for most of the time, it has become essential to rid indoor air of bacteria, viruses, and other pathogens to the greatest extent possible.

Most existing buildings in India are not equipped to establish or maintain healthy indoor air quality, and therefore need to be upgraded. Although cooling accounts for the largest use of energy in offices and commercial buildings, the air conditioning systems in most of the old buildings are not designed for high levels of ventilation or filtration or energy efficiency. Retrofitting these air conditioning systems can offer at least some level of protection from Covid-19. Moreover, it presents an opportunity to integrate energy efficiency measures with those for enhancing air quality. It is in this direction that EESL had launched the RAISE (Retrofit of Airconditioning to Improve Indoor Air Quality for Safety and Efficiency) initiative.

RAISE focus mainly on enhancing indoor air quality, thermal comfort, and energy efficiency in air-conditioning systems. The retrofitting involves upgrades or modifications to the existing systems. The RAISE-enhanced ventilation system, for instance, factors the building's occupancy, design, and use, to turn air over at a rate that prevents the build-up of pollution and pathogens. State-of-the-art filters in the HVAC system not only remove pollutants from indoor and outdoor sources but also enhance the cooling and energy performance. Sensors provide real-time updates to the building's occupants about different metrics of air quality. The air handling unit and the chilled water system are upgraded to enhance energy efficiency as well as cooling performance.

A series of pilots conducted in Delhi have established the effectiveness and cost benefits of such measures as well as their short-term and long-term impacts on air quality, user comfort, and energy use. The results have been very encouraging. Air quality in the offices improved dramatically, with up to 98% reduction in pollutants. Currently, there is no standardized approach to retrofitting for Covid-19 response. The pilots have addressed this issue, providing a foundation for the development of specifications for future use in other buildings throughout the country. Based on the pilots, EESL has developed retrofit specifications for nationwide scale-up of the RAISE initiative.

It is a challenging ask, but one that EESL is well-positioned to address. Although most offices and commercial establishments are either closed or working in limited capacity at present, they will likely resume activity at near-pre-pandemic levels sometime in the future. Ensuring healthy and energy-efficient buildings for people should, therefore, be among the top priorities for both the public and the private sectors. The retrofitting of centrally air-conditioned public buildings, government and private sector hospitals, hotels, airports, and metros – all of which are expected to maintain high standards of air quality and resilience – needs to be taken up on priority.

Today, the world is fighting some of its gravest global issues at once – climate change, energy consumption, rising pollution, and Covid-19. Initiatives like RAISE will help in addressing them, together, to a considerable extent.

## In Focus

### Top energy trends from India & across the globe

- **Renewables set to provide more than half of the increase in electricity supply in 2021**

Solar PV and wind are expected to contribute two-thirds of renewables' growth. The share of renewables in electricity generation is projected to increase to almost 30% in 2021, their highest share since the beginning of the Industrial Revolution and up from less than 27% in 2019. Wind is on track to record the largest increase in renewable generation, growing by 275 TWh, or around 17%, from 2020. Solar PV electricity generation is expected to rise by 145 TWh, or almost 18%, and to approach 1,000 TWh in 2021.

- **World Bank Revises Climate Change Policy But Stops Short of Halting Fossil Fuel Funding**

The World Bank, the biggest provider of climate finance to developing countries, is finalizing a new five-year climate action plan amid growing political momentum in Britain, the United States, and other countries for ending public financing of high-emission fossil fuel projects.

- **India, US to pursue ways to deepen their partnership on clean energy**

India and the US will pursue ways in which they can deepen their partnership on climate and clean energy, after Special Presidential Envoy for Climate John Kerry called on Prime Minister Narendra Modi in New Delhi during which they affirmed that the two countries can creatively collaborate on a 2030 agenda.

- **Biden and World Leaders Focus on Innovation for 'Clean Energy Future'**

President Biden announced on Friday that the United States would revive its participation in an initiative among dozens of nations and investors to increase government budgets for renewable energy research, development and deployment. The program, Mission Innovation, was spearheaded by former President Barack Obama and Bill Gates, in parallel with the Paris Agreement on climate change, in 2015

- **India 'red hot investment opportunity' for clean energy: Kerry**

Calling India a "red hot investment opportunity" because of the country's efforts to increase the share of renewables in the energy basket, special US presidential envoy for climate John Kerry said on Tuesday that "global investment in new clean power capacity is set to exceed \$10 trillion through mid-century, more than six times the investments in dirtier options".

- **Green hydrogen can spearhead India's transition to clean energy**

Green hydrogen has the potential to not just slash imports but also transform the country into a global leader on climate-change mitigation.