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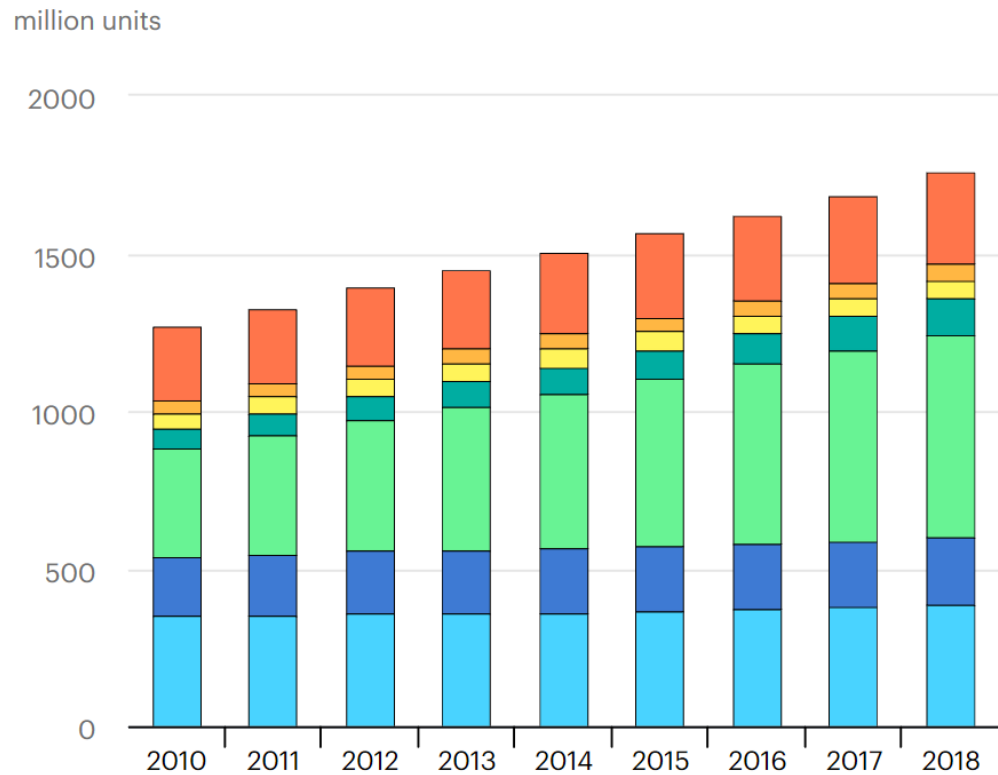
# KSTA6563: Disease Resilient and Energy Efficient Centralized Air-conditioning (CAC) Systems in Public Buildings

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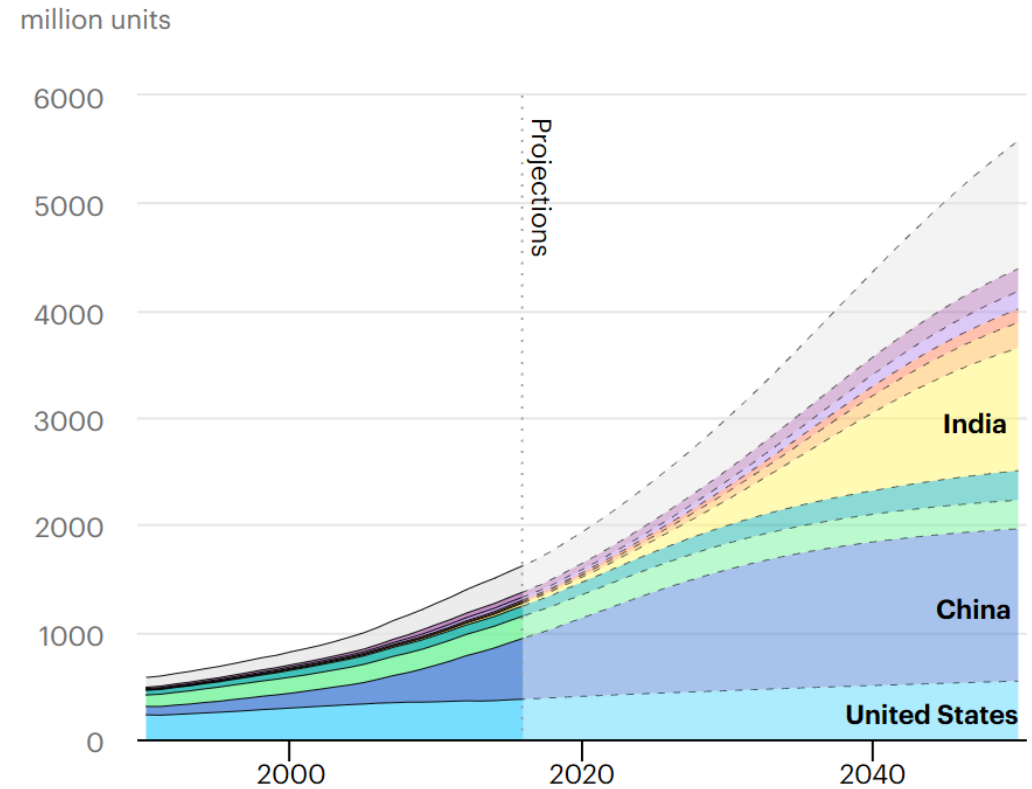
# Trend of world air-conditioners market demand

Estimated air conditioner stock in selected regions, 2010-2018



● United States   
 ● Japan and Korea   
 ● China   
 ● Other Asia   
 ● Latin America  
● Middle East   
 ● Rest of world   
 Source: IEA data base

Global air conditioner stock, 1990-2050



● United States   
 ● China   
 ● Japan and Korea   
 ● European Union   
 ● India   
 ● Indonesia  
● Mexico   
 ● Brazil   
 ● Middle East   
 ● Rest of world   
 Source: IEA data base

# Challenge of Centralized Air-conditioning System of Public Buildings under COVID-19 Pandemic



**Risks to virus transmission**



**Inefficient**



**Insanitation**



**Environmental risks**



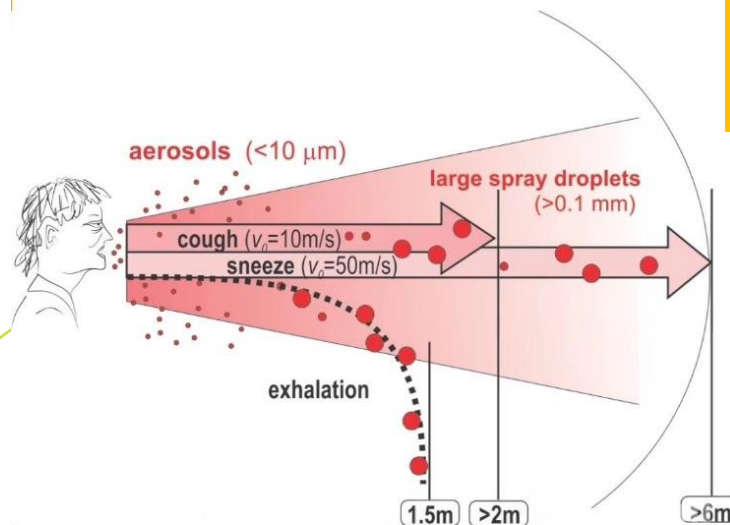
**Need for capacity building**

# Reducing Virus Transmission Risks

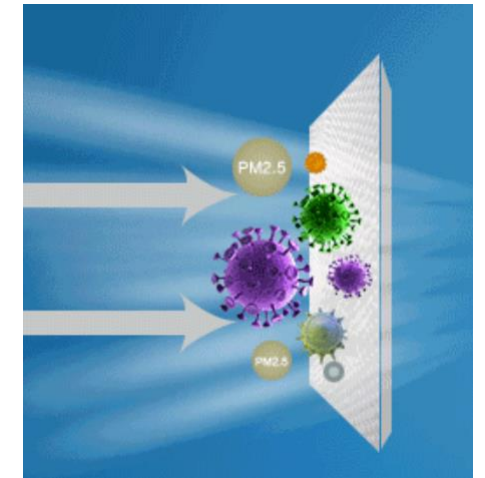
- Almost all public buildings are equipped with centralized air conditioning systems, but the design and equipment are old, inadequate to meet hygiene standards.
- High density of people in public buildings, high risk of virus transmission and infection.
- People need to go back to the offices/public buildings as economy reopens.

Transmission of the COVID-19 virus can occur by direct contact with infected people and indirect contact with surfaces in the immediate environment or with objects used on the infected person.

**Airborne transmission** is different from droplet transmission as it refers to the presence of microbes within droplet nuclei, which are generally considered to be **particles <5 $\mu$ m in diameter as aerosols**, can remain in the air for **long periods of time (a few hours)** and be transmitted to others.



If centralized A/C system is poorly designed and operated (recirculated air), it can increase the risks of virus transmission in the building  
→ A/C systems have to be assessed, redesigned, upgraded and operated using smart and advanced technologies to meet hygiene standards



**Dust + Virus = High Risks**

# KSTA 6563: Regional Support to Build Virus Resilient and Energy Efficient Centralized Air Conditioning Systems

## TOTAL Project Amount:

\$1,000,000





## Countries:

### REGIONAL

– All subregions covered; country selection in consultation with RDs. Tentative countries include PHI, THA, PAK, SRI and IND.

– Pilot project can be duplicated in DMCs.

## Operational Priorities:

1. Addressing remaining poverty & reducing inequalities 
2. Accelerating progress in gender equality 
3. Tackling climate change and disaster resilience and enhancing environmental sustainability 
4. Making city more livable 

## Impact:

- ✓ health outcomes in Asia and the Pacific improved
- ✓ living and working environment and quality improved

## Outcome:

Deployment of centralized air conditioning systems that meet energy efficiency standards and help contain indoor transmission of viruses enhanced

# TA 6563 Results Chain

## OUTPUT 1

### Knowledge on Energy efficiency and virus transmission risks of centralized AC systems in typical public buildings improved

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- To assess indoor air pollution and virus transmission risk
- To analyze energy consumption of AC systems
- To conduct fluorocarbons life cycle assessment
- Operational process for smart automated control system will be designed in different scenarios (during pandemic, resuming work, and normal situations) with **digital technology**, and the system will automatically adjust the operation parameters according to the hygiene and energy efficiency **in different scenarios**.

## OUTPUT 2

### Innovative centralized AC systems using digital technologies demonstrated

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- The pilot project will be procured through “**innovation challenge**” to demonstrate the benefits of AI-enabled AC systems which addresses efficiency and health objectives **at the same time**.
- **Higher efficiency filtration and ultraviolet sterilization technology** will be incorporated to eliminate and prevent the spread of viruses in AC systems.

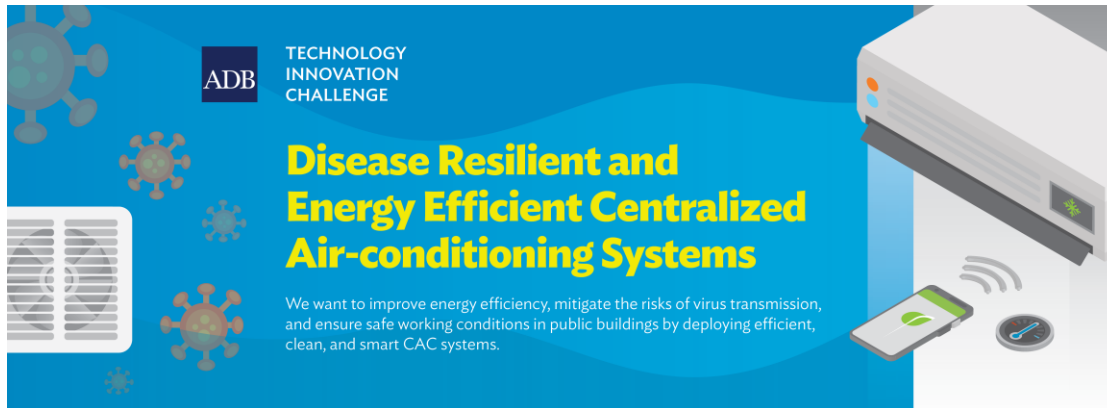
## OUTPUT 3

### Awareness on energy conservation and containing indoor virus transmission enhanced

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- The output will disseminate the knowledge gained under the TA and enhance awareness and capacity to prevent and contain indoor virus transmission with cleaner and more efficient AC systems. Training works will be conducted for relevant government institutions and operators of public buildings.

ADB challenge website  
<https://challenges.adb.org/en/challenges>



## TIMELINE



## EOI Top 5

Applicants	Country	Country Demonstration
Ananta Industries	Philippines	Philippines
A.T.E.-HMX	India	India
Enersion	USA	India (3) and Australia
International CAC Consortium	Aus; Thai; Bhu; Sri; Ind	Sri Lanka
Partivartan - Transformation	India	India

# Individual Consultants

Position	Consultant
<b>Team Leader and Centralized Air-conditioning Technology Expert</b> (International)	<b>Yashkumar Shukla,</b> Executive Director, Center for Advanced Research in Building Science and Energy, CEPT University
<b>Air-conditioning/Energy Efficiency Expert</b> (International)	<b>Yanping Zhou,</b> Managing Director, Senior HVAC Engineer, Energydesign (Shanghai) Co.,Ltd.
<b>Health and Air Quality Expert</b> (International)	<b>Richie Mittal,</b> Managing Director, Overdrive Engineering Pvt Ltd
<b>Information Technology Application Expert</b> (International)	<b>Megan Huang,</b> Senior HVAC Engineer, commercial manager, China Energy Engineering Group Guangdong Electric Power Design Institute Co., Ltd.
<b>Centralized Air-conditioning Technology Expert</b> (National)	Vacant
<b>Air-conditioning/Energy Efficiency Expert</b> (National)	Vacant
<b>Health and Air Quality Expert</b> (National)	Vacant
<b>Information Technology Application Expert</b> (National)	Vacant



# Webinar Series on Disease Resilient and Energy-Efficient Centralized Air-Conditioning Systems

Webinar Series	Time	Session focal
<b>Webinar 1 - Disease Resilience and Indoor Air Quality</b>	16:00-17:30 Manila time, 1 September	<b>Richie Mittal,</b> <b>Health and Air Quality Expert (International)</b> richiemittal@gmail.com
<b>Webinar 2 - Energy Efficiency</b>	16:00-17:30 Manila time, 8 September	<b>Yanping Zhou,</b> <b>Air-conditioning/Energy Efficiency Expert (International)</b> yanping.zhou@energydesign-asia.com
<b>Webinar 3 - Smart HVAC Systems</b>	16:00-17:30 Manila time, 15 September	<b>Megan Huang,</b> <b>Information Technology Application Expert (International)</b> huangdonglan@gedi.com.cn
<b>Webinar 4 - Refrigerant Management</b>	16:00-17:30 Manila time, 22 September	<b>Yashkumar Shukla,</b> <b>Team Leader and Centralized Air-conditioning Technology Expert (International)</b> yash.shukla@cept.ac.in



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