



Bureau of Energy Efficiency



सत्यमेव जयते
Government of India
Ministry of Power



giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

ANGAN

Augmenting Nature by Green Affordable New-habitat

A Courtyard for Revolutionary Change in Building Energy Efficiency

An International Conference on Building Energy Efficiency

9th-11th September, 2019 | Hotel The LaLIT, New Delhi





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german
cooperation
DEUTSCHE ZUSAMMENARBEIT

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Zusammenarbeit (GIZ) GmbH

THIS PRESENTATION WAS SHARED BY

Prof. Prasad Vaidya

Energy Consultant, ZENERG, Mumbai

FOR THE SESSION:

“Steps towards Net Zero Energy Buildings”

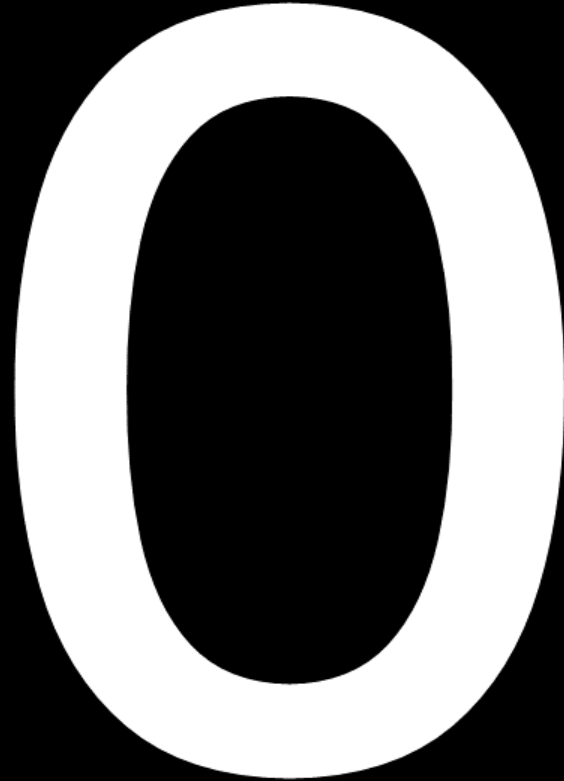
DURING ANGAN 2019

Knowledge Partner

teri | THE ENERGY AND
RESOURCES INSTITUTE
Creating Innovative Solutions for a Sustainable Future

Event Partner

TEC INDIA 
EVENT & BRAND MANAGEMENT CO.



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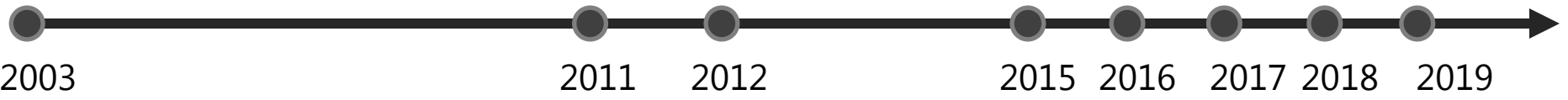
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At CEPT University

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Source: US DOE



Source: CARBSE

NZE Single Family Home in Jaipur



NZE Single Family Home in Jaipur



Net Zero Energy

EUI 18 kWh/m²

PV → 19 kWh/m²

ECMs address envelope, appliances, HVAC, and lighting design



Zero water discharge

Rainwater harvesting

Low flow fixtures

Greywater recycling

Water conserving plants



IAQ

WHO levels

Ventilation

with filtration



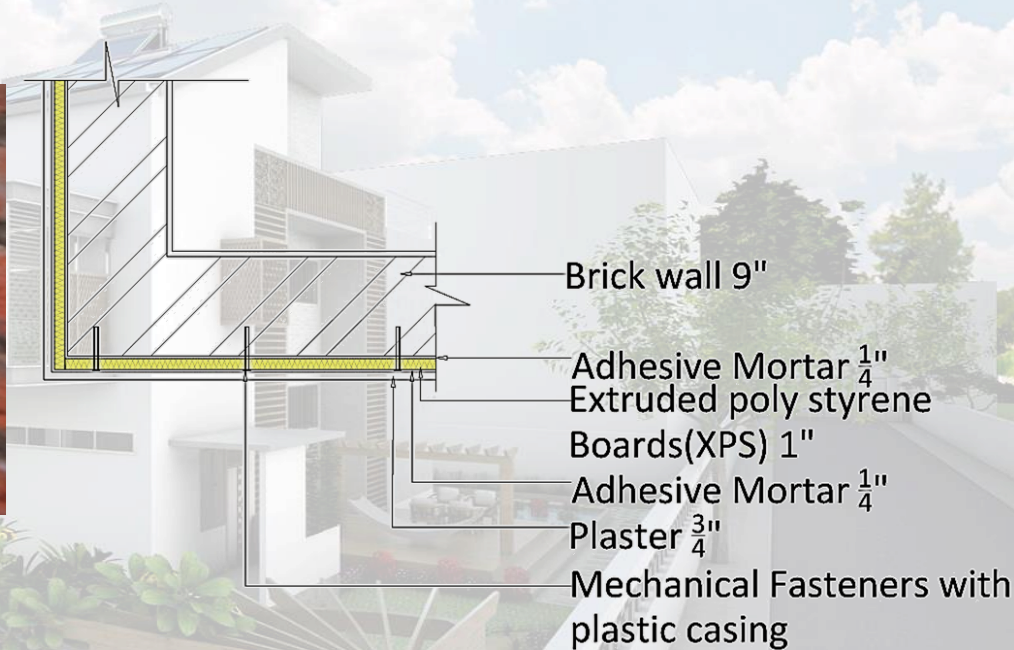
Affordability

Debt to income ratio, Incremental capital cost, LCC

NZE Single Family Home in Jaipur



The challenge in constructability was to figure out such construction detail that would be easily understood by the Indian masons.



Wall Plan XPS fixing detail

NZE Single Family Home in Jaipur



Oasis Abode will act as an **affordable** energy efficient **prototype** that can be used by the developers in India.

Aesthetically similar to typical houses, it is **an easily marketable solution**.

NZE Kendriya Vidyalaya in Jodhpur



NZE Kendriya Vidyalaya in Jodhpur



Strategic landscape for nutrition and heat mitigation

30% of the site for biodiversity
10% of the site for edible gardens



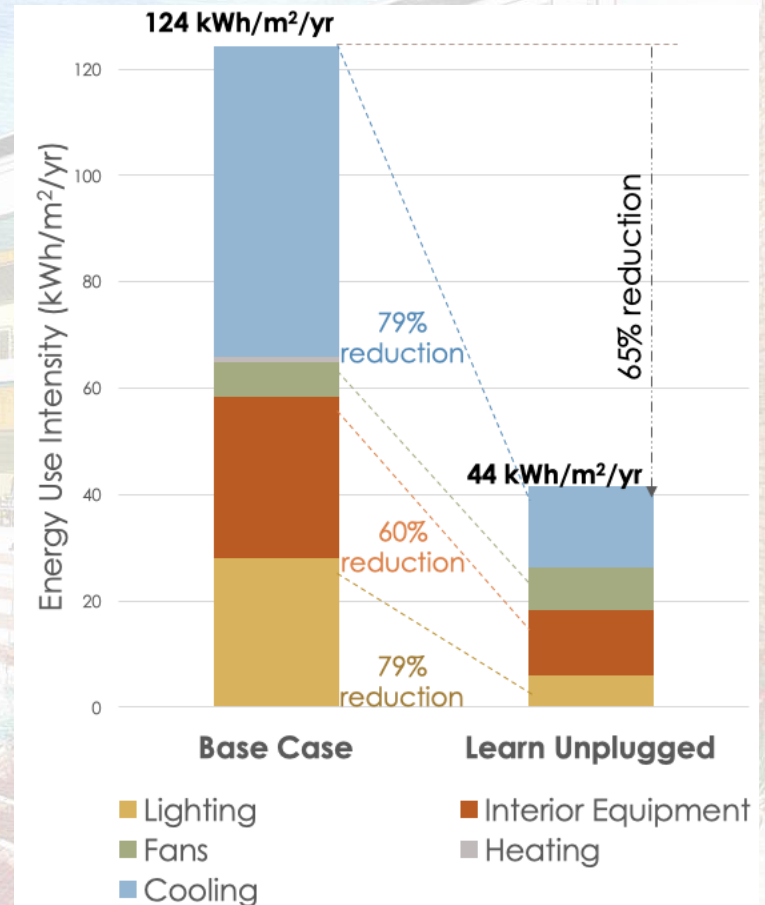
Living Building Challenge

18/20 imperatives achieved



Lifecycle emissions

75% reduction

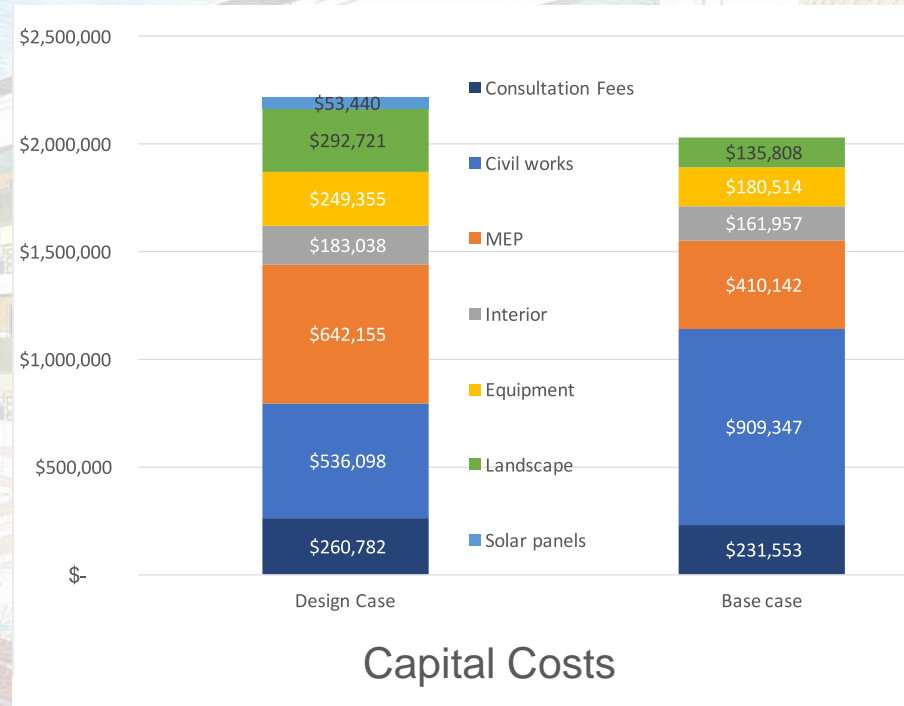


NZE Kendriya Vidyalaya in Jodhpur

Capital cost increased by 9%
Annualized ROI of 5.4% over 20 years.
21% reduction in operating costs



Ensure better maintenance with reduced operating costs



Capital Costs

NZE Affordable housing in Chennai



NZE Affordable housing in Chennai



Cooling as a service
For thermal comfort
and Resilience



Affordable and
abundant
clean energy
RESCO Model



Affordable for
Operational
Cost



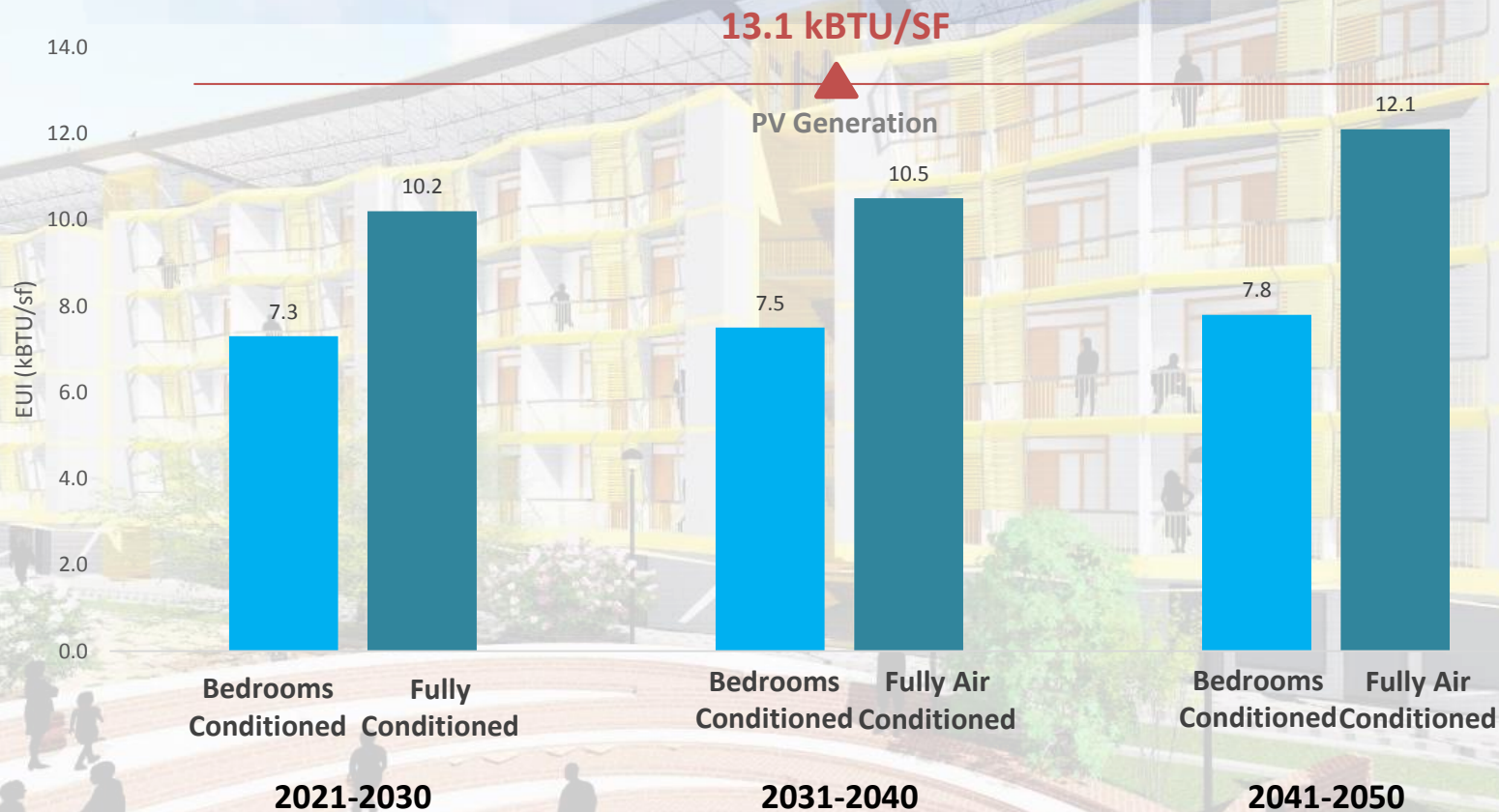
Post occupancy
personalised
assistance
Mobile App

Affordable: Within the criteria of the PMAY CLSS

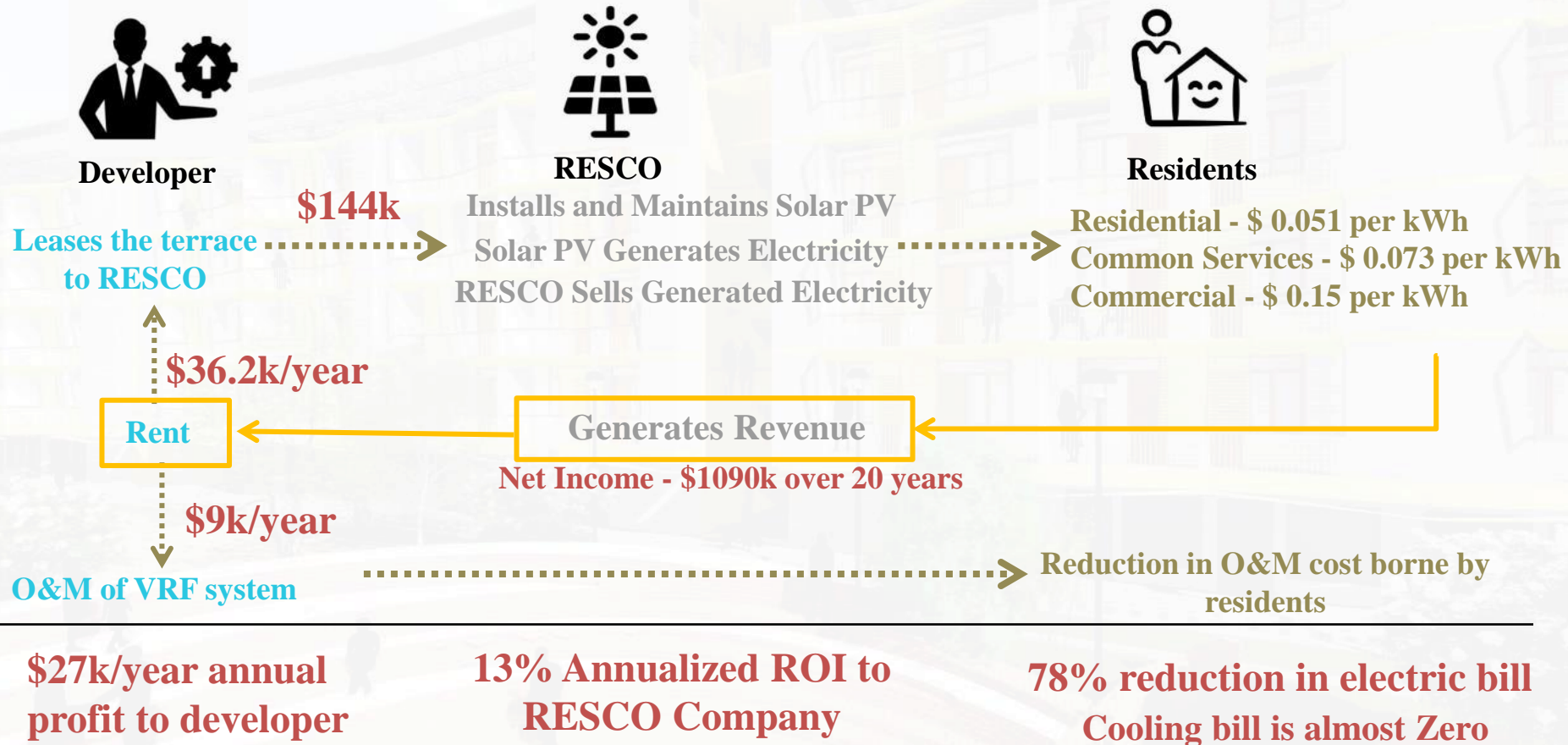
NZE Affordable housing in Chennai



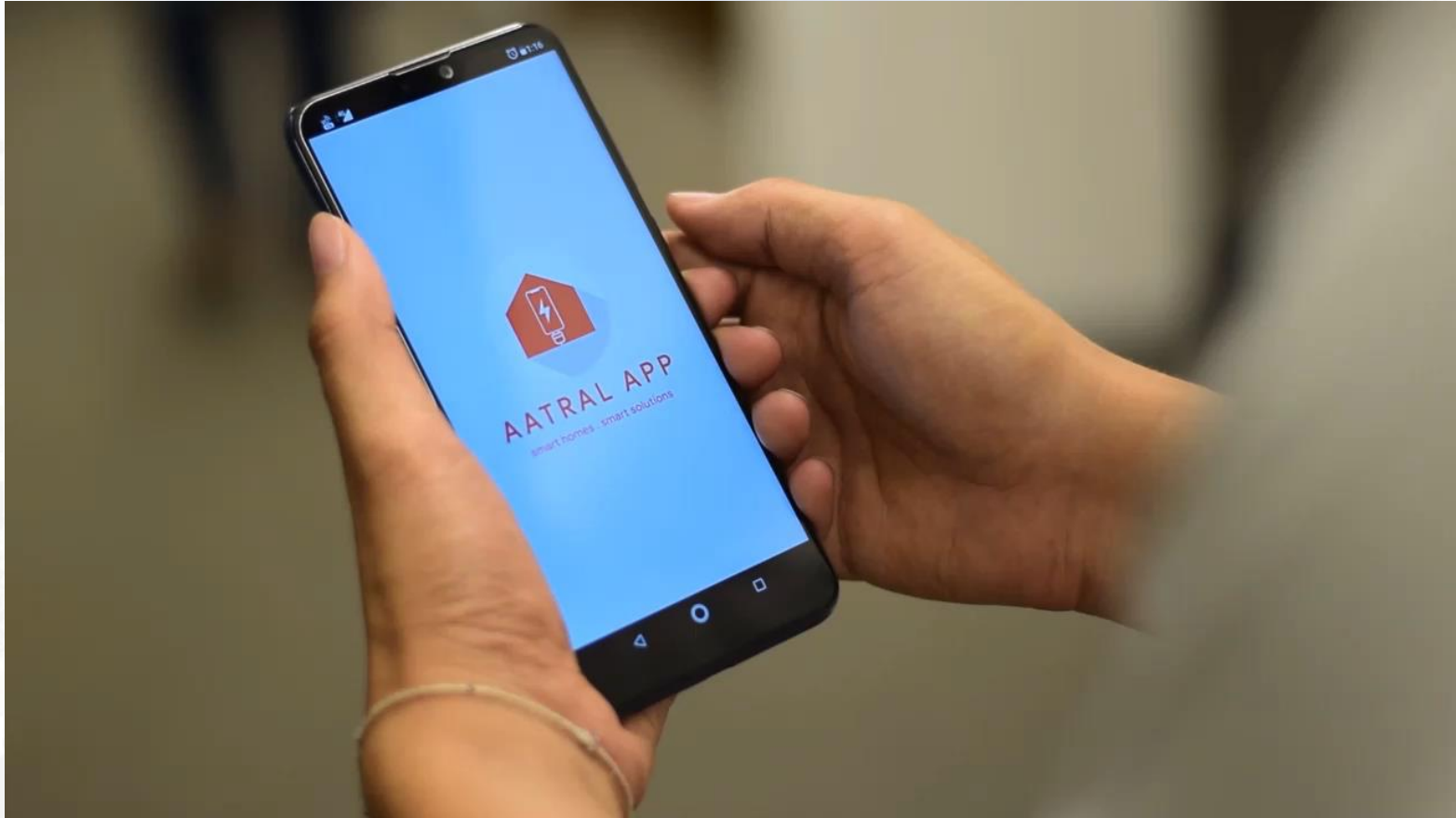
NZE Affordable housing in Chennai



NZE Affordable housing in Chennai



NZE Affordable housing in Chennai



Quality of the solutions

▲ 2017 Team

- ▲ Won 1st prize in Urban single family housing category.



▲ 2018 Team

- ▲ Finalist in elementary school category.



▲ 2019 Team

- ▲ 2nd place in Mixed-Use multifamily category.



Image Source: Department of Energy Race to Zero 2017

Industry Partners

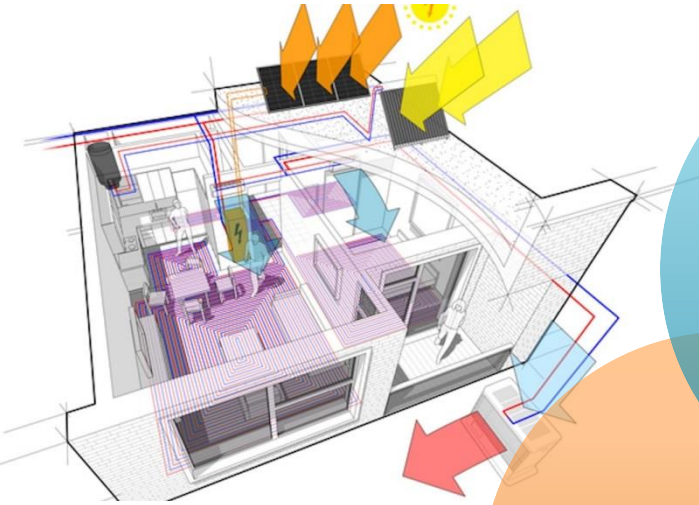
Ashok B. Lall Architects
Delta Controls
DesignBuilder
EDS
Greentech Knowledge Solutions
Guardian Glass
HMX
INSUboard
Johnson Controls
Kamal Cogent
Kesarjan Building Center
Lighstanza
Mahindra Lifespace Developers
Mitsubishi Electric
Oizom
Torowatt
Volpak Systems



A Mahindra Lifespaces initiative



Sweet Spot 1



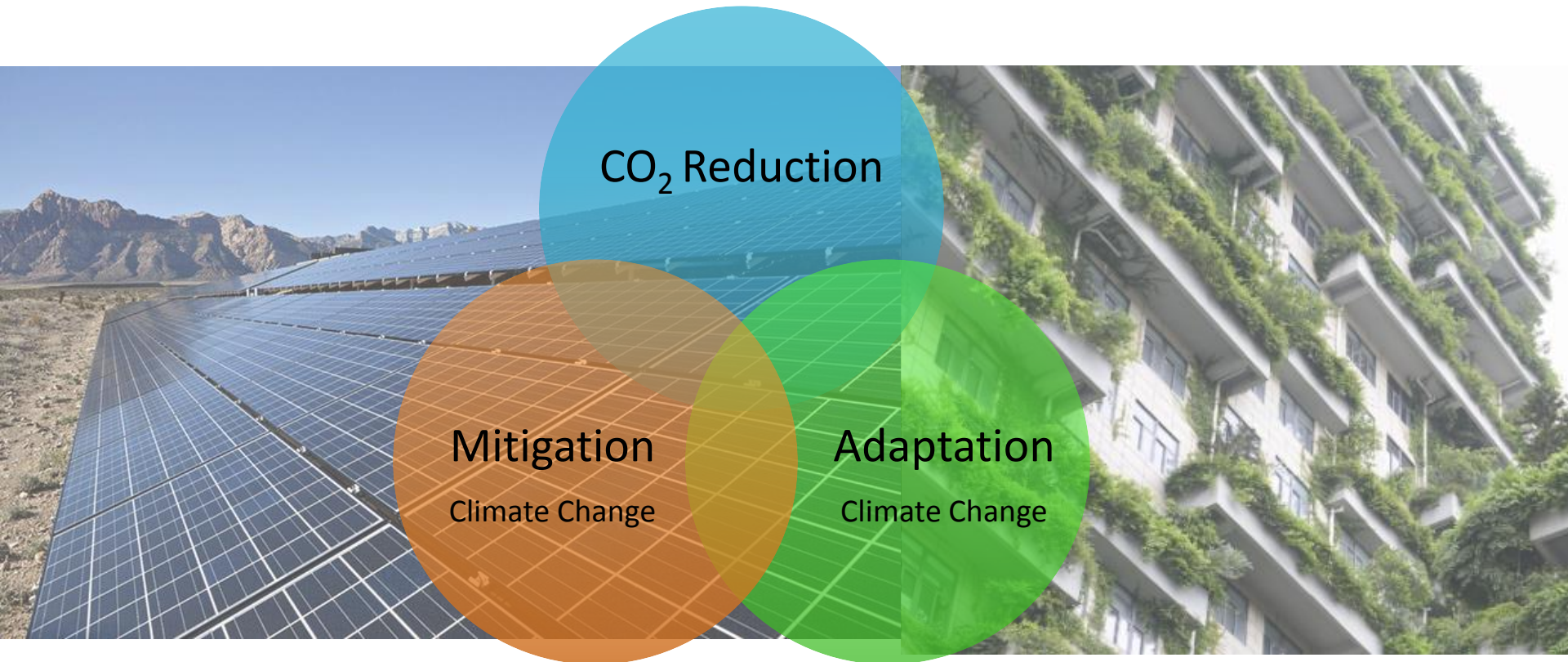
EE and RE
Environment

**Societal
Needs**
People and Comfort

Affordability
Cost Effectiveness



Sweet Spot 2



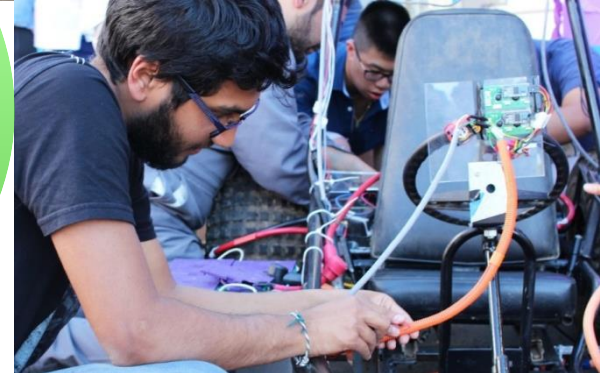
Sweet Spot 3



Green Jobs
Skilling

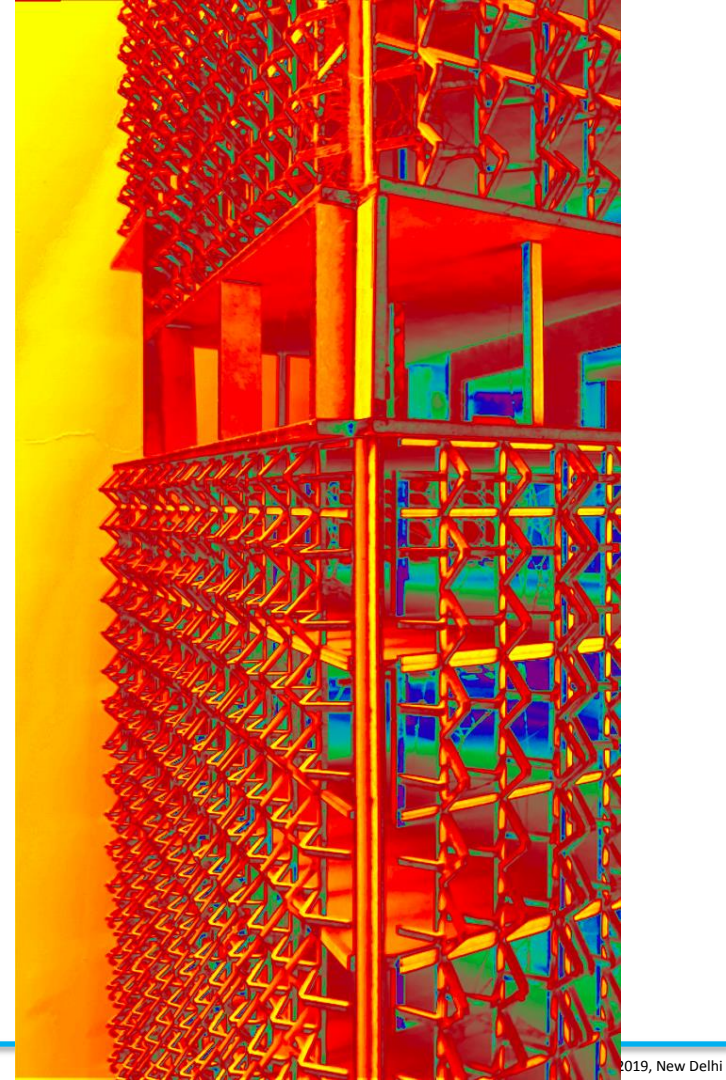
Industry
Partnerships

Technology
Incubation



Solar Decathlon India

- ▲ Use the innovative power of 1,00,000 architecture + engineering students
- ▲ Create next generation solutions for real building projects
- ▲ A laboratory for integrating technology in design solutions
- ▲ Industry plays an active collaboration role
- ▲ Positive take-home message for government stakeholders, builders and end-users
- ▲ Raise public awareness



Beneficiaries

Direct Beneficiaries

- Students
- Faculty Members

Industry

- Developers and Owners
- Real Estate Industry
- Manufacturers and Suppliers
- Architects, Engineers

Central Government

- Ministry of Power
- Ministry of Housing and Urban Affairs
- Ministry of Environment, Forest & Climate Change
- Ministry of Science and Technology
- Ministry of Power
- Ministry of New and Renewable Energy

State and Local Government

- Urban Development & Town Planning Dept.
- Public Works Dept.
- State Level Nodal Agencies
- UDD, ULBs and Municipalities

Thank you

Prasad Vaidya