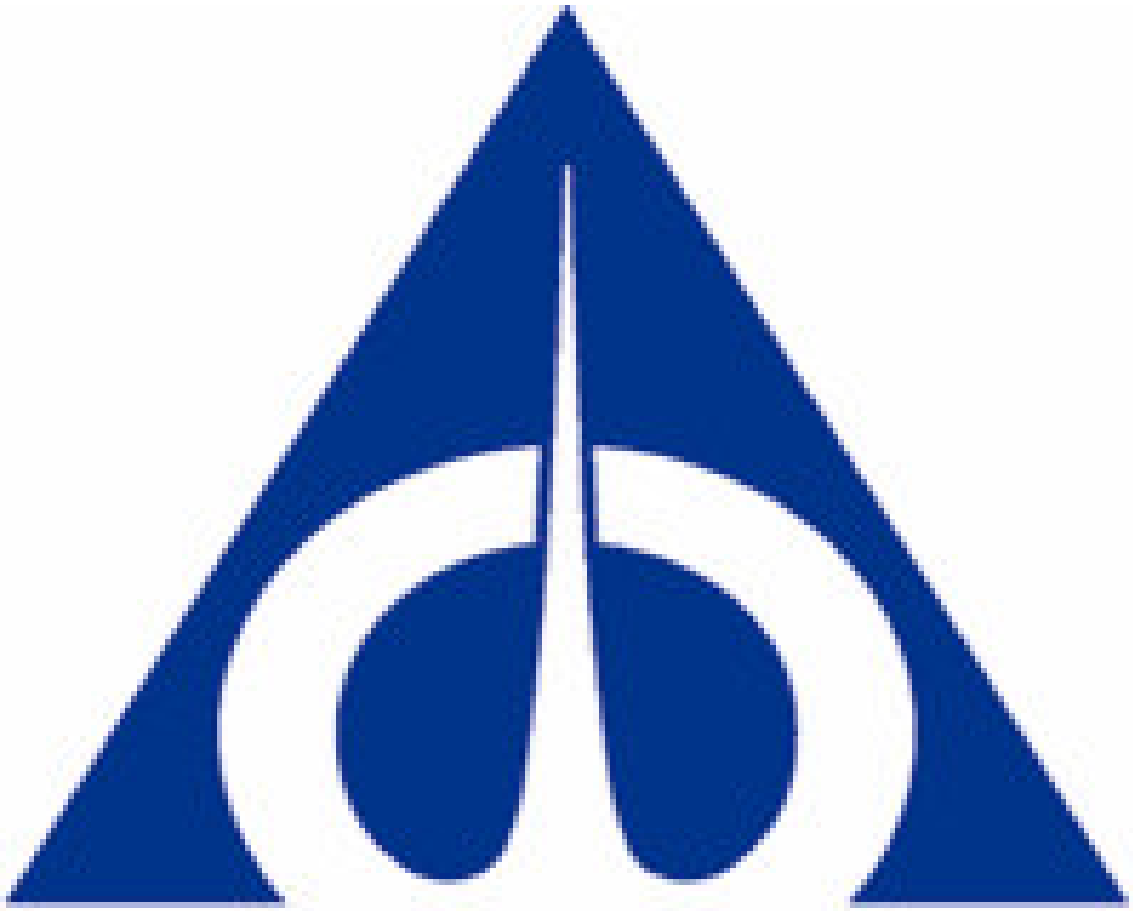

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Conserving and transforming the existing for future

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- 21st century made us realize the importance of energy conservation.

- Growth in technology and customer demand has increased the demand for energy, which has resulted in green house gas emission, leading to global warming and climate change

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WHAT IS ENERGY CONSERVATION?

Reduction in energy consumption to preserve resources for the future including controlling environmental pollution

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Energy conservation in Buildings

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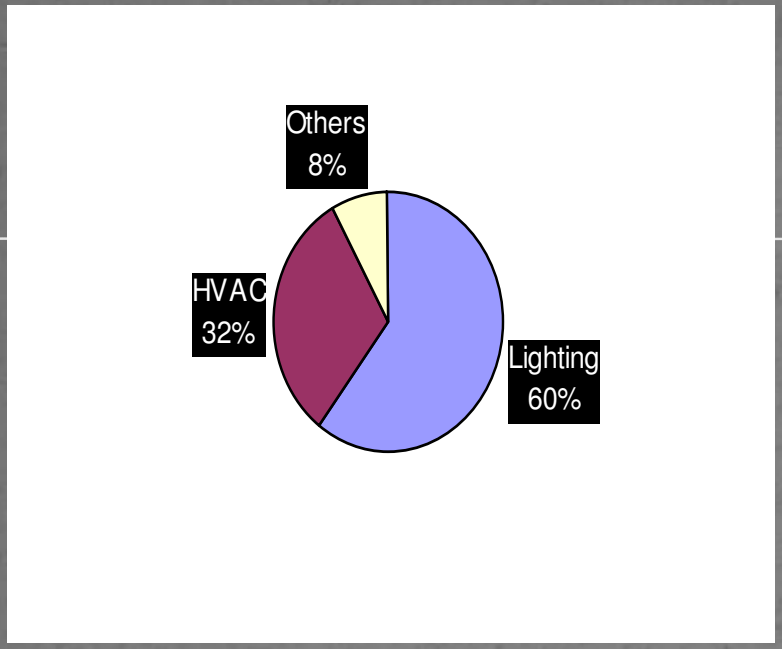
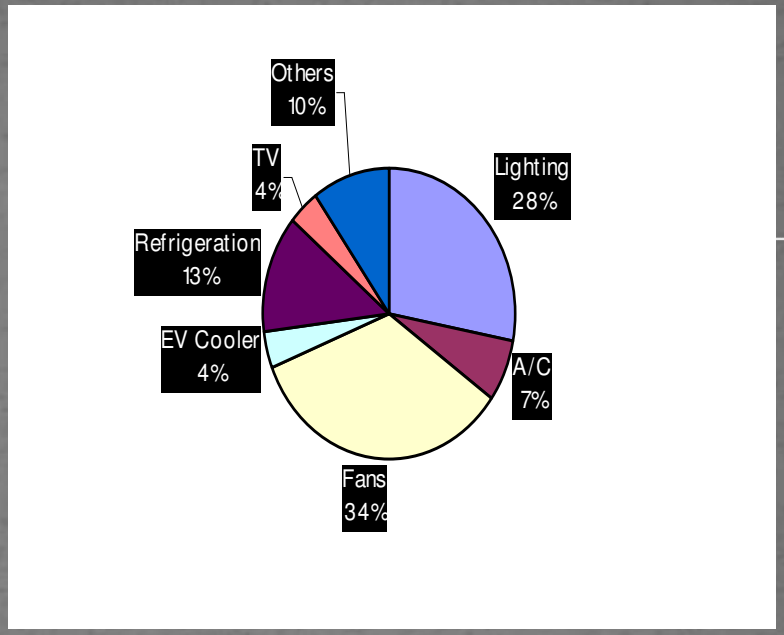
ENERGY CONSUMPTION IN BUILDING SECTOR





- 8% rise in annual energy consumption in the residential and commercial building sectors.
- Hence Concept of green building is practiced to reduce the energy consumption in buildings

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ENERGY CONSERVATION & BUILDING RETROFIT

- Apart from new buildings existing buildings are major source to energy consumption.
- Retrofitting a existing buildings is a more effective strategy
- Renewable energy targets can be met more effectively as compared new green buildings .
- The concept of constructing new green buildings is fairly established , retrofitting existing buildings is comparatively a new concept.

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- Los Angeles city council has passed a "GREEN BUILDING ORDINANCE“ which Promises to retrofit all cities owned building larger than 7500 square feet or built before 1978 with “Green-Technology”.

- In India, government has passed Energy conservation act 2001 -An Act for efficient use of energy and its conservation

- Real estate groups looking at cuts in energy bills for their national /International leasing customers

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WHAT IS BUILDING RETROFIT PROGRAMME?

- Building energy retrofitting refers to addition of new technology/features to older system, feature may be in the form of energy , water and lighting efficient fixtures, waste management techniques, & HVAC upgradation etc.

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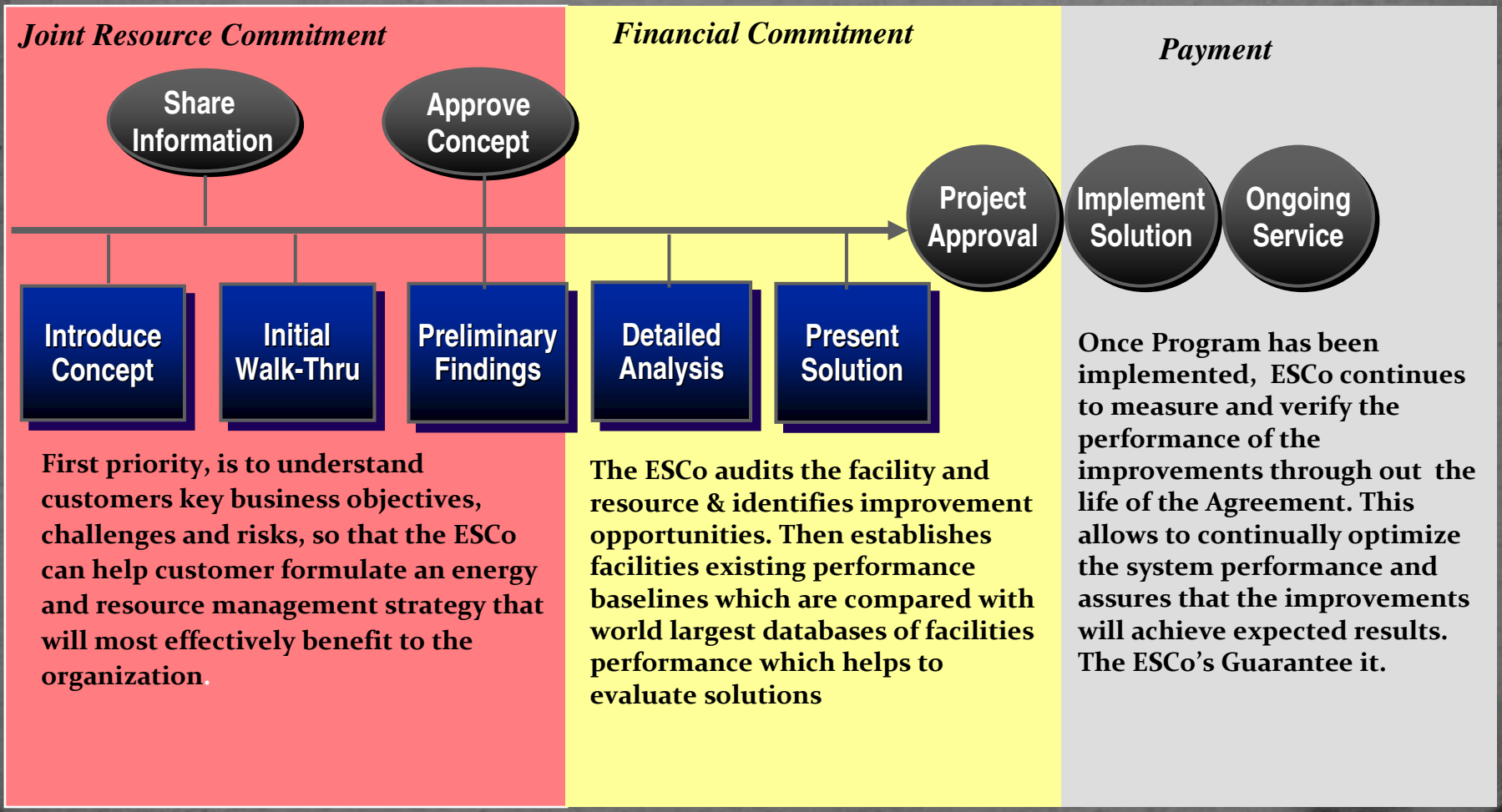
RETROFIT FLOW CHART



BENEFITS OF RETROFIT BUILDINGS

- Payback periods for energy-efficient investment in developing countries shorter than developed countries.
- Inefficient equipment replacement potential more in developing country.
- Job creation through the promotion of energy efficient programmes
- Encourages efficient building technology through promotion of local materials .
- Government buildings can adopt similar programs to save the environment.

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K. RAHEJA CORP'S SUSTAINANAIBILITY INITIATIVES

- K Raheja Corp working with Bill Clinton-led Clinton Climate Initiative (CCI) to retrofit their buildings

- First in Asia to have signed the performance contracting model under Clinton Climate Initiatives(CCI)

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INORBIT MALL, MALAD , MUMBAI

- **Property Details**
  - **Building type:** Shopping Mall (Mixed Use Retail)
  - **Building size:** 50,000 square meters

- **Energy and Sustainability Solutions**
  - ✓ HVAC upgrading

    Replacement of inefficient chilled water pumps with energy efficient pumps

    Installation of VFDs for AHUs
  - ✓ Operation through Automation

    Optimize operation of essential equipments through BAS.

    Control Peak Demand by automatic switching off non essential load
  - ✓ Energy Efficient lighting

    Energy Efficient lighting for indoor and outdoor Car Park, Service area.
  - ✓ Solar Powered LCD Panel

    Innovative communication tool demonstrating the environmental

    and financial impacts of the project.

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INORBIT MALL, MALAD, MUMBAI

- **Results**
  - ✓ 583,307 kWh total savings
  - ✓ 466,645 kg of CO_2 savings
  - ✓ 2.8 years financial payback

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HOTEL RENAISSANCE, POWAI, MUMBAI

- **Property Details**
  - **Building type:** Hotel Building

- **Energy and Sustainability Solutions**
  - ✓ Heat pump for simultaneous heating and cooling
  - ✓ Cooling pump rightsizing
  - ✓ Cooling tower upgrades
  - ✓ Lighting retrofit
  - ✓ Exhaust fan duty cycling
  - ✓ AHU duty cycling

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HOTEL RENAISSANCE, POWAI, MUMBAI

- **Key Benefits**
  - ✓ GHG emission reduction equivalent to 5400 MT of CO_2 or reduction of 1080 cars for project term
  - ✓ Optimum utilization of existing infrastructure
  - ✓ Innovative solutions leading to savings from all areas
  - ✓ Maximum Demand management

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THE RESORT, MALAD, MUMBAI

- **Energy and Sustainability Solutions**
  - ✓ Heat pump for simultaneous heating and cooling
  - ✓ Primary-Secondary variable pumping
  - ✓ Cooling pump rightsizing
  - ✓ Exhaust fan duty cycling
  - ✓ AHU duty cycling
  - ✓ HVAC controls
  - ✓ Lighting retrofit

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THE RESORT, MALAD, MUMBAI

- **Energy savers on unitary Acs**
  - ✓ Energy cost reductions 15% of annual consumption
  - ✓ GHG emission reduction equivalent to 2500 MT of CO_2 or reduction of 500 cars for project term
  - ✓ State of the art BMS for better monitoring & centralized controls
  - ✓ Energy efficient upgrades
  - ✓ Reduction in fixed energy costs, optimizing lean occupancy energy spend

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ONGOING PROJECTS

- Inorbit mall, Vashi, Mumbai

- Commercial buildings in Hyderabad and Pune

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SWOT ANALYSES FOR RETROFITING EXISTING BUILDING

❑**Strengths**

Use of environmental friendly building materials
Use of non-toxic and recycled materials
Use of energy efficient and eco-friendly equipment
Use of renewable energy
Efficient use of water
Effective controls and building management system
Quality indoor air for human comfort
Health & safety for workmen during construction

❑**Weakness**

Incremental Capital cost & funding
Availability of Materials & Time Frame
No extra premium from client
Lack of incentives from Government

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❑**Opportunities**

Job creation through the promotion of the building energy retrofitting.
Encourages local vendors through promotion of local materials
Municipalities can adopt similar programs to save the environment.

❑Threats

.

Energy retrofitting costs of existing building are higher.
Traditional approach & thinking of developers
Expense & time to train the architects, engineers & end users.
Expense and time to train engineers, technicians and end users.

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THANK YOU

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