Survey on Energy Use/Consumption and Energy Efficiency in the Services Sector

Presentation by VERDE
24 June 2019
RESEARCH OBJECTIVES
Research Objectives

**Energy Use and Energy Consumption**
To obtain a breakdown of energy use/energy consumption in the Services sector.

To obtain details on the renewable energy technology installations (photovoltaic and solar water systems) and on stand-by generators installed in the sector.

**Energy Efficiency**
To determine the level of energy efficiency of the Services sector, through Energy Use Intensity (EUI) calculations.
METHODOLOGY
Methodology

Primarily Computer Assisted/Smartphone Assisted Personal Interviewing using a structured questionnaire

Non-random stratified sampling

- Phone calls
- Site visits and meetings on research objectives
- Phone calls and updates on data collection
- E-mails
- Face to face interviews

80 Companies in services sector

9 Sub sectors within the services industry

4 Months for data collection and validation

Reliability of data can only be ascertained to some extent, given that data provided by organisations have been utilised as is in the analysis.
Sample size
Target vs Achieved
Target sample and achieved sample

**Services Sector Sample Breakdown**

<table>
<thead>
<tr>
<th>Services Sub-Sector</th>
<th>Target sample</th>
<th>Number of organisations surveyed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale and retail trade</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Storage</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Food Services Activities (excluding accommodation and food production)</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Information and communication and call centres</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Financial and Insurance Activities</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Professional, scientific and technical activities</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Education</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Human health and social work activities</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Arts, Entertainment and Recreation</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>80</strong></td>
<td><strong>83</strong></td>
</tr>
</tbody>
</table>

Differential Target vs Actual Sample

- Target sample (left axis)
- Number of organisations surveyed (left axis)
- Differential Actual vs Target (right axis)
SUB SECTORS’ OVERALL OUTLOOK
Insights from the survey
Snapshot

Data availability
- 20.5% Foot count
- 89.2% Building built area
- 74.7% Building gross area

Percentage of companies from sample
- 34.9% Use diesel
- 13.4% Use gasoline
- 44.6% Use diesel for transport
- 28.9% Use gasoline for transport
- 61.4% Have a back-up generator

Renewable Energy
Only 6% of companies use renewable energy
Snapshot

93.8%
Electricity expense as a % of total energy expense

0.821
Lowest power factor in the industry

53
Out of 83, do not maintain records of their electricity bills

0.975
Highest power factor in the industry
Intensity Measures
Energy Use Intensity (EUI)

EUI is an indicator to measure the performance of an enterprise on different attributes.

- **Turnover**
  EUI Per unit of turnover refers to the amount of energy consumed to produce 1 unit of turnover

- **Employee**
  EUI Per employee refers to the amount of energy consumed by 1 employee

- **Foot count**
  EUI Per foot count refers to the amount of energy consumed by 1 person who visits the premises

- **Built area**
  EUI Per built area refers to the amount of energy consumed per square metre of building

- **Hour of operation**
  EUI Per hour of operation refers to the amount of energy consumed per hour of operation of the building

The main indicator used in the report is EUI per hour of operation
### Intensity measures in the services sector

<table>
<thead>
<tr>
<th>Key figures</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub sector</td>
<td>Electricity energy use intensity per unit of turnover (kWh/1000 Rs)</td>
</tr>
<tr>
<td></td>
<td>Electricity energy use intensity per employee (kWh/employee)</td>
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<tr>
<td></td>
<td>Electricity energy use intensity per foot count (kWh/foot count)</td>
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<td>0.3</td>
</tr>
<tr>
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<tr>
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<td>0.9</td>
</tr>
</tbody>
</table>

- **Highest figures**
- **Lowest figures**
Sub-sectoral Analysis

HUMAN HEALTH AND SOCIAL WORK ACTIVITIES
Sub-sector: Human Health and Social work activities

Key facts

- Main source of energy: Electricity 70.8%
- Main use of electricity: Equipment/Office loads
- Companies using renewable energy: 0%
- Capacity range of generators: 80 – 2,500 kVA

Indicators

- Electricity EUI per turnover per year: 6.0 kWh/’000 Rs/year
- Electricity EUI per employee per year: 4,551.2 kWh/employee/year
- Electricity EUI per built area per year: 93.7 kWh/m²/year
- Electricity EUI per hour of operation: 150.7 kWh/hour of operation
Sub-sector: Human Health and Social work activities

Main uses

Electricity
- Air conditioners
- Lighting
- Office equipment
- Powering all medical and non-medical equipment
- Cooking
- Washing
- Pumps
- Overall Healthcare operation
- Computers
- Laundry

Gas
- Water
- Kitchen
- Cooking
- Dryer

Diesel
- Generators
- Vehicles

Gasoline
- Vehicles
Sub-sector: Human Health and Social work activities

Electricity use breakdown

- Equipment/Office loads: 45%
- Lighting: 6%
- Air conditioning: 27%
- Ventilation: 1%
- Motive power: 1%
- Other: 21%

Diesel use breakdown

- Transport: 25.7%
- Non transport: 74.3%
**Sub-sector: Human Health and Social work activities**

### Indicators 2017

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<td>Average power factor</td>
<td>0.89</td>
<td>0.90</td>
</tr>
</tbody>
</table>
Sub-sectoral Analysis

EDUCATION
Sub-sector: Education

Key facts

- Main source of energy
  Electricity 83.4%

- Main use of electricity
  Equipment/Office loads

- Companies using renewable energy
  10%

- Capacity range of generators
  60 – 730 kVA

Indicators

- Electricity EUI per turnover per year
  1.6 kWh/'000 Rs/year

- Electricity EUI per employee per year
  1,099.0 kWh/employee/year

- Electricity EUI per built area per year
  23.2 kWh/m²/year

- Electricity EUI per hour of operation
  76.5 kWh/hour of operation
### Sub-sector: Education

#### Main uses

<table>
<thead>
<tr>
<th>Energy Type</th>
<th>Uses</th>
</tr>
</thead>
</table>
| Electricity | - Air conditioning  
              - Lighting  
              - Powering of equipment  
              - Office  
              - Training and administrative activities  
              - Classroom, lecture theatres  
              - Ovens,  
              - Ventilation  
              - Water heating  
              - IT equipment  
              - Water pump  
              - Workshop machinery |
| Gas         | - Cooking  
              - Boiling water  
              - Laboratories |
| Diesel      | - Generators  
              - Vehicles |
| Gasoline    | - Brush cutter |
| Renewable Energy | - Lighting |
Sub-sector: Education

Electricity use breakdown

- Equipment/Office loads: 44%
- Lighting: 21%
- Air conditioning: 20%
- Motive power: 3%
- Ventilation: 6%
- Other: 6%

Diesel use breakdown

- Transport: 82.7%
- Non transport: 17.3%
Sub-sector: Education

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Sub-sectoral Analysis

FINANCIAL AND INSURANCE ACTIVITIES
Sub-sector: Financial and Insurance activities

Key facts

Main source of energy
Electricity 87.0%

Main use of electricity
Air conditioning

Companies using renewable energy
8.3%

Capacity range of generators
160 – 2,000 kVA

Indicators

Electricity EUI per turnover per year
0.9 kWh/’000 Rs/year

Electricity EUI per employee per year
2,504.6 kWh/employee/year

Electricity EUI per built area per year
203.5 kWh/m²/year

Electricity EUI per hour of operation
705.4 kWh/hour of operation
Sub-sector: Financial and Insurance activities

Main uses

**Electricity**
- Lighting
- Office equipment
- Business operations
- Lifts
- Computers
- Cooling
- Servers
- Electrical power requirement from building
- Printers
- Water dispensers
- Air conditioning

**Gas**
- Canteen
- Cooking

**Diesel**
- Vehicles
- Generators

**Gasoline**
- Vehicles

**Renewable energy**
- Lighting
Sub-sector: Financial and Insurance activities

Electricity use breakdown

- Air conditioning: 56%
- Motive power: 4%
- Ventilation: 3%
- Other: 5%
- Equipment/Office loads: 17%
- Lighting: 16%

Diesel use breakdown

- Transport: 90.3%
- Non transport: 9.7%
### Sub-sector: Financial and Insurance activities

#### Indicators 2017

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Sub-sectoral Analysis

WHOLESALE AND RETAIL TRADE
Sub-sector: Wholesale and Retail trade

Key facts

- Main source of energy
  
  **Electricity 47.8%**

- Main use of electricity
  
  **Equipment/Office loads**

- Companies using renewable energy
  
  **5.3%**

- Capacity range of generators
  
  **165 – 2,000 kVA**

Indicators

- Electricity EUI per turnover per year
  
  **0.4 kWh/’000 Rs/year**

- Electricity EUI per employee per year
  
  **6,988.1 kWh/employee/year**

- Electricity EUI per built area per year
  
  **233.3 kWh/m²/year**

- Electricity EUI per hour of operation
  
  **345.9 kWh/hour of operation**
Sub-sector: Wholesale and Retail trade

Main uses

**Electricity**
- Lighting
- Machinery and equipment, POS
- Production
- Office
- Air conditioning
- Refrigeration
- Building purposes
- Cold rooms, chillers
- Lifts, pumps
- Production
- Bottling
- Cooling
- Manufacturing, machineries
- Electric motors
- Tills
- Sliding doors
- Kitchen, Bakery and pastry equipment

**Gas**
- Bakery
- Kitchen
- Fork lift
- Oven

**Diesel**
- Generators (stand-by and running)
- Vehicles
- Boiler

**Renewable energy**
- Lighting
Sub-sector: Wholesale and Retail trade

Electricity use breakdown

- Equipment/Office loads: 49%
- Ventilation: 4%
- Motive power: 18%
- Air conditioning: 20%
- Lighting: 9%

Diesel use breakdown

- Transport: 44.7%
- Non transport: 55.3%
Sub-sector: Wholesale and Retail trade

## Indicators 2017

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<td>0.88</td>
<td>0.90</td>
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</tbody>
</table>
Sub-sectoral Analysis

STORAGE
Sub-sector: Storage

Key facts

- **Main source of energy**
  - Electricity 74.2%

- **Main use of electricity**
  - Air conditioning

- **Companies using renewable energy**
  - 0%

- **Capacity range of generators**
  - 20 – 4,170 kVA

Indicators

- **Electricity EUI per turnover per year**
  - 4.4 kWh/’000 Rs/year

- **Electricity EUI per employee per year**
  - 13,634.9 kWh/employee/year

- **Electricity EUI per built area per year**
  - 203.1 kWh/m²/year

- **Electricity EUI per hour of operation**
  - 941.9 kWh/hour of operation
Sub-sector: Storage

Main uses

Electricity
- Lighting
- Office
- Cod rooms
- Manufacturing
- Warehousing
- Administration
- Reception and delivery of raw materials
- Air conditioning

Gas
- Fork lift

Diesel
- Vehicles
- Forklift
- Loaders

Gasoline
- Vehicles
Sub-sector: Storage

Electricity use breakdown

- Air conditioning: 30%
- Lighting: 26%
- Equipment /Office loads: 27%
- Ventilation: 4%
- Other: 13%

Diesel use breakdown

- Transport: 97.7%
- Non transport: 2.3%
### Sub-sector: Storage

#### Indicators 2017

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<tr>
<td>Electricity energy use intensity per unit of turnover per year (kWh/’000 Rs/year)</td>
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<td>0.86</td>
<td>0.90</td>
</tr>
</tbody>
</table>
Sub-sectoral Analysis

FOOD SERVICES ACTIVITIES
Sub-sector: Food services activities (Excluding accommodation and food production)

Key facts

- Main source of energy: **Electricity 47.8%**
- Main use of electricity: **Lighting**
- Companies using renewable energy: **0%**
- Capacity range of generators: **150 – 750 kVA**

Indicators

- Electricity EUI per turnover per year: **0.3 kWh/’000 Rs/year**
- Electricity EUI per employee per year: **242.6 kWh/employee/year**
- Electricity EUI per built area per year: **13.6 kWh/m²/year**
- Electricity EUI per hour of operation: **3.5 kWh/hour of operation**
Main uses

- **Electricity**
  - Lighting
  - Sound system
  - Air conditioning
  - CCTV
  - POS system
  - Chiller
  - Refrigerator
  - Electronic devices

- **Gas**
  - Cooking
  - Gas stoves
  - Duck Roaster
  - Heating water
  - Heater
  - Stove
  - Kitchen

- **Diesel**
  - Generators
  - Vehicles
  - Tractor
  - Golf course

- **Gasoline**
  - Vehicles

Sub-sector: Food services activities (Excluding accommodation and food production)
Sub-sector: Food services activities (Excluding accommodation and food production)

Electricity use breakdown

- Lighting, 53%
- Equipment/Office loads, 22%
- Other, 25%

Diesel use breakdown

- Transport, 68.9%
- Non transport, 31.1%
### Sub-sector: Food services activities (Excluding accommodation and food production)

#### Indicators 2017

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<td>0.97</td>
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Sub-sectoral Analysis

INFORMATION AND COMMUNICATION AND CALL CENTERS
Sub-sector: Information and Communication and Call centres

Key facts

- Main source of energy: **Electricity 95.0%**
- Main use of electricity: **Equipment/Office loads**
- Companies using renewable energy: **0%**
- Capacity range of generators: **150 – 1,600 kVA**

Indicators

- **Electricity EUI per turnover per year**: 2.0 kWh/’000 Rs/year
- **Electricity EUI per employee per year**: 964.3 kWh/employee/year
- **Electricity EUI per built area per year**: 80.5 kWh/m²/year
- **Electricity EUI per hour of operation**: 34.9 kWh/hour of operation
Sub-sector: Information and Communication and Call centres

Main uses

**Electricity**
- Lighting
- Office
- Air conditioning
- Personal computers
- Electronic equipment
- Telephone
- UPS
- Printers

**Diesel**
- Vehicles

**Gasoline**
- Vehicles
Sub-sector: Information and Communication and Call centres

Electricity use breakdown

- Lighting: 16.2%
- Equipment/Office loads: 83.4%
- Other: 0.4%

Diesel use breakdown

- Transport: 84.4%
- Non transport: 15.6%
Sub-sector: Information and Communication and Call centres

Indicators 2017

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Sub-sectoral Analysis

PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES
Sub-sector: Professional, Scientific and Technical activities

Key facts
- Main source of energy: **Electricity 88.0%**
- Main use of electricity: **Air conditioning**
- Companies using renewable energy: **0%**
- Capacity range of generators: **80 – 3,000 kVA**

Indicators
- Electricity EUI per turnover per year: **0.4 kWh/’000 Rs/year**
- Electricity EUI per employee per year: **1,503.9 kWh/employee/year**
- Electricity EUI per built area per year: **1,308.6 kWh/m²/year**
- Electricity EUI per hour of operation: **397.5 kWh/hour of operation**
Sub-sector: Professional, Scientific and Technical activities

Main uses

Electricity
- Lighting
- Building services
- Broadcasting equipment
- Air conditioning
- Servers

Gas
- Bacteriology

Diesel
- Vehicles
- Generators
Sub-sector: Professional, Scientific and Technical activities

Electricity use breakdown

- Air conditioning: 62%
- Lighting: 21%
- Equipment/Office loads: 17%

Diesel use breakdown

- Transport: 99.6%
- Non-transport: 0.4%
## Sub-sector: Professional, Scientific and Technical activities

### Indicators 2017

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Sub-sector</th>
<th>Sector average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity energy use intensity per unit of turnover per year (kWh/000 Rs/year)</td>
<td>0.4</td>
<td>2.9</td>
</tr>
<tr>
<td>Electricity energy use intensity per employee per year (kWh/employee/year)</td>
<td>1,503.9</td>
<td>4,849.9</td>
</tr>
<tr>
<td>Electricity energy use intensity per foot count per year (kWh/foot count/year)</td>
<td>Data not available</td>
<td>301.7</td>
</tr>
<tr>
<td>Electricity energy use intensity per built area per year (kWh/m2/year)</td>
<td>1,308.6</td>
<td>253.1</td>
</tr>
<tr>
<td>Electricity energy use intensity per hour of operation (kWh/hour of operation)</td>
<td>397.5</td>
<td>302.3</td>
</tr>
<tr>
<td>Average power factor</td>
<td>0.94</td>
<td>0.90</td>
</tr>
</tbody>
</table>
Sub-sectoral Analysis

ARTS, RECREATION AND ENTERTAINMENT
Sub-sector: Arts, Recreation and Entertainment

Key facts

- **Main source of energy**: Electricity 88.3%
- **Main use of electricity**: Equipment/Office loads
- **Companies using renewable energy**: 0%
- **Capacity range of generators**: 150 – 730 kVA

Indicators

- **Electricity EUI per turnover per year**: 6.7 kWh/’000 Rs/year
- **Electricity EUI per employee per year**: 9,160.3 kWh/employee/year
- **Electricity EUI per built area per year**: 118.0 kWh/m²/year
- **Electricity EUI per hour of operation**: 64.7 kWh/hour of operation

*Key facts and indicators are provided for the sub-sector.*
Main uses

Electricity
- Office use
- Events (sound, light, projectors)
- Gaming machines
- Air-conditioning
- Lighting
- Building operation
- Recreational activities
- Cold rooms
- Equipment
- IT
- Water heating
- Chiller AC system

Gas
- Cooking
- Kitchen equipment

Diesel
- Back-up generator
- Vehicles
Sub-sector: Arts, Recreation and Entertainment

Electricity use breakdown

- Lighting: 30%
- Equipment/Office loads and Airconditioning: 70%

Diesel use breakdown

- Transport: 9.6%
- Non transport: 90.4%
### Sub-sector: Arts, Recreation and Entertainment

#### Indicators 2017

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</table>
ISSUES FACED
Issues faced

Record keeping on energy

- Companies do not keep record of their energy data
- Companies do not keep their CEB bills for long
- A number of companies which are tenants do not have any records and we were directed to their syndic or building maintenance officers
- Most companies stated that details relating to generators were not available as they are maintained by another service provider – it was also mentioned that power-cuts have been very rare and therefore they do not have any records of those
- Companies usually maintain records in terms of overall expenditure on energy without focusing on the intrinsic details behind those costs

Personnel

- Large organisations have dedicated staff to cater for energy requirements (for example, maintenance manager, facilities manager). Across other organisations, directors and partners handle requests
- Data available was found at the level of the accountant on a number of occasions
Issues faced

Transportation

- Most of the companies do not keep records of their fuel expenses based on distance travelled.
- Many companies used fleet cards and their employees have such benefits, making it impossible to retrieve fuel expenses.
- Many companies outsource employee transportation to a fleet of taxis or vans and therefore do not have records on fuel expenses and distance travelled.

Other

- In respect of energy breakdown, most companies mentioned that it is difficult to answer and they can only provide a best guess – asset registers for energy consuming appliances/machines were requested together with specific details.
- Renewable energy was not used by most of the companies, although they expressed a keen interest to be able to use such forms of energy in the future, under the proviso that their expenses on energy are decreased over time.
- Restaurants specifically have been difficult to deal with, refusing to participate.
IDEAL BENCHMARKING
Ideal benchmarking

Ideal measures which are believed to provide more accurate indicators with respect to the services sector have been detailed below. If this data is gathered on an ongoing basis by organisation, robust information would be available for a more thorough assessment of energy efficiency in the sector, as well as for the development of more accurate benchmarks.

Wholesale and Retail trade

Ideal benchmarking required:
The number of people purchasing consumer goods of all types. This number is difficult to estimate, given that the same consumer may visit different outlets at different frequencies

Measure which will be obtained:
The amount of energy required to store, distribute and sell consumer goods to 1 consumer

Storage

Ideal benchmarking required:
The occupancy rate of the storage facility and how it evolves over time

Measure which will be obtained:
The amount of energy required to store 1 m3 of goods

Food Services Activities (excluding accommodation and food production)

Ideal benchmarking required:
The number of people visiting different food outlets at different times of the day

Measure which will be obtained:
The amount of energy required to provide an outdoor eating out service to 1 person
Financial and Insurance Activities

Ideal benchmarking required:
The number of primary and secondary clients of all financial services institutions

Measure which will be obtained:
The amount of energy required to offer access to finance and insurance facilities to 1 person

Information and communication and call centres

Ideal benchmarking required:
The number of end clients that are being serviced through the call centres and other ICT services

Measure which will be obtained:
The amount of energy required to provide an outsourcing solution to 1 end customer

Professional, scientific and technical activities

Ideal benchmarking required:
The number of clients using a local professional services provider

Measure which will be obtained:
The amount of energy required to provide professional services to 1 client
Arts, Entertainment and Recreation

Ideal benchmarking required:
The number of people visiting arts, recreation and entertainment facilities at different frequencies

Measure which will be obtained:
The amount of energy required to provide entertainment to 1 person

Education

Ideal benchmarking required:
The number of students utilising an educational institution. This data is available on the public domain and stands at 287,983 for 2017

Measure which will be obtained:
The amount of energy required to provide education to 1 student

Human health and social work activities

Ideal benchmarking required:
The number of people visiting different health service providers at different frequencies and/or served through social institutions

Measure which will be obtained:
The amount of energy required to provide welfare to 1 person
Only for the education sector is the ideal measure data available. The following has been worked out based on these publicly available figures, to determine EUI per student.

Estimated energy (electricity) consumption for the sector (2017): 28,430,254

Total number of students (2017): 287,983

EUI - Electricity consumption to provide education to 1 student in 2017:

**98.7 kWh/student**
Contribution to GVA

Sub sector contribution to GVA(%) vs. Electricity Consumption (kWh)

- 100,000,000 200,000,000

0.0% 5.0% 10.0%

Financial and Insurance activities
Professional, Scientific and Technical activities
Storage
Information and Communication and Call...
Wholesale and Retail trade
Education
Human Health and Social work activities
Food services activities (Excluding...)
Arts, Recreation and Entertainment

• GVA measures have been utilised to estimate energy consumption for different sub-sectors.

• The chart depicts the relationship between GVA and estimate of energy consumption across the sub sectors.

• A blue arrow has been used to represent sub sectors which are intensively consuming electricity while their GVA contribution remain low, although some sectors are mostly concerned with well-being (represented in green arrow)
RECOMMENDATIONS AND ENABLERS
Recommendations

1. Record keeping
Companies should maintain proper records on energy usage to be able to track evolution and maintain a specific level of efficiency and understand whether efficiency is increasing over time.

3. Renewable energy
Consider the use of renewable energy and its long term benefits, especially in new buildings.

2. Training
Internally implement energy efficient programmes and educate all staff on the importance of energy efficiency.
Enablers

1. Appreciation of business leaders for energy efficiency
   Increased commitment from business leaders and effort to manage energy usage within their organisation and willingness to educate their employees on the importance on energy efficiency and proper record keeping

2. Energy efficiency concerns regarding transport
   Need to educate all employees on environmental effects of transportation and how to handle energy efficiency when it comes to transport
   Proper record keeping on usage of diesel and gasoline, with a set procedure to decrease transport expenses
Q&A
THANK YOU