



Energy
Efficiency
Management
Office

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

Presentation by VERDE
24 June 2019



Contents

- Research Objectives
- Methodology
- Sample size – Target vs Achieved
- Sub-sectors and Overall outlook
- Insights from the survey
- Intensity measures
- Sub-sectoral analysis
- Issues faced
- Ideal benchmarking
- Recommendations and Enablers
- Q&A



RESEARCH OBJECTIVES



Research Objectives

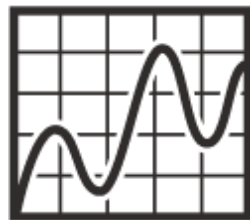
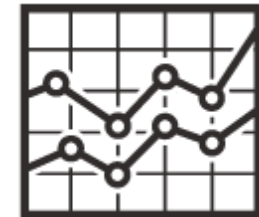


Energy Use and Energy Consumption

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.

Renewable Energy and Stand-by generators



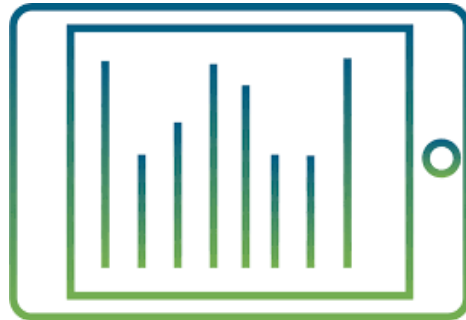
Energy Efficiency

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

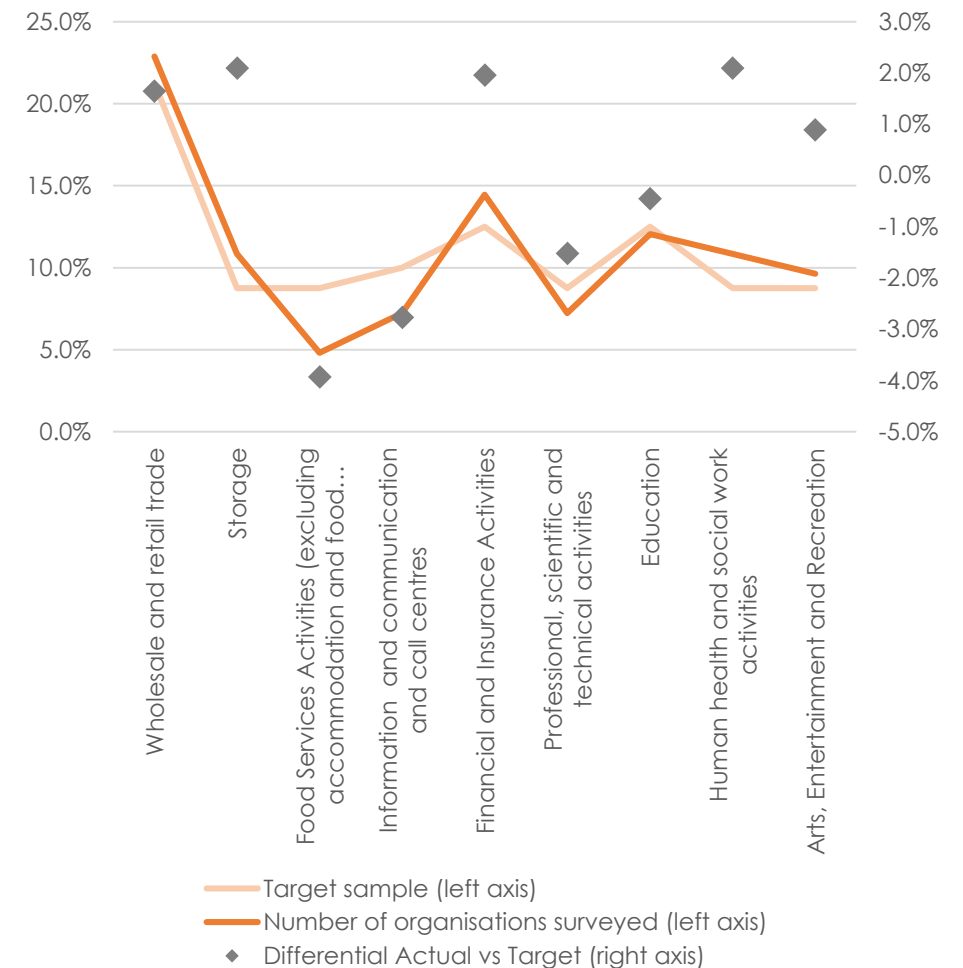


Target sample and achieved sample

Services Sector Sample Breakdown

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

Differential Target vs Actual Sample



SUB SECTORS' OVERALL OUTLOOK

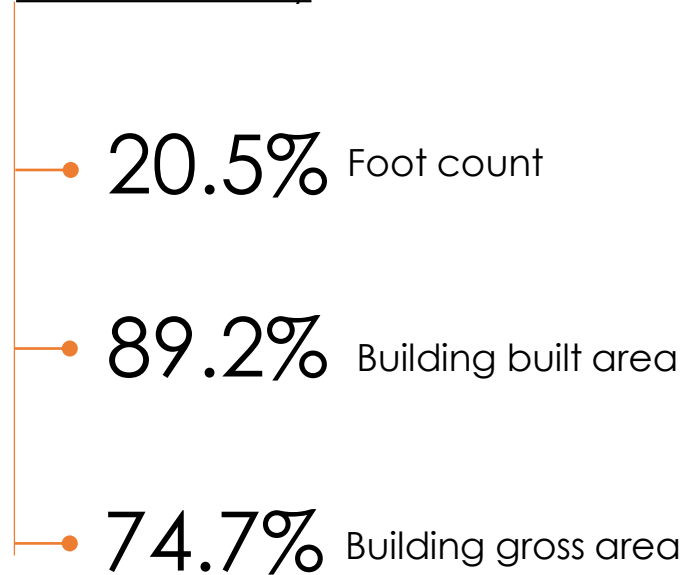


Insights from the survey

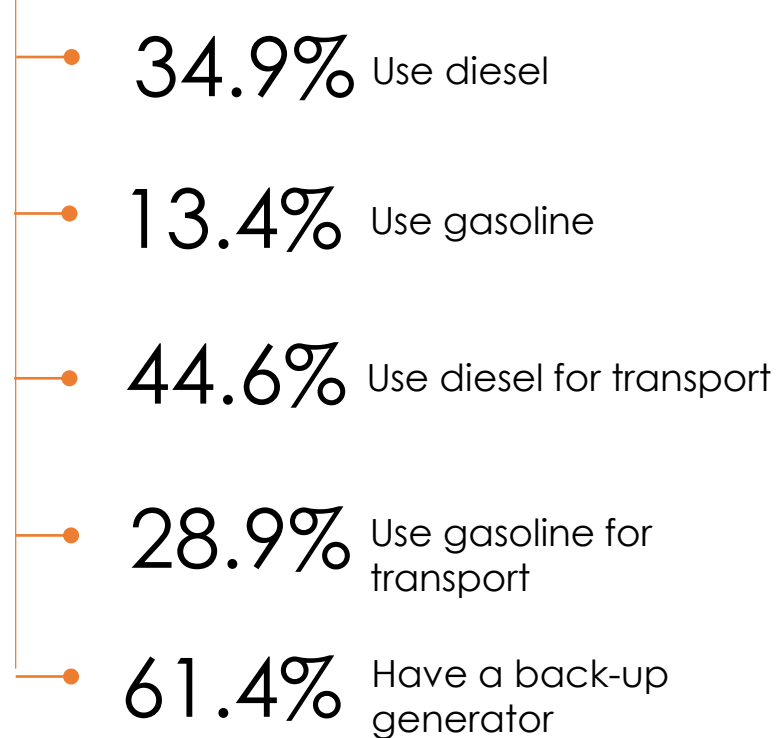


Snapshot

Data availability



Percentage of companies from sample



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

Key figures	Indicators				
	Sub sector	Electricity energy use intensity per unit of turnover (kWh/'000 Rs)	Electricity energy use intensity per employee (kWh/employee)	Electricity energy use intensity per foot count (kWh/foot count)	Electricity energy use intensity per built area (kWh/m ²)
Arts, Entertainment and Recreation	6.7	9,160	3.8	118.0	64.7
Food Services Activities (excluding accommodation and food production)	0.3	243	0.2	13.6	3.5
Human health and social work activities	6.0	4,551	155.5	93.7	150.7
Education	1.6	1,099	0.0	23.2	76.5
Wholesale and retail trade	3.7	6,988	7.1	233.3	345.9
Information and communication and call centres	2.0	964	8.9	80.5	34.9
Storage	4.4	16,635	2,214	203.1	941.9
Professional, scientific and technical activities	0.4	1,504	-	1,309	397.5
Financial and Insurance Activities	0.9	2,505	24.0	203.5	705.4

■ 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

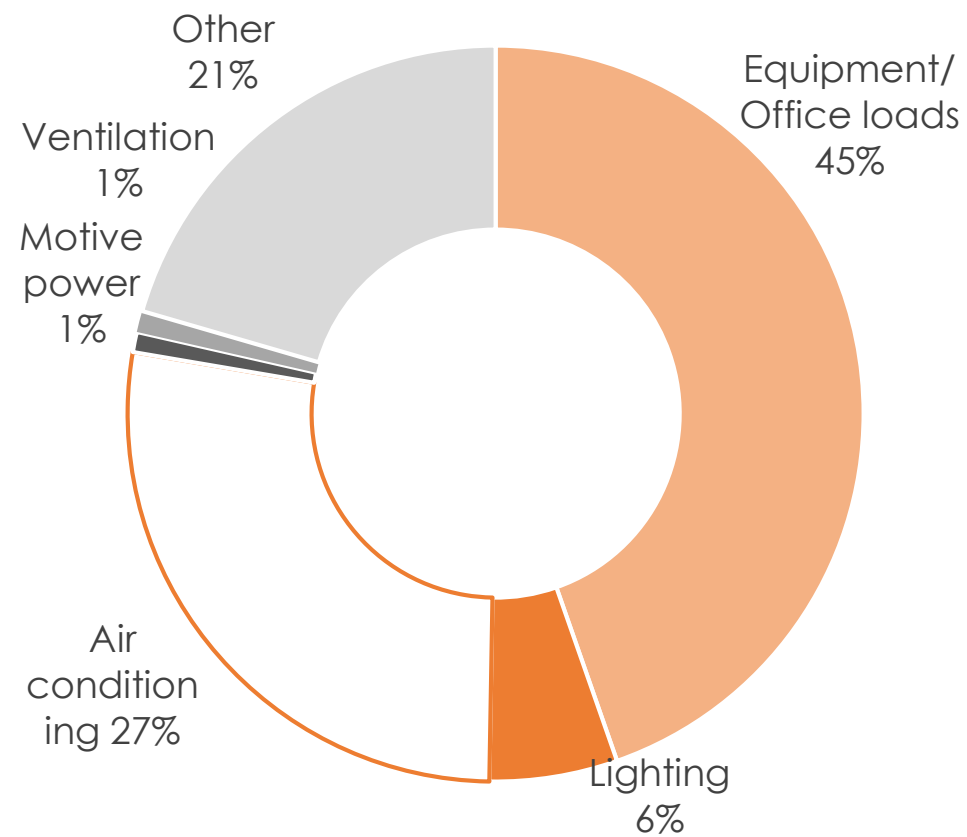
Gasoline



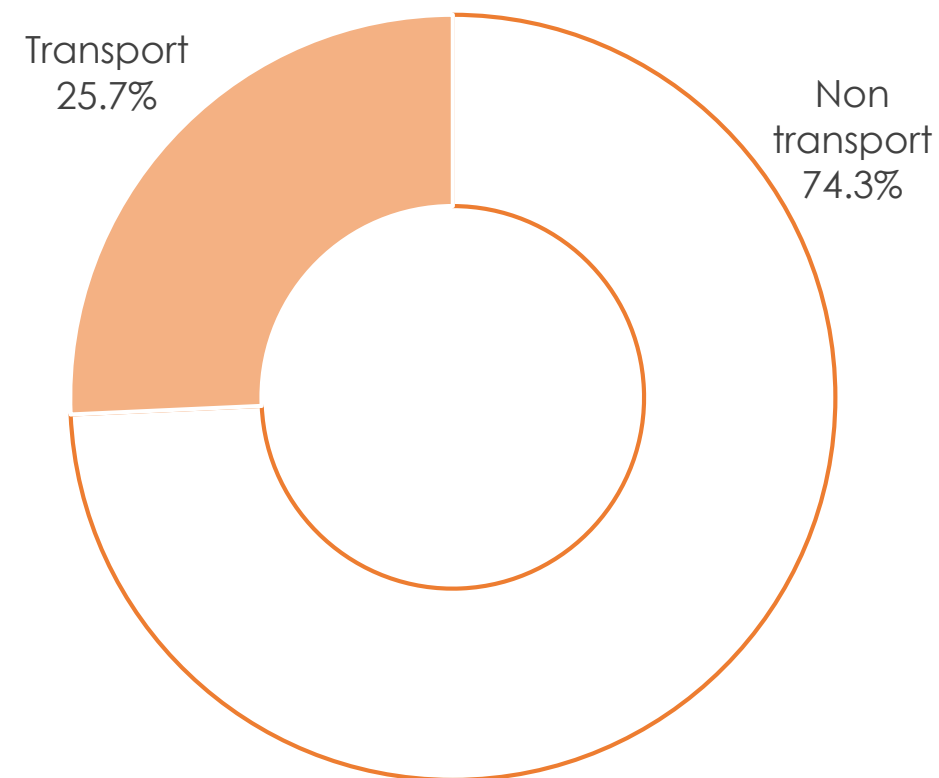
- Vehicles

Sub-sector: Human Health and Social work activities

Electricity use breakdown



Diesel use breakdown



Sub-sector: Human Health and Social work activities

Indicators 2017

	Sub-sector	Sector average
Electricity energy use intensity per unit of turnover per year (kWh/'000 Rs/year)	6.0	2.9
Electricity energy use intensity per employee per year(kWh/employee/year)	4,551.2	4,849.9
Electricity energy use intensity per foot count per year (kWh/foot count/year)	155.5	301.7
Electricity energy use intensity per built area per year (kWh/m ² /year)	93.7	253.1
Electricity energy use intensity per hour of operation (kWh/hour of operation)	150.7	302.3
Average power factor	0.89	0.90

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

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

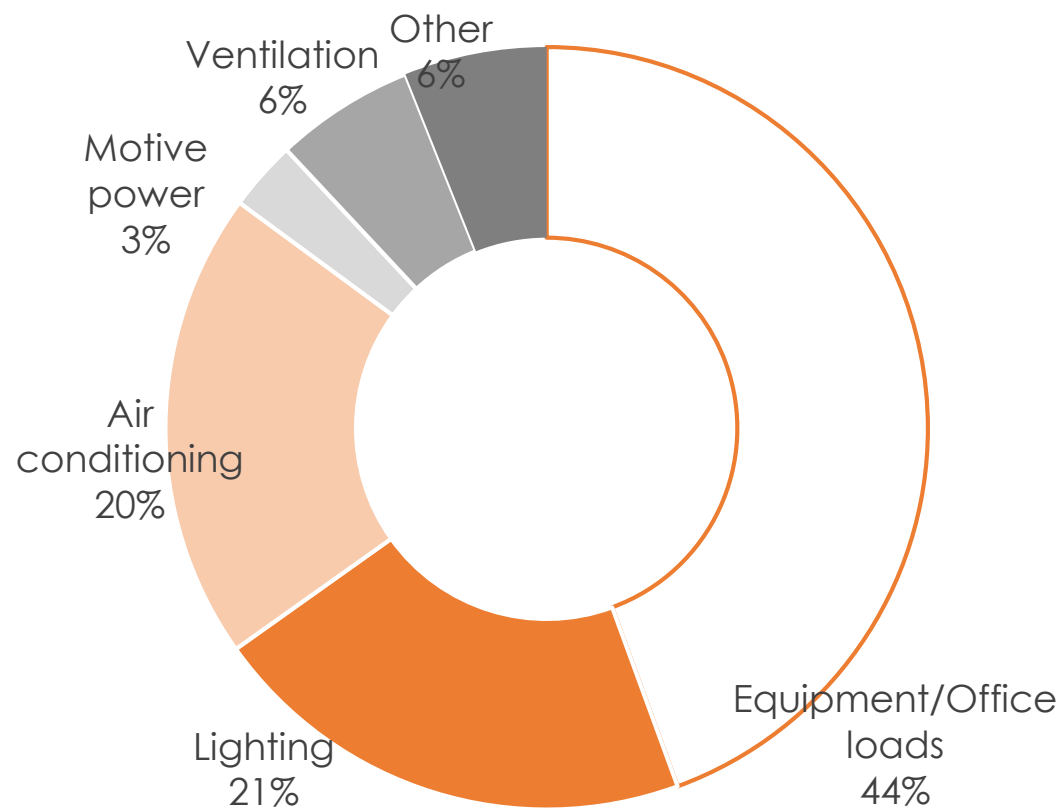
Renewable Energy



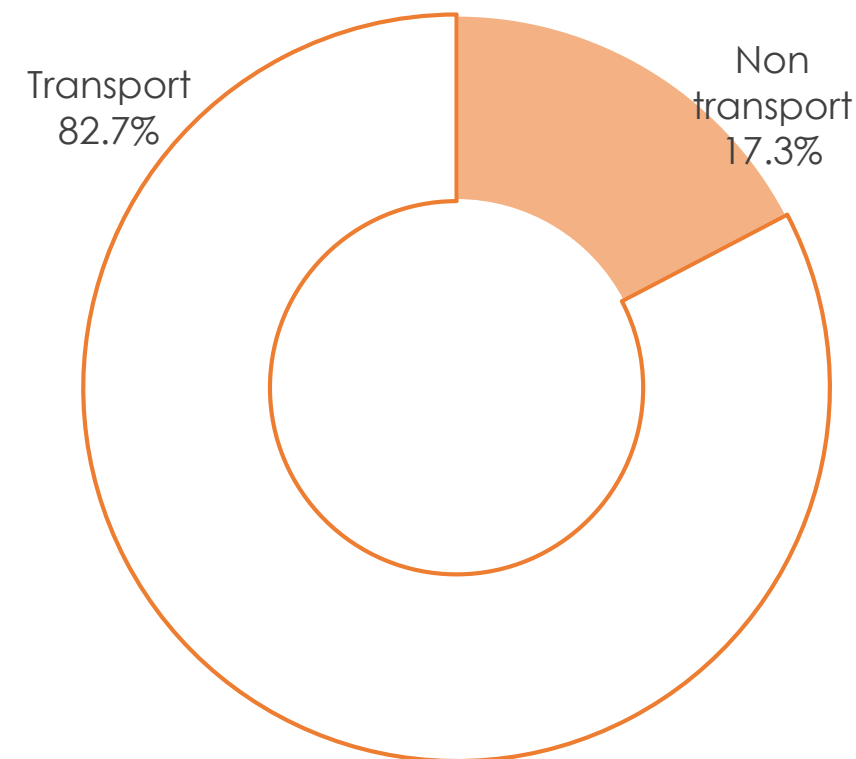
- Lighting

Sub-sector: Education

Electricity use breakdown



Diesel use breakdown



Sub-sector: Education

Indicators 2017

	Sub-sector	Sector average
Electricity energy use intensity per unit of turnover per year (kWh/'000 Rs/year)	1.6	2.9
Electricity energy use intensity per employee per year(kWh/employee/year)	1,099.0	4,849.9
Electricity energy use intensity per foot count per year (kWh/foot count/year)	Data not available	301.7
Electricity energy use intensity per built area per year (kWh/m ² /year)	23.2	253.1
Electricity energy use intensity per hour of operation (kWh/hour of operation)	76.5	302.3
Average power factor	0.82	0.90



Sub-sectoral Analysis

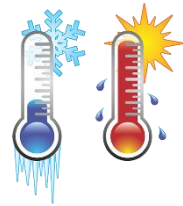
*FINANCIAL AND INSURANCE
ACTIVITIES*

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



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



- Canteen
- Cooking



- Vehicles
- Generators



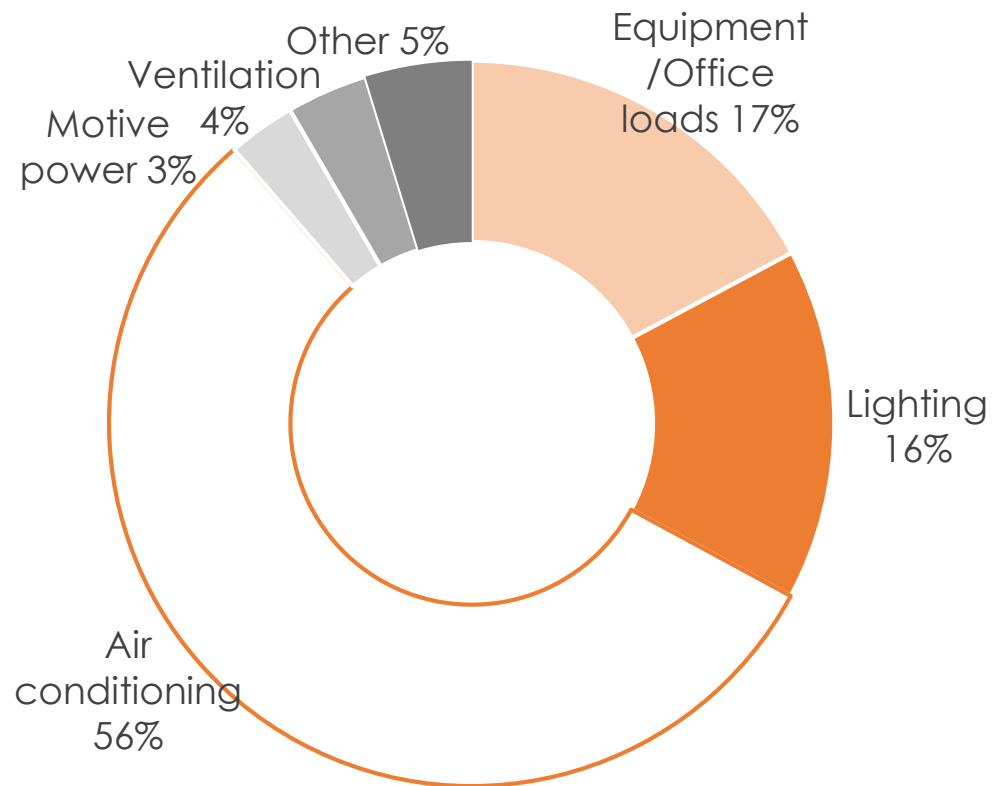
- Vehicles



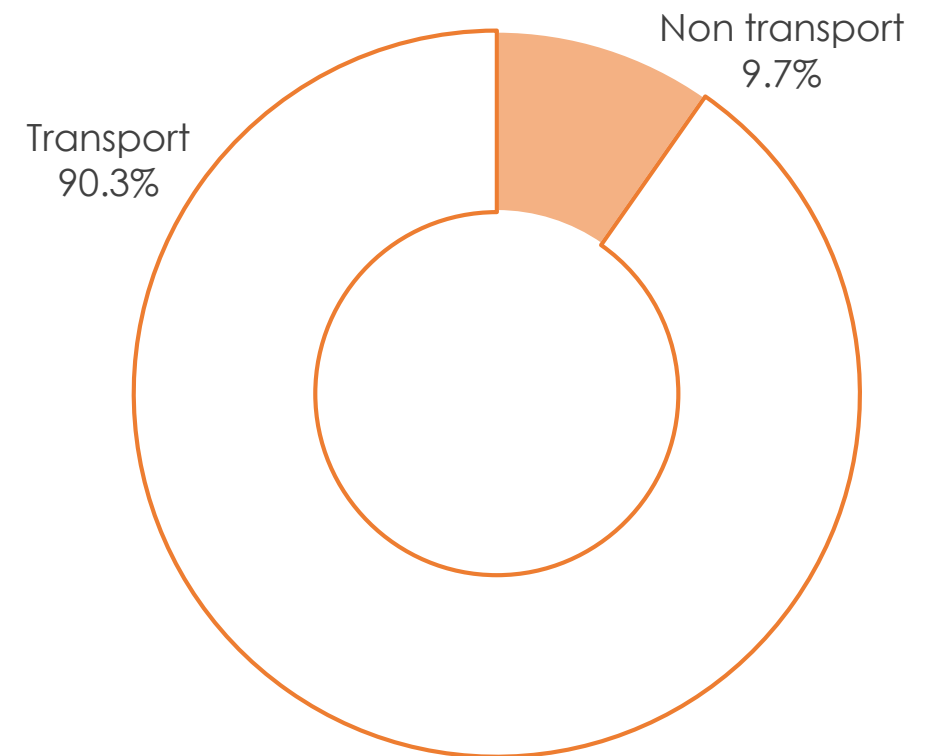
- Lighting

Sub-sector: Financial and Insurance activities

Electricity use breakdown



Diesel use breakdown



Sub-sector: Financial and Insurance activities

Indicators 2017

	Sub-sector	Sector average
Electricity energy use intensity per unit of turnover per year (kWh/'000 Rs/year)	0.9	2.9
Electricity energy use intensity per employee per year(kWh/employee/year)	2,504.6	4,849.9
Electricity energy use intensity per foot count per year (kWh/foot count/year)	24.0	301.7
Electricity energy use intensity per built area per year (kWh/m ² /year)	203.5	253.1
Electricity energy use intensity per hour of operation (kWh/hour of operation)	705.4	302.3
Average power factor	0.93	0.90

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

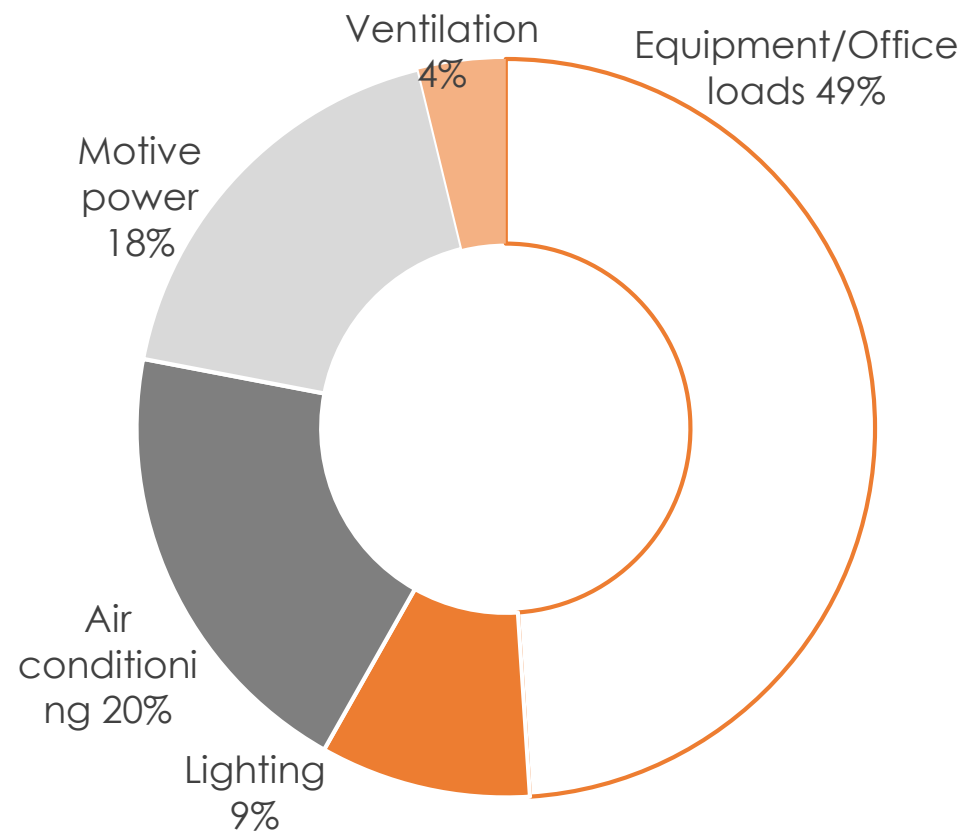
Renewable energy



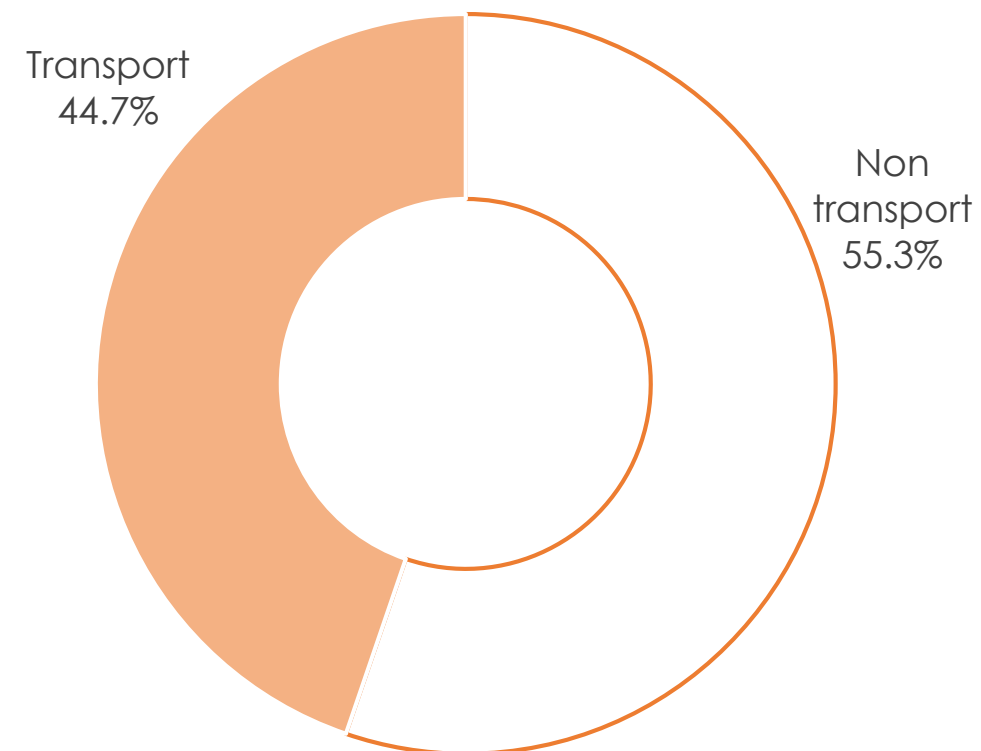
- Lighting

Sub-sector: Wholesale and Retail trade

Electricity use breakdown



Diesel use breakdown



Sub-sector: Wholesale and Retail trade

Indicators 2017

	Sub-sector	Sector average
Electricity energy use intensity per unit of turnover per year (kWh/'000 Rs/year)	3.7	2.9
Electricity energy use intensity per employee per year(kWh/employee/year)	6,988.1	4,849.9
Electricity energy use intensity per foot count per year (kWh/foot count/year)	7.1	301.7
Electricity energy use intensity per built area per year (kWh/m ² /year)	233.3	253.1
Electricity energy use intensity per hour of operation (kWh/hour of operation)	345.9	302.3
Average power factor	0.88	0.90



Sub-sectoral Analysis

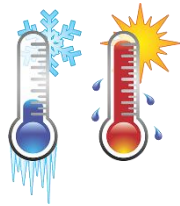
STORAGE

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
- Cold rooms
- Manufacturing
- Warehousing
- Administration
- Reception and delivery of raw materials
- Air conditioning

Gas

- Fork lift



Diesel

- Vehicles
- Forklift
- Loaders



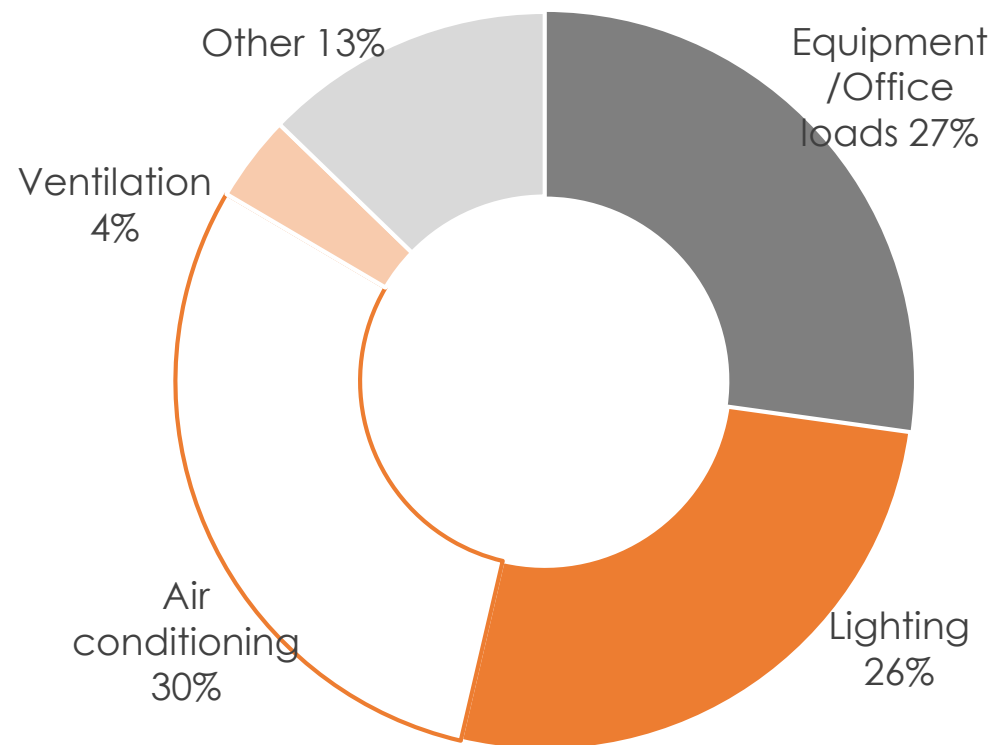
Gasoline

- Vehicles

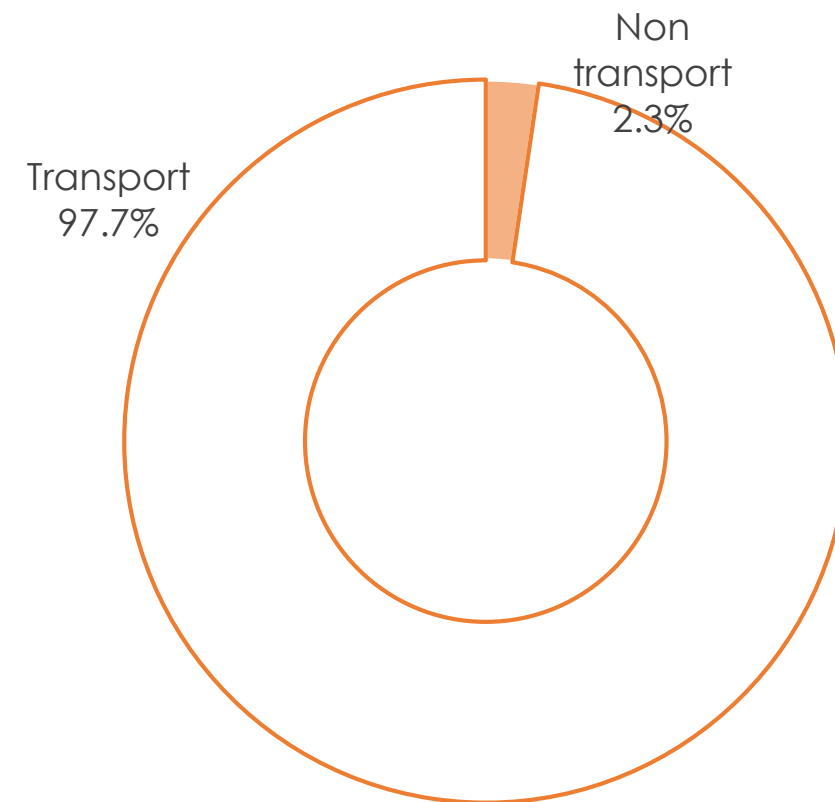


Sub-sector: Storage

Electricity use breakdown



Diesel use breakdown



Sub-sector: Storage

Indicators 2017

	Sub-sector	Sector average
Electricity energy use intensity per unit of turnover per year (kWh/'000 Rs/year)	4.4	2.9
Electricity energy use intensity per employee per year(kWh/employee/year)	16,634.9	4,849.9
Electricity energy use intensity per foot count per year (kWh/foot count/year)	2,214.0	301.7
Electricity energy use intensity per built area per year (kWh/m ² /year)	203.1	253.1
Electricity energy use intensity per hour of operation (kWh/hour of operation)	941.9	302.3
Average power factor	0.86	0.90



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

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

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

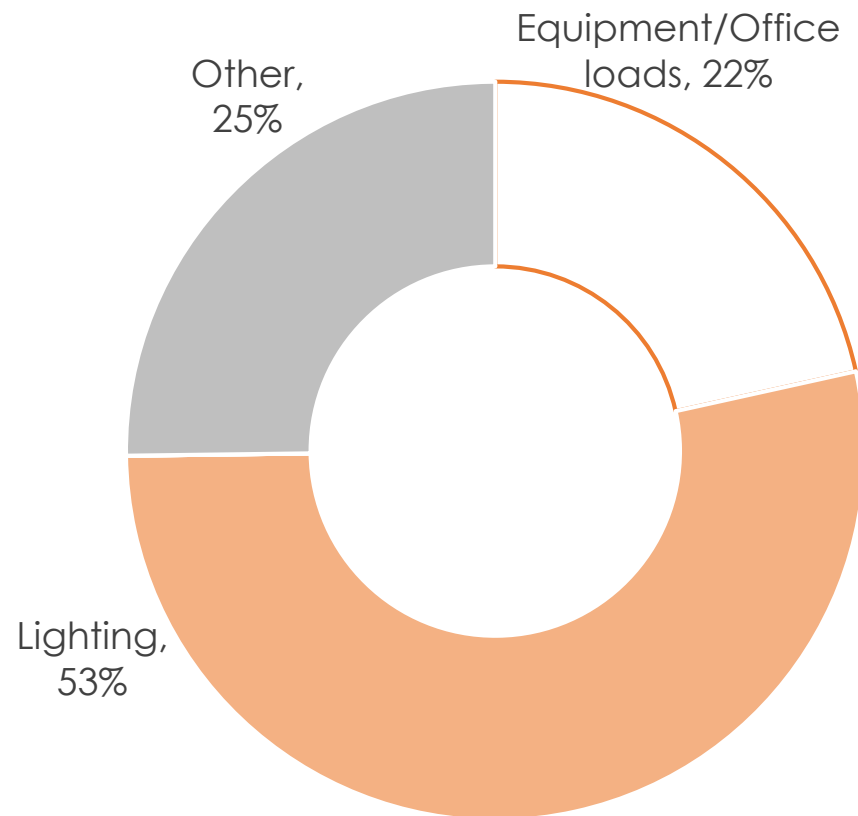
Gasoline



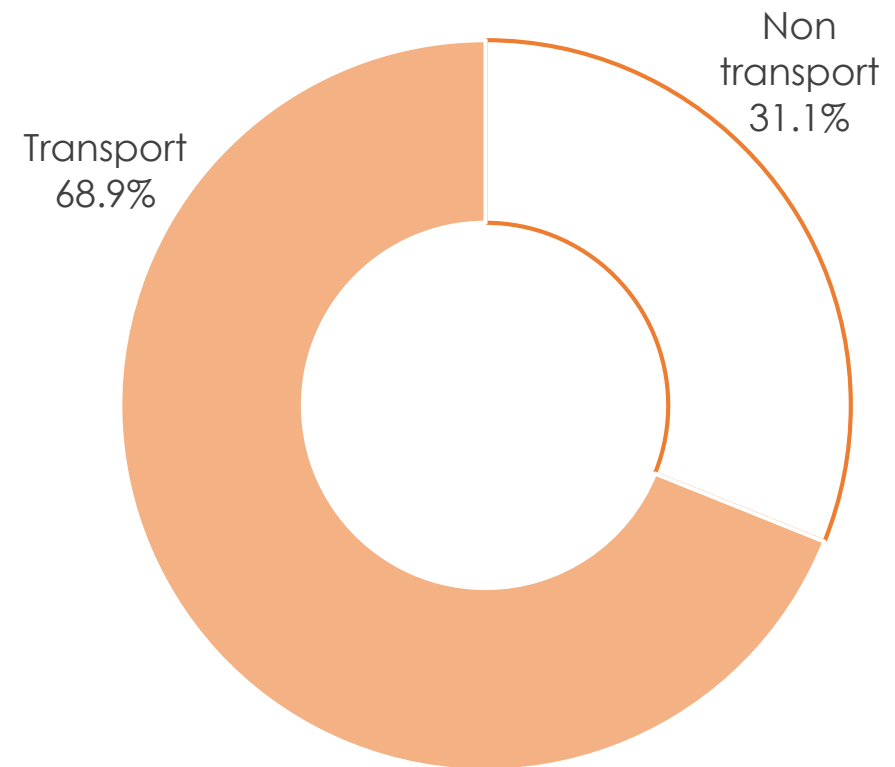
- Vehicles

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

Electricity use breakdown



Diesel use breakdown



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

Indicators 2017

	Sub-sector	Sector average
Electricity energy use intensity per unit of turnover per year (kWh/'000 Rs/year)	0.3	2.9
Electricity energy use intensity per employee per year(kWh/employee/year)	242.6	4,849.9
Electricity energy use intensity per foot count per year (kWh/foot count/year)	0.2	301.7
Electricity energy use intensity per built area per year (kWh/m ² /year)	13.6	253.1
Electricity energy use intensity per hour of operation (kWh/hour of operation)	3.5	302.3
Average power factor	0.97	0.90



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

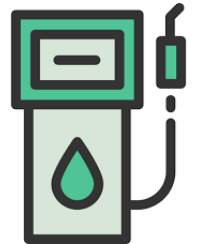
Diesel

- Vehicles



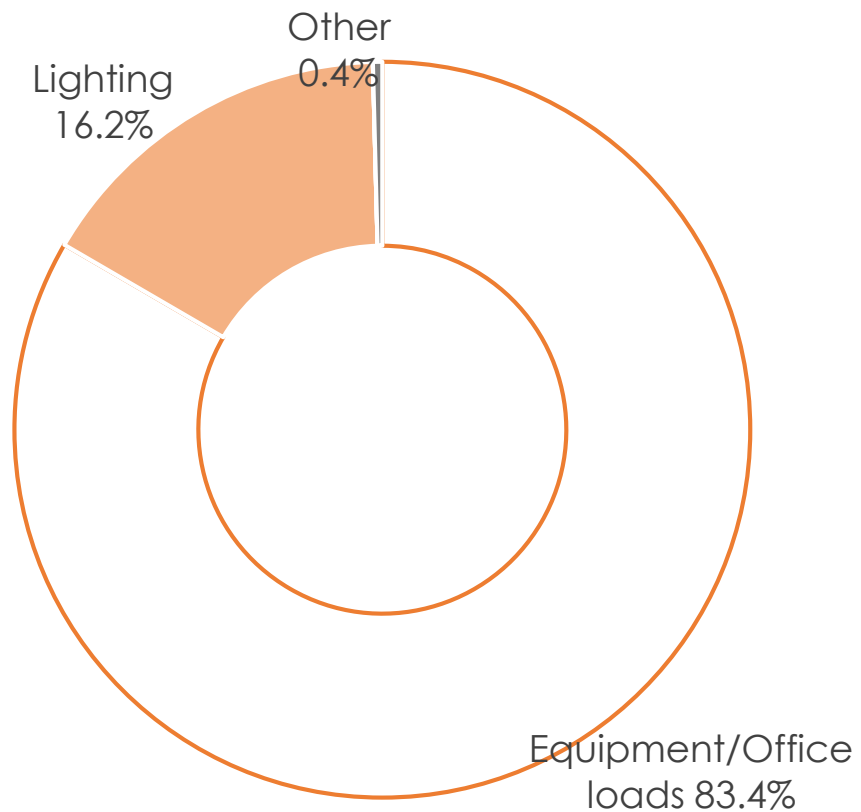
Gasoline

- Vehicles

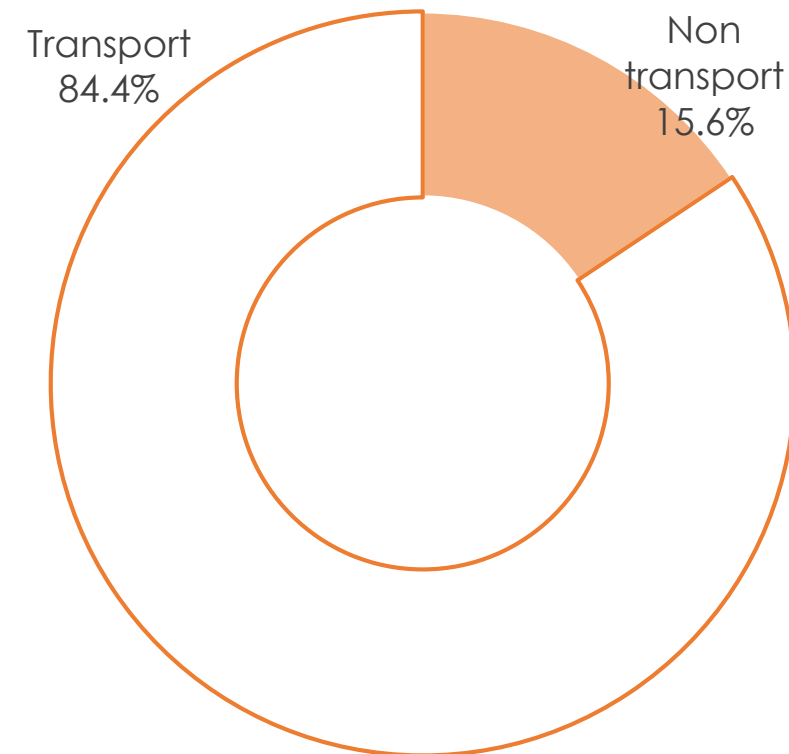


Sub-sector: Information and Communication and Call centres

Electricity use breakdown



Diesel use breakdown



Sub-sector: Information and Communication and Call centres

Indicators 2017

	Sub-sector	Sector average
Electricity energy use intensity per unit of turnover per year (kWh/'000 Rs/year)	2.0	2.9
Electricity energy use intensity per employee per year(kWh/employee/year)	964.3	4,849.9
Electricity energy use intensity per foot count per year (kWh/foot count/year)	8.9	301.7
Electricity energy use intensity per built area per year (kWh/m ² /year)	80.5	253.1
Electricity energy use intensity per hour of operation (kWh/hour of operation)	34.9	302.3
Average power factor	0.97	0.90



Sub-sectoral Analysis

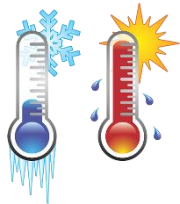
*PROFESSIONAL, SCIENTIFIC AND
TECHNICAL ACTIVITIES*

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



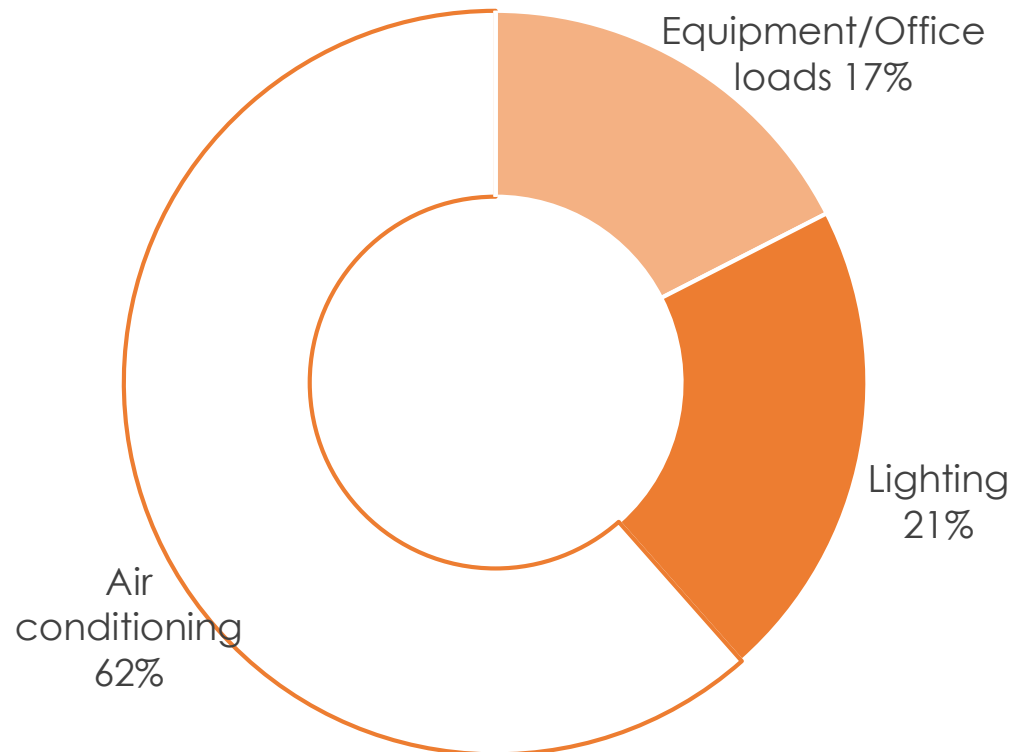
Diesel

- Vehicles
- Generators

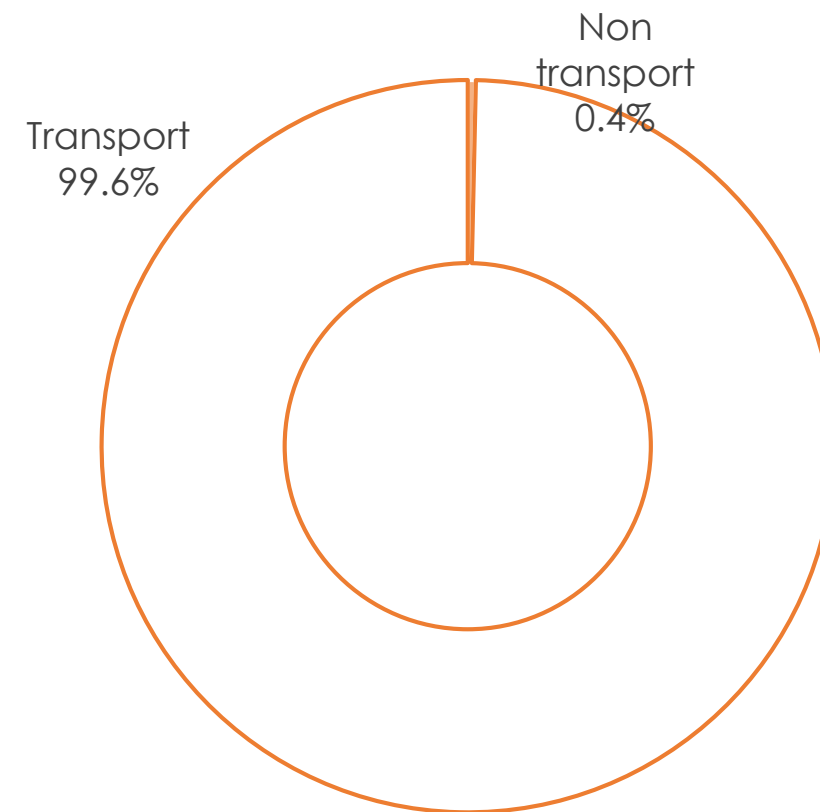


Sub-sector: Professional, Scientific and Technical activities

Electricity use breakdown



Diesel use breakdown



Sub-sector: Professional, Scientific and Technical activities

Indicators 2017

	Sub-sector	Sector average
Electricity energy use intensity per unit of turnover per year (kWh/'000 Rs/year)	0.4	2.9
Electricity energy use intensity per employee per year(kWh/employee/year)	1,503.9	4,849.9
Electricity energy use intensity per foot count per year (kWh/foot count/year)	Data not available	301.7
Electricity energy use intensity per built area per year (kWh/m ² /year)	1,308.6	253.1
Electricity energy use intensity per hour of operation (kWh/hour of operation)	397.5	302.3
Average power factor	0.94	0.90



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

Sub-sector: Arts, Recreation and Entertainment

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



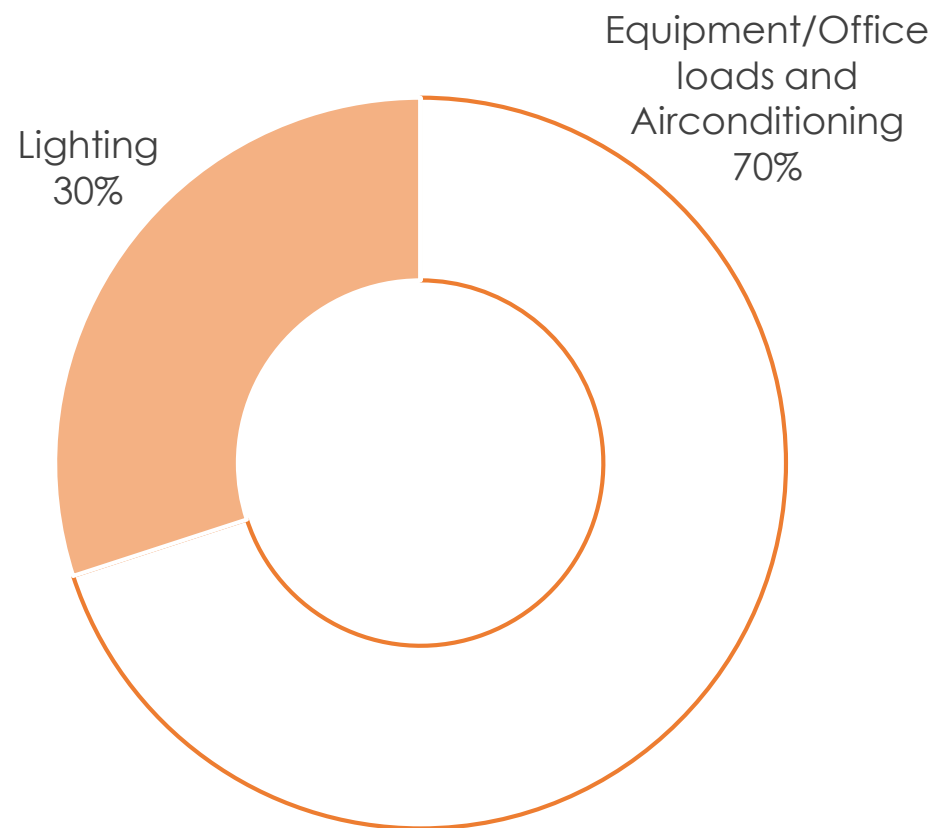
Diesel

- Back-up generator
- Vehicles

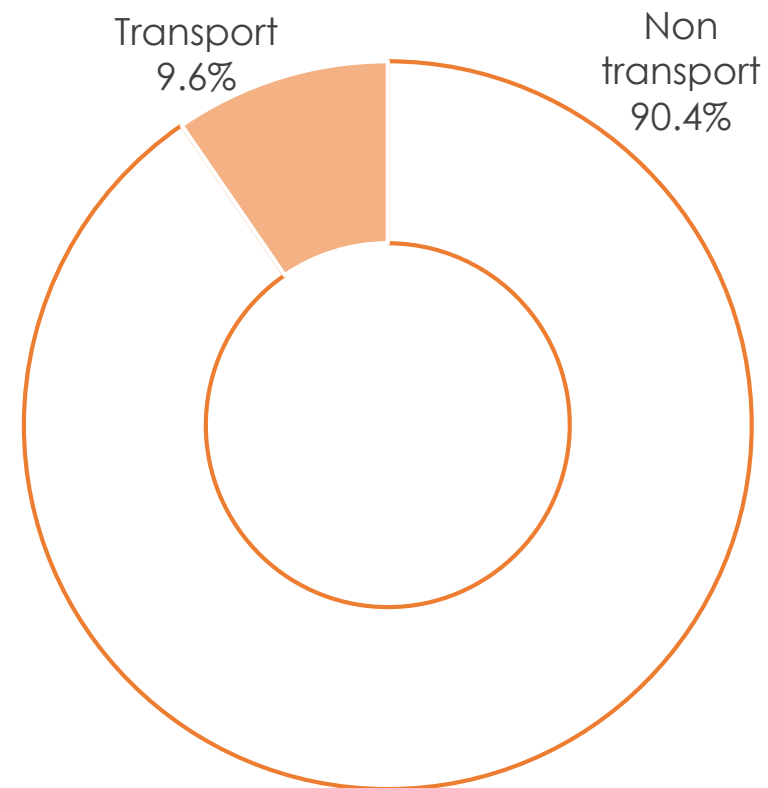


Sub-sector: Arts, Recreation and Entertainment

Electricity use breakdown



Diesel use breakdown



Sub-sector: Arts, Recreation and Entertainment

Indicators 2017

	Sub-sector	Sector average
Electricity energy use intensity per unit of turnover per year (kWh/'000 Rs/year)	6.7	2.9
Electricity energy use intensity per employee per year(kWh/employee/year)	9,160.3	4,849.9
Electricity energy use intensity per foot count per year (kWh/foot count/year)	3.8	301.7
Electricity energy use intensity per built area per year (kWh/m ² /year)	118.0	253.1
Electricity energy use intensity per hour of operation (kWh/hour of operation)	64.7	302.3
Average power factor	0.85	0.90

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

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

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

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

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

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

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

Example

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

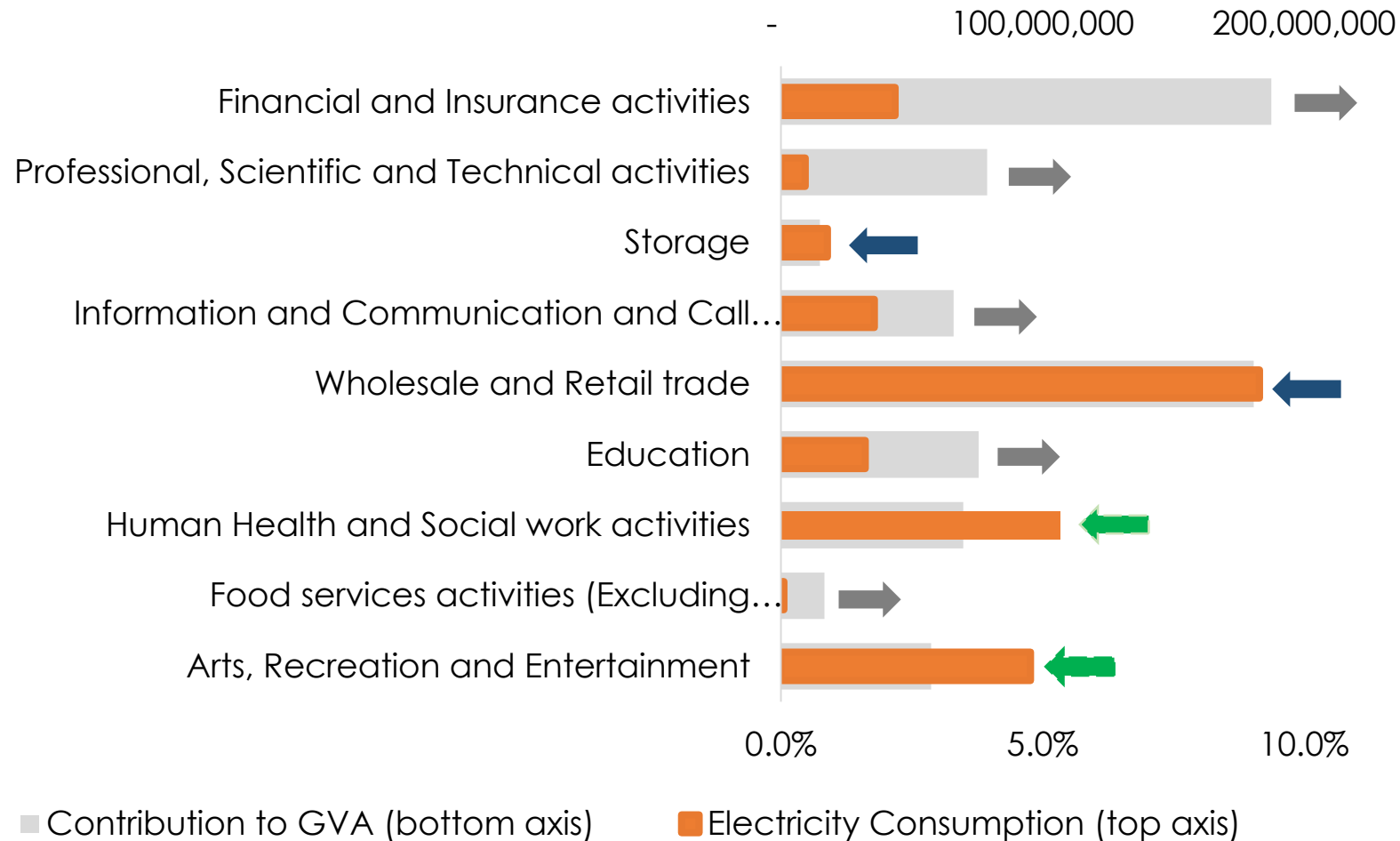
EUI - Electricity consumption to provide education to 1 student in 2017:

98.7 kWh/student



Contribution to GVA

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



- 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

