

UNDA project, on “Up-scaling Energy Efficiency in the residential and services sectors in the Arab Region”



Shared Prosperity **Dignified Life**



Economic and Social Commission for Western Asia

Draft results of the baseline mapping study of the energy use situation in the buildings sector in Jordan

Draft findings about the characteristics and profiles of energy consumption of the services Sector in Jordan

Taskforce Meeting, 27 November 2019 –Amman, Jordan

Topics covered in this presentation:

1- Overview of the existing services building stock and summary of its characterization:

2- Overall Energy Consumption in the Services Sector:

3- End-Use Energy Consumption in the Existing Services Sector in Jordan:

1- Overview of the existing building stock and summary of its characterization:

This part covers the following topics:

- 1.1: Building Typology for Services Sector Buildings, and Number of Units
- 1.2: Building Permits
- 1.3: Building Numbers for Services Sector Buildings
- 1.4: Number of Schools, classrooms, & Students per District
- 1.5: Number of Hotels, Pop Hotels & Hotel Apartments per district

1- Overview of the existing building stock & Summary of its characterization:

1.1: Building Typology for Services Sector Buildings, and Number of Units: (1),(2),(3)

Table 1: Zoning provisions of commercial sectors. (GAM, 2011)

Commercial Sector	Max. plot coverage (%)	Plot size (m ²)	Max. FAR	Max. building height (m)	Building depth (m)	Setback (m)		
						Front	Back	Sides
Central	85	<200	6	72		-	*	*
		>200	10			-		
Ordinary	70	<600	6		<18	-	4	-
		>600	8.5	**	>18	-	4	4

* The setback could be either backward or sideways if any distance will be at least 2.5 m from the plot border. The building may have a courtyard of minimum 15 percent of the plot size.

** The maximum building height should be equal to the street width along with the front setback, if any, however maximum 72 m.

Table 2: Main macroeconomic and demographic assumptions the number of the tertiary sector buildings for the year 2014 in Jordan. (MEMR, 2017b)

Sub sector	Number of Units in 2014
Tourism Sector	7110
Health (hospitals and Clinics)	4820
Commerce	73280
Education	6410
Offices	2740

(1): GAM, 2011

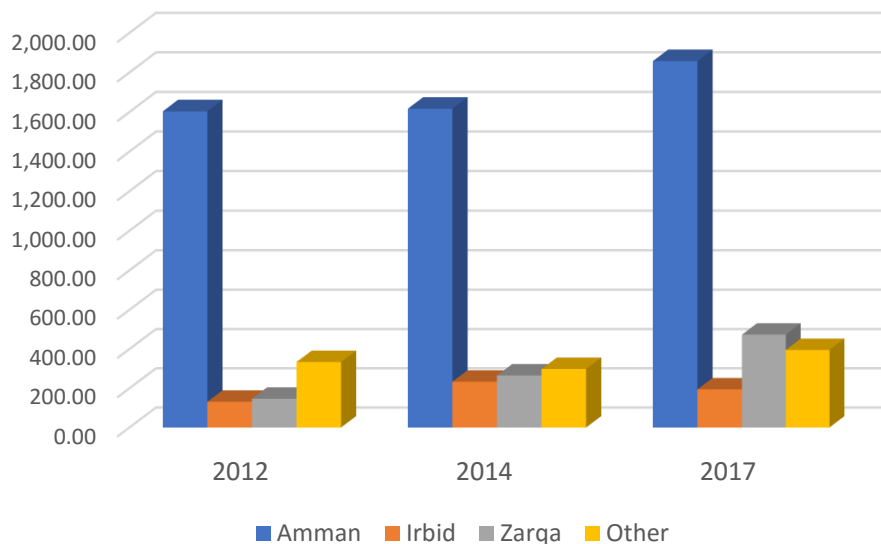
(2): DOS, 2014

(3): MEMR, 2017

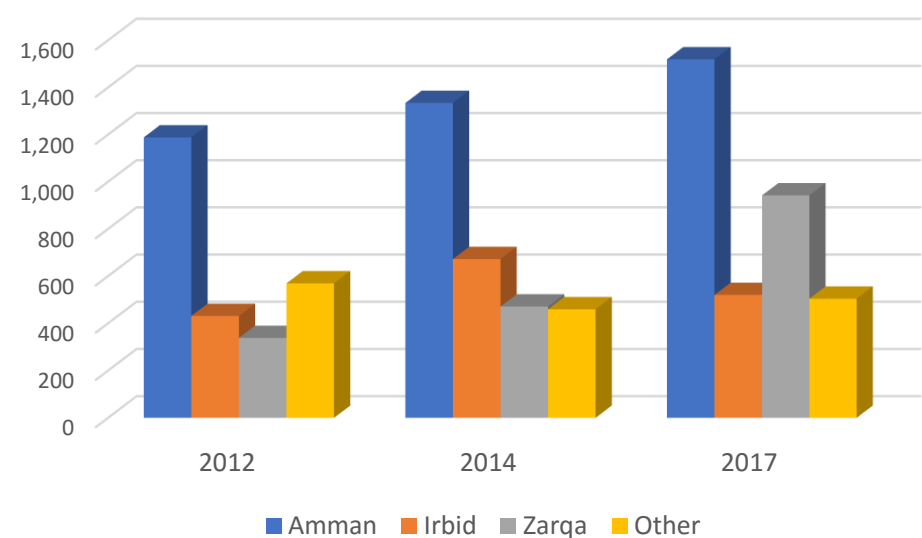
1- Overview of the existing building stock & Summary of its characterization:

1.2: Building Permits: (1),(2),(3), (4)

Total area (m2) of new Permits Per Governorate / year



Number of New Permits Per Governorate/year



(1): Central bank of Jordan, 2017, (2): DOS, 2015+2017+2018), (3):Ministry of Higher Education, 2016, (4):Ministry of Education, 2018

1- Overview of the existing building stock & Summary of its characterization:

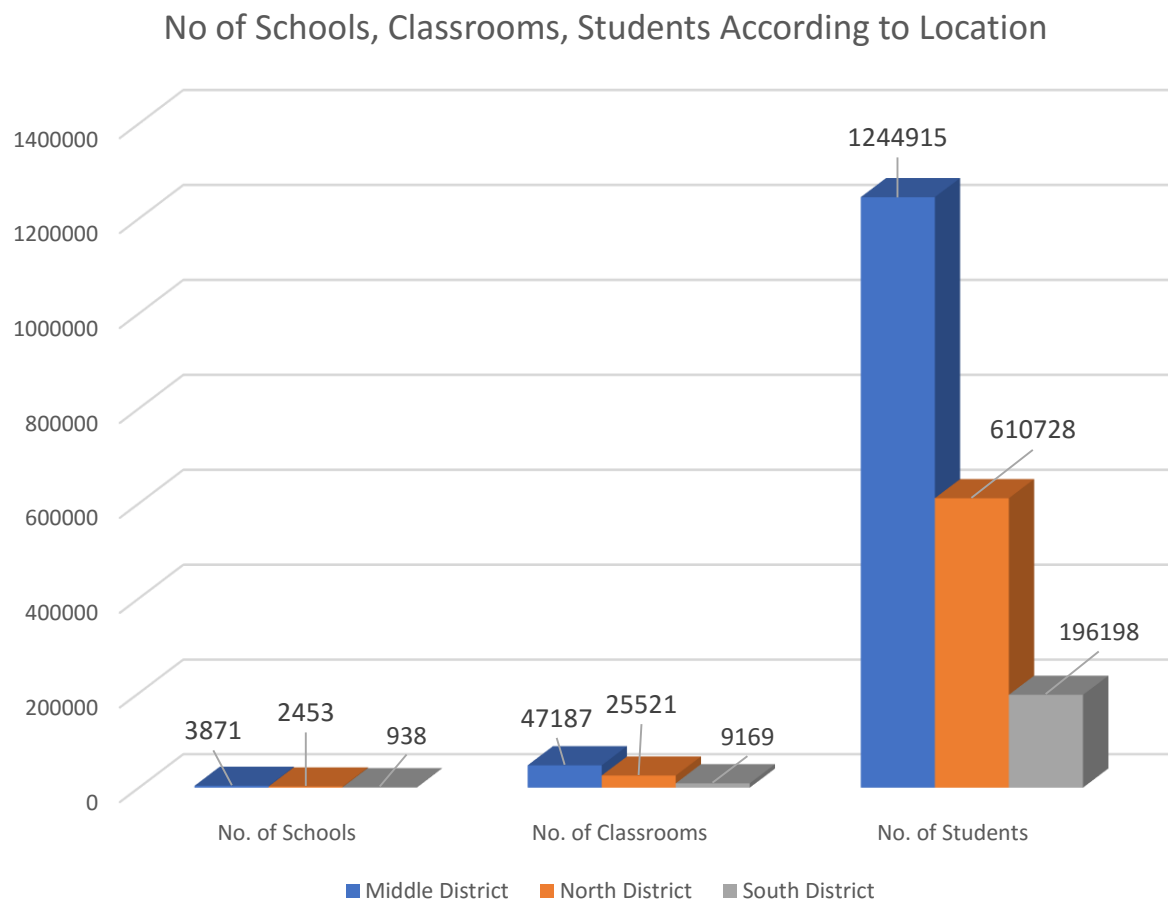
1.3: Building Numbers for Services Sector Buildings ^{(1),(2),(3), (4)}

Sub sector (2017)	No. of Units	Sub sector (2017)	No. of Units
Tourism		Health facilities	
Hotels	261	Public Hosp.	50
Popular hotels	101	Private Hosp.	66
Hotels apartments	180	Health Centers	673
Restaurants	15750	Clinics	4037
Pop Restaurants	979	Pharmacies	2838
Offices, Finance, and commercial		Education	
Public Buildings & Office Buildings	2465	Schools Primary and Secondary	7262
Banks	277	Public Universities	10
COMMERCES	~80000	Private Universities	20
		Colleges	32

(1): Central bank of Jordan, 2017, (2): DOS, 2015+2017+2018), (3):Ministry of Higher Education, 2016, (4):Ministry of Education, 2018

1- Overview of the existing building stock & Summary of its characterization:

1.4: Number of Schools, classrooms, & Students per District: (1),(2),(3),(4)



(1): Ministry of Education, 2017

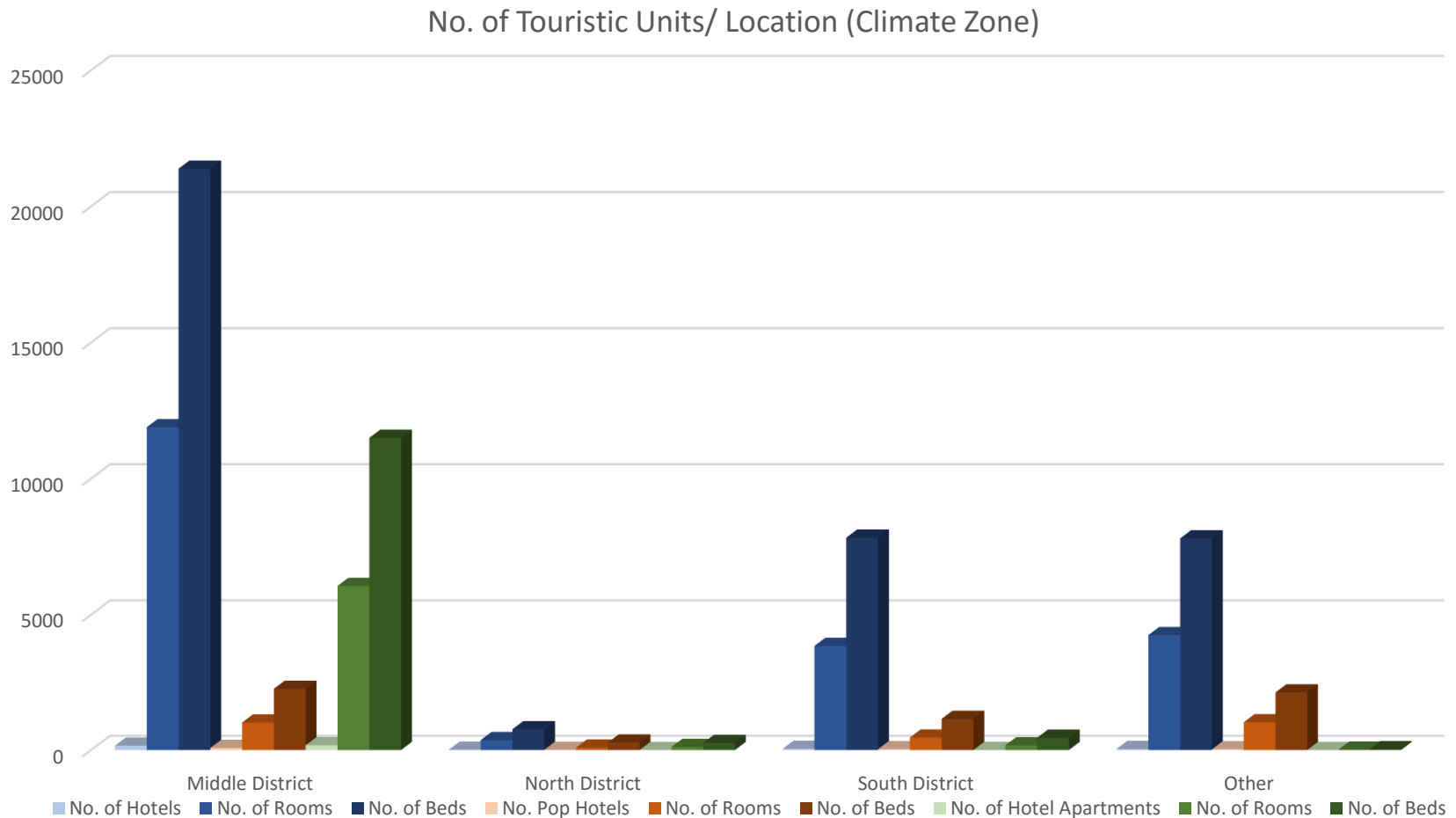
(2): Ministry of Higher Education, 2017

(3): DOS, 2018

(4): Central Bank of Jordan, 2017

Chapter VI: Typologies of existing buildings in the tertiary sector & the potential evolutions of its parks

1.5: Number of Hotels, Pop Hotels & Hotel Apartments per district : (1),(2),(3),(4)



(1): Central Bank of Jordan, 2017

(2): Jordanian Hotel Society, 2017

(3): Ministry of Tourism, 2018

(4): DOS, 2018

2- Overall Energy Consumption in the Service Sector:

This part covers the following topics:

- 2.1: Overall energy consumption for 2006, 2008, 2010, 2014, 2017 per district & Sector
- 2.2: Electricity Use per sector for 2006, 2008, 2010, 2014, 2017, 2018
- 2.3: Total Energy Use for the Services Sector:

2- Overall Energy Consumption in the Service Sector:

2.1: Overall energy consumption for 2006, 2008, 2010, 2014, 2017 per district & Sector

			Annual Electricity Consumption				
Year			2006	2008	2010	2014	2017
JEPCO (middle District) Climate Zones 1+2	Domestic & Government Buildings	Gwh	2308.5	3057.9	3555.6	4376.2	5298.2
	Industrial	Gwh	1222.9	1561.7	1734.1	1968.1	2073.7
	Commercial & Hotel	Gwh	1166.6	1465.1	1645.3	1742.9	1746.2
	Agriculture & Water Pumping	Gwh	368.6	462.8	454.8	533.1	625.1
	Street Lighting	Gwh	130.4	145.4	155.5	138.8	178.6
	Total	Gwh	5393	6692.9	7559.5	8759.1	9921.8
		%	13%	11%	8%	3%	5.0%
IDECO (North District) Climate Zones 2	Domestic & Government Buildings	Gwh	678	832.4	986.3	1368.2	1673.3
	Industrial	Gwh	150	157	269.1	262.6	294.2
	Commercial & Hotel	Gwh	123.2	153.5	187.4	238	297.6
	Agriculture & Water Pumping	Gwh	296.2	370.8	443	545.1	651.3
	Street Lighting	Gwh	74.3	83.2	98	106.8	134.7
	Total	Gwh	1326.5	1596.9	1983.8	2520.7	3051.1
		%	10%	9%	12%	9%	5.7%
EDCO (South district) Climate Zones 2+3+4	Domestic & Government Buildings	Gwh	448.2	569.1	677.8	839	937
	Industrial	Gwh	130.5	175.4	297.7	353	365
	Commercial & Hotel	Gwh	177.9	249.7	288.1	309	342
	Agriculture & Water Pumping	Gwh	731.5	879.4	969.1	1206	1406
	Street Lighting	Gwh	56.7	54.9	61.1	70	89
	Total	Gwh	1560.3	1928.5	2293.8	2777	3139
		%	9%	9%	12%	6%	2.9%
Total	Domestic & Government Buildings	Gwh	3651	4459	5225	6583.4	8038
	Industrial	Gwh	2757	3128	3262	3878.3	3877
	Commercial & Hotel	Gwh	1528	1925	2187	2357.7	2507
	Agriculture & Water Pumping	Gwh	1396	1713	1868	2284.2	2706
	Street Lighting	Gwh	261	284	315	315.6	404
	Total	Gwh	9593.4	11509	12857.4	15419.2	17503.8
		%	10%	9%	8%	6%	4.8%

(1): NEPCO, 2017

27/11/2019

Presentation three, Tala Awadallah, ESCWA, 2019

10

2- Overall Energy Consumption in the Service Sector:

2.2: Electricity Use per sector for 2006, 2008, 2010, 2014, 2017, 2018, (1),(2),(3)

		Household	Industrial	Commercial	Water Pumping	Governmental	Street Lighting	Others	Total
2006	No. of consumers (000)	987	15	161	5	15	-	12	1195
	Consumed Percentage %	30.4	29.6	15.2	14.5	4.3	2.7	3.2	100
	Elec. Consumed GWh	2918	2839	1457	1392	416	263	310	9595
2008	No. of consumers (000)	1134	15	176	6	13	-	7	1352
	Consumed Percentage %	31.4	28	15.9	14.7	6.9	2.5	0.7	100
	Elec. Consumed GWh	3630	3231	1841	1695	797	284	77	11555
2010	No. of consumers (000)	1264	16	189	7	13	-	8	1498
	Consumed Percentage %	33	26.3	16.1	14.3	7.1	2.4	0.8	100
	Elec. Consumed GWh	4260	3398	2084	1844	915	315	105	12921
2014	No. of consumers (000)	1,594	17	200	1	23	10	16	1,862
	Consumed Percentage %	35.6	25.2	15.9	10.2	6.9	2.1	5.3	100
	Elec. Consumed GWh	5,473	3,886	2,267	1,565	1,063	316	821	15,391
2017	No. of consumers (000)	1879.5*	19.6	236.5	10.2	*	12.2	-	2158
	Consumed Percentage %	45.7*	22.3	14.3	15.3	*	2.3	-	100
	Elec. Consumed GWh	7998.8*	3909.7	2509.8	2683.2	*	402.3	-	17503.8
2018	No. of consumers (000)	1934.916*	18.731	247.433	10.364	*	13.987	-	2237.8
	Consumed Percentage %	45.4*	22.4	14.3	15.5	*	2.4	-	100
	Elec. Consumed GWh	7963.8*	3929.3	2508.4	2718.9	*	421	-	17,541.4
* Governmental electricity consumption for the years 2017 and 2018 are included within the household consumption.									

(1): NEPCO, 2017,
27/11/2019

(2): Electricity Regulatory Commission, 2010,2015

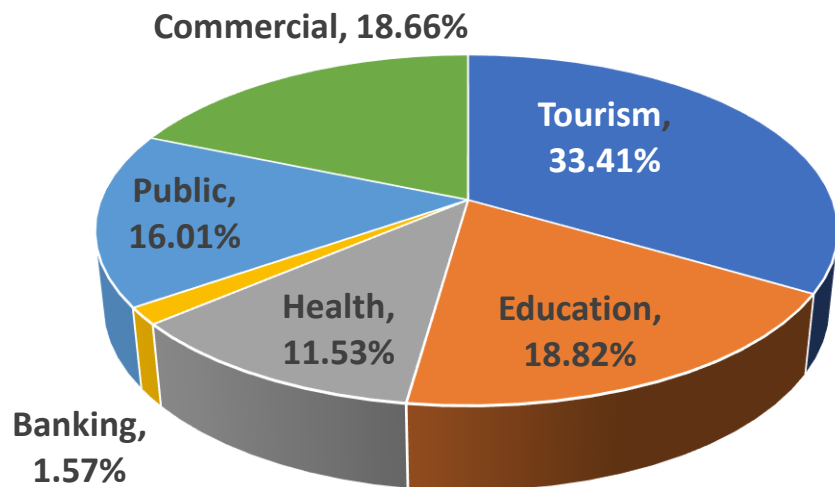
(3): EMRC, 2018

Presentation three, Tala Awadallah, ESCWA, 2019

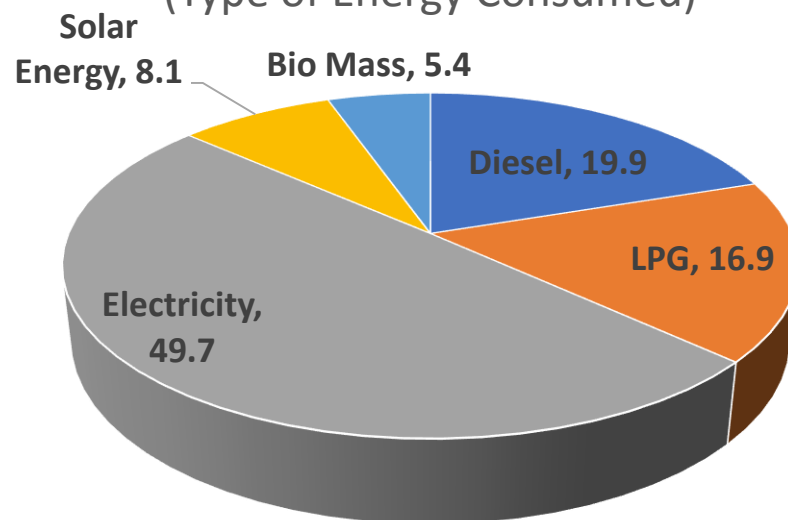
2- Overall Energy Consumption in the Service Sector:

2.3: Total Energy Use for the Services Sector:

(%) of Total Services Energy
(by Sector)



(%) of Total service energy
(Type of Energy Consumed)

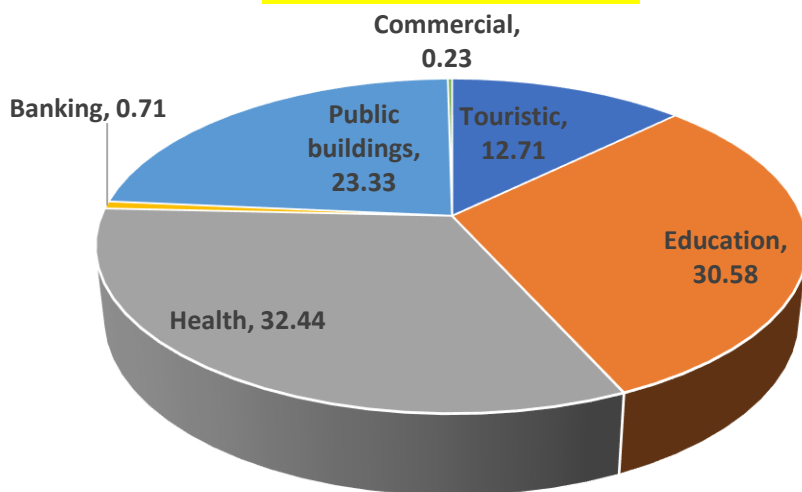


2- Overall Energy Consumption in the Service Sector:

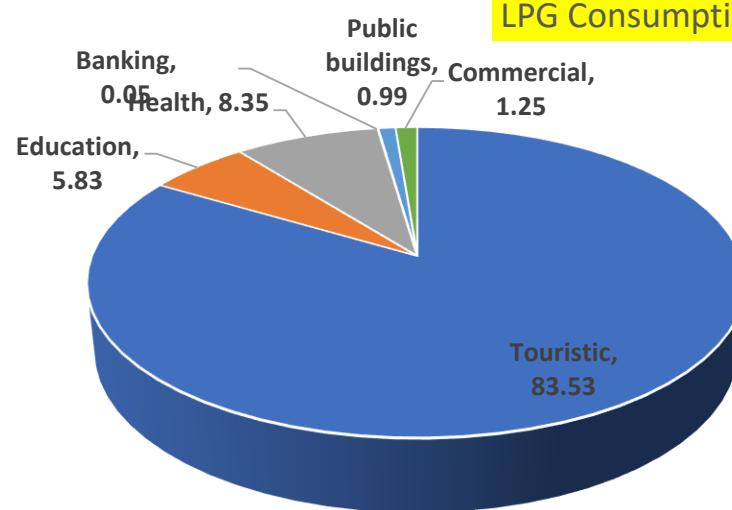
2.3: Total Energy Use for the Services Sector

((%) of services subsector using each type of energy):

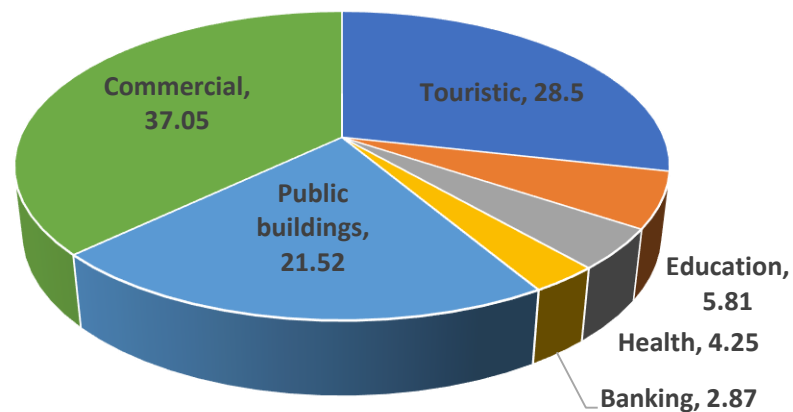
Diesel Consumption (%)



LPG Consumption (%)



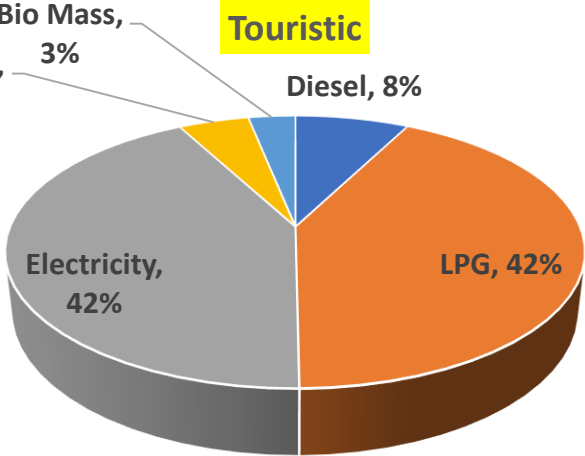
Electricity Consumption (%)



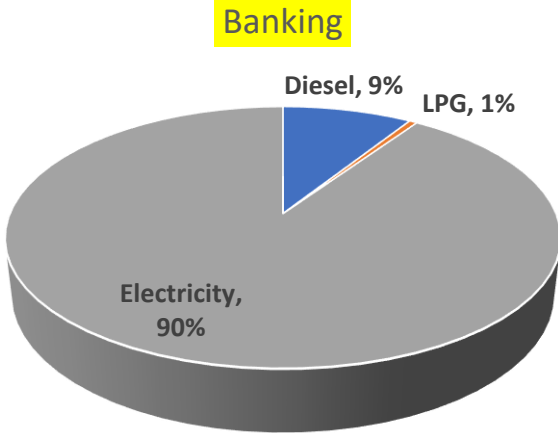
2- Overall Energy Consumption in the Service Sector:

2.3: Total Energy Use for the Services Sector:(%) type of energy used in each services subsector)

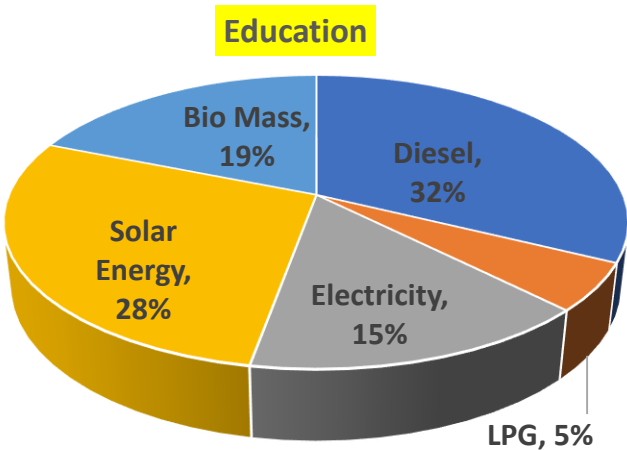
Touristic



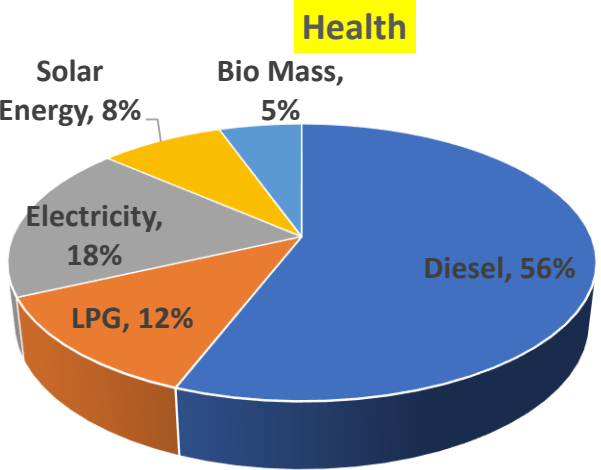
Banking



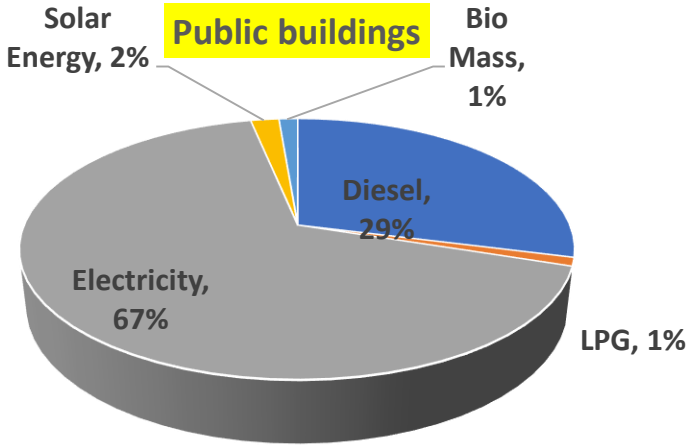
Education



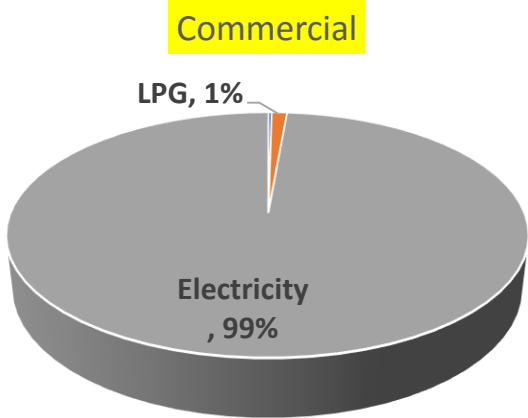
Health



Public buildings



Commercial



3- End-Use Energy Consumption in the Existing Service Sector:

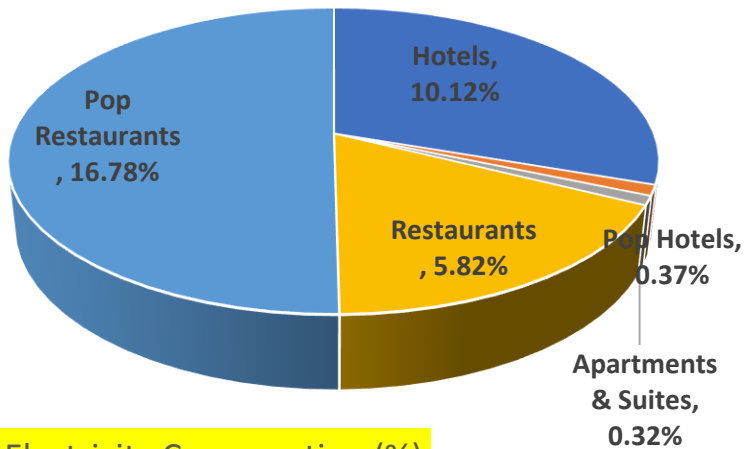
This part covers the following topics:

- 3.1: End Use Energy Consumption of Buildings in the Tourism Subsector
- 3.2: End Use Energy Consumption of Buildings in the Health Subsector
- 3.3: End Use Energy Consumption of Buildings in the Education Subsector
- 3.4: End Use Energy Consumption of Buildings intended for Commercial Spaces

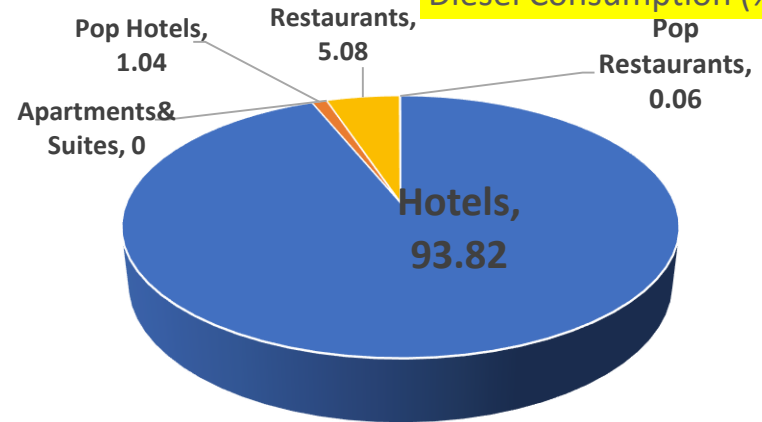
3- End-Use Energy Consumption in the Existing Service Sector:

3.1 End Use Energy Consumption of Buildings in the Tourism Subsector

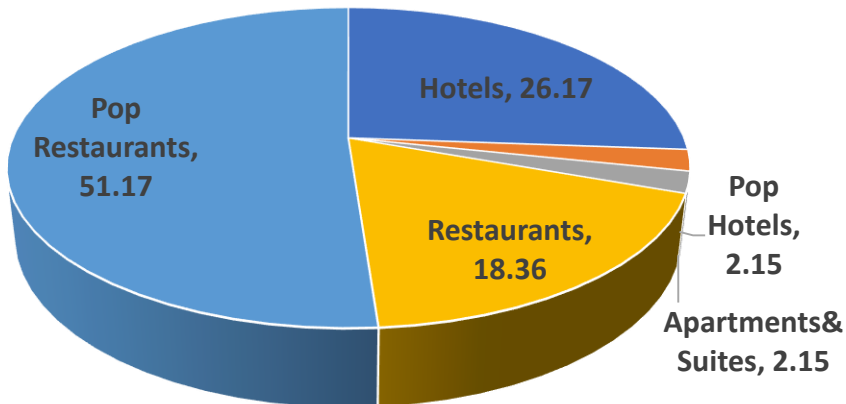
Total Energy (%)



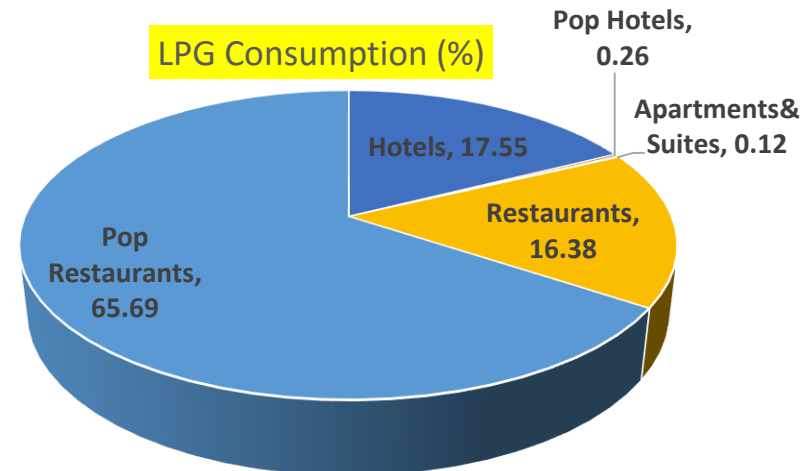
Diesel Consumption (%)



Electricity Consumption (%)



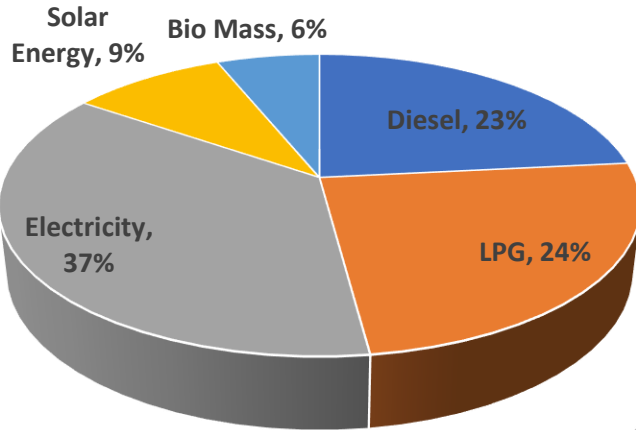
LPG Consumption (%)



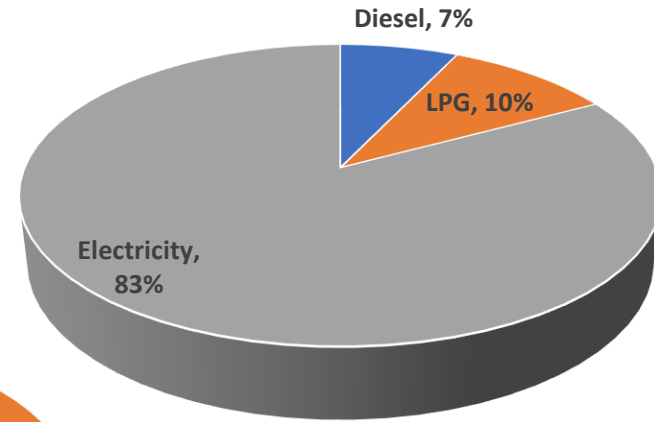
3- End-Use Energy Consumption in the Existing Service Sector:

3.1 End Use Energy Consumption of Buildings in the Tourism Subsector

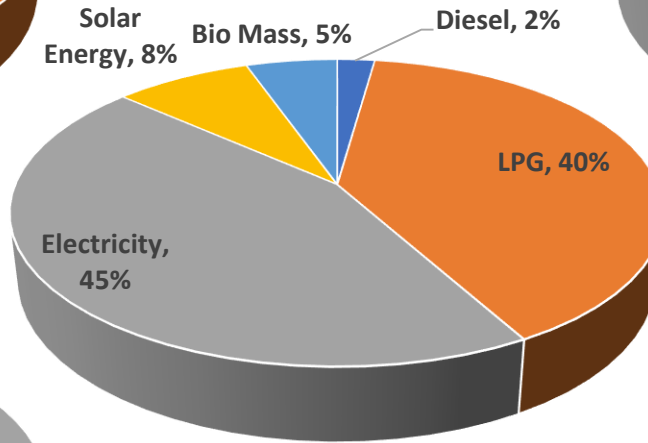
Hotels



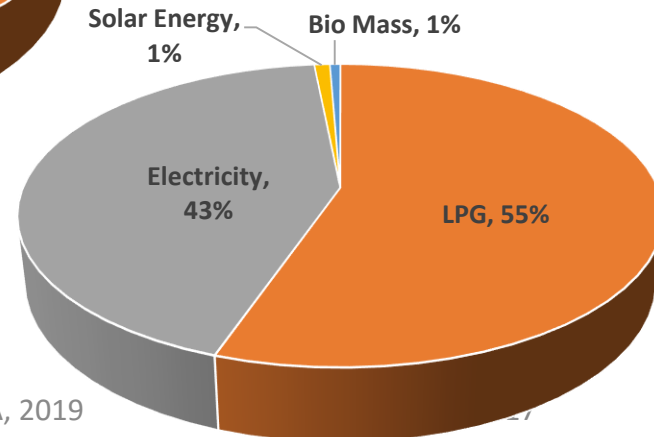
Pop Hotels



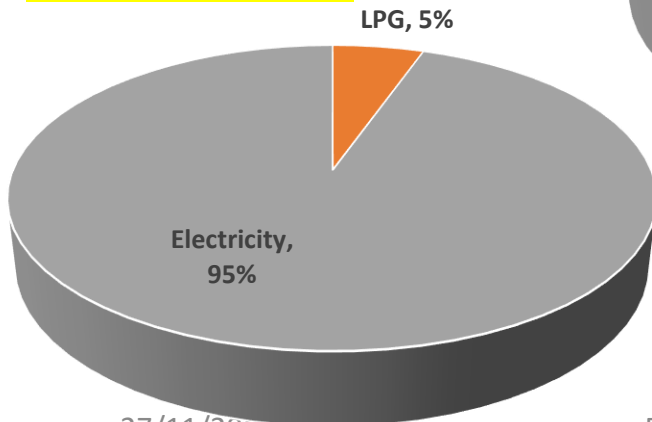
Restaurants



Pop Restaurants

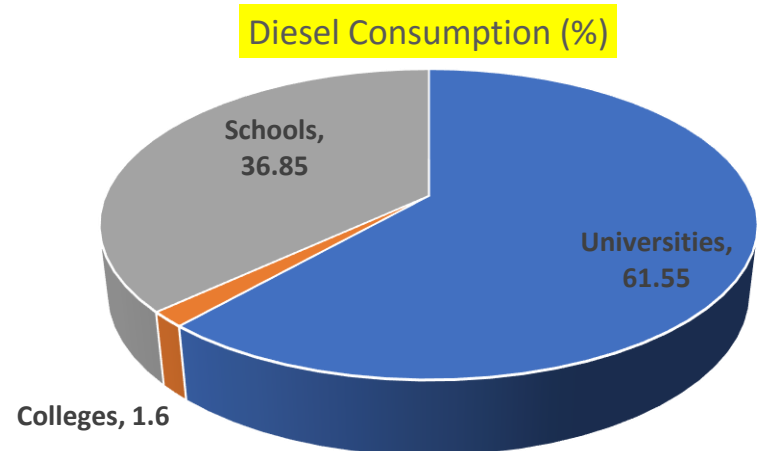
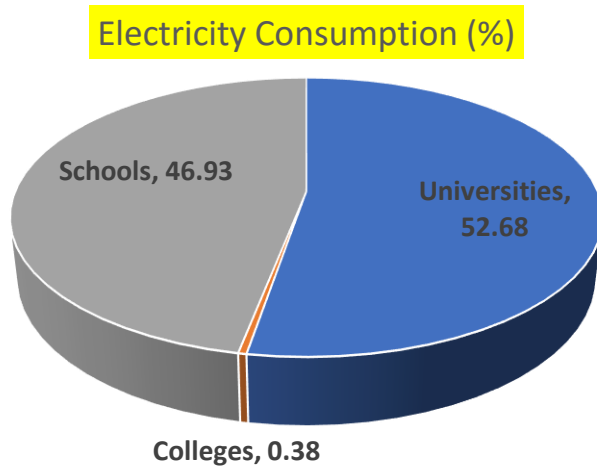
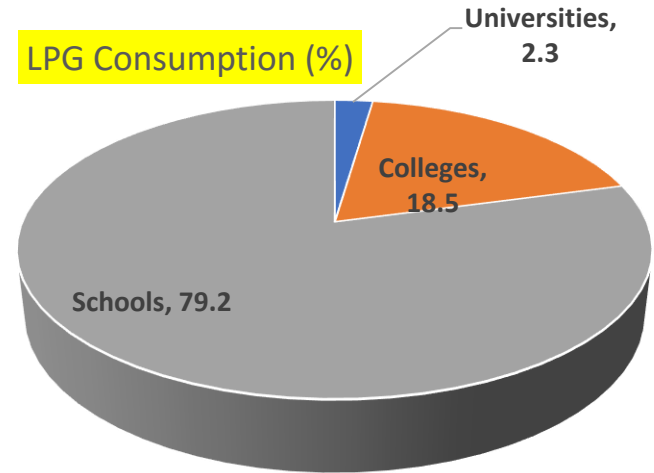
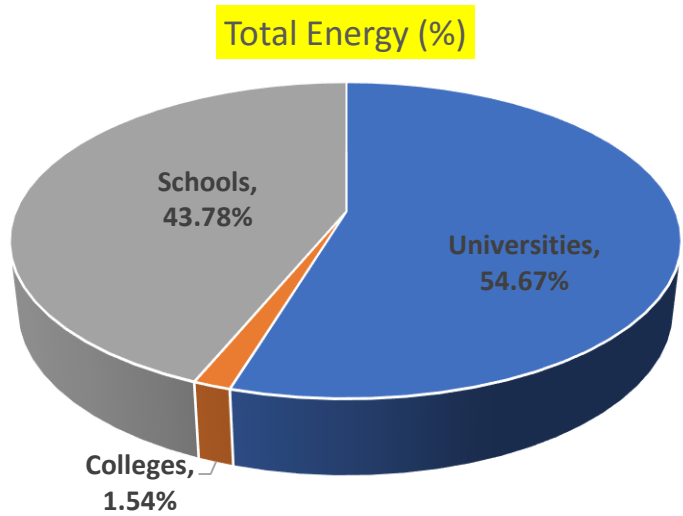


Apartments & Suites



3- End-Use Energy Consumption in the Existing Service Sector:

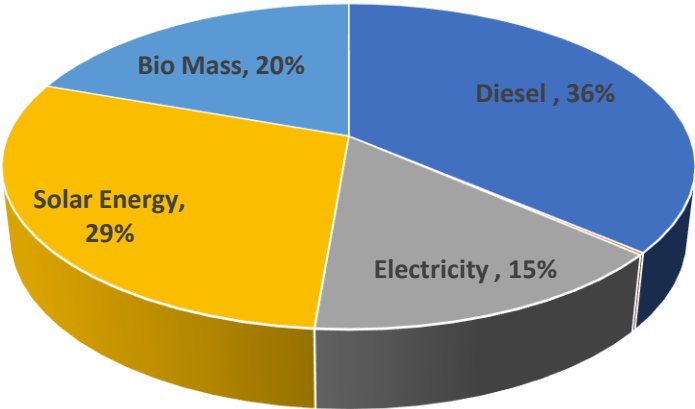
3.2 End Use Energy Consumption of Buildings in the Educational Subsector



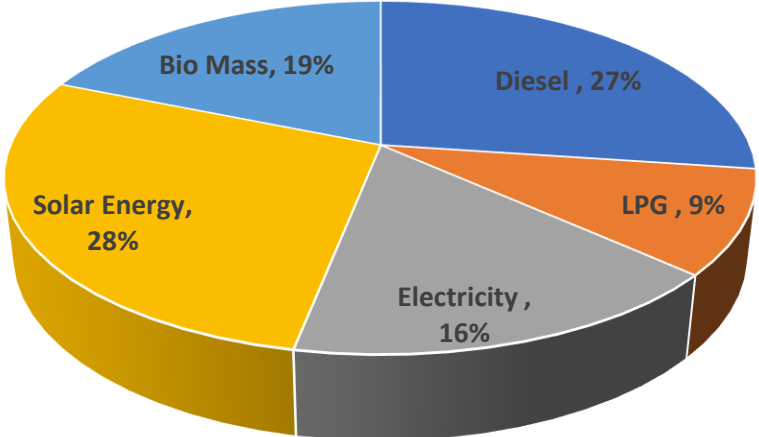
3- End-Use Energy Consumption in the Existing Service Sector:

3.2 End Use Energy Consumption of Buildings in the Educational Subsector

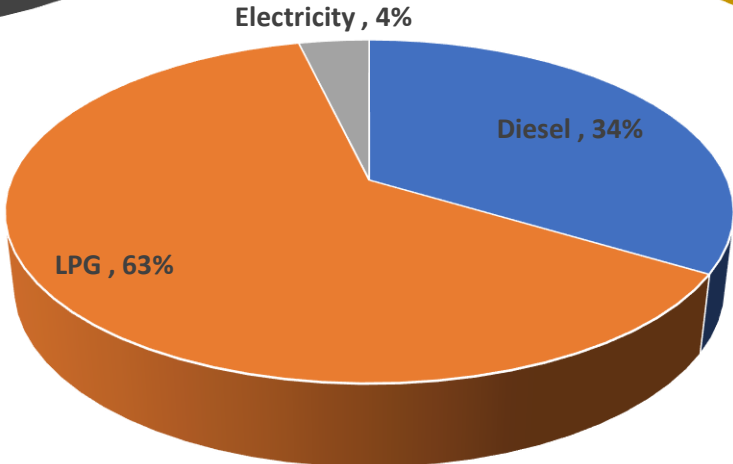
Universities



Schools



Colleges

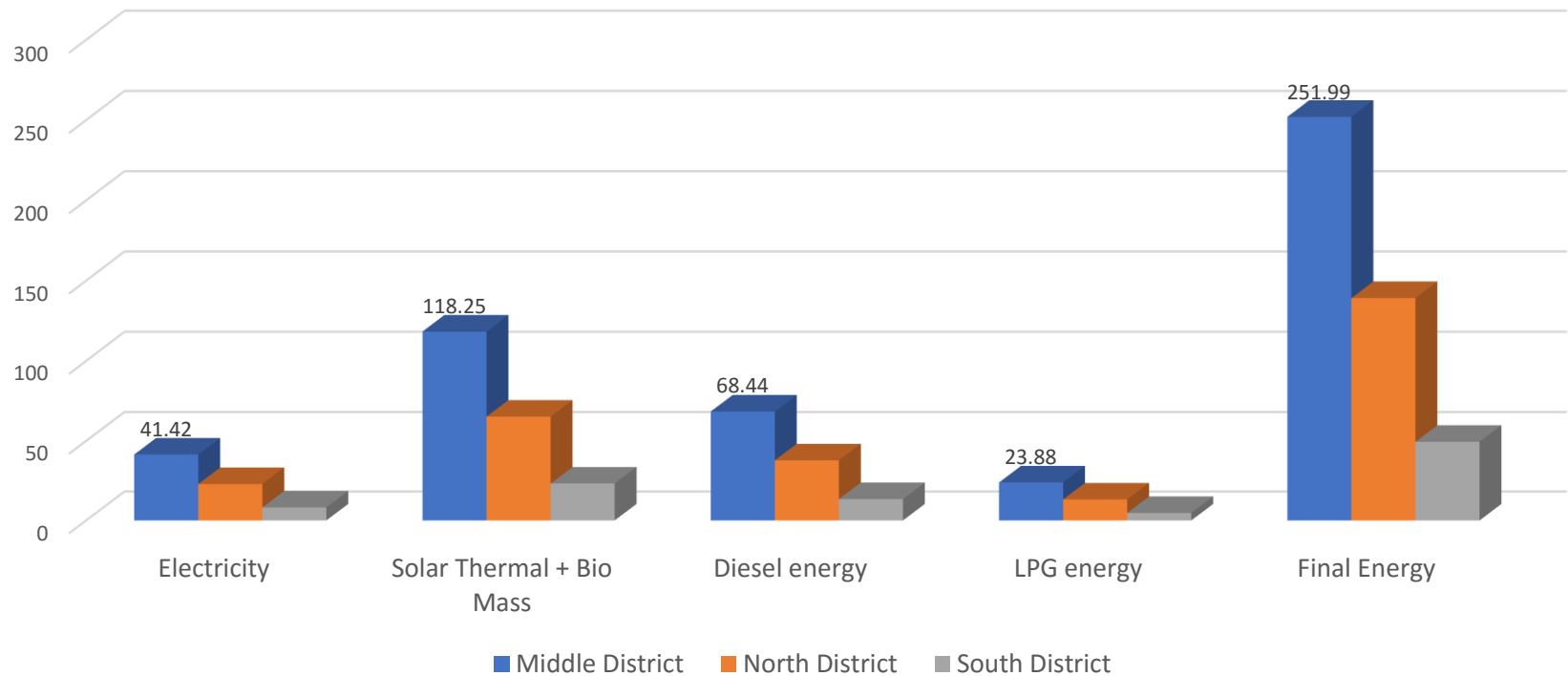


3- End-Use Energy Consumption in the Existing Service Sector:

3.2 End Use Energy Consumption of Buildings in the Educational Subsector (Schools)

Intensity of electricity use in all districts is 22 kWh/m².classroom

Energy Consumption (TOE 000) in 2017, by location



(1): Ministry of Education, 2017

(2): Ministry of Higher Education, 2017

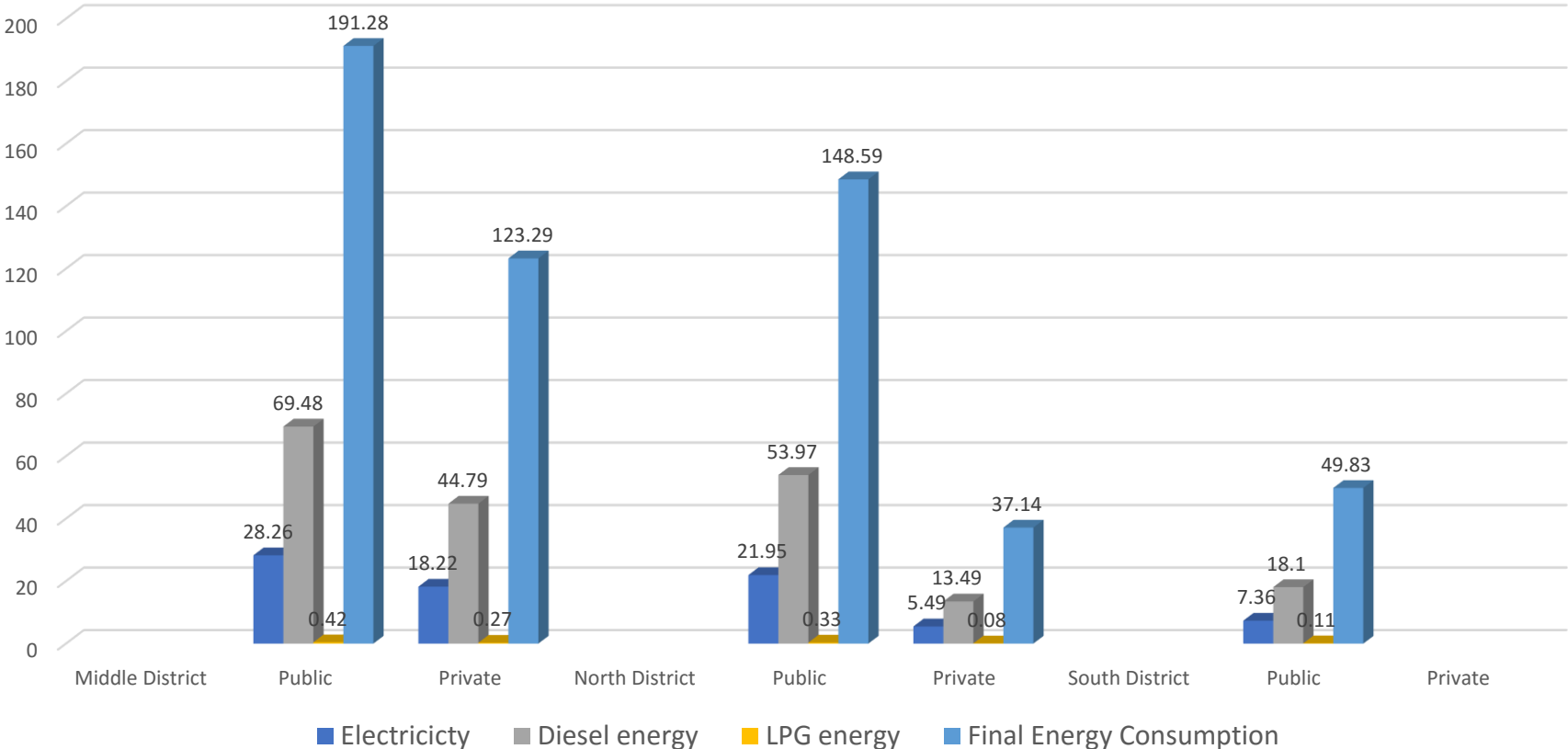
(3): DOS, 2018

(4): Central Bank of Jordan, 2017

3- End-Use Energy Consumption in the Existing Service Sector:

3.2 End Use Energy Consumption of Buildings in the Educational Subsector (Higher Education)

Energy Consumption in Universities (TOE 000), per district



(1): Ministry of Education, 2017

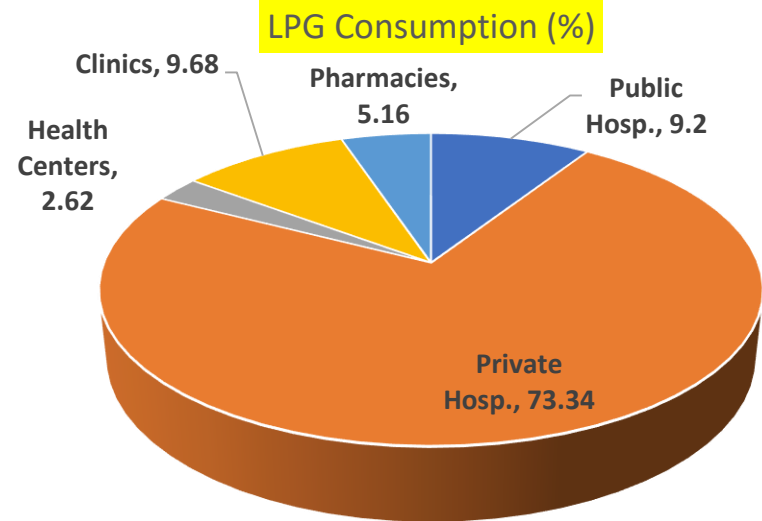
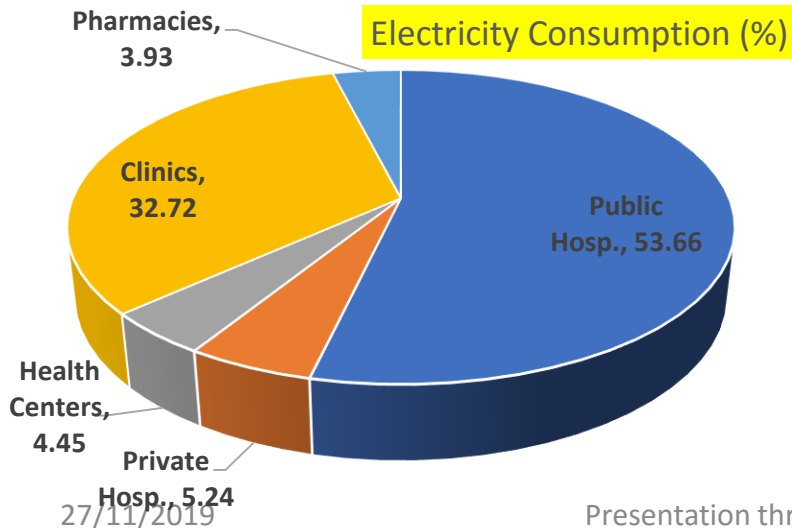
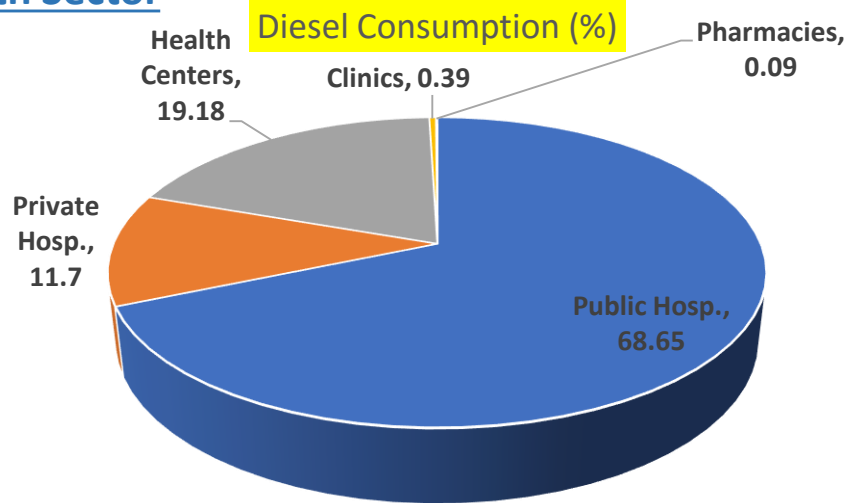
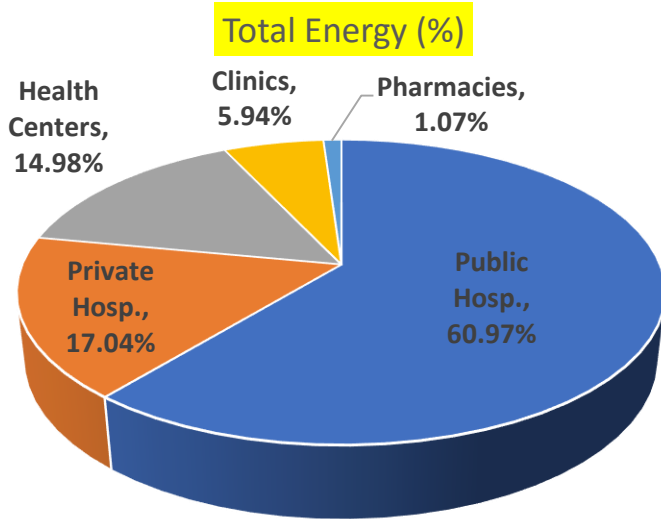
(2): Ministry of Higher Education, 2017

(3): DOS, 2018

(4): Central Bank of Jordan, 2017

3- End-Use Energy Consumption in the Existing Service Sector:

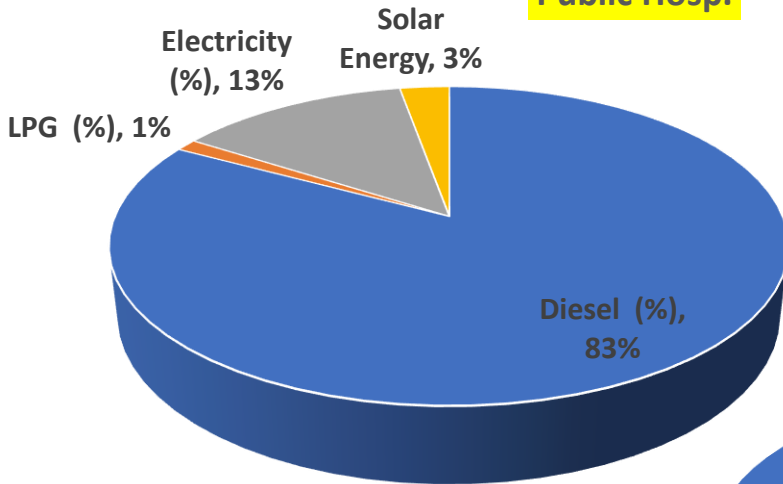
3.3 End Use Energy Consumption for the Health Sector



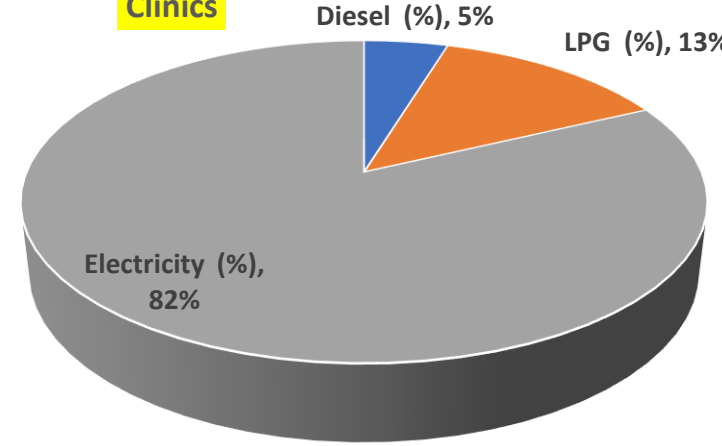
3- End-Use Energy Consumption in the Existing Service Sector:

3.3 End Use Energy Consumption for the Health Sector

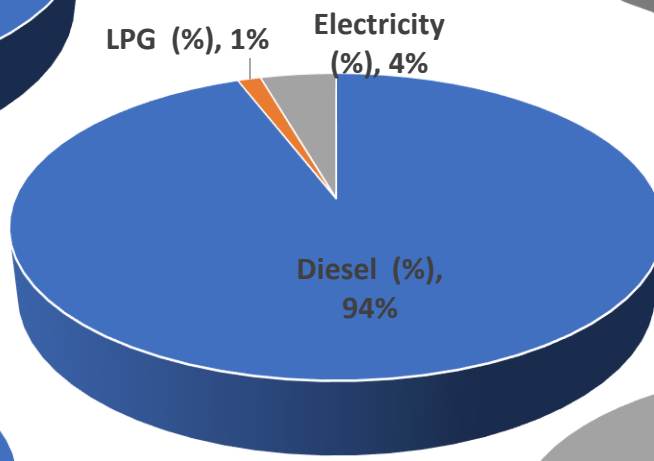
Public Hosp.



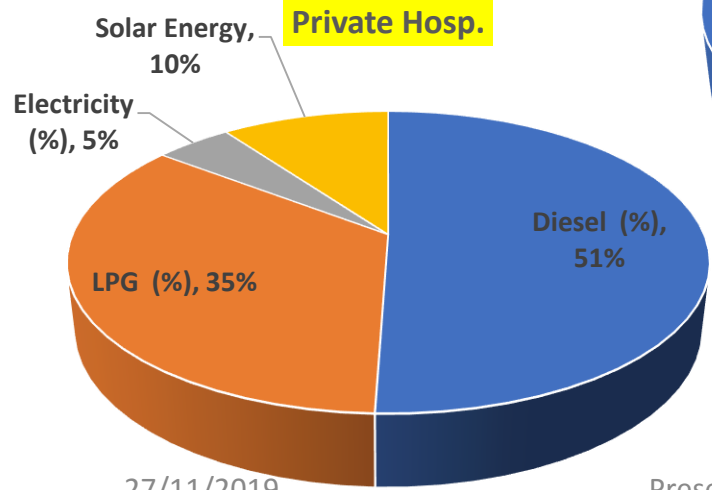
Clinics



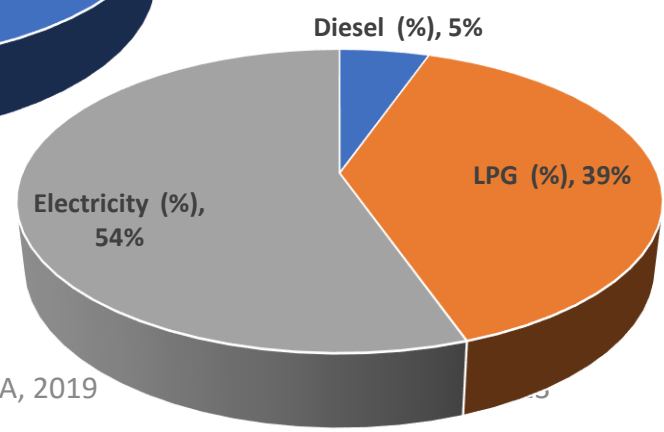
Health Centers



Private Hosp.

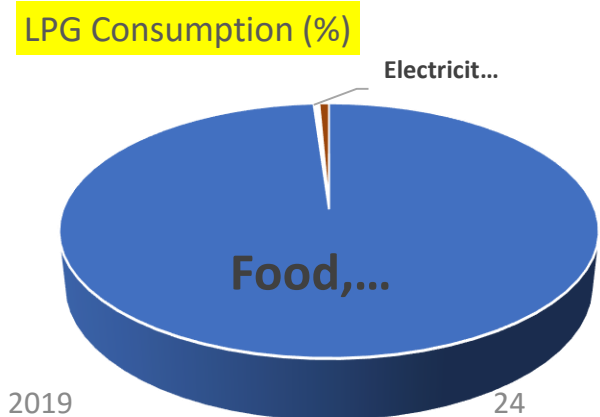
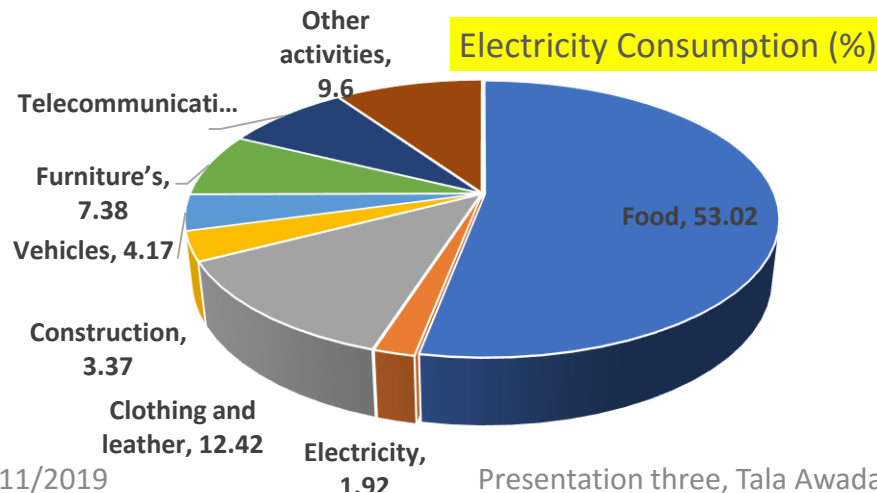
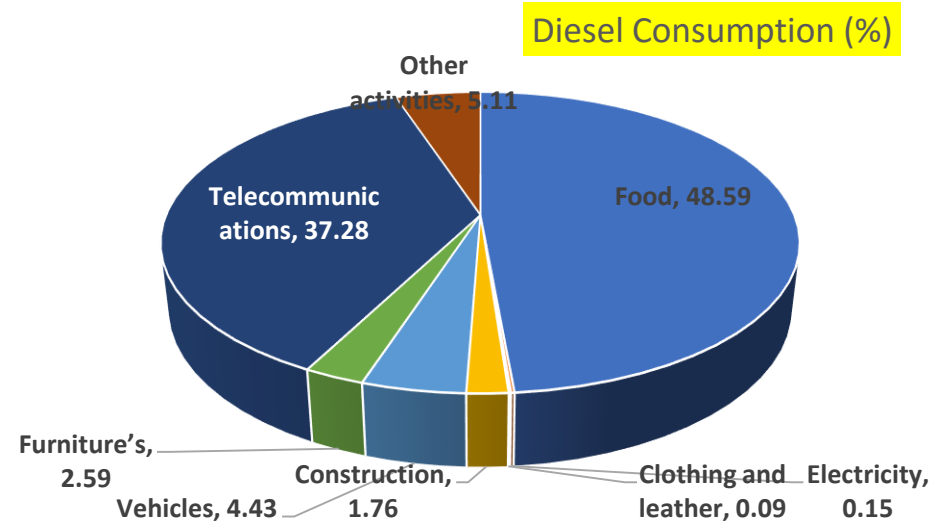
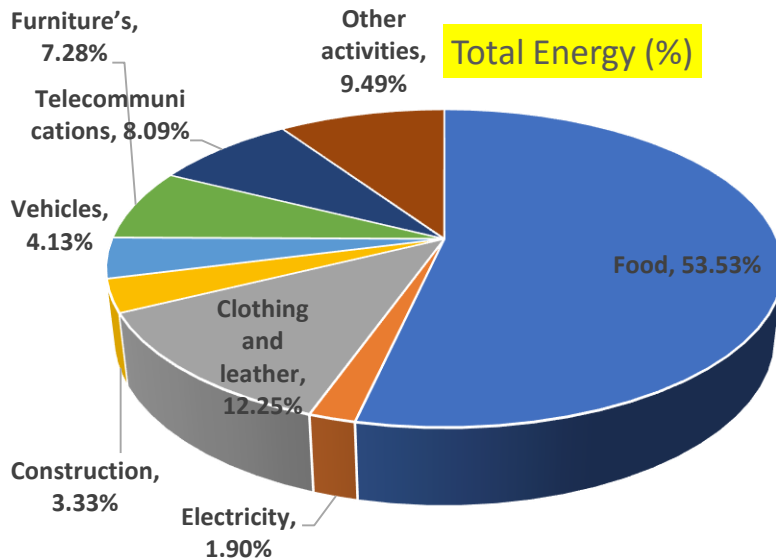


Pharmacies



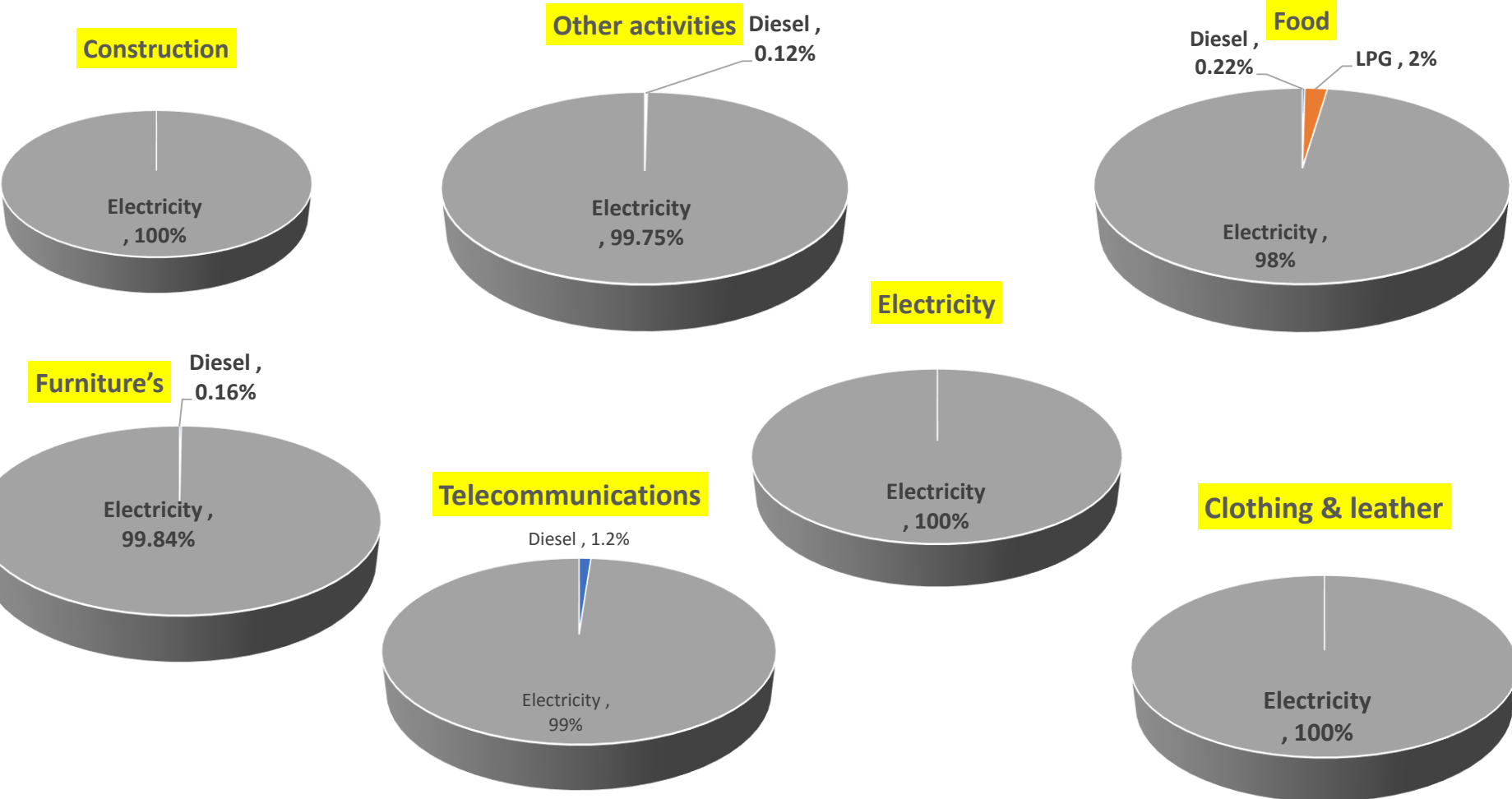
3- End-Use Energy Consumption in the Existing Service Sector:

3.4 End Use Energy Consumption for the Commercial Sector



3- End-Use Energy Consumption in the Existing Service Sector:

3.4 End Use Energy Consumption for the Commercial Sector



Conclusions and Remarks:

- The Services sector consumes an average of **6-7%** of the total **energy** consumption of Jordan.
- The Services sector consumes an average of **15%** of the total **electricity** consumption of Jordan.
- The Tourism Sector consumes the **biggest share of LPG and Electricity Consumption** from the services sector.
- **Solar Energy** application is found in Educational Sector from official surveys , although many applications are evident in other subsectors, but their energy contributions are not documented.
- There are **no detailed surveys for public building** energy consumption, only total energy.
- The building envelope of services sector buildings is not well defined, and is too diverse to find a common structure. It depends on location, income, and regulation of construction.
- **Electricity** consumption categorization is mostly based on estimations and averages, not measured and surveyed actual detailed consumption. All data are estimated using findings of scientific research not total surveys. (lighting, refrigeration, heating or cooling, etc.)

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- National Electric Power Company (**NEPCO**) Annual Report 2010. 2014, & 2017.
- National Energy Research Center (**NERC**), research reports 2012 & 2017.
- Ministry of Public Works & Housing (**MPWH**), building codes & guides 2008 & 2013
- Central Bank of Jordan (**CBJ**), Annual Report 2017.
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