



# Presentation on data collection methods and modelling: **SERVICES**


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16 November 2022

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# Content

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1. Introduction
  2. Structure of indicators
  3. Data collection, processing and EEI indicators calculation
  4. Advanced statistics in services
  5. Conclusions
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# Definition: Services

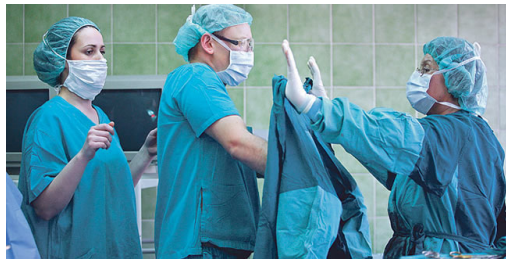
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- All public and private enterprises excluding:
  - Fishing
  - Forestry/Agriculture
  - Military services
  - Manufacturing (and Construction)
  - and Energy Sector

Badly known sector in EU, energy consumption is usually determined as differences between total final energy consumption and consumption in other sectors.

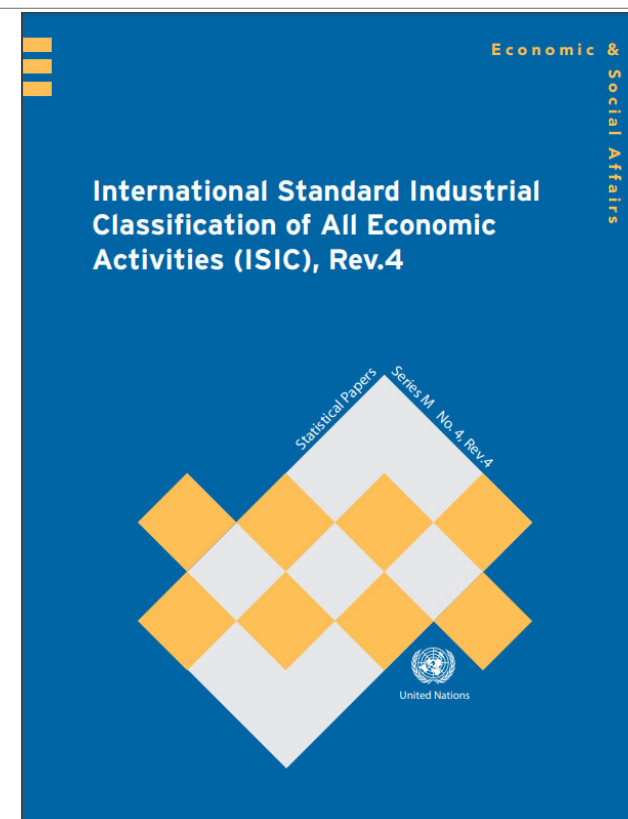
# Services – non-homogeneous sector

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# Categorisation of economic activities

- G - **Wholesale and retail trade**
- H - **Hotels and restaurants**
- I - Transport, storage and communications
- J - Information and communication
- K - Financial and insurance activities
- L - Real estate activities
- M - Professional, scientific and technical activities
- N - Administrative and support service activities
- O - Public administration and defence – **Public sector**
- P - **Education**
- Q - **Human health and social work activities**
- R - **Other** community, social and personal activities



# Aggregated indicators in service sector

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DATA COLLECTION AND MODELLING

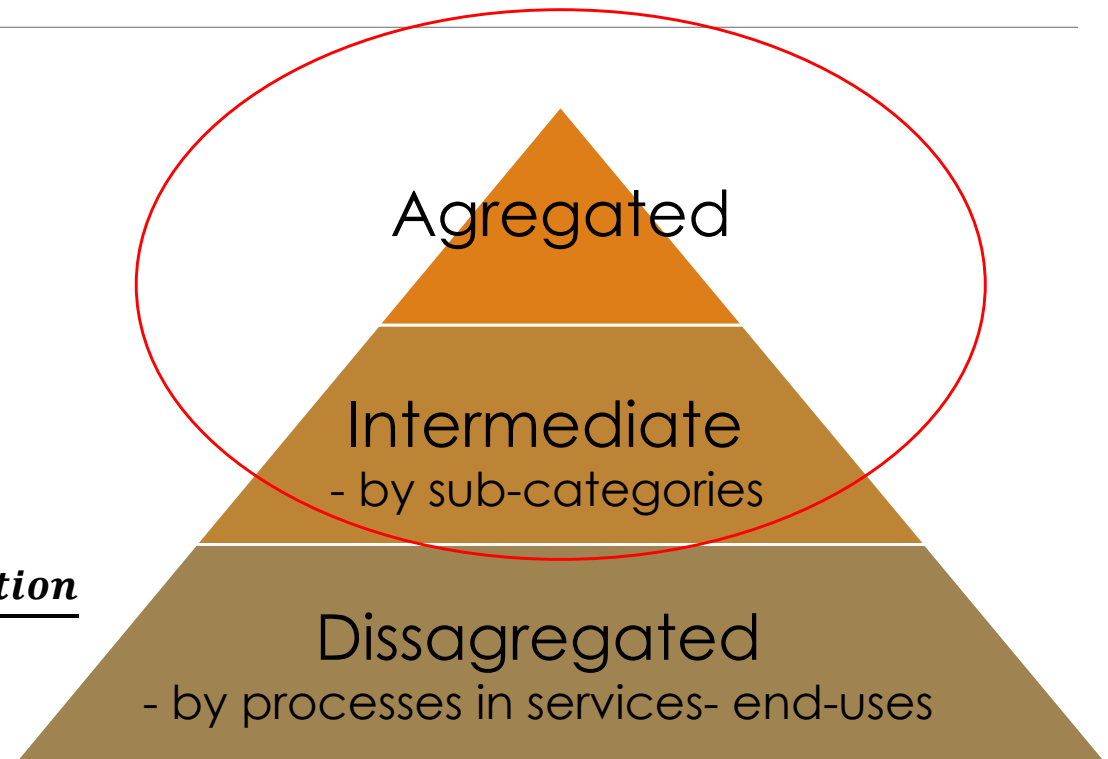
# Structure of the indicators in services

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- Total energy consumption
- Total energy consumption structure
- Energy intensity
- Specific consumption

$$\text{Energy intensity} = \frac{\text{energy consumption}}{\text{value added}}$$

$$\text{Specific consumption} = \frac{\text{energy consumption}}{\text{floor area}}$$



# Data for estimating EE indicators - IEA template

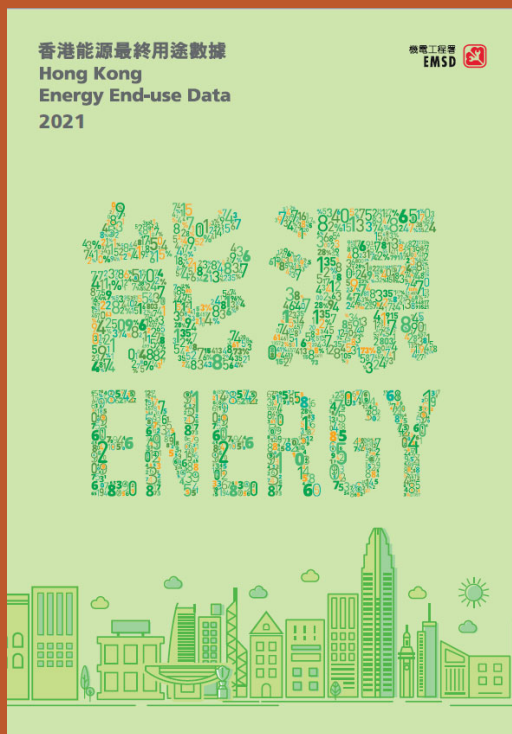
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## Data sources:

- **Energy Balance** - final annual energy consumption in services by international standards and recommendations;
- **National Accounts** – value-added in services (current LCU, constant 2015USD, PPP 2017USD)
- **Floor Area – building registers, surveys**



# Example: HONG KONG



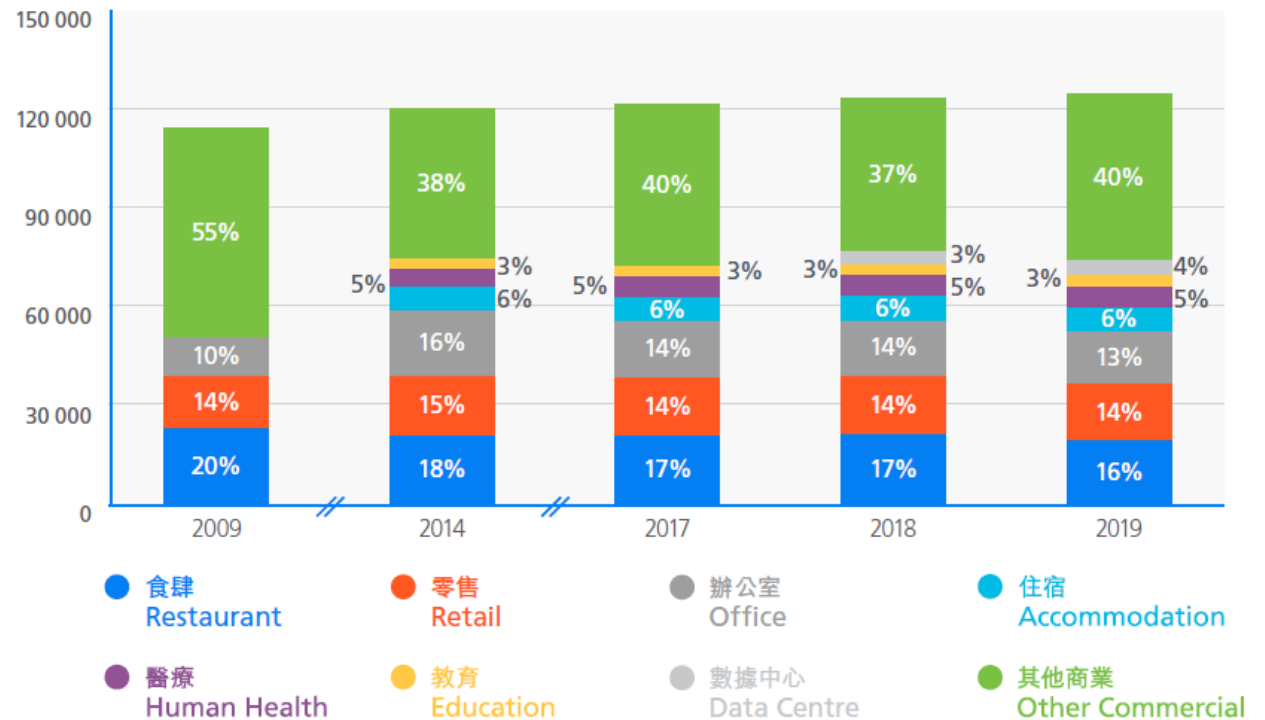
## 4.2 商業類別 Commercial Sector

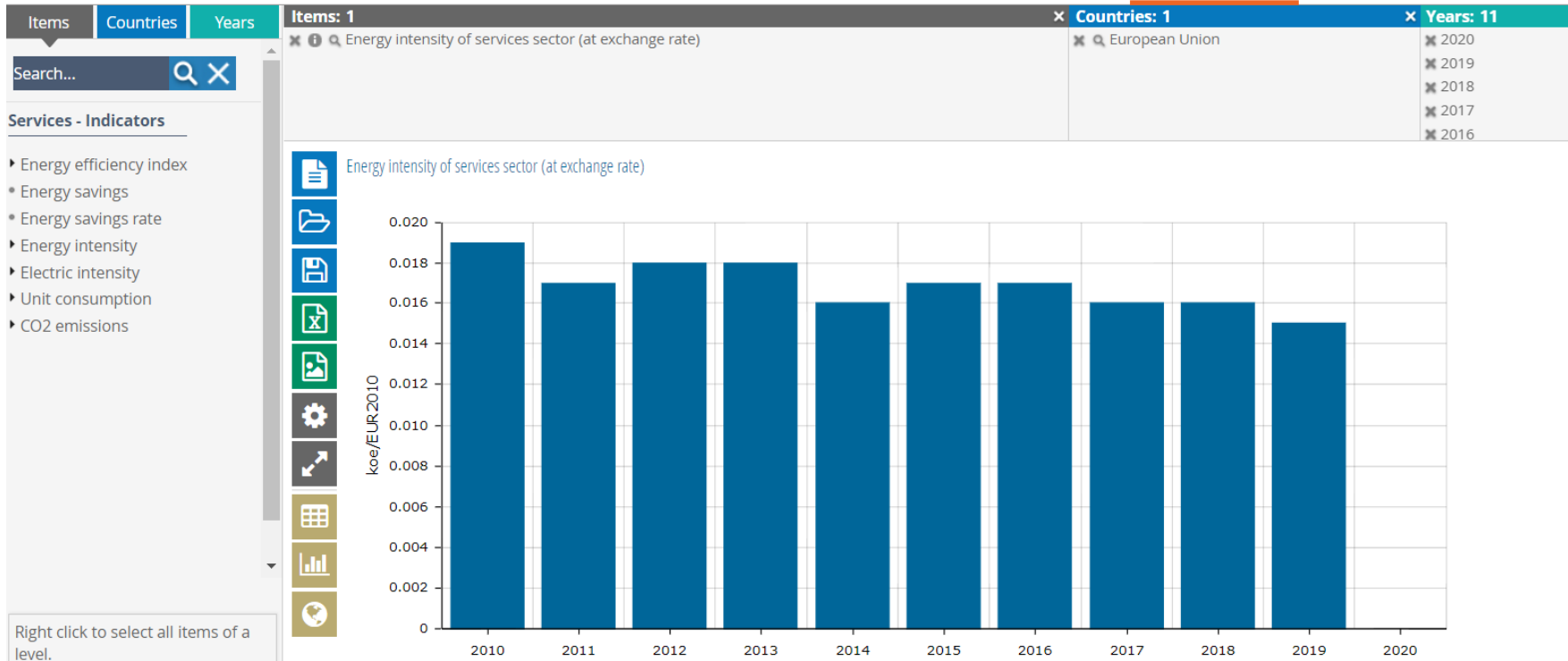
圖表 Chart 34

商業類別所有能源使用按組別劃分

Total Energy Consumption in Commercial Sector by Segment

參考表格 Refer Table 27  
單位 Unit: 太焦耳 Terajoule

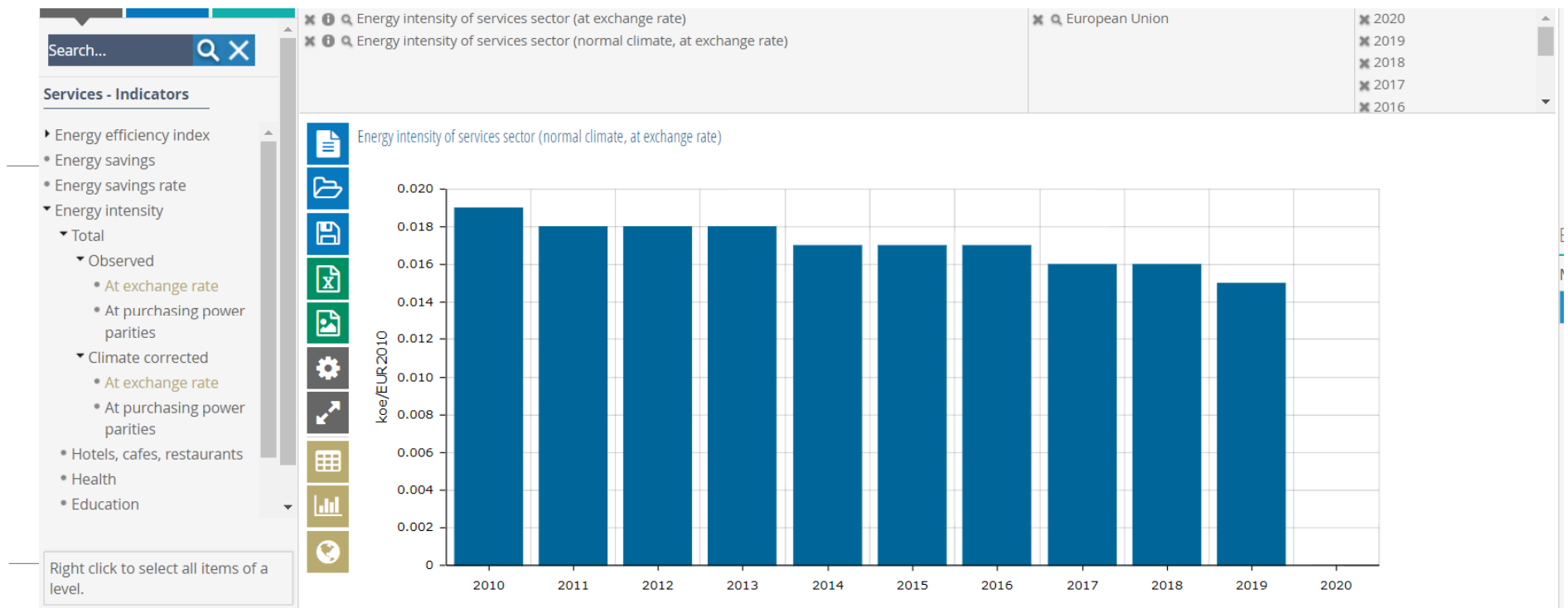




# Energy intensities in EU

NOMINAL DATA !!!!

SOURCE: ODYSSEE DATABASE



Energy intensities in EU

CLIMATE CORRECTED !!!!!

SOURCE: ODYSSEE DATABASE

# Energy consumption in services

## How to collect data? Similar to industry!

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### INCLUDES:

1. Electricity, gas and heat supplied from network
2. Purchases of energy at an market (coal, oil, petroleum products, solid biomass...)
3. Energy taken from own stocks
4. Own energy produced for direct use (solar heat, waste...)
5. Own energy produced in transformation processes (electricity, heat).
6. Floor area of buildings (total, heated, cooled)

EXCLUDES: energy used for transportation, non-energy use, other purposes

The initial questionnaire is similar to manufacturing industry



# How to collect data?

ATTENTION :

**OWN PRODUCTION!!!**

**RENEWABLES !!!!**

<b>Does enterprise own and use small oil generation unit for electricity generation?</b>			
1	If yes, what are annual quantities of fuel used for electricity gene	(kg)	
2	- fuel oil	lit	
3	-	lit	
4	- others (specify measurement unt)		

<b>If enterprise have own solar PV system ?</b>			
6	what is capacity of the solar PV?	kW	
7	what is annual electricity generation?	kWh	
8	what is annual electricity delivery into grid?	kWh	

<b>If enterprise have solar collector?</b>			
9	what is capacity of the solar collector/geyser ?	kW	
10	what is total surface area of solar collector/geyser?	m2	
11	what is volume of hot water storage?	lit	

<b>If enterprise have small-scale wind power plan</b>			
12	what is capacity of the plant?	kW	
13	what is annual electricity generation in the plant?	kWh	
14			

# Reporting on energy consumption in services in National Statistics Office

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- **Responsibility:** Department ??
- **Questionnaire:** similar structure is applied in many countries
- **Reporting period:** calendar year, Y-1 year
- **Sample design:** all large and medium size enterprises, sampling of the small size enterprise
- **Implementation:** January – May, Y-0 year
- **Challenges:** often, enterprises in service sector do not manage and pay the costs for energy, energy is part of a rent or the costs are paid by local community, government, etc.



# Data processing

**TRANSFORMATION**  
(only if enterprise is autoproducer electricity and or heat plant)

**FINAL ENERGY CONSUMPTION for EE indicators**

**FINAL non-energy**

**Transport**

Table 1. Fuel consumption in manufacturing industry

Energy form	Net Calorific Value	Unit	Purchase		Own production	Sale		Stock		Total consumption in units	Out of which:				
			in units	costs (without VAT)	in units	in units	costs (without VAT)	at 1st January (beginning of the year)	at 31st December (end of the year)		for electricity, heat production	other energy purposes	non-energy purposes	transport	other
			1	2	3	4	5	6	7	8	9	10	11	12	13
Electricity		MWh													
Anthracite		t													
Coking Coal		t													
Other Bituminous Coal		t													
Other Sub-bituminous Coal		t													
Lignite/Brown Coal		t													
Patent fuel		t													
Coke Owen Coke		t													
Gas Coke		t													
BKB		t													
Liquid petroleum gas (LPG)		t													
Motor gasoline		t													
Other kerosene		t													
Gas Diesel Oil		t													
Transport Diesel		t													
Heating and Other Gasoil		t													
Fuel oil:		t													
Res.fuel: low sulphur content		t													
Res.fuel: high sulphur content		t													
Petroleum coke		t													
Naphta		t													
White spirit i SPB		t													
Lubricants		t													

To be considered as energy in services





# Additional questions

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## Floor area of buildings\*

- **Total floor area** of building performing economic activity in service
- **Total heated floor area** of building performing economic activity in services
- **Total cooled floor area** of building performing economic activity in services

*\* usually means the closed area where heating and cooling can be performed*

## Floor area of open spaces with energy consumption

- e.g. Area of parking places in supermarkets with lighting services
- e.g. Restaurants and bars on open spaces
- other

*\* Some countries in EU reported that  $\frac{1}{4}$  of electricity in services is spent in open areas*

# Disaggregated indicators in service sector

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ADDITIONAL DATA ARE NEEDED

REGULAR ANNUAL QUESTIONNAIRE IS EXPANDED



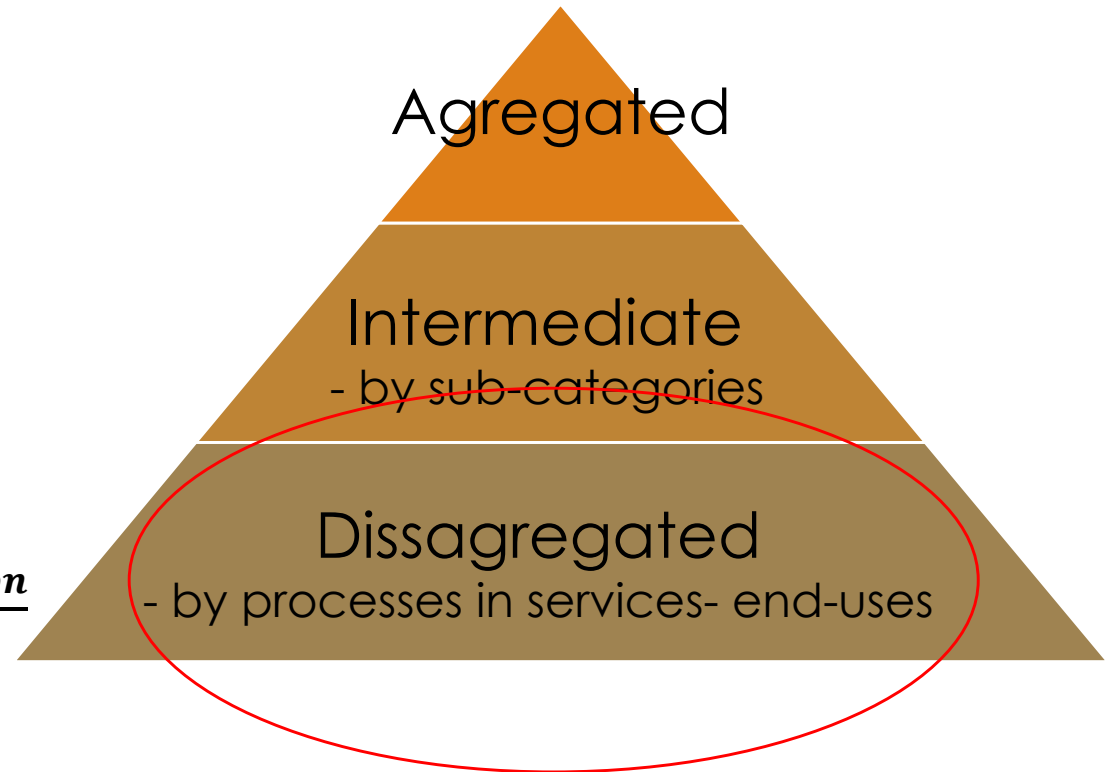
# Structure of the indicators in services: total and by sub-categories

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## END-USES

1. HEATING
2. COOLING
3. WATER HEATING
4. LIGHTING AND APPLIANCES

- Energy intensity =  $\frac{\text{energy consumption}}{\text{value added}}$
- Specific consumption =  $\frac{\text{energy consumption}}{\text{floor area}}$



# Other indicators for energy intensities

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<b>Service category</b>	<b>Unit of activity</b>
Schools	Number of students, number of occupants
Hospitals	Bed capacity, number of occupied beds
Hotels	Number of rooms, number of nights, number of employees, floor area
Restaurants	Number of meals
Offices	Number of employees, floor area
Retail	Number of employees, floor area







# Modelling process - proposal



Modelling process is based on quick estimation of end-uses consumption that can be calculated from survey



Step 1. After identifying total energy consumption for energy purpose, use the seasonal/monthly data to conclude about specific end-use consumption



Step 2. Use expert estimates from respondents about the end-use consumption from the respondent



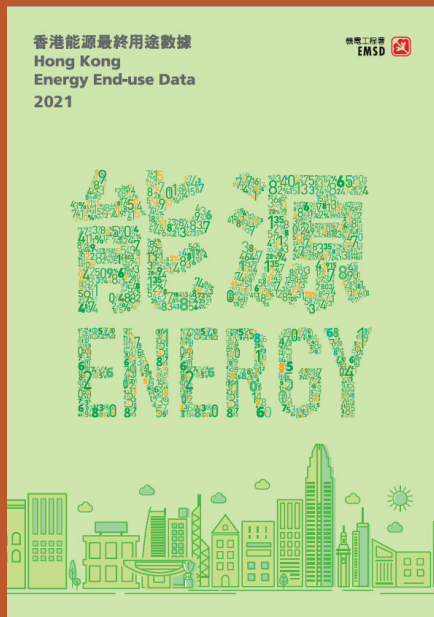
Step 3. Use technical specification of large equipment from survey and the way of its use and calculate end-use consumption.



Step 4. Aggregate all the end-use consumption and compare with energy balance



# Example of good practices: HONG KONG



表格 Table 41

## 醫療組別電力使用按最終用途劃分

## Electricity Consumption in Human Health Segment by End-use

單位 Unit : 太焦耳 Terajoule

	空氣調節 Air Conditioning	照明 Lighting	辦公室設備 Office Equipment	熱水及冷凍 Hot Water & Refrigeration	垂直運輸 Vertical Transport	其他 Others	總計 Total
2009	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-
2012	1,189	283	279	294	-	1,275	3,321
2013	1,178	284	280	295	-	1,280	3,317
2014	1,237	289	285	301	-	1,301	3,412
2015	1,261	297	292	305	-	1,335	3,489
2016	1,257	303	298	316	-	1,363	3,537
2017	1,289	307	302	318	240	1,143	3,600
2018	1,315	313	308	327	245	1,165	3,673
2019	1,348	321	316	336	251	1,195	3,768



Reports Table Chart



EEI SERVICES ⓘ

Other: PRODUCT/FLOW - Per floor area energy intensity (GJ/m2)

COUNTRY	Australia	Austria	Italy	Japan	Mexico	New Zealand
TIME	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓
2010	..	..	..	0.17	..	0.15
2011	..	..	..	0.17	..	0.14
2012	..	..	..	0.16	..	0.16
2013	..	..	..	0.15	..	0.15
2014	..	..	..	0.14	..	0.15
2015	..	..	..	0.12	..	0.15
2016	..	..	..	0.13	..	0.15
2017	..	..	..	0.14	..	0.14
2018	..	..	..	0.11	..	0.14
2019	..	..	..	0.11	..	0.15
2020	..	..	..	0.11	..	0.14

Item selection

Download Beyond 20/20 Browser

Useful links



Show table

EEI SERVICES ⓘ

Table size  
11 rows by 6 columns

COLUMNS:

COUNTRY

ROWS:

TIME

Other:

PRODUCT/FLOW

ENDUSE

Select range

- Services space heating
- Services space cooling
- Services lighting
- Other building energy use
- Non-building energy use
- Total Services
- Sewerage, waste and remediation [ISIC 37-39]
- Wholesale and retail [ISIC 46-47]
- Warehousing, support for transport, postal [ISIC 52-53]
- Accommodation and food [ISIC 55-56]
- Information and communication [ISIC 58-63]
- Finance, insurance, real estate, science, admin [ISIC 64-82]
- Public admin, excluding defence [ISIC 84]
- Education [ISIC 85]
- Health and social work [ISIC 86-88]
- Arts, entertainment and recreation [ISIC 90-93]
- Other services [ISIC 33, 45, 94-96]

# Exercise – Modeling end-use in a hospital

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## Available data in questionnaire:

- Floor area of building - 15.600 m<sup>2</sup>
- Natural gas is used for space heating and water heating
- Electricity is used for air conditioning, lighting, appliances and underground parking
- Respondent provided estimates of natural gas and electricity per end uses
- Available monthly data on electricity and natural gas consumption

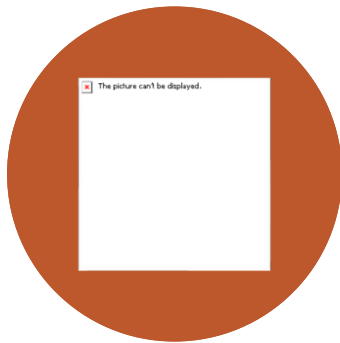
Task 1. Estimate end-use consumption using respondent's assumptions

Task 2. Compare estimated consumptions with seasonal character of consumption from Task 1.

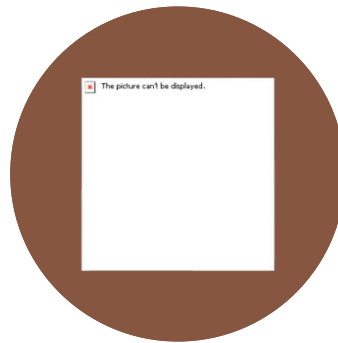
....and  
recommendations

# Content

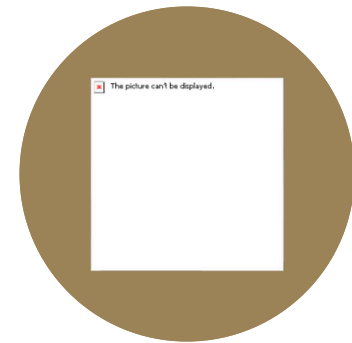
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LOREM IPSUM DOLOR SIT AMET,  
CONSECTETUER ADIPISCING ELIT.



NUNC VIVERRA IMPERDIET ENIM.  
FUSCE EST. VIVAMUS A TELLUS.



PELLENESQUE HABITANT MORBI  
TRISTIQUE SENECTUS ET NETUS.