UNDA project, on "Up-scaling Energy Efficiency in the residential and tertiary sectors in the Arab Region"

National Seminar on: "Launching of the baseline mapping study on the energy use in the building sector in Jordan",
5 March 2019 –Amman - Jordan

MINISTRY OF ENERGY AND MINERAL RESOURCES
THE HASHEMITE KINGDOM OF JORDAN

Economic And Social Commission For Western Asia

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Proposed UNDA baseline mapping study methodology for energy consumption in commercial buildings

Content

1. Main objectives of the baseline mapping study on energy use in commercial buildings
2. Methodology of data gathering and analysis for commercial buildings
3. Questions and topics to discuss

Main objectives of the baseline mapping study on energy use in commercial buildings

- **Estimation of the built stock of commercial buildings**
  - ✓ **Per category : shopping malls, outlet stores, etc.**
  - ✓ **Per climate and geographical areas**
  - ✓ **Per energy performance (where possible)**
- **Estimation of final Energy consumption**
  - ✓ **Per energy source**
  - ✓ **Per usage**
  - ✓ **Per climate zone**
- **Estimation of equipment rate**
  - ✓ **Per usage**
 - ✓ **per category**
  - ✓ **Per climate zone**

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Main objectives of the baseline mapping study on energy use in commercial buildings

- **Focus on some specific usages**
  - ✓ **Evolution of the equipment rate**
  - ✓ **Evolution of energy performance**
  - ✓ **Evolution of energy consumption linked to usage patterns (zooming on refrigeration and conservation)**

- **Elaboration of EE indicators**
  - ✓ **Per total final consumption**
  - ✓ **Per energy source**
  - ✓ **Per usage**
  - ✓ **Per category (where possible)**
  - ✓ **Per climate area**

- **Enable the elaboration of future scenarios for the stock of commercial buildings and estimate their EE potential**

Methodology of data gathering and analysis for commercial buildings

- **Distribution of Building stock per climate zone**
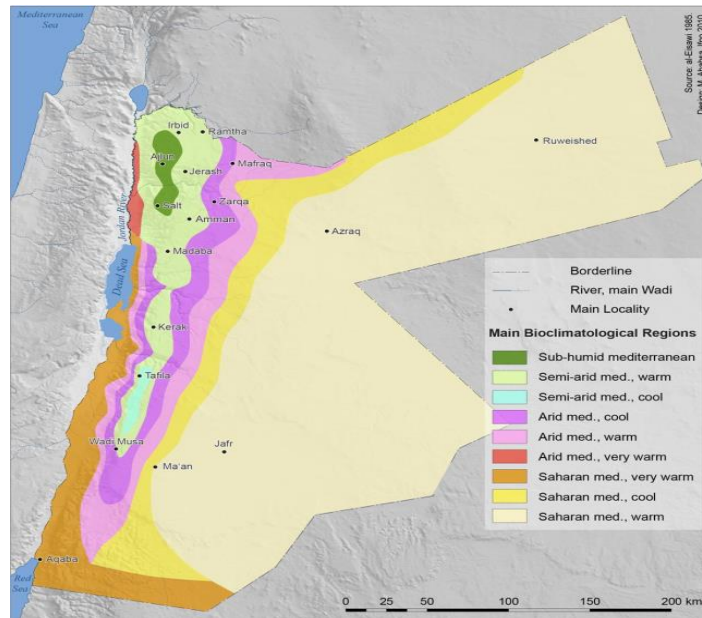
Climate characteristics of Jordan. Atlas of Jordan 2014.

- **More distribution factors**
  - ✓ Urban / rural
  - ✓ Shares of total heated areas
  - ✓ Shares of total air conditioned areas
  - ✓ Etc.

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Methodology of data gathering and analysis for commercial buildings

- **Available data sources from public institutions**

مجتمع القطاع التجاري لغاية تاريخ 2013/12/31

القطاع	عمان	الزرقاء	السلط	مأدبا	اربد	المفرق	جرش	عجلون	الكرك	الطفيلة	معان	العقبة	المجموع
المواد الغذائية	10110	3208	4269	900	4000	1920	450	636	1329	351	333	143	27649
الكهربائيات والالكترونيات	1433	346	20	58	353	76	45	42	48	13	10	46	2490
الالبسة والموضوعية والمجوهرات	5288	1562	76	300	1970	404	80	187	713	69	70	53	10772
الإنشاءات ومواد البناء	3647	804	214	95	822	803	55	265	541	199	88	104	7637
السيارات والآلات الثقيلة	2824	839	61	135	1137	380	30	134	240	52	74	82	5988
الأثاث المنزلي والمكتبي	3533	898	40	115	989	288	40	82	145	85	46	36	6297
الاتصالات وتكنولوجيا المعلومات	1990	484	15	55	485	185	30	83	191	23	37	19	3597
اخرى	7482	500	196	25	490	24	30	10	50	10	10	20	8847
المجموع	36307	8641	4891	1683	10246	4080	760	1439	3257	802	668	503	73277

*جميع البيانات مأخوذة من الغرف التجارية.

Survey – Ministry of Energy

Methodology of data gathering and analysis for commercial buildings

- **Available data sources from public institutions**

جدول رقم (20)

معدل الاستهلاك السنوي للقطاع التجاري من الانواع المختلفة من الطاقة حسب المحافظة

كهرباء دينار	غاز مسال اسطوانة كبيرة	غاز الممسال امسطوانة صغيرة	الكاز ليتر	الديزل ليتر	المحافظة
2346.25	0.01	3.06	4.57	657.29	عمان
1745.15	0.00	3.50	20.25	295.30	الزرقاء
1071.15	0.02	5.62	3.74	0.00	البلقاء
936.25	0.21	0.16	0.29	0.01	مأدبا
1462.35	0.01	2.51	0.47	2.41	اربد
836.09	0.01	30.78	0.00	0.18	المفرق
1539.88	0.00	8.95	2.43	11.08	جرش
777.86	0.00	8.76	14.76	0.00	عجلون
921.93	0.04	3.63	6.31	15.86	الكرك
822.05	0.00	1.79	28.55	105.07	الطفيلة
1667.59	0.00	6.15	111.35	27.61	معان
2194.53	0.11	1.16	0.00	0.00	العقبة
1743.43	0.02	4.57	8.48	313.64	المملكة

نوع الطاقة المستهلكة

Survey – Ministry of Energy

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Methodology of data gathering and analysis for commercial buildings

- **4 types of possible sources of information**
  - ✓ **Public sources data**
  - ✓ **Surveys**
  - ✓ **Measurement campaigns**
  - ✓ **Modeling**

  Combining sources is often needed for complete and balanced indicator sets

Statistical data of building stock	Data for GIS	Energy consumption
• Ministry of Energy • Department of Statistics • JNBC, MoPWH, MoMA	• JNBC • DoS, MoMA, • Google Map…..	• Ministry of Energy • NERC • RSS, JorGBC……

↓

Typology & Quantification Equipment / Buildings

Climate area distribution

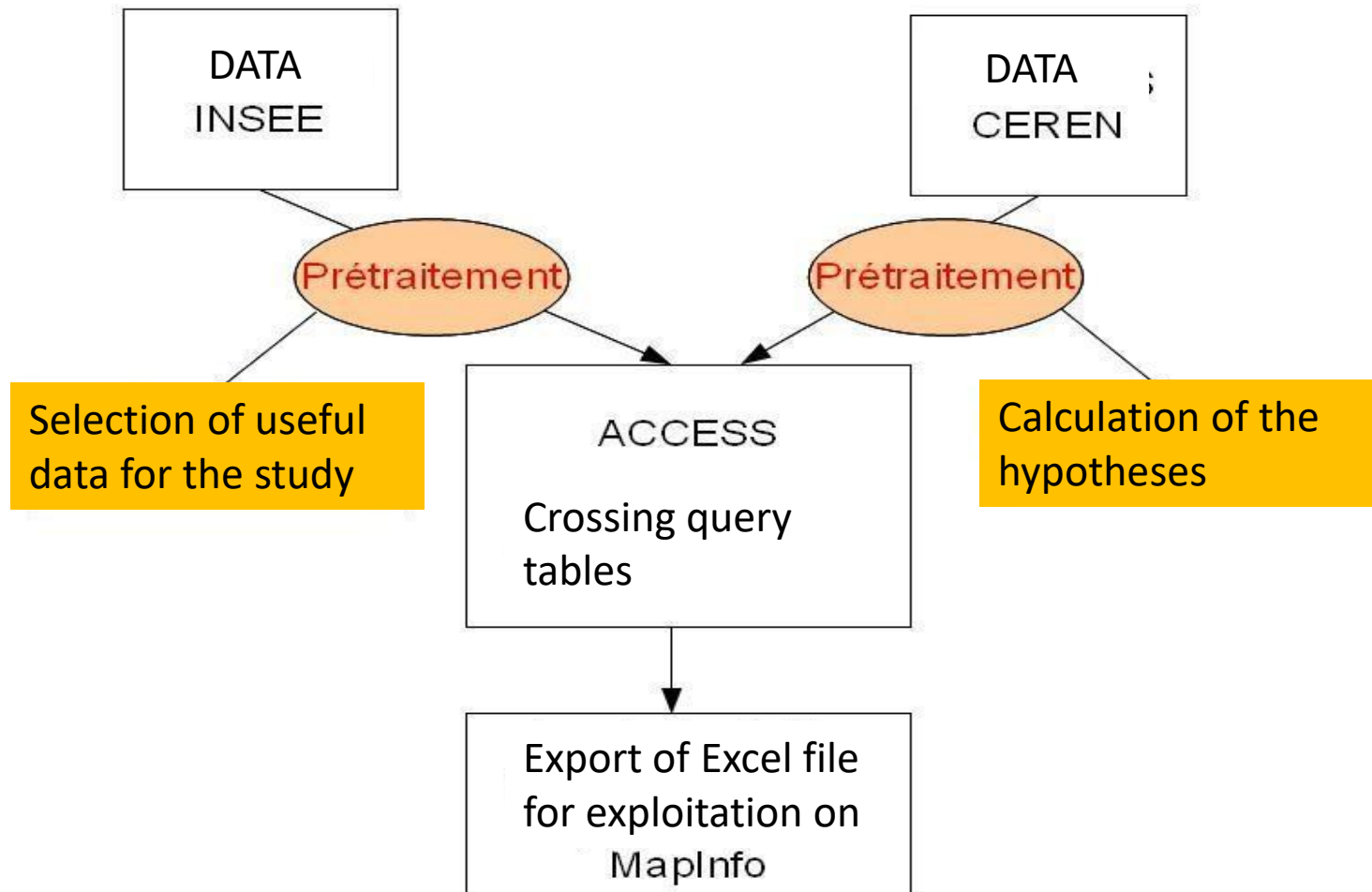**Characterization physical / energy**

Methodology of data gathering and analysis for commercial buildings

- **Available data sources from public institutions**

	National level	Regional level
Available data	▪ Final energy consumption in hypermarkets, etc. ▪ Final energy consumption per usage	▪ Final energy consumption in shopping malls per energy source ▪ Final energy consumption per usage
Sources	✓ STEG surveys ✓ Min. of Commerce, Chambers of Commerce ✓ Energy audits	✓ Data gathering from gas and electricity distributors
strengths	Reliable sources	Surveys
weaknesses	✓ Little data on characteristics of the buildings and equipments	✓ Small number of indicators ✓ No aggregation possible on supra levels
Timeliness	Access to data processed by the Ministry of energy , DoS, and other but no access to raw database	

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Methodology of data gathering and analysis for commercial buildings

- **Example of approach used in France**

DATA INSEE

DATA CEREN

Prétraitement

Prétraitement

Selection of useful data for the study

ACCESS

Crossing query tables

Calculation of the hypotheses

Export of Excel file for exploitation on MapInfo

Energy Consumption and their respective ratios for commercial buildings

Commercial space	Area covered m^2	Intensity consumption kWh/m^2	Overall Consumption in GWh/year	Overall Consumption in toe/an
Points of sales retail stores				
Hypermarkets				
Shopping Malls				
TOTAL				

Distribution of the stock of commercial buildings across the geographical and climate Zones

Total Commercial buildings stock (small stores excluded)	Total area in m2	Total electricity consump. in KWh	Total electricity consump. in toe	Total gas consump. in toe	Total primary energy consump. In toe	Total primary energy intensity in koe / m^2 /Year
Zone 1						
Zone 2						
….						
TOTAL						

Methodology of data gathering and analysis for commercial buildings

- **Highlight on the methodological aspects taken into account**
  - ✓ The right approach is needed from all actors for all to endorse the results.
  - ✓ The appraisal of information gathered through available sources (Ministry of Energy, DoS, Chamber of Commerce, Electricity utilities, NERC, RSS, JorGBC, etc.) and identifying the additional data needed
  - ✓ The methods to estimate the additional data needed (combination of top-down and bottom-up approaches)
    - ➢ Bottom-up : the use of micro data (energy consumption of a representative sample of shopping malls per category per climate zone) to reduce uncertainty
    - ➢ Top-down : Macro data (Country or region) using distribution factors (administrations, climate zones, categories., etc.)
  - ✓ Comparison of modeling results with metered data (gas/electricity consumption for a representative sample of shopping malls)
  - ✓ Data consistency checks with regional and national level statistics.

Main questions and points for discussion

- **What are the important energy usages to focus on ? (heating, cooling, lighting, others?)**

- **How can we estimate the penetration rate of high-performance equipment and its evolution ?**

- **How can we estimate the high thermal quality buildings rate and its evolution?**

- **What are the alternative sources of information to turn to for complementary data? (Other than Ministry of Energy, DoS, Chamber of Commerce, Electricity utilities, NERC, RSS, JorGBC, etc.).**

- **How to strengthen efforts of existing data producers : Ministry of Energy, DoS, Chamber of Commerce, Electricity utilities, NERC, RSS, JorGBC, etc.?**

- **How to establish an energy monitoring tool for the commercial building sector, in order to measure the impact of energy management in the country?**

- **Other points for discussion….**

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THANK YOU FOR YOUR ATTENTION

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