

# 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**

***Buildings energy issues, policy and institutional frameworks in Jordan***

Taskforce Meeting, 27 November 2019 –Amman, Jordan

# Topics covered in this presentation:

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## **1- Background and Energy related information:**

- 1.1: Overview of the building sector
- 1.2: Energy related challenges in the building sector for Jordan.
- 1.3: Energy pricing tariffs applied to end-users in the building sector.

## **2- Institutional frameworks and policies related information:**

- 2.1: Identification of the main actors and stakeholders in the residential and tertiary Sector
- 2.2: Policies, strategies and regulations in force in Jordan aiming to establish sustainable energy systems in the building sector.
- 2.3: Policies, strategies and regulations under development in Jordan aiming to establish sustainable energy systems in the building sector.
- 2.4: Assessment of the country's know-how and capabilities with respect to sustainable energy systems in the building sector

## **3- Existing instruments and programs:**

- 3.1: Existing instruments/potential tools for implementing sustainable energy programs in the building sector
- 3.2: Potential local financing tools for sustainable energy actions

## **4- Challenges:**

Challenges and obstacles that may hinder the development of sustainable energy in the building sector in Jordan

# 1- Background and Energy Related Information

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## 1.1: Overview of the building Sector:

- ❑ Population and Demographic dynamics>> increase expenditure of housing>> construction activities.<sup>(1), (2)</sup>
- ❑ Construction Sector= GDP, Employment, economy, contracts & implementation challenges <sup>(3)</sup>
- ❑ residential stock in Jordan is heating, which consumes ~61 percent of the residential stock's total energy and ~14 percent of total annual demand on national energy for heating spaces. <sup>(4)</sup>
- ❑ Building description, morphology and skyline>> both residential and non-Residential.
- ❑ Building Licenses, Existing Stock, <sup>(1), (2)</sup>
- ❑ Governorates of Jordan and Climate zones>> population density per governorate >> surveys conducted according to governorate and districts NOT Climate Zone= difficult to find detailed data according to location as part of climate zone. <sup>(2)</sup>
- ❑ No. of existing building stock, and their categorization are collected per year and sector, for governorates and districts.

*(1): GAM,*

*(2): DOS,*

*(3): Central Bank of Jordan, 2017,*

*(4): Younis, Taki & Bhattacharayya, 2017*

# 1- Background and Energy Related Information

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## 1.2: Energy related challenges in the building sector for Jordan:

- ❑ Non-renewable energy limitations <sup>(1)</sup>:
  - ✓ National Imported Energy= 92% 2018
- ❑ National Renewable energy potential:
  - ✓ Renewable energy resources <sup>(2)</sup> = 930 GWh 2016
    - Hydropower= 42 GWh= 4.50 %
    - Biomass= 6.5 GWh= 0.65 %
    - PV= 491 GWh= 52.80 %
    - Wind= 391 GWh= 42.00 %
  - ✓ National Renewable Energy Contribution= 0% in 2015>> 6% in 2017. <sup>(3)</sup>
  - ✓ Total Net-Metering Systems= 6566 units 2017. <sup>(4)</sup>

*(1): Innovative Jordan, 2019, (2): IEA, 2016, (3): USAID & Jordan Investment Commission, 2017, (4): EMRC, 2017*

# 1- Background and Energy Related Information

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## 1.2: Energy related challenges in the building sector for Jordan:

- ❑ National Primary energy and electricity demand <sup>(1)</sup>
  - ✓ Primary= oil (56.6 %), + natural gas (35.0 %), + solar energy (5.0%)
  - ✓ National Energy Consumption= transportation sector (49%), + residential sector (23%), + industrial (14%) + commercial (14 %).
- ❑ Building Envelope requirements <sup>(1)</sup>
  - ✓ Final Energy=      Residential=      21.5%      2018  
   Commercial=      15.5%      2018
  - ✓ Electricity=      Residential=      46.0%      2018  
   Commercial=      14.0%      2018
  - ✓ Thermal insulation studies <sup>(2)</sup>, Cooling and heating needs <sup>(3)</sup>, Heating Systems in residential sector <sup>(4)</sup>

*(1): MEMR, 2019,*

*(2): Al-hinti and Al-Sallami, 2017 ,*

*(3): Zarei and Zare, 2013,*

*(4): Jaber et al., 2008*

# 1- Background and Energy Related Information

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## 1.3: Energy pricing tariffs applied to end-users in the building sector:

### a): Countryside “rural fils” (1)

### b): Distribution Tariff: (2)

- |  |   |
|--|---|
| <input type="checkbox"/> Principal Consumers | <input type="checkbox"/> Telecommunication Sector |
| <input type="checkbox"/> TV and Broadcasting | <input type="checkbox"/> Industrial Sector        |
| <input type="checkbox"/> Household Tariff    | <input type="checkbox"/> Agriculture              |
| <input type="checkbox"/> Domestic Tariff     | <input type="checkbox"/> Water Pumping            |
| <input type="checkbox"/> Private Hospital    | <input type="checkbox"/> Hotels                   |
| <input type="checkbox"/> Commercial Sector   | <input type="checkbox"/> Streets Lighting         |
| <input type="checkbox"/> Banking Sector      | <input type="checkbox"/> Others                   |

### c): Tariff sale of Renewable Energy: (3)

### d): Fuel Price-difference Item (2)

### e): Fuel Prices for 2010, 2014 and 2017 (4)

(1): MEMR, 2011,

(2): EMRC, 2018,

(3): Energy & Electricity Law, 2012,

(4): MEMR, 2018

## 2- Institutional frameworks & policies related information:

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### 2.1: Identification of the main actors and stakeholders in the residential and tertiary Sector:

#### a): Public Sector Actors: <sup>(1)</sup>

- Ministry of Energy and Mineral Resources (MEMR)
- Energy and Mineral Regulation Commission (EMRC):
- Ministry of Public Works and Housing (MPWH)
- Ministry of Environment
- Jordan National Building Council (JNBC)
- The Department of Statistics (DoS)
- Jordan Standards and Metrology Organization (JSMO)
- The National Energy Research Center (NERC)

#### b): Private Sector Actors: <sup>(2)</sup>

- Jordan Engineers Association (JEA), AND Jordanian Contractors Association (JCA)
- Jordan Green Building Council (JGBC)
- Electricity Distribution System Operators (EDSO)
- The Regional Center for Renewable Energy and Energy Efficiency (RCREEE)
- Royal Scientific Society (RSS)/ Construction & Sustainable Building Center (CSBC)
- Greater Amman Municipality, (GAM)/ Sustainable Unit
- Others.

*(1): MEMR, EMRC, MPWH, JNBC, DOS, JSMO, NERC,*

*(2): JEA, JCA, JGBC, EDSO, RCREEE, RSS, CSBC, GAM*

## 2- Institutional frameworks & policies related information:

### 2.1: Identification of the main actors and stakeholders in the residential and tertiary Sector:

Table 13: Summary of Stakeholders and their respective role.

Stakeholders	Regulations	Administration	Enforcement	Outreach	Technical
MEMR + EMRC	Provides energy efficiency targets				Participated in the Green Building Guidelines + EE Codes
MPWH + JNBC	Develop Building Codes	Construction permits and approval	Sustainable Unit		Hosts the Technical Committee that oversaw the Green Building Guidelines+ EE Codes
GAM		Construction permits and approval	Sustainable Unit		
JGBC				Awareness and policy advocacy	
JEA		Certifies engineering plans & Designs		outreach to engineering offices/ training	Participated in the Green Building Guidelines + EE Codes
JCA				Organizes work of contractors for building	
RSS + CSBC	Develop Code/ under the umbrella of JNBC				Participated in the Green Building Guidelines + EE Codes
JSMO	Exempts customs fees & duties on imported products	Develops standards: building materials+ energy+ water saving devices (local & imported)			Participated in the Green Building Guidelines + EE Codes

(1): MEMR, EMRC, MPWH, JNBC, JSMO, (2): JEA, JCA, JGBC, RSS, CSBC, GAM



## 2- Institutional frameworks & policies related information:

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### 2.2: Policies, strategies and regulations in force in Jordan aiming to establish sustainable energy systems in the building Sector:

- a): National Energy Strategy <sup>(1), (2)</sup>
- b): National Strategy for the Development of Renewable Resources <sup>(3), (4)</sup>
- c): National Master Strategy of Energy Sector <sup>(1)</sup>
- d): National Energy Efficiency Action Plan (NEEAP) <sup>(4)</sup>
- e): National Energy Efficiency strategy <sup>(1), (5),</sup>
- f): Jordanian National Building Law No. 7, Instructions of Code application, <sup>(6),</sup>
- h): The Renewable Energy & Energy Efficiency Law of 2012 (REEL), <sup>(4), (7)</sup>
- i): Bylaw No. (73) Year 2012 on Regulating Procedures and Means of Conserving Energy and Improving Its Efficiency, <sup>(1),</sup>
- j): General Electricity Law, <sup>(8),</sup>

*(1):MEMR, 2017 (2):(USAID & JIC, 2017 (3):Komendantova et al., 2017 (4):JREEEF, 2017 (5):RCREEE, 2012, (6):MPWH, 2018 (7):NEPCO, (8):EMRC*

## 2- Institutional frameworks & policies related information:

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### 2.2: Policies, strategies and regulations in force in Jordan aiming to establish sustainable energy systems in the building Sector:

#### k): Jordanian Building Codes & Guides <sup>(1), (2)</sup>, Annex D

- ✓ Thermal Insulation Code 2009
- ✓ Mechanical Ventilation & AC Code 2018
- ✓ Central Heating Code 2018
- ✓ Natural Ventilation Code 2018
- ✓ Natural Lighting Code 2018
- ✓ Solar Energy Code 2012
- ✓ Energy Efficient Building Code 2010, >>> 2019.
- ✓ Jordan Green Building Guide 2013
- ✓ Thermal Insulation Code Manual 2018
- ✓ Central Heating Code Manual 2018
- ✓ Mechanical Ventilation & AC Code Manual 2018
- ✓ Solar Energy Code Manual, >>> 2019
- ✓ Energy Efficient Building Code Manual, >>> 2019

*(1):MPWH, 2018*

*(2): RSS, CSBC, 2018*

## 2- Institutional frameworks & policies related information:

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### 2.3: Policies, strategies and regulations *under development* in Jordan aiming to establish sustainable energy systems in the building sector:

- a): Sustainable Energy Mix and Policy Framework for Jordan <sup>(1)</sup>
- b): Codes application and implementation <sup>(2)</sup> >> Sustainable Unit
- c): Forecasts and future assumptions <sup>(3)</sup>

### 2.4: Assessment of the country's know-how and capabilities with respect to sustainable energy systems in the building sector

- a): Jordanian Engineers Association (JEA) + Engineers Training Center <sup>(4)</sup>
- b): Professional certification>> PA-CEMP>> JEA, REEEII, JREEEF, MEMR, RCREEE
- c): Upgrading Capacity of Local designers & Consultants>> A/E Business Council+ Green Unit
- d): Pilot Projects>> JGBC <sup>(5)</sup> + <sup>(6)</sup>
- e): Capacity building programs
  - The Master on Sustainable Development and Renewable Energy <sup>(7)</sup>
  - Affordable Green Housing Program <sup>(8)</sup>

*(1):Saidan,2011, (2):JNBC,GAM,2019, (3):MEMR,JREEEF,2017, (4):JEA,2018, (5):JGBC,2018, (6):Mujally,2017 (7):MANSOUR,2017 (8):Visser,2018*

## 3- Existing instruments and programs

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### 3.1: Existing instruments/ potential tools for implementing sustainable energy programs in the building sector:

#### a): Governmental Green building Incentives: <sup>(1), (2)</sup>

- GAM>> FAR
- Incentives are only given to a whole green building system, not only the energy efficiency compliance

#### b): Projects through the MEMR: <sup>(3)</sup>

- install renewable energy schemes in 20 schools
- Buildings implemented by the Higher Council for Science & Technology HCST to adopt EE.
- Solar Thermal Systems and PV applications in Al Basheer and three government hospitals
- Convert the Islamic Hospital into a green building using renewable energy schemes to generate electricity from solar PV system and energy wheeling regulations
- Finance 12 national institutions with JD2 million to install solar power systems to support their humanitarian, social and medical services to citizens
- Others.

*(1): GAM, 2015*

*(2): MPWH, 2013*

*(3): MEMR, 2018*

## 3- Existing instruments and programs

### 3.1: Existing instruments/ potential tools for implementing sustainable energy programs in the building sector:

#### c): The Second National Energy Efficiency Action Plan: <sup>(1), (2)</sup>, Residential

Table 16: Summary of EE measures in residential sector 2017-2020, NEEAP 2014.

No	Measures	Description	Period	Electricity saving (GWh)	Program Cost (MJD)	Bill saving for users (MJD)
1	Replacement incandescent lamps with LED for low and medium households income classes (<600 kWh/month)	1 million LED targeting 250000 consumers	2017-2020	155	10	12
2	Enforcement of Energy Label and standards program for 4 home appliances	Air conditioning, Refrigerators, Freezers, Washing machines	2017-2020	400	NA	21
3	EE building codes enforcement in residential sector (just insulation)	About 66000 new households during the next 5 years.	2017-2020	401	259	75
4	Program for roof insulation of existing building in residential sector	15000 houses with around 2 million m <sup>2</sup> of roof	2017-2020	41	32	7
	<b>Total</b>			<b>998</b>	<b>301</b>	<b>116</b>

(1): MEMR, 2014

(2): JREEEF, 2017

## 3- Existing instruments and programs

### 3.1: Existing instruments/ potential tools for implementing sustainable energy programs in the building sector:

#### d): The Second National Energy Efficiency Action Plan: <sup>(1), (2)</sup>, Commercial & Services

Table 17: Summary of EE measures in commercial and Services sector 2017-2020, NEEAP 2014

No	Measures	Description	Period	Electricity saving (GWh)	Program Cost (MJD)	Bill saving for users (MJD)
1	Jordan public building energy efficiency program	Government program of public building retrofitting	2015-2017	36	12	7
2	Replacement of Fluorescent Tubes in public buildings	80,000 of 10-watt Tube- LED Lamps	2017-2020	2	1	1
3	Energy efficiency in health centers	300 to 400 small and medium hospitals in all Jordan.	2017-2020	12	5	2
4	Replacement of Fluorescent Tubes in commercial buildings by LEDs	Replacement of 250.000 units of Fluorescent Tubes 4x18 watt with LED 60 cm Tubes.	2017-2020	66	15	10
5	Energy efficiency in existing small and medium hotels	100 to 120 small and medium hotels in all Jordan.	2017-2020	11	5	2
6	EE building codes enforcement in tertiary sector (Just insulation)	About 5700 new units during the next 5 years.	2017-2020	249	95	19
	<b>Total</b>			<b>376</b>	<b>133</b>	<b>41</b>

(1): MEMR, 2014

(2): JREEEF, 2017

## 3- Existing instruments and programs

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### 3.1: Existing instruments/ potential tools for implementing sustainable energy programs in the building sector:

- a): The Affordable Green Housing (GAH) Program <sup>(1), (2)</sup>
- b): The Energy Efficiency in Public Buildings (EEPB) Project <sup>(3),</sup>
- c): The Accelerating 0-emission building sector ambitions in the MENA region Project <sup>(4)</sup>
- d): Projects through collaboration with Regional and International agencies:  
*USAID+ REEE I + REEE II + RCREEE + MINARET+ CES-MED + WBG*

### 3.2: Potential local financing tools for sustainable energy actions:

#### a): General:

- Concessionary lending from development banks <sup>(5)</sup>
- Donor aid grants. <sup>(5)</sup>
- MEMR>> Expression of Interest (unsolicited proposals) framework+ international collaborations. <sup>(6)</sup>

#### b): Tax Exemption for EE and RE systems <sup>(7), Annex B</sup>

*(1): JGBC,2018 (2): HFHJ,2018 (3):MPWH,2018 (4):NERC,2017 (5):Ministry of Environment, 2017 (6):Greenpeace International, 2013 (7): JSMO*

## 3- Existing instruments and programs

### 3.2: Potential local financing tools for sustainable energy actions:

#### c): Jordan Renewable Energy and Energy Efficiency Fund (JREEEF):

Table 18: Summary of JREEEF Plan (2016-2020).|

Target Market	Households	SMEs	Tourism	Hospitals	Public Buildings
<b>Major Focus</b>	Low income households	All SMEs	Small and medium hotels	Small and medium hospitals	Public buildings and facilities not covered by KfW
<b>Basic Strategy</b>	Financial and technical support for PV, SWH and EE lighting projects	Financial/technical support and awareness and communication to install PV, SWH, EE lighting and other EE measures.	Financial/technical support and awareness and communication to install PV, SWH, EE lighting and other EE measures.	Financial/technical support and awareness and communication to install PV, SWH, EE lighting and other EE measures.	Financial/technical support and awareness and communication to install PV, SWH, EE lighting and other EE measures.
<b>Partners and Intermediaries</b>	NGOs, CBOs, Utilities, microfinance organizations, social associations	Commercial banks, microfinance institutions, existing loan guarantee programs	Banks, microfinance institutions, NGOs, utilities, existing loan guarantee programs	Banks, microfinance institutions, NGOs, utilities	Banks, NGOs, utilities
<b>Financial &amp; Technical Support</b>	Grants, revolving credits, guarantees and TA	Grants, revolving credits, and TA	Grants, revolving credits, guarantees and TA	Grants, revolving credits, guarantees and TA	Grants, revolving credits, guarantees and TA
<b>Initial Projects</b>	PV Project - Al Ghour Region; SWH project; and EE lighting project	Interest subsidy program in cooperation with JLGf and one bank	In 2015, market assessment and program design	In 2015, market assessment and program design	In 2015, market assessment and program design for agencies not addressed by kfw
<b>Future Projects</b>	Expansion of PV, SWH and EE lighting projects; LED bulb project in refugee areas	Expansion of program with many banks	2016-2018 - one or more programs for small/medium hotels	2016-2018 - one or more programs for small/medium hospitals	2016-2018 - one or more programs for public agencies
<b>Potential CoFinancing</b>	European Union; Canadian DFATD, MoPIC	Commercial banks	Commercial banks	KfW public buildings program; commercial banks	KfW public buildings program; commercial banks
<b>Goals</b>	15,000 PV systems; 50,000 SWH; 150,000 LED tubes and 51,000 LED bulbs	Cumulative SME RE/EE investment of 10 million JD	Cumulative SME RE/EE investment of 5 million JD	Cumulative SME RE/EE investment of 5 million JD	Cumulative SME RE/EE investment of 3 million JD



## 4- Challenges

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### Challenges and obstacles that may hinder the development of sustainable energy in the building sector in Jordan

- Lack of awareness in regulations, laws, application requirements for EE.
- Electricity/transport infrastructure deficiencies.
- Inadequate legislation and enforcement that enables green growth, lack of proper inspection mechanisms.
- Short termism in planning
- Overlap of ministry's responsibilities & lack of coordination between ministries towards common goals
- Perceived and actual strain placed by refugees on economy
- Lack of capacity, technical skills & data required to design & implement green growth projects
- Lack of adequate financing mechanisms to incentivize the private sector to initiate green growth.
- Lack of funding perceived as key barrier by ministries
- Low public trust in governmental commitment to strategies
- Lack of knowledge transfer and communication between the public and private sector
- Lack of smart systems: recording and reporting of data (by sector)= electronic government.

(1): Saidan, 2011

(2): World Bank, 2012

# Conclusions and Remarks:

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- Develop client knowledge and product information services through credible professional sources like the Ministries of Public Works and Housing, Energy and Environment, Jordan Green Building Council and Jordan Engineering Association.
- Provide proper incentive and funding schemes and build a system of incentives for contractors to ensure the cost-effectiveness of green buildings
- Strengthening of governmental incentives through subsidy, rebate program, tax incentive schemes, rating systems and technical assistance.
- Develop proper EE benchmarks for Jordan.
- Activate Monitoring Reporting Systems (MRV) with the MEMR

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