Stakeholder Report: Jordan

IKI Project: Accelerating 0-emission building sector ambitions in the MENA region (BUILD_ME)

Prepared on behalf of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety under the International Climate Initiative

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This report summarises the results stakeholder interviews and roundtables conducted during the first phase of this project from 2016 to 2018. Any developments after this date are not reflected in this report. Also, some of the results presented in this report reflect the views of individuals interviewed in the course of the project and may therefore not reflect the position of Navigant, it's partners or the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.

[1] On October 11, 2019, Guidehouse LLP completed its previously announced acquisition of Navigant Consulting Inc. In the months ahead, we will be working to integrate the Guidehouse and Navigant businesses. In furtherance of that effort, we recently renamed Navigant Consulting Inc. as Guidehouse Inc.

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OVERVIEW

Context: NERC and Navigant, project partners within the IKI Project Accelerating 0-emission building sector ambitions in the MENA region have conducted numerous interviews and organized stakeholder roundtables to assess drivers and barriers for efficient heating and cooling in residential buildings in Jordan. A similar approach was used in Lebanon and Egypt, for which stakeholder reports are also available.

Aim: The aim of the interviews and interaction with stakeholders at roundtables was to

- Assess barriers for the uptake of efficient and/or renewable energy-based cooling and heating technologies in residential buildings;
- Evaluate what role different stakeholder groups play in the decision process;
- Collect recommendations on how the financial and regulatory framework should be changed to make it easier for homeowners and developers to choose efficient heating and cooling appliances rather than conventional ones.

Measures to unlock energy efficiency potential in new residential buildings in Jordan

This report presents policy recommendations to unlock the potential of accelerating energy efficiency in new residential buildings in Jordan. The recommendations are based on interviews with key stakeholders and roundtable workshops carried out in Jordan in 2017 and 2018 allowing all key stakeholder groups to provide inputs.

Project Developers

i. Mandatory examination of the knowledge of all mechanical, architects and civil engineers regarding the Jordanian energy efficiency building codes.
ii. Progressively turn the currently used national building rating system related to energy savings from guidelines to national mandatory rating systems for all new buildings
iii. Digitalize the permitting process to ensure code compliance at the design stage.
iv. Empower municipalities with a technical workforce capable to inspect buildings in the construction phase and enforce penalties for non-compliance to the energy efficiency building code.

Banks

i. Raise awareness among bankers and loan applicants on the social, economic and environmental benefits of energy efficient and renewable energy solutions in the building sector and the JREEEF application process.
ii. Offer training and capacity building to support credit officers in understanding the impact of low interest loans on business opportunities in energy efficiency, with a focus on efficient heating and cooling technologies.

Public Authorities

i. Review and simplify the building codes and energy efficiency codes.
ii. Raise the awareness of the municipalities outside of Amman regarding the existing energy efficiency incentives in the Jordan Green Building Guide and introduce policies that enables municipalities to offer incentives for energy efficient buildings beyond the floor to area ratio
iii. Review the technical workforce capability of municipalities to ensure the compliance of rooftop t solar water heaters (SWH) and solar PV with respect to the Jordanian Solar Code.
iv. Set clear obligations for utilities to reduce energy demand of consumers.

Suppliers

i. Provide financial incentives to the importers and manufacturers of thermal insulation and double-glazed windows.
ii. Introduce solar air collectors for space heating and encourage suppliers to import them.
iii. Incentivize suppliers to import reflective film for windows to reduce the cooling load.

1 PROJECT BACKGROUND

The MENA region is characterized by three important energy challenges, to which energy efficiency in buildings can be an important part of a response

- Insufficient or inefficient electricity generation capacities lagging demand growth due to a growing population and lack of adequate forecasting and planning by governments;
- High dependence on energy imports weighing heavily on public budgets and resulting in economies exposed to the price volatility of fossil fuels;
- High emission factor of electricity production despite considerable renewable resource potential.

In light of the Paris Agreement and in response to these trends, the International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has decided to finance the two-year project “Accelerating 0-emission building sector ambitions in the MENA region”. The project focuses on improving the energy efficiency of buildings through the uptake of highly energy efficient and/or renewable-energy based heating and cooling systems in new multi-family residential buildings.

In the first phase of the project, three target countries out of six were selected for the implementation of project-specific measures. A macroeconomic base analysis served as a foundation for the selection of the target countries Lebanon, Jordan and Egypt. The macroeconomic analysis examined the most relevant parameters pertaining to the economic and legal framework in these countries, as well as other aspects influencing the implementation of energy efficiency measures in the building sector. The target countries were those in which the framework conditions promise the greatest possible success for the implementation of the project objectives.

Phase II of the project focused on the implementation of project activities in the target countries by: providing support for the implementation of pilot projects, and facilitating a policy dialogue for improving energy efficiency policies and accelerating the uptake of energy efficiency measures in the building sector.

The present report summarizes findings for key stakeholder groups and lay down policy recommendations for accelerating energy efficiency in buildings in Jordan. These recommendations have been derived from a round of 106 interviews with key stakeholders, 300 individual surveys with local residents and two round table workshops conducted in Jordan with relevant stakeholders from the following groups:

- Project developers, including architects and engineers
- Banks, including national funds
- Ministries, including national research centres and Municipalities
- Utilities, including grid operators
- Technology suppliers

2 THE ROLE OF ENERGY EFFICIENCY IN BUILDINGS IN JORDAN

2.1 State of the electricity sector

Jordan has succeeded in building up an energy system that offers a stable electricity supply to its consumers. However, given the lack of domestic fossil fuel resources, its energy supply is highly dependent on imports from other countries (>97%). As the government has been subsidizing energy prices to ensure affordable energy prices to Jordanians, its budget has been exposed to the volatility of international fossil fuel markets. In the event of the interruption of gas supply from Egypt and Syria in 2011 during the Arab Spring, the cost of producing electricity in Jordan has increased significantly, switching from natural gas to diesel oil. In 2014, at oil price peak, the government spent 17 % of the GDP of Jordan of its budget to cover the losses of the National Electricity Power Company (NEPCO), which accumulated to JOD 4.6 billion (€ 5 Billion in 2014 equivalent) . Assuming that NEPCO was a profitable utility before 2011, the average government budget amount spent to subsidize electricity in Jordan every year between 2011 and 2014 was equal to JOD 1.2 billion (approximately EUR 1.3 billion in 2014 equivalent). The increase in budget spending on NEPCO losses resulted in significant, sometimes two-digit, increases of electricity prices for consumers, which are however still not cost reflective.

In light of these disruptions and unsustainable path forward, the government has eliminated all subsidies for oil products, adopted its first national energy efficiency action plan and formulated minimum energy performance standards for household appliances, which are promising steps to tap into the potential of energy efficiency in the residential sector.

2.2 Energy efficiency in residential buildings – an untapped potential

The residential sector consumes 45% of the electricity generated in Jordan . With the potential of energy efficient buildings to reduce energy consumption by 30% compared to the status quo in Jordan , JOD 160 million per year could be saved if a nation-wide residential building retrofit strategy was implemented . International experience shows that the first step for a successful retrofit strategy is to focus on accelerating energy efficiency in new residential buildings. Given Jordan's new construction rate of 2.6% per year, tackling energy efficiency in new residential building construction can potentially save the government JOD 4 million per year .

3 STAKEHOLDER: PROJECT DEVELOPERS

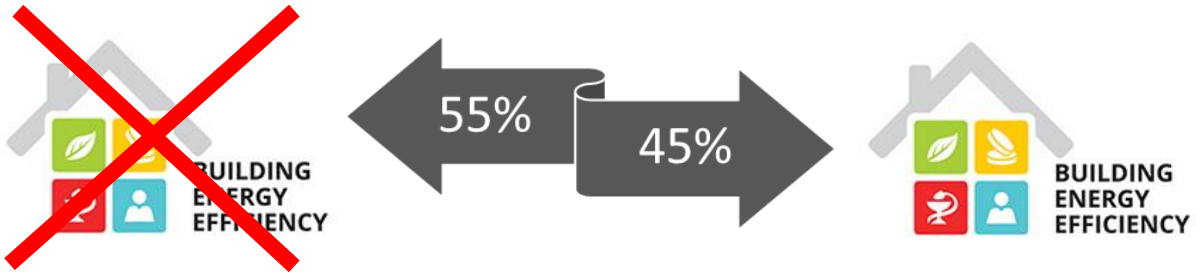
3.1 Context: Whom did we interview?

Seventeen project developers, including contractors, engineers and architects were interviewed by NERC in Jordan to gather their views on the drivers and barriers to accelerate energy efficiency in the building sector.

3.2 Status quo: The role of project developers in the decision-making process for energy efficiency

Our interviews showed that energy efficiency measures in the building sector in Jordan are moving forward,but have not yet passed the business as usual approach. The majority of project developers interviewed do not consider energy efficiency in heating and cooling plays a role in the design and construction of new residential buildings , as illustrated in figure 1.

Figure 1: Share of project developers opting for energy efficient designs in their residential projects (n=17)



There exists a correlation between the income class of customers and the decision of project developers to consider energy efficient heating and cooling technologies. Project developers with a major share of high-income clients were considering energy efficiency whereas other project developers with major share of low-income clients were not considering energy efficient measures.

3.3 Policy recommendations: How to accelerate ambitions for energy efficiency of heating and cooling in new residential buildings?

I. Mandatory examination of the knowledge of all mechanical, architects and civil engineers regarding the Jordanian energy efficiency building codes and introduction of the Junior Engineer Program

Rationale: Engineering offices are often not putting in practice the energy efficiency-related provisions of building codes because of a lack of knowledge and training. In Jordan, there are several different codes that are focusing on energy efficiency in buildings and for renewable energy. Some project developers admitted that they lack knowledge in, for example, conducting a load analysis for the heating and cooling demand of the building and thus, just follow business as usual approaches and their experience to select technologies.

Implementation: The Jordan Engineers Association (JEA) has the responsibility and mandate to design, organize and complete the examination. JEA will be responsible to offer trainings to engineers. The test shall be designed in different sections targeting different

sectors in the design, construction and inspection of new residential buildings. Civil, electrical and mechanical engineers who work in contracting companies shall apply for a test tailored to the design phase of energy efficiency measures, whereas engineers who work in municipalities shall apply for a test tailored to the inspection of energy efficiency measures during construction phase. As a next step, we propose to implement a new program at the JEA to continue bridging the gap between the theoretical building codes and their application in practice. This program will be called the " Junior Engineer program" and will be a key step on the road to becoming a professional engineer. Fresh university graduate will work as junior engineers under the immediate supervision and direction of an experienced engineer for a training period that can last up to 36 months. By the end of their training, junior engineers will have to successfully pass a professional examination and will be expected to to take full professional responsibility, manage technical risk and solve problems using best professional practices.

Impact: Examining the knowledge of engineers and introducing the Junior Engineer Program will solve the missing link between the Energy Efficiency Building code and the application of the code and provide a boost for energy efficiency to surpass the business as usual approach in the building sector.

II. Progressively turn the currently used national building rating system for energy savings from being a guideline to national mandatory rating systems for all new buildings

Rationale: Because of the lack of a transparent national database on the building energy performance, there exists currently no agreed baseline across stakeholders on a business-as-usual-scenario for heating and cooling technologies. Because of this lack of baseline, some stakeholders prefer to keep the Jordan Green Building Guide rating system as a guideline rather to implement it as a mandatory requirement.

Implementation: Develop a buildings baseline and train government officials to update the baseline to benchmark the building energy performance for different geographies and type of buildings. An Energy Use Index should be developed to determine the minimum acceptable energy performance of each building type in the different climate zones in Jordan. Enforcement of the law could start with the new buildings in the public sector and then private sector. Energy Performance Certificates of public buildings should be displayed at the entrance of the building to raise awareness on the economic, social and environmental benefits to citizens. To lower cost of implementation on the side of the government and on the side of the project developer of this policy, it is advised to develop a uniform standard and simple engineering tool that calculates the energy performance of the building and can evaluate the impact of implementing different energy measures on the performance of the building is advised. An example of such tool can be excel based following standard EN13790.

Impact: Establishing a baseline rating system to classify the energy performance of public and residential buildings will contribute to raising awareness and increase market demand of energy efficient buildings, transparency for buyers and clarity on the minimal requirements and efficient options for new construction.

III. Digitalize the permitting process to ensure code compliance at the design stage

Rationale: There is a considerable lack of capacity among municipalities' inspectors to inspect the conformity of 4000 to 7000 new buildings per year with respect to the Jordanian energy efficiency codes. To frame the picture in a concrete example, 100 engineers are currently employed at the Order of engineers to inspect conformity with 45 building codes whereas 200

engineers are employed at the Civil Defence Department to inspect the conformity with respect to 5 civil defence codes. In addition, bureaucratic procedures slow down the building permitting process and increase cost on the side of project developers. Digitalizing the process of checking compliance with the energy efficiency building code, the process of assessment for compliance with this code and enforcement needs to be as transparent and clear as possible. Thus the need to digitalize the process to facilitate adequate enforcement.

Implementation: Computerize the building design review and permitting process by implementing new software with online applications and machine verification processes at JEA in coordination with municipalities.

Impact: Decrease administrative burden in applying for energy efficiency measures, improve enforcement of the Jordanian building code and reduce wait times for new construction.

IV. Empower municipalities through a technical workforce capable to inspect buildings in the construction phase and enforce penalties for non-compliance to the energy efficiency building code

Rationale: Missing compliance for the implementation of building code provisions. Municipalities' inspectors lack the engineering knowledge and tools to inspect the compliance of innovative energy efficient solutions with the building code.

Implementation: Training courses should be offered to municipalities, following the example of GAM. Municipalities should use their authority to set penalties for non-compliance with training requirements on the one hand and with code provisions on the other hand. A second Jordanian National Energy Efficiency Action Plan (2017 – 2020) was launched in April 2018 by MEMR in order to implement several energy conservation measures such as the enforcement of using thermal insulation for new households. The proposed measures would hence be in line with the requirements of the NEEAP-

Impact: Inspectors are trained and qualified to ensure proper implementation of energy efficiency measures to achieve energy savings.

4 STAKEHOLDER: BANKS

1.1 Context: Whom did we interview?

Fifteen representatives from financial institutions were interviewed, including commercial banks and the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF). The commercial banks interviewed are the largest banks in the country.

4.1 Status quo: Are you offering low interest loans to energy efficient projects? If yes, what triggered you to do so and how is your experience when it comes to lending money for energy efficiency measures?

Our interviews showed that the majority of commercial banks (>80%) are providing financial support for energy efficiency and renewable energy projects and services. Most of these banks that support EE projects have started this support in 2016 as a result of the establishment of Jordan Renewable Energy & Energy Efficiency Fund (JREEEF).

The support is offered in the form of a subsidized soft loans only. Investment grants are not offered. The funding program includes financing households to install solar water heaters with an upfront cost of 50% of the capital cost. Also financing solar PV systems with an upfront cost of up to 2,250 JD for up to 3 kWp. Furthermore, the bank will finance SMEs to install a solar PV system with an upfront cost up to JD 350,000. Banks have had a positive experience offering loans to ESCOs as they are repaying their debt from the savings of their clients through benefit sharing model.

In deciding to lend money for energy efficient or renewable energy projects, banks consider the most bankable energy efficient technology to be LED, followed by PV systems and last solar water heaters. A small portion of banks are confident to lend money for projects implementing passive energy efficiency measures (. Few of the interviewed banks are not offering energy efficient loans because it is not within their current strategy.

4.2 Policy recommendations: How to accelerate ambitions for energy efficiency of heating and cooling in new residential buildings?

I. Raise awareness of the end user (and hence loan applicant) on the social, economic and environmental benefits of energy efficient and renewable energy solutions in the building sector and the JREEEF application process

Rationale: Lack of awareness on the added benefits for the country for every kWh saved or produced with renewable power compared to business as usual and how reduction in energy subsidies will translate in improved public services. Lack of awareness on the impacts of climate change in Jordan for future generations.
Implementation: To be most effective in changing traditional conceptions of appropriate heating and cooling technologies, a campaign should target schools and introduce curriculum on impacts of climate change and mitigation measures. The message should clearly highlight the role of citizens in mitigating climate change by investing today in energy efficient and renewable solutions for residential buildings. The government should lead a nation-wide campaign to increase market demand for JREEEF support to loan applicants. Energy performance certificates could further increase awareness about energy efficiency in new and existing buildings.
Impact: Increasing awareness of the end-user, driving increased applications for JREEF support for loans and funds, which in turn pushes project developers to apply energy efficient solutions.

II. Offer training and capacity-building to support loan officers in understanding the impact of low interest loans on business opportunities in energy efficiency, with a focus on efficient heating and cooling technologies

Rationale: Because of the non-conventionality of the cash flows of an energy efficient asset, loan officers sometimes feel unsure about how to value energy efficient solutions and consider their applications similar to normal consumable goods, instead of depreciable assets.

Implementation: Training bankers in understanding the impact of bank loans on the value of energy efficiency measures and how to categorize these from least to highest impact with respect to financial indicators. An analysis tool can be distributed for bankers for this purpose to allow them to tailor financial products to energy efficient products.

Impact: Providing training will improve the ability of bankers to turn energy efficiency lending into innovative banking products, reducing lending risks and opening new market segments.

5 STAKEHOLDER: PUBLIC AUTHORITIES

5.1 Context: Whom did we interview?

Twenty-four representatives of the public sector were interviewed, spanning from municipalities to research institutes and ministries. These interviews focused on the institutions with greatest immediate relevance to the project such as the Ministry of Energy and Mineral Resources and the Ministry of Public Works and Housing, the Building Research Center and municipalities, which represent the local authorities that seek to implement and oversee building codes for buildings such as Greater Amman Municipality. These entities were considered as the most relevant in the public sector as they deal directly with energy related issues and will have an impact on energy efficiency in residential buildings.

5.2 Status quo: Does your authority consider setting energy efficiency targets in its future strategy?

The energy efficiency of the overall economy of Jordan can be assessed through the evolution of its primary and final energy intensities. The primary energy intensity has decreased from 0.942 toe/1000 JD in 2005 to 0.728 toe/1000 JD in 2011, so a reduction of around -4.2%.

The final energy intensity has decreased with higher rate - 4.9% in the same period. However, since 2011, both intensities have slightly increased with annual rate of 1.8% and 2.3% respectively showing some kind of degradation of the energy performance of the economy. On the overall period 2005-2015, the primary and final energy intensity has decreased with an annual rate of -1.8% and -2.1% respectively.

According to the energy strategy 2007-2020, Jordan aims to reach the target of 20% improvement in energy efficiency by the year 2020. However, this strategy has to be operationalized through short and midterm action plans with concrete and feasible energy efficiency measures.

In 2018, The second NEEAP has set a target of 17.5% reduction in energy consumption by 2020.The second NEEAP comprised several energy efficiency actions with an estimated total investment cost of around 696 million JD (994 million USD) and will generate an annual saving for the user of about 230 million JD (329 million USD) per year by 2020. In this case the average payback period of the NEEAP from the point of view of the users will be around 2.5 years if all measures are fully implemented.

Three of the four interviewed municipalities have a Sustainable Energy Action Plan (SEAP) and one of them has already joined the Covenant of Mayors for Climate & Energy setting a target of 40% reduction in CO2 and GHG emissions by 2030.

5.3 Policy recommendations: How to accelerate ambitions for energy efficiency of heating and cooling in new residential buildings?

I. Review and simplify the building codes and energy efficiency codes

Rationale: There exists more than 30 building codes in Jordan. Project developers consider the codes too complicated and long. Many request a simplified code in the form of a checklist.

Implementation: The Ministry of Public Works and Housing is responsible for issuing new guidelines for codes through establishing a technical committee to prepare detailed guidelines. The Ministry is also responsible for organizing workshops for contractors and local building experts from the private and public sectors to introduce/explain the code guidelines. Best practice from countries with similar climatic conditions should be considered in the revision of guidelines and potential revision of codes.

Impact: Increased implementation of the building code and accelerate take up of efficiency measures.

II. Raise the municipalities awareness regarding the existing energy efficiency incentives in the Jordan Green Building Guide and introduce policies that enables municipalities to offer incentives for energy efficient buildings beyond the floor to area ratio

Rationale: Except for Greater Amman Municipality (GAM), which is not under the jurisdiction of the Ministry of Public Works and Housing, other municipalities in Jordan do not have the knowledge and currently lack interest in offering incentives to energy efficient measures in buildings following the Jordan Green Building Guide.

Implementation: GAM prepares bylaws to offer incentives for energy efficient measures in buildings based on its own experience. The by-laws must be approved by the parliament. These incentives include lower registration fees for energy efficient buildings, privileged treatment for applicants opting for EE measures by prioritizing their applications and faster treatment than typical applications

Impact: Increase market demand for energy efficient heating and cooling equipment outside of Amman and accelerate the rate of new constructions.

III. Review the technical workforce capability of municipalities to ensure the compliance of rooftop t solar water heaters (SWH) and solar PV to the Jordanian Solar Code .

Rationale: Although instructions were issued in 2014 to install SWH on new buildings, flats and offices with surface areas larger than 250 m2, 150m2 and 100m2 respectively, the lack of inspection regarding the quality of the design and absence of penalties resulted in lack of control on the design and proper installation of SWH in Jordan due to lack of qualified inspectors.

Implementation: Conducting training courses by the Royal Scientific Society / National Energy Research Center on solar water heater installation and system sizing to municipalities and to clarify requirements for proper installation according to the solar code.

Impact: Increased quality control for the Jordanian SWH market.

IV. Set clear obligations for utilities to reduce energy demand of consumers

Rationale: Lack of clear regulation on obligations for utilities to reduce demand of their consumers. In addition, utilities lack experience to roll out energy efficiency programs. So far

only Jordan Electric Power Company (JEPCO) tried to roll out CFL for its residential consumers but failed. CFL were of poor quality and the process was seen as being time-intensive and costly.

Implementation: Conducting an awareness campaign in cooperation with utilities in implementing energy efficient measures in the residential sector mainly on replacement of old lamps with LED. International consultant support can be requested on demand to support utilities in ensuring quality testing of LEDs. Recently in Jordan, the planned and ongoing replacement of incandescent lamps with LED for residential sector was mentioned in second NEEAP (2017 – 2020). About 1 million LED for 250,000 consumers will be targeted in Jordan. Similar programs could be rolled out for other measures.

Impact: Acceleration of the uptake of efficiency measures and decrease in energy consumption, greater reach of awareness programs.

6 STAKEHOLDER: SUPPLIERS

6.1 Context: Whom did we interview?

The consortium hired the market research institute Growth from Knowledge (GfK), as an external partner to conduct a market survey with 300 residents in Jordan and 50 suppliers and retailers of heating and cooling technologies for residential buildings. The goal was to gather the view of each group to understand what drives or hinders them to import/invest in energy efficient and/or renewable energy based heating and cooling technologies.

6.2 Status quo: What are the current heating and cooling technologies being imported and sold to residential consumers?

Jordanian suppliers and retailers are importing most of their technologies from China (90%) followed by Korea and EU countries. Sales of more energy efficient technologies have increased in the last five years due to the enforcement of JSMO technical regulations concerning energy labelling and eco design for AC units.

The Jordanian heating and cooling supplier market is dominated by the product categories air conditioners and heat pumps (>80%). The suppliers and retailers interviewed typically import and sell single split type units with an average COP of 3.7. Packaged air conditioners, hot water boilers and electric resistance heaters each represent a share of 5% in the market.

Most of the interviewed suppliers were selling boilers and a small number were selling solar thermal systems. It is important to note that suppliers selling solar PV were not interviewed.

There is an increase in selling LPG boilers within the last 3 years due to increased awareness of consumers and developers and the fact that LPG boilers require less floor area. It is worth to mention that solar water heater penetration rate in Jordan is around 15%, with much unused potential.

6.3 Policy recommendations: How to accelerate ambitions for energy efficiency of heating and cooling in new residential buildings?

I. Provide financial incentives to the importers and manufacturers of thermal insulation and double glaze windows.

Rationale: Double glazed windows are more expensive than single glazed windows. However, the initial cost should be offset against savings made by reduced energy required to heat and cool buildings and the subsequent carbon emissions reduction.
Implementation: The government should provide tax reductions or exemptions for double glaze windows and insulation materials to encourage suppliers to sell these efficient equipments with adequate prices for the customers. This requires an impact assessment study to be performed by a qualified consultant to figure out the value of tax reduction that would lead to encourage the using of above measures while decreasing the energy bill burden.
Impact: Increased demand in the market for using insulation and double glaze windows that would lead to energy savings in buildings of up to 30% in space heating which will significantly reduce the energy bill in Jordan and reduce carbon emissions.

II. Introduce solar air collector for space heating and encourage suppliers to import it

Rationale: This technology is well known in Europe and has successfully proved its economic feasibility. While in Jordan this technology is still not utilized due to lack of awareness about its importance.

Implementation: Awareness campaigns in cooperation with chambers of trade, universities, energy companies and users about of the importance of utilizing this technology in how it can provide energy and cost savings.

Impact: The raised awareness will encourage consumers to use this technology that would lead to reduce the energy bills for heating by 10% and reduce the energy bill in Jordan.