

Track II: Robust systems & infrastructures

Workshop on energy efficiency in buildings

Economic And Social Commission For Western Asia



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IMPROVING THE ENERGY SUSTAINABILITY OF THE BUILDING SECTOR IN THE ARAB REGION

Improving the energy sustainability of the building sector in the Arab region

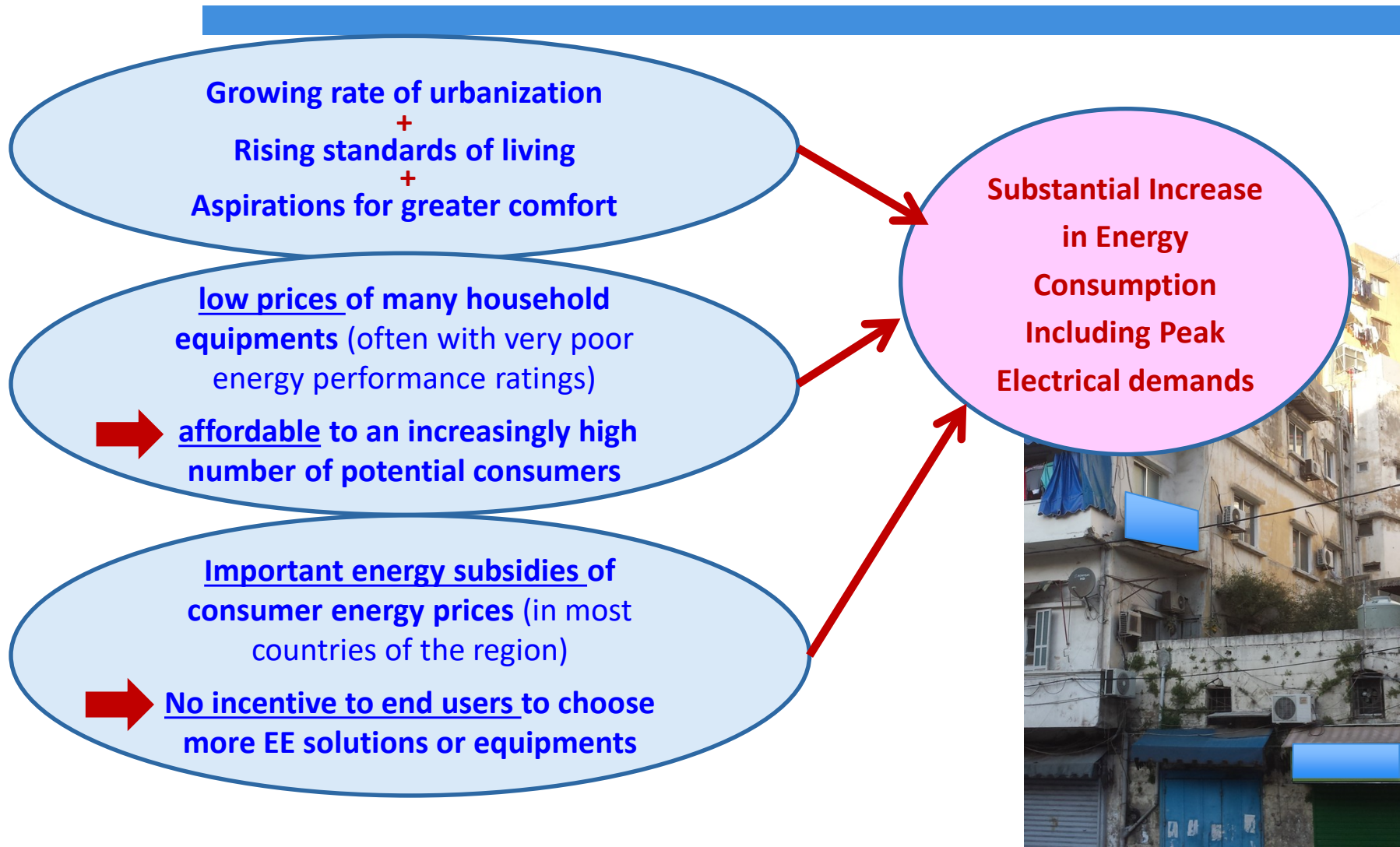
About 28% of primary energy supply in the Arab region is used to meet the energy needs of the building sector

The residential and services sectors account for about 60 % of electricity consumed in the Arab region (of which 70 % were for the domestic sector alone)

Peak electrical demands typically during hot season (June – September), indicating that the building sector (air conditioning), main responsible for peak demands

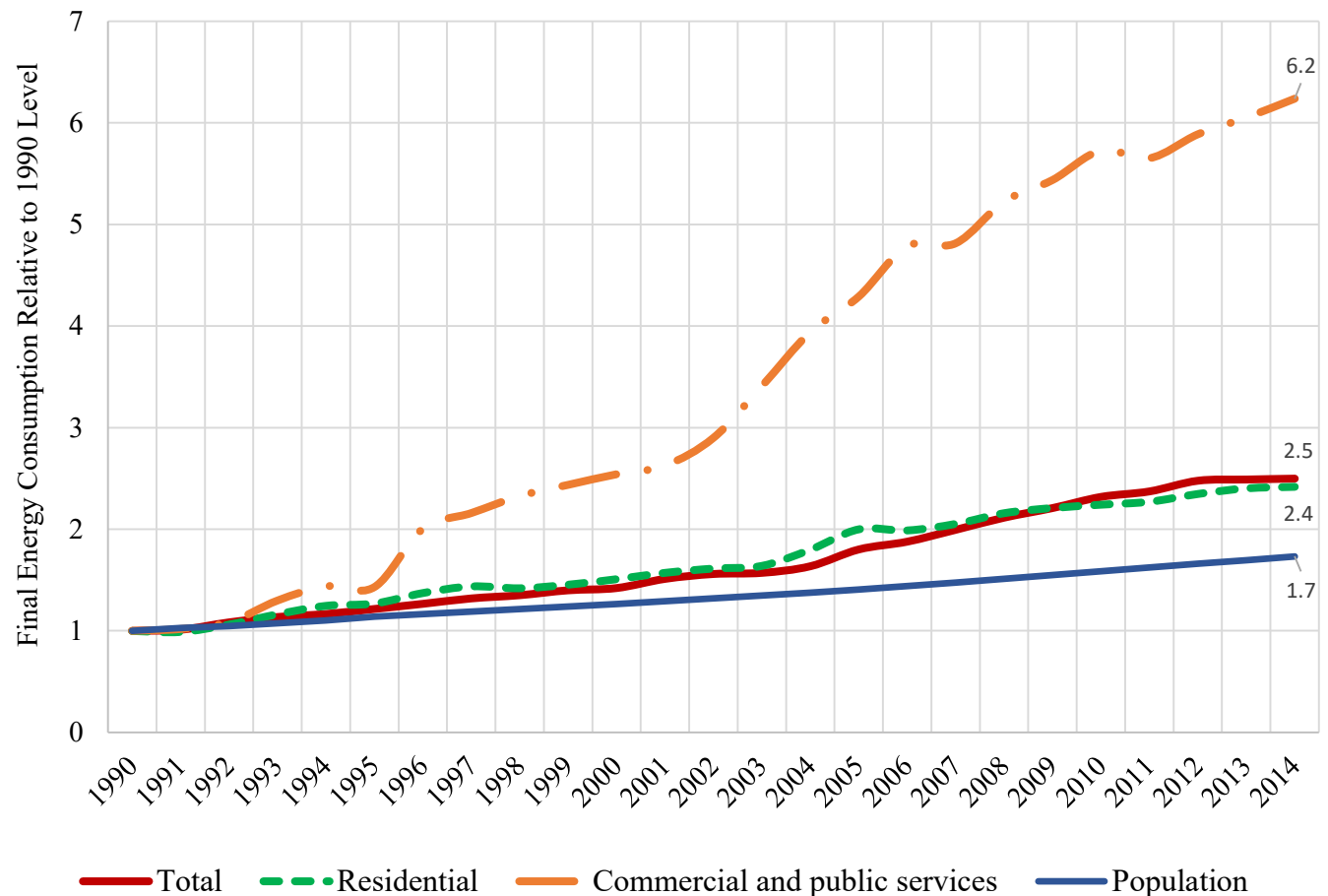
Peak demand increased sharply during last decade: 2020 figures to be double those of 2010 / electrical energy consumption figures will increase by same order of magnitude

Improving the energy sustainability of the building sector in the Arab region



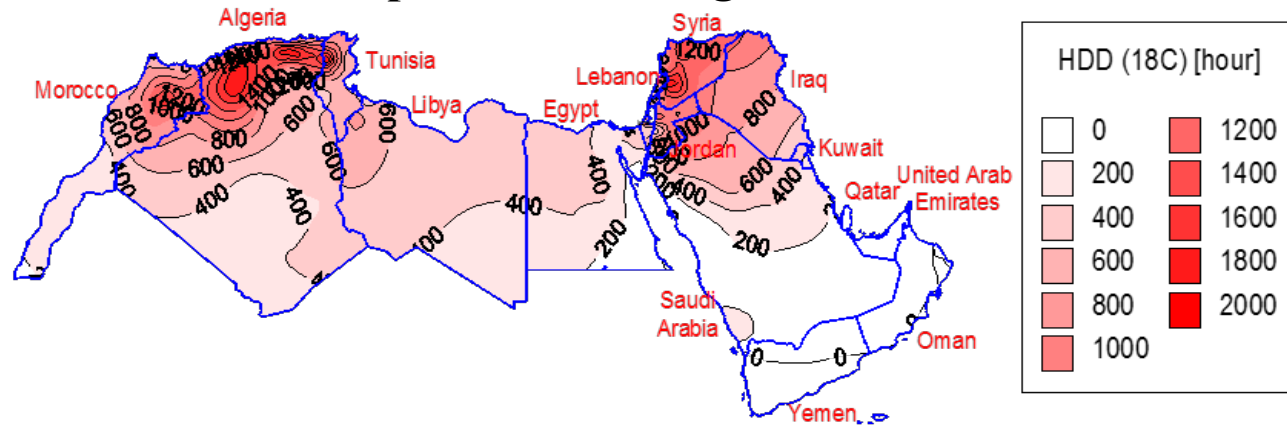
Improving the energy sustainability of the building sector in the Arab region

TFEC trends in the buildings sector in the Arab region, 1990-2015

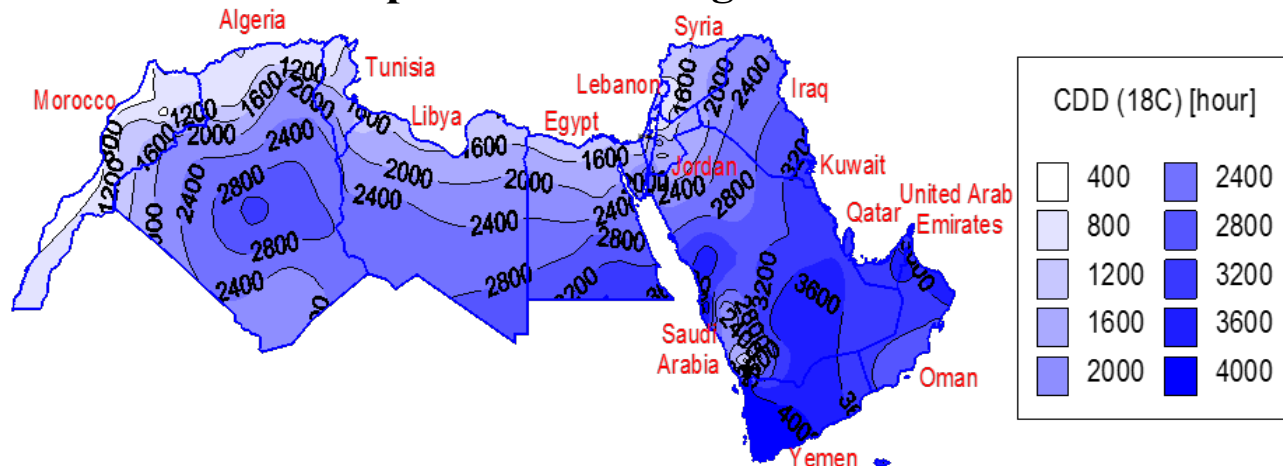


Improving the energy sustainability of the building sector in the Arab region

Contour map of the Arab region for annual HDDs



Contour map of the Arab region for annual CDDs



Improving the energy sustainability of the building sector in the Arab region

Significant potential to improve buildings energy performance throughout the Arab region using proven EE measures and adequate energy policies

New buildings stock:

- Impact of enforcement of building envelope EE codes
- Impact of enforcement of integrated building energy performance design (Design optimization using Life cycle analysis of EE measures)
- Impacts of Net Zero Energy Buildings (NZEB)

Existing building stock:

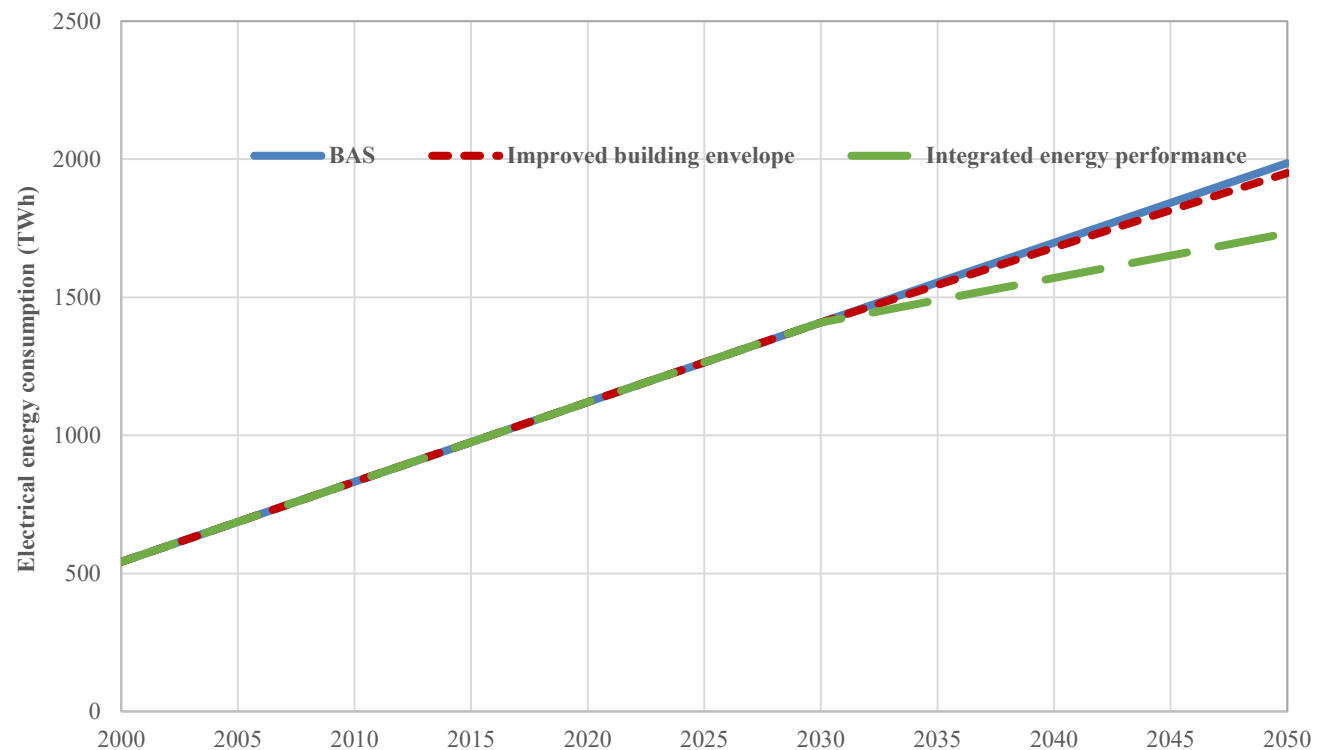
- Impacts of 3 levels of building energy retrofits: **basic level**/low investments, **Medium level**/intermediate investments, **Deep level**/high investments

Start the full implementation in 2030 (use next decade for preparation work: policies, regulations, standards, training & capacity building of operators, setting up logistical apparatus and financing mechanisms, etc.)

Analysis of Impacts done with a detailed building hourly simulation tool using a typical annual weather data for 1000s of building configuration

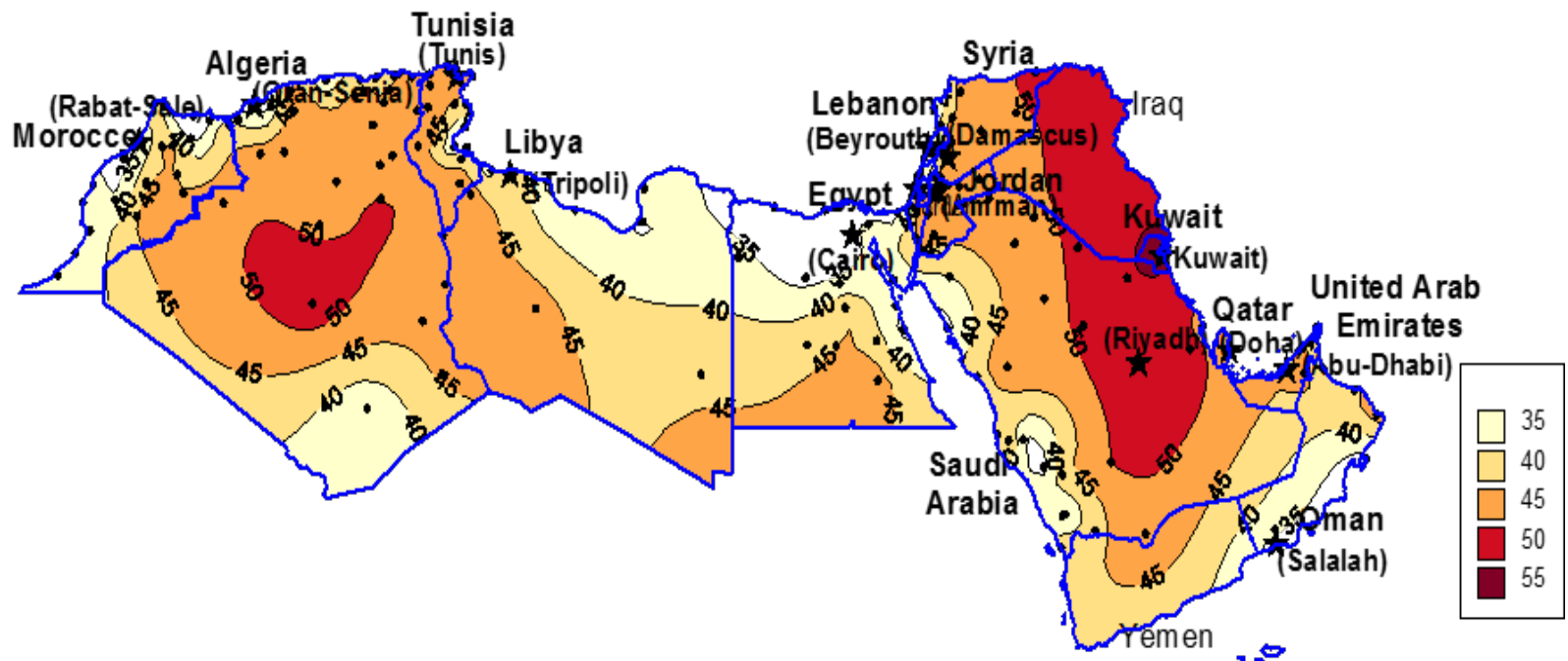
Improving the energy sustainability of the building sector in the Arab region – New buildings stock

Impact on buildings' total final energy consumption of implementing EE for new buildings in the Arab region starting in 2030



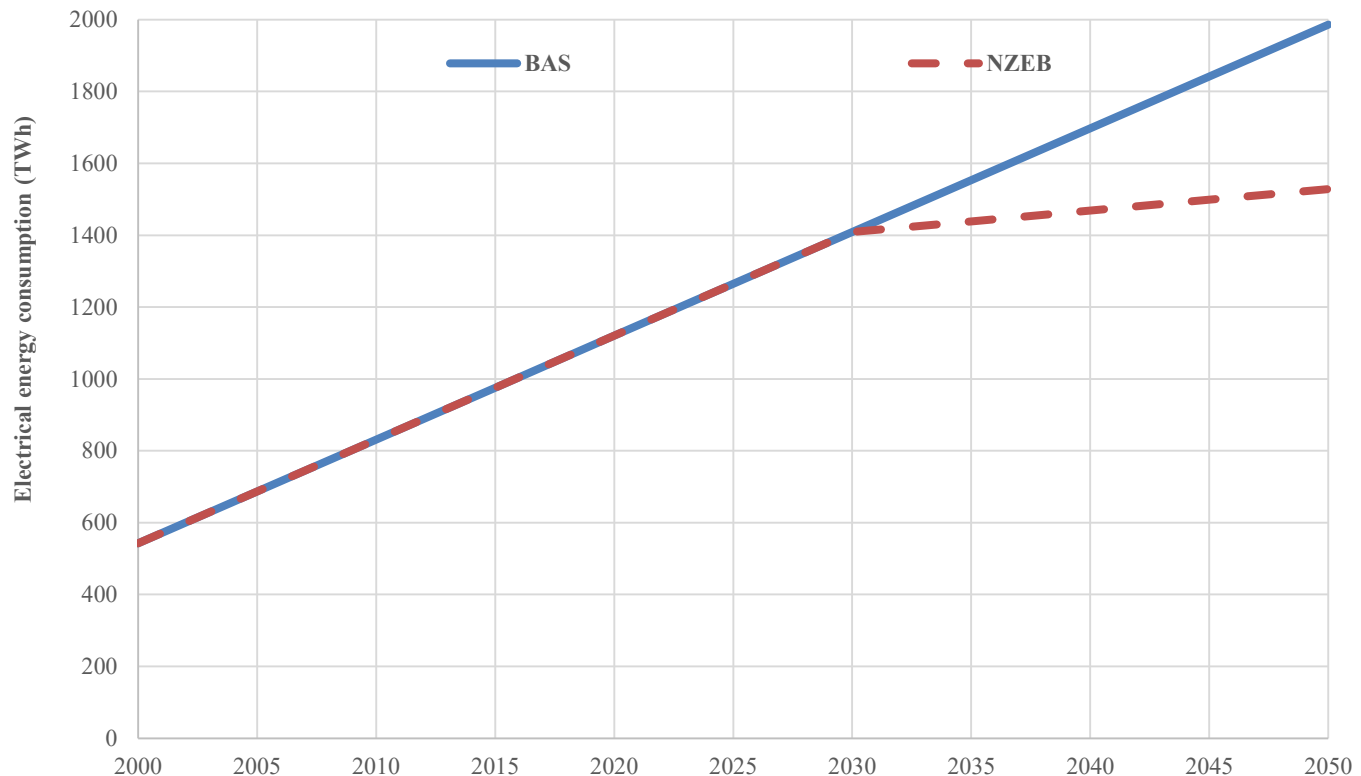
Improving the energy sustainability of the building sector in the Arab region – New buildings stock

Potential annual energy savings (%) in residential buildings for the Arab region, based on the optimal energy performance design:
Annual primary energy savings: 35-55% - Highest savings in hot climates, especially GCC / lowest savings in regions with mild climates.



Improving the energy sustainability of the building sector in the Arab region - New buildings stock

Impact on electrical energy consumption of implementing net-zero residential buildings for the new housing stock in the Arab region starting in 2030



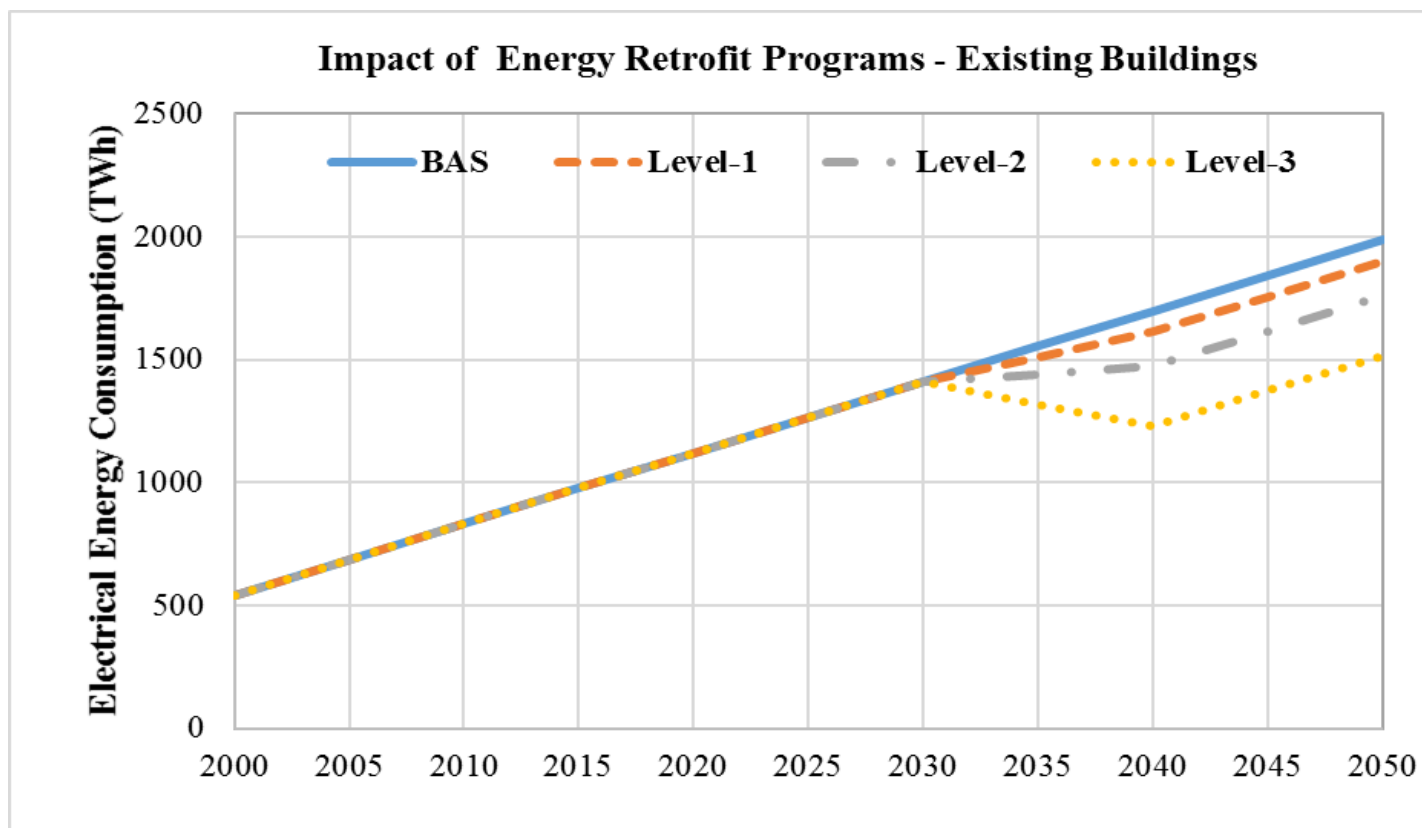
Improving the energy sustainability of the building sector in the Arab region – Existing buildings stock

3 levels of building retrofits considered,

- **Level-1 energy retrofit:** basic retrofit, mostly low-cost EE measures (replacing lighting with LED, weatherizing to reduce air infiltration, Thermostat resetting) – About 8% annual energy savings
- **Level-2 energy retrofit:** level-1 measures + EE equipment (replacement of Old equipment with EE ones + temperature & lighting controls. – About 23% annual energy savings
- **Level-3 energy retrofit:** deep retrofit, capital-intensive measures, (Level 2 + roof thermal insulation, replacing glazing, replacing cooling systems, automated control systems, etc.) – Over 50% annual energy savings

Improving the energy sustainability of the building sector in the Arab region - Existing buildings stock

The implementation of large scale EE retrofit programs for existing buildings' stocks within the Arab region can have a significant impact on future energy consumption.



Improving the energy sustainability of the building sector in the Arab region

Road map:

- ***Improve EE in existing buildings stock*** by implementing large-scale retrofit programmes that include generic and easily achievable EE measures targeting all types of buildings + tailored EE measures specifically targeting energy intensive buildings;
- ***Improve EE in new buildings*** by implementing / reinforcing energy performance buildings codes for all types of new buildings + specific energy performance requirements for energy intensive buildings (energy audit at design stage: airports & large commercial /office buildings)
- ***Develop, implement and reinforce energy performance requirements of buildings systems and equipment*** through energy performance labelling and MEPS specific to commercial buildings (lighting, heating, cooling and appliances);

Improving the energy sustainability of the building sector in the Arab region

Road map (Cont.):

- ***Develop, implement and reinforce the energy performance requirements of common household appliances*** through energy performance labelling and MEPS (refrigerators, room air conditioners, televisions and washing machines);
- ***Establish and improve knowledge in Arab countries of energy consumption patterns in the buildings sector*** by implementing and reinforcing systematic and sustainable statistical data collection of end-use energy consumption patterns per energy source for each of the main building branches, and by defining and monitoring relevant key energy performance indicators;
- ***Provide the human and financial resources required***, and the time requirements for mobilizing resources to implement energy efficiency policies, and build the capacity of the relevant stakeholders.

Improving the energy sustainability of the building sector in the Arab region

Success of the Arab region's transition towards more sustainable energy systems in the buildings sector requires capacity-building & training for all operators involved in the process:

- Architects;
- Engineers involved in the design and execution processes;
- Contractors;
- Equipment suppliers;
- Field operators (workers, works supervisors and controllers).

Building occupants would require some basic guidance, so they can operate buildings in a sustainable and energy efficient manner.

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THANK YOU FOR YOUR ATTENTION

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