Independent Sustainable City

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Situation

Nowadays, cities are mostly relying on non-renewable sources of energy such as fossil fuels.

- The International Energy Agency estimates that in 2011, 81.2% of the world's primary sources of energy came from fossil fuels. [1]
- In the United Arab Emirates (UAE) where the climate is very hot, a huge amount of energy is consumed by cooling and air conditioning purposes.

ESTIMATE HOUSEHOLD ENERGY USAGE IN THE MIDDLE EAST

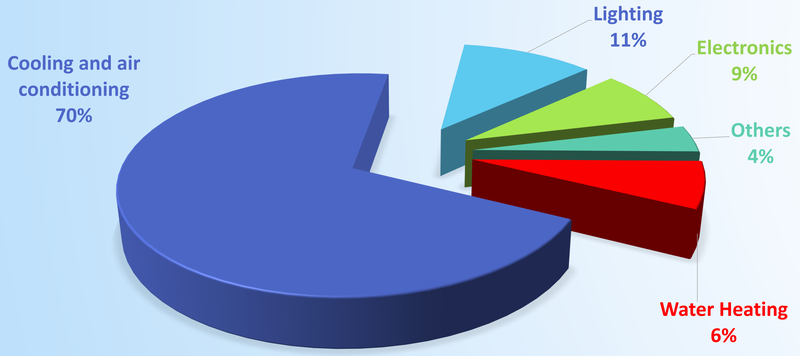

Chart 1: Estimated household energy use in the Middle East [2]

Problem

- Depending on non-renewable energy sources to generate electricity.
- Controlling heat flow.
- Management of energy consumption is not efficient. 70% of electricity consumed for cooling and air conditioning purposes. [3]
- Handling and treatment of wastewater is inadequate.

Solution

Wastewater:

Two different pipes are used for sewage depending on type of wastewater. Leads to minimization of cost and reduction of wastewater treatment process.

Infrastructure:

Use building materials which reduces thermal flow from outside to inside (PCM bricks, Insulated glass).

Architectural design:

The city will be elevated from its surrounding area and the buildings will have a swaying shape design.

Figure 1: An image of swaying walls [4]

Smart network grid:

Improves efficiency of energy consumption, which reduces cost and total usage.

Records and predicts energy consumption which helps suppliers plan in advance.

Solar panels:

Buildings will be equipped with photovoltaic solar cells that will help in meeting the energy demand by converting sunlight into electricity.

Evaluation

Wastewater piping:

An expensive process that requires double the number of pipes, which makes facilities look repugnant. However, this makes secondary treatment unnecessary which leads to saving time and reducing costs.

Materials:

Expensive materials that are not manufactured in all factories. Nonetheless, these materials as well as the architectural design aid in reducing power usage and cost in the long run.

Smart Grid:

Privacy and security of information is a hue concern. On the other hand, implementing powerful security measures will prevent any breaches.

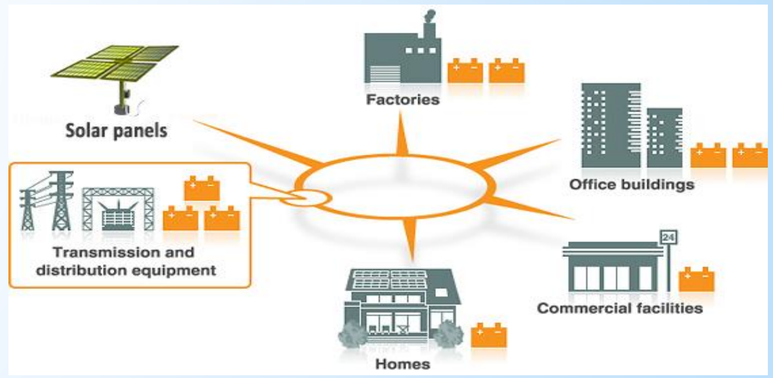

Figure 2: Smart grid connecting facilities and solar panels [5]

Solar Panels:

Material used to build them is toxic and expensive. However, they will help us meet the energy demand of the city and serve as an emergency power source.

References

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[5] Cdn8.triplepundit.com, (2014). [online] Available at: http://cdn8.triplepundit.com/wp-content/uploads/2014/11/NEC-smart-grid-en-storage.jpg [Accessed 13 Dec. 2014].