Lina Energy – LE ltd.

Green Roofs for Jordan Climate Change Mitigation

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Outline

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Lina Energy – LE Ltd.

LE Ltd. is a start-up company that is thriving to join the GLOBAL FORCES towards a cleaner, healthier and energy secured world. We are aiming to facilitate energy efficiency through providing our customers with LE green roof tailored design, installation and after sales services.
How LE Ltd. was born?
How SWITCHMED helped?
LE ltd. Green roof

Green roof is a roof, deck or other structure onto which vegetation is intentionally grown or habitats for wildlife are established.

Green roofs are one of the most readily-accessible sustainable technologies available to the construction industry and can be included as part of new buildings and (subject to structural checks), retro-fitted to existing buildings to provide several benefits to the occupants of buildings, as well as the local setting.
- growing medium – mostly inorganic
- geotextile
- drainage layer
- root barrier
- metal/lightweight roof deck

50 – 200 mm
Jordan is a resource-starved, middle-income country with insufficient supplies of water, oil and other natural resources.

The country is classified as being a semi-arid to arid region with annual rainfall of less than 200 mm over 92% of the land. The country comprises 89,297 km², most of which (92%) is desert /rangeland.

91% of treated wastewater is reused for agriculture.
Water consumption in Jordan by sector (2010)

- Irrigation: 56%
- Municipal: 39%
- Industrial: 4%
- Livestock: 1%
Water usages per resources in Jordan (2010)

- Renewable groundwater: 48%
- Surface water in Jordan Valley: 23%
- Non-renewable groundwater: 9%
- Surface water in the Highlands: 9%
- Treated wastewater: 11%
14% of the country’s energy resources are consumed by water delivery. Constructed dams, the Disi-Amman conveyance system, exploring additional sources of supply, deep aquifers, and brackish and large-scale seawater desalination, reducing physical and commercial losses.
Ministry of Water and Irrigation of which is:

Jordan needs to address the impact of climate change on its social, economic and environmental development.

target per capita municipal requirement of 155 l/d by 2020.
Greywater is the output from bathtubs, showers, sinks, floor drains and washing machines, which, though no longer clean, is not as contaminated as toilet water.
toilet flushing

35%

garden irrigation
Greywater is captured from the various household sources (sinks, hand-basins, showers, etc.), and **taken** (possibly through a simple treatment system and maybe storage) to a *distribution system*.

The components of any type of greywater system may therefore be summarized as follows:

1. Sources  
2. Collection  
3. Treatment  
4. Storage  
5. Use
No treatment at all
relatively clean nature
There are four reasons why greywater may need to be treated:

• To remove substances which may be harmful to plants;
• To remove substances which may be harmful to health;
• To remove substances which may be harmful to the wider environment;
• To remove substances which may clog the greywater system.
LE ltd. irrigation system

1. Efficient drip irrigation system
1. Use of grey water
Legend

1. 3-way diverter valve
2. Small valve box or rigid plastic pot
3. ABS 1.5" or 2" double ell (aka twin 90)
4. ABS 1.5" or 2" double ell (aka twin 90) with inspection/clean-out port
5. 1.5" or 2" long sweep 90° bend
6. Optional 3-way valve actuator
7. Backwater valve
Graywater Inlet pipe

Union

Automatic overflow pipe

Union

One-way sewage check valve (backwater valve)

Union

Vent

One way check valve

Graywater out to landscape via 1" tubing, see laundry-to-landscape system diagram

Union

Power cord to GFCI outlet (Ground Fault Circuit Interrupter)

Surge tank

Effluent pump with float control switch

To sewer

Blackwater 4" pipe
Mat irrigation has large particle size and pore volume, the capillarity of this media can be greatly reduced when compared to topsoil. Other irrigation systems quickly exceed the media’s ability to move water via capillary action. Gravity takes over, moving water rapidly down through the media and into the drainage layer, resulting in water waste. Mat irrigation widely distribute the point of emission, mitigating this problem.
LE ltd. green roof benefits

- Absorb Dust and Toxic Particles
- Enhance surrounding microclimate
- Reduce of Energy Costs
- Provides a recreational area
- Recover wildlife Natural Habitat
- Noise protection
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