Assessment of the national water and energy saving potential of greywater reuse – Israel as a case study

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The water saving potential and the socio-economic feasibility of greywater reuse within the urban sector - Israel as a case study

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Summary
What is GWR and how can it effect Israel’s water economy?

Onsite reuse of light GW:
1. shower/bath
2. washbasin
3. washing machine

Reuse for:
1. Toilet flushing
2. Garden irrigation

What would happen if all new apartment buildings were required to install GWR systems?
A typical installation in a multi-storey apartment building

Taken from: Gross *et al.* (2015)
Population Growth – Driver of urban water demand increase

Population Annual Growth rate 2005-2030

Germany: 0.8%
USA: 1.4%
Israel: 30% penetration only new buildings (2050)
China: 0.4%
India: 1.2%
Urban consumption is the fastest growing segment of Israel’s water economy.
Annual national water saving by GWR

Assuming GWR is mandated in all new construction from 2012

Bands are different proportion of domestic water supplied by GWR
GWR can **slow down** the growth rate of urban water demand.

By 2050 – 30% reuse only in buildings built after 2015.

- Urban Demand with GWR
- 140 MCM (Avoided Desalination)
- CAGR 1.47%

Urban Demand

By 2050 – 30% reuse only in buildings built after 2015.
By 2050, 15 million people will require ~15 desal plants over just 200 km of coast. GWR can replace 1-2 of these!
Decentralized water production saves water and energy.
Energy\textsubscript{GWR} \approx \frac{1}{5} \text{Energy}_{\text{Desalination}}

- **Reduce** national electricity consumption by 560 GWh/y in 2050
- **Prevent** emission of 6-8 \cdot 10^6 tonnes \text{CO}_2 by 2050
Cumulative monetary savings due to GWR
Assuming GWR is mandated in all new construction from 2012

Bands are different proportion of domestic water supplied by GWR
Summary - GWR in Israel can:

~10% ✓ **Reduce** urban water demand by:

• 120-200 MCM/y in 2050

~0.5%a ✓ **Reduce** national electricity consumption by:

• 560 GWh /y in 2050

~10% ✓ **Avert** construction of 1-2 desalination plants by 2050

✓ **Save** money

• Cumulative sum of ~ 50 billion NIS (ca. 15 billion US$) in 2050

✓ **Prevent** emission of 6-8·10^6 tonnes CO_2 by 2050

✓ **Reduce** negative environmental effects
Thank you for your attention
Why is the testing regime so important?

Capital cost = 100k + 6.7k*ρ [NIS]
Because it destroys commercial viability.

MOH STANDARD
Yearly fixed costs
Electricity
service contract
BOD
TSS
Fecal coliforms
Sampling

Viability point moves to 70 apartments per building