Linking **People**. Promoting **Growth**.

Life
beyond our rivers!
The reality of water re-use.
The Sedgefield Case Study

Knysna Municipality

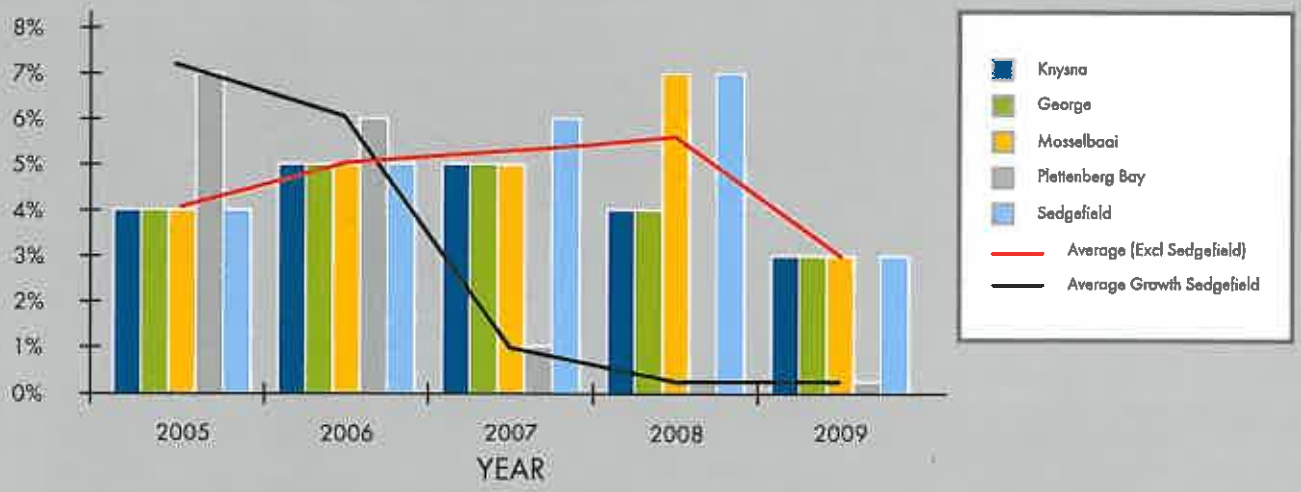
SSI
A DHV COMPANY
ENGINEERS AND ENVIRONMENTAL CONSULTANTS

Sedgefield in the Southern Cape, is the first town to hit the wall, it has literally run out of water. The same scenario will soon be played out in many other towns and cities in South Africa but a change of mindset can avert the shortages caused by accelerated development, seasonal demand and adverse weather patterns.

The consequences for Sedgefield, which has been one of the fastest developing areas on the Garden Route, has been that all development has ground to a halt due to lack of water and wastewater treatment capacity.

In December 2008 the town made national news headlines as its main water source, the Karatara River ran dry, forcing authorities to truck in supplies for concerned residents and holidaymakers at great cost. Innovative thinking which allows us to 'hedge our bets' by implementing alternative solutions not affected by the same environmental criteria, will ensure long term water security for our communities.

Typical Growth In Garden Route Towns



Lack of water has stifled development in the Southern Cape resulting in job losses and loss of potential revenue streams for local municipalities.

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SEDGEFIELD WATER SUPPLY

Sedgefield's main water supply is extracted from the Karatara River for treatment and distribution to users. However, Sedgefield is at the end of the line - and has to rely on what is left after irrigation extraction by upstream users. During peak holiday seasons the Knysna Municipality augments additional demand by tapping into the important but limited groundwater system.

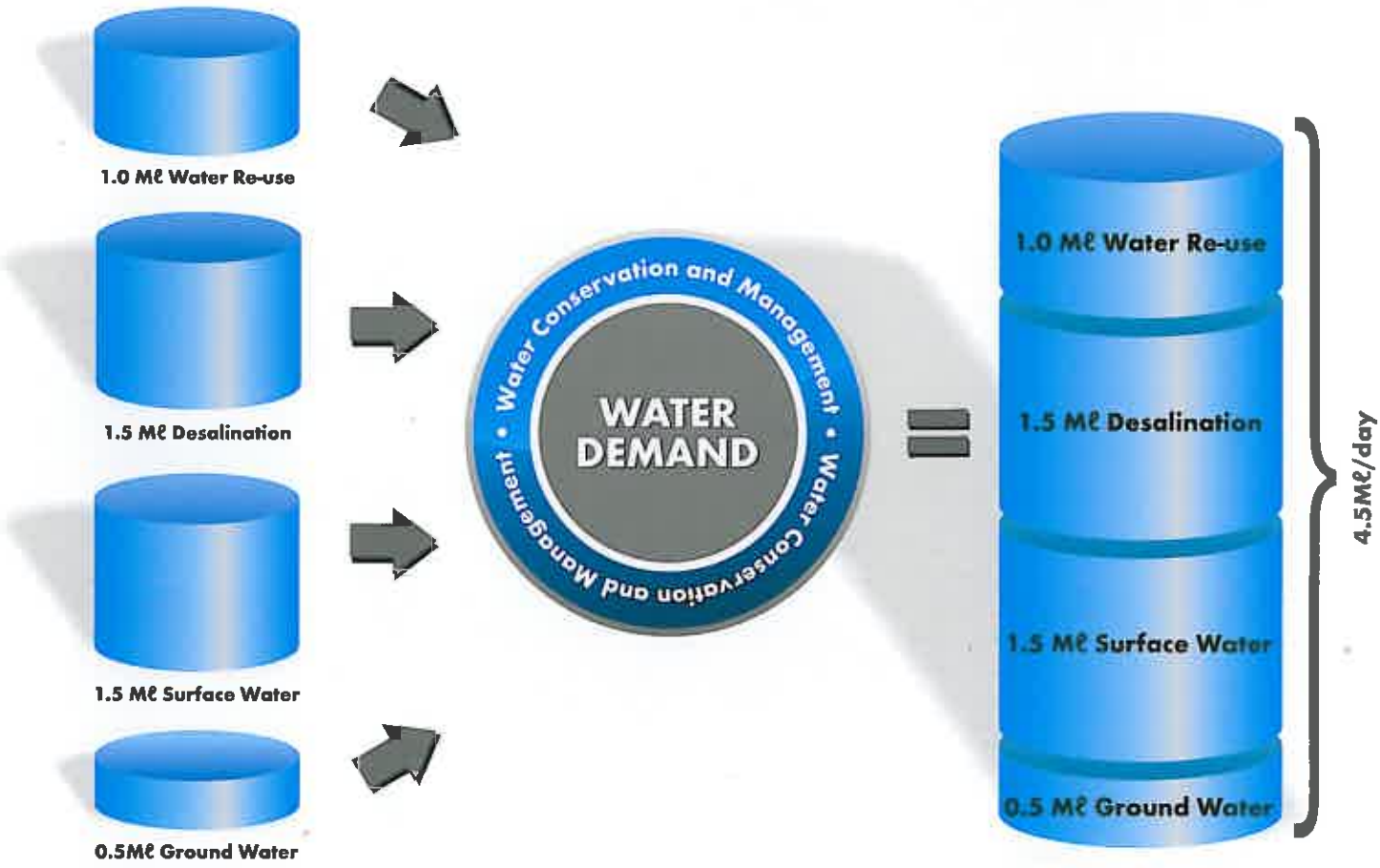
Planned Augmentation of Water Supply

The conventional planning solution was to construct a new dam to supplement the water supply at an estimated cost of R110-million, plus R15-million to upgrade waste water treatment facilities. Besides taking several years to implement, the +/-R130-million cost was prohibitive for a town the size of Sedgefield.

SSI's attractive R60-million solution is to combine the independent sources of supply of surface water, boreholes, desalination and water re-use to cater for peak demand and changing weather patterns, which combined will achieve the 4.5Mℓ/day water demand target.

Changing Mindsets:

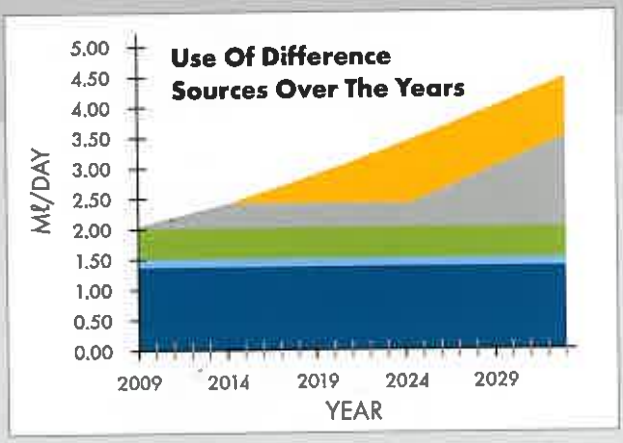
- "Build another dam" is not necessarily the optimal solution: Erratic surface water availability is forcing us to consider alternatives which can guarantee water supply.
- Wastewater treatment technology advances now allow cost effective water re-use to meet all quality requirements from irrigation through to high quality potable standards.
- Desalination is now a mature and affordable technology – ideal for coastal resorts that experience high peak holiday demand. During off-peak times the plant can simply be switched off in favour of more cost effective sources of supply.



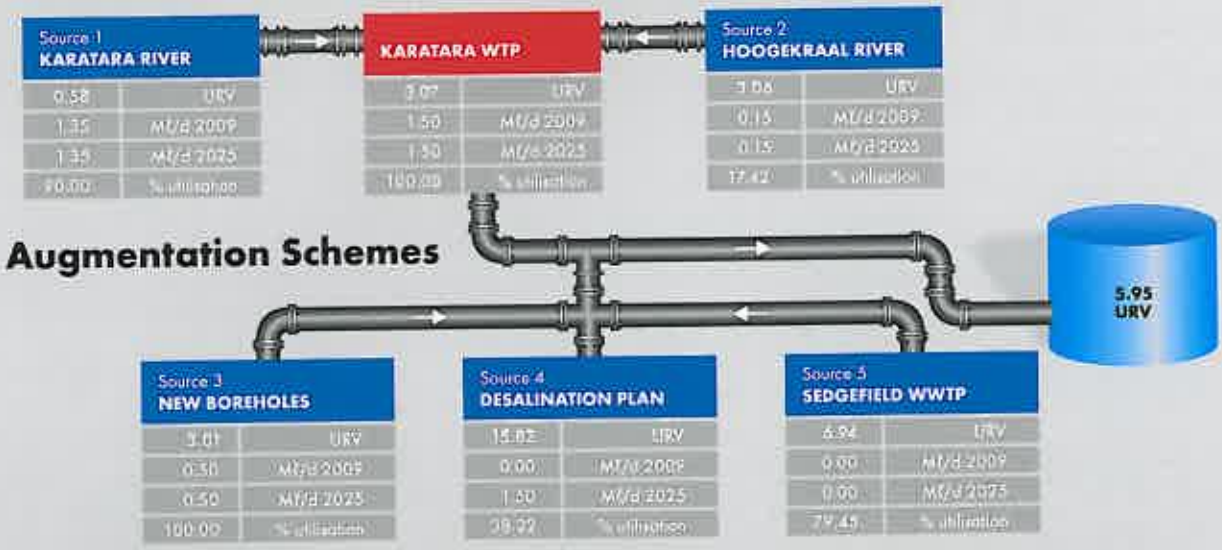
CASE SPECIFIC SOLUTIONS

The water demand for Sedgefield, like many of our coastal towns, peaks at 2 to 3 times the average demand. These peak demand periods are often only during the holiday season. Desalinated water is on tap at the reservoirs and will therefore reduce the demand on the surface water supply.

NOTE: Water demand management and conservation go hand in hand - it is pointless pouring more and more water into a leaking bucket.



Augmentation Schemes



SUSTAINABLE WASTE WATER TREATMENT

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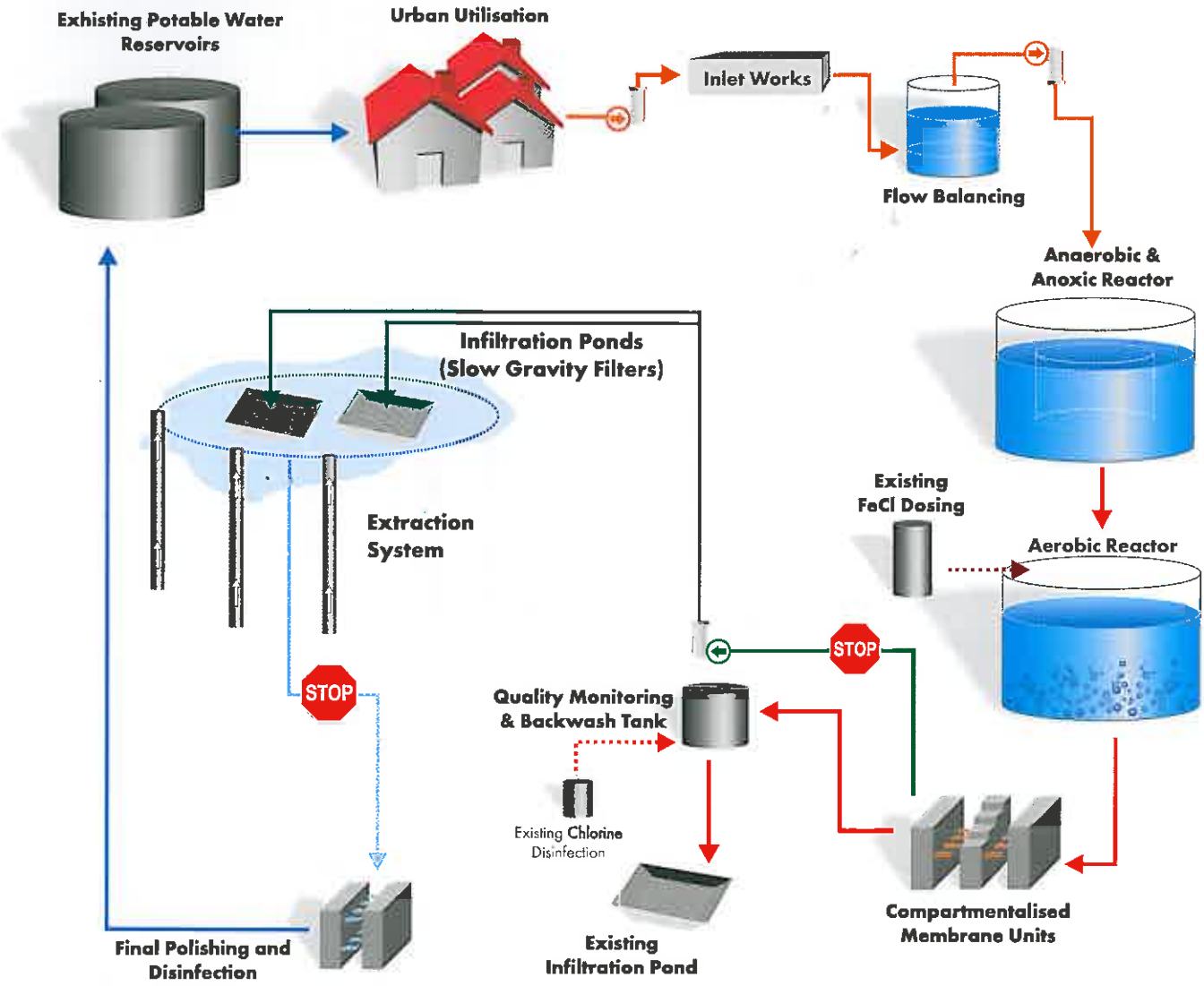
Membrane Bio Reactor (MBR) Plant Sedgefied, South Africa

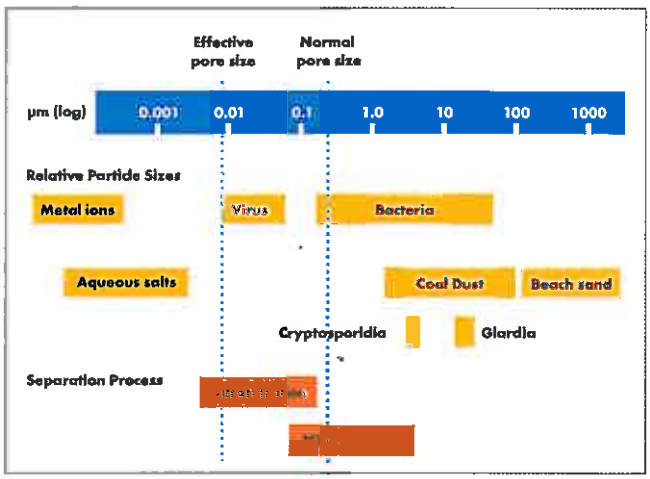


STOP

Proposed STOP Points:

It is proposed that the system is implemented in three phases, as this will allow;

- The next phase can be designed using actual achieved results, rather than using conservative assumptions.
- Phased development and publishing of results will build confidence in the reliability of the system.



SUSTAINABLE WASTE WATER TREATMENT

Membrane Bio Reactor (MBR) Plant Sedgefield, South Africa

General Information regarding water supply:

- Development is restricted by water availablility and treatment capacity.
- The normal supply from Karatara River is supplemented from boreholes in town to meet the peak holiday season demands.

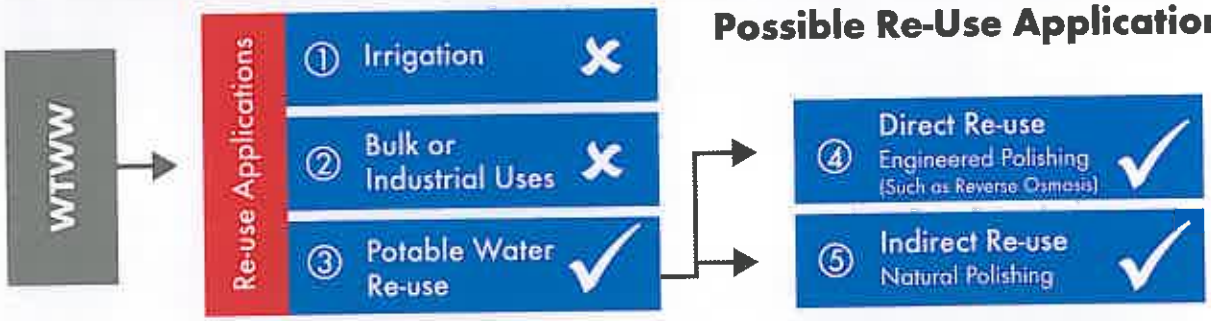
Existing Sedgefield WWTW

- Requires an extension to cope with increased flows
- Rated Capacity = 750m³/d
- Located in Confined Area
  - Steep dunes to north and south
  - Smutsville development to the east
  - Groenvlei 200m to the west
- Sensitive receiving environment

Proposed Sedgefield WWTW

- Required capacity = 2000m³/d
- Small footprint technology, with guaranteed high quality effluent (eg MBR)
- Special Limit Values required by DWAF, due to sensitive receiving environment
- Water Re-use required by DWAF (suggest irrigation)

Possible Re-Use Applications



1 Irrigation

Utilisation of potable water for irrigation is costly and a waste. It is possible to convey final effluent to major irrigation points and remove their demand from the potable water supply. Irrigation water can be produced with dissolved nitrate and phosphates to reduce fertilizer requirements.

There is only a limited irrigation demand in Sedgefield, which should be pursued but will not solve the water problem.

2 Bulk or Industrial Applications

This generally refers to industrial users which require large volumes of less than potable quality water for their cooling or rinsing etc.

There are no known bulk users in Sedgefield to which this could apply

3 Potable Water Re-use

To allow water to be re-used for potable applications, a high degree of polishing is required to minimize the risks associated. Although there will be strong public resistance to this, functioning full scale applications in Atlantis and Torrelee confirm that the public concerns can be addressed and overcome.

Potable water re-use is of a scale which can play a significant role in easing the water shortage problems in Sedgefield

4 Direct Potable Water Re-use

The major disadvantages of direct re-use are, the cost for polishing* and there is no buffer or long term storage i.e. water produced today is recycled immediately, i.e. any extended disruption to the supply will result in water shortages.

This is an option, but should only be used if indirect applications are prohibitively expensive. The Municipality will also be required to appoint highly skilled operators to manage the risks effectively

*Polishing is required to ensure that high quality water is produced reliably, to prevent contamination of the potable water system. Systems employed for these purposes include reverse osmosis, ozonation, sand filtration and/or activated carbon filtration. Combinations of these systems are generally adopted to ensure 'multiple barriers' to prevent contamination.

5 Indirect Potable Water Re-use

The major advantage of indirect re-use is the natural polishing, buffering and storage of the water. Natural polishing typically involves long retention times, which are cost prohibitive for 'engineered solutions'. Storage of the water allows selection of the water, i.e. only high quality water is selected, and lower quality can be discharged conventionally. This protects the water system.

This is the preferred ultimate solution for Sedgefield

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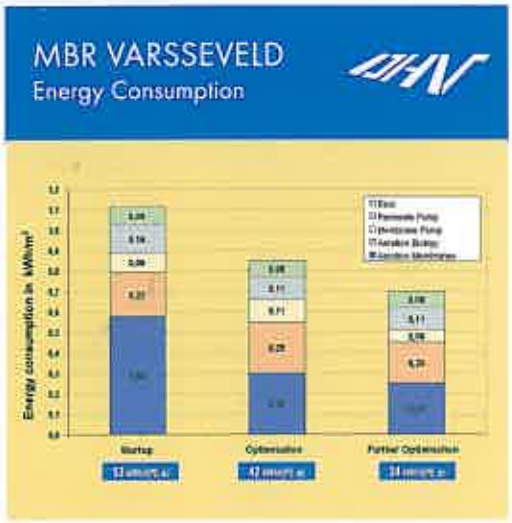
DHV MBR RESEARCH

4.5 Years Operaton of Beverwijk WWTW (Membrane Tests)

Why SSI/DHV?

SSI is 75% owned by the Dutch based engineering group, DHV.

DHV are world leaders in water and wastewater treatment using conventional to new / innovative treatment solutions. DHV has been involved with research for the dutch government to minimise the risk of implementing MBR into their local waterboards. Initially, this included 4.5 years of research into the advantages and disadvantages of various membrane suppliers. This experience was built upon as DHV was awarded the design of the first full scale MBR project in the Netherlands, at Varsseveld WWTW. Varsseveld has been running for almost 5 years and through various optimisations the operating costs have been reduced substantially.



The partnership between SSI and DHV allows international best practice and lessons learned to be implemented into South African solutions.

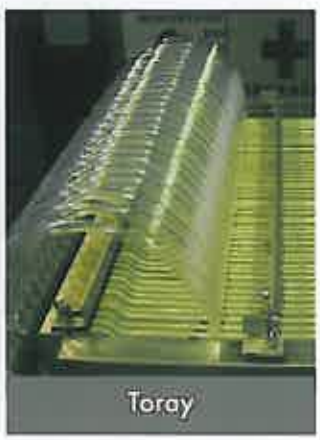

Mitsubishi


Zenon


Huber


X-Flow


Kubota


Toray


Memfis


Koch/Puron

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SSI is represented in all major centres through a 20 branch network covering South Africa. Offices also in Botswana, Mozambique and Zimbabwe.

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