



SABIA 2017

The role of Bio-Gas in Direct Potable Water Reuse (DPR) in Windhoek : Its History and Its Future

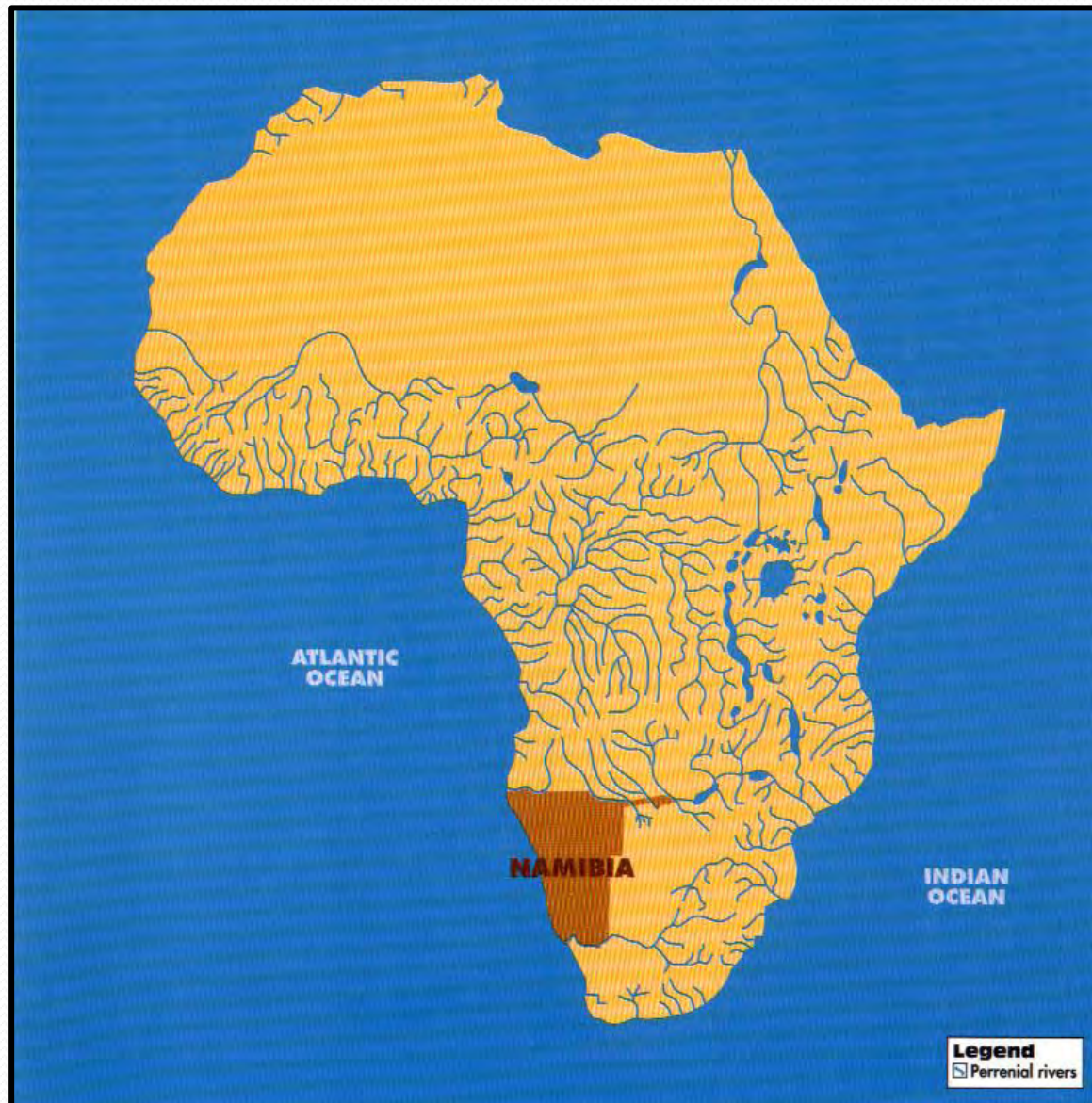
Piet du Pisani
City of Windhoek



Andrew Taylor
CAE



Perennial Rivers in Africa



ATLANTIC
OCEAN

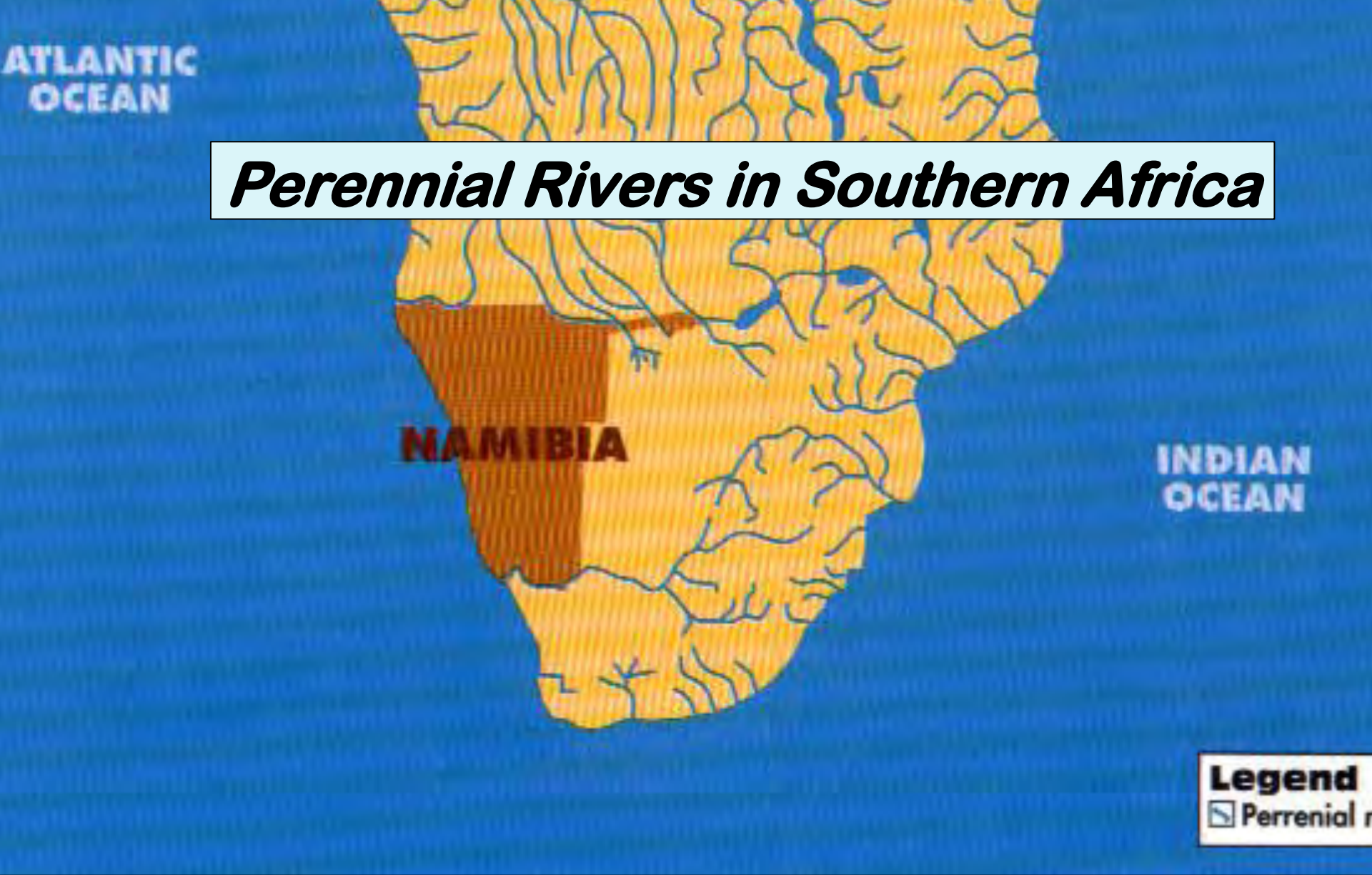
Perennial Rivers in Southern Africa

NAMIBIA

INDIAN
OCEAN

Legend

☐ Perennial r



Finding Water in Namibia



Fish River Normal Rainy Season



26.04.2013

Fish river flood 2005



Location of Windhoek



Windhoek Fact file

- *Namibia most Arid Country south of Sahara*
- *Windhoek is the Capital with:*
- *Average rainfall* **360 mm**
- *Average evaporation* **3400 mm**
- *No of inhabitants 1990* **140 000**
- *No of inhabitants 2015* **420 000**
- *Pop Growth* **5% / year**

What to do and how ?

THE SUNDAY TRIBUNE, NOVEMBER 24, 1968

Windhoek drinks sewage water

IT'S A PURIFIED WORLD 'FIRST'

WINDHOEK.
A WORLD "FIRST" FOR WINDHOEK, which the Mayor, Mr. Con Katzke, described as equal in importance to the Chris Barnard achievement in its implications for the rest of the world, was announced at a mayoral Press conference here this week.

Threat to
park is

The Gammams water care works



PST's and bio-gas plant



Biological trickle filters



Activated sludge basin and SST's



Maturation ponds



The CAE Namibia bio-gas plant

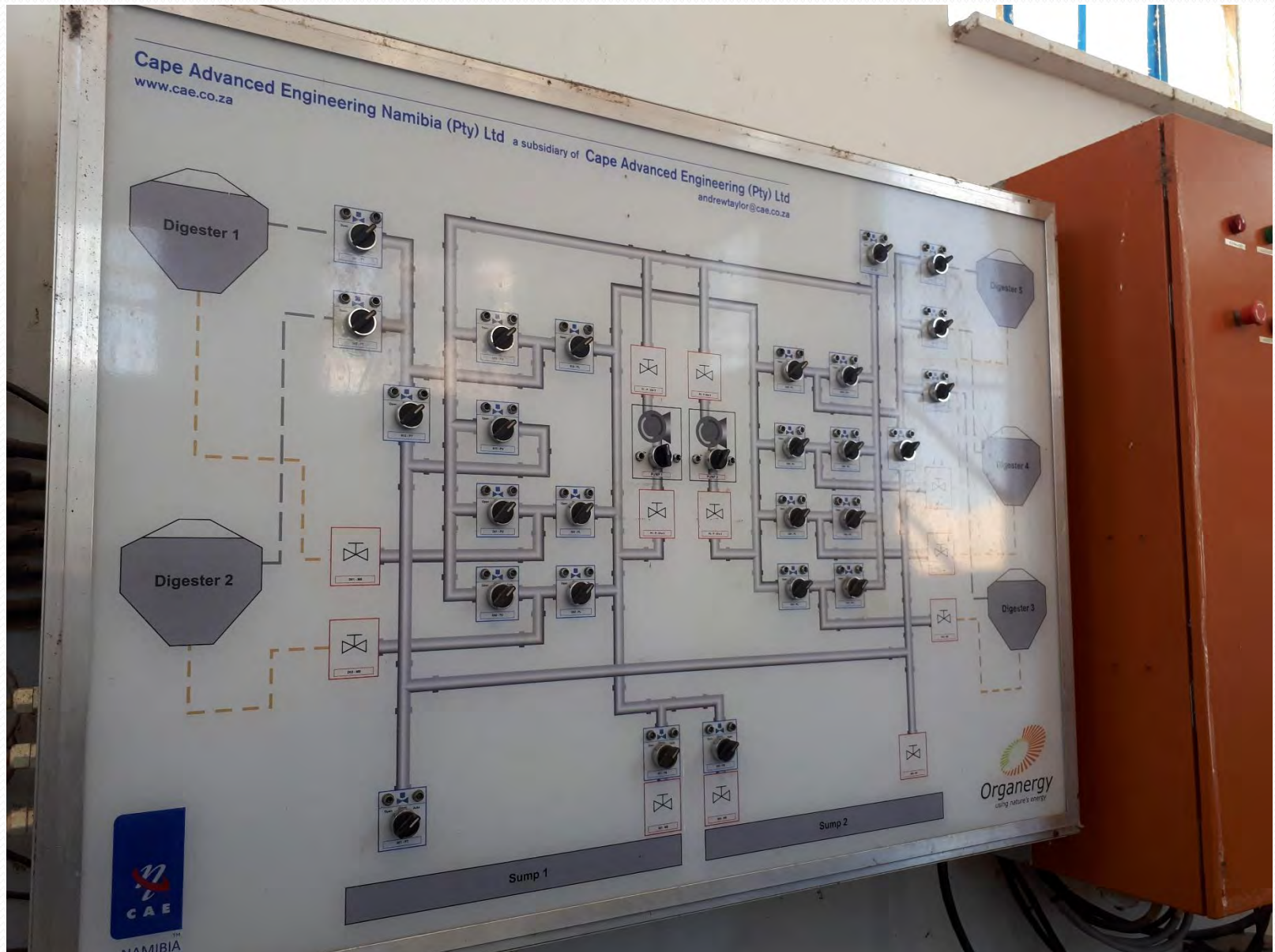


CAE Namibia bio-gas plant PPP

- ***Automate and operate the PST's (40 MI capacity)***
- ***Construct and operate the sludge handling systems***
- ***Refurbish, upgrade and operate the bio-digesters
(5 x 1750 m³)***
- ***Refurbish, upgrade and operate the bio-gas systems
(gas storage, scrubbing and piping)***
- ***Install and operate new bio-gas CHP power
generation (2 x 250 kVA V12 CAE 444 units)***
- ***Automate the plant with a SCADA system***

- ***Payments are based on open book PPP with a
defined IRR
(tender process involved 5 council approvals)***

Skills development / job creation



Heat and gas reticulation system



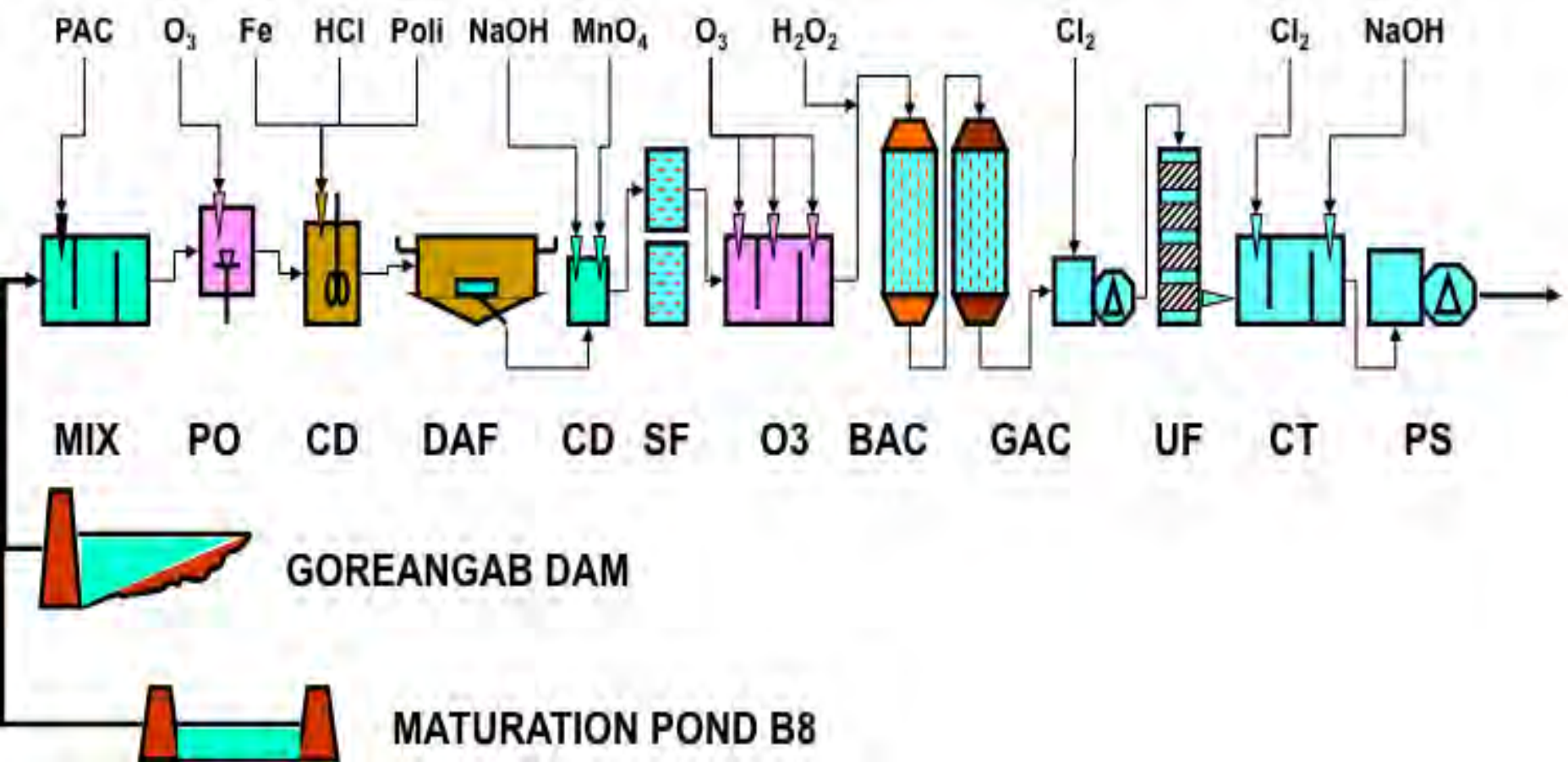
Bio-gas CHP generation & flare



The new Goreangab DPR plant PPP

- ***20 year PPP from 2002 to 2022
(open book costing at defined IRR)***
- ***Provides 25% of the potable water required***
- ***DPR Is currently producing advanced treated water cheaper than available surface sources***
- ***Technology has been evaluated over 49 years without :***
 - ***any outbreak of water borne disease***
 - ***any increase in incidence of disease***
- ***Consistently produces water of a superior quality to available natural sources***

Goreangab Multiple Barrier Process Train



New Goreangab Plant completed in 2002



Short History Of Wastewater





The old Goreangab DPR plant

- ***In 1993 a semi-purified pipeline system was installed***
- ***The old Goreangab DPR plant is now used for semi-purified water***
- ***Semi-purified water is distributed for industrial use, sports fields and parks***

Windhoek Country Club



Conclusion

- ***Windhoek has proven that through PPP's:***
 - ***Reclaimed waste water is a reliable resource***
 - ***Potable reuse is sustainable***
 - ***Potable reuse is safe***
 - ***Potable reuse is desirable***
 - ***Potable reuse is affordable
(cheaper than desalination)***
 - ***With the required care and commitment potable reuse Direct or Indirect, is the way to go.***
 - ***Bio-gas power generation enables negative sludge treatment cost to the city***
- ***The proof is in the drinking***

Some sage advice

- **Thomas Jefferson**: You will not know the worth of water until the well has run dry
- **Lukas Van Vuuren**: Water should be judged by its quality, not its history
- **Don Bursill**: You can turn anything wet into drinking water, if you filter it through enough money
- **Ron Linsky**: Water is Water
- **What should Cape Town be doing ?**