Spreadsheet Final Presentation

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Singapore's water needs

By 2061, imported water is no more

Desalination

Process of converting sea water into fresh water

Local catchment

Collect rainwater and process into fresh water

Imported water

Purchase raw water from Malaysia, Johore

Newater

Recycle waste water into fresh water

Potable water

- Also known as drinking water
- Supplied to households (“Domestic”)
- And offices/shopping malls etc (“Non-domestic”)

Non-potable water

- Used for industry, factories, construction
- Supplied to factories for washing, irrigation etc
- Can be mixed with raw water and processed to become drinkable

Government 2060 Target

^30%

***70%**

^30% of Singapore's total water needs in 2060
**Government's projections based on economic growth*

Assumptions

Infrastructure

- Capacity of future and new water plants is the average of 3 newest existing plants
- Singapore will always have 2 months worth of potable water reserve stored

Environmental

- 70 percent water loss via surface evaporation
- 10 percent water loss via seepage underground

People

- Government's water conservation target of daily 130 liter per capita by 2030 is met
- Population, and economy continues to grow until 2060

Analysis Approach

	Low water demands	Expected water demand	High water demands
	Low population projection	Expected population projection	High population projection
	High rainfall	Expected rainfall	Low rainfall
	High Conservation Effort	Expected Conservation Effort	Low Conservation Effort
	High water price	Expected water price	Low water price

What is the water supply needed?

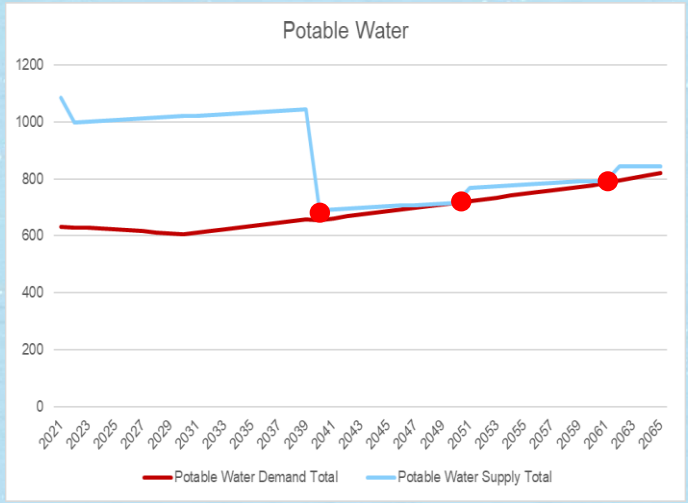
Demonstration of model

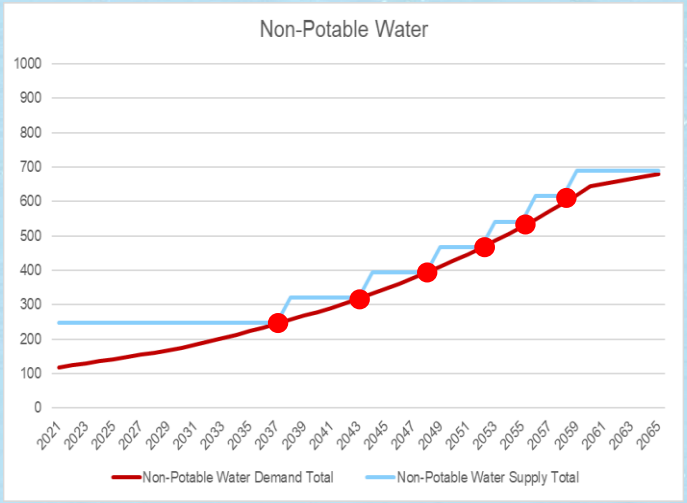
Excel demo

Scenario 1 – Expected water demands

Expected water demands

- Medium population projection
- Medium rainfall
- Expected Conservation Efforts
- Medium water price hike
- Agreement ends in 2040





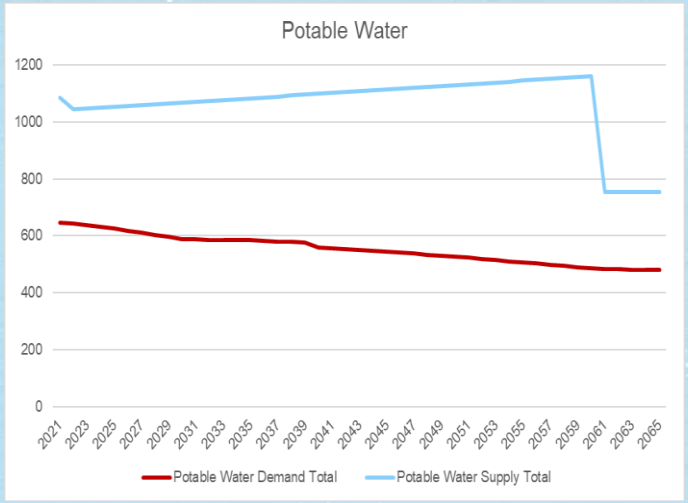
# New Build Desalination Plant	3
# Plants	Required by
1	Year 2040
2	Year 2051
3	Year 2062

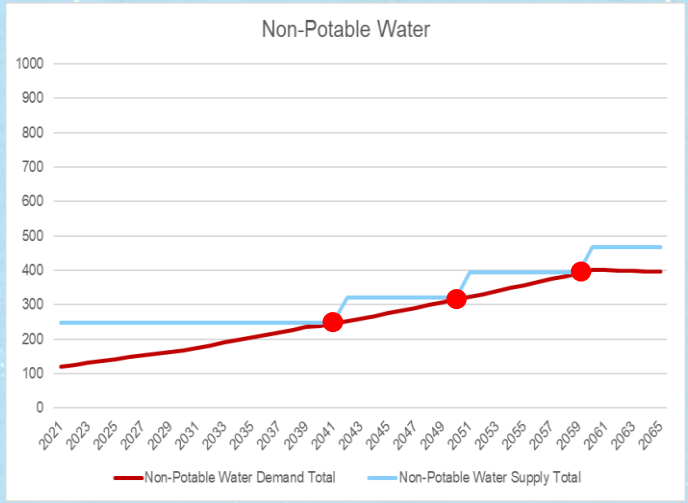
# New Build NEWater Plant	6
# Plants	Required by
1	Year 2038
2	Year 2044
3	Year 2049
4	Year 2053
5	Year 2056
6	Year 2059

Scenario 2 – Low water demands

Low water demands

- Low population projection
- High rainfall
- High Conservation Effort
- High water price hike
- Agreement ends in 2061





No new desalination plant needed

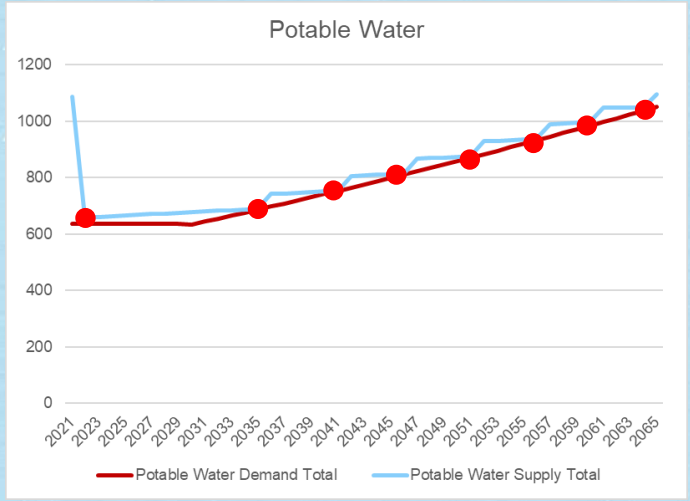
# New Build NEWater Plant	3
# Plants	Required by
1	Build by Year 2042
2	Build by Year 2051
3	Build by Year 2060

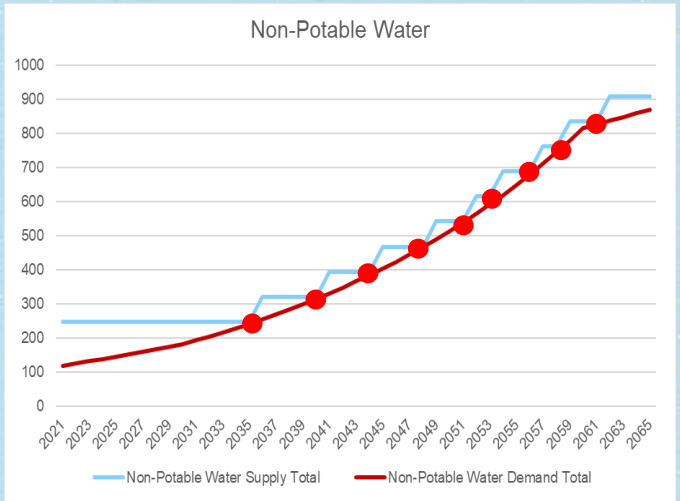
Potable water demand decreases due to low population (~6m in 2060) and aggressive water conservation

Scenario 3 – High water demands

High water demands

- High population projection
- Low rainfall
- Low Conservation Effort
- No water price hike
- Agreement ends in 2022



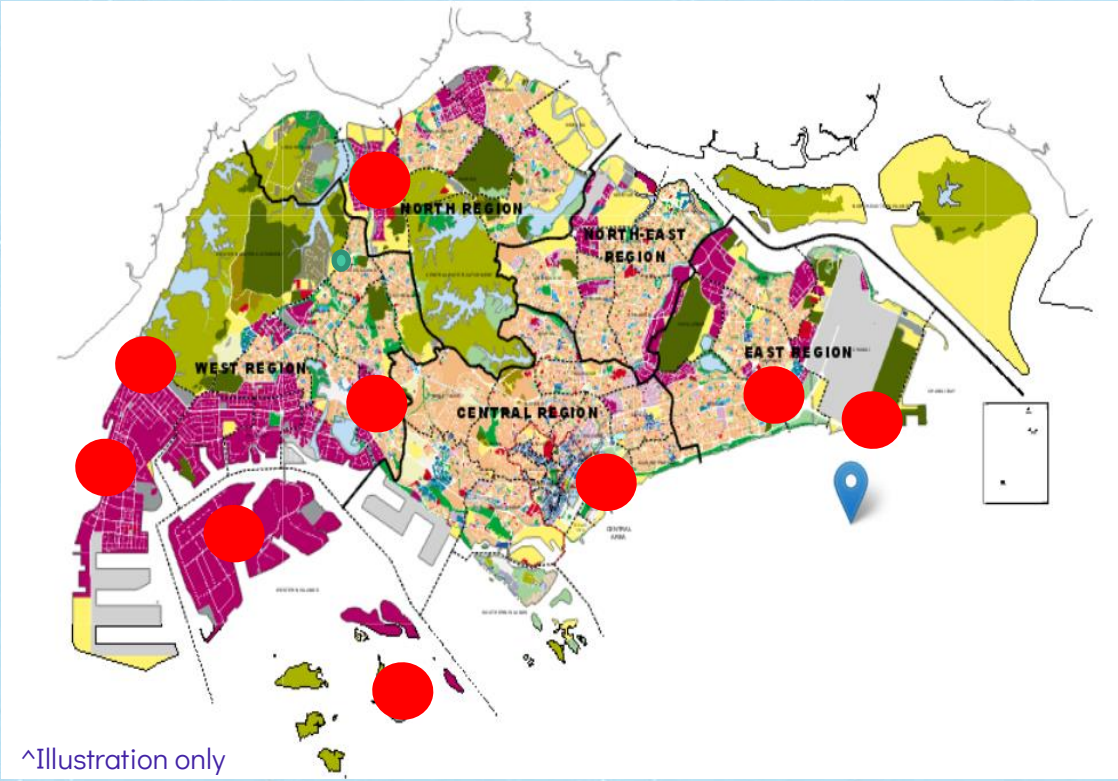


# New Build Desalination Plant	9
# Plants	Required by
1, 2	Year 2022
3	Year 2036
4	Year 2042
5	Year 2047
6	Year 2052
7	Year 2057
8	Year 2061
9	Year 2065

# New Build NEWater Plant	9
# Plants	Required by
1	Year 2036
2	Year 2041
3	Year 2045
4	Year 2049
5	Year 2052
6	Year 2054
7	Year 2057
8	Year 2059
9	Year 2062

Land constraint estimation

URA Master Planning Map 2022



^Illustration only

- Average size of NEWater and Desalination plant is ~265,000 m^2
- 19 plants = 5 million m^2
- Based on URA MP2019, there is *14 million m^2 set aside for Utilities (including water plants)

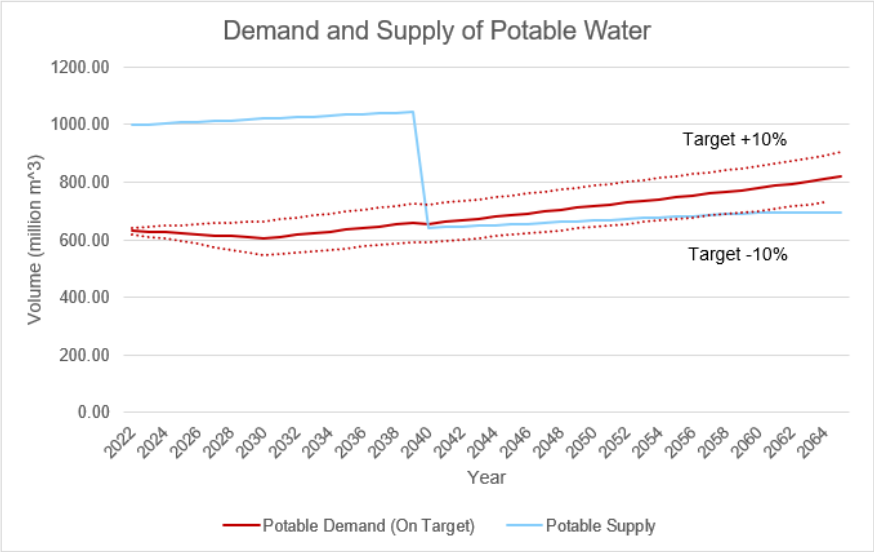
*14 million includes existing facilities and infrastructure

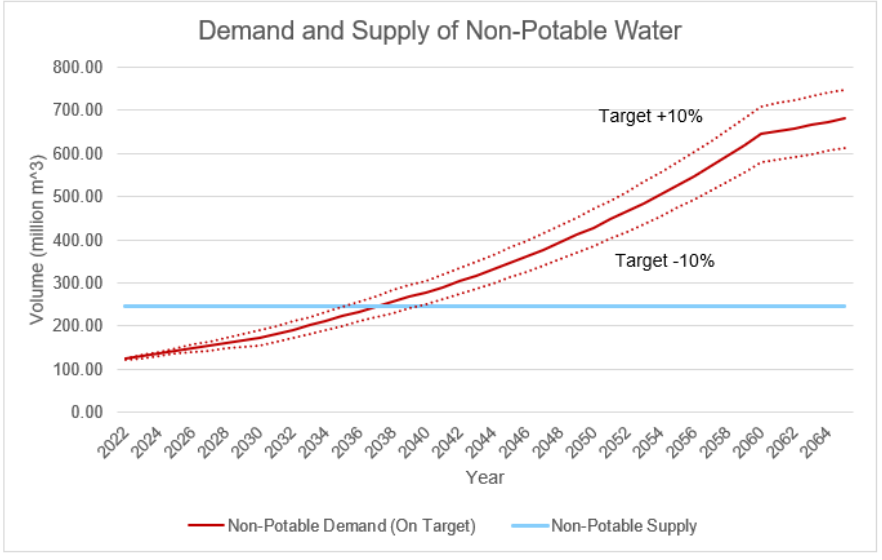
Conclusion

Sensitivity and Trade-Off

Sensitivity Analysis [1]

Conservation efforts

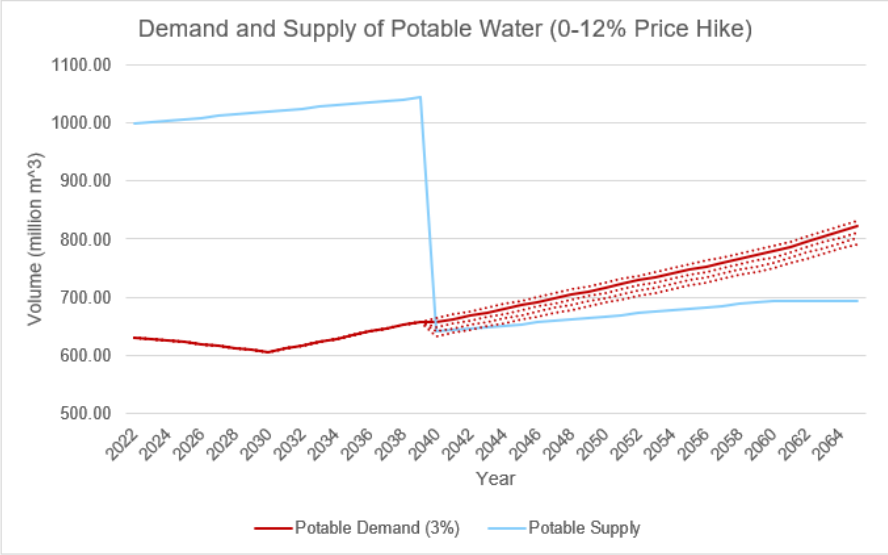


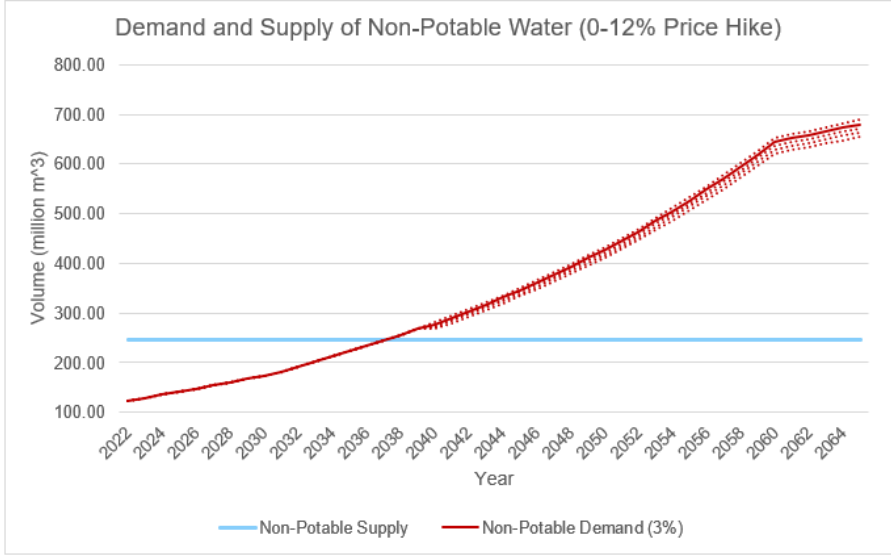


- Based on sensitivity analysis, **conservation efforts has the highest impact on demand**

Trade-Off Analysis [2]

$ Price Hike





- A +- 3% price hike will not change the demand much because **water is price inelastic**

If we all play our part in saving water, only *9* new plants are estimated to be needed

- Water conservation efforts is key in reducing demand
- Increasing local rainwater catchment is key in increasing supply and achieving self-sustainability

Thank you

Questions and answers