

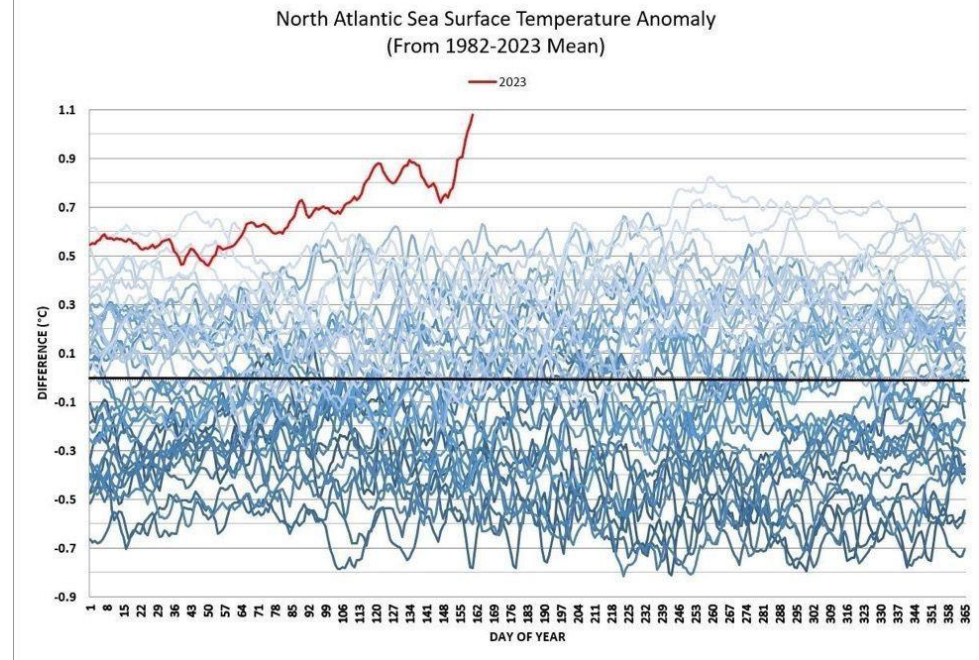
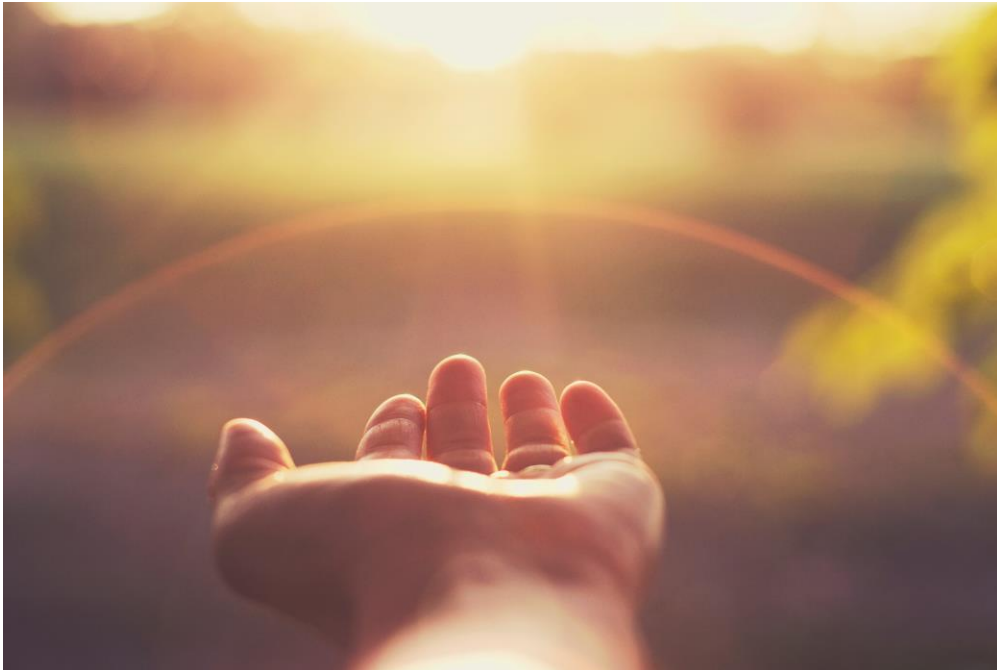
Scott Pearson

# How Pragmatic Design Improves Water Sustainability



**water**  
NEW ZEALAND  
CONFERENCE & EXPO  
17-19 OCTOBER 2023  
Tākina, Te Whanganui-a-Tara Wellington

# Sustainability...











**Energy savings and pumping efficiency**



# Energy Efficiency and Conservation Authority



IDEAL TIME FOR ENERGY SAVINGS IS AS EARLY AS POSSIBLE.



TIME PRESSURES CAN MEAN YOU BUY OF THE SHELF AND MISS LONG TERM OPPORTUNITIES

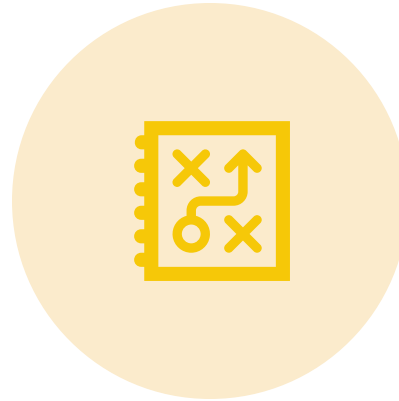


SOUND DESIGN ADVICE AT THIS EARLY STAGE IS CRUCIAL FOR MAXIMISING AND PROTECTING YOUR INVESTMENT.

# Energy Conservation Measures



IDENTIFY AREAS WHERE  
ENERGY CAN BE REDUCED



CHALLENGE THE  
BASELINE



DON'T FORGET NEW(ER)  
TECHNOLOGIES

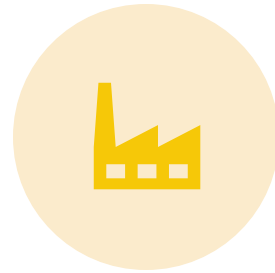
# Pumping



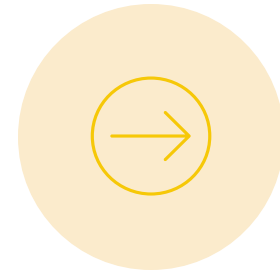
LOWER THE  
LEVEL (2%)



MORE EFFICIENT  
MOTORS (1%)



OPTIMISE PLANT  
OPERATION



SELECT THE  
RIGHT PUMPS

# Pumping Summary

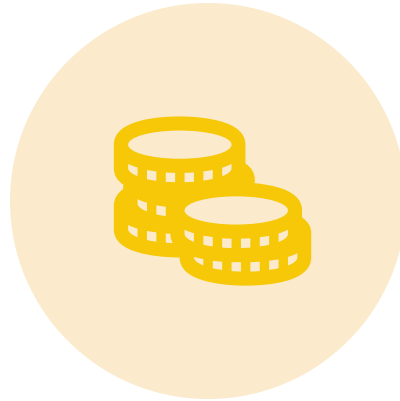
Parameter	Pumping Combination			
	3 x 10,000 m <sup>3</sup> /day	1 x 10,000 m <sup>3</sup> /day, 2 x 15,000 m <sup>3</sup> /day	3 x 15,000 m <sup>3</sup> /day	2 x 20,000 m <sup>3</sup> /day
Average energy use (kWh/m <sup>3</sup> )	0.371	0.366	0.363	0.359
Average energy cost (\$ / annum)	\$393,000	\$387,000	\$384,000	\$380,000
Total Energy over 25 years (GWh)	46.0	45.3	45.0	44.5
25-year NPV (\$)	\$(4,350,000)	\$(4,310,000)	\$(4,235,000)	\$(4,160,000)



# Membranes



LET THE SUPPLIERS  
LOOSE?



ENERGY COST VS  
CAPITAL



CHEMICAL USE

# Heat Management



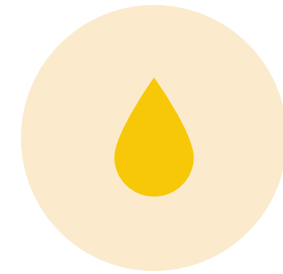
EXHAUST  
HOT AIR



INSULATION



RE-USE



WATER  
HEATING

# Compressed Air



VALVES AND EQUIPMENT  
>6 BAR



INTEGRITY TESTING  
<3 BAR



AIR SCOUR  
~2 BAR



VARIABLE VS FIXED  
SPEED



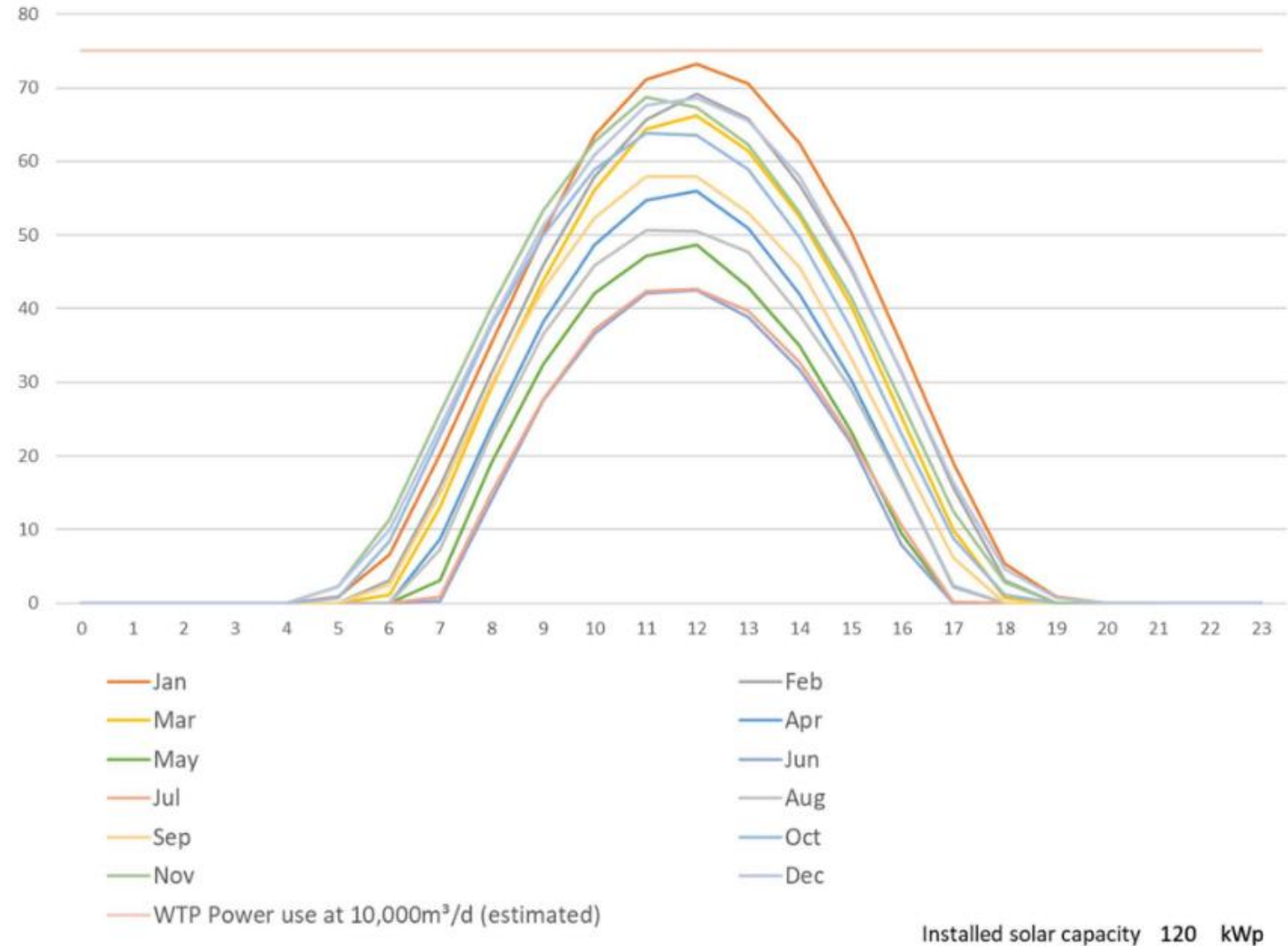
# Energy Recovery

Free energy!

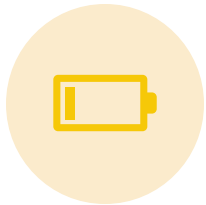
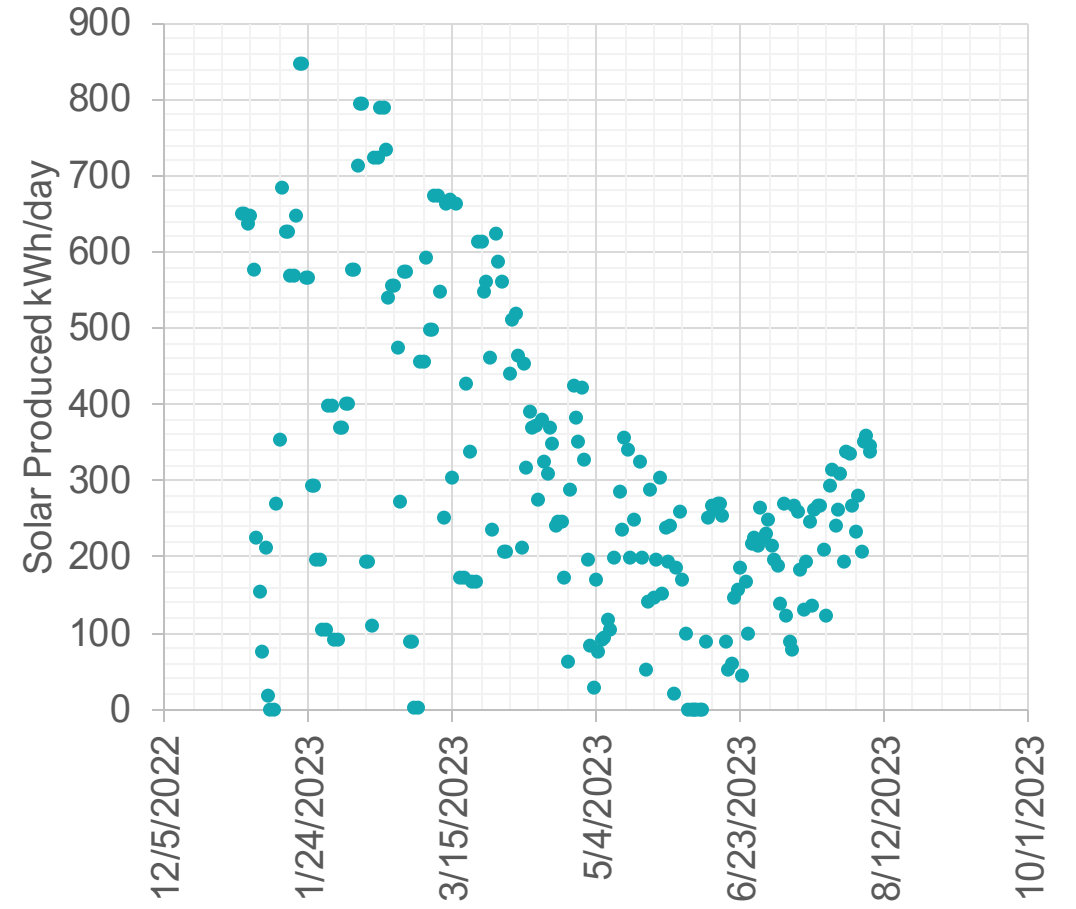
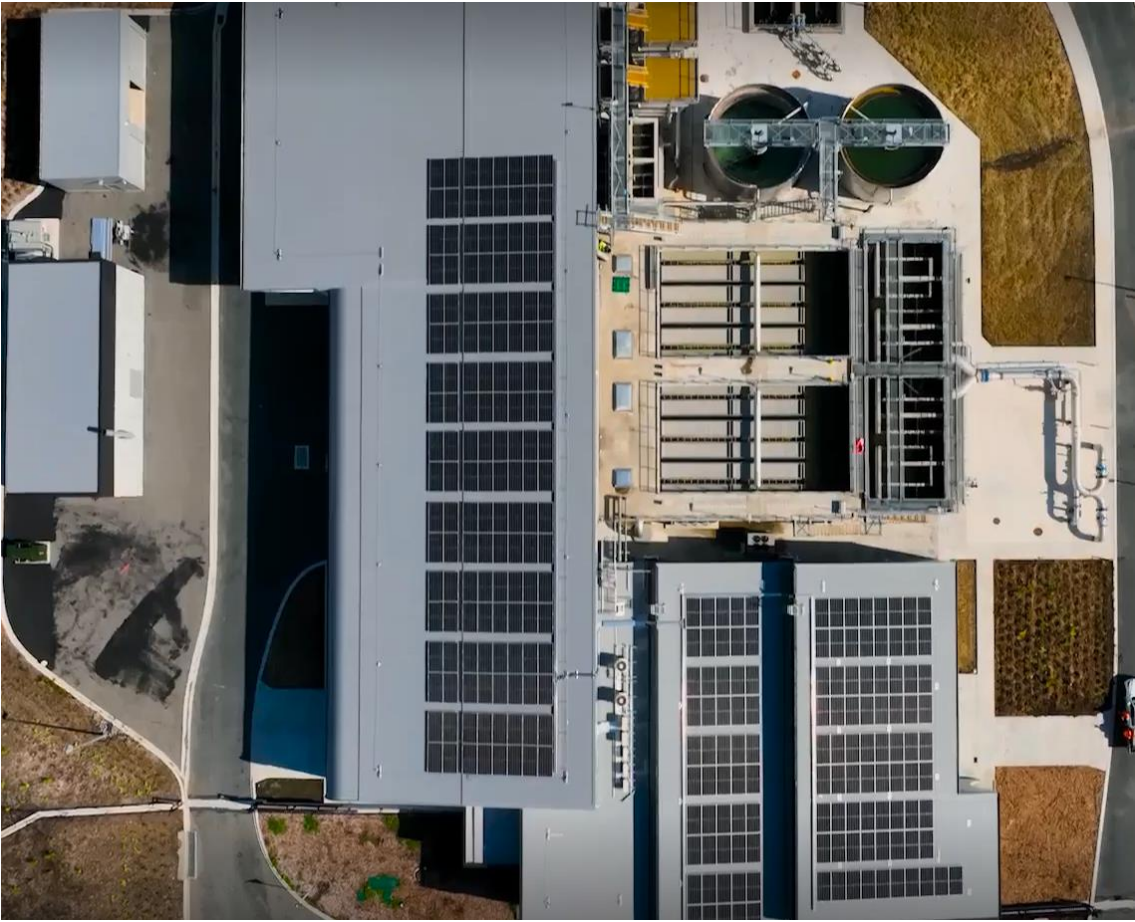


# Embedded Generation

- 12 year estimated payback period
- \$40,000 positive 25 year NPV
- 6.8% 25 year IRR







65,000 kWh  
TO AUGUST



120,000 kWh  
ANNUAL



150,000 kWh  
THEORETICAL



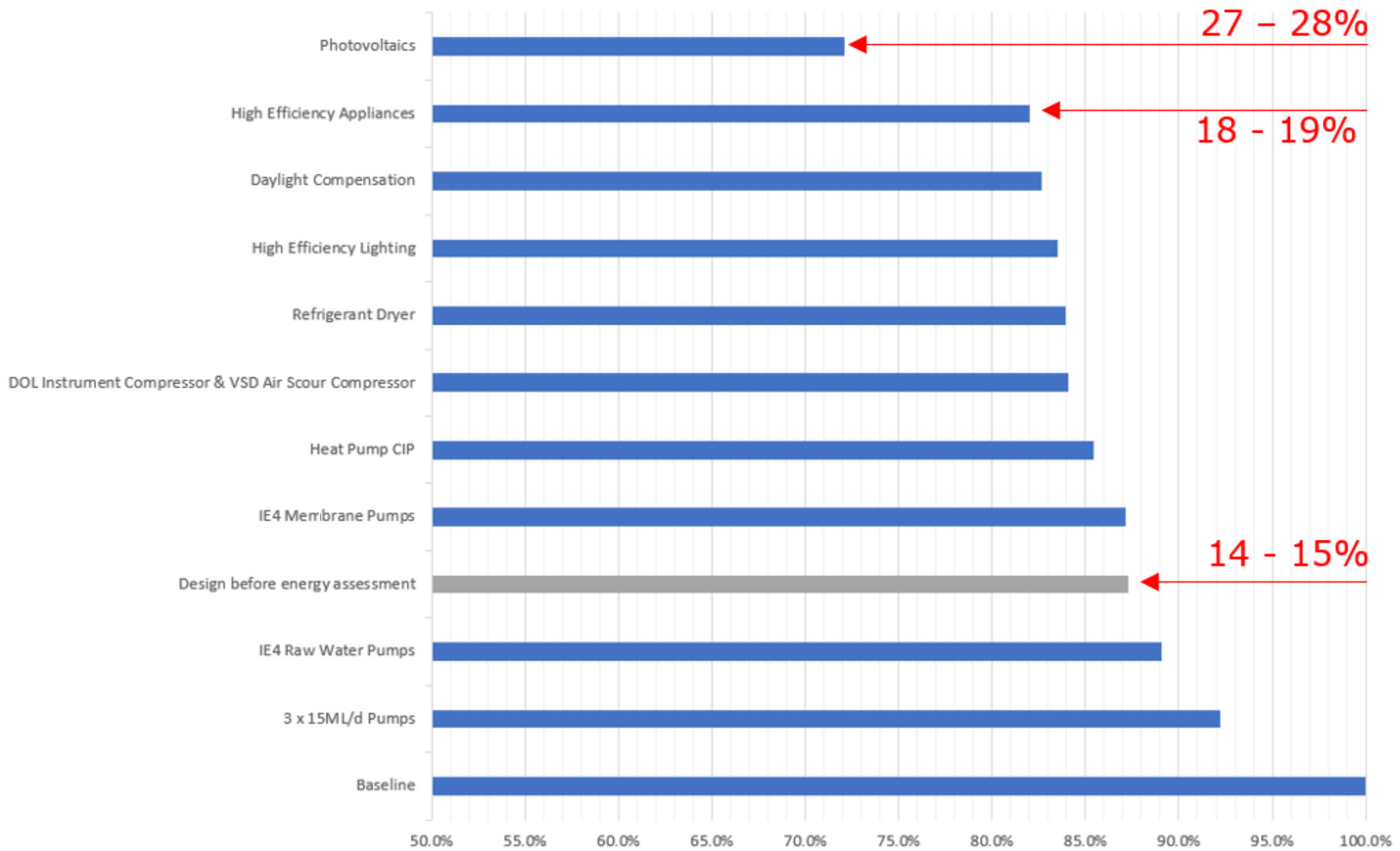
>1 YEAR IN FIRST  
6 MONTHS...



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# Relative Energy Consumption of Energy Conservation Measures





## Other Sustainable Features

# Other Project Sustainable Features

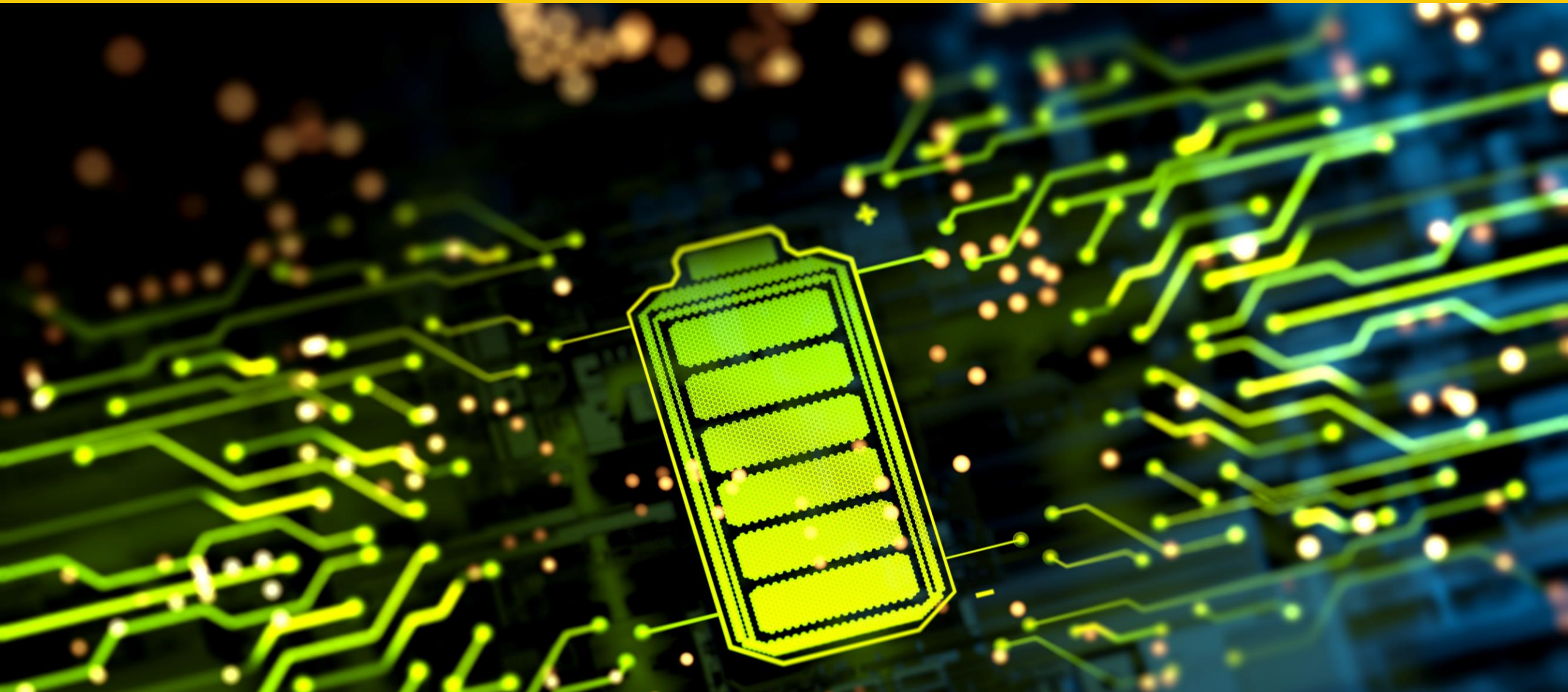
- Business as Usual:
  - lighting, appliances and HVAC.
  - Sustainable materials, e.g. VOCs and formaldehyde
- Water re-use
- Natural light
- Insulation and double glazing
- Maximise thermal mass
- High level actuated windows
- Fly ash concrete
- Reduced mowing areas –low maintenance gardens instead





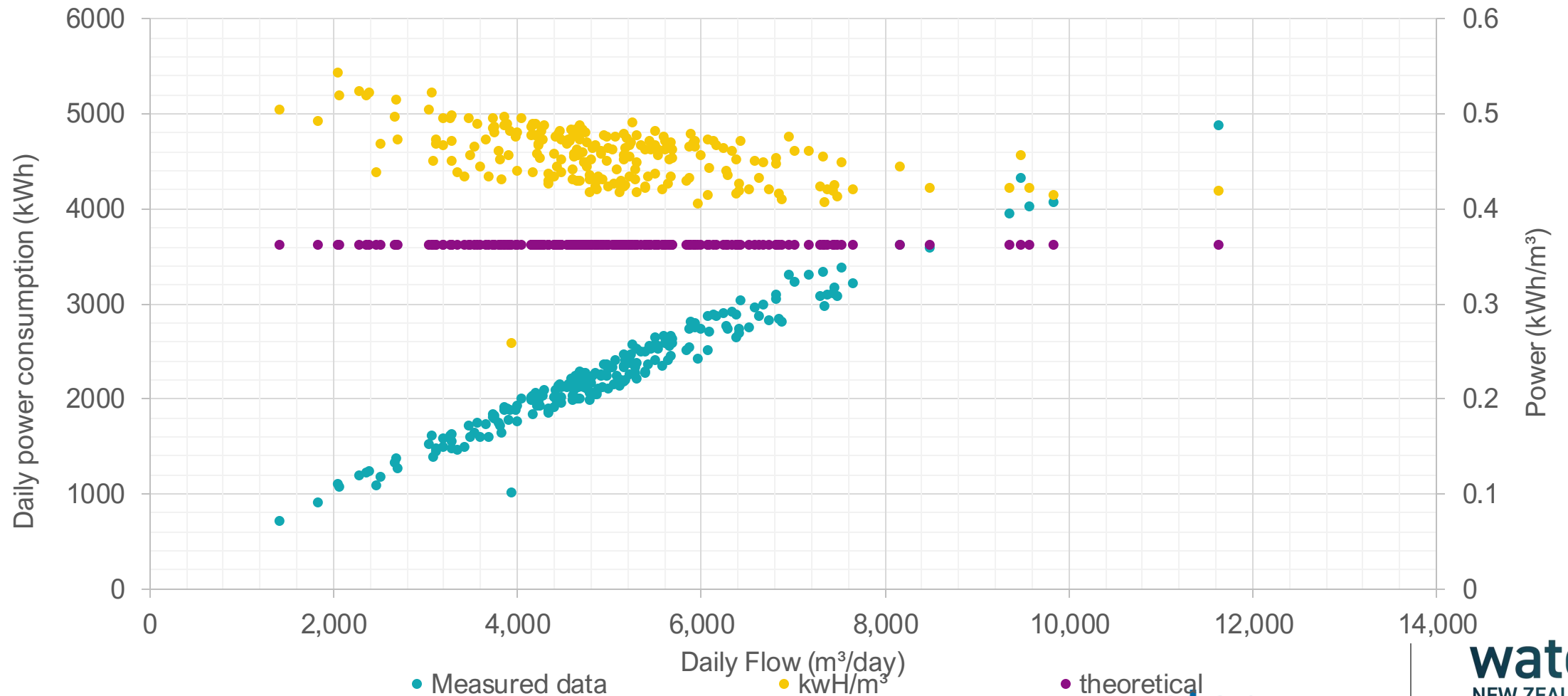




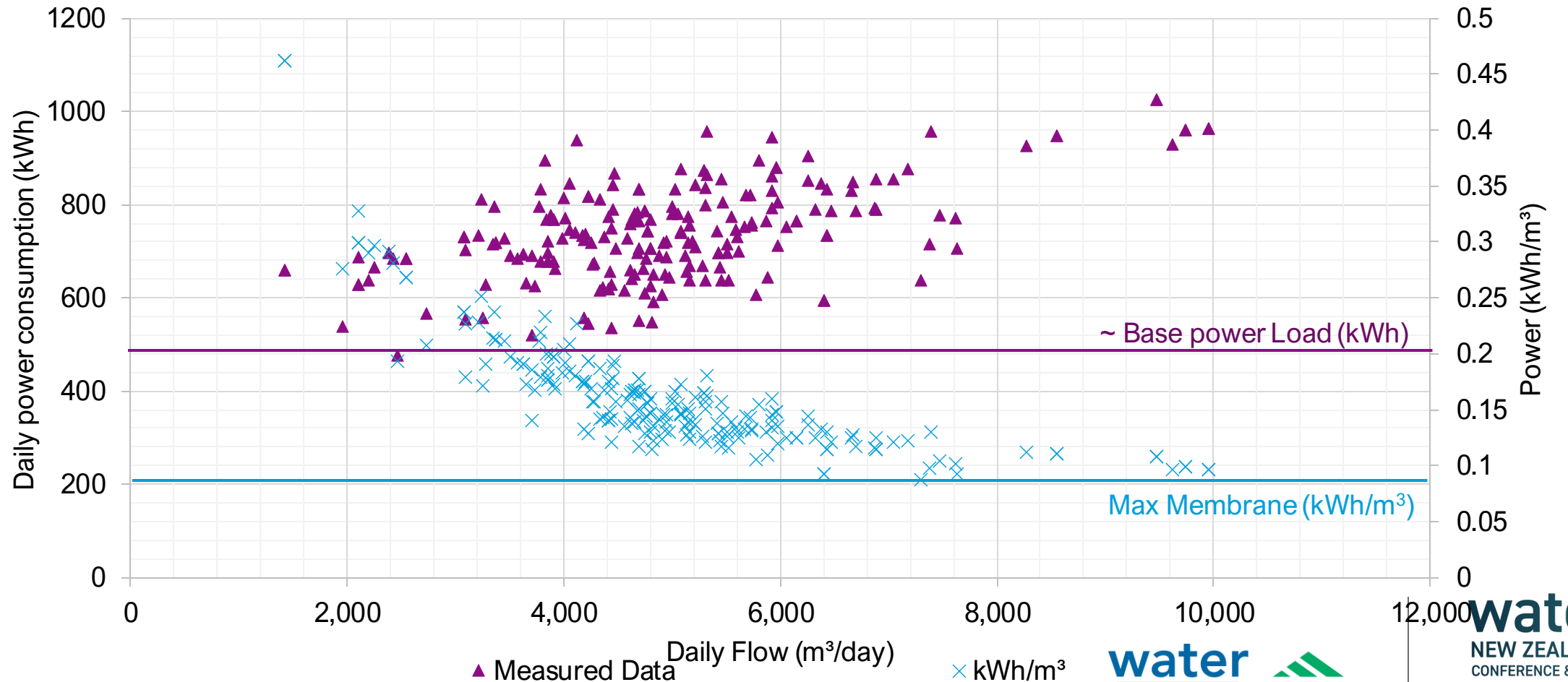


# Energy Monitoring

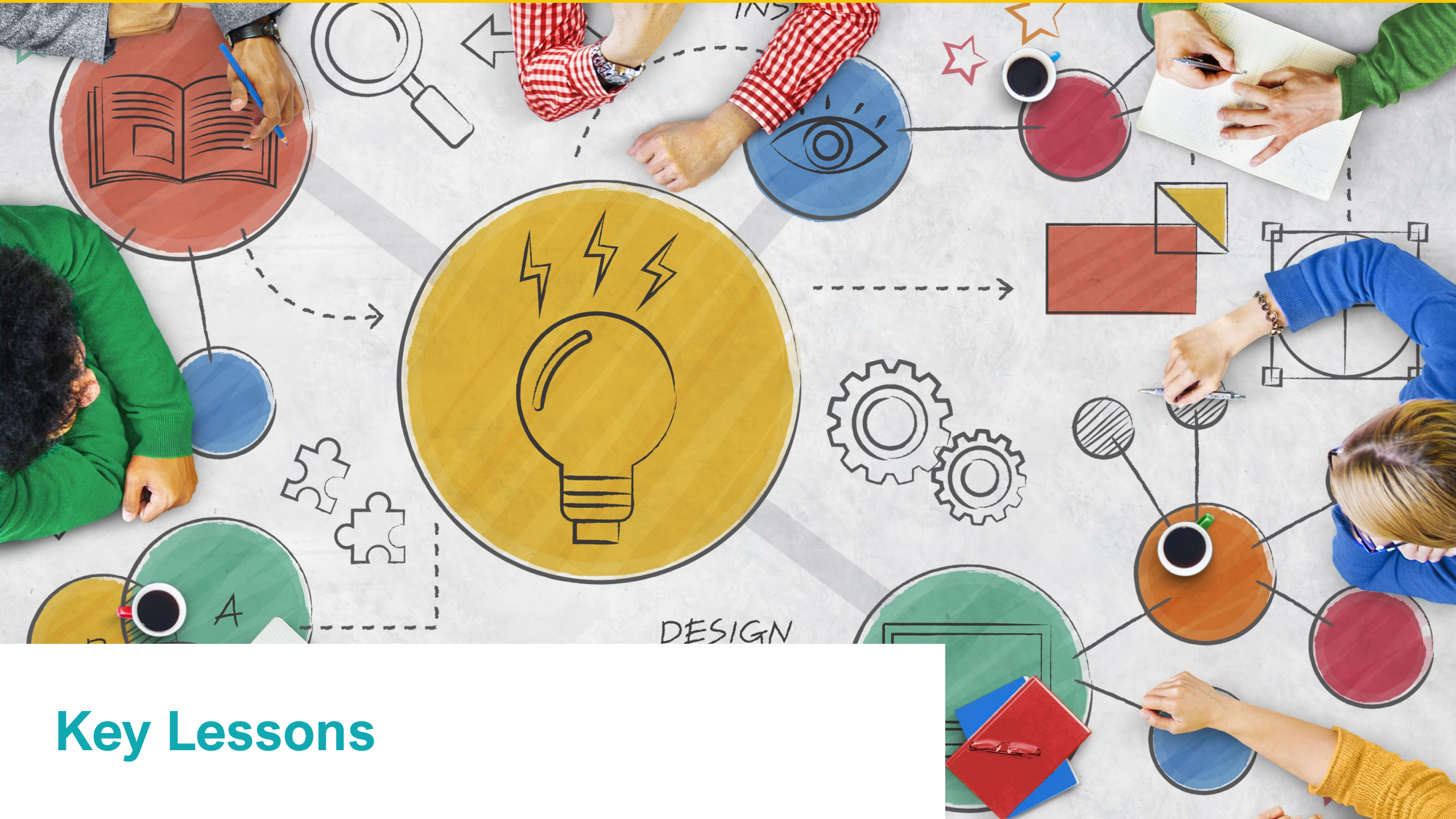
# Raw Water Pump Station



# Water Treatment Plant







# Key Lessons

# Key Lessons



WHO IS YOUR BRYAN?



THE RIGHT MINDSET



START EARLY



ANCILLARY SYSTEMS,  
SUB-METERING AND  
MONITORING



EFFORT  $\propto$  VALUE