



Veolia Solutions Enable Customers to Achieve Sustainability Goals

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Speaker 2: Alex Waite – City of Santa Monica



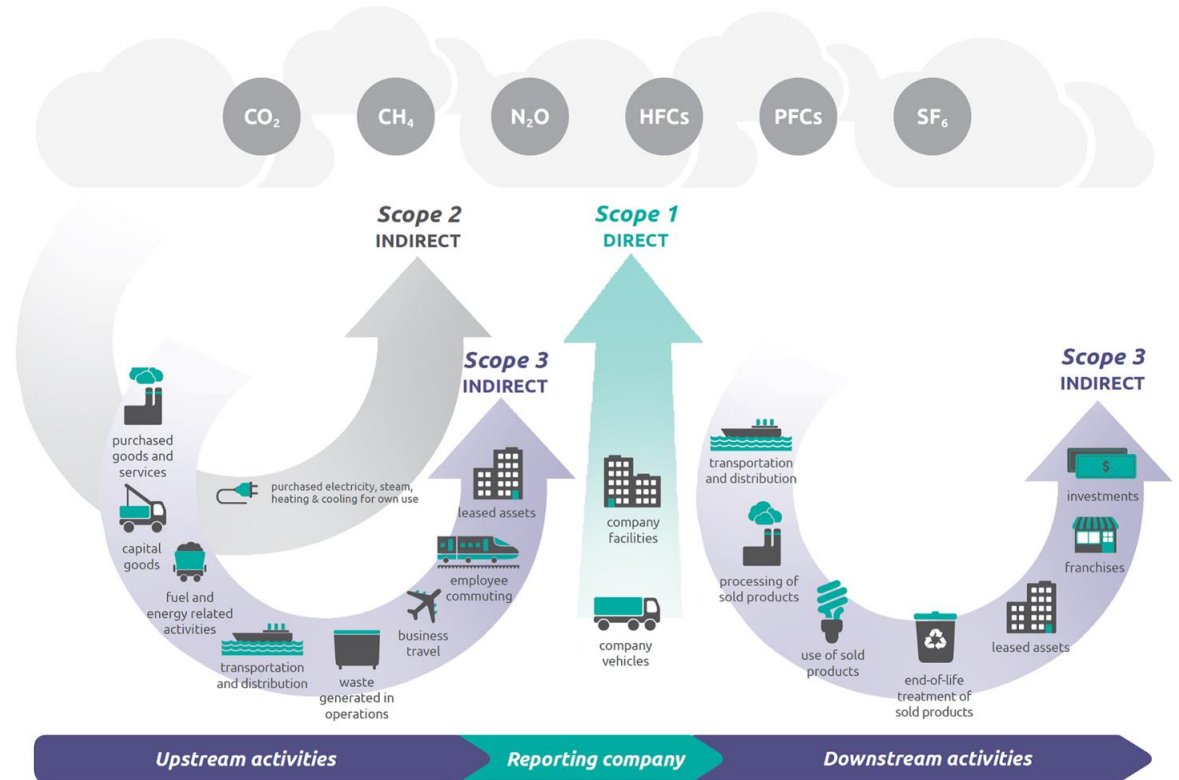


Agenda

1. City of Santa Monica Overview – Indirect Potable Reuse Project
2. GHG Quantification Methodology
3. City of Santa Monica Project Quantification
4. Food and Beverage Water Reuse Project Quantification
5. Anaerobic Digestion Facility Project Quantification
6. Question Period

Sustainability Goals

- Interrelated Impacts:
 - Emission reduction
 - Water conservation
 - Waste reduction
- All levels of government + private sector work towards goals



City of Santa Monica Sustainable Water Infrastructure Project

City of Santa Monica – Water Resources Division



93,000+ residents
2,700+ commercial
customers



Drinking water and
fire protection



groundwater (local)
surface water (MWD)



Sewer collection and
recycled water

**9 million
gallons**

of high-quality drinking
water daily

14 million gallons

of wastewater captured
and delivered for
treatment each day

77,000 gallons

per day of recycled
water

**4 water storage
reservoirs**

totaling 40 million gallons



City of
**Santa
Monica**

Goals of the City's Sustainable Water Master Plan

- Diverse, sustainable, & drought resilient water supply to support a sustainable community
- Reduction of energy footprint to support carbon reduction goals for the City
- Long term cost benefits for rate payers



PLAN AT A GLANCE

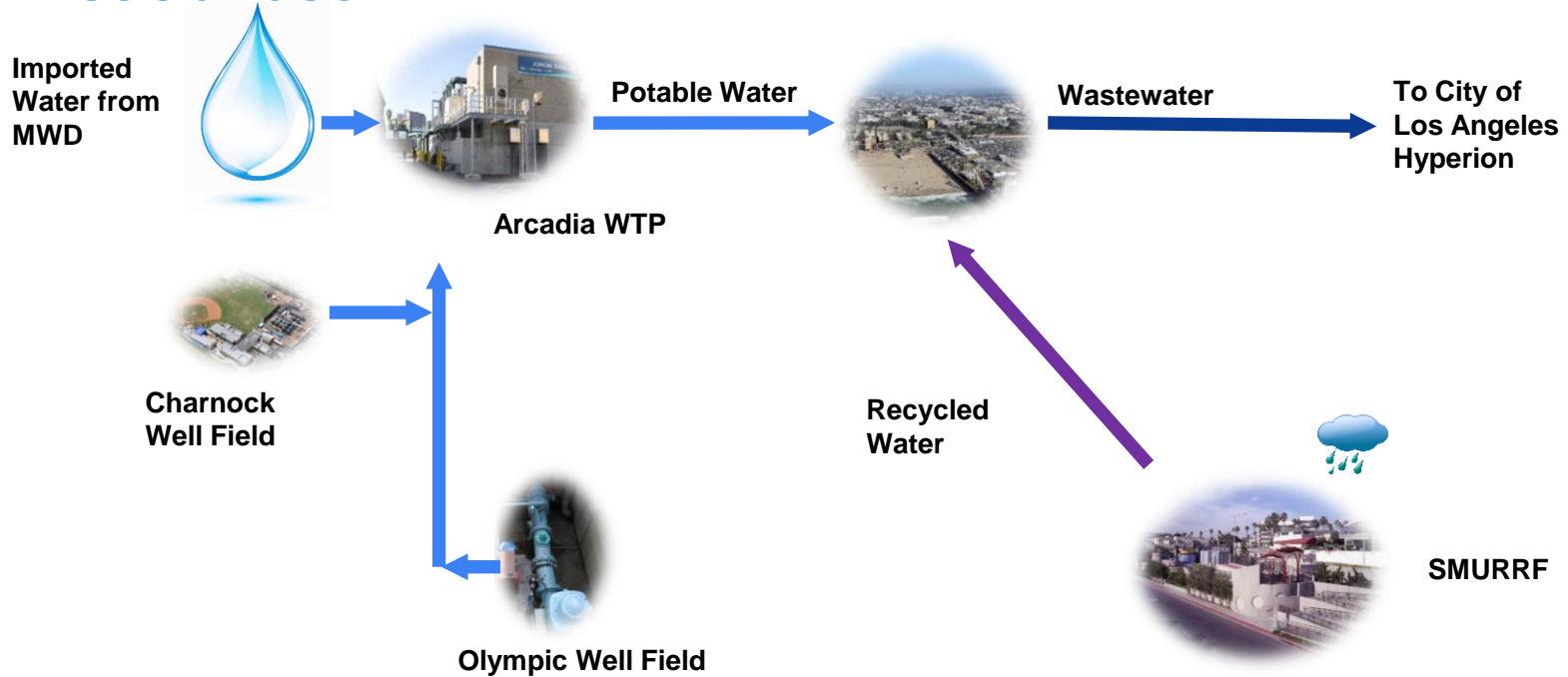
The CAAP is a guiding document that provides overarching policy direction to achieve the interim goal of an 80% reduction in emissions by 2030 and to increase Santa Monica's resilience to climate change hazards and impacts. The plan supports and enhances many existing plans and initiatives within the City. The CAAP also suggests new plans and actions to supplement ongoing efforts and create new initiatives.

CLIMATE ACTION SECTOR	OBJECTIVES	SUPPORTING EFFORT
ZERO NET CARBON BUILDINGS	<ul style="list-style-type: none"> • Achieve 100% renewable grid electricity • Install 100 MW of local solar energy • Reduce fossil fuel use 20% in existing buildings • Discourage fossil fuels in new buildings 	<ul style="list-style-type: none"> • Zero net energy for new residential construction (2017) • Zero Waste Strategic Operations Plan (2014) • Disposable Food Serveware Ordinance (2018)
ZERO WASTE	<ul style="list-style-type: none"> • Divert 95% of materials from landfills 	<ul style="list-style-type: none"> • Plastic Bag Ban (2011) • Mandatory solar for new commercial construction (2017)
SUSTAINABLE MOBILITY	<ul style="list-style-type: none"> • Convert 50% of local trips to foot, bike, scooter & skateboard • Convert 20% of commuter trips to transit • Convert 50% of vehicles to electric or zero emission 	<ul style="list-style-type: none"> • Land Use & Circulation Element (2008) • Bike Action Plan (2011) • Pedestrian Action Plan (2016) • Electric Vehicle Action Plan (2017)
CLIMATE ADAPTATION SECTOR	OBJECTIVES	SUPPORTING EFFORT
CLIMATE READY COMMUNITY	<ul style="list-style-type: none"> • Increase community resilience to climate change • Protect vulnerable groups from impacts • Integrate climate change impacts into City planning, operations & infrastructure projects 	<ul style="list-style-type: none"> • All Hazards Mitigation Plan (2015) • Santa Monica Organizations Active in Disaster (2018)
WATER SELF-SUFFICIENCY	<ul style="list-style-type: none"> • Achieve water self-sufficiency by 2023 	<ul style="list-style-type: none"> • Water Neutrality Ordinance (2017) • Sustainable Water Master Plan (2018)
COASTAL FLOODING PREPAREDNESS	<ul style="list-style-type: none"> • Enhance natural systems to prevent damage from coastal flooding • Increase resilience of public and private assets in the coastal flood zone 	<ul style="list-style-type: none"> • Local Coastal Program Land Use Plan (2018)
LOW CARBON FOOD & ECOSYSTEMS	<ul style="list-style-type: none"> • Increase self-reliance through local food production • Reduce or sequester carbon emissions from food production, consumption, waste and landscape management and natural processes 	<ul style="list-style-type: none"> • Urban Forest Master Plan (2016)

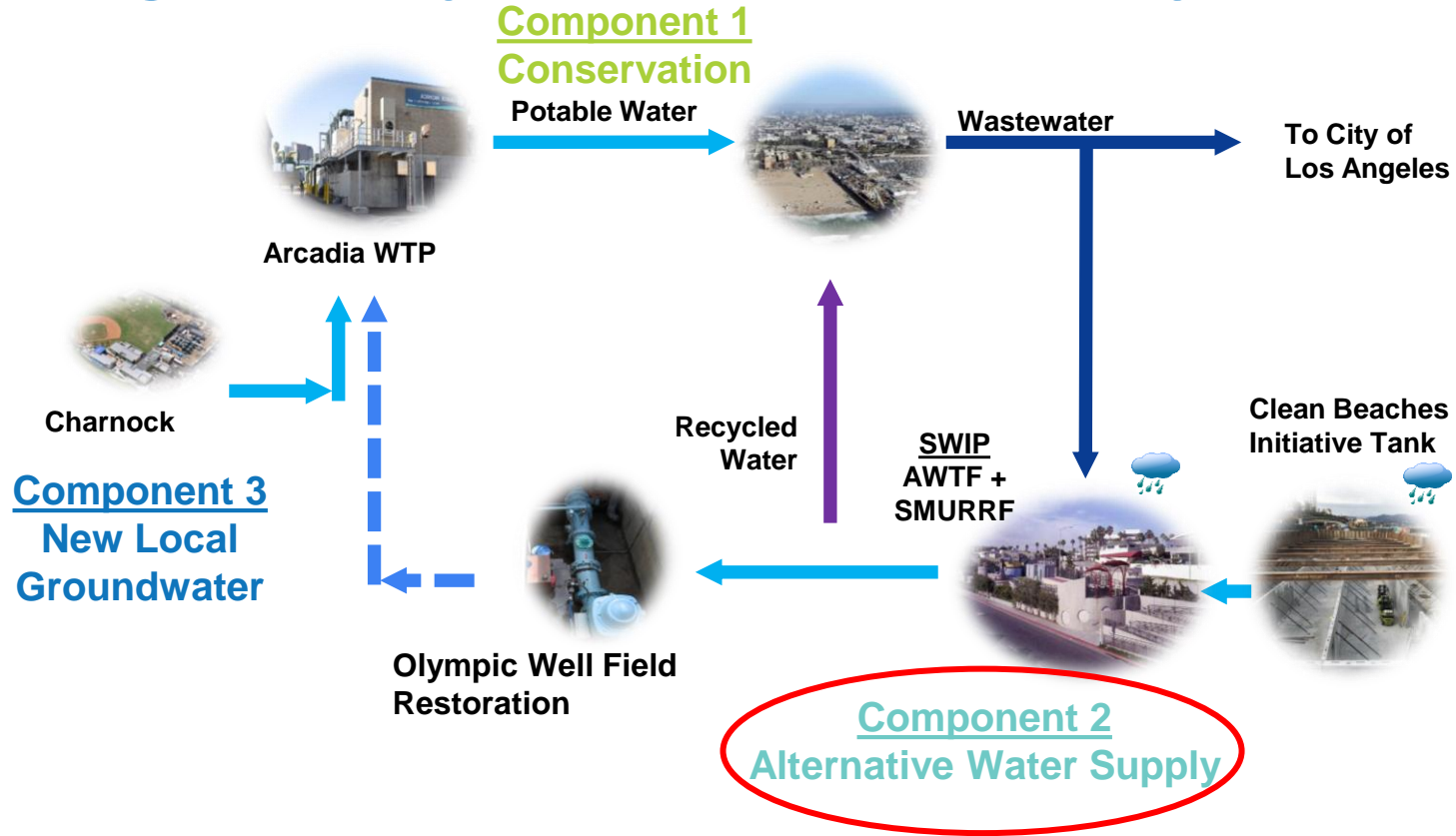
The CAAP is not an element of the City's General Plan or a regulatory document for the purposes of streamlining the California Environmental Quality Act (CEQA) process. Any policy or ordinance described in the CAAP must be developed and adopted through a public review process.

Integrated Approach to Maximize Local Water Resources

Resources



Closing the Loop on the One-Water Cycle



Sustainable Water Infrastructure Project (SWIP)



Advanced Water Treatment Facility



1.5 MGD

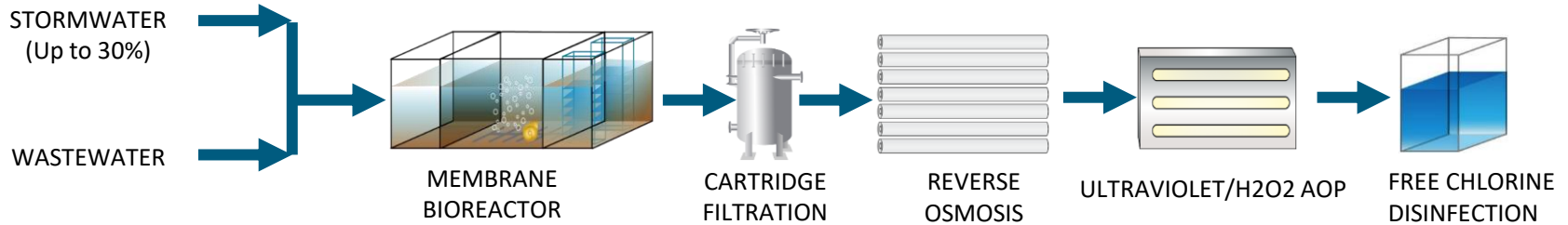
Santa Monica Urban Runoff Recycling Facility



SWIP's Multiple Benefits

- Improves beach water quality
- Provides EWMP/MS4 compliance
- Drought resilient water supply
- Diversifies City's water supply portfolio
- Increases recycled water production
- Augments local groundwater supply
- Creates ~1,600 AFY of local water supply for the City

SWIP Advanced Water Treatment Facility (AWTF)



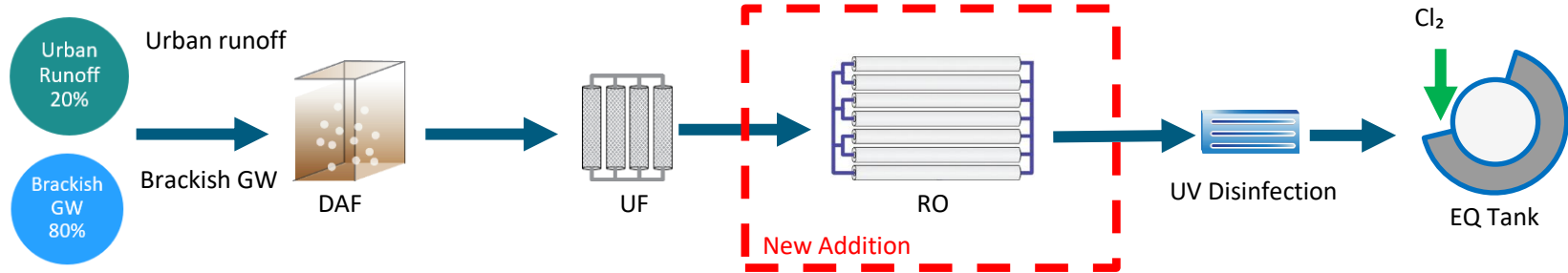
Process	Virus	Cryptosporidium	Giardia
MBR	1.0	2.5	2.5
Cartridge Filters	-	2.0	2.5
RO	1.5	1.5	1.5
UV-AOP	6.0	6.0	6.0
Chlorine	5.0	-	-
Total	13.5	12.0	12.5
Required for Title 22 GRRP	12.0	10.0	10.0



First MBR and CF
Granted LRVs in CA!



Santa Monica Urban Runoff Recycling Facility (SMURRF)



- Originally constructed in 2000 as stormwater BMP
- Provides pollution control for MS4 and EWMP compliance
- Produces up to 500 AFY of Title 22 diluent water pending WDR/WRR permit amendment for GRRP



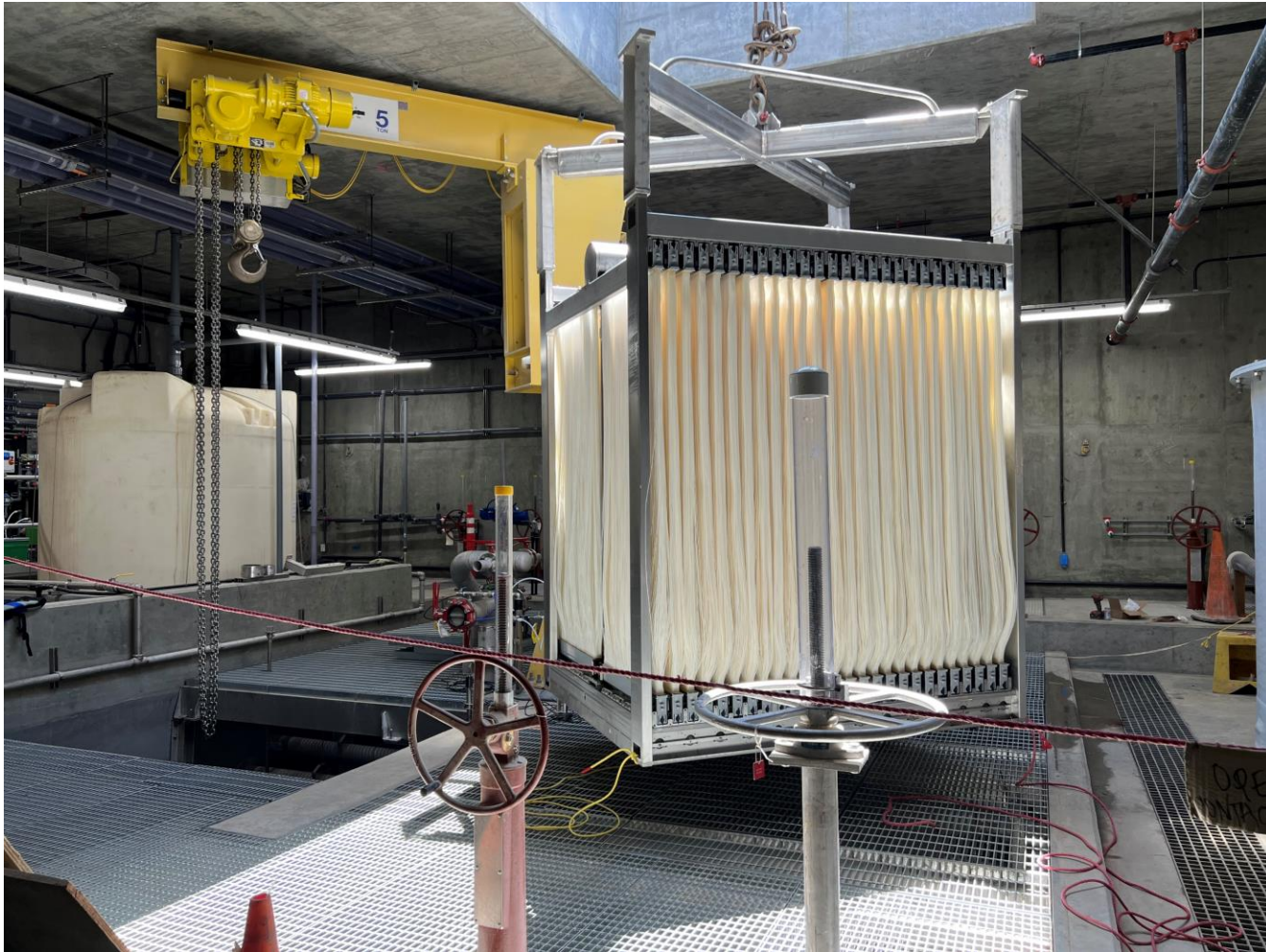
First stormwater direct injection project in CA!





First underground AWTF in CA!





City of
**Santa
Monica**



City of
**Santa
Monica**

| Greenhouse Gas Assessments

Climate Change: Local Impacts

GRADUAL CLIMATE CHANGES

Increased Temperature

Fluctuations in
Precipitation

Sea Level Rise

LOCAL CLIMATE HAZARDS

Extreme Heat Events

Worsened Air Quality

Increased Drought

Increased Wildfire

Increased Coastal Flooding

DIRECT IMPACTS

Heat-related illness or death

Power outages

Increased beach tourism & congestion

Asthma & respiratory impacts

Water shortages

Increased utility rates

Crop loss & increased food prices

Property loss & damage

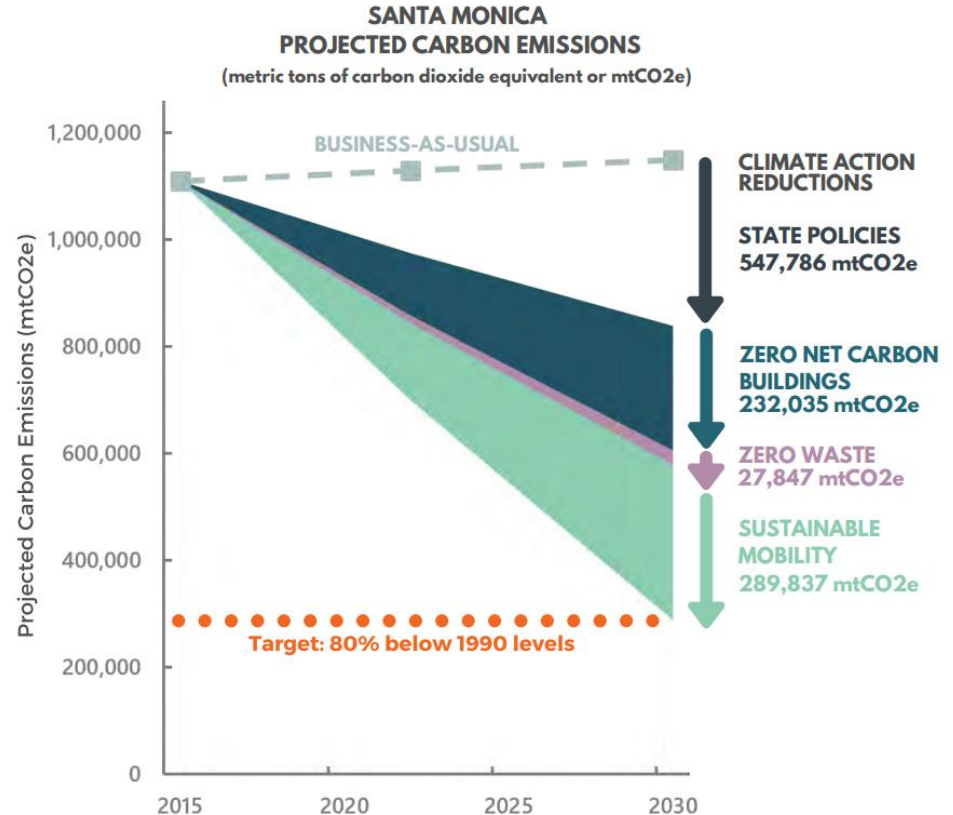
School & business disruption

Transportation impacts



Greenhouse Gas Reduction Targets

- Regulatory/compliance + voluntary action on climate change
- Municipalities can set procurement targets to match policy goals
- **GHG quantification lets us measure and track progress**



Quantification Methodology

Step-by-Step

Base Case: status quo, current practice
Project Case: new project, process change

01

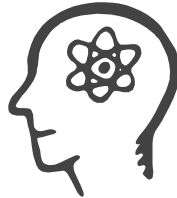
Identify Project
and Base Case
Scenarios



New vs. Pre-existing
Solution

02

List Project and
Base Case
Emissions



e.g., Electricity use,
Chemical use,
Haulage/Diesel use

03

Emission Factor
Retrieval



Converts all
units to TCO₂eq

04

Emission
Calculation



Positive or negative
net emissions, **WHY?**

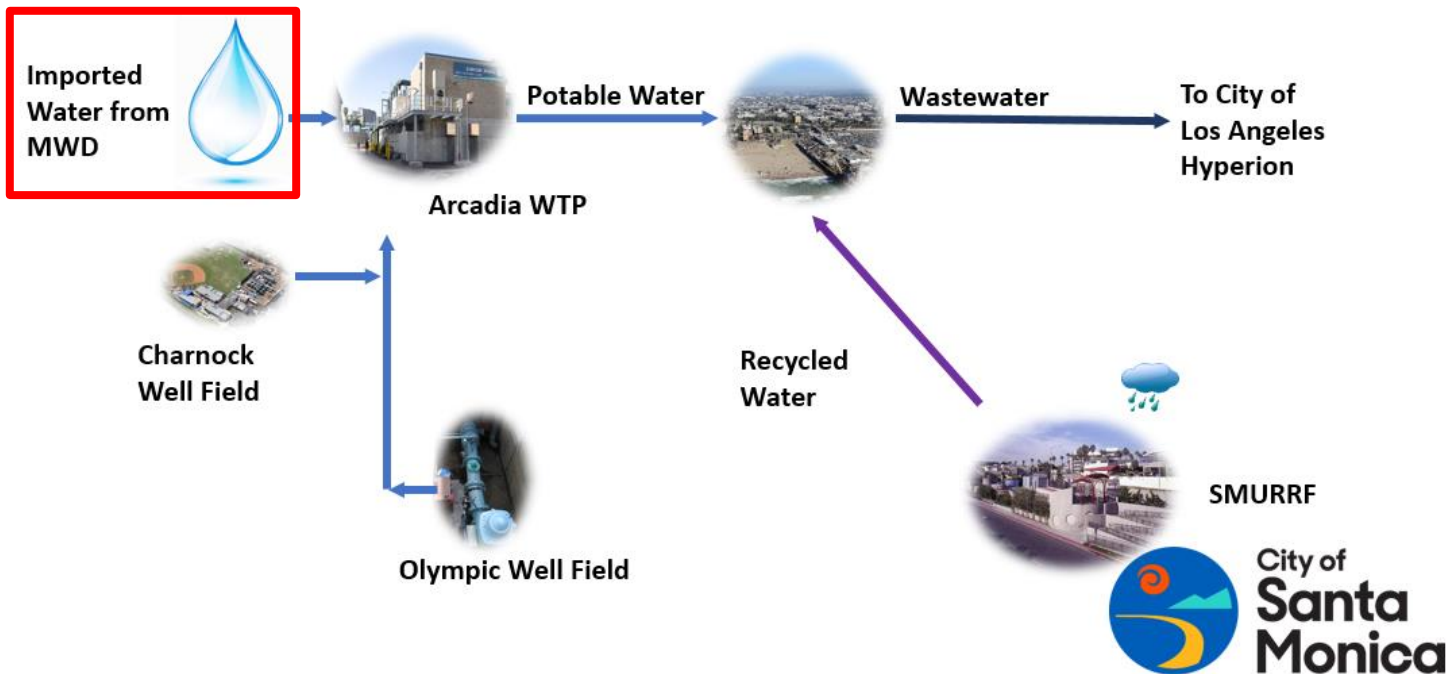


Project 1 – Santa Monica Project Quantification

Project 1 – Santa Monica: Indirect Potable Reuse for Aquifer Recharge

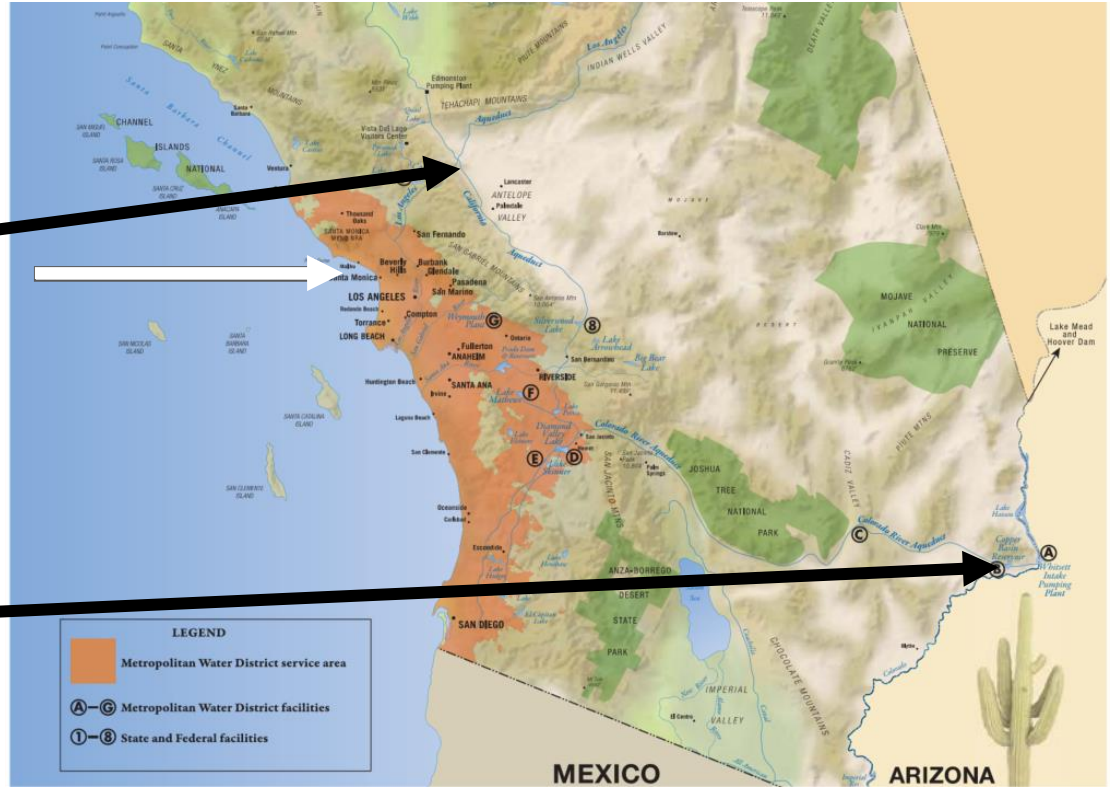
Base Case

- Relies on well water and imported freshwater for potable water
- Importing water emits ~ 0.8 TCO₂eq per million litres, city uses ~ 10 billion litres per year



Project 1 – Santa Monica: Indirect Potable Reuse for Aquifer Recharge

Project Case



Project 1 – Santa Monica: Indirect Potable Reuse for Aquifer Recharge

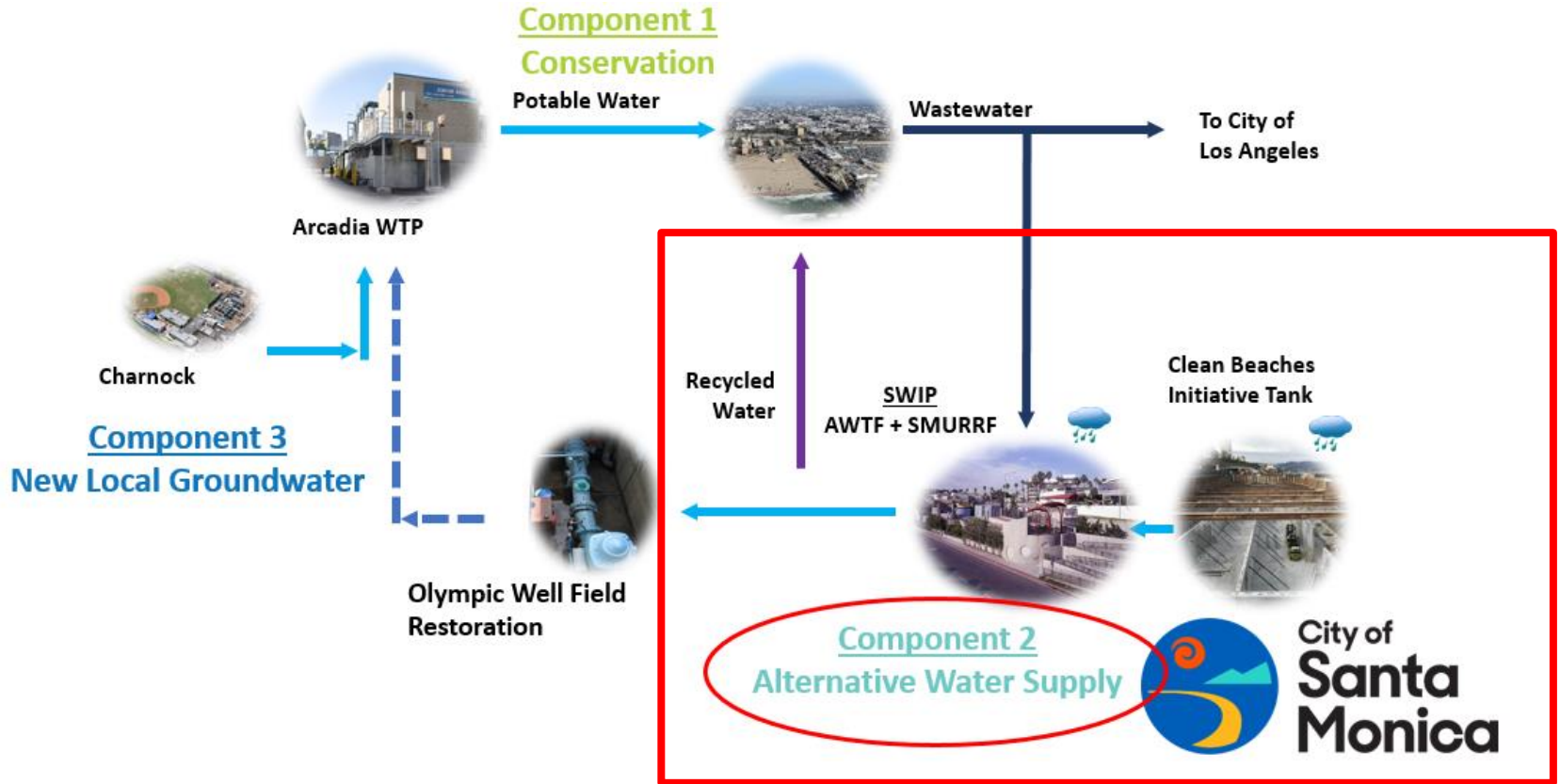
Imported Water Emission Factor

- Emissions from imported water are tied to electricity primarily (pumping, treatment)
- Emission factors are projected to decrease over time (state energy policy - decarbonize)

Scope	2017	
	GHG Emissions (MT of CO ₂ e)	Percent of Total Emissions
Scope 1	8,875	4%
Stationary Combustion	1,918	1%
Fugitive Emissions	71	<1%
Mobile Combustion	6,886	3%
Scope 2	194,480	86%
Electricity Consumption	192,511	85%
T&D Losses	1,969	1%
Scope 3	10,598	5%
Water and Wastewater	184	<1%
Waste Generation	3,157	1%
Employee Commute	7,257	3%
Scope 3 Construction	12,081	5%
Construction Emissions	12,081	5%
Total Emissions	226,036	100%

Project 1 – Santa Monica: Indirect Potable Reuse for Aquifer Recharge

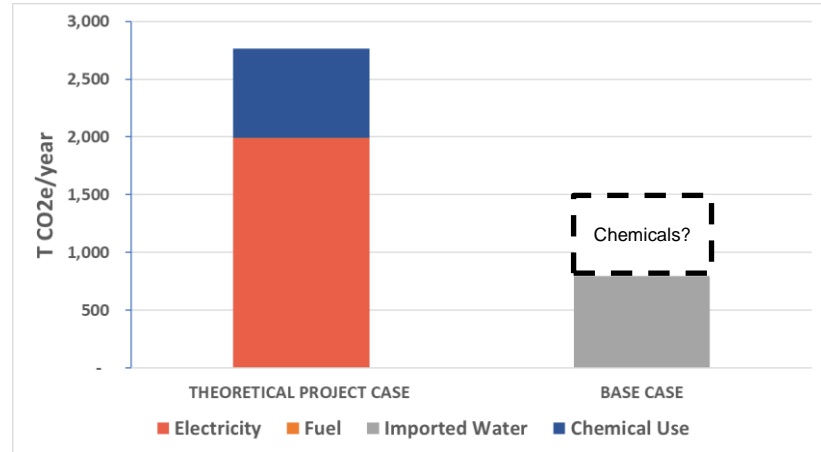
Project Case



Project 1 – Santa Monica: Indirect Potable Reuse for Aquifer Recharge

Comparison

	tCO2eq/yr	
	Project Case (no Electricity Offsets)	Base Case
Electricity	1984	0
Fuel	5	0
Imported Water	0	793
Chemical Use	775	0
Totals	2765	793

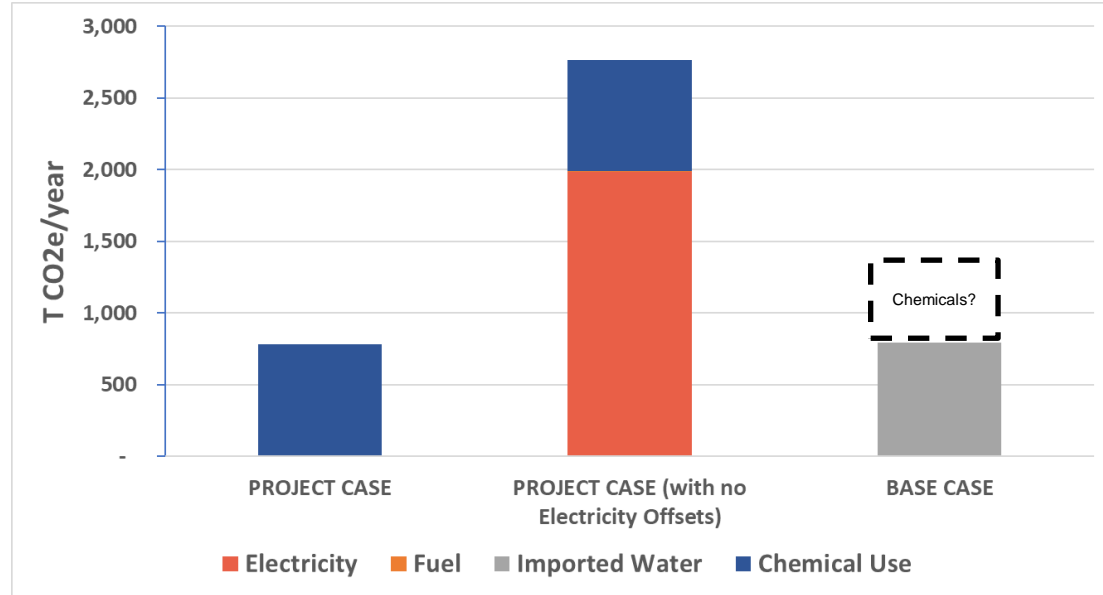


- Main cause of emissions is from the electricity usage
- Residual waste from the AWTF and SMURRF are sent to wastewater treatment, would go there in the base case also
- Chemical consumption is not regularly tracked or included in GHG assessments for existing facilities

Project 1 – Santa Monica: Indirect Potable Reuse for Aquifer Recharge

Comparison

	tCO ₂ e/yr		
	Project Case	Project Case (no Electricity Offsets)	Base Case
Electricity	0	1984	0
Fuel	5	5	0
Imported Water	0	0	793
Chemical Use	775	775	0
Totals	781	2765	793



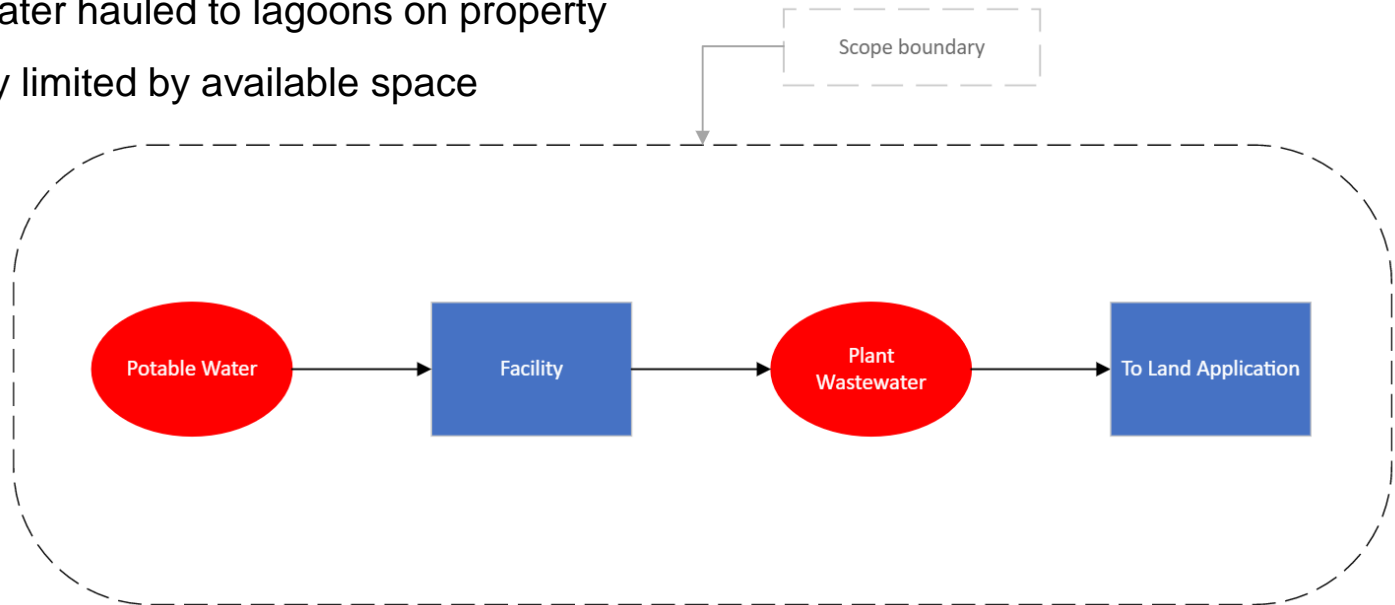
- Electricity is all renewable for the AWTF and SMURRF process
- Southern California Edison: Clean Power Alliance

| Project 2 – Food & Beverage Water | Reuse System

Project 2 – Food & Beverage Water Reuse System

Base Case (No Reuse)

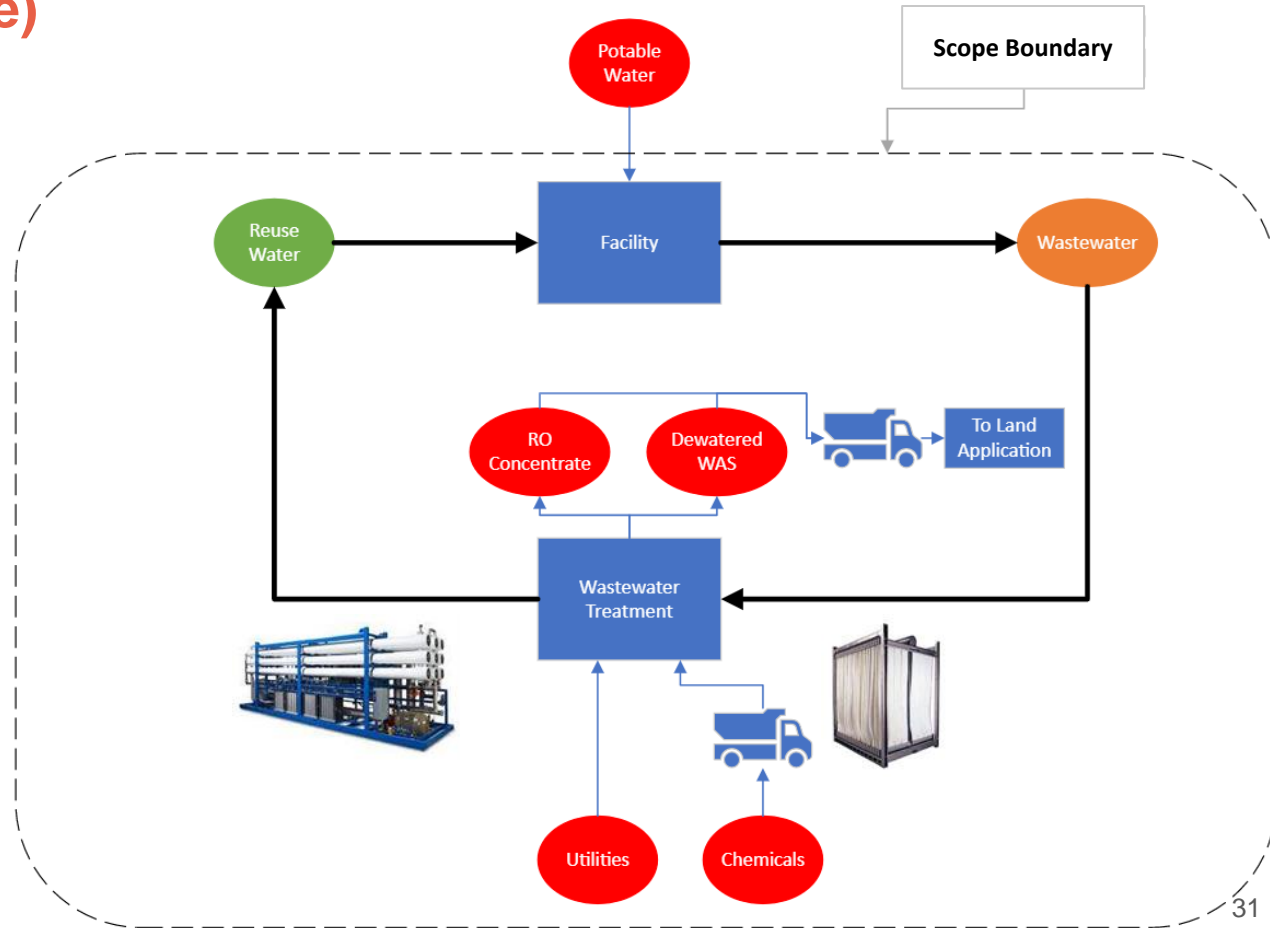
- Pre-existing F&B plant with plans for expansion
- Basis of 2.2 million gallons per day (MGD) potable water use
- Produces low strength, low solids wastewater
 - Wastewater hauled to lagoons on property
 - Capacity limited by available space



Project 2 – Food & Beverage Water Reuse System

Project Case (Reuse)

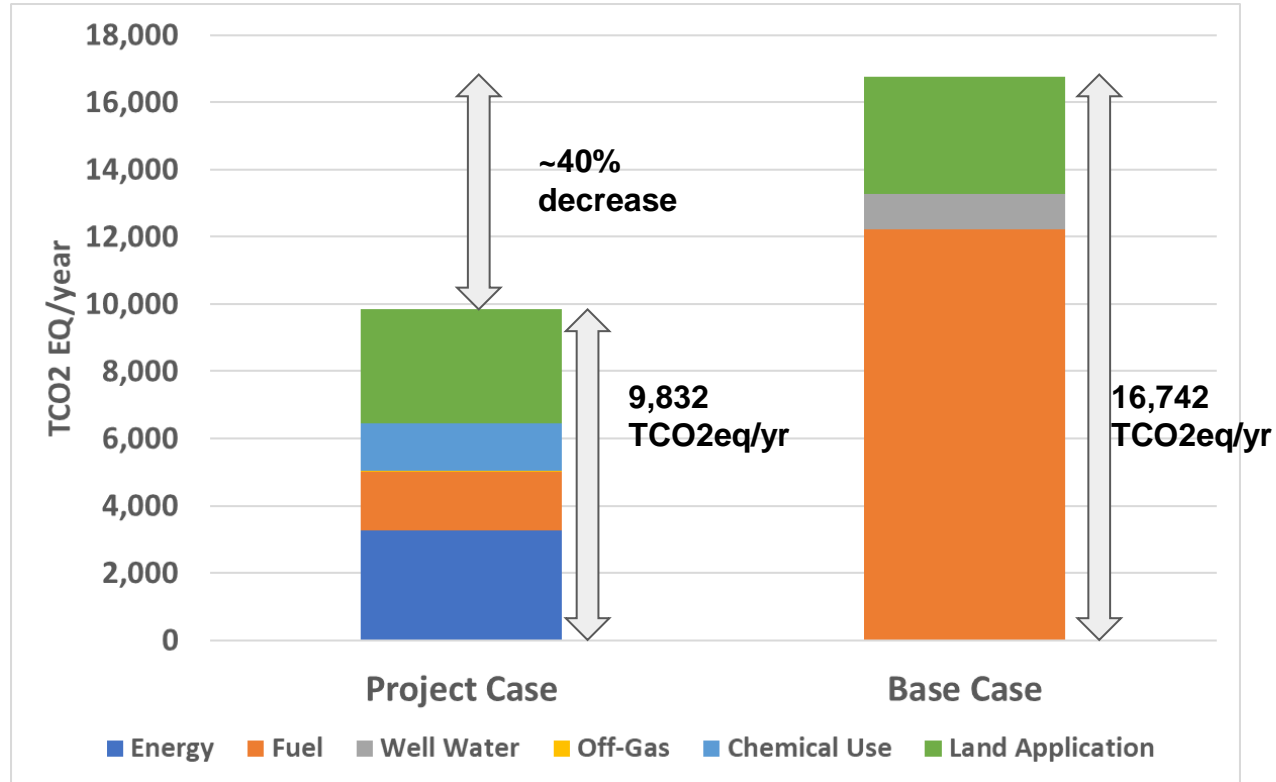
- MBR/RO treatment
- 1.7 MGD water reuse
 - Reduces potable water use
- Decreases WW to land application
 - Reduces Haulage
- Allows for plant expansion



Project 2 – Food & Beverage Water Reuse System

Project Comparison

- Emissions from MBR/RO process offset by haulage reduction
- **Haulage emissions are key**
 - Reuse reduces haulage by ~6,500 tonnes/day & ~7,000 TCO₂eq/yr
- >70% Renewable energy grid

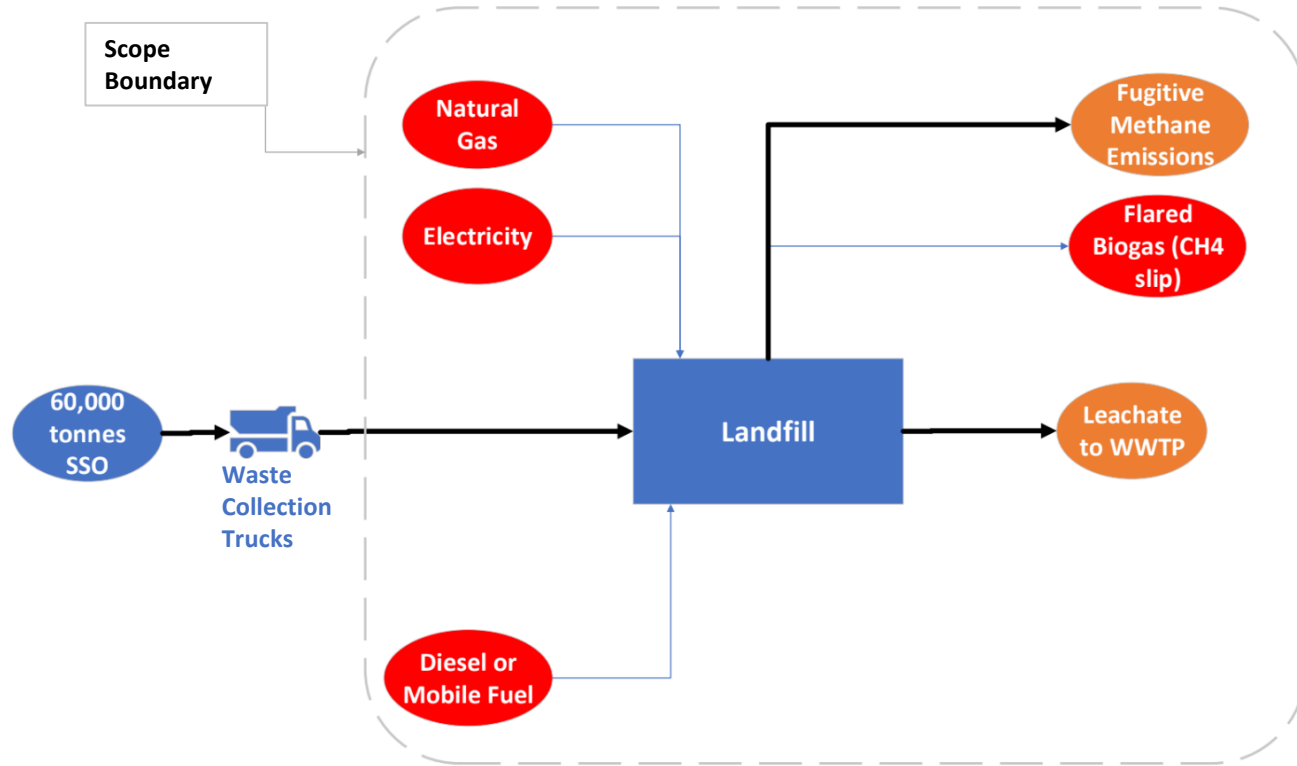


| Project 3 – Anaerobic Digestion Facility

Project 3 – Anaerobic Digestion Facility

Base Case - 60,000 tonnes/year to landfill

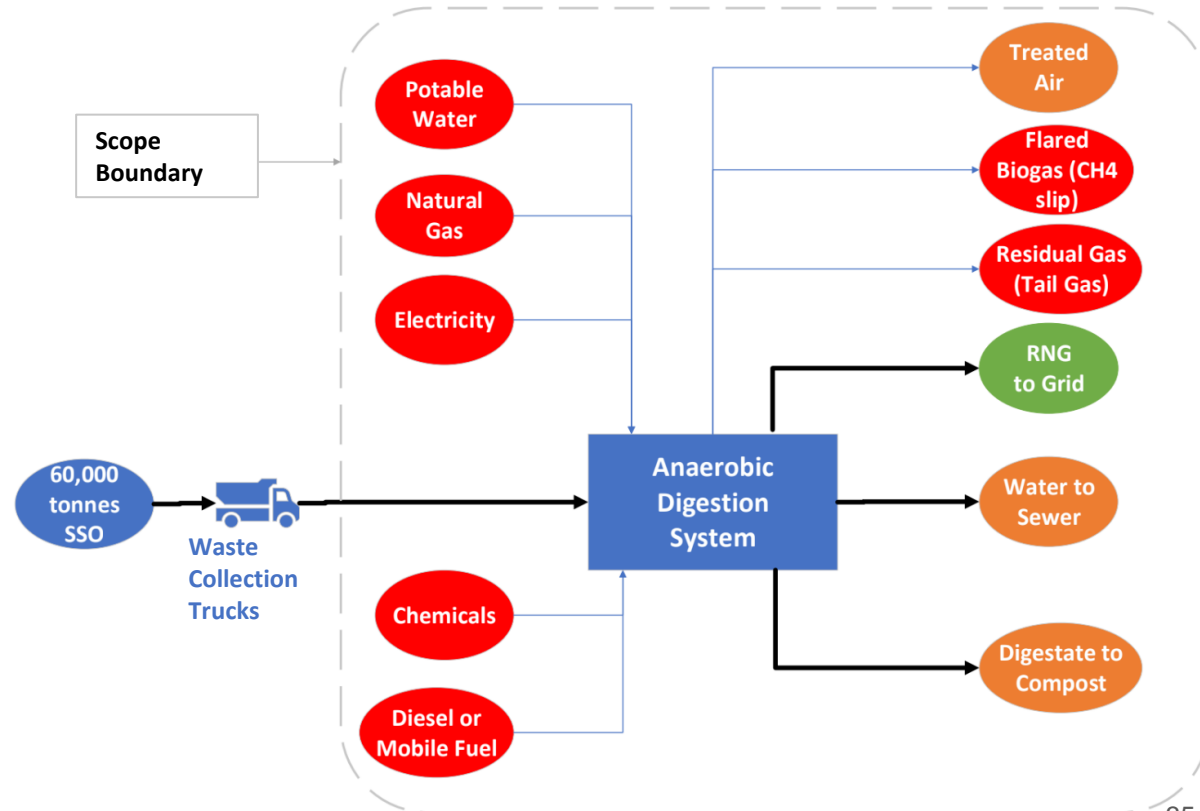
- 60,000 tonnes/year organics mixed into garbage collection
- Sent to landfill
- Emits large amounts of uncaptured methane
- **25x higher** global warming potential (GWP) than CO₂



Project 3 – Anaerobic Digestion Facility

Project Case - 60,000 Tonnes/year to AD facility

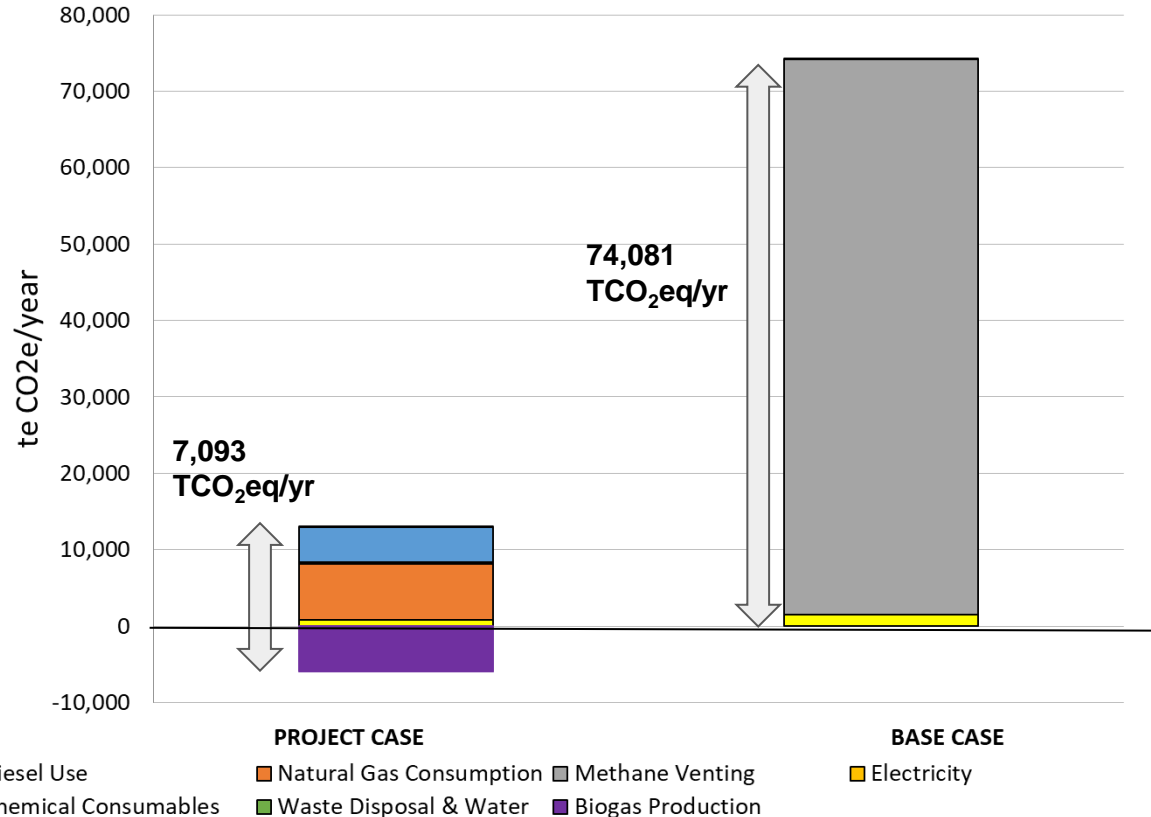
- 60,000 tonnes/year SSO sent to AD facility
- Captures, processes, and repurposes methane emissions as RNG
- Treatment requires additional energy & chemicals
- However, avoids methane emissions



Project 3 – Anaerobic Digestion Facility

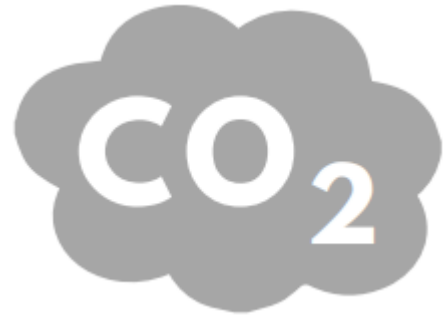
Project Comparison

- Net emissions impact
 - -66,987 TCO₂eq/yr
- **Methane venting emissions need to be avoided!**
- >95% renewable electricity grid for the region
 - Lowers emissions for electricity use



Key Takeaways

- As climate change is more prevalent in everyday life, need for change is a must
- All levels of both private and public sector groups need to establish sustainability goals
- Focus on apparent local hazards (i.e. shortage of water) and direct changes
- GHG emission calculations can help determine key issues and potential improvements
- By using multiple factors in facility design/changes, can establish a well-balanced project



| Questions?

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