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Energy Self-Generation Potential

Presentation Purpose

6E. Evaluate energy self-generation with the primary goal of decreasing overall energy costs and reliance on the energy grid, and recommend policy options for consideration.

Explore the expansion of the FOG receiving and the internal combustion combined heat and power (Cogen) system, linear electromagnetic induction, fuel cell, expanded solar, or other ideas to increase NapaSan's generation of electrical power, as long as there is both immediate and long-term cost savings.

Timeframe:
Initial framework of alternatives will be provided to the Board for consideration by June 30, 2020.

Energy and Chemical Savings Options Status

Category	ECM	ECM Name	Status	kWh Saved ($0.14/kWh)	Utility $ Savings	O&M/Other $ Savings	Total $ Savings	Investment	SPBP, yrs
Chemical	9	Evaluation Study of Alternate Treatment Chemicals	Completed			TBD		$ 135,000	TBD
	10	Peracetic Acid Pilot Study	Completed						
Load Reduction	11	Jockey blower	Master Plan	108,000	$ 14,000	$ 20,000	$ 34,000	$ 525,000	15.4
	12	Aeration basin internal recycle pumping	Master Plan	513,000	$ 66,000	$ (1,000)	$ 65,000	$ 211,000	3.3
Cogen Optimization		Continue to Monitor FOG Import	Continuing						
	15	Algae to Energy Study (Complete)	Continuing			TBD		$ 35,600	TBD
	14	CEPT - Chemically Enhanced Primary Treatment (In-house pilot study)	Update	747,000	$ 103,833		$ 103,833	$ 335,000	3.2
Generation	16	Fuel Cell	Update	4,098,585	$ 680,000	$ (260,000)	$ 420,000	$ 3,754,739	8.9
Other	18	Pond Surface Lease (Floating Solar)	Update			$ 220,000	$250,000		

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Presentation Focus

- Master Plan – Task 4 & 5
- Chemically Enhanced Primary Treatment – CEPT
- Mainspring Linear Generator Update
- Floating Solar Update

WASTEWATER TREATMENT PLANT MASTER PLAN

Task 4 – Renewable Energy Production and Energy Management

Potential Study Topics:

- Food waste or increased organic import to the anaerobic digester
- Biogas filtering capacity
- Digester gas production and cogeneration capacity
- Vehicle Refueling
- Algae co-digestion
- Winery waste receiving station
- Smaller aeration basin “jockey” blower
- Resiliency to Public Safety Power Shutdown (PSPS) events

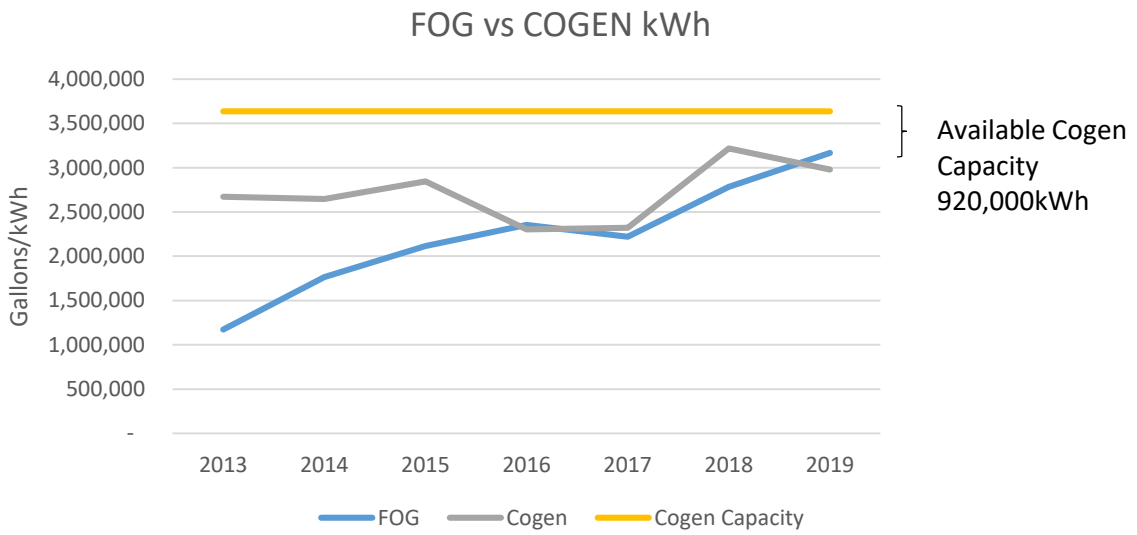
  Modifications necessary to use existing on-site solar during a utility outage

Task 5 – Nutrient Management

- Aeration Basin Internal Recirculation

Cogen Optimization

BOM meeting January 15, 2020



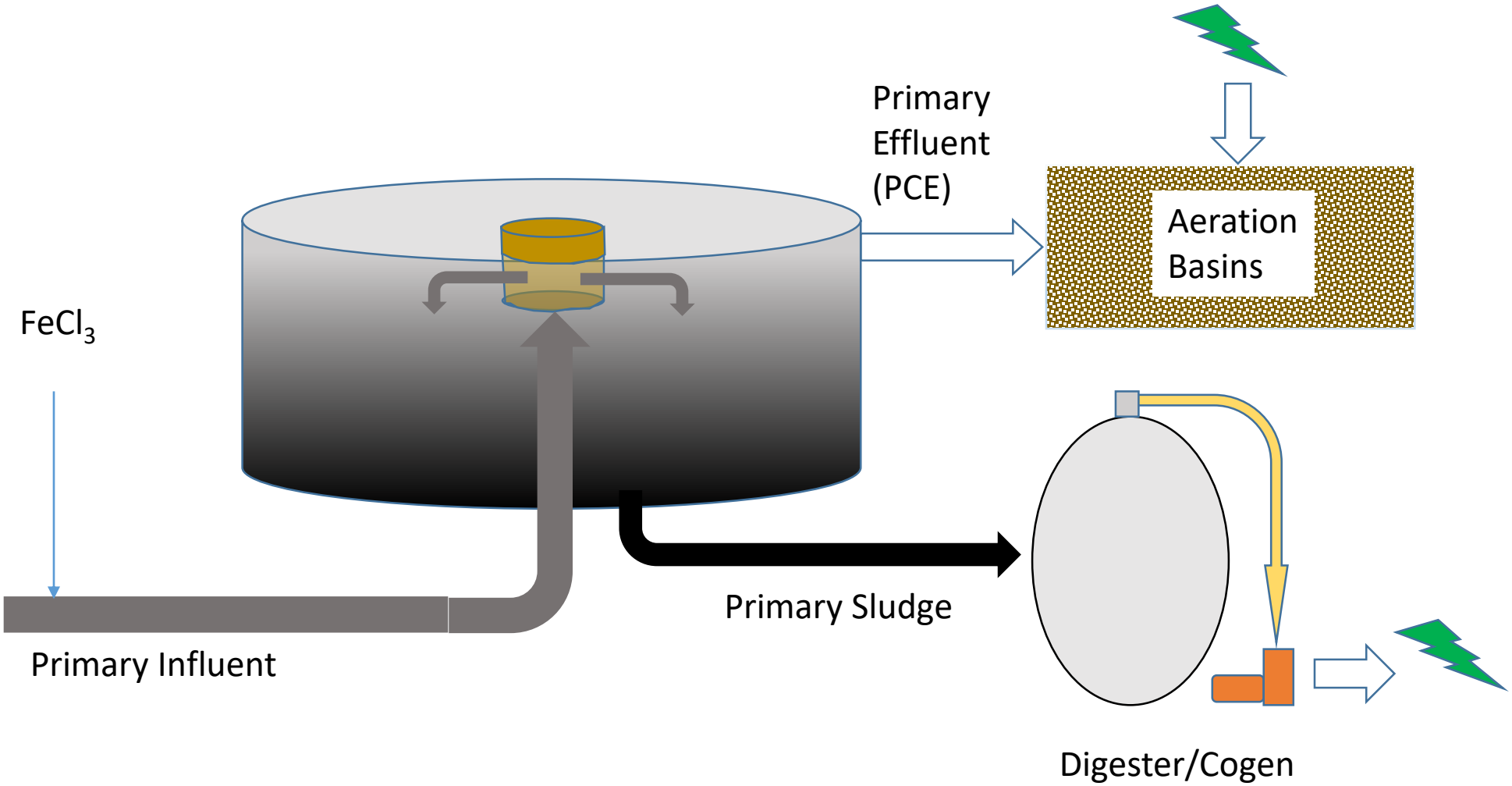
CEPT – Continue with an in-house pilot study using ferric chloride and ferric sulfate and polymer to determine cost balance around this mode of operation.

Chemically Enhanced Primary Treatment – CEPT

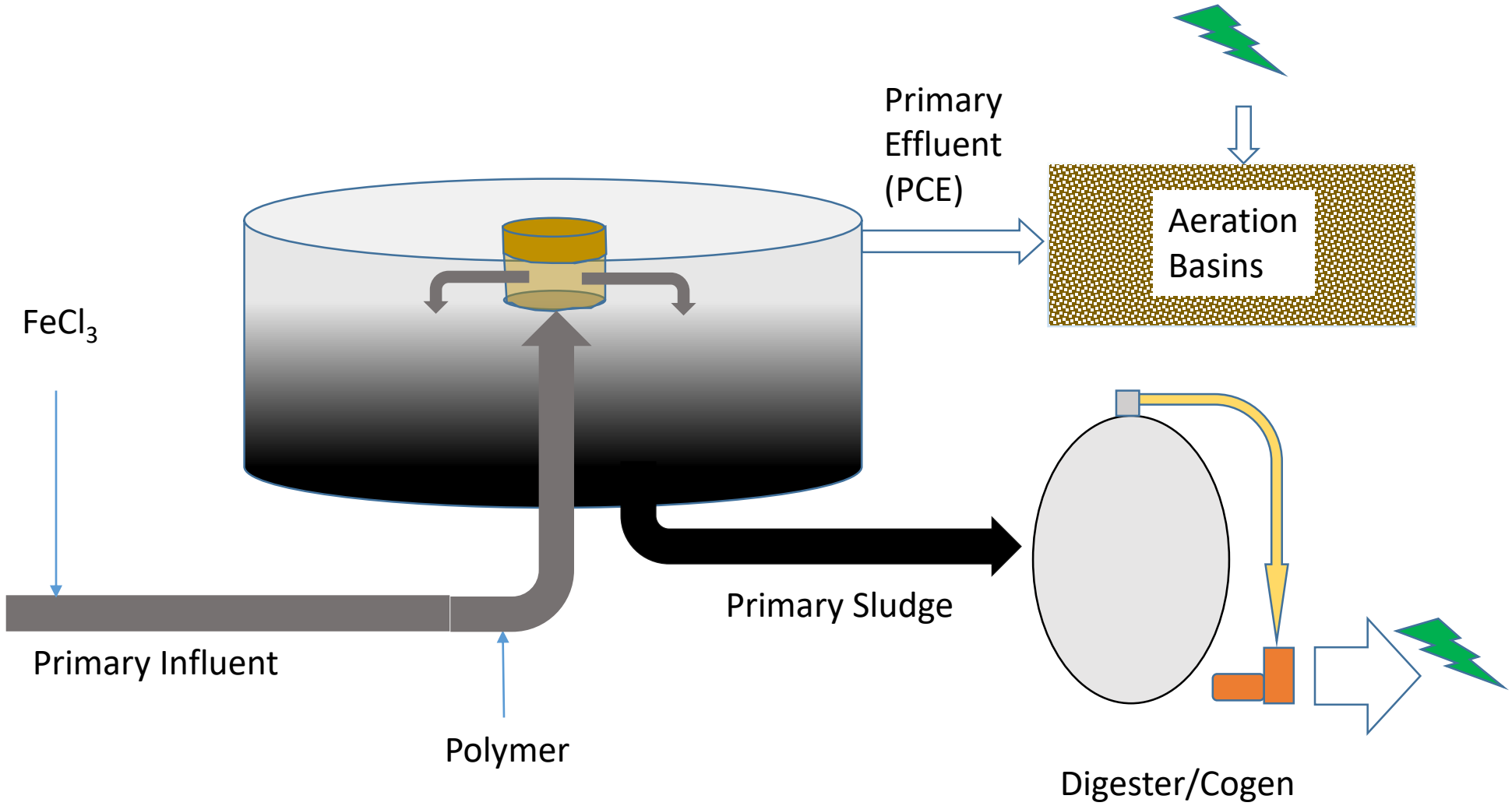
Why are we considering this?

- A proven effective operating mode to increase primary clarifier removals.
- Decreases organic loading to the Activated Sludge system reducing operating cost by reducing blower use, resulting in less electricity purchased.
- Increases activated sludge process available capacity delaying CAPEX of building additional aeration basins.
- Increases digester volatile solids loading leading to increased gas production and increased electrical cogeneration resulting in less electricity purchased.
- Requires no additional CAPEX to implement.

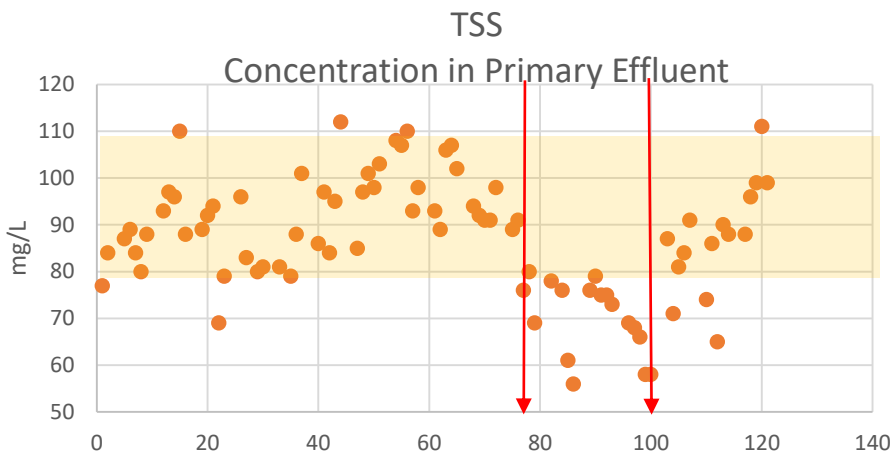
PRIMARY TREATMENT

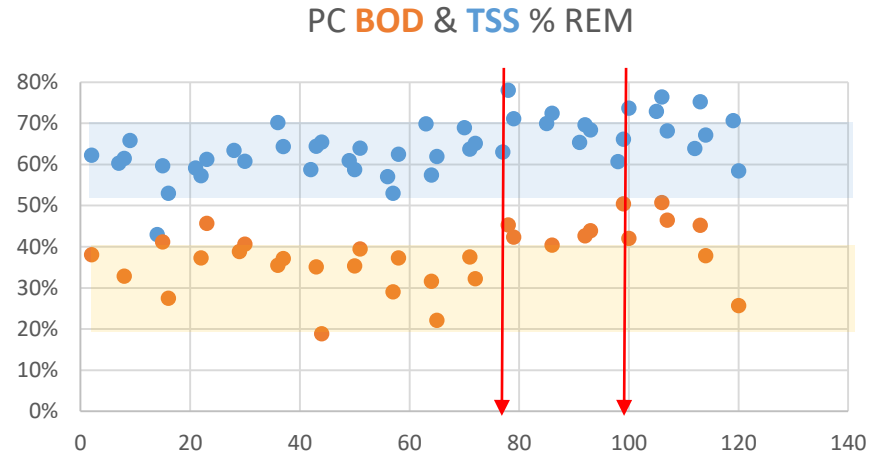


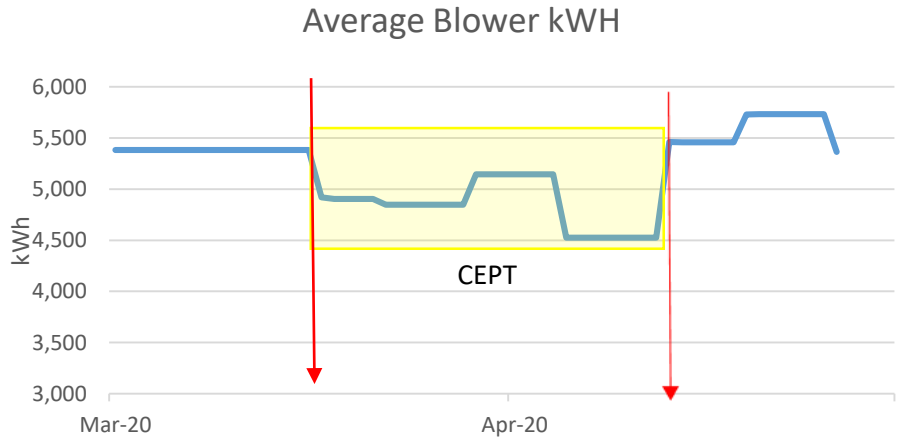
CHEMICALLY ENHANCED PRIMARY TREATMENT



CEPT Pilot March 2020







CEPT Potential Impact

	2019	3/2020 CEPT	Target CEPT
Average Primary Treatment BOD Removal	34%	44%	60%
Blower Electricity Cost	$ 295,022	$ 265,243	$ 218,040
Blower Electricity Savings		**$ 29,779**	**$ 76,982**
Average Primary TSS Removal	64%	70%	80%
Increase Gas Generation Savings		**$ 34,022**	**$ 86,405**
Total Annual Savings		**$ 63,801**	**$ 163,387**
Polymer Cost		$ 27,549	$ 33,058
Ferric Chloride Cost	$ 138,206	$ 138,206	$ 172,757
Ferric Chloride Cost Inc		-	$ 34,551
Total Chemical Cost Increase		**$ 27,549**	**$ 67,610**
Projected Annual Savings		**$ 36,252**	**$ 95,778**
Ratio (Saved:Spent)		2.3	2.4

Generation

MAINSPRING – Linear Generator

- Continue to work with Gopal Shanker – ReColte Energy and Mainspring on a 10 yr and 14 yr PPA.
- 250 kW generator would utilize two-thirds of our current digester gas production.
- Capacity in the existing cogeneration would become available.
- Considering a natural gas tariff change from NGR-1 to G-EG that will lower the cost of natural gas for the cogen engine.
- Economic analysis projects a $90,000 per year savings.

Other

FLOATING SOLAR

- Project continues to look favorable.
- CAISO Cluster 12 Interconnection Application on-track anticipated to complete in nine months.
- PG&E interconnect analysis of infrastructure requirements and associated costs are known.
- Power run has received favorable approval of granting right of way access.
- Execution of Lease Agreement anticipated in November 2021.

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Questions