

DOE Bioenergy Technologies Office (BETO) 2019 Project Peer Review

Rialto Bioenergy Facility

(This is an universal content template for the ADO session presentations – you may use company backgrounds, pictures, graphics, etc.)

March 6, 2019

1:30 pm - 2:00 pm

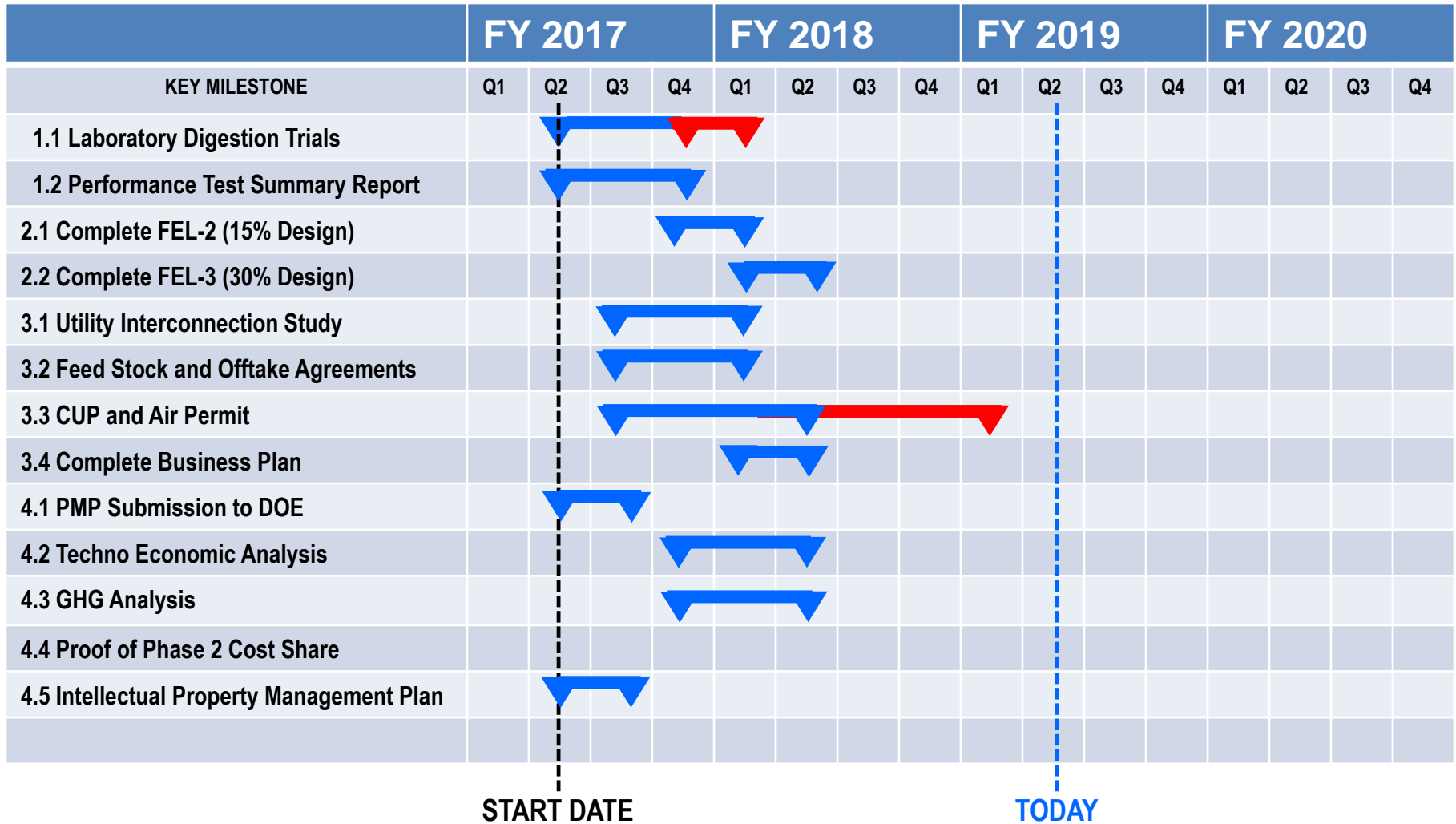
Technology Session Area Review

Principal Investigator – Yaniv Scherson, PhD, PE
Rialto Bioenergy Facility, LLC

Goal Statement

1. Construct a large scale (1000 ton per day) integrated mixed waste organics diversion solution which:
 - Provides renewable energy generation services
 - Is a repeatable model for California
2. Demonstrate a cost effective and net energy positive alternative to land application of biosolids through commercial production of Biochar
 - Reduced levelized cost of biosolids disposal
 - Sustainable alternative
 - Objective 2 requires pyrolysis which was analyzed and included with DOE Grant
3. The project must meet financing due diligence requirements and internal finance requirements

Key Milestones - Example



NOTE: Use **GREEN** text and lines to show Active Tasks, **RED** text and lines to show where Tasks were delayed.

Project Budget Table

Budget Periods	Original Project Cost (Estimated)		Project Spending and Balance		Final Project Costs
	DOE Funding	Project Team Cost Shared Funding	Spending to Date	Remaining Balance	What funding is needed to complete the project.
BP1 – Digestion Trials and Process Design (FEL-1)	\$67,190	\$273,960	\$341,150	\$0	\$0
BP2 – FEL-3 and Permitting	\$1,931,906	\$2,117,882	\$1,789,510	\$142,396	\$0

Quad Chart Overview

Timeline

- Project start date – Jan 15, 2017
- **Project end date – June 30, 2019**
- Percent complete – The original scope of work is 100% complete.

Barriers

- Barriers addressed
 - ADO-D: Technology Uncertainty of Integration and Scaling
 - Ct-I: Development of Processes Capable of Processing High-Moisture Feedstocks in Addition to Conventional Anaerobic Digestion
 - Ot-C: Risk of Financing Large-Scale Biorefineries

Budget

	Total Costs Pre FY 17	FY 17 Costs	FY 18 Costs	Total Planned Funding (FY 19-Project End Date)
DOE Funded	\$0M	\$0.9M	\$1.1M	\$0
Project Cost Share (Comp.)*	\$0M	\$1.1M	\$1.3M	\$0

Partners

- Partners - None
- Other interactions/collaborations
 - City of Rialto
 - Waste Management
 - California Energy Commission
 - CalRecycle
 - Southern California Edison
 - Southern California Gas Company
 - City of Anaheim
 - Southwest Gas Company

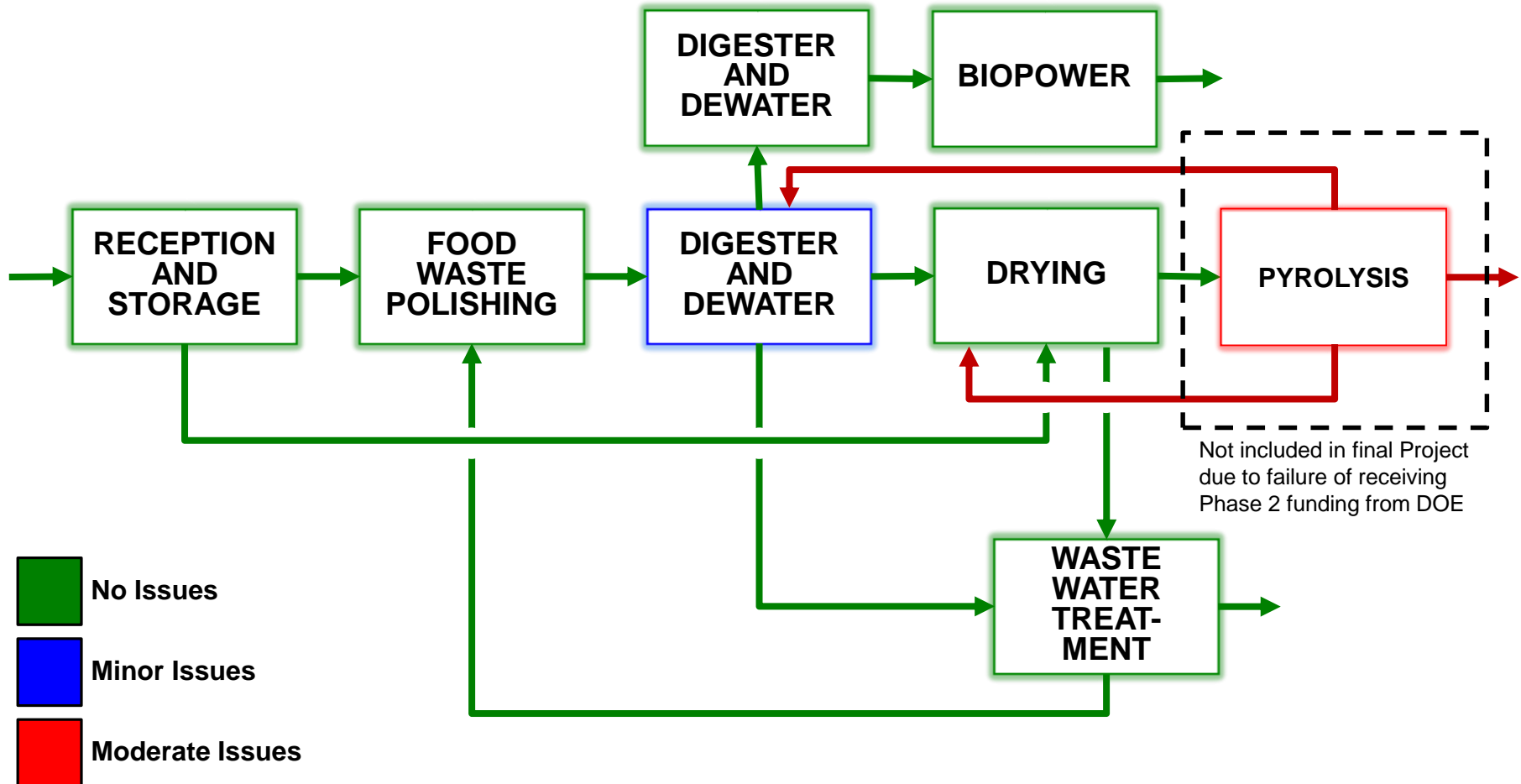
1 - Project Overview

- Describe the history, context, and high-level objectives of the project
 - *DE-FOA-0001232: FUNDING OPPORTUNITY ANNOUNCEMENT (FOA) NUMBER DE-FOA-0001232: PROJECT DEVELOPMENT FOR PILOT AND DEMONSTRATION SCALE MANUFACTURING OF BIOFUELS, BIOPRODUCTS AND BIOPOWER (PD2B3)*
 - *All Milestones outlined for Budget Period 1 and 2 have been completed*
 - *The original proposal included a smaller project however project financials and feedstock agreements required construction of a larger facility.*
 - *Pyrolysis has been removed from the originally proposed plans due to the Down Select GO/NO GO Decision*
 - *Project Financing closed on January 30, 2019*

2 – Approach (Technical)

- *The technical approach of this project emphasized using conventional processes and technology in a unique application pyrolyzing biosolids within an anaerobic digestion plant to increase biopower production, offset fossil fuel use and create biochar*
- *The critical success factors (technical, market, business) that will define technical and commercial viability of this project*
 - *Demonstration that a financeable project can be developed with pyrolysis*
 - *Develop a biochar from wastewater biosolids market*
 - *Develop a repeatable bolt on technology for the wastewater sector*
- *Explain the top 2-3 potential challenges (technical and non-technical) to be overcome for achieving successful project results*
 - *Permitting within strict South Coast Air Quality Management District rules*
 - *Integration with digestion of biosolids drying*
- ***The Phase 2 No-Go Decision forced the Recipient to not include Pyrolysis in the final project. The process was not financeable without DOE involvement.***

Overall Process Operations Block Diagram



2 – Approach (Management)

- *A classic management approach has been applied to the project. The Principle Investigator is working with a team of internal staff and consultants to develop the project*
- *The following key people are assigned to the project*
 - *Yaniv Scherson, PhD, PE, Managing Director of Anaergia Services and the Project Principle Investigator and lead Project Developer*
 - *Arun Sharma, Anaergia's Global Lead for Build Own Operate, the Project's financing and contracting lead*
 - *Andrew Dale, PE, Project Manager, the Project Manager and Technical Lead for permitting and 30% Design*
 - *Juan Josse, Anaergia's Chief Engineer, responsible for the project Process Design*
- *The key milestones for the project are driven by contractual obligations for the feedstock reception and digestion. The development, costing, and permitting work included the full scale pyrolysis system.*

3 – Technical Accomplishments/ Progress/Results

- *All milestones associated with Budget Periods 1 and 2 have been achieved.*
 - *Completed CEQA Permitting for new solid waste facility in 9 months*
 - *Air Permit in South Coast Air Quality Management District for a 13.38 MWe Facility in 11 months*
 - *Completed 30% design and GMP pricing in 6 months*
 - *Completed financing of project w/o pyrolysis in January 2019*
- *The most important milestones achieved are completing all off the required permitting and engineering to begin construction on June 26, 2018 with a bridge loan. The project closed financing on January 30, 2019*
- *The project began construction and closed financing without the pyrolysis system which will be further testing with a new test plan and schedule are under development.*

3 – Technical Accomplishments/ Progress/Results (cont'd)

- *Prior Anaergia Studies have shown pyro-oil produces biogas*
- *The Budget Period 1 study Confirmed the following*
 - *Pyro-oil produces biogas when feed to the digester*
 - *Oil is inhibitory if loaded at high concentration without acclimation*
 - *Acclimation to oil takes time – at least 1 SRT*
 - *Oil is digestible*
 - *Oil is not inhibitory to bacteria acclimate and feed is stepped up*
 - *SOP parameters for digester health were achieved*
 - *Gas production with oil demonstrated at the loading expected at Rialto*



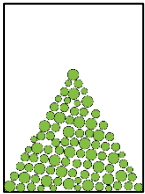
4 – Relevance

Sludge Pyrolysis Improves Resource Recovery for a WWTP



- **MORE ENERGY**

- Increases biogas production by ~25% through co-digestion of oil & gas



- **FEWER SOLIDS**

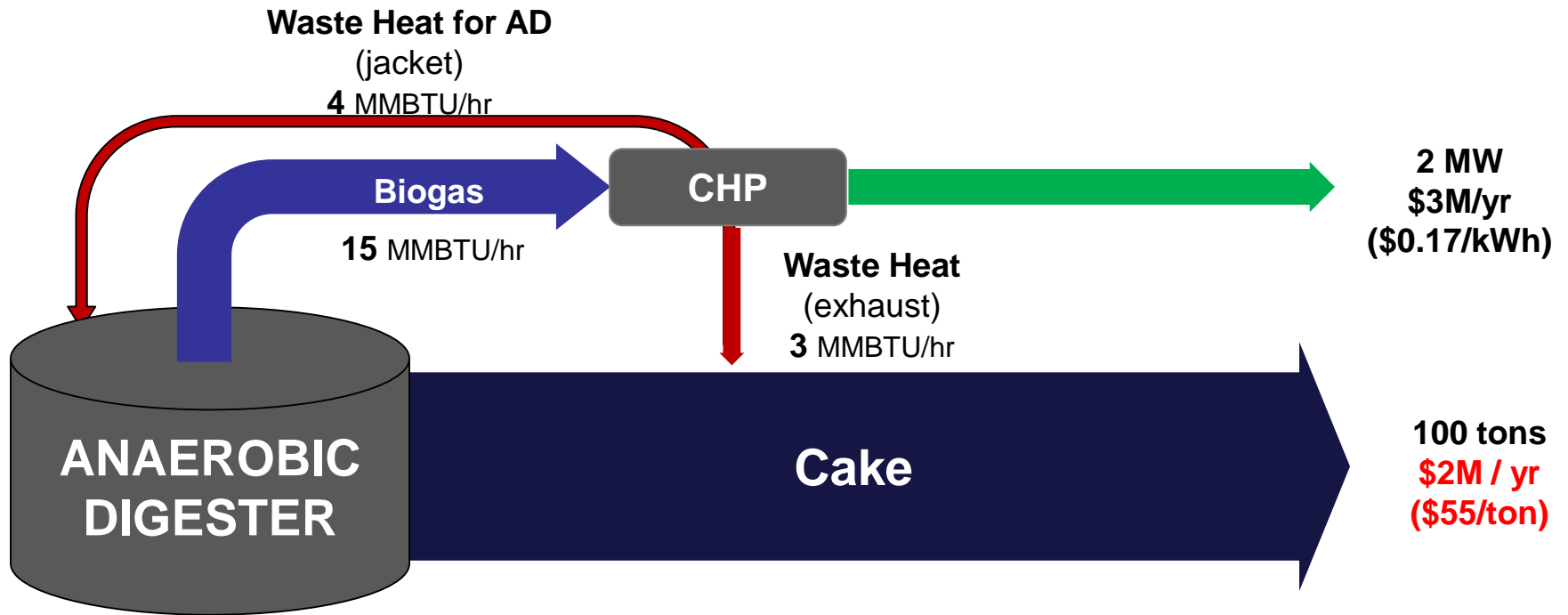
- Reduces mass of dewatered sludge by ~8X



- **HIGHER VALUE**

- Solid char has higher fertilizer value

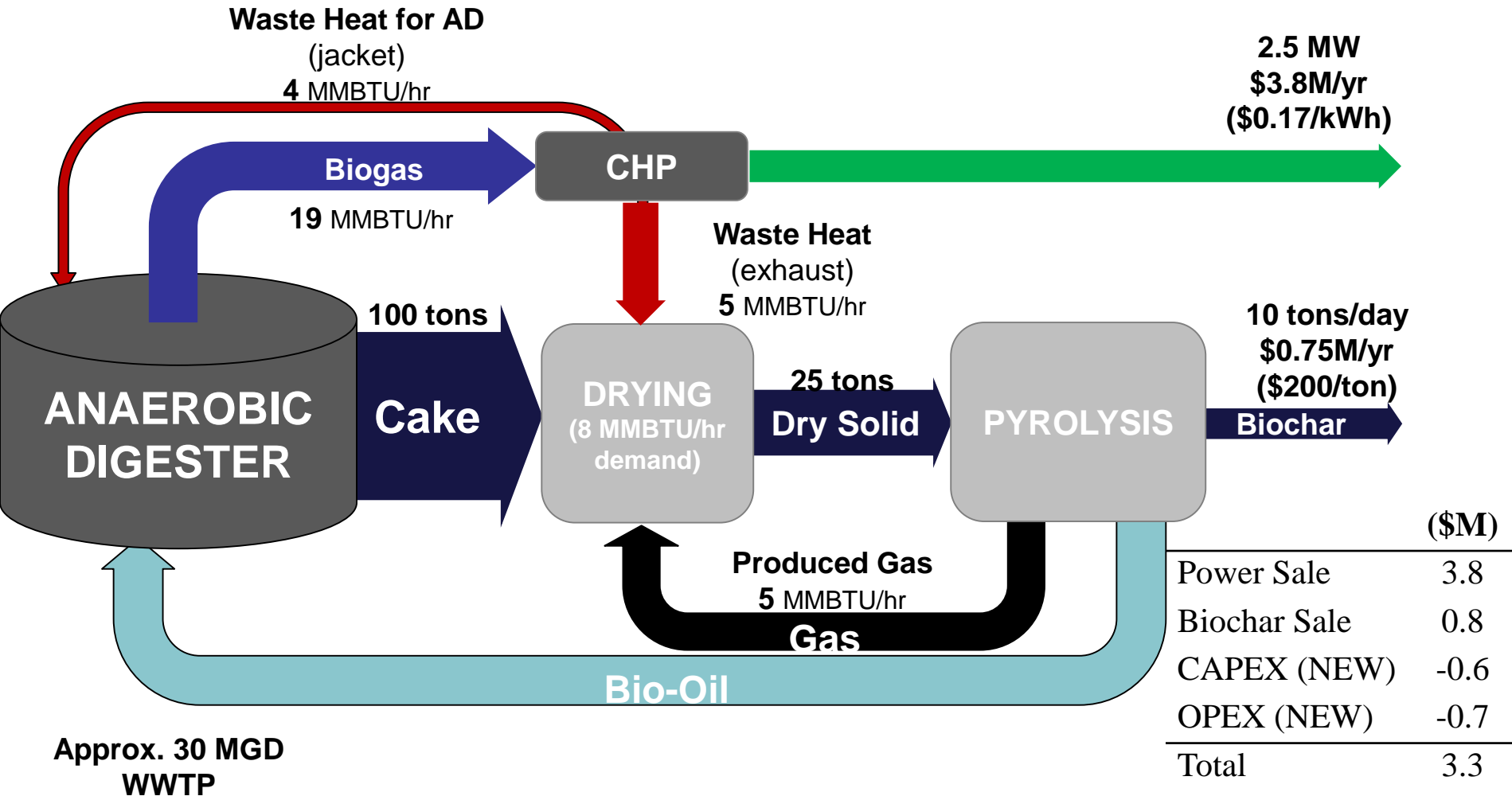
Typical Case for a WWTP



Approx. 30 MGD
WWTP

	(\$M)
Power Sale	3.0
Disposal Cost	-2.0
Total	1

Pyrolysis Added to a WWTP



5 – Future Work

- *During the next 3-4 months the Recipient is negotiating for an additional \$1M of DOE funds to assist in performing additional trials at a demonstration scale.*
- *There are no new decision points for the project. The Phase 2 NO-GO decision removed pyrolysis from the project. The project will continue without pyrolysis including all anaerobic digestion and drying portions of the project.*
- *The project team will continue to look for additional funds to implement pyrolysis at Rialto or another future project.*

Summary

- Summarize the key points you wish the audience and reviewers to take away from your presentation in the following categories:
 1. A full scale food waste and biosolids project has been permitted in Southern California and is under construction.
 2. Full Environmental Impact Report completed and approved in 9 months.
 3. Full South Coast Air Quality Management District Permits approved in 11 months.
 4. Pyrolysis could not be financed without DOE involvement
 5. The project is in construction (without pyrolysis) scheduled for operational startup in August 2020