Biomass Cogeneration Facility
Feasibility Analysis and Business Case

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June 30, 2020

Mr. Wayne Peabody
City of Willows
201 North Lassen Street
Willows, CA 95988

Dear Mr. Peabody:

Morrison has assessed the feasibility of a proposed biomass facility, located in the City of Willows, from the following standpoints:

1. Venture Description and Approach
2. Industry Overview
3. Market Analysis
4. Operational Analysis
5. Management Analysis
6. Capital
7. Risk Assessment

Our procedures consisted primarily of:

1. An assessment of internal information provided by the City of Willows.
2. Direct interviews with potential users of a biomass facility in the region.
3. As assessment of information provided by the City of Napa and Napa Recycling and Waste Services which recently embarked on a joint partnership to operate a biomass facility that serves the region.
4. An assessment of external statistics and other independent information.
5. An assessment of the market, operational, and management potential and needs, including the results of similar ventures.
6. Discussions and written representations from City of Willows and County of Glenn personnel.

The purpose of a feasibility assessment is to determine the general viability of a proposed approach to a project. In the actual execution of a plan, external circumstances, internal decisions, and other factors may dictate departures from the original vision. Further, it is not possible to consider every possible cost or circumstance, internal or external. Accordingly, we make no representation as to the outcome of any action any party may take based on this Assessment.

With these limitations, we have concluded that there is great regional market demand for the services a biomass facility in Glenn County could provide. However, at this time, the construction and operation of a biomass facility operated by the City of Willows would present issues for financial sustainability. Should this venture align with the goals of their business, and if they had access to the needed non-traditional capital (such as state and federal grants or incentives) to allow for acquisition and operational expenses, a private operator may be able to operate a biomass facility in Glenn County and potentially achieve financial viability.

This Assessment replaces and supersedes all previous drafts, correspondence, and other related communications, written or oral. Please contact me at your convenience with any questions or comments. Once again, I thank you for allowing us the privilege of providing services to City of Willows.

Sincerely,

Original is signed

R. Brent Morrison
Founder and Principal

BIOMASS FEASIBILITY STUDY
A Project of City of Willows

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BIOMASS FEASIBILITY STUDY
A Project of City of Willows

SECTION I. – EXECUTIVE SUMMARY

Venture Description and Approach (Section II)
Morrison was engaged by the City of Willows to conduct a feasibility analysis and business case regarding the potential establishment of a biomass facility in Glenn County. As outlined in the initial grant proposal application submitted to USDA and the subsequent scope of work for Morrison, the goal of the venture was to: evaluate the market demand for a biomass/cogeneration facility; evaluate competing businesses in the region; assess potential locations; equipment needs and costs; and land/building acquisition needs; evaluate management and organization needs; and conducting financial analysis to determine the financial feasibility of a potential operation.

Industry Overview (Section III)
With several different sources of biomass – and different finished outcomes of processing that biomass – the biomass industry is diverse and as noted above, fairly complex, with a unique set of challenges related to energy pricing, financing, and state and federal government regulations.

California Energy Commission data states that in 2018, the latest data available, there were a total of 91 operating biomass plants in the state, representing all types of fuel production (biomass; digester gas; anaerobic digestion; landfill gas; municipal solid waste). These facilities resulted in biomass-produced electricity totaling 5,847,152 net megawatt-hours (MWh) or 2.99 percent of the state's total system. Of all the biomass facilities in the state, 23 are currently operating as solid fuel biomass power plants (using wood, sawdust, and crop waste to produce energy/byproducts), according to the California Biomass Energy Alliance. A USDA Forest Service Map, produced in Quarter 1 of 2019 lists 26 active “wood products” biomass facilities in the state, a slight discrepancy with the data above. This map also lists 15 existing “biomass power plants” as being idle (26 percent of all facilities listed); and 16 as “active projects or proposals.”

Market Analysis (Section IV)
Demand for biomass facilities in the region among food and agriculture companies is strong. As noted in the Market Analysis beginning on Page 18, survey participants were asked to rank their likelihood of utilizing a biomass facility in Glenn County on a scale of 1 to 5 with 5 being the most likely; 92% of the survey participants ranked their likelihood of use a 5. Those surveyed collectively reported producing at least 83,000 tons of biomass annually. Conservatively assuming all of this biomass is green tons (which would not necessarily be the case), this would at a minimum reflect the availability of 41,500 bone dry tons of biomass in the region, just from the 13 companies participating in the survey.

Operational Analysis (Section V)
The operational analysis for a potential biomass facility included an assessment of potential locations for a biomass facility within the city limits of Willows; an assessment of land/building acquisition; and an assessment of equipment needs and costs.

Management Analysis (Section VI)
Morrison explored the challenges and benefits of an ownership/management structure by a private owner; a city-owned management/ownership structure; and a public/private partnership.

Based on the analysis, it seems the most feasible and sustainable option for a management and operation structure is to leverage this feasibility analysis and business case to attract a private company to operate a public biomass facility in Glenn County. To that end, the assessment of needed personnel and expertise to operate a Glenn County biomass facility and costs and the assessment of potential hours/days of operation would be largely dependent on the private operator's experience.

Capital (Section VII)

Capital and operating costs are detailed in the financial projections prepared for this study and documented in the Assumptions for the financial projections (see Page 27). These include:

- Total investment of $8,810,000, consisting of approximately $ 1,420,000 related to the land; $ 1,699,700 related to the building and approximately $ 5,690,300 related to equipment costs. The capital investment includes $250,000 for a PG&E Connectivity study.
- Cost of equipment, machinery, engineering and construction costs, and planning costs are based on a 2,000 kW capacity biomass plant.
- Total equipment costs of approximately $ 5,690,300 represent an assumed 77% of capital costs exclusive of land.

Operating capital will be needed to manage cash flow; the project does not anticipate generating positive cash flow until Year 2 of the venture.

Risk Assessment (Section VIII)

As noted in this study, a Glenn County biomass facility would likely be most feasible if it was constructed, owned, and operated by a private company well-versed in biomass operations. If that approach was employed there would likely be low business risk.

Financial Projections (Section IX)

Net income for Year 1-5 is projected at losses of $(1,082,768); $(586,519); $(580,307); $(573,780); and $(566,920) under the assumptions documented beginning on Page 26. Earnings before interest, tax, depreciation, and amortization (EBITDA) for the project is projected to be $(120,094) in Year 1; and $370,248 in in Years 2-5, totaling $1,360,898.

Given the lack of long-term financial profitability projected for this venture, traditional bank financing would likely be a challenge to achieve without other funding sources such as incentives, subsidies, or grant funding. Biomass projects generating negative earnings and/or cash flow for several years is not an anomaly, as demonstrated in our consideration of financial analyses for two unrelated proposed biomass facilities (see Appendix C, 8 and 10). This would likely be a strong consideration of any financial investment by the City of Willows for this venture.

Conclusions (Section X)

The biomass industry is incredibly complex. Energy pricing, financing, and state and federal government regulations make market entry a significant barrier without specialized expertise. A private company well-versed in biomass operations and management is likely the most feasible and sustainable approach to building and operating a public biomass facility in Glenn County. ■

SECTION II. – VENTURE DESCRIPTION AND APPROACH

In March 2019, Morrison was engaged by the City of Willows to conduct a feasibility analysis and business case regarding the potential establishment of a biomass facility in Glenn County. A 2018 United States Department of Agriculture (USDA) Rural Business Development Grant supported this work.

As outlined in the initial grant proposal application submitted to USDA and the subsequent scope of work for Morrison, the goal of the venture was to: compile data and information to determine the potential need by local businesses for a biomass facility; identify any regional biomass competitors; assess likely management and organization needs; and conduct at least three to five years of financial projections for a potential operation.

Conversations with City of Willows staff and Glenn County personnel led to defining the scope of the project to particularly focus on the feasibility of a small scale solid-fuel biomass facility that would have the potential to generate electricity to supply to the utility grid (Pacific Gas and Electric). The concept of the feasibility would be one that accepted outside public biomass, providing a local drop-off point for biomass that could generate value for the City.

Given that agriculture is the number one economy in Glenn County as well as in the immediately adjacent counties of Butte, Colusa, and Tehama Counties, the approach was informed by the reasonable assumption that there is a likely high volume of solid fuel biomass (mainly from orchard crops) that needs a home. This includes trimmings from orchard crops, as well as removed trees, in addition to almond and walnut hulls and shells and rice hulls.

The feasibility analysis and business case was designed to be documented in a formal report that could be used by the City of Willows to explore the potential of operating a biomass facility, or to attract a private operator of a biomass facility. The scope of the feasibility study was not intended to be a comprehensive analysis of the biomass industry, available technologies, or the government policies impacting the industry, but rather to provide a highly localized view on the regional market potential for a biomass facility – primarily meeting the needs of the local agriculture community by providing a home for their agricultural pruning and byproducts.

To accomplish this, Morrison met with City of Willows staff; conducted personal interviews with regional businesses producing biomass to determine potential demand and use for a biomass facility; conducted interviews with management and personnel at existing biomass facilities; and performed independent research related to biomass facilities.

The sum of this work is documented in this report. Key findings include:

- Demand for biomass facilities in the region among food and agriculture companies is strong. As noted in the Market Analysis beginning on Page 18, survey participants were asked to rank their likelihood of utilizing as biomass facility in Glenn County on a scale of 1 to 5 with 5 being the most likely; **92% of the survey participants ranked their likelihood of use a 5**.

- Those surveyed collectively reported producing at least 83,000 tons of biomass annually. Conservatively assuming all of this biomass is green tons (which would not necessarily be the case), this would at a minimum reflect the availability of 41,500 bone dry tons of biomass in the region, just from the 13 companies participating in the survey.
- Based on insights from Greg Kelley, General Manager of Napa Recycling & Waste Services, a company that operates the Napa Recycling & Composting Facility, owned by and located in the City of Napa and that has been in active development of a biomass electricity generating facility for several years, the provisions of the Bioenergy Feed-in Tariff Program (SB 1122) or the Bioenergy Market Adjusting Tariff (BioMAT) highly incentivizes building and operating a facility with a capacity to produce no more than 3 MW of electricity from biomass. This is because of the higher price utilities are contracted to pay these small-scale biomass electricity producers. A projected City of Willows Biomass facility therefore was assumed to operate at this capacity, which according to Kelley would require 34,353 bone dry tons of biomass per year. The likely supply of biomass in the region exceeds this, with adequate regional fuel supply for operations.
- There are significant input costs, particularly equipment that would require significant upfront capital investment to support the establishment of a biomass facility. The ability for the City of Willows to make this kind of capital investment in highly unlikely without significant outside funding (federal and/or state grants).
- In the absence of any incentives, subsidies, or grant funding to offset capital needs, this venture would require $575,000 in upfront cash to begin operations and a loan in the amount of $5.6 million just to operate a facility. Given the lack of long-term financial viability, traditional bank financing would likely be a challenge to achieve, without other funding sources like incentives, subsidies, or grant funding.
- In reviewing two separate financial analyses for two separate proposed biomass facilities on other California communities, the operations generate negative earnings or cash flow for several years.
- Several biomass facilities are owned and operated by entities with their own biomass waste streams – therefore there is higher value proposition for those entities to build and operate biomass facilities to offset costs they would otherwise be paying for disposal. The City of Willows, does not operate its own waste management (services are contracted out to Waste Management), nor does it have a significant stream of municipal wood cuttings, given a lack of substantial municipal parks and city street trees.
- The biomass industry is incredibly complex. Energy pricing, financing, and state and federal government regulations make market entry a significant barrier without specialized expertise. A private company well-versed in biomass operations and management is likely the most feasible and sustainable approach to building and operating a public biomass facility in Glenn County.
- The planning phase for biomass facilities is much longer than other manufacturing or processing businesses, with community engagement, design and engineering, environmental review, and utility interconnection studies contributing to a likely multi-year planning process. The City of Napa and Napa Recycling & Waste Services has been engaged in a planning for more than five years.
- As noted in the attached pro forma financial projections prepared for this venture (see Appendix A and the Financial Projections section of this document beginning on Page

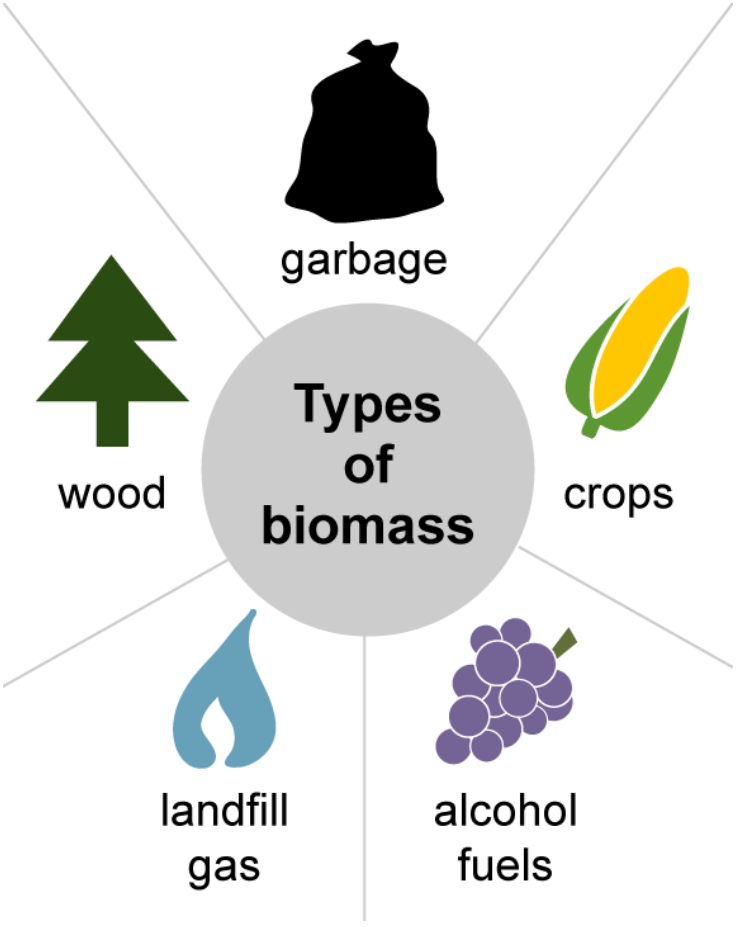
26), a biomass facility in Glenn County could generate net sales (including disposal fees, power sales, and sales of generated biochar) of $1,933,940 in Year 1 and $2,512,356 in Years 2-5, totaling $11,983,364 over the first five years of the venture.

- Net income for Year 1-5 is projected at losses of $(1,082,768); $(586,519); $(580,307); $(573,780); and $(566,920) under the assumptions documented beginning on Page 26.
- Earnings before interest, tax, depreciation, and amortization (EBITDA) for the project is projected to be $(120,090) in Year 1; and $370,248 in in Years 2-5, totaling $1,360,898.■

SECTION III. – INDUSTRY OVERVIEW

Biomass

Biomass is defined as "organic material that comes from plants and animals" that can be used as a renewable source of energy.[1] Biomass can come from a variety of different sources with varying uses.



Source: U.S. Energy Information Administration, adapted from The National Energy Education Project.

Examples of biomass and their uses for energy include:

- Wood and wood processing wastes: burned to produce heat and generate electricity
- Agricultural crops and waste materials: burned for fuel or converted to liquid biofuels
- Food, yard, and wood waste in garbage: burned to generate electricity in power plants or converted to biogas in landfills
- Animal manure and human sewage—converted to biogas, which can be burned as a fuel[2]

Industry size and scope

With several different sources of biomass – and different finished outcomes of processing that biomass – the biomass industry is diverse and as noted above, fairly complex, with a unique set of challenges related to energy pricing, financing, and state and federal government regulations.

[1] U.S. Energy Information Administration.
[2] U.S. Energy Information Administration.

California Energy Commission data[3] states that in 2018, the latest data available, there were a total of 91 operating biomass plants in the state, representing all types of fuel production (biomass; digester gas; anaerobic digestion; landfill gas; municipal solid waste). These facilities resulted in biomass-produced electricity totaling 5,847,152 net megawatt-hours (MWh) or 2.99 percent of the state's total system.

A number of these biomass facilities are listed by the CEC as being operated by companies well-versed in biomass energy generation including: nine facilities run by Ameresco Inc.; three by Covanta; seven by Fortistar Methane Group; and five by Sierra Pacific Industries. At least 25 are associated with a governmental entity, including cities, counties, sanitation districts, and municipal utility districts, among others.

Many of these facilities are owned and operated by entities with their own biomass waste streams and that is either solely what they process or is the majority of the biomass they process – therefore there is higher value proposition for those entities to build and operate biomass facilities to offset costs they would otherwise be paying for biomass disposal. Although many of these facilities appear to only process their own biomass, a number do allow for public drop-off of biomass waste. Two of these are discussed more fully in the *Competition* section of this document, beginning on Page 9.

Of all the biomass facilities in the state, 23 are currently operating as solid fuel biomass power plants (using wood, sawdust, and crop waste to produce energy/byproducts), according to the California Biomass Energy Alliance[4]. A USDA Forest Service Map (See *Appendix B, 1*), produced in Quarter 1 of 2019 lists 26 active "wood products" biomass facilities in the state, a slight discrepancy with the data above. This map also lists 15 existing "biomass power plants" as being idle (26 percent of all facilities listed); and 16 as "active projects or proposals."

Unique industry dynamics
The active projects or proposals for biomass facilities in California is significant – representing more than 60 percent of the existing active facilities –and indicates need and interest in new biomass facilities in the state.

Particularly with environmental concerns limiting the ability of farmers to openly burn their biomass; a strong state walnut and almond industry that has lost homes for their hulls and shells given declines in the dairy industry; and unfortunately, an abundance of dead trees given the impacts of wildfire, it would be fair to assume that the new biomass facilities could offer a solution to these problems.

Still, the number of idle plants in California also demonstrate the complex industry dynamics in the biomass sector and potential risks to operating a biomass facility. Over the last several years, several California biomass facilities have been idled or closed altogether, documented in local news media and industry, as well industry publications (See *Appendix B, 2, 3, 4, 5, 6).*

[3] California Energy Commission, ww2.energy.ca.gov/almanac/renewables_data/biomass/index_cms.php
[4] http://www.calbiomass.org/facilities-map/

Perhaps most relevant for consideration to this potential venture, a biomass facility approximately 42 miles from Willows shuttered in 2012, with company representatives citing financial viability as the reason for closure. This facility accepted agricultural byproduct biomass, similar to what would be proposed for a potential biomass facility in the City of Willows.

Causes for idling or closures may be unique to the business model or the specific market of a particular biomass facility and not entirely indicative of the potential success of a biomass facility in the City of Willows, though there are factors that do impact the biomass industry as a whole, namely the market demand and prices from utility companies purchasing biomass power.

Julee Malinowski-Ball, executive director of the California Biomass Energy Alliance (CBEA) was quoted in a 2018 Power Magazine as saying one significant cause to the idling of California biomass facilities is that, "Our Renewable Portfolio Standard [RPS] is designed generally, for the most part, to be technology neutral under the guise of 'least-cost, best fit,' but no utilities are procuring renewables based on that combined assessment. They're just buying the cheapest renewable out there and that isn't your baseload renewable resources like biomass and geothermal."

Pacific Gas and Electric – the sole utility provider in the City of Willows and greater North State, affirms this in a 2018 published whitepaper on Biomass, used to inform research and development initiatives (See *Appendix B, 7)*.

The document lists a number of challenges facing the California biomass facility in particular, stating "At the moment, Biomass is generally generating biogas at the price of $14 - 42/MMBTU (The Oxford Institute for Energy Studies, 2017). Natural Gas is currently at around$3/MMBTU. Moreover, assuming a conversion rate of 30% for electricity generation, it leads to a cost greater than $140/MWh). While PG&E doesn't necessarily expect to see comparable pricing (given low-carbon credits and the positive environmental value of biogas), projects that offer significantly lower prices will be more likely to garner investment."

Viable models exist

Even with these industry wide challenges, however, new California biomass facilities are currently being planned for to meet local and regional demand, with support from the provisions of California's Bioenergy Feed-in Tariff Program (SB 1122) or the Bioenergy Market Adjusting Tariff (BioMAT). This legislation guarantees that utilities will pay at least 12.7 cents for each kilowatt-hour generated for smaller biomass facilities (defined as less than 3 MW).

Recognizing that in the midst of industry dynamics, biomass operations can be viable, the City of Napa and Napa Recycling & Waste Services, has been engaged in a multi-year process to build a biomass gasification system to convert the city's wood waste to electricity and biochar. Greg Kelley, General Manager provided key insights to Morrison regarding Napa's planning process and the biomass industry, which are shared through this document.

In summarizing the California biomass industry, Kelley noted "Each model is a snowflake – every biomass facility is different." This is important context to have in analyzing the viability of

a biomass facility, understanding that what may be viable in one community or with one operator may not be viable in another. Understanding this, a heavy emphasis of this particular study was to fully understand the localized market need for a facility specific to the region around the City of Willows, with the recognition that market demand is a key variable to success. ■

SECTION IV. – MARKET ANALYSIS

To assess the market feasibility of a biomass facility in Glenn County, Morrison primarily sought to assess the potential of "users" of the facility's services, namely those who would bring solid biomass, or needed fuel to the potential biomass facility.

Though there are likely multiple approaches to determine the available fuel supply and potential need for facility, Morrison's was approach was to conduct qualitative research through in-depth interviews of food and agriculture companies, discussed one-on-one over the phone. This approach allows for a more direct data on likely use of a facility, volumes of biomass produced, and anecdotal experience that could best inform the feasibility of this venture.

Overall, the results of this qualitative research demonstrated overwhelming demand among food and agriculture companies for a biomass facility in Glenn County that would accept solid fuel, as documented below in this section.

With a strong interest level in a biomass facility among food and agriculture companies participating in the interviews, secondary market research was then conducted to better inform fuel availability.

A full description of the results of the both the market survey and the secondary data is summarized below, with a regional market overview providing context for the existing market conditions.

Regional Market Overview

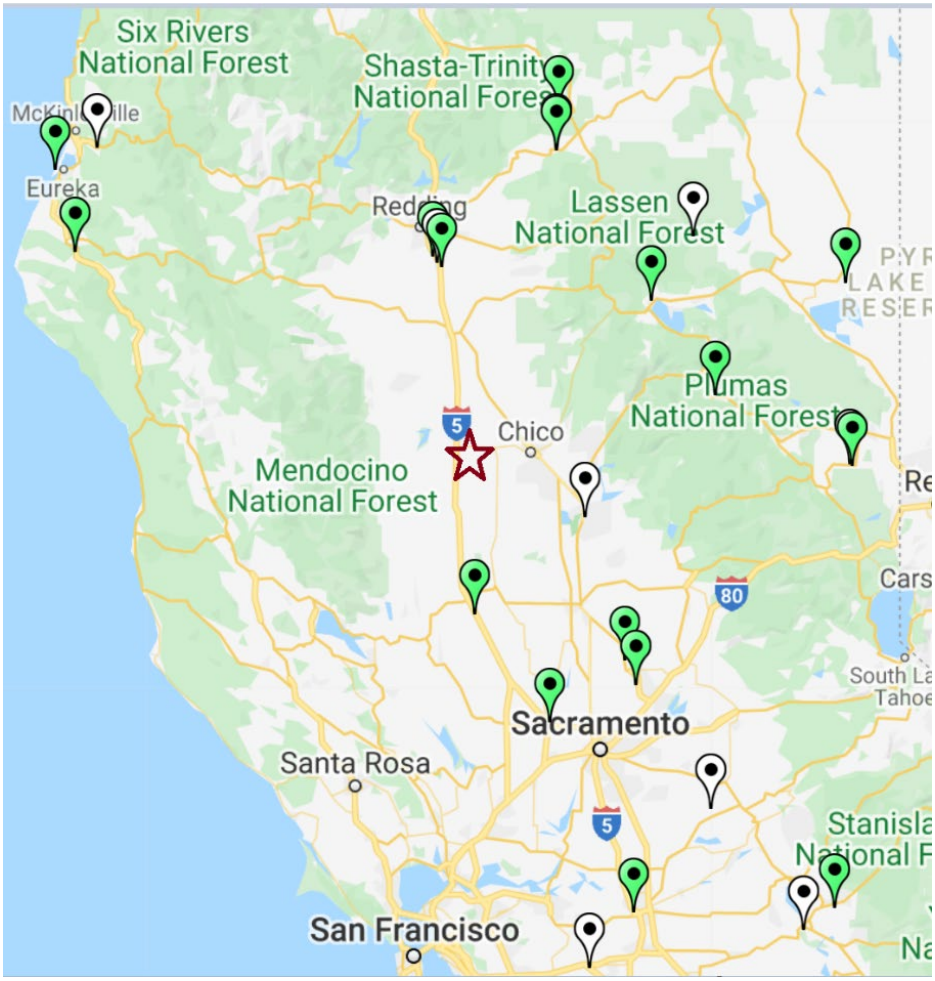
Glenn County profile
Glenn County, which includes the City of Willows, is located about halfway between Sacramento and Redding along Interstate 5. The County's population is 28,000 and according to the Glenn Grows website, boasts just 21 people per square mile, with more than 1,000 farms and more than 500,000 acres under agricultural cultivation.

The regional market demographics of Glenn County, as well as the adjacent counties of Butte, Colusa, and Tehama lend to a strong potential need for a regional biomass facility, based on agriculture being the number one industry in each of these communities[5]. The regional market for biomass is much more apt to be driven by the needs of food and agriculture companies. Among the top three crops in all counties are walnuts and almonds, which provides an abundance of biomass from prunings, removal of trees, and hulls and shells. Rice is also a leading commodity in the region and rice hulls are biomass fuel as well.

[5] American Community Survey, United States Census Bureau.

The total agricultural crop values in Glenn County increased from $748 million to $834 million between 2016 and 2017, an overall increase of 11.5 percent[6]. Glenn County has experienced upward growth for several of the major crops that necessitate biomass in terms of actual tons produced as well, which may be a stronger indication of potential volume needs for biomass. From 2014 to 2017, almonds tons produced increased 13 percent; pistachios 16 percent; and walnuts 38 percent. As noted in the summarized results from the market surveys and based on Morrison's general experience with food and agriculture companies in the region, continued growth is expected in the near future.

It is worth noting that in the region, the City of Willows and the County of Glenn contract out waste management services (currently Waste Management is the sole provider) and in light of that, the municipalities themselves do not have a waste stream to dispose of on their own accord that would necessitate strong use of a biomass facility. The municipalities also do not have significant municipal street trees or parks that would generate a substantial volume of biomass.



Source: California Biomass Energy Alliance

Competition
As shown in the map to the left, sourced from the California Biomass Energy Alliance website, there are no active or idle biomass facilities in Glenn or Tehama Counties. There is an idle facility in Butte County.

The closest active biomass facility to potential users in Glenn County is 32 miles south of the City of Willows, and is owned by Wadham Energy Limited Partnership, based in San Ramon. Based on the company website, although this site does accept public biomass, this site solely

[6] Glenn County Report 2017; 2018.

processes rice hulls and would not be a significant competitor for the solid-fuel biomass generated by potential users targeted for a potential City of Willows facility [7].

Wheelabrator Shasta, one of northern California's largest wood-fired power plants with an energy generating capacity of 55 MW, is approximately 60 miles from the City of Willows and accepts tree limbs and logs and chips (though no roots or stumps). This is the nearest likely competition to a potential City of Willows facility. With the capacity of this facility and its proximity to Trinity and Shasta counties – both high timber regions – this facility is not substantially dependent on the fuel produced by those in the Glenn County region.

There are other uses that agricultural crop biomass can be used for in the region. As noted in the survey responses below, there is a local composting facility that accepts biomass. Furthermore, CalPlant, is set to open in 2020, a facility that will convert rice straw to industrial-grade medium density fiberboard (MDF), with a valuable, high-return home for rice biomass. ■

Qualitative Market Research – Market Survey Interviews

Morrison created a market interest survey for the purpose of conducting one-on-one interviews of potential users in food and agriculture in order to gauge the market need and demand for a biomass facility in the region.

The survey questions were developed based on Morrison's prior similar experience developing qualitative market research questions for other types of facilities in order to determine market demand for a biomass facility in Glenn County. Once the survey was completed, outreach to potential survey participants commenced. Outreach to schedule appointments was conducted by phone calls and emails. Interviews, directed from the list of survey questions, were then conducted by phone. In-depth interviews by phone allowed Morrison to ask follow-up questions if needed as well as to answer clarifying questions from the participants.

The survey structure consisted of four main sections. The first section was designed to gather the following general participant information: name, company, title, the city where the company is located, and the kind of biomass generated by the company. The second section was designed to be answered by companies that currently generate biomass. The third section was designed to be answered by companies that do not currently utilize or need biomass facilities, but expressed some degree of likelihood of using or needing biomass facilities in the next three to five years. The fourth and last section was designed to be answered by both companies that currently use biomass facilities or that will likely need biomass facilities in the next three to five years. The survey questions are located in *Appendix C*.

Concurrently to the development of the survey, Morrison compiled a list of companies in the region known to Morrison who would likely need and/or currently utilize a biomass facility to ask to participate in the survey. The compiled list was based on the knowledge of and relationships with companies in the local area and Farm Bureau membership lists in the region. Additional companies to contact were also added throughout the survey as survey participants suggested other companies who might have an interest in a biomass facility.

[7] https://www.enpowercorp.com/facilities/wadham-facility/

When conducting interviews, Morrison stressed the confidentiality of the survey to participants and informed them that their responses would be aggregated and that individual company responses would not be shared. The nature of the confidentiality of the survey was a key component in establishing trust with the participants and assuring them that no personally identifiable information would be shared.

During the course of the interviews 20 food and agriculture companies were contacted. Of the 20 companies contacted 13 were interviewed.

The level of participation of these companies demonstrate strong interest alone; representations made by a marketing firm familiar with similar surveys reported to Morrison that a response rate of 20 percent would indicate strong interest. The response rate to this survey was 65 percent.

Key Industries Targeted:
The survey targeted the following key industries in the region (in alphabetical order):

- Almonds
- Prunes
- Rice
- Walnuts

The companies contacted are located in the following California counties: Glenn County, Tehama County, Colusa County, and Butte County.

Following is a list of the 20 companies contacted to participate in the survey in alphabetical order:

1. Adams Group
2. Andersen & Sons Shelling
3. Baugher Ranch Organics
4. California Heritage Mills
5. California Olive Ranch
6. California Walnut Company
7. Capay Farms
8. Carriere Farms
9. CF Koehnen and Son's
10. Cortina Hulling & Shelling
11. Crane Mills
12. Crain Walnut Shelling
13. Emerald Farms
14. Hart Farms
15. North State Hulling
16. Omega Walnut
17. Pacific Farms and Orchards
18. Riverwest Processing
19. Rumiano Cheese
20. Sun Valley Rice

KEY FINDINGS

The most essential finding from the qualitative research was strong likelihood of use of a biomass facility. On a scale of 1 to 5 with 5 being the most likely; **92% of the survey participants ranked their likelihood of use a 5**.

Another key finding was that more companies are currently paying for their biomass to be disposed of than companies that are receiving payment for their biomass. Initial assumptions were that companies may be accustomed to be being paid for their biomass and having to pay disposal fees would be a barrier to use of a biomass facility. This does not appear to be the case.

In total, the participating companies represented approximately 83,000 tons of biomass annually. The majority of participating companies noted the biomass that they generated was from orchard removal and prunings.

SUMMARY OF RESPONSES

Survey Section I

For Section I of the survey, participating companies were asked to provide their names, the title of the participant being interviewed, as well as the locations of their companies. Additionally, the participants were asked what types of biomass they generate.

Survey Section II

Currently Generating Biomass and Types of Biomass Generated

Of the 13 companies interviewed 13 said they generate biomass (100%). The companies interviewed reported generating the following biomass: almond dust, almond hulls, almond shells, walnut blows, walnut hulls, walnut shells, , rice hulls, rice straw, orchard removal, prunings dirt/gravel/sticks. Some of the companies reported generating multiple types of biomass. The following table lists the number of producers that reported generating each type of biomass and the corresponding percentage.

Type of Biomass	Number of Companies Generating Type of Biomass	Percentage of Participants
Almond Dust	1	8%
Almond Hulls	1	8%
Almond Shells	3	23%
Walnut Blows	1	8%
Walnut Hulls	2	15%
Walnut Shells	4	31%
Rice Hulls	2	15%
Rice Straw	1	8%
Orchard Removal	5	38%

Prunings	5	38%
Dirt/Gravel/Sticks	1	8%

Estimate of Current Biomass Volume
The participants were asked to provide an estimate of how much volume of biomass, in tons, their company currently generates. One reported generating 0-999 tons of biomass annually (8%); three reported generating 1,000-9,999 tons (23%); seven reported generating 10,000+ tons (54%); and two were unable to estimate the volume of biomass they generate (15%).

Frequency of Disposal
The frequency of disposal varied widely depending on the company. Participants were asked how often they are generating enough biomass that they need to dispose of it. Seven indicated that they generate enough biomass that they need to dispose of it on an annual basis (54%); two reported generating enough biomass for disposal on a monthly basis (15%); two stated they generate enough biomass necessitating a need for disposal on a weekly basis (15%); and three (said they produce enough biomass that they need to dispose of it daily (23%).

Current Disposal of Biomass
Participants were asked what they currently do with the biomass they generate. Three participants reported (23%) they dispose of their biomass by burning it; seven reported (23%) they send it another biomass facility or entity to dispose of; and three reported (23%) they reincorporate it into their fields.

Generation of Income or Cost from Biomass
Participants were asked if they are currently generating any income from the biomass they generate or if they are paying a fee to have the biomass disposed of. Two said they receive income (15%), six said they pay for disposal (46%), and four reported breaking even (31%). One (%) reported that they do not, receive income, have to pay, or break even as they use the biomass themselves.

Delivery of Biomass to Biomass Facility
Of the 13 that generate biomass, seven reported having to deliver the biomass they generate to a biomass facility or another entity on their own accord (54%).

Length of Travel to Biomass Facility
The seven participants that deliver the biomass they generate to another entity were asked how far they are currently traveling to deliver the biomass they generate. As several companies deliver to multiple facilities, the responses here exceeded the total participants. Three reported traveling 0-19 miles to deliver the biomass (43%); one reported traveling 20-39 miles (14%); two reported driving 40-59 miles (29%); one reported driving 60-79 miles (14%); and one reported driving 100-120 miles to dispose of their biomass (14%). No one reported driving 80-100 miles to dispose of their biomass.

Charge for Pickup if Not Delivering On Own
If the participants are not delivering biomass on their own they were asked if they were charged for the pickup and transportation. Two participants reported that they are charged for the pickup and transportation (40%), two reported that they are not charged (40%), and one stated that it depends on what type of biomass was being picked-up (20%).

Current Basis for Payment
Participants were asked the current basis for payment (weight, containers, etc.). Nine companies reported (69%) weight as the basis for payment; one reported (8%) acreage as the basis for payment; one reported (8%) per load as the basis for payment; and one (8%) disposes of their biomass on their property.

Transportation Provided by Biomass Company
If the participants are not delivering biomass on their own they were asked if pickup and transportation is offered by the biomass company their biomass is being delivered to. The participants all reported that pick up and transportation is provided and no one reported pick up and transportation is not.

Number of Producers/Growers that Contribute to Biomass Volume
Participants were asked how many producers/growers contribute to the volumes of biomass that were estimated to be generate. Seven reported 1-49 producers/growers (54%) contribute to the volumes of biomass they estimate they generate; three reported 50-99 producers/growers (23%); one reported 100-149 producers/growers (8%); one reported 150-199 producers/growers (8%); and one reported 200-250 producers/grower (8%) contribute to the volumes of biomass they estimate they generate.

Need for Additional Biomass Disposal in 3-5 Years
When asked if they anticipate generating higher levels of biomass in the next three to five years nine participants said they would need to dispose of more biomass in the future (69%) and four said they would not (31%).

Approximate Volumes that would need an Alternative Use or Outlet
The nine participants that reported they anticipated generating higher levels of biomass in the next three to five years were asked the approximate volumes of biomass that would need an alternative use or outlet, aside from current disposal arrangement. The majority (6, 66 percent) reported any volume above what they currently generate would need an alternative outlet. There was one responses for each of the following volumes: 500 tons, 1,000 tons, and none.

Additional Uses for Biomass that are not Currently Utilized
When asked, *"Are there any additional uses you would like for your biomass that you are not currently taking advantage of?"* nine reported (69%) there are no additional uses they are not currently taking advantage of and four reported (31%) they would like any kind of outlet for their biomass because there currently aren't any.

Survey Section III
As mentioned above, this section was designed to be answered by companies that do not currently utilize or need biomass facilities, but expressed some degree of likelihood of using or needing biomass facilities in the next three to five years. All responding companies did need utilize or need biomass facilities, therefore these questions were not asked.

Survey Section IV
This survey section was asked to all 13 companies who currently generate biomass.

Special Considerations to Business
Those surveyed were asked, *"Are there any special considerations to your business and the biomass you generate that would need to be accommodated (picking up/dropping off at certain times of day, special equipment or transportation to handle biomass, etc.)?"*

Seven (54%) reported there are no special considerations to their business and the biomass they generate that would need to be accommodated. Two (15%) participants stated that the hours of operations for biomass facilities were special considerations. There was one response for each of the following special considerations: the biomass facility will pick up, the type of truck that picks up biomass, trucking arranged, proximity of the biomass facility, and the frequency of biomass disposal.

Factors Impacting Willingness to Move Business
When asked, *"If you currently have an outlet for your biomass, and a new company could match the price of your current provider, what other factors would impact your willingness to move your business?"* participants provided many and often multiple responses.
The largest number of responses (4 responses) was related to proximity. The other responses (listed below) were mentioned 1-3 times:

- Trucking is paid for by biomass facility
- Hours of operation for biomass facility
- Storage capacity
- Contract length
- Ability to pick up biomass from operation
- Ability to take biomass
- Ability to work around operation's schedule

Three participants reported that other than price there were no other factors that would impact their willingness to move their business.

Biomass Facility Availability Negatively Affecting Business Growth
Two participants (15%) reported that the lack of a biomass facility affects their ability to grow their business and eight (62%) reported it does not. One (8%) said it has the potential to negatively affect their ability to grow their business in the future and two (15%) said if they are unable to move their biomass it negatively affects their ability to grow their business.

Maximum Contract Length Willing to Consider
Participants were asked the maximum contract length they would consider for a company that would take their biomass. Five reported a preference for a 0-1 year contract length (38%); five reported a preference for 3-5 years (38%); two reported a preference for 5-10 years (15%); and one reported it would entirely depend on the terms of the contract (8%).

Likelihood of Using a Biomass Facility in Glenn County
Participants were asked to rank their likelihood of utilizing as biomass facility in Glenn County on a scale of 1 to 5 with 5 being the most likely. 12 participants ranked their likelihood of use a five, which is 92% of the survey participants. 1 participant (8%) ranked their likelihood of use a one.

Anecdotal Experiences with Lack of Outlets or Uses for Biomass
The survey participants were asked if they had any anecdotal experiences with a lack of a reliable facility to take their biomass that they would be willing to share. Following are restated comments from participants when asked this question:

- Due to lack of available biomass facilities, company has had to shut down production until they can dispose of their biomass.
- Company is afraid their current biomass disposal options are going to disappear as more California dairies are lost.
- Company has to pile and burn removed trees from entire orchards because biomass facilities have been shut down.
- Company has had to sit on biomass for a few months at a time because there are no available facilities.
- Company would prefer a biomass facility to accept cardboard as well.
- Company is afraid their current biomass facility will shut down and their only other option will be to take biomass to the dump which will be more expensive.
- Orchard removal is the biggest issue. Company will have nowhere to take the biomass because no one wants it.
- There are not enough biomass facilities to deliver biomass to. Trucking is already an issue so arranging for biomass delivery is an additional concern. ▪

Secondary Market Research
To further provide insights on the potential use of a biomass facility by local food and agriculture companies, secondary market research was conducted.

As noted above survey participants were asked to rank their likelihood of utilizing as biomass facility in Glenn County on a scale of 1 to 5 with 5 being the most likely; **92% of the survey participants ranked their likelihood of use a 5**. Those surveyed collectively reported producing at least 83,000 tons of biomass annually, primarily from orchard removals and pruning. Conservatively assuming all of this biomass is green tons (which would not necessarily be the case), this would at a minimum reflect the availability of 41,500 bone dry tons of biomass in the region, just from the 13 companies participating in the survey. A projected City of Willows biomass facility is projected to operate at 3 MW, which according to Greg Kelley, General Manager of Napa Recycling & Waste Services, would require 34,353 bone dry tons of biomass per year.

Though the strongest indicator of biomass likely delivered to a potential biomass facility is the qualitative research conducted, a review of the acreage of key tree crops in the region give a conservative snapshot of the region's availability of biomass fuel, just from orchard tree prunings.

All data for crop acreage comes from the most recent crop reports for each county. A review of a 2014 feasibility study for a biomass facility in Nevada County performed by TSS Consultants (See *Appendix B, 8)*, noted that based on discussions with University of California Cooperative Extension staff the following pruning biomass yields per acre and the potential harvestable percentage (not all pruning material is considered technically recoverable) could be assumed for each crop listed.

Applying those figures to the acreage for each tree nut crop listed provides the total tons of biomass from prunings alone that would be technically available in the greater region.

Crop	Acreage	Annual Pruning Biomass Yield (BDT/Acre)	Harvestable Percentage	Total Tons (all rounded to nearest whole number)
Glenn County				
Almonds	54,950	0.65	70	25,002
Walnuts	32,390	.5	70	11,336
Prunes	3,767	.98	50	1,845
Total				**38,183**
Butte County				
Almonds	40,411	0.65	70	18,387
Walnuts	53,909	.5	70	18,868
Prunes	7,800	.98	50	3,822
Total				**41,077**
Tehama County				
Almonds	12,370	0.65	70	5,628
Walnuts	25,082	.5	70	8.778
Prunes	5,257	.98	50	2,576
Total				**16,982**
Colusa County				
Almonds	65,870	0.65	70	29,971
Walnuts	22,182	.5	70	7,764
Prunes	808	.98	50	396
Total				**38,131**
All Counties				**134,373**

Though a percentage of these total prunings could be committed to potential competitors, it is reasonable to assume that a significant percentage of the 134,373 total tons produced from pruning alone could be diverted to a new biomass facility in the City of Willows.

With the majority of survey respondents noting that the number one factor for moving their business would be proximity – and with no operating biomass facilities in Butte or Glenn County – even just considering 50 percent of harvestable prunings from Butte and Glenn County being diverted to a City of Willows facility, minimum volumes would be 39,630 tons of biomass. ■

SECTION V. – OPERATIONAL ANALYSIS

As detailed in the Scope of Work for this feasibility venture, the operational analysis for a potential biomass facility was to include an assessment of potential locations for a biomass facility within the city limits of Willows; an assessment of land/building acquisition; and an assessment of equipment needs and costs.

It is important to note that the planning for operations and management of a biomass facility can be significant – even after feasibility is determined. The planning phase for biomass facilities is much longer than other manufacturing or processing businesses, with community engagement, design and engineering, environmental review, and utility interconnection studies contributing to a likely multi-year planning process. The City of Napa and Napa Recycling & Waste Services has been engaged in a planning for more than five years.The analysis performed below gives general direction, but given the nature of biomass facilities, any operator would need to invest in further analysis and planning specific to a proposed venture.

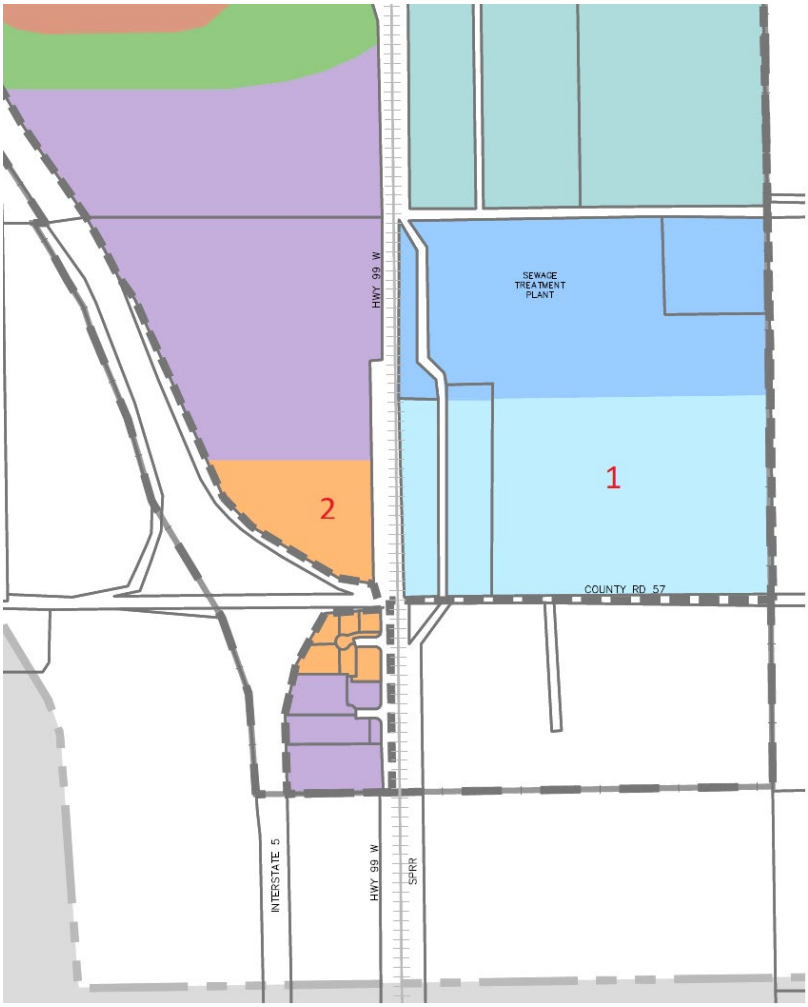
Site Feasibility
As Morrison had recently completed a site feasibility analysis for a cold storage facility in the region, Morrison's approach to analyzing potential locations for a biomass facility began with that developed site list, recognizing the different land use requirements between the facilities. Still these sites present the most opportunity and compatibility for a biomass facility.

The potential six sites from the prior site feasibility analysis included:

Site Number and Location	Acreage Estimate	Zoning	Additional Features	Owner
1 – Willows	30	Heavy Manufacturing	Rail access could be developed at the property; close freeway access to Interstate 5.	City of Willows
2 – Willows	Lots from 1-5 acres	Light Manufacturing	On old Highway 99; Close freeway access to I-5 (less than .5 mile); ability to co-locate near potential users. No rail access.	Private owner (Basin Street Properties)
3 – Willows	~314 that could be subdivided	Light Manufacturing	Near a current beverage biomass warehouse/ distribution company; rail access could be developed at the property; about 1.2 miles to I-5.	Private owner

4 – Orland	Lots from 3 to 18 acres	Industrial Park or MP District	Curb and gutter improvements already exist; 3.5 miles east of Interstate 5; streamlined permitting.	Glenn County
5 – Orland	20 acre	Service Commercial	Rail access; existing home and domestic well.	Private owner
6 – Orland	80 acres; 18 acres	Heavy industrial	Proximity directly near Interstate 5.	Private owner

It is likely that any of the sites listed in the table would be feasible to locate a biomass facility with respect to size needed, permitted use (or the ease in getting the use permitted), and general functionality of a potential biomass facility. However, the sites identified do require vastly different financial resources which would inherently impact the economic feasibility of the project.



Source: City of Willows

An analysis of the six sites narrowed the most feasible locations to two specific properties: Site 1, which is adjacent to the City of Willows' wastewater treatment facility and could potentially offset power needs for the operation of the facility and a site commonly referred to as "Basin Street" (Site 2).

These were deemed the most feasible due to each sites proximity to Interstate 5, the size of the lots (smaller acreage to allow for reduced land acquisition costs); the fact that Site 1 is currently owned by the City of Willows (potentially eliminating land acquisition costs if the facility was city-owned); and the fact that Site 2 has significant energy behind it from U.S. Economic Development Administration funding.

Rail access is the major distinction between both properties (there is the potential to develop this on Site 1), which could prove to be beneficial to a potential biomass operator.

A significant downside to both properties is that they are undeveloped and would require land improvements (see Assumptions on Page 27). However, the only site that does not require these is the Orland site in the airport industrial park, which is 3.5 miles east of Interstate 5, which limits ease of access.

The current zoning of the land for Site 1 is MH Heavy Manufacturing and for Site 2 is ML Light Manufacturing. MH may be a more intensive use than needed, but under the Willows Municipal Code MH permits all permitted uses for the ML Light Manufacturing use (Site 2's zoning) are permitted in MH zones. This includes the "manufacturing, processing, fabricating, refining, repairing, packaging or treatment of goods, materials or produce by electric power, oil or gas (except operations involving fish fats and oils, bones and products or similar substances commonly recognized as creating offensive conditions in the handling thereof." A biomass facility would likely be an allowed use by right, with likely environmental review. There is an overlay on Site 2 that would require a use permit, which would be subject to review and approval by the City of Willows Planning Commission. This would be a few thousand dollars, at most, based on representations from the City of Willows Planning Staff.

Ultimately, any site would have to fit the needs of an operator if it was not the City of Willows. Site 1 may be more attractive given potentially compatibility issues at Site 2, which is geared more at food processing businesses. Site 2 also has the potential for greater economic development for food processing businesses – a biomass facility may not be the highest and best use on Site 2.

Assuming that land would have to be purchased by an operator of the facility (if the operator were not the City of Willows and the City did not use Site 1), acquisition costs of $4 per square foot or $175,000 per acre were used to calculate land acquisition costs. This was the price confirmed with Frank Marinello of Basin Street Properties for property at Site 2 and is a reasonable figure of per acre costs to assume for any similar property in close proximity to this site.

For a reasonable estimate of the size of the site, just over 8 acres was used: Napa's proposed facility is expected to be 12 acres and it is likely that 8 acres would be sufficient for this venture Costs of $1,420,000 were therefore used as a reasonable estimate of total land acquisition costs (see Assumptions beginning on Page 27). If land did not need to be purchased, this cost could be eliminated and would impact the overall financial feasibility of this project. Still to be conservative in projecting financial feasibility, land acquisition was assumed.

Building and Equipment Needs and Costs
In assessing the feasibility of a future biomass facility in Glenn County and to inform the financial analysis of this study, research was performed as it relates to the likely design, engineering, and construction needs and costs for a potential biomass facility.

As any potential operator of a biomass facility would likely seek to design and construct a facility to best suit their needs and personal specifications, extensive feasibility work was not conducted on the design specifications for a potential facility. This was also not directed by the

City of Willows to be considered within the Scope of Work of this feasibility analysis and business case. Morrison focused efforts on determining reasonable costs for potential building and equipment needs.

This research provide a range of costs: public records show biomass power plants ranging from $2,500 - $3,000 per kW of installed capacity[8].

Further, according to a 2018 ATB Cost and Performance Summary by the National Renewable Energy Laboratory, biomass capital installation ranges from $3,970 to $4,100 per kW of installed capacity[9].

Further research from biomassmagazine.com indicates that gasification technologies had a total installed capital cost of between $2,140 and $5,700 per kW of installed capacity.

For purposes of these projections Morrison determined it a conservative estimate to use the average cost per kW of installed capacity for the total capital investment for the biomass plant for a total capital expenditure of $ 7,390,000 based on a 2,000 kW capacity biomass plant.

Additionally, based on similar fees paid by Napa Recycling & Waste Services, it was estimated the $250,000 would be needed for a connectivity assessment to be produced by PG&E.

A 2013 study produced by the International Biochar Initiative, detailing capital expenditures specifically around gasification technology, the gasifier, biomass conversion technology, and biomass preparation and handling equipment showed that this costs account for 77% of capital costs exclusive of land (See *Appendix C, 9)*. For the proposed facility, Morrison assumed that 77% ($5,690,300) of the total capital expenditures exclusive of land related to equipment and the remaining 23% ($1,699,700) was allocated to the building (before capitalization of construction period interest).

The economic life for the buildings are assumed to be 25 years with equipment having a 10-year useful life based on similar useful lives of these types of assets. ■

SECTION VI. – MANAGEMENT ANALYSIS

As detailed in the Scope of Work for this feasibility venture, the management and organization analysis was to include an assessment of the potential management and organization structure of facility; the identification of likely expertise/qualifications needed to operate facility; the assessment of needed personnel to operate a Glenn County biomass facility and costs; and the assessment of potential hours/days of operation.

Morrison discussed with City of Willows and Glenn County personnel whether Morrison's scope for this feasibility analysis and business case should extensively assess the feasibility of the city and or county operating a facility, or a private entity operating the facility, recognizing that there

[8] Burns & McDonnell, 2005; Trillium Planning and Development, 2002; and "Poultry Litter", 2005
[9] https://atb.nrel.gov/electricity/2018/summary.html.

are other management options outside of these options that would not be analyzed (community/membership model for example).

It was determined to explore the challenges and benefits of an ownership/management structure by a private owner; a city-owned management/ownership structure; and a public/private partnership.

Each approach was considered and provided below:

Private operator
The majority of biomass facilities are operated by private companies, and in California, many of these companies already have a strong presence. Among several others, these include well-known industry leaders Sierra Pacific Industries, Covanta, and Ameresco Inc.

The core competency of these companies is biomass electricity generation and related services, and as such these companies likely possess time-tested and well-refined processes and functions, with well-informed pricing models; operations plans; accounting procedures; and necessary certifications to meet compliance needs. This would ensure effective operation of a facility and likely economic sustainability of the venture. An established operator looking to expand into a new market and generate additional revenue may be able to absorb short-term start-up costs and weather any fluctuation in initial operations more effectively than a city or county operator. A private operator also would avoid the added expense of prevailing wage for construction and would not have to keep wages and benefits in line with other public employees.

However, a private operator constructing and operating a biomass facility is based solely on their willingness to do so and thus far, based on representations from City of Willows and Glenn County personnel, there has been only passing interest from outside companies in the past two years to do so. The completion of this feasibility analysis and business case however, may be a potential marketing tool to attract private companies to the region.

A private operator would be unfamiliar with the region and the likely users of the facility – corporate policies may not fit the expressed preferences of potential users and standard measures of performance may not be aligned with the small, rural nature of Glenn County and likely users of a biomass facility.

One alternative is to attract one of the existing private major biomass generators in Glenn County to build excess capacity if they have plans to build their own biomass solution and encourage them to accept outside biomass. For example, if one of the region's walnut or almond hullers installed biomass generating technology for their own purposes, they may be willing to accept biomass from the public as well. The City of Willows would lose the benefit of biochar sales, and energy generation, but this approach would fill the local market need without the City outlaying the capital costs for a facility.

Public entity operator
As stated above, most biomass facilities are owned and operated by private companies. The City of Willows currently does not have existing personnel with experience in managing and

operating a biomass facility. Though the City of Willows has engaged in several complex and large-scale capital infrastructure projects with success (including the development of the Basin Street property), the day-to-day operation of a biomass facility would require expertise not currently available within current city leadership.

Furthermore, with a the lack of expertise in the industry, if the City sought to operate this facility, current City leadership would have to rely solely on the expertise of a hired outside professional, which could expose the city to significant liability, considering the need of any facility to meet local, state, and federal regulations.

Additionally, the City of Willows' 2018-2019 budget was adopted with a general fund deficit of $98,000. The City also faces a PERS unfunded liability $78,000 higher than that in 2017/2018, with this liability anticipated to grow. Adding additional City Staff to execute the construction of, and manage and operate a biomass facility is not financially feasible at this point.

The City of Willows would be well-positioned to receive federal grant funding to operate the facility; however construction costs may be subject to prevailing wage (which would result in higher costs); and any employees hired would be public employees, subject to wages and benefits defined in agreements between the city and collective bargaining units.

Public Private Partnership
In the absence of a private operator opening a biomass facility on their own accord, the model of a public-private partnership could be considered for this venture. There are several cities that have launched biomass facilities in partnership with waste management companies, including the facility being proposed in Napa, which is a partnership between the City of Napa and Napa Recycling & Waste Services.

However, as in the case for Napa, this arrangement has been most ideal for cities/government entities with a significant amount of prunings and municipal solid waste generated by the government entity itself, and wherein the construction of a biomass facility can be negotiated in a waste franchise agreement.

The City of Willows may be able to work in partnership with local waste haulers to develop a biomass facility, but this still leaves an absence of expertise in biomass operations and regulations.

A public private partnership for the City of Willows could include the land for a facility, with the facility run by another entity. As mentioned above The City of Willows would lose the benefit of biochar sales, and energy generation, but this approach would fill the local market need without the City outlaying the capital costs for a facility.

Recommended Model
Based on the analysis, it seems the most feasible and sustainable option for a management and operation structure is to leverage this feasibility analysis and business case to attract a private company to operate a public biomass facility in Glenn County.

To that end, the assessment of needed personnel and expertise to operate a Glenn County biomass facility and costs; and the assessment of potential hours/days of operation would be largely dependent on the private operator's experience.

To inform the projections, Morrison's approach was to estimate personnel and management expenses, based on estimates used in the publication Biomass for Power Generation, Volume 1: Power Sector Issue 1/5, June 2012 by International Renewable Energy Agency (IRENA). Personnel and management costs are calculated within fixed operating and maintenance costs and range from 1% to 6% of the initial capital investment per year.

As the 2 MWh biomass plant is on the smaller side, fixed O&M is assumed to be $142,800 per month, about 2% of capital costs exclusive of land, inclusive of personnel and management. ■

SECTION VII. – CAPITAL

The most feasible option for a biomass facility in Glenn County is likely for the facility to be owned and operated by a private company, Morrison's approach to determining the capital needs focused on the likely needs of a private for-profit operator.

Capital and operating costs are detailed in the financial projections prepared for this study and documented in the Assumptions for the financial projections (see Page 27). These include:

- Total investment of $8,810,000, consisting of approximately $ 1,420,000 related to the land; $ 1,699,700 related to the building and approximately $ 5,690,300 related to equipment costs. The capital investment includes $250,000 for a PG&E Connectivity study.
- Cost of equipment, machinery, engineering and construction costs, and planning costs are based on a 2,000 kW capacity biomass plant.
- Total equipment costs of approximately $ 5,690,300 represent an assumed 77% of capital costs, exclusive of land. See also the study produced by the International Biochar Initiative, detailing capital expenditures in Appendix C, 9.

To inform the financial projections, it was assumed that these capital costs would be financed by ownership contributions plus a conventional bank loan.

Interest was calculated based on long-term debt principal and line of credit balances, as detailed in the financial projections, and an interest rate of 5%, which was determined based on current commercial loan rates as reported on CommercialLoanDirect.com (see Assumptions beginning on Page 27).

■

SECTION VIII. – RISK ASSESSMENT

As noted in this study, a Glenn County biomass facility would likely be most feasible if it was constructed, owned, and operated by a private company well-versed in biomass operations. If that approach was employed there would likely be low business risk. Morrison would advise that

the City of Willows constructing, owning, and operating a biomass facility would lend itself to a higher level of risk.

Potential risks for a private operation include:

1. *Availability of labor and materials to construct a facility and of equipment.* With the recent impacts of the Camp Fire and the increased demand to build homes and buildings in nearby Butte County, the availability of labor for construction will likely be impacted. A nationwide survey in August 2018 conducted by Autodesk and the Associated General Contractors of America shows 80 percent of construction companies nationwide are facing difficulties filling hourly craft positions, with more than half having trouble filling salaried positions, like project managers, engineers and architects. The same survey found nearly half of California construction employer respondents said it would be even harder to hire over the next 12 months (prior to the Camp Fire). Still, this would likely slow the construction timeline of a project rather than make it impossible to build. A private, well-experienced operator likely has standard building designs that could be readily adapted for Glenn County, and reduce time needs on the design side of construction, allowing for a more streamlined design and construction timeline.
2. *Demand fluctuations*. With a public biomass facility, demand fluctuations will be the most significant risk for a private entity to manage. It will be critical to a private entity to secure a number of large volume regular users to support the ability to maintain operations for the smaller, more on-demand needs reflected from the market survey. To mitigate risk, six-month or one-year contracts, with a minimum charge regardless of volume delivered, may be a policy to employ. Longer-term contracts will not be a significant challenge for a biomass facility to solicit; 53% of the respondents to the market demand survey indicated that they would consider a maximum contract length of at least three years (see discussion of results beginning on Page 8).
3. *Transportation.* Transportation of the biomass to the facility could be a significant impact to producers with fluctuating fuel costs and availability of trucking, as noted in the market survey.
4. *Environmental impacts.* The lack of control over weather and drought conditions in California may impact the availability of biomass. The production volume of crops in the area would directly impact the biomass facility's ability to operate efficiently.
5. *Obsolescence*. As this would be a brand new facility, it will be likely be equipped with new, state-of-the-art equipment and software. Obsolescence should not be an issue for many years.
6. *Plant safety and legal liability*. Plant safety and legal liability will be a risk that could be readily mitigated with an experienced operator well-versed in biomass policies; best practices; and all California state biomass requirements and compliance needs. A biomass operator with existing facilities in California will already have policies, practices, and procedures in place to address safety and legal liability.
7. *Financing*. Financing arrangements with a conventional bank lender would likely have to be secured by any private company seeking to construct a biomass facility in Glenn County. An experienced operator with a strong history of building and operating biomass facilities will likely not face as many risks in acquiring financing.
8. *Competition*. As discussed in the market analysis, there are few public biomass facilities in the region that would offer significant competition. The major risk in competition comes

largely from private food and agriculture companies building their own on-site biomass to meet their own needs. This is especially true of larger food and agriculture companies with a high volume of product (one respondent to the market demand survey was in the process of designing and building their own biomass in the absence of Glenn County having public biomass space). Still, building biomass is a timely process and if a private biomass facility operator was to effectively communicate their plans and interest in building a facility in Glenn County, they may be able to deter private food and agriculture companies from proceeding with plans for their own biomass facilities and shift their interest to using a public biomass facility.

9. *Labor*. The nationwide skilled labor shortage could have an impact on labor needed to operate and manage a Glenn County biomass facility. Still, as noted in the regional market overview in the Market Analysis section (see Page 8), Glenn County's economy is largely driven by agriculture, with this industry and supporting business (including biomass facilities) employing the largest number of people in the county. With nearby Butte, Tehama, and Colusa counties providing additional potential labor pools; and Butte Community College, California State University, Chico attracting young talent to the region, labor will likely not be a significant risk factor.
10. *Permitting and Interconnection Study*. As noted above, the biomass industry is incredibly complex and would be dependent on Pacific Gas & Electric driving and approving an interconnection. Furthermore, achieving approval for operation is a much more complex process than for a typical business venture and would require a level of experience and expertise. A significant timeline would be required as well.

Summary: While it is not possible to anticipate every possible risk, the major risks noted above appear as though they could be appropriately mitigated by an experienced biomass operator. ■

SECTION IX. – FINANCIAL PROJECTIONS

Through an evaluation of key market trends; a market demand survey consisting on in-depth one-on-one potential user interviews; representations made by a private biomass operator concerning historical costs; and additional outside research, financial statements have been prepared on a month-by-month basis for the five years of the venture, summarized annually below. The full financial projections and assumptions are included in Appendix A of this document. Below is a brief and summarized version of both documents.

These financial projections were developed to assist in the assessment of the potential for a biomass facility in the City of Willows. A specific operator has not been identified as of the time of these projections but may include independent operators of other biomass facilities, parties with a need for biomass capacity as part of their business activities, or the City itself.

For the purpose of these projections, it is assumed that this business would be established as a division, limited liability company (LLC), S-Corporation, or subsidiary of a currently existing company or organization which would cause income from this venture to flow to the owners' tax returns and be taxed at the rates relevant to their entire income. Accordingly, income taxes are not reflected in these projections for the venture; and any potential owner/operator should assess tax issues based on their overall tax situation.

It is presumed that operations will commence in August 2025 ("Year 1") for projection purposes, based on discussions with Napa Recycling & Waste Services (see below for detail of types of information obtained and relied upon) a company working on developing a similar project. The assumed start date includes time for identifying a private developer or obtaining funding if a public project, construction of the facility itself, site preparation, permitting required for the facility through various agencies, and a connectivity study for determining immediate sources by the utility company for the power being generated by the facility. Actual operations may start in in prior or subsequent months or years. All construction and related payments to readying the facility for normal operation is assumed to occur prior to commencement of operations. All transactions are in US dollars (USD). All projections are in nominal dollars (not inflation adjusted) and not tax adjusted unless otherwise noted.

The assumptions and support for each line item is documented below. As referenced, support includes a survey of bio-waste producers comprised primarily of food and agriculture companies located within Glenn and surrounding counties ("Market Survey"), see discussion of survey beginning on Page 8.

Certain assumptions are based on information obtained from Greg Kelley, General Manager of Napa Recycling & Waste Services ("NRWS"), a company that operates the Napa Recycling & Composting Facility, owned by and located in the City of Napa. NRWS has been in active development of a biomass power generating facility for several years and has gone through many of the pre-construction stages, including research, budgeting, permitting, and others. The facility they are planning to build, pending approval from governing bodies for funding, is likely to be of similar size, capacity, and location type as the proposed facility in Glenn County. The NRWS facility is planned to process primarily wood from trees, while the proposed Glenn County facility would additionally process agricultural biomass produced from processing certain crops, such as hulls from rice, walnuts, and almonds, as well as shells from walnuts and almonds. Information obtained from NRWS includes types and costs of permitting that must be obtained for such a facility, expected annual production levels for the facility, recommended lot size for a facility, requirements to transform biomass material to be ready for gasification, general market information for biochar, and types of ancillary buildings and equipment necessary to operate such a facility.

A 2013 study produced by the International Biochar Initiative ("IBI 2013 Study") was used to research and support the various uses of biochar as well as its pricing. Finally, the publication Biomass for Power Generation, Volume 1: Power Sector Issue 1/5, June 2012 by International Renewable Energy Agency (IRENA) is utilized as a source of information for several key areas such as: power generation rates, operating expenditures, and useful lives of fixed assets. Some assumptions are based on representations by the City of Willows (see the related Representation Letter).

Income Statement assumptions:
The Detailed Projected Income Statements show revenue and expense projections detailed by account. The supporting assumptions for each line are as follows:

- Volume (units): Based on discussions with the NRWS, there are various elements in determining volume of biomass required for production, power production and total output of biochar. The following volume based elements are used to estimate the different factors that go into powers sales and biochar material sales:
  - *Biomass processed daily (tons):* The NRWS indicated that for the size of facility assumed (see the "Property plant & equipment (net)" section under "Projected Balance Sheets and Cash Flows" below) that to operate a twenty four hours a day, that an average of 94 tons of biomass would be processed for power generation on a daily basis.
  - *Total biomass processed (tons):* Using an average days-per-month of 30.4 (365/12), this estimates total processed biomass at 2,863 tons per month or 34,353 tons per year.
  - *Total power produce (tons):* Assuming a power production rate of 134.09 kWh per ton of biomass, based on information provided by the NRWS and assessed against information contained in IRENA, it is estimated that the facility would produce 383,865 kWh monthly or 4,606,384 kWh annually.
  - *Power sales price/kWh:* An average sales price per kWh of $0.1277, see 'Power sales' section below, is assumed.
  - *Biochar produced (tons):* The NRWS provided an estimated rate of 1 ton of biochar material per 10 tons of biomass processed, additionally the Biochar Journal published an article titled Campfire Lessons – breaking down the combustion process to understand biochar production in December 2014 stating that "gasification char typically contains 10%-12% of the original biomass weight…". This results in 10% of tons processed turned into biochar available for sale. The different types of biomass were evaluated for their impact on the value of the different forms of biochar that are produced through gasification, of the largest sources of tonnage noted in the "Market Survey" (orchard removal & prunings, almond biomass, walnut biomass, and rice hulls) all were considered fairly equal in quality, with only rice hulls were identified as having a slightly higher value. This biochar comparison is per a study published by Biogeosciences titled Physical and chemical characterization of biochars derived from different agricultural residues last revised in December 2014.
  - *Biochar sales price/ton:* This represents the average sales price per ton of biochar sold, see 'Biochar material sales' section below.

- Sales: Based on discussion with the NRWS, operating at full capacity for the size of facility assumed (see the "Property plant & equipment (net)" section under "Projected Balance Sheets and Cash Flows" below), it is estimated that a total of 34,353 tons of biomass will need to be processed annually. To assess the availability of the required volume of tons, the responses from the Market Survey indicated that those surveyed produced at least a total of approximately 83,000 tons of biomass annually (which does not include an estimate for biomass from entities not included in the survey). Given the total annual required tons of biomass represents approximately 41% of the total biomass produced by just the companies surveyed, it is assumed that such a volume could be available each year. Additionally, a model of collecting fees for disposing of biomass to facility was assessed. The net financial impact to each company surveyed varied between a net cost (46%), net income (15%), break even (31%), or other (15%), see Page 8 for details. Disregarding the companies who responded "other", half of the companies said they has costs ranging from $7-20 per ton and the remaining half received income or broke even. It was assumed for these projections that

the facility would charge disposal fees, in order to better fund the overall operation while maintaining a sufficient supply of biomass to operate at full capacity.

- *Disposal fees:* These represent fees charged to those disposing of their biomass material. The fees are based on a price per ton of $5.00, which was determined based on responses in the Market Survey. A number of the companies surveyed indicated they were paying for disposal of their biomass and of those they were paying between $7.00 and $20.00 per ton. The lower rate would then incentivize producers of biomass to dispose of their material to the facility as it would represent a reduced cost to them.
- *Power sales:* Represents gross sales of power sold to PG&E at a rate of $0.1277 per KWh at full production capacity of 34,400 tons annually, see 'Sales' section above, or roughly 2,860 tons monthly. The KWh rate of $0.1277 was obtained from the NRWS and deemed reasonable based on Morrison's experience with other power generation installations. It is assumed that a portion of this power would be utilized onsite through the normal operation of the facility calculated as an average of 52.5% of power produced. This is based on a range of 50-55% provided by the NRWS. Also, it is assumed that an inherent ramp up period would be encountered during the initial operations of the facility. A subjective estimate, due to limited sources for this specific type of facility, of one half of average processed tons was used for month one, August 2025, increasing to normal average processed tons by month seven, February 2026, increasing evenly throughout the intervening months.
- *Biochar material sales:* Represents the sale of the biochar material, the residual material remaining after the biomass is utilized in the gasification process. Based on information provided by the NRWS, it's estimated that this process would produce biochar material at a rate of roughly 1 ton of biochar for every 10 tons of biomass processed. The market for biochar can vary, based on information provided by the NRWS they calculated a price range of $200 to $1,000 per ton. According to the IBI 2013 Study biochar sold for a wide variety of prices, ranging from $0.08 to $13.48 per kilogram, with an average of $2.48 per kilogram or approximately $2,250 per ton. Emphasizing the input from the NRWS, having more current information, it was assumed the biochar could sell, on average at approximately $600 per ton.

- Operating Expenses: Operating expenses include: both fixed and variable operation and maintenance costs (O&M), power usage, depreciation and interest expense. Operation and maintenance costs are estimated using general assumptions from IRENA, while the remaining expenses are calculated independently for this projection. See below for general assumptions for operating expenses:
  - *Operation and maintenance expense - fixed:* Based on ratios compiled in IRENA these are calculated as a percentage of initial capital costs and consist of expenses associated with the operation of the biomass plant such as: labor, scheduled maintenance, routine equipment replacement, insurance, etc. Fixed O&M range from 1% to 6% of the initial capital investment per year. As the 2 MWh biomass plant is on the smaller side, fixed O&M is assumed to $142,800 per month, about 2% of capital costs exclusive of land.
  - *Operation and maintenance expense - variable:* Based on rates compiled in IRENA, these costs are dependent on the output of the system and are calculated as a value per unit of output (USD/kWh). These include costs such as: non-biomass fuel costs (natural gas, diesel fuel, etc.), ash disposal, unplanned maintenance and incremental servicing

costs. Power plants that can burn biomass incur variable costs at an average of 7 to 9 cents per kilowatt-hour. For purposes of this projection, the average variable cost of 8 cents per kWh was used to estimate variable costs.

- *Depreciation:* Represents depreciation of the costs of buildings and equipment, see the 'Property plant & equipment (net)' section below, over the estimated useful lives of the assets. The useful life for buildings is estimated at 25 years and 10 years for equipment. The estimated useful lives were determined based on the IRENA report. These amounts are used to calculate 'Biomass Facility cost' and 'Depreciation per month' within the *General Assumptions*.
- *Interest:* Calculated based on long-term debt used to construct the biomass facility, both noted below, at an interest rate of 5%, which was determined based on current commercial loan rates as reported on CommercialLoanDirect.com. This includes interest paid during normal operations beginning August 2025. Interest only payments are assumed for the construction period and capitalized as described below at "Long-term debt" under "**Projected Balance Sheets**." Refer to *Loan Schedule* section for amortization schedule and monthly principal and interest amounts.

- Net income: Based on the net financial result of the financial projections.

Projected Balance Sheets:
The projected balance sheets reflect the estimated net impact of activities related to this venture. Key assumptions include:

- Cash: Represents net cash earned by the business plus any capital contributions. The cash balance at any point reflects the cumulative cash balance of the business over time (distributions not budgeted and would be determined by the eventual owner). If net cash from all activities drops below zero per the Projected Cash Flows, that amount would be reflected as a draw on the Line of Credit in these projections.
- Accounts receivable: Represents outstanding invoices estimated at 75% of the previous month's revenues.
- Property, plant & equipment (net): Represents the value of all fixed assets net of depreciation, including the cost of equipment, machinery, engineering and construction costs, and planning. Public records show biomass power plants ranging from $2,500 - $3,000 per kW of installed capacity (Burns & McDonnell, 2005; Trillium Planning and Development, 2002; and "Poultry Litter", 2005., "Source 1") Further, according to 2018 ATB Cost and Performance Summary by the National Renewable Energy Laboratory ("Source 2") (https://atb.nrel.gov/electricity/2018/summary.html), biomass capital installation ranges from $3,970 to $4,100 per kW of installed capacity. Further research from biomassmagazine.com ("Source 3") indicates that gasification technologies had a total installed capital cost of between $2,140 and $5,700 per kW of installed capacity. For purposes of these projections we determined it a conservative estimate to use the average cost per kW of installed capacity for the total capital investment for the biomass plant for a total capital expenditure of $7,390,000 for buildings and equipment (prior to capitalization of construction period interest) based on a 2,000 kW capacity biomass plant. Additionally, based on similar fees paid by NRSW it was estimated the $250,000 would be needed for a connectivity assessment to be produced by PG&E. According to IRENA, for capital expenditures specifically around gasification technology, the gasifier, biomass conversion technology, and biomass preparation and handling equipment account for 77% of capital costs exclusive of land. For

the proposed facility, we assumed that 77% ($5,690,300) of the total capital expenditures exclusive of land related to equipment and the remaining 23% ($1,699,700) was allocated to the building (before capitalization of construction period interest). The economic life for the buildings are assumed to be 25 years with equipment having a 10-year useful life based on similar useful lives of these types of assets. PP&E is decreased by accumulated depreciation and is assumed to become operational on August 1, 2025.

- Accounts payable: Represents outstanding invoices to be paid to vendors. A/P projections assume 100% of each month's invoices will be paid in the month subsequent to receipt.
- Current maturities of LT debt: Represents debt principal to be paid within the following twelve months all Long Term Debt, detailed below.
- Long-term debt for the financing of property, plant, and equipment is estimated at $5,600,000. The following terms are assumed: the term of the debt is assumed to be 15 years, amortized at 25 years with a balloon payment estimated at $3,073,549, due August 2040, a schedule of monthly payments, and that the first two years of the loan over the estimated constructed phase of the facility would include interest only payments (which would be capitalized in the amount of $560,000 into buildings and equipment). The cost of this financing is documented on the *Loan Schedule* and as part of *Interest* sub-section, of section "Operating Expenses" under "**Detailed Projected Income Statement**" assumptions above.
- Retained earnings: Represents the cumulative earnings retained from the results of the operation of the business. The opening balance for retained earnings includes interest expense incurred prior to operations, related to interest only payments made during the construction phase. See "Long-term debt" above.
- Contributions: Represents estimated equity contributions to the business by the owner(s), calculated as needed for projected property, plant & equipment needs (including capitalization of construction period interest) in excess of that financed by long-term debt and sufficient to create a projected cash balance of $575,000 at the beginning of operations at August 1, 2025.

Capital Investment & Operating Expenses:

This document contains calculations for capital expenditures, depreciation, and operating expenditures. It includes:

- A summary of the different sources of capital cost estimates.
- A calculation of the average of those different sources to estimate total capital costs for the proposed facility.
- An estimate for interconnectivity study
- The inclusion of total debt associated with the project as well as two years of interest only payments, both per *Loan Schedule*.
- An estimate of initial cash investment, based on the difference between maximum debt level, plus total of interest only payments, and less any additional beginning cash.
- A breakout of building costs and equipment costs from the total capital investment and their useful lives.
- A calculation of monthly depreciation for each fixed asset type.
- A range of estimated fixed operating costs based on IRENA and a calculation of fixed operating costs based on a percent of capital costs.

- A range of estimated variable cost per kWh sourced from IRENA and an averaging of cost per kWh.

Loan Schedule:
This spreadsheet contains the amortization schedule for debt obtained as part of financing required to establish the facility and put into operation, using inputs from above spreadsheets. This spreadsheet contains principal and interest amounts used to calculate interest expense and principal payments made against the loan over the projection period. Specific assumptions for inputs include:

- Loan Amount: This was calculated as a percent of capital costs, as noted under Capital Investment & Operating Expense as well as the "Long-term debt" section under "Projected Balance Sheets and Cash Flows" above.
- Annual Interest Rate: Based on rates for commercial construction notes, noted in Interest sub-section, of section "Operating Expenses" under "Detailed Projected Income Statement" assumptions above.
- Loan Length in Years: See "Long-term debt" section under "Projected Balance Sheets and Cash Flows" above.
- Number of Payments per Year: "Long-term debt" section under "Projected Balance Sheets and Cash Flows" above.
- Start Date of Loan: This assumes a two year period of construction for the facility.
- State Date of Principal Payments: Based on the assumed two year period construction period, principal payments would start once operations begin.
- Optional Extra Per Month Payment: Due to limited cash availability initially, no extra payments are assumed during the 5-year projection period.

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Income Statement

	Year 1	Year 2	Year 3	Year 4	Year 5
Gross revenues	$1,933,944	$2,512,361	$2,512,361	$2,512,361	$2,512,361
Deductions	-	-	-	-	-
Net Sales	1,933,944	1,492,792	1,865,989	1,865,989	1,865,989
Operating & maintenance expense	2,054,034	2,142,108	2,142,108	2,142,108	2,142,108
Depreciation	685,296	685,296	685,296	685,296	685,296
Interest	277,378	271,471	265,259	258,732	251,872
Total Operating Expense	3,016,708	3,098,875	3,092,663	3,086,136	3,079,276
Net income (loss)	$(1,082,768)	$(586,519)	$(580,307)	$(573,780)	$(566,920)

	Year 1	Year 2	Year 3	Year 4	Year 5
Balance Sheet					
Assets					
Current:					
Cash	$106,442	$ 83,342	$ 60,216	$ 37,064	$ 13,883
Accounts Receivable	157,022	157,022	157,022	157,022	157,022
	263,464	240,364	217,238	194,086	170,905
Long term:					
Plant & equipment (net)	8,684,704	7,999,408	7,314,112	6,628,816	5,943,520
Total Assets	$8,948,168	$8,239,772	$7,531,350	$6,822,902	$6,114,425
Liabilities & Equity					
Current:					
Line of credit	$ -	$ -	$ -	$ -	$ -
Accounts Payable	201,402	200,899	200,369	199,813	199,228
Current maturities of LT debt	120,871	127,055	133,555	140,388	147,570
	322,273	327,954	333,924	340,201	346,798
Long term:					
Long term debt	5,363,663	5,236,105	5,102,020	4,961,075	4,812,921
Equity					
Retained earnings	(1,082,768)	(1,669,287)	(2,249,594)	(2,823,374)	(3,390,294)
Contributions	4,345,000	4,345,000	4,345,000	4,345,000	4,345,000
	3,262,232	2,675,713	2,095,406	1,521,626	954,706
Total Liabilities & Equity	$8,948,168	$8,239,772	$7,531,350	$6,822,902	$6,114,425

Financial Feasibility Conclusions
To summarize the statements above, net income for Year 1-5 is projected at losses of $(1,082,768); $(586,519); $(580,307); $(573,780); and $(566,920) under the assumptions documented beginning on Page 26. Earnings before interest, tax, depreciation, and amortization (EBITDA) for the project is projected to be $(120,094) in Year 1; and $370,248 in in Years 2-5, totaling $1,360,898.

Under the assumptions documented and in the absence of any incentives, subsidies, or grant funding to offset capital needs, this venture is projected to require $9,945,000 prior to commencement of operations, which would be used for acquisition and construction of property, plant, and equipment; capitalized interest during the construction period, and; a $575,000 operating cash balance at the commencement of operations on August 1, 2025. For purposes of the financial projections in this study, it assumed that needed funds would be $4,345,000 in equity contributions and $5,600,000 in long-term debt. Given the lack of long-term financial profitability projected for this venture, traditional bank financing would likely be a challenge to achieve without other funding sources such as incentives, subsidies, or grant funding.

Biomass projects generating negative earnings and/or cash flow for several years is not an anomaly, as demonstrated in our consideration of financial analyses for two unrelated proposed biomass facilities (see Appendix C, 8 and 10). This would likely be a strong consideration of any financial investment by the City of Willows for this venture.

Still, it is possible that a private operator, with significant experience and streamlined operations, may be able to achieve financial feasibility for a biomass venture in the City of Willows. It is likely that a private operator, with significant history, could achieve lower operating and maintenance costs and could offer significant capital at the outset of a project, to reduce financing needs. Grant funding also could substantially impact the financial viability of this venture and support this venture achieving financial viability. To be conservative, none of these situations were assumed.

Within the limitations of the paragraph above, Morrison concludes that the general approaches to approach, competition and markets, operations and management; capital needs, and risks discussed in this assessment are technically feasible. Financial profitability and positive cash flow would be difficult to achieve with the City of Willows as an operator, but may be achievable if a private operator, well-versed in biomass operations, built and operated a potential facility. ■

SECTION X. – CONCLUSIONS

The purpose of a feasibility assessment is to determine the general viability of a proposed approach to a project. In the actual execution of a strategy, external circumstances, internal decisions, and other factors may dictate departures from the original plan. Further, it is not possible to consider every possible cost or circumstance, internal or external. Accordingly, no representation is made as to the outcome of any action City of Willows or any other party may take based on this Assessment.

Within the limitations of the paragraph above, Morrison concludes that the general approaches to approach, competition and markets, operations and management; capital needs, and risks discussed in this assessment are technically feasible. Financial profitability would be difficult to achieve with the City of Willows as an operator, but may be achievable if a private operator, well-versed in biomass operations, built and operated a potential facility. ■