CITY OF LOVELAND
WATER & POWER DEPARTMENT
200 North Wilson • Loveland, Colorado 80537
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AGENDA ITEM: **20**
MEETING DATE: 1/6/2015
TO: City Council
FROM: Steve Adams, Water and Power
PRESENTERS: Gretchen Stanford, Customer Relations Manager
Brieana Reed-Harmel, Senior Electrical Engineer
Julie Rosen, Outside Legal Counsel, Ryley Carlock & Applewhite

TITLE:
FEMA Alternate Project

RECOMMENDED CITY COUNCIL ACTION:
Authorize the Director of Water and Power to compile and submit the scope of work for construction of a substation and installation of a small (1 to 2 MW) solar facility on the Boedecker property to the Colorado Office of Emergency Management (COEM) and Federal Emergency Management Agency (FEMA) for approval as the "Alternate Project".

OPTIONS:
1. Adopt the action as recommended
2. Deny the action
3. Adopt a modified action (specify in the motion)
4. Refer back to staff for further development and consideration
5. Adopt a motion continuing the item to a future Council meeting

SUMMARY:
This is an administrative action. On May 30, 2014, Loveland received confirmation that FEMA had determined the City was eligible to receive a subgrant of approximately $9.1 million for an alternate FEMA project to replace the Idylwilde Dam and Penstock facilities lost in the September 2013 Flood. This agenda item recommends that construction of a substation and installation of a small (1 to 2 MW) solar facility on property owned by the City southeast of Boedecker Lake be designated as the "Alternate Project" to be completed with those FEMA funds. On December 17, 2014, the Loveland Utilities Commission recommended using the FEMA Alternate Project funds for construction of a substation and 1-2 MW solar project on the Boedecker site.

BUDGET IMPACT:
☐ Positive
☒ Negative
☐ Neutral or negligible

The FEMA Project Worksheet for the alternate project totals $9,068,018. The City can expect to receive 87.5% or $7,934,516 in project reimbursements. The remaining $1,133,502 will come from other available power utility funds.

BACKGROUND:
Due to the Idylwilde Hydroelectric Facility having suffered severe damage in the last two floods along the Big Thompson River, it was determined that the Idylwilde facility should not be rebuilt and the subgrant funds should be used on an alternate project. There were multiple projects identified as possible alternate projects and they included:

- Installation of solar at the following locations:
  - Value Plastics
  - City owned property near I-25 and Highway 402
  - Fort Collins/Loveland Airport
  - Larger solar facility at Loveland Water and Power owned property near Boedecker Lake
  - Smaller solar facility at Loveland Water and Power owned property near Boedecker Lake
- Improving the City's Fiber Optic Network
- Substations
  - Building a new substation near Boedecker Lake
  - Hardening the West Substation
- Installation of an in-line turbine at the Water Treatment Plant

Staff engaged the assistance of Owners Engineer, NEI Electric Power Engineering Inc, to evaluate the various projects from a technical perspective. Staff has also engaged Ryley Carlock & Applewhite (RCA) to provide legal guidance for the FEMA alternate project process. Additionally, staff evaluated the various projects from the standpoint of how they would benefit the entire community and the utility, the ability to complete the projects in the allotted time, the environmental constraints, and the legal requirements from FEMA. These projects have gone through an initial overview process with the City's Conceptual Review Team (CRT) to evaluate the land use and special considerations for each site. The information from these evaluations is outlined in the staff report and additional attachments.

Staff recommends the construction of a substation and installation of a smaller (1 to 2 MW) solar facility on the Boedecker property as the "Alternate Project". The Loveland Utilities Commission considered this item at its December 17, 2014 meeting and concurred with staff's project recommendation. The recommended project will provide benefit to the community while complying with the requirements and restrictions for the use of the subgrant funds.

With Council's approval, Loveland Water and Power will submit the project scope of work and request for project extension to COEM and FEMA by January 15, 2015. Once approval is received from these agencies the Water and Power Department will begin the planning, design, procurement and construction which must be completed no later than September 14, 2017.

REVIEWED BY CITY MANAGER:

William D. Cahill

LIST OF ATTACHMENTS:

1. Staff Report on FEMA Alternate Project (**Attachment A**)
2. The "City of Loveland Water and Power FEMA Alternate Project Report" by NEI Electric Power Engineering Inc. (**Attachment B**)
3. Submittal Letter dated December 5, 2014, Preliminary Alternate Project Descriptions and Questions sent to Colorado Office of Emergency Management (COEM) and FEMA (**Attachment C**)
4. Responses from COEM and FEMA dated December 8, 2014 (**Attachment D**)
5. FEMA Alternate Project Options Spreadsheet (**Attachment E**)
6. Timeline – Project Options Evaluation for FEMA Alternate Project (**Attachment F**)
7. Environmental Implications Summary Table (**Attachment G**)
8. Power Point presentation **(Attachment H)**

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TO: City Council

DATE: January 6, 2015

THROUGH: Steve Adams, Water and Power Director

FROM: Bob Miller, Power Operations Manager
Gretchen Stanford, Customer Relations Manager
Brieana Reed-Harmel, Senior Electrical Engineer

RE: Staff Report on FEMA Alternate Project

Background

During the flood of the Big Thompson River in September 2013, the City of Loveland sustained significant damage to the Idylwilde hydroelectric facility. The Idylwilde Dam suffered damage to the super structure and the reservoir was completely filled in with silt, sediment and cobbles. Approximately 2,000 feet of the penstock that ran adjacent to the Big Thompson River was destroyed. The Power House was flooded which compromised the electrical equipment within the facility.

The Federal Emergency Management Agency (FEMA) estimated that the eligible damage sustained to the Idylwilde Dam and the penstock was $9,068,018 and determined that the Power House was ineligible for FEMA reimbursement due to being covered by the City's insurance policy through CIRSA. On May 27, 2014, the City of Loveland was awarded by FEMA a fixed subgrant of $9,068,018 for damage sustained to the Idylwilde Dam and the penstock. On May 30, 2014, the City of Loveland accepted the subgrant and elected to participate in the FEMA Alternate Project Program. It had been determined that the hydroelectric facility should not be replaced since it had also sustained damage during the flood in 1976. This Alternate Project Program will reimburse the City 87.5% or approximately $7.93 million of the subgrant funds for an alternate project instead of repairing or replacing the Idylwilde facility. The balance of approximately $1.1 million will be paid from available power utility funds.

Through the Request for Proposal (RFP) process the utility hired NEI Electric Power Engineering, Inc. as an Owner's Engineer to study several project options that could potentially be funded by the FEMA subgrant. The "City of Loveland Water and Power FEMA Alternate Project Report" submitted as Attachment B, dated December 12, 2014 by NEI evaluated and estimated project costs against the awarded subgrant amount along with how projects fit into the required federal regulations, potential benefits to the City and what were possible payback periods for each project. The cost figures in the NEI report are estimates for project comparison purposes and do not take into account the reduction in funding required from the FEMA regulations, the actual project costs and payback will be determined once the project scope has been determined and bids received.

FEMA Alternate Project Program

The FEMA regulations allow the subgrant funds to be used for an alternate project when rebuilding the damaged facility would not best serve public welfare. The program also allows for the funds to be used on more than one eligible project.

There are many restrictions for the use of the subgrant funds when electing to perform and alternate project. Included are the following restrictions:

- The alternate project must be pre-approved by the Colorado Office of Emergency Management (COEM) and Federal Emergency Management Agency (FEMA).
- The procurement process must comply with all state and federal procurement regulations including the Federal Acquisition Regulation (FAR).
- The alternate project must comply with all environmental and historical preservation laws, regulations and orders; including the National Environmental Policy Act (NEPA) and the National Historic Preservation Act, which requires consultation with the State Historic Preservation Office (SHPO)
- The alternate project must be a permanent project that benefits the general public.
- The alternate project must be located in the declared disaster area.
- The City of Loveland must own and maintain responsibility for the facility.
- Subgrant funding cannot be used to provide ongoing operations and maintenance, leasing costs, placed in the general fund or used to pay debts.
- The alternate project must be completed within the specified timeframe.
- Costs of the alternate project which exceed the fixed subgrant amount are the responsibility of the City .

Timeline

Pursuant to FEMA regulations there are defined timelines within which alternate projects must be completed. Per FEMA regulations, technically the deadline for final project completion, including completion of construction and close out is March 14, 2015. However, the FEMA rules allow the City to obtain a 30 month extension on project completion from the COEM. The City of Loveland expects to be granted the 30 month extension placing the deadline for completion of the alternate project on September 14, 2017.

Important COEM and FEMA dates for the project are:

- The disaster due to the flooding was declared on September 14, 2013.
- The deadline to submit the proposal for the alternate project to the State for approval by both the COEM and FEMA is January 14, 2015 which is 60 days prior to the deadline for approval.
- The deadline to obtain an extension from the State for completion of the project is eighteen months from the date of disaster declaration, or March 14, 2015.
- The deadline for approval by both the COEM and FEMA of the alternate project is eighteen months from the date of disaster declaration, or March 14, 2015. We note this is technically under the FEMA rules, the deadline for project completion; however, because we plan to obtain an extension from COEM, March 14, 2015 is in effect our deadline for project approval.
- With the 30 month time extension, the alternate project must be completed 48 months from the date of disaster declaration, or September 14, 2017.

As seen in the timeline on Attachment F titled “Project Options Evaluation for FEMA Alternate Project” information is provided on important dates for the FEMA timeline as well as information on internal progress for various project option evaluations.

Projects Being Considered

After evaluating our Capital Improvement Plan, the 2014 Utility Customer Survey results and regulatory compliance, the electric utility identified several different project options as detailed on Attachment E for the use of the subgrant funding. The projects reviewed included:

- Installation of solar at the following locations:

  - Value Plastics
  - City owned property near I-25 and Highway 402
  - Fort Collins/Loveland Airport
  - Larger solar facility at Loveland Water and Power owned property near Boedecker Lake
  - Smaller solar facility at Loveland Water and Power owned property near Boedecker Lake
- Installation of an in-line turbine at the Water Treatment Plant
- Improving the City's Fiber Optic Network
- Substations
  - Building a new substation near Boedecker Lake
  - Hardening the West Substation

Solar Projects: The Idylwilde Hydroelectric facility had been providing the Loveland electric customers with clean, renewable, low cost electricity since its original completion in 1925. After the second flood severely damaged the facility, the utility determined that a good possible use of the subgrant funds might be to produce renewable energy from a source less prone to natural disasters in order to provide the same benefit to the rate payers. Solar was identified as a good option since it would produce more energy than was capable from the previous Idylwilde facility, it could be built in more locations than a new hydroelectric facility, it has no Federal Energy Regulatory Commission (FERC) licensing requirements, and it would help the utility reach the Renewable Energy Standards (RES) prior to being mandated to do so. The utility looked at several land options around the City of Loveland for possible solar installations for the subgrant. All these solar projects would connect directly to Loveland's electric distribution grid.

1) ***Solar at Value Plastics:*** The Value Plastics property is located adjacent to existing electrical infrastructure and an existing substation. This makes the site an ideal location for solar installation. Since this property is not owned by the City, the utility would pursue a long term or permanent utility easement on the property to install the solar facility. This would be a one-time cost to the utility, to compensate Value Plastics for the loss of the use of the land. The identified potential location for a solar facility on this site is currently being used as a retention pond which may cause the site to be partially submerged during heavy rain events. This would be taken into consideration during the design of the project. This site is located in the region between Loveland and Fort Collins where the two Cities have a development plan in place. Coordination will most likely be required by both Cities if this site is chosen for a solar facility. This property does not need to be rezoned but will require a Special Review Application which will take approximately 3-5 months to complete. When compared to other potential solar sites this option may have a higher cost to construct solar due to the easement acquisition costs, as well as the need to raise the solar panels above the expected 100 year water surface elevation of the retention pond.

2) ***Solar at I-25 and Hwy 402:*** The City owns land near the intersection of Highway 402 and I-25 and was identified as a possible location for a solar facility. Within the long-term utility plan, this location has also been identified as a potential location for a new substation as growth continues in this portion of the City. One of the biggest challenges with this location is there is no existing electrical infrastructure in the area to connect the solar to Loveland's distribution system. The closest tie is approximately 3.5 miles from this site. Due to the need to obtain easements and the environmental and historical evaluations for the site as well as the linear distribution line that would be required for this alternate project, the ability to build this distribution line could cause the project to be delayed. Additionally, the cost to extend the

distribution line to this site significantly increases the cost of this project and makes it more expensive when compared to other land options. This land is currently zoned as E-Employment Center and would need to be rezoned and a new Conceptual Master Plan developed for the property in order to place a solar facility on the site. This would add to the timeline for completion of the project.

3) ***Solar at the Fort Collins/Loveland Airport:*** The Fort Collins Loveland Airport was identified as a possible location for a large scale solar facility due to proximity to existing electrical distribution infrastructure and Crossroads Substation. There are several solar projects that have been successfully completed at other airport locations throughout the country. However, one of the restrictions from the Federal Aviation Association (FAA) is that the land cannot be sold, it can only leased. The lease amount is defined in the FAA regulations. This makes the ongoing operations and maintenance costs of the site higher than other available sites. If this site is chosen for a solar option we will need to work closely with the FAA to follow all their requirements for placing solar at an airport site, one of which will be to go through an extensive sun evaluation to make sure the solar placement does not create any glare that would affect the airport operations. This property does not need to be rezoned but will require a Special Review Application which will take approximately 3-5 months to complete. Due to this higher ongoing cost, this project option was not the top choice when compared with other solar location options.

4) ***Larger or Smaller Solar Facilities at the Boedecker property:*** Loveland Water and Power has recently purchased 29.75 acres of property near Boedecker Lake northeast of the intersection of County Road 21 and 14th Street Southwest. This area had previously been identified in the utility's long term plan as a location for a new substation to accommodate future growth. The property is ideal for a substation location due to the proximity to existing transmission lines and its location near the edge of our growth management area. However, the property is much larger than what would be required for the substation, leaving close to 25 acres available for other purposes. The utility has looked at two different options for solar on this property:
    - ***a.*** Using the entire 25 aces for a solar facility and building the substation at a later date based on growth needs using other funds. There is existing electrical infrastructure on 14th Street Southwest to connect the solar facility to the City's electrical distribution system.
    - ***b.*** Using approximately 14 acres for a solar facility and reserving the remaining acreage for a buffer for the adjacent properties. The Parks Department has expressed interest in developing a park in this portion of the City and this could provide the buffer to the adjacent neighborhoods. If this is the direction chosen, the park would not be part of the alternate project.

    This site located outside the City limits so the utility will need to go through an annexation process prior to construction. The timeline to complete the annexation process would be approximately 6-8 months. Through the annexation process and subsequent special review process, public comments will be solicited from the citizens located near this site and mitigation may need to be done to alleviate any citizen concerns about placing a substation and solar facility at this location. This site was identified as the best option for construction of solar at this time due to the fact that the land is already owned by Loveland Water and Power.

Installation of an In-Line Turbine at the Water Treatment Plant: The installation of an in-line turbine at the Water Treatment Plant (WTP) is a project that has been previously evaluated by the Water and Power Department. It was determined that this project should be considered as a possible use of the subgrant funds for the same reason that the utility looked at solar, it would replace a portion of the Idylwilde facility with a renewable source for the rate payers. The in-line turbine would require Federal Energy Regulatory Commission (FERC) licensing. However, because of the size of the turbine and it would be installed in an existing pipeline, it qualifies for an expedited licensing program through the State of Colorado.

Compared to the energy generated from a solar project and what was generated by the 900 kW Idylwilde facility , the amount of energy generated from the 275 kW in-line turbine is significantly lower. Additional evaluation needs to include financial and operational impact of a turbine system that the WTP staff are not familiar with operating, and City Technical Services staff are not familiar with maintaining. Considering this, a third party operations and maintenance contract would most likely be needed. We will also need a risk assessment on the impact to the City's main raw water supply from Greenridge Glade Reservoir to the WTP.

Improving the City's Fiber Optic Network: Additional fiber installed in the City of Loveland would provide long term benefits to the utility, other City departments and to the residents. However, this project was ultimately determined to not be a good use of the subgrant funds due to several factors.

Since much of the new fiber would be installed in areas where easements have not been obtained, the utility would need to acquire these easements. Easement acquisition can vary from a few months to a few years. In the past the utility has experienced complications in easement acquisition which have delayed capital improvement projects. Given the hard deadline for completion of the alternate project, these delays could cause the project to fail. Additionally, delays could be caused due to compliance requirements with NEPA.

In the future, the use of federal subgrant funds may limit the use of the fiber and may preclude the utility from using this infrastructure to develop a communications utility or allow commercial use of the fiber network. Additionally, in order for residents and businesses of Loveland to take advantage of this fiber, the City would be required to comply with Colorado State House Bill 152 by forming a communications utility.

The utility also determined that installing fiber at this time would be in advance of our actual needs. The utility would not realize a true benefit until infrastructure such as automated distribution equipment is in place.

Substations: The West Substation, situated north of the Big Thompson River on Namaqua road, was affected during the September 2013 flood. The Big Barnes Ditch runs along the upper bank immediately north of the West Substation. During the flood, water overtopped the Big Barnes Ditch and flooded the access road to the substation. Without access to the substation, the utility took the substation offline during the flood in order to mitigate damage in the event the ditch continued to fail. Also Big Thompson flood waters were within 15 feet of this facility even though it is located out of the 500 year flood plain,.

For an alternate project option, the hardening of the ditch and the access road were evaluated to provide protection to West Substation. Ultimately it was determined that improvements to this site may not be cost effective. The West Substation is the oldest substation in the system and will need extensive upgrades when equipment is replaced. Design standards and requirements have changed since the original construction of the substation and the site is not large enough to easily accommodate the needed upgrades. In order to expand the West Substation, the utility would have to purchase land from adjacent owners. The utility cannot expand to the south due to the proximity of the floodplain and there is a limited amount of land to the east. Ultimately any expansion would not mitigate the threat from the

ditch or the proximity to the floodplain. For several years, the utility has been evaluating alternate sites to build a new substation to eventually replace the West Substation, and putting significant amounts of money into a site that has existing vulnerabilities and may be replaced in the future is not a good use of the funds.

As part of the long term utility plan, the utility has identified several locations Citywide for new substations to accommodate future growth. Including:

- West side of town to replace West Substation
- Southwest portion of the Growth Management Area (Boedecker Substation accomplishes this)
- Southeast portion of the Growth Management Area (I-25 & 402 Substation accomplishes this)

The Boedecker property which was recently purchased by Loveland Water and Power had previously been identified in the long term utility plan as a good location for a new southwest substation. The property is ideal because it has existing transmission lines that run through the property. This substation could be used to provide additional capacity to the system reducing the critical nature of West Substation to the utility. Due to these benefits this project has been determined to be a good potential project for consideration.

Environmental

Any proposed project that FEMA provides funding for must undergo an environmental review pursuant to the National Environmental Policy Act (NEPA), unless NEPA provides an exclusion. There are two types of NEPA exclusions, a statutory exclusion (SE) or a categorical exclusion (CATEX). Statutory exclusions are usually tied to emergency response actions (i.e., coordination of disaster relief assistance, management or control of immediate threats to public health and safety, debris removal, etc.) or actions that substantially restore a facility at its original site as it existed before the major disaster or emergency. The statutory exclusions do not appear to apply to the FEMA Alternate Project Program. Categorical exclusions are categories of actions which have been determined by NEPA as typically having no significant environmental impact.

- ***SE (Statutory Exclusion):***
  - ✓ *is a specific action excluded from NEPA review*
  - ✓ *requires no formal documentation for the proposed action.*

- ***CATEX (Categorical Exclusion)***
  - ✓ *is an action that FEMA has found will not result in significant impacts to the environment*
  - ✓ *does not:*
    - *induce significant impacts to planned growth or land use for the area,*
    - *require the relocation of significant numbers of people;*
    - *have a significant impact on any natural, cultural, recreational, historic or other resource;*
    - *involve significant air, noise, or water quality impacts;*
    - *have significant impacts on travel patterns;*
    - *otherwise, either individually or cumulatively, have any significant environmental impacts*
    - *give way to "extraordinary circumstances," such as have a considerable impact on upstream or downstream resources or create public controversy,*
  - ✓ *requires relatively simple documentation that the action fits one of the categorical exclusion categories defined in FEMA's environmental regulations*

- ✓ *There are two (2) CATEXs that are contemplated as applicable to the currently proposed FEMA Alternate Projects:*
  - *Example: CATEX ix: Acquisition, Installation, or Operation of Utility and Communication Systems that Use Existing Distribution systems or Facilities, or Currently Used Infrastructure Rights-of-Way.*
  - *Example: CATEX xvi: Improvements to existing Facilities and the Construction of Small Scale Hazard Mitigation Measures in Existing Developed Areas with Substantially Completed Infrastructure, When the Immediate Project Area Has Already Been Disturbed, and When Those Actions Do Not Alter Basic Functions, Do Not Exceed Capacity of Other System Components, or Modify Intended Land Use; Provided the Operation of the Completed Project Will Not, of Itself, Have an Adverse Effect on the Quality of the Human Environment*

If an SE or CATEX are not applicable, then NEPA requires that the project undergo a comprehensive environmental review prior to project construction in order to determine whether it would result in damage to the environment. There are two types of environmental reviews, an environmental assessment (EA) and an environmental impact statement (EIS). The primary difference between an EA and an EIS is the depth and breadth of analysis of the following key components:

- the purpose and need for the project;
- the alternatives to the project;
- the affected environment in which the project is to occur;
- environmental consequences of the project;
- and the mitigation of the impacts.

Each component must then consider whether there will be:

- significant impacts to planned growth or land use for the area;
- a requirement for relocation of significant numbers of people;
- a significant impact on any natural, cultural, recreational, historic or other resource;
- significant air, noise, or water quality impacts;
- significant impacts on travel patterns;
- and whether individually or cumulatively, the component have any significant environmental impacts.

The environmental review and analysis will require engagement with regulatory agencies such as the State Historic Preservation Office (SHPO), the Army Corps of Engineers (ACE), US Fish and Wildlife Service (USFWS) among others, and concurrence from a host of agencies (i.e., Native American Tribes, Larimer County, Colorado Department of Transportation, Colorado Department of Public Health and Environment, etc.).

- **EA (Environmental Assessment)**
  - ✓ There are two (2) types: Traditional EA and Programmatic EA
  - ✓ **EA** – Traditional EA:
    - is a mechanism for determining whether any proposed project or action will have a significant impact on the quality of the human environment
    - is broad in scope
    - can result in documentation and sufficient evidence to demonstrate compliance with the NEPA process

- is a tool for determining whether to prepare an EIS
- can take 10 months or more to complete

✓ **PEA** -Programmatic EA:

- is a mechanism for verifying what impact a specific project has on the human environment
- is more narrow in scope
  - ➢ is tied to a specific action, region, and set of circumstances (i.e., "Utility Restoration" or "Road and Bridge Repair" in the State of Colorado in areas where a natural disaster has occurred)
- is a mechanism for demonstrating and documenting compliance with the NEPA
- can take significantly less time to complete than a traditional EA

✓ A draft PEA from FEMA Region VIII is scheduled to be released for public comment in December 2014. The Programmatic EA is anticipated to be finalized in February in 2015. The PEA is titled "Utility Restoration, Replacement, and Relocation in the State of Colorado." This PEA appears to be applicable to some of the FEMA Alternate projects currently being contemplated by the City.

- **EIS (Environmental Impact Statement)**
  - ✓ is a detailed statement for federally funded projects significantly affecting the quality of the human environment
  - ✓ is a compilation of the environmental impacts of the proposed project, reasonable alternatives to the proposed project, and a summary of the irreversible and irretrievable commitments of resources that would be involved in the proposed project
  - ✓ can take a minimum of 9 months to complete; often takes years to complete

NEPA compliance for all projects associated with the alternate project must be full and robust. The typical evaluation can take the better part of a year or more to complete, depending upon the level of review and documentation required. The consequences of not following the NEPA process include lawsuits (citizen suits, injunctions requiring immediate stoppage of work; time, money, and resources associated with attorney fees and court costs); project delays (review agency interventions, project re-design, rewrite of documents in appropriate form and content); denial of funding; and negative publicity. As shown in Attachment G, each proposed project was evaluated by an environmental consultant to determine the timeline and requirements associated with the NEPA process. It appears that each proposed project qualifies for a CATEX or a PEA. If this is the case, it appears that the NEPA process can be completed within the currently proposed project timelines.

Financial

The various project options were evaluated based on upfront construction costs, ongoing costs associated with the maintenance of the facility, benefits to the utility, its' customers and the City, and for the avoided purchased power costs over time.

If we were to build one of these power generating project options without the use of the FEMA money it might not make economic sense due to the extended payback period. However, by using the fixed subgrant the payback period is very attractive. Unlike our wholesale costs from Platte River Power Authority (PRPA) shown below which are expected to increase over time, the cost of generation for each of these projects will remain fixed for the life of the facility.

2015 PRPA Wholesale Rates

Season	*Energy Charge*	*Demand Charge*
Summer	$0.03943/kWh	$10.84/kW
Winter	$0.03783/kWh	$7.57/kW

Comparison of Generating Project Options

Site	*Generation System Type*	*Generation Size (kW)*	*Energy Generated in Year One (MWh)*	*Equivalent Cost of Generation Cents/kWh*	*Payback Period Total Cost (years)*	*Payback Period Loveland Cost (years)*
Value Plastics Solar Project	Solar: Fixed	3,550.00	6,205.40	$0.088	36	2
	Solar: 1-Axis	3,060.34	6,975.75	$0.082	30	2
I-25 and Hwy 402 Solar Project	Solar: Fixed	2,920.00	5,104.16	$0.112	47	9
	Solar: 1-Axis	2,517.24	5,737.80	$0.104	38	7
Airport Solar Project	Solar: Fixed	3,620.00	6,327.76	$0.121	61	14
	Solar: 1-Axis	3,120.69	7,113.30	$0.111	48	1
Larger Boedecker Solar Project	Solar: Fixed	3,289.47	5,750.00	$0.088	36	2
	Solar: 1-Axis	2,873.56	6,550.00	$0.082	30	2
Smaller Boedecker Solar Project	Solar: Fixed	1,840.00	3,216.32	$0.085	35	2
	Solar: 1-Axis	1,586.21	3,615.60	$0.080	29	2
In-Line Turbine	Hydroelectric	275.00	812.00	$0.111	38	1
Former Idylwilde Facility ***(for comparison)***	Hydroelectric	900.00	2,826.24 **(average production)**	N/A	N/A	N/A

The 2015 Power 10 Year Financial Plan supports the $9.07M front-loading of costs by utilizing funds from the Plant Investment Fee (PIF) revenue totaling $3.0M, General revenue generated through rates of $6.07M. The State will be reimbursing the utility up to the 87.5% of the subgrant amount as invoices are submitted, evaluated and approved.

In addition, it is important the utility process the alternate project following federal grant regulations for reimbursement; this includes, but is not limited to, securing approval of the scope of work, working within federally established purchasing regulations, tracking all payroll, and completing a sealed bid process.

Green Benefits

There is something to be said for the fact that our customers have paid for the Idylwilde hydroelectric facility for 89 years and have been enjoying the benefits of renewable energy. This was taken into consideration when determining project options. It is important to ask, should we be providing the same benefit to our customers, what benefits does it provide to our system, what is the cost versus other energy resources and does it comply with State renewable energy requirements.

Over time, solar has become a more cost effective renewable energy option. Recent estimates from PRPA's 30 MW Rawhide solar Request for Proposal (RFP) indicate that the cost of large solar is now very close to the cost of utility scale wind. This is due in part to the fact that transmission costs are not incurred for solar located on the existing grid and solar generation is more aligned with the City's electric load patterns. Also, solar can be acquired for a fixed or known price, reducing future price risk relative to other sources. In consultation with PRPA staff, it is expected that Loveland would have about 1% of its current peak load or 1.6 MW plus 0.9 MW from the Idylwilde facility for a total of 2.5 MWs available under the Power Supply Agreement. Going above that amount of Loveland owned generation would take additional staff review and possible PRPA Board action.

When considering the green benefits to the utility there are several factors to take into account including greenhouse gas reduction, renewable energy standards, climate, health, economy, and sustainability. Currently the City's Electric Utility does not need to comply with the Colorado State Renewable Energy Standard (RES) which states that utilities with more than 40,000 customers are expected to have 10% renewables by 2020. The utility currently serves 34,000 customers and is anticipated to reach the 40,000 customer threshold by approximately 2021. However, in recent legislative sessions this mandate has come under annual legislative review. There is a possibility that the customer threshold for municipal utilities could be lowered and/or the percentage of renewables required could increase. With the 2015 wind farm addition to PRPA's generating sources, Loveland Water and Power currently has 8.19% of renewables that could count towards the RES. Each renewable project considered could increase Loveland's RES percentage by the amounts shown below.

Site Considered	Percent Increase to RES
Airport Solar	0.74%
Value Plastics Solar	0.73%
Larger Boedecker Solar	0.67%
I-25 & Hwy 402 Solar	0.60%
Smaller Boedecker Solar	0.38%
Hydroelectric Inline Turbine	0.11%

On December 11, 2014, PRPA's Board of Directors authorized PRPA's CEO, Jackie Sargent, to negotiate a contract for up to 30 MWs of solar at the Rawhide Energy Station that will be funded through Tariff 1. Loveland Water and Power would receive renewable energy credit for 23% of the total energy produced if and when the solar field is built and connected to the grid.

Idylwilde was grandfathered in as a City owned generating resource when PRPA was formed. Any generating resource the utility owns through the Alternate Project Program with a capacity of 900 kW or less would be considered a replacement for the Idywilde hydropower facility regardless of the energy generated from this resource. This is important because the Power Supply Agreement with PRPA states that Loveland cannot own generation rated at more than 1 MW or 1% of Loveland's peak load on PRPA's system. The combined capacity for solar (or other City generation) that can be added without additional consideration by PRPA's Board is currently 2.5 MW (0.9 MW to replace Idylwilde hydropower and 1.6 MW that represents 1% of Loveland's peak load to date).

Preliminary Alternate Project Options Proposal to COEM and FEMA

Because we are the first electric utility seeking to build and alternate project which would entail a new power source there is very little published FEMA guidance that speaks to energy related projects. Also there is little precedence on how the program has been implemented. We decided to seek feedback from COEM and FEMA on the most feasible projects that were identified in advance of the formal submittal in an effort to determine if there were any major concerns or problems that would make the alternate project ineligible for use of the subgrant funds.

As shown in Attachment C, on December 5, 2014 the City submitted the four options that had been identified as possible uses for the subgrant funds. Those options were:

- Construction of a new Substation on the Boedecker property in conjunction with a smaller solar facility on the same property.
- Construction of a larger solar facility on the Boedecker property
- Construction of a large solar facility on land that would be obtained through a lease or through a utility easement, such as the Value Plastics site.
- Construction of a hydroelectric power plant at the Water Treatment Plant.

In addition to a brief description of the projects that we were considering, we also included a list of questions related to the feasibility of each site with regard to the regulations from FEMA on the use of the funds. These questions were designed to determine any complications or regulations that may affect the completion of the project in order to inform the final decision.

In a very short time period both COEM and FEMA provided responses shown in Attachment D to the questions. The general response was that the projects that were identified would meet the requirements from COEM and FEMA. They did not make any assessments based on whether the projects were feasible from a timeline perspective or whether there would be problems discovered during the NEPA review. On December 9, 2014, staff had a follow-up up conference call with COEM to discuss their response. In the call it was reiterated that the top three priorities of COEM and FEMA would be:

- The project would provide benefit to the entire community.
- The City follows all federal procurement and contracting regulations.
- The project goes through the NEPA process to ensure that all permitting is obtained and all impacts of the project are fully reviewed and analyzed.

Recommendation

The recommendation from staff and the Loveland Utilities Commission is to use a portion of the fixed subgrant funds to construct a substation on the Boedecker property and construct a small (1 to 2 MW) solar facility with the remaining funds on the same site.

City of Loveland Water and Power
FEMA Alternate Project Report

Prepared for City of Loveland

December 12, 2014

By

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(Revision #3)

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Two general types of projects were considered in this study: upgrades to existing systems and installation of energy producing resources. These projects are discussed in this report. The following projects were selected for consideration by FEMA.

1. PROJECT OPTION 1
   A. Construction of the Boedecker Substation—Constructing a new substation at the Boedecker Property.
   B. Boedecker Solar Project—Constructing an approximately 1.8 MW fixed or 1.6 MW 1-axis solar photovoltaic power plant at the Boedecker Property

2. PROJECT OPTION 2
   A. Larger Boedecker Solar Project—Constructing an approximately 3.3 MW fixed or 2.9 MW 1-axis solar photovoltaic power plant at the Boedecker Property

3. PROJECT OPTION 3
   A. Value Plastics Solar Project—Constructing an approximately 3.5 MW fixed or 3.1 MW 1-axis solar photovoltaic power plant at the Value Plastics site.

4. PROJECT OPTION 4
   A. Hydroelectric Power Plant—Install an approximately 275 kW hydroelectric power plant at the Loveland Water Treatment Plant.

Table 1 shows the estimated costs of each option.

Table 1: Summary of costs for suggested projects.

PROJECT OPTION	***TASK***	***ESTIMATED COST***
1	Boedecker Substation	$4,200,000.00
	Boedecker Solar Project (1.8MW fixed, 1.6MW 1-axis)	$4,900,000.00
	TOTAL	$9,100,000.00
2	Larger Boedecker Solar Project	
	3.3MW Fixed	$8,523,684.21
	2.9MW 1-axis	$8,633,333.33
3	Value Plastics Solar Project (3.5MW fixed, 3.1MW 1-axis)	$9,100,000.00
4	Hydroelectric Power Plant 275kW	$1,805,000.00

The costs shown in Table 1 and those used in the rest of this report should be used for comparison purposes only. They are based on a combination of actual quotes and estimated average values. The sources used in this report for the cost and other assumptions are given in the section on "Methods and Assumptions." The final prices for any of the projects finally chosen may be higher or lower depending upon the specific characteristics of a particular site and the technologies used for the projects. Once a project has been chosen exact quotes should be sought.

INTRODUCTION

NEI was engaged by the City of Loveland to study several projects that may be funded by FEMA. The amount of funding available is approximately $9.1 million and this report examines the positive benefits and where possible, payback times of the different alternatives, and provides other information by which the projects may be compared. There are limitations on the types of projects that FEMA will fund. A partial list of FEMA's requirements includes:

- The project must be in the declared disaster area
- The facility must be owned by the City of Loveland and the City must maintain full responsibility for the facility
- The procurement and construction of the facility must follow federal regulations including Federal Acquisition Regulations (FAR) and the Stafford Act
- The project must comply with Environmental and Historical requirements including full National Environmental Policy Act (NEPA) and State Historical Preservation Office (SHPO) reviews.
- The project must benefit the entire community
- The project must be completed in the established time frames.
- Funding cannot be used to provide ongoing O&M costs

The projects consist of two general types. The first type is projects that generate electrical energy and the second type is projects that are improvements or additions to existing Loveland facilities. Included in the first general type of project are:

1. Building a solar photovoltaic power plant which may be located at any one of four different locations. The locations considered are:
   a. Value Plastic site
   b. I-25 and Highway 402 site
   c. Fort Collins—Loveland Airport site
   d. Boedecker property site

2. Building a hydroelectric power plant at the Loveland Water Treatment Plant

Included in the second type of project are the following:

1. Improving the City's fiber optic network

2. Building the Boedecker Substation or improving the West Substation site to resist future flood impacts

ENERGY PRODUCING PROJECTS

Methods and Assumptions

There are four locations being considered for the installation of a solar photovoltaic (PV) power plant and one site for a hydroelectric plant. Operation of the plants after construction is automatic in most cases but some operation and maintenance (O&M) will be needed. In the case of the PV systems most (O&M) costs are due to vegetation management and replacement and maintenance of inverters. Vegetation management is needed to reduce the risk of fire and prevent shading of the array by plant life. Due to the consequences of vegetation the land upon which a photovoltaic power plant is built is typically dedicated exclusively to its use. A hydroelectric plant has a number of moving parts subject to wear. This makes periodic monitoring and maintenance necessary resulting in makes the O&M costs being slightly higher than for a PV system.

Most of the costs used in this report are average values for power plants of these types presently being installed in the United States and are typical costs. In some cases, where time allowed, NEI got actual quotes from contractors for the type of construction work anticipated, but in most cases construction costs were estimated. The exact costs that will finally be seen may be higher or lower than those contained herein depending upon the exact characteristics of the site chosen and the technologies used in the power plants. The cost and land used for the PV systems will be especially sensitive to the exact technology used in the array. Even so, the costs shown should be reasonably close to actual final costs and it is hoped that the typical values used in this report will be useful for the purpose of comparison between different sites and installations.

There are two common types of PV systems that are candidates for the types of installations being contemplated by Loveland: fixed systems and 1-axis tracking systems. A fixed system does not track the sun and is the

simplest to install. Its O&M costs over the life of the plant are also only approximately 70% of the costs of the 1-axis tracking system. A 1-axis tracking system keeps the PV array pointed toward the sun from sunrise to sunset, but does not track the sun as it changes altitude during the year. A 1-axis tracking system takes more land area than a fixed system for the installed MW capacity, but will generally generate more energy on an annual basis than the fixed system for each MW of capacity installed.

Tracking systems typically need more maintenance due to the greater number of moving parts and a more complex control system. The bulk of maintenance for both types of PV systems will be due to cleaning, vegetation management and inverter maintenance. The cost of operations and maintenance (O&M) for a fixed system is approximately $32.00/kW/year and the cost for a tracking system is approximately $45.00/kW/year.[1] The cost of O&M for a small hydroelectric plant is approximately $52/kW/year[2]. For the comparisons in this report these values were assumed to increase at a rate of 2%/year and a discount rate of 1.7% was used for finding the present value of annual maintenance costs over the 25 year life of the PV system and the 20 year assumed life of the hydroelectric plant. In this study it was assumed that the land costs and the O&M costs would not be paid for from the $9.1 million dollar subgrant and the $9.1 million would pay for only the PV installation costs and the interconnection costs.

Even though 25 years is the time period often assumed for the life of a PV system the output of the panels will not have decreased to zero at that time. Depending upon the type of technology used the panels can be expected to degrade 0.8%/year, so in 25 years their output will be reduced to of 80% of their output when new.[3] This degradation will vary with the module technology used, and the actual durability of these panels after their stated life is unknown since modern PV panels have been in use for such a short time. For this report the 0.8% degradation per year was used but it should be understood that this value is very sensitive to panel technology. The PV system can be left in service for as many years beyond its design life at this gradually reducing output as long as maintenance costs are acceptable. For this study the typical life of 25 years was used for the plant but is should be understood that a PV power plant will still have some output and can be kept in service if desired beyond its stated life.

Likewise, the assumed lifetime of the hydroelectric plant used in this report is 20 years. However, there are many small hydroelectric plants in the United States that have been in use for over 50 years. It would be expected that with normal maintenance and some refurbishment the plant could operate at its full output for many years beyond the 20 years used in this study.

A fixed PV system needs approximately 7.6 acres/MW[4] of installed capacity on average and will generate approximately 230 MWh/acre/yr. of energy at a site along the Front Range of Colorado. A 1-axis tracking system requires approximately 8.7 acres/MW[4] on average and will generate approximately 262 MWh/acre/yr. The present cost of ground mounted photovoltaic systems of the 1-5MW size in the United States is approximately $2.50/Watt for a fixed system and $2.90/Watt for a 1-axis tracking system, not including the interconnection or land costs. These average values were used for the analysis in this report.

A present worth comparison on an annualized basis was done between the projects. The present value of the O&M costs, land, PV system, and interconnection costs were summed to produce the total present worth of each project. Next, the present worth of the energy produced and Loveland's demand costs were calculated during the lifetime of each plant. The sum of the present worth of energy and demand costs is the avoided costs due to installing each plant. This is the present worth of the amount that will not need to be paid to PRPA during the plant's lifetime.

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[1] *Addressing Solar Photovoltaic Operations and Maintenance Challenges A Survey of Current Knowledge and Practices*, Electric Power Research Institute, July 2010,

[2] *Renewable Energy Technologies: Cost Analysis Series, Volume 1: Power Sector Hydropower*, International Renewable Energy Agency, June 2012.

[3] Dirk C. Jordan and Sarah R. Kurtz, *Photovoltaic Degradation Rates — An Analytical Review*, National Renewable Energy Laboratory, Journal Article NREL/JA-5200-51664, June 2012.

[4] Sean Ong, Clinton Campbell, Paul Denholm, Robert Margolis, and Garvin Heath, *Land-Use Requirements for Solar Power Plants in the United States*, National Renewable Energy Laboratory, Technical Report NREL/TP-6A20-56290, June 2013.

The present worth is defined as the value at the present time of a cost incurred (or value of energy generated) at a particular year in the future assuming those costs were compiled at the end of the year. The equation used in this report to compute the present worth of a future value is[5]:

$$P = F(1+i)^{-n}$$

Where:
P=Present value
F=Future value at the end of year n
i=interest rate, 1.7% or 0.017 in this study

The charges resulting from Loveland's purchase of electricity from PRPA are divided into two different types. The first is an energy charge that pays for each kilowatt-hour kWh of electricity purchased. The second charge is a demand charge which requires Loveland to pay a cost for each kW of demand that occurs at the time PRPA has the largest demand on their system. Both charges change seasonally. The summer season is defined as June, July, and August, and the winter season includes September-May. The cost of electricity purchased from PRPA starting January 2015 is shown in Table 2 and these values were used in this study.

Table 2: Loveland's electrical costs beginning 2015.

Season	*Energy Charge*	*Demand Charge*
Summer	$0.03943/kWh	$10.84/kW
Winter	$0.03783/kWh	$7.57/kW

It was assumed for this study that both the energy and demand charges will increase 3.5%/year. A number of assumptions about the exact construction of the PV systems are needed to allow the calculation of the amount that each PV system will offset the demand charges. It was assumed that the fixed system was aimed directly south and installed at an angle equal to the latitude of Loveland. This would normally maximize the amount of energy generated in a year. For the 1-axis system it was assumed the system was oriented north-south and mounted horizontally.

Loveland provided the demand data for their system including the day and time at which peak demand occurred each month for the past four years. The information provided is shown in Table 3.

Table 3: Peak demand and times of occurrence—2011 through 2014.

	2011			*2012*			*2013*			*2014*		
Month	*Day*	*Hour*	*MW*	*Day*	*Hour*	*MW*	*Day*	*Hour*	*MWh*	*Day*	*Hour*	*MWh*
Jan.	31	18:00	97.112	11	18:00	97.112	14	19:00	98.412	6	18:00	100.285
Feb.	1	18:00	92.026	7	19:00	92.026	26	19:00	92.875	5	19:00	102.753
March	7	18:00	88.578	1	19:00	88.578	4	19:00	91.251	1	19:00	90.246
April	13	19:00	77.453	24	13:00	83.546	9	12:00	88.29	13	21:00	80.546
May	9	14:00	83.498	22	17:00	97.234	17	17:00	100.587	28	18:00	109.41
June	28	17:00	126.402	25	17:00	148.76	27	16:00	144.464	30	17:00	123.388
July	18	17:00	139.866	20	16:00	147.585	11	17:00	146.696	22	18:00	144.141
Aug.	23	16:00	136.134	8	18:00	136.130	27	17:00	140.376	13	16:00	133.827
Sept.	1	18:00	129.298	4	18:00	123.680	6	15:00	139.032	3	18:00	123.900
Oct.	3	18:00	97.592	2	17:00	87.795	28	19:00	87.202	7	17:00	86.803
Nov.	16	18:00	90.4	26	18:00	94.437	21	18:00	96.87			
Dec.	5	18:00	105.024	19	18:00	101.596	9	18:00	105.291			

The information in Table 3 was used to determine the percentage of its full output power each PV array would be expected to generate at the exact time and day when peak demand occurred during the years shown. To find the amount of generated power at these times the amount of effective solar insolation on the array at the time and date of the peak demand was calculated. Direct, diffuse, and reflected insolation using a ground reflectance coefficient ρ=0.2, were calculated for each month and summed to get the total effective insolation on the array. It was assumed that the sky was completely clear at the date and time of peak demand in all cases. The values of effective solar insolation on the day and time of peak demand for each of the past four years were averaged

[5] Donald G. Newnan and Bruce Johnson, *Engineering Economic Analysis, Fifth Edition*, Engineering Press Inc., San Jose, CA, ISBN 0-910554-83-5, 1995

to determine the average amount of effective incident insolation on the array during the times of peak demand.[6] The amount of incident solar insolation at the time of the peak demand as a percentage of the maximum annual incident solar insolation falling on the array was calculated. The average value of the power generated at the time of peak demand was assumed to be this percentage of the array rated output. The percentage of the rated output that each array would be expected to generate at the date and time of the peak demand each month is shown in Table 4. This calculated array output was multiplied by the demand charges in Table 2 to determine the average amount of the demand cost that would be offset by the PV system. For the hydroelectric plant it was assumed that it could be controlled to produce peak output at the time of peak demand each month. The present values of the demand charges each year were determined and included in the present value of electricity generated as an avoided cost that will not have to be paid to PRPA.

Table 4: Percentage of array output available at the time of peak demand.

Month	*Fixed Array*	*1-Axis Array*	*Hydroelectric Plant*
January	0.00%	0.00%	100%
February	0.00%	0.00%	100%
March	0.00%	0.00%	100%
April	48.81%	57.20%	100%
May	55.23%	91.36%	100%
June	48.21%	91.22%	100%
July	40.91%	85.86%	100%
August	44.40%	81.58%	100%
September	30.99%	63.50%	100%
October	19.46%	38.58%	100%
November	0.00%	0.00%	100%
December	0.00%	0.00%	100%

To calculate the value of energy costs for the electricity generated by the PV power plants each month, the percentage of the yearly output of a PV plant that is expected to be generated every month was determined from data supplied by the National Renewable Energy Laboratory (NREL)[7] and is shown in Table 6. The hydroelectric plant was assumed to generate equal amounts of energy each month.

Table 5: Percentage of annual energy generated each month.

Month	*Fixed Array*	*1-Axis Array*	*Hydroelectric Plant*
January	6.70%	4.81%	8.33%
February	7.76%	6.36%	8.33%
March	8.52%	8.05%	8.33%
April	9.13%	9.87%	8.33%
May	8.98%	10.65%	8.33%
June	9.28%	11.82%	8.33%
July	9.28%	11.69%	8.33%
August	9.28%	10.65%	8.33%
September	9.13%	9.22%	8.33%
October	8.52%	7.40%	8.33%
November	7.00%	5.19%	8.33%
December	6.39%	4.29%	8.33%

The cost of the electricity generated by each plant was calculated by dividing total present worth of the project by the amount of energy the plant was expected to produce during its lifetime to get the energy costs in $/kWh. The number of years for a plant to break even was arrived at by finding the year in which the total present worth of all the electricity made by the plant up until that year equaled the project present worth for the same year.

[6] Gilbert M. Masters, *Renewable and Efficient Electrical Power Systems*, John Wiley & Sons, Inc. Hoboken, NJ, ISBN -0471-28060-7, 2004, pp. 385-439.

[7] William Marion and Stephen Wilcox, *Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors*, NREL, Golden, CO, April, 1994.

A second payback period was also calculated using only the cost Loveland will incur for each plant. Since FEMA will provide funds for the interconnection and plant construction costs, the only costs incurred by Loveland will be land and O&M costs. To get the payback period considering only Loveland's costs, the present worth of these costs were calculated and the year when the present worth of these costs equal the present worth of the generated electricity is given as this payback period.

1a. Value Plastics Solar Project

The Value Plastics site is shown in Figure 1 and consists of approximately 50 acres. This property is annexed to the City of Loveland. This site is adjacent to the Horseshoe Substation but is separated from it by a railroad right of way. This means that to interconnect directly with the substation the distribution line installed to interconnect the PV system will include a railroad crossing. However, there is an existing underground distribution line at the south side of the substation that may be intercepted to connect the new PV system to the 12.47kV distribution system. The location of this line is shown in Figure 2.

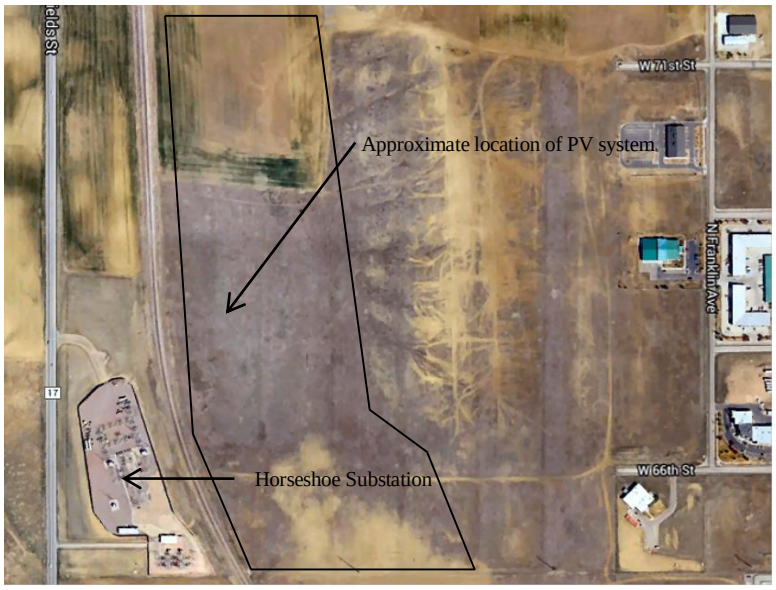


Figure 1: Value Plastic's site showing the Horseshoe Substation.

The cost of the interconnection will depend on the final interconnection configuration. The costs shown in Table 6 are based upon the assumption that the existing underground feeder is adequate and may be used for the interconnection.

The site is large enough to install up to a 6.5 MW fixed system or a 5.7 MW 1-axis tracking PV system if the funds were available. However, the amount that can be installed using only $9.1 million is shown in Table 6. It is assumed for this analysis and those to follow that only the array cost and the interconnection costs would be paid out of the $9.1 million provided by FEMA. The O&M costs and utility easement costs would be paid from other funds.

Figure 2: Horseshoe Substation and distribution line.

Table 6: Cost analysis for the Value Plastics Solar Project.

	Fixed System	*1-Axis Tracking System*
Array Size (kW)	3,550.00	3,060.34
Land Needed (acres)	26.98	26.63
Land Cost—Utility Easement (per acre)	$14,500.00	$14,400.00
Land Present Value (Utility Easement)	$391,210.00	$383,400.00
Interconnection Cost	$225,000.00	$225,000.00
PV Array Cost	$8,875,000.00	$8,875,000.00
O&M Present Value	$2,893,649.84	$3,507,926.80
Total Present Value	$12,384,859.84	$12,991,326.80
Present Value of Loveland's Costs	$3,284,859.84	$3,891,326.80
Energy Generated Annually 1st Year (MWh)	6,205.40	6,975.75
Total Energy Generated in Life of Plant (25 yrs.) MWh	141,116.60	158,635.08
Present Value of Energy Avoided Costs in life of plant	$6,560,026.19	$7,393,826.89
Present Value of Demand Charges avoided in life of plant	$2,508,428.70	$3,973,714.65
Present Value of Total Electrical Charges avoided in life of plant	$9,068,454.89	$11,367,541.54
Average Cost of Electricity Over Life of Plant $/kWh	$0.088	$0.082
Payback Period (Total Cost) Years	36	30
Payback Period (Loveland's Cost) Years	2	2
Percentage of Present Cost of Plant Paid for by Avoided Energy Purchases	73.22%	87.50%
Percentage of Loveland's Present Costs Paid for by Avoided Energy Purchases	276.07%	292.13%

*These values are unknown at this time but have been calculated to determine the cost of land to make this option the least expensive on a $/kWh basis.

Two columns are given in this table, one for a fixed PV system and the other for a 1-axis tracking system. For this and all similar tables to follow the meaning of the headings are described below.

- *Array Size*—This is the rated plant output in kilowatts that can be built for the funds or land available.
- *Land Needed*—This is the estimated amount of land area in acres needed to contain a PV system of the given size
- *Land Cost*—This is the cost of land provided which was provided to NEI by Loveland. For the Value Plastics site, this is an estimated cost necessary to make this the project the lowest costs among the PV plants.

- *Land Present Value*—This is the calculated present value for the land that the PV site will need
- *Interconnection Cost*—This is the estimated cost of interconnecting the plant to the nearest distribution line
- *PV Array Cost*—This is the estimated cost of the PV array, inverters, and PV system wiring, etc.
- *O&M Present Value*—This is the present value of the operations and maintenance costs of the plant over its lifetime assuming 25 years for the PV plants and 20 years for the hydroelectric plant assuming a 1.7% discount rate.
- *Total Present Value*—This is the sum of the Land Present Value, Interconnection Cost, PV Array Cost, and O&M Present Value
- *Present Value of Loveland's Costs*—This is the present value of only the costs directly incurred by Loveland, i.e. the sum of Land Present Value and O&M Present Value
- *Energy Generated Annually 1st Year*—This is the amount of energy that the plant could be expected to generate in a year without any degradation due to age
- *Total Energy Generated in Life of Plant*—This is the total energy in megawatt-hours that can be expected to be generated by this plant in its lifetime including degradation of the plant output with time
- *Present Value of Energy Avoided Costs in Life of Plant*—This is the present value of the energy the plant would be expected to generate in its lifetime. This is the amount of energy that will not need to be purchased from PRPA due to the power plant output
- *Present Value of Demand Charges Avoided in Life of Plant*—This is the present value of the demand charges avoided due to the plants generating power at the time of peak demand.
- *Present Value of Total Electrical Charges Avoided in Life of Plant*—This is the sum of present value of avoided energy charges and demand charges. This is the total amount of avoided costs of electricity, both energy and demand, due to the output of the power plant.
- *Average Cost of Electricity Over Life of Plant $/kWh*—This found by dividing the total present value of the plant by the total energy generated by the plant during its lifetime
- *Payback Period (Total Cost) Years*—This is the number of years it takes for the present value of the electricity generated to equal the total present value of the plant
- *Payback Period (Loveland's Cost) Years*—This is the number of years it takes for the present value of electricity generated to equal the present value of Loveland's cost for the plant. It does not include the $9.1 million supplied by FEMA
- *Percentage of Present Cost of Plant Paid for by Avoided Energy Purchases*—This is the percentage of the plants total cost that is paid for by the value of electricity the plant will generate during its lifetime. For example, if this value was 50%, it would mean the plant generates 50% of the electricity necessary to pay for itself in its lifetime.
- *Percentage of Loveland's Present Costs Paid for by Avoided Energy Purchases*—This is the percentage of Loveland's costs that are paid for by the value of electricity the plant will generate during its lifetime. For example, if this value was 150% it would mean that in the life of the plant the value of electricity generated would be 1.5 times the cost of the plant to Loveland.

Some explanation is needed for the land costs shown in Table 6. Among the other three possible sites for PV systems, the lowest cost of generation occurred at the Boedecker Property as may be seen by comparing the cost of electricity row in Table 8, Table 10, and Table 12. The cost for purchasing the utility easement at the Value Plastics site is unknown at this time. For that reason, a calculation was done to determine the cost for which land would have to be acquired to make the price of energy generation at this site lower than the other sites. Those values are shown in red in Table 6. If the cost of purchasing the utility easement at this site is less than $14,500.00/acre if a fixed system is chosen or $14,400.00/acre if a 1-axis system is chosen, then the Value Plastics site would produce electricity for a lower cost that the Boedecker Property. If the cost of purchasing land exceeds these values then the Boedecker Property should be chosen over the Value Plastics site.

Table 7 displays the anticipated schedule for this project. This table does not include the time required to obtain the utility easement or the NEPA or SHPO requirements.

Table 7: Construction schedule: Value Plastics Solar Project

	2015												2016												2017							
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1																																	
2																																	
3																																	

1. Engineering
2. Equipment Procurement
3. Construction

1b. I-25 and Hwy 402 Solar Project

There is 37 acres of city owned land available near the intersection of highways I-25 and 402 which is annexed to the City of Loveland. The proposed location of the PV system is shown in Figure 3. An important concern with this site is the lack of electrical infrastructure nearby.

The site is large enough to install a 4.8 MW fixed or 4.25 MW 1-axis PV system. However, the size will be limited by the available funds and the cost of adding the needed infrastructure to interconnect the PV system to the Loveland distribution system.

The nearest distribution line to the site is approximately 3.5 miles away along South Boise Avenue. All new construction to the site must be placed underground and an easement must be obtained for the land used. An overhead distribution line exists at the corner of Boise Avenue and Hwy 402 that appears to be the closest place which could be used to connect to the underground line that would feed the new site. It is assumed that this existing distribution line is capable of handling the PV system output without being upgraded and that right-of-way could be acquired along Hwy 402. If any existing line upgrades are needed, such as installing larger conductors on the overhead line that was used for the interconnection, this cost is not included in the prices shown below. One possible line route is shown in Figure 4.

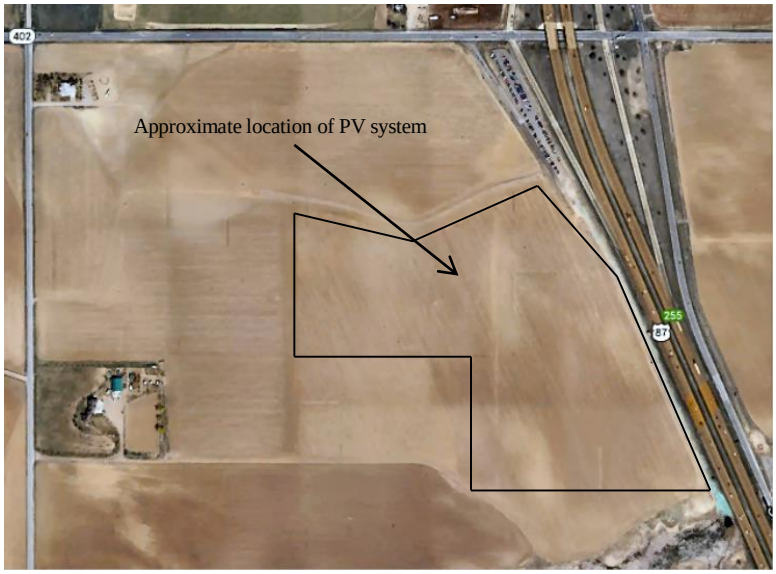


Figure 3: I-25 and Hwy 402 PV Solar Project Site.

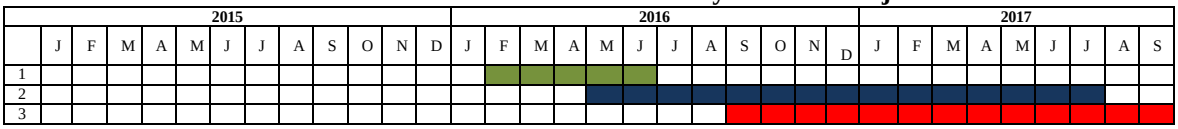
Figure 4: Line route from PV site to interconnection point.

Using the approximate cost that was provided by Loveland Water and Power of $507,000.00 per mile for underground distribution line construction, and considering the cost of an underground to overhead connection, the approximate cost and size of the PV system is shown in Table 8 and Table 9 shows the construction schedule.

Table 8: Cost analysis for the I-25 and Hwy 402 Solar Project.

	Fixed System	***1-Axis Tracking System***
Array Size (kW)	2,920.00	2,517.24
Land Needed (acres)	22.19	21.90
Land Cost (per acre)	$70,000.00	$70,000.00
Land Present Value	$1,553,440.00	$1,533,000.00
Interconnection Cost	$1,800,000.00	$1,800,000.00
PV Array Cost	$7,300,000.00	$7,300,000.00
O&M Present Value	$2,380,128.88	$2,885,393.31
Total Present Value	$13,033,568.88	$13,518,393.31
Present Value of Loveland's Costs	$3,933,568.88	$4,418,393.31
Energy Generated Annually 1st Year (MWh)	5,104.16	5,737.80
Total Energy Generated in Life of Plant (25 yrs.) MWh	116,073.37	130,482.94
Present Value of Energy Avoided Costs in life of plant	$5,395,852.53	$6,081,682.96
Present Value of Demand Charges avoided in life of plant	$2,063,270.93	$3,268,520.22
Present Value of Total Electrical Charges avoided in life of plant	$7,459,123.46	$9,350,203.18
Average Cost of Electricity Over Life of Plant $/kWh	$0.112	$0.104
Payback Period (Total Cost) Years	47	38
Payback Period (Loveland's Cost) Years	9	7
Percentage of Present Cost of Plant Paid for by Avoided Energy Purchases	57.23%	69.17%
Percentage of Loveland's Present Costs Paid for by Avoided Energy Purchases	189.63%	211.62%

Table 9: Construction schedule: I-25 and Hwy 402 Solar Project.



1. Engineering
2. Equipment Procurement
3. Construction

Table 9 does not include the time needed to obtain the easement for the new underground line, and it is possible that adding this additional time will mean the project may not finish construction by the September 2017 deadline. The NEPA process needed for this line construction may also delay the project beyond the deadline.

After the construction of the PV system there will still be approximately 15 acres left at this site for alternative use. One possibility is a mixed use site that would accommodate fracking or other well drilling and servicing equipment. These types of additional uses and their potential value were not considered in this report.

The possibility has been raised that this area could be expanded in the future and turned into an energy park. There is sufficient land to install an additional 1-2 MW of PV at the site, but the remaining land is of questionable use for other electrical energy related purposes. To add additional electrical generating resources a source of fuel must be identified. The value of the remaining land at this site is limited by the availability of other fuel sources and the land area available. Some other generation types that potentially could be installed on the remaining land at this site are considered below. These new plants will likely be owned by independent power producers rather than Loveland, and while not selling power directly to Loveland (since Loveland must purchase its power from PRPA) they could be provided with interconnection facilities to interconnect with Loveland's distribution system.

1. Wind: The area is a Class 1 wind site according to NREL and is classified as "poor". It is unlikely that any wind resources would be cost effective on the site.
2. PV: There is room for an additional 1-2 MW of solar photovoltaic power to be generated at the site and this expansion could be easily done if planned for when the infrastructure for the original interconnection was provided.
3. Solar thermal: These plants require area for both the collector system and the steam turbine. While there might be enough land available for a small system of this type, the cost of this resource would probably not be less than simply installing additional photovoltaic panels and inverters.
4. Natural gas reciprocating, turbine engines or microturbines: There is room to develop a natural gas fueled power plant if desired. The remaining land area could conceivably support a power plant delivering 5-10 MW. This would require the installation of considerable infrastructure including the gas delivery system and a dedicated distribution line to the site. If there are natural gas wells in the area it is possible to process gas directly from the wells for use in the power plant. This can reduce the costs of the gas delivery system and waste gas burning power plants have been successful in oil and natural gas fields at other locations. A power plant in the 5-10MW range would likely require the installation of a dedicated distribution line.
5. Municipal solid waste or agricultural waste: Depending upon the amount of waste available it might be possible to install a small waste processing system that could deliver enough fuel to feed a small generator. This would require a transportation system for the waste to the site. Except in rare cases the transportation costs usually make this option uneconomical and this option would take extensive study before its feasibility could be determined.
6. Fuel cells: The remaining area could be used for the interconnection of fuel cells. The needed infrastructure would be similar to that installed for other natural gas fueled generating equipment. A natural gas delivery system would be needed and if the power plant were large enough a dedicated distribution line may be needed.

Small power plants of the types shown above have all proven successful in some settings. However, unless a ready and easily obtainable and transportable fuel source is identified, the best choice would be to simply install a larger solar plant or dedicate the land to alternative uses such as fracking or other well drilling purposes.

1c. Airport Solar Project

There are several potential sites available near the airport. Some of them are smaller than needed, however. The best site would contain the complete PV system on one contiguous plot of land to make possible interconnecting to the Loveland electrical distribution system at only one point. Of the possible sites, two are of sufficient size and one of them is directly adjacent to a distribution line which would make interconnection relatively easy and lower the interconnection costs. It is also near the Crossroads Substation. This site, shown in Figure 5, is approximately 41 acres.

There is a larger site slightly to the south that consists of 59 Acres. It borders an underground distribution line, and the site would also be suitable for the PV system installation. This site is shown in Figure 6.

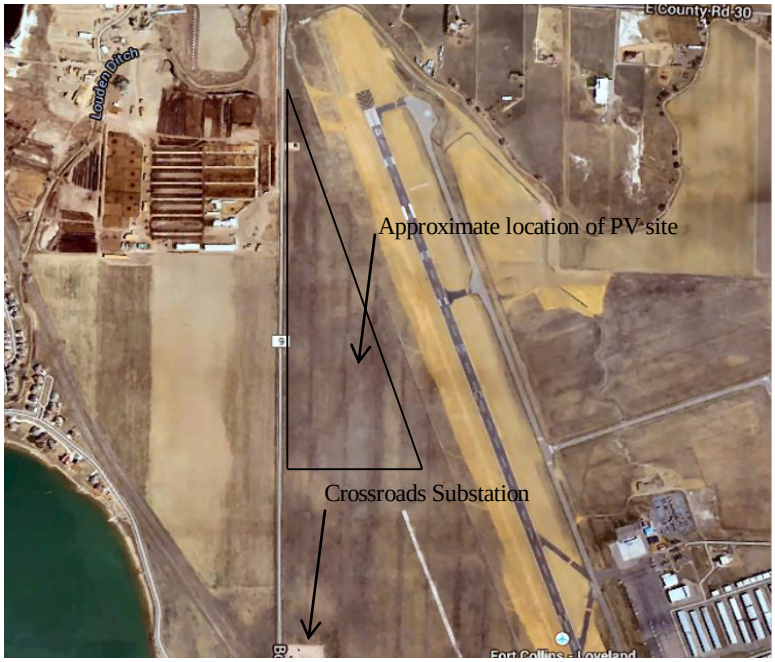


Figure 5: Airport Solar Project site.

Figure 6: Alternate airport PV Solar Project site.

This site in Figure 6 is not quite as desirable as the site shown in Figure 5 because the connection to the distribution line near the site in Figure 5 will be slightly easier to make than the connection that would be necessary to interconnect with the underground line near the alternate site in Figure 6. However, either site could accommodate the planned PV system.

The site in Figure 5 could accommodate 5.4 MW of fixed PV or 4.7MW of 1-axis tracking PV. The site in Figure 6 is large enough for 7.7 MW fixed PV or 7.8 MW of 1- axis tracking PV. The amount that can be installed will be limited by the available funds rather than available land area.

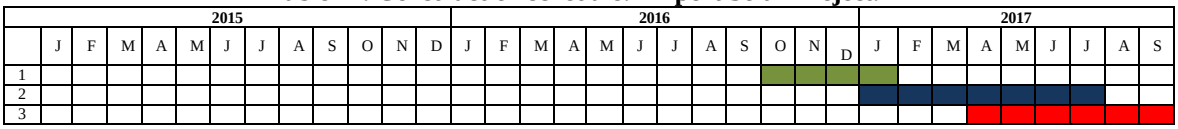
The analysis of the PV system at this site is shown in Table 10.

Table 10: Cost analysis for the Airport Solar Project.

	Fixed System	***1-Axis Tracking System***
Array Size (kW)	3,620.00	3,120.69
Land Needed (acres)	27.51	27.15
Land Cost (per acre per year)	$9,600.00	$9,600.00
Land Present Value	$5,342,751.04	$5,272,451.69
Interconnection Cost	$50,000.00	$50,000.00
PV Array Cost	$9,050,000.00	$9,050,000.00
O&M Present Value	$2,950,707.72	$3,577,097.18
Total Present Value	$17,393,458.76	$17,949,548.87
Present Value of Loveland's Costs	$8,293,458.76	$8,849,548.87
Energy Generated Annually 1st Year (MWh)	6,327.76	7,113.30
Total Energy Generated in Life of Plant (25 yrs.) MWh	143,899.18	161,763.09
Present Value of Energy Avoided Costs in life of plant	$6,689,378.82	$7,539,620.66
Present Value of Demand Charges avoided in life of plant	$2,557,890.67	$4,052,069.59
Present Value of Total Electrical Charges avoided in life of plant	$9,247,269.49	$11,591,690.24
Average Cost of Electricity Over Life of Plant $/kWh	$0.121	$0.111
Payback Period (Total Cost) Years	61	48
Payback Period (Loveland's Cost) Years	14	1
Percentage of Present Cost of Plant Paid for by Avoided Energy Purchases	53.17%	64.58%
Percentage of Loveland's Present Costs Paid for by Avoided Energy Purchases	111.50%	130.99%

Table 11 displays the anticipated schedule for this project.

Table 11: Construction schedule: Airport Solar Project.



1. Engineering
2. Equipment Procurement
3. Construction

1d. Larger Boedecker Solar Project

The property at this site consists of 25 acres that could be used for a PV site and an additional 4-5 acres that would be used for a future substation. Loveland Water and Power owns this land. Figure 7 shows the location of the Boedecker Substation and PV site. The site is not large enough to accommodate the maximum size array that could be purchased for the available funds since only 25 acres are available. This is the only site among those considered where the size of the array that can be installed is limited by the land available rather than the money available. Assuming only 25 acres are available Table 12 shows the analysis of the power plant that could be installed.

There is presently an underground distribution line just south of 14th St SW that could be extended to the PV site, as shown in Figure 7, to interconnect the system assuming the existing underground distribution line is

adequately sized to carry the output of the power plant. This extension and the boring under the road will add to the cost of the interconnection. The analysis of this project is shown in Table 12.

Table 12: Cost analysis for the Larger Boedecker Solar Project.

	Fixed System	*1-Axis Tracking System*
Array Size (kW)	3,289.47	2,873.56
Land Needed (acres)	25.00	25.00
Land Cost (per acre)	$10,833.00	$10,833.00
Land Present Value	$270,825.00	$270,825.00
Interconnection Cost	$300,000.00	$300,000.00
PV Array Cost	$8,223,684.21	$8,333,333.33
O&M Present Value	$2,681,291.55	$3,293,827.98
Total Present Value	$11,475,800.76	$12,197,986.31
Present Value of Loveland's Costs	$2,952,116.55	$3,564,652.98
Energy Generated Annually 1st Year (MWh)	5,750.00	6,550.00
Total Energy Generated in Life of Plant (25 yrs.) MWh	130,760.38	148,953.13
Present Value of Energy Avoided Costs in life of plant	$6,078,600.99	$6,942,560.46
Present Value of Demand Charges avoided in life of plant	$2,324,340.90	$3,731,187.47
Present Value of Total Electrical Charges avoided in life of plant	$8,402,941.89	$10,673,747.92
Average Cost of Electricity Over Life of Plant $/kWh	$0.088	$0.082
Payback Period (Total Cost) Years	36	30
Payback Period (Loveland's Cost) Years	2	2
Percentage of Present Cost of Plant Paid for by Avoided Energy Purchases	73.22%	87.50%
Percentage of Loveland's Present Costs Paid for by Avoided Energy Purchases	284.64%	299.43%

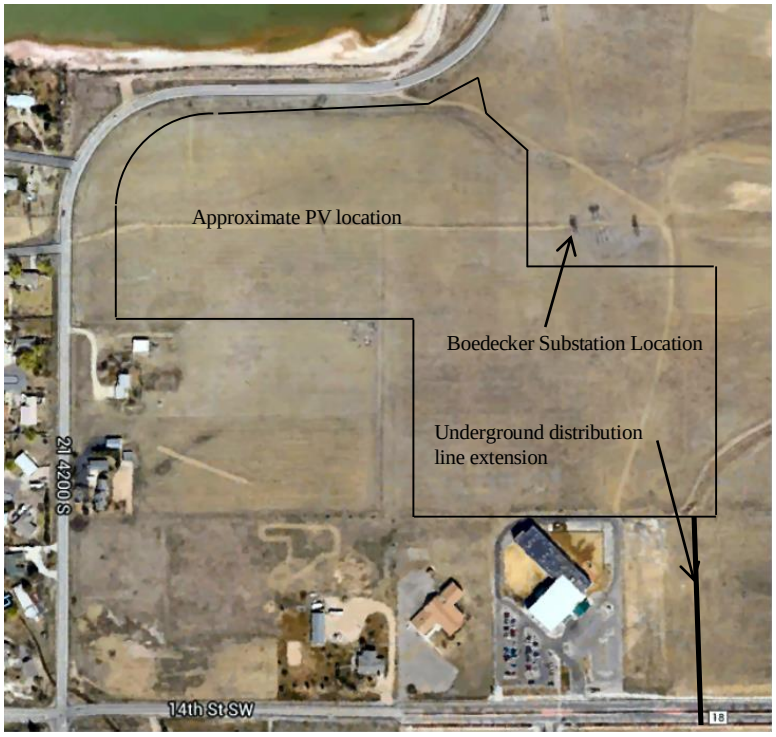
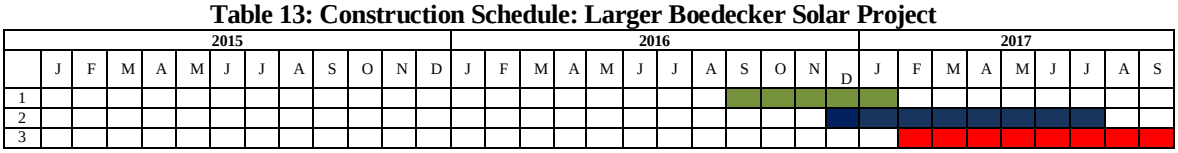


Figure 7: Boedecker Solar Project site.

Table 13 contains the anticipated schedule for this project.

Table 13: Construction Schedule: Larger Boedecker Solar Project



1. Engineering
2. Equipment Procurement
3. Construction

1e. Boedecker Solar Project

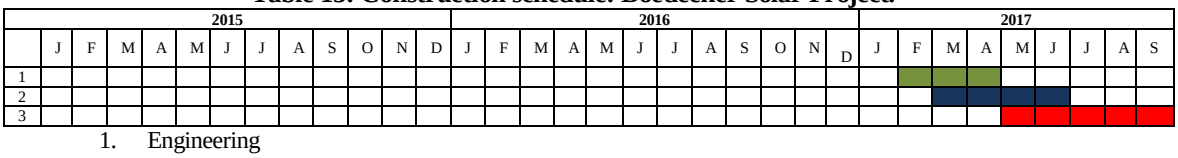
If the Boedecker Substation were built on this property there will be approximately $4,900,000.00 left to install a PV system on the area adjacent to the substation. The PV system may be directly connected to the substation and the extension of the underground distribution line shown in Figure 7 will not be needed. The interconnection costs will be included in the price of the substation. Table 14 shows the analysis of the power plants if the two projects are done together.

Table 14: Cost analysis for the Boedecker Solar Project if the project is done in conjunction with the Boedecker Substation.

	Fixed System	***1-Axis Tracking System***
Array Size (kW)	1,840.00	1,586.21
Land Needed (acres)	13.98	13.80
Land Cost (per acre)	$10,833.00	$10,833.00
Land Present Value	$151,488.67	$149,495.40
Interconnection Cost	$0.00	$0.00
PV Array Cost	$4,600,000.00	$4,600,000.00
O&M Present Value	$1,499,807.24	$1,818,193.04
Total Present Value	$6,251,295.91	$6,567,688.44
Present Value of Loveland's Costs	$1,651,295.91	$1,967,688.44
Energy Generated Annually 1st Year (MWh)	3,216.32	3,615.60
Total Energy Generated in Life of Plant (25 yrs.) MWh	73,142.12	82,222.13
Present Value of Energy Avoided Costs in life of plant	$3,400,126.25	$3,832,293.37
Present Value of Demand Charges avoided in life of plant	$1,300,143.33	$2,059,615.48
Present Value of Total Electrical Charges avoided in life of plant	$4,700,269.58	$5,891,908.85
Average Cost of Electricity Over Life of Plant $/kWh	$0.085	$0.080
Payback Period (Total Cost) Years	35	29
Payback Period (Loveland's Cost) Years	2	2
Percentage of Present Cost of Plant Paid for by Avoided Energy Purchases	75.19%	89.71%
Percentage of Loveland's Present Costs Paid for by Avoided Energy Purchases	284.64%	299.43%

Table 15 contains the anticipated schedule for the Boedecker Solar Project. This shows the timeline for the solar project only, not the substation construction.

Table 15: Construction schedule: Boedecker Solar Project.



1. Engineering
2. Equipment Procurement
3. Construction

Solar Project Comparison

All the proposed sites are suitable for a PV power plant in the sizes anticipated. Table 16 summarizes the information discussed thus far and shows the comparison of the sites based upon cost of the generated electrical energy and payback period. Table 17 compares the projects based upon the amount of their costs they will return

to Loveland over their lifetimes by offsetting energy and demand costs. The information contained in these tables may be used to compare the costs of the projects using various criteria.

Table 16: PV project comparison.

Site		*Array Size (kW)*	*Land Cost*	*Land Area Needed (acres)*	*Electrical Energy Generated (MWh)*	*Equivalent Cost of Generation Cents/kWh*	*Payback Period Total Cost (years)*	*Payback Period Loveland Cost (years)*
Value Plastics Solar Project	Fixed	3,550.00	$14,500.00/acre	26.98	141,116.60	8.8	36	2
	1-Axis	3,060.34	$14,400.00/acre	26.63	158,635.08	8.2	30	2
I-25 and Hwy 402 Solar Project	Fixed	2,920.00	$70,000.00/acre	22.19	116,073.37	11.2	47	9
	1-Axis	2,517.24	$70,000.00/acre	21.90	130,482.94	10.4	38	7
Airport Solar Project	Fixed	3,620.00	$9,600.00/acre/year	27.51	143,899.18	12.1	61	14
	1-Axis	3,120.69	$9,600.00/acre/year	27.15	161,763.09	11.1	48	1
Larger Boedecker Solar Project	Fixed	3,289.47	$10,833.00/acre	25.00	130,760.38	8.8	36	2
	1-Axis	2,873.56	$10,833.00/acre	25.00	148,953.13	8.2	30	2
Boedecker Solar Project	Fixed	1,840.00	$10,833.00/acre	13.98	73,142.12	8.5	35	2
	1-Axis	1,586.21	$10,833.00/acre	13.80	82,222.13	8.0	29	2

*These values are unknown at this time but have been calculated to determine the cost of land to make this option the least expensive on a $/kWh basis.

Table 17: Comparison of PV projects based upon costs paid for by avoided costs.

Project		Project Present Worth	Project Present Worth to Loveland (excludes FEMA funds)	Generated Electricity Present Worth	Percentage of Total Project Cost Repaid by Avoided Electrical Costs	Percentage of Loveland's Costs Repaid by Avoided Electrical Costs
Value Plastics Solar	Fixed	$12,384,859.84	$3,284,859.84	$9,068,454.89	73.22%	276.07%
	1-axis	$12,991,326.80	$3,891,326.80	$11,367,541.54	87.50%	292.13%
I-25 and Hwy 402 Solar	Fixed	$13,033,568.88	$3,933,568.88	$7,459,123.46	57.23%	189.63%
	1-axis	$13.518,393.31	$4,418,393.31	$9,350,203.18	69.17%	211.62%
Airport Solar	Fixed	$17,393,458.76	$8,293,458.76	$9,247,269.49	53.17%	111.50%
	1-axis	$17,949,548.87	$8,849,548,87	$11,591,690.24	64.58%	130.99%
Larger Boedecker Solar Project	Fixed	$11,475,800.76	$2,952,116.55	$8,402,941,89	73.22%	284.64%
	1-axis	$12,197,986.31	$3,564,652.98	$10,673,747.92	87.50%	299.43%
Boedecker Solar Project	Fixed	$6,251,295.91	$1,651,295.91	$4,700,269.58	75.19%	284.64%
	1-axis	$6,567,688.44	$1,967,688.44	$5,891,908.85	89.71%	299.43%

It may be concluded from the information in Table 16 and Table 17 that if a solar project is being considered, the most attractive projects are either the Boedecker Solar Projects or the Value Plastics Solar Project if the utility easement costs for the Value Plastics site are below those shown in red in Table 16. The reason these two sites are less costly and will produce more energy for the amount of money invested is mainly due to the land costs at each site and the relatively low interconnection costs. These projects come the nearest to generating enough electricity to pay for their construction costs, and they return nearly three times Loveland's investment over the expected plant lifetime.

2. Hydroelectric Power Plant

A small hydroelectric power plant could be built at the Loveland Water Treatment Plant (WTP). The proposed location of the plant is shown in Figure 8. The advantages of the site are that the land is owned by the city and there would be no cost for land. There is also a 12.47kV overhead distribution line near the power house site and the interconnection would be relatively simple.

It is proposed that a 275 kW generator could be installed at the site and the energy produced is anticipated to be 812 MWh/year for the first year and gradually increasing to 1,033 MWh/year in 15 years and 1,148 MWh/year in 30 years[8]. The lifetime of the power plant is reported to be 20 years; however, there are many small hydroelectric plants in the western United States that are still in operation after 50 years or more. If this facility is installed it is likely that with normal maintenance the plant will last far longer than the anticipated 20 years.

At this gradually increasing energy output the plant should generate 18,910.5 MWh in 20 years. The projected cost of construction is $1,715,000.00[8] which is on the higher side of typical construction costs for small hydroelectric plants. The O&M costs for small hydroelectric plants are approximately $52/kw/year.[9] The interconnection with the existing distribution line will require the construction of approximately 1,000 feet of new overhead distribution line along with equipment for interconnection to the power plant. Using a cost of $26.34/ft. for overhead construction provided by Loveland Water and Power, the project costs were compared in a similar way as was done with the PV alternatives. The analysis of this plant is shown in Table 18.

Figure 8: Proposed hydroelectric power plant location.

Table 18: Cost analysis for the hydroelectric power plant.

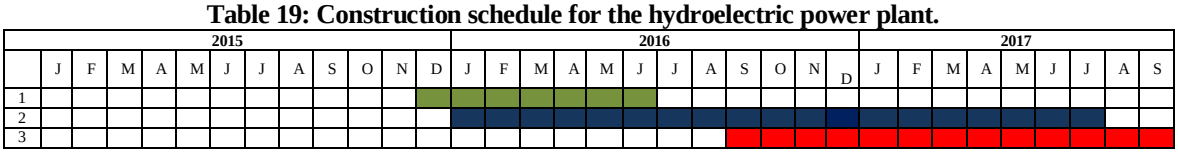
Size (kW)	275.00
Land Needed (acres)	0.00
Land Cost (Per Acre)	$0.00
Land Present Value	$0.00
Interconnection cost	$90,000.00
Plant Cost	$1,715,000.00
O&M Present Value	$289,241.30
Total Present Value	$2,094,241.30
Present Value of Loveland's Costs	$289,241.30
Energy Generated Annually (1st year MWh)	812.00
Total Energy Generated in life of plant (25 yrs.) MWh	18,910.50
Present Value of Energy Avoided Costs in life of plant	$859,974.35
Present Value of Demand Charges avoided in life of plant	$118,222.43
Present Value of Total Electrical Charges avoided in Life of Plant	$978,196.78
Average Cost of Electricity Over Life of Plant $/kWh	$0.111
Payback Period (Total Cost) Years	38
Payback Period (Loveland's Cost) Years	1
Percentage of Present Cost of Plant Paid for by Avoided Energy Purchases	46.71%
Percentage of Loveland's Present Costs Paid for by Avoided Energy Purchases	338.19%

The estimated construction schedule is shown in Table 19.

[8] *WTP Hydroelectric Feasibility Study*, Sunrise Engineering, 2013

[9] *Renewable Energy Technologies: Cost Analysis Series, Volume 1: Power Sector Hydropower*, International Renewable Energy Agency, June 2012.

Table 19: Construction schedule for the hydroelectric power plant.



1. Engineering
2. Equipment Procurement
3. Construction

IMPROVING LOVELAND'S FACILITIES

3. Fiber Optic System

The most important question to be answered when contemplating the installation of a fiber optic system is what the final use of that system will be. There are four broad categories of projects that might be considered.

1. Projects to support future electric utility needs
2. Projects to support present needs of various city departments
3. Projects for ownership and use by Loveland as a city-owned retail broadband internet provider
4. Projects for future use by a commercial communications or internet provider

Each of these final usage types will be briefly discussed. Before investing in such a network, it would be desirable for the final intent of the network to be clearly understood before design and construction is begun.

Fiber installed for future electric utility needs

A fiber optic network system can be of considerable value to an electric power utility. If installed from a central control room to the main substations it can provide a secure communications channel that will make possible advanced monitoring of the electric power system. Among the uses an electric utility may have for a fiber optic network are: the use of Systems Control and Data Acquisition Systems (SCADA), video monitoring of the security of the substation, automated meter infrastructure (AMI) and automated outage management systems (OMS), and extension to video and security monitoring of other city assets. These types of monitoring projects appear to be a growing trend in the electric power industry to improve the security of the utility's infrastructure and reduce outages that might occur due to equipment failure, vandalism or sabotage.

At this time, Loveland's substations have a fiber optic network installed that is owned and operated by Platte River Power Authority (PRPA). This is being used for the SCADA system to the substations themselves at no cost. However, if additions are made beyond substation SCADA, additional costs may be incurred for the use of this network if fiber is leased from PRPA.
SCADA and AMI systems both require a fast communication channel and a fiber optic network owned and operated by the electric utility is an ideal medium. These systems increase the utilities ability to monitor and control the power system.

If the fiber optic network and AMI system were installed, this could be integrated into an OMS. The city now uses a manual OMS system, and a fiber network would allow them to progress toward an automated OMS system.

The modern automated OMS system will typically gather, compile, and display information from a variety of sources including:

- Customer Information Systems (CIS): A computerized system used to track customer information, generate bills, issue service requests, and "manage" customer relationships by providing the utility information about each customer's needs and preferences.
- Interactive Voice Response (IVR) system: Interactive computer system which can answer telephone calls, route information, compile data, return calls, and call back customers as programmed. It can be linked to record customers' locations and link these with locations in the distribution system.

- Call Overflow (COF) systems: A system that redirects telephone calls from one answering location to another when volume exceeds capacity. It allows overflow calls to be answered and information tabulated.
- SCADA status information: A computer system that gathers data from devices such as protective relays, provides breaker, switch, and re-closer statuses and a means to control these devices remotely, and displays the status of this monitored equipment graphically.
- Distribution Automation (DA) systems: Computer system which monitors and controls devices on the distribution system. May include monitoring and controlling breakers, re-closers, and distributed generators.
- AMI systems: Systems which can remotely read kWh from meters and automatically record the values in a computer data base. Some systems can also send instantaneous values to the system reading the meter. Meter data can be transferred via radio, telephone, or power line carrier. Also includes two-way communication to make possible remotely disconnecting customers or in other ways manage demand.
- Protective relay fault location information: Protective relays are devices on the power system which trip breakers to disconnect parts of the system experiencing malfunctions, such as short circuits or open conductors. The OMS may be informed if a relay has detected a problem on part of the system and has tripped a breaker. This will help the OMS characterize the reason for an outage.
- Geographic Information Systems (GIS): A computer based technology to collect, record, and display geographically referenced or spatially oriented information. Can record the exact locations of utility infrastructure and attach to those records construction information, life, or repair data. Can produce graphic displays which compile and usefully display data concerning components in a power system.
- Automatic Vehicle Locator (AVL) systems: Uses global positioning system information to automatically record in near real time the location of vehicles in a utility's fleet. Can display on a GIS based system the location of all line trucks or other vehicles so dispatchers can determine the truck located nearest an outage.
- Crew reporting information[10]

The object of this system is to give operator real time data that can be of considerable help when restoring power especially during wide-spread outages.

One successful method that has been used by other utilities is to use the existing electrical substations for fiber hubs. The fiber network backbone would be built to the substations and used at first for substation security and SCADA. This would allow the city to own the fiber network instead of depending on the PRPA for fiber for the SCADA system. Loveland's electric utility could expand their own fiber network and add an AMI or other distribution automation systems and finally integrate this into an automated OMS as future funds became available.

The estimated cost to connect the seven substations in Loveland together with a fiber ring installed underground in existing right-of-way, including the cost of equipment necessary to use this network for the electric utility's SCADA system are shown in Table 20.

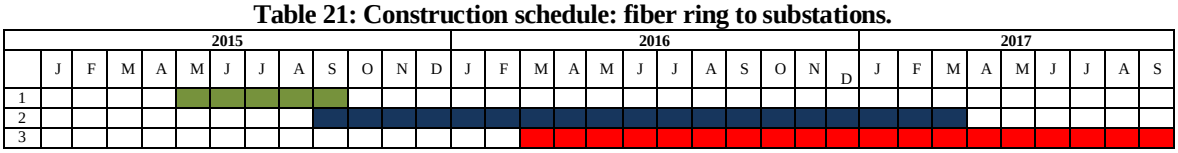
Table 20: Approximate cost of fiber ring to the Loveland substations.

Cost Item	Estimated Cost
Underground fiber ring installed to 7 Substations (approx. 29 miles of fiber)	$5,800,000.00
Integration and additional end-use equipment	$350,000.00
Total Estimated Cost	$6,150,000.00

The estimated construction schedule is shown in Table 21.

[10] Nielsen, T.D. (2002). "Improving Outage Restoration Efforts Using Rule-Based Prediction and Advanced Analysis." *IEEE Power Engineering Society Winter Meeting 2002*, Vol. 2, January, pp. 866-860.

Table 21: Construction schedule: fiber ring to substations.



1. Engineering
2. Equipment Procurement
3. Construction

One thing to consider with this plan is that the city is presently getting the use of PRPA's fiber network at no cost, resulting in the new fiber installation having no real pay-back until the AMI or other metering infrastructure were installed. The fiber would be left dark until such time that additional investment in the metering infrastructure was planned. Even after that the payback would be hard to determine.

Another alternative that might be considered is that if the PRPA fiber ring between the substations is adequate and can be used for the AMI system, then the available funds could be used to begin installing fiber to each home as part of a larger commitment that would eventually connect all customers to a fiber network. This would allow better monitoring of the condition of the distribution system. If the PRPA owned fiber continues in use for the fiber backbone, fiber could be then installed to approximately 5,200 customers with the available $9.1 million. In the future the infrastructure could be added to include all customers.

Projects to support present needs of various city departments

The second group of projects that may be considered are fiber projects that would benefit other city agencies. Among the agencies in Loveland using fiber communications at this time are:

1. Fire department
2. Traffic department
3. City utility departments
4. Libraries
5. Water/wastewater department

Many if not all of these agencies could be benefited by projects improving the fiber network in Loveland. Instead of one single large project, several smaller projects could be identified that would improve the fiber network used by the city. For the available $9.1 million approximately 45 miles of underground fiber could be installed.

One area of concern that has been identified is the redundancy of the fiber network. The loss of a single fiber path could disable communications to some city facilities. Careful planning and construction would make it possible to have a system that could continue to operate normally even with the loss of part of the system. Projects could be implemented to improve the redundancy of the North, West, and South fiber rings. This redundancy could have substantial benefit by preserving communication to critical agencies during emergencies. Some sample projects might be:

1. Extending fiber to the water treatment plant
2. Extending fiber to the waste water treatment plant
3. Installing fiber along the Hwy 402 to I-25 corridor and then to the airport
4. Installing fiber for redundancy to the West Substation
5. Installing fiber as necessary to make the North, South and West fiber rings completely redundant.

Under this plan the City would identify and prioritize a number of projects for which part of the available funds would be earmarked. These projects would then be undertaken to remedy discrepancies in the present fiber network.

Fiber owned and used by a City owned broadband retail internet provider

Another option that may be chosen is to install the fiber as the first part of a larger fiber system that would include all the existing fiber installed in Loveland and eventually be extended to provide broadband internet citywide to both city and retail customers. This could be done through the city forming their own communications company to provide broadband internet services. The first question that may arise is concerning the legality of this option. Before attempting to provide communications services to retail customers in Loveland the City should ensure that this option meets state law. State law would appear to prohibit this option at this time.

Assuming the legality of this option, the city's facilities are already being supplied by a fiber network that could eventually become part of the citywide fiber system. The ability to provide broadband service to all customers in Loveland using a city owned municipal communications company would mean a long-term commitment that would go far beyond the initial investment of $9.1 million and would take considerable effort at the beginning of the project to form the company and plan the construction of its facilities.

One way this type of network may be installed would be to install fiber to a limited number of customers under the first phase of the total system build-out. This would make it necessary to establish the city-owned communications company at the beginning of the project so when the fiber was installed to the customers the company and its facilities would be prepared to deliver service.

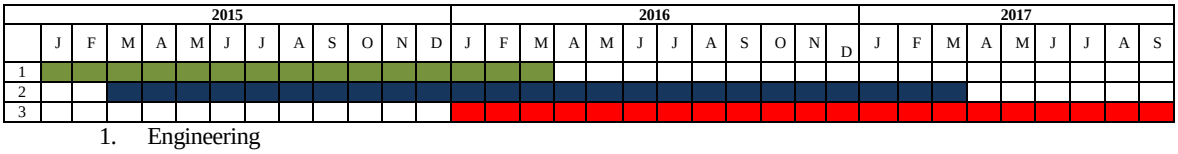
The system might be grown by first installing the initial trunk fiber to hubs located at one or two existing electrical substations, and built out from these hubs to surrounding customers. In this way a relatively large number of customers could be connected for the initial investment. If the substation chosen was near the communications backbone and central office the number of customers connected for the initial investment could be maximized. After the initial customers were connected and producing revenue the network could be gradually extended until it included all the substations as hubs and eventually all the customers in Loveland. Since this would extend the fiber infrastructure to each substation and customer, this network could also be used for electrical system SCADA to the substations, a future AMI system and an automated OMS. For the initial $9.1 million investment approximately 4500 customers could be connected to the system. A general cost estimate is shown in Table 22.

Table 22: Estimated cost

Cost Item	Estimated Cost
Central office and equipment	$1,100,000.00
Fiber trunk line to one substation	$350,000.00
Fiber lines to customer and end use equipment—4500 customers	$7,650,000.00
Total Estimated Cost	$9,100,000.00

The estimated construction schedule is shown in Table 23. This schedule does not include the time necessary for forming and planning the communications company.

Table 23: Construction schedule: broadband network.



1. Engineering
2. Equipment Procurement
3. Construction

Projects for future use by a commercial communications or internet provider

Another model that has been used by other municipal utilities is to install dark fiber that is either used in the future by the city or leased or sold to another communications company for the future installation of a broadband

system. This model has been less successful; with some municipalities finding they eventually must sell the fiber network they have installed to a communications company for a nominal cost and then make back their initial investment by leasing the utility's infrastructure, such as poles and right-of-way, to the communications company. The communications company is responsible for maintenance and expansion of the fiber network and servicing the customers connected to the system.

Under this scenario, the city could once again install a fiber network to the substations that would not be used until such time that the network was leased or sold to an outside company. Installation cost and schedule would be the same as shown in Table 20 and Table 21. Many utilities using this model have found that the payback period of this at present lease rates is 40 years or more. It is suggested that if this model is used the city have in place a definite plan that includes the company that will be using the fiber, when the fiber network will be operational, and the revenue that will be returning to the city under the contracts with the communications company used.

Comparison of projects

Of the types of projects considered in this section of the report, the one that appears most valuable is the project that would add redundancy to the system and install the fiber network to the facilities where it is presently inadequate. This alternative would include identifying several projects of this type be identified and prioritized. The $9.1 million is then budgeted to complete as many as possible in the order of priority. The other projects, adding fiber for distribution system automation, and automated OMS, or adding fiber as the first task in a complete communications system to each customer, all have value but will take a much larger and prolonged commitment of money and effort by the city. And if the projects are not completed, the original $9.1 million would be spent for naught.

4. New Boedecker Substation

In the recent flooding the drainage ditch adjacent to the West Substation was damaged. Part of the road serving the substation was also damaged and the slope supporting the southwest side of the substation was at risk. The damage was mainly due to erosion caused by the moving water. The substation and the areas that were damaged are shown in Figure 9

One possible solution to prevent damage to the substation from future flooding is to construct the Boedecker Substation at the site shown in Figure 7 and eventually remove the West Substation from service. A transmission line passes near the new site and it is assumed that this line could be intercepted and a tap used to feed the Boedecker Substation. The cost of the routing the transmission line into the substation would be incurred by PRPA.

A major expense and the major expenditure in time for this project will be due to building circuits to connect the new substation to the existing distribution circuits so the existing West Substation circuits could be fed from the Boedecker Substation when needed. This effort will take detailed planning and it may be difficult to get this work done in the allotted time. Some of the distribution construction may have to be completed after the project deadline.

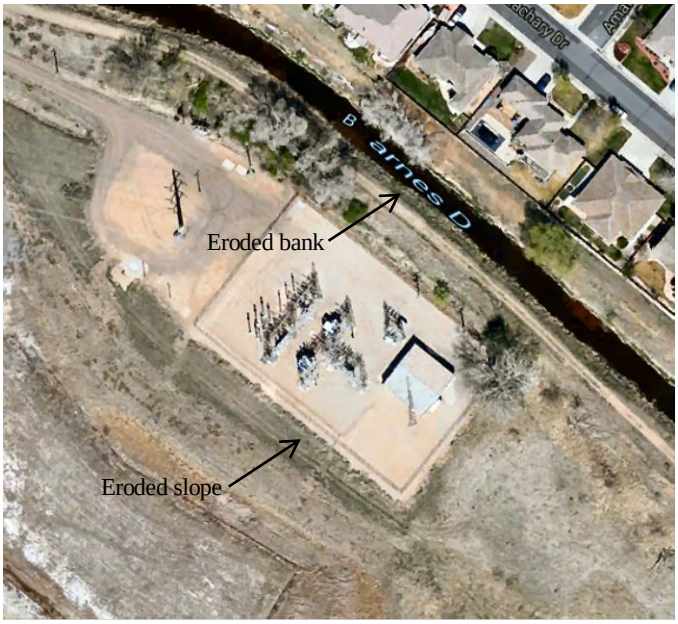


Figure 9: West Substation showing areas that suffered erosion.

Assuming the transmission line would be overhead and the existing 12.47kV feeders from the existing West substation would be fed from to the Boedecker Substation underground, and using $507,000.00/mile for the cost of underground feeder construction, a very rough estimate of the construction costs required for this project are shown in Table 24 and the anticipated construction schedule is shown in Table 25.

Table 24: Boedecker Substation Project Estimate.

Cost Item	Estimated Cost
Substation Construction	$4,200,000.00
Total Estimated Cost	$4,200,000.00

Table 25: Construction schedule for the Boedecker Substation.

	2015													2016												2017								
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1																																	
2																																	
3																																	
4																																	
5																																	

1. Engineering
2. Equipment Procurement
3. Transmission Line Construction
4. Substation Construction
5. Distribution System Construction

The benefit of this option is that Loveland will have the ability to take the West Substation out of service and feed the distribution load from the Boedecker Substation if needed. If future flooding threatens the West Substation this will give Loveland the option of switching the feeders to the Boedecker Substation and de-energizing the West Substation if needed. This will prevent long-term loss of power during emergency flooding conditions due to flood damage to the substation.

5. Improving the West Substation

Rather than building the Boedecker Substation, it may be possible to improve the West Substation site to make future damage to the existing substation from flooding less likely. There are two different alternatives that may be chosen. The first alternative is lining the ditch, shown in Figure 10, with concrete, improving the road

drainage, and placing rip-rap on the slope of the substation (Alternative 1 in Table 26). Included in this alternative would be paving the substation access road.

The second alternative consists of adding the rip-rap on the substation slope as proposed in Alternative 1, but building a retaining wall between the ditch bank and the substation rather than lining the ditch. In the case of either the retaining wall or lining the ditch with concrete, the improvements would start at the substation and follow the substation road to the point where it intersects Namaqua Rd.

Figure 10: Ditch near West Substation.

If the retaining wall alternative is chosen there are two choices to consider. The first is a concrete cantilever wall (Alternative 2a in Table 26); the second is a gravity wall (Alternative 2b in Table 26). Before the gravity wall is chosen a more detailed analysis of the site will be needed to determine if the design of this type of wall can perform satisfactorily in this application. The alternative used for improving ditch stability would require coordination with the Ditch Company.

Table 26: Estimated cost for improvements to the West Substation.

Improvement	***Alternative 1***	***Alternative 2a***	***Alternative 2b***
Concrete Ditch Liner	$1,850,000.00		
Road Drainage Improvements and paving	$130,000.00		
Cantilever Retaining Wall		$6,800,000.00	
Gravity Wall			$1,750,000.00
Rip Rap	$100,000.00	$100,000.00	$100,000.00
TOTAL	$2,080,000.00	$6,900,000.00	$1,850,000.00

While further analysis will need to be done to choose between the alternatives shown in Table 26, our suggestion at this time is that Alternative 1 will produce the best results for the lowest cost. Table 27 shows the anticipated construction schedule for these improvements.

Table 27: Construction Schedule

	2015													2016												2017								
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
1																																	
2																																	
3																																	

1. Engineering
2. Equipment Procurement
3. Construction

Improvement of the drainage facilities at the West Substation should make it less likely that the substation will be damaged by future flooding. The benefit of this option is that during emergency flooding conditions in the future the probability will be reduced that power will be lost on a long-term basis due to damage to the substation.

CONCLUSIONS

Comparison of the value of each of the projects considered is made more difficult due to the two different types of projects involved. The first type is meant to produce energy, and these are simpler to compare to each other than the other type which consists of upgrading existing facilities. It should also be noted that if in the future Loveland increases its customer base to 40,000 customers, or the current Renewable Energy Standards law is modified, Loveland may be required to participate in providing renewable energy aside from their energy purchased from PRPA; the power producing projects proposed will probably qualify for the State's renewable energy portfolio. This may also add value to those projects which generate energy.

While there are many ways to compare projects of this type, the comparison in this report was made based upon the present worth of each of the energy producing projects and the avoided cost of the energy that would otherwise be purchased from PRPA compared to the present value of Loveland's costs. This comparison is shown in Table 28.

Table 28: Comparison of project costs to avoided costs for each power producing project.

Project		Project Present Worth	Project Present Worth to Loveland (excludes FEMA funds)	Generated Electricity Present Worth	Percentage of Total Project Cost Repaid by Avoided Electrical Costs	Percentage of Loveland's Costs Repaid by Avoided Electrical Costs
Value Plastics Solar	Fixed	$12,384,859.84	$3,284,859.84	$9,068,454.89	73.22%	276.07%
	1-axis	$12,991,326.80	$3,891,326.80	$11,367,541.54	87.50%	292.13%
I-25 and Hwy 402 Solar	Fixed	$13,033,568.88	$3,933,568.88	$7,459,123.46	57.23%	189.63%
	1-axis	$13.518,393.31	$4,418,393.31	$9,350,203.18	69.17%	211.62%
Airport Solar	Fixed	$17,393,458.76	$8,293,458.76	$9,247,269.49	53.17%	111.50%
	1-axis	$17,949,548.87	$8,849,548,87	$11,591,690.24	64.58%	130.99%
Larger Boedecker Solar Project	Fixed	$11,475,800.76	$2,952,116.55	$8,402,941,89	73.22%	284.64%
	1-axis	$12,197,986.31	$3,564,652.98	$10,673,747.92	87.50%	299.43%
Boedecker Solar Project	Fixed	$6,251,295.91	$1,651,295.91	$4,700,269.58	75.19%	284.64%
	1-axis	$6,567,688.44	$1,967,688.44	$5,891,908.85	89.71%	299.43%
Hydroelectric Plant		$2,094,241.30	$289,241.30	$978,196.78	46.71%	338.19%

The plants that come the nearest to paying off their total costs are the Value Plastics or Boedecker Solar projects. They both pay off nearly 90% of their construction costs during their expected lifetimes. The project that appears to be the most financially beneficial to Loveland over the total lifetime of the plant is the hydroelectric power plant which can be expected to pay back over three times its cost to Loveland.

In the case of PV systems, the choice between installing a fixed or a 1-axis system is one of cost and maintenance needed. In all cases a 1-axis system will produce the most energy at the lowest cost even though the maintenance needed will be more than for a fixed system. The additional energy produced, however, might not be worth dedicating the use of personnel or a third party operator to provide this additional system operation and maintenance. If the city decides it is willing to dedicate personnel or a contractor to maintain the system, then the 1-axis system should be chosen. If the city decides it would rather not have to dedicate more resources than necessary for maintenance purposes, then the fixed system should be chosen.

In light of all the aforementioned information given for each project, the following projects were selected for consideration by FEMA.

1. PROJECT OPTION 1
   A. Construction of the Boedecker Substation—Constructing a new substation at the Boedecker Property.
   B. Boedecker Solar Project—Constructing an approximately 1.8 MW fixed or 1.6 MW 1-axis solar photovoltaic power plant at the Boedecker Property

2. PROJECT OPTION 2
   A. Larger Boedecker Solar Project—Constructing an approximately 3.3 MW fixed or 2.9 MW 1-axis solar photovoltaic power plant at the Boedecker Property

3. PROJECT OPTION 3
   A. Value Plastics Solar Project—Constructing an approximately 3.5 MW fixed or 3.1 MW 1-axis solar photovoltaic power plant at the Value Plastics site.

4. PROJECT OPTION 4
   A. Hydroelectric Power Plant—Install an approximately 275 kW hydroelectric power plant at the Loveland Water Treatment Plant.

City of Loveland

DEPARTMENT OF WATER AND POWER

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December 5, 2014

SENT VIA EMAIL

Johan Barrios
Colorado Office of Emergency Management
9195 E. Mineral Avenue, Suite 200
Centennial, Colorado 80112
johan.barrios@state.co.us

Re: PW00602 – City of Loveland Request for Preliminary Input on Draft Project Description

Dear Ms. Barrios,

The City of Loveland Water and Power Department (the "City") submits the enclosed informal, draft project descriptions to seek preliminary input from COEM and FEMA on several possible alternate projects the City is considering for use of the fixed estimate of $9,068,018 described in the Fixed Subgrant Agreement Letter. This submittal seeks initial feedback in order to inform the final project proposal, which the City intends to submit to you in mid-January 2015, in hopes that the submittal could then be sent to COEM and approval obtained from COEM and FEMA by March 14, 2015.

We have copied Kevin Helland of FEMA on this correspondence. Given the short timeframe within which feedback is needed, and that many of the questions posed and most of the input sought pertains directly to FEMA's alternate project program, FEMA's input as well as COEM's input is critical to have as soon as practicable; and therefore we request that COEM and FEMA review this concurrently.

We understand and agree that any preliminary input provided in response to this draft submittal is not binding on either COEM or FEMA and would only be provided as a courtesy to the City.

As background, the Fixed Subgrant Agreement Letter is pursuant to PW00602, which applies to the Idylwilde Dam, Penstock and Power House ("Hydroelectric Facility"), damaged in the flood on September 14, 2013. Because the Hydroelectric Facility had been similarly damaged in two major floods, first in 1976 and again in 2013, the City determined public welfare

would not be best served by restoring the damaged hydroelectric facility again. Therefore, pursuant to 44 C.F.R. § 206.203(d)(2), the City seeks to perform an alternate project.

In this informal submittal, we describe four possible alternate projects, and seek feedback as to whether the projects would be approvable or whether there are certain components of projects that may need to be modified in order to be approvable. We also enclose specific questions regarding the FEMA alternate project program, and how it may apply to the described project options. In the end, the City's intent is to choose one of the four possible projects described herein. However, depending on your feedback, the City may explore some variation or combination of the projects described. For example, the City may decide to construct a smaller solar project, as well as a substation. Whether a single project or multiple projects are selected, the costs will either remain at or below the fixed subgrant, or, to the extent costs exceed the fixed subgrant amount, the City will bear the additional costs.

As an approach we have found very effective leading to discussion on the alternate project the City requests an in person meeting, or alternatively a conference call, with both COEM and FEMA, during which we can discuss the four possible projects, answer any questions you may have and, ideally, obtain your feedback.

We seek your early input prior to submittal of a formal proposal because the City's process requires the Loveland City Council ("City Council") to vote on an alternate project proposal before it is submitted to COEM, and ultimately to FEMA. Prior to submittal to City Council we want to assure that we have identified and addressed issues that may prevent COEM or FEMA's ultimate approval.

In order to ensure the City is able and allowed to proceed with construction upon approval and completion of the environmental and historic preservation reviews, and meet the regulatory deadlines (as may be extended by COEM and FEMA, if granted) the City's current proposed timeline is as follows:

1. December 5, 2014 – City's informal submittal to FEMA and COEM for early guidance

2. Early/Mid-December 2014 – Ideally, meet with FEMA and COEM to discuss the possible alternate project options

3. January 6, 2015 – City's regular meeting with the City Council to discuss possible alternate projects

4. Mid-January 2015 – City's formal alternate project proposal submittal to FEMA and COEM

Given that per FEMA regulations, the deadline for work would be March 14, 2015, the City is currently working to submit a request for a 30-month extension from COEM.

We greatly appreciate your willingness to review the enclosed draft alternate project descriptions. We look forward to discussions with you on this matter. Please contact Brieana Reed-Harmel at (970) 962-3592 or Brieana.Reed-Harmel@cityofloveland.org with any questions you may have. We plan to reach out to you within the next week or so to discuss scheduling a meeting or conference call to further review the project descriptions provided in the enclosure.

Sincerely,

Stephen C. Adams
Water and Power Director

Enclosures

Cc:
Walter Estep, FEMA – Walter.Estep@fema.dhs.gov
Kevin Helland, FEMA – Kevin.Helland@fema.dhs.gov
Brent Worthington, City of Loveland, Finance Director – Brent.Worthington@cityofloveland.org
Judy Schmidt, City of Loveland, Acting City Attorney – Judy.Schmidt@cityofloveland.org

FOR INFORMAL COEM AND FEMA REVIEW
City of Loveland
Summary of Possible Alternate Projects
December 5, 2014

The City is considering the following four project options. The City has determined that each of the project options described below will provide a benefit to the general public previously served by the damaged hydroelectric facility by providing a new or improved power source and increasing the reliability of power for the City's utility customers. In the final alternate project proposal, the benefit of the selected project(s) will be described in more detail.

For ease of reference, the descriptions of each project option below, are organized in sections designated as A, B and C, follow the criteria set out in 44 C.F.R. § 206.203(d)(2)(v).

Project Option 1 – Boedecker Substation and Boedecker Solar Projects

Project Option 1 entails two distinct components: (1) the construction of a new substation, referred to as Boedecker Substation, and (2) the construction of a solar project, referred to as Boedecker Solar Project. First we describe the project option as it pertains to the Boedecker Substation (Project Option 1, Part 1), and next, the project as it relates to the Boedecker Solar Project (Project Option 1, Part 2).

Project Option 1, Part 1 – Boedecker Substation:

A. Detailed Description of the Proposed Alternate Project

Facility description and scope of work: The Boedecker Substation work would entail the construction of the substation and acquisition of new units and equipment for the substation. The project would begin with planning, design and engineering work, and conclude once the substation construction is completed.

Facility owner: The City would own Boedecker Substation and be responsible for maintenance and repairs as an owner.

Facility operator: While the City would be responsible for operations, consistent with the practice at the City's existing substations, the City would contract the normal maintenance function to Platte River Power Authority, the quasi-public entity owned by the City and nearby municipalities. The City would carry insurance to cover the facility.

Location: Boedecker Substation would be located at a site bordering County Road 21, north of the intersection with 14th Street SW, within Larimer County. If this substation were to be constructed along with the solar project, as proposed in this Option 1, the substation would be immediately east of the solar field, abutting County Road 21. The property is not located in a regulatory floodplain or in a 100-yr floodway.

The property on which the Boedecker Solar Project would be located is owned by the City of Loveland Water and Power Department. The City owns 29.75 acres at this site, about 4 to 5 acres of which would be used for the substation.

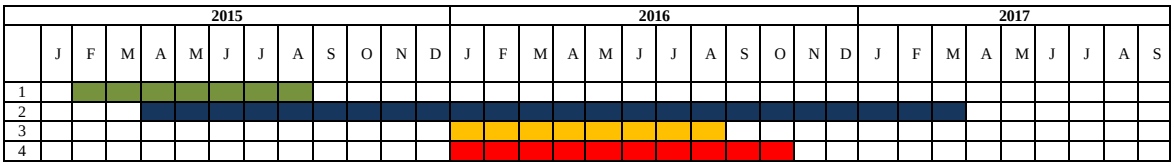
Insurance: The City will insure the project as needed and consistent with its general policies.

Environmental historic preservation review: The City plans to perform the required environmental and historic preservation reviews prior to the commencement of construction. To the extent the City may be required to obtain approval from the County pursuant to requirements known as the 1041 Regulations, which per the Loveland Land Use Code, may require a County review process and permit, the City will comply with these requirements as well.

B. Schedule of Work

The City plans to seek a 30-month extension from the State due to the time needed to obtain equipment and construct the substation. The following is a general timeline for construction. Prior to beginning the construction work shown below, NEPA and NHPA reviews would be completed.

Construction schedule for the Boedecker Substation



1. Engineering
2. Equipment Procurement
3. Transmission Line Construction
4. Substation Construction

C. Projected Cost of the Project

The total estimated cost for the Boedecker Substation project is approximately $4,200,000. Because this project is significantly less than fixed subgrant amount of approximately $9,100,000, the City would propose construction of the Boedecker Substation along with the Boedecker Solar Project option described immediately below. Both the projects under this Option 1 (Boedecker Substation along with the Boedecker Solar Project), total are not expected to exceed the approximate $9,100,000 million fixed subgrant. However, if costs exceed the fixed subgrant amount, the City would pay for the excess costs using City funds.

Project Option 1, Part 2– Boedecker Solar Project:

A. Detailed Description of the Proposed Alternate Project

Facility description and scope of work: The Boedecker Solar Project would entail the construction of a solar-powered generation facility, and the acquisition of associated equipment and parts. This project would also entail installing at least one circuit and connecting the solar project to the City's distribution system.

This solar project would entail either a fixed system of solar panels or a 1-axis tracking system that keeps the solar panels pointed to the sun from sunrise to sunset. Given that this Project Option 1 entails two components, the solar project would likely be limited to a 1.9 to 2.2 MW facility.

The project would begin with planning, design and engineering work, and conclude once the solar project construction is completed, and is connected to the City's distribution system.

Facility owner: The City would own the Boedecker Solar Project and be responsible for maintenance and repairs as the owner.

Location: The Boedecker Solar Project would be located at a site bordering County Road 21, north of the intersection with 14th Street SW, within Larimer County. If this solar project were to be constructed along with the Boedecker Substation as proposed in this Option 1, the Solar Project would be immediately west of the substation, abutting County Road 21. The property is not located in a regulatory floodplain or in a 100-yr floodway.

The property on which the Boedecker Solar Project would be located is owned by the City of Loveland Water and Power Department. The City owns 29.75 acres at this site, about 14 to 17 acres of which would be used for the Boedecker Solar Project.

Facility operations: The City would be responsible for operations and maintenance, and would hire a contractor to perform maintenance activities.

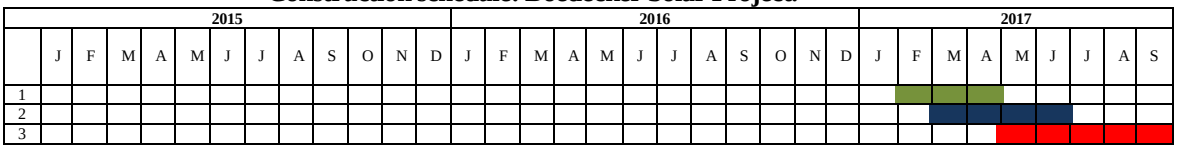
Insurance: The City will insure the project as needed and consistent with its general policies.

Environmental historic preservation review: The City plans to perform the required environmental and historic preservation reviews prior to the commencement of construction.

B. Schedule of Work

The City plans to seek a 30-month extension from the State due to the time needed to obtain equipment and construct the substation. The following is a general timeline for construction. Prior to beginning the construction work, NEPA and NHPA reviews would be completed.

Construction schedule: Boedecker Solar Project.



1. Engineering
2. Equipment Procurement
3. Construction

C. Projected Cost of the Project

Estimated cost of this project option is $4,900,000. Both the projects under this Option 1 (Boedecker Substation along with the Boedecker Solar Project), total are not expected to exceed the approximate $9,100,000 million fixed subgrant. However, if costs exceed the fixed subgrant amount, the City would pay for the excess costs using City funds.

Project Option 2 – Larger Boedecker Solar Project

A. Detailed Description of the Proposed Alternate Project

Facility description and scope of work: The Larger Boedecker Solar Project would entail the construction of an approximately 2.8MW to 3.2MW solar-powered generation facility, and the acquisition of associated equipment and parts. This project may also entail connecting the solar project to the City's distribution line, which could possibly be achieved by connecting to an existing underground distribution line, assuming that line is adequately sized.

The project would begin with planning, design and engineering work, and conclude once the solar project construction is completed, and is connected to the City's distribution system.

Facility owner: The City would own Boedecker Solar Project and be responsible for maintenance and repairs as the owner.

Location: The Larger Boedecker Solar Project would be located at a site bordering County Road 21, north of the intersection with 14th Street SW, within Larimer County. The property is not located in a regulatory floodplain or in a 100-yr floodway.

The property on which the Boedecker Solar Project would be located is owned by the City of Loveland Water and Power Department. The City owns 29.75 acres at this site, about 25 acres of which would be used for the larger solar project.

Facility operator: The City would be responsible for operations and maintenance, and would hire a contractor to perform maintenance activities.

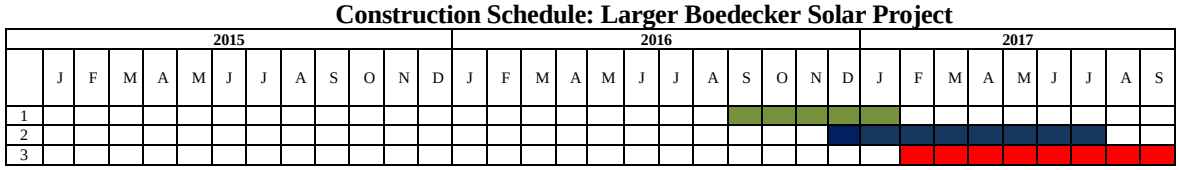
Insurance: The City will insure the project as needed and consistent with its general policies.

Environmental historic preservation review: The City plans to perform the required environmental and historic preservation reviews prior to the commencement of construction. In addition, to the extent the solar project may be subject to County permitting under what is known as the 1041 Regulations, the City would comply with any such requirements.

B. Schedule of Work

The City plans to seek a 30-month extension from the State due to the time needed to obtain equipment and construct the substation. The following is a general timeline for construction. Prior to beginning the construction work, NEPA and NHPA reviews would be completed.

Construction Schedule: Larger Boedecker Solar Project



1. Engineering
2. Equipment Procurement
3. Construction

C. Projected Cost of the Project

The estimated total costs of the solar project and interconnection are approximately $8,700,000. If costs exceed the approximate $9,100,000 million fixed subgrant, the City would pay for the excess costs using City funds.

Project Option 3 – Value Plastics Solar Project

A. Detailed Description of the Proposed Alternate Project

Facility description and scope of work: The Value Plastics Solar Project would entail the construction of approximately 3.1MW to 3.6MW solar power plant, and acquisition of the associated equipment and parts. In addition, the project would involve installation of an interconnection line to connect to the Horseshoe Substation located at the adjacent site.

The Horseshoe Substation is separated from the property on which the Value Plastics Solar Project would be located by a railroad right-of-way. There is an existing underground distribution line going underneath the railroad right-of-way that could possibly be used to interconnect to the system. As part of the project, an interconnection line would need to be installed from the solar project to the existing line.

This solar project would entail a 1-axis tracking system that keeps the solar panels pointed to the sun from sunrise to sunset. Given that this Project Option 3 entails only the solar project, it can be up to about 3.6MW, within the fixed subgrant.

The project would begin with planning, design and engineering work, and conclude once the solar project construction is completed, and is connected to the Horseshoe Substation.

Facility owner: The City would own the Value Plastics Solar Project and be responsible for maintenance and repairs as the owner.

Location: The project would be located at the site recently purchased by Value Plastics, 805 W. 71st. St., within Larimer County. The site is not located in a regulatory floodplain or in a 100-yr floodway. The City would not own the property but would have either (a) a long-term utility easement, or (b) a long-term lease for the solar project from Value Plastics, which would remain the owner of the underlying real property. The terms of the utility easement or lease would be such that the City would be responsible for maintenance and repairs of the solar facility.

Facility operator: The City would be responsible for operations and maintenance, and would engage a contractor to perform maintenance activities.

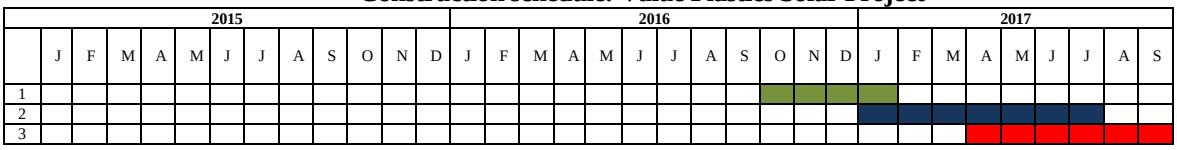
Insurance: The City will insure the project as needed and consistent with its general policies.

Environmental historic preservation review: The City plans to perform the required environmental and historic preservation reviews prior to the commencement of construction.

B. Schedule of Work

The City plans to seek a 30-month extension from the State due to the time needed to obtain equipment and construct the substation. The following is a general timeline for construction. Prior to beginning the construction work, NEPA and NHPA reviews would be completed.

Construction schedule: Value Plastics Solar Project



1. Engineering
2. Equipment Procurement
3. Construction

C. Projected Cost of the Project

The total estimated costs would be approximately $9,100,000. If costs exceed the approximate $9,100,000 million fixed subgrant, the City would pay for the excess costs using City funds.

Project Option 4 – Hydroelectric Power Plant

A. Detailed Description of the Proposed Alternate Project

Facility description and scope of work: The Hydroelectric Power Plant project would entail the construction of one in-line turbine at the City's existing Loveland Water Treatment Plant. This project would entail the acquisition of equipment and parts for the in-line turbine, as well as the installation of about 1,000 feet of overhead distribution line and equipment for the interconnection to the City's distribution system.

The project would begin with planning, design and engineering work, and conclude once the hydroelectric plant construction is completed, and is connected to the City's distribution system.

Facility owner: The City would own the Hydroelectric Power Plant and be responsible for maintenance and repairs as the owner.

Location: The project would be located at the Loveland Water Treatment Plant site, 3152 Waterdale Dr, within Larimer County. The site is not located in a regulatory floodplain or in a 100-yr floodway.

The City owns the underlying real property, as well as the Loveland Water Treatment Plant.

Facility operator: The City would be responsible for operations and maintenance, and would hire a contractor to perform maintenance activities.

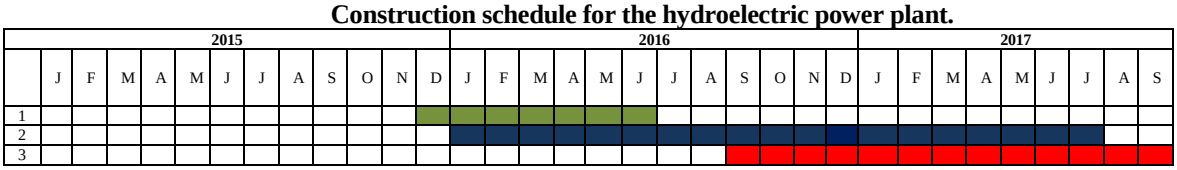
Insurance: The City will insure the project as needed and consistent with its general policies.

Environmental historic preservation review
The City plans to perform any required environmental and historic preservation reviews prior to the commencement of construction. The project will also require a FERC license, which the City will obtain.

B. Schedule of Work

The City plans to seek a 30-month extension from the State due to the time needed to obtain equipment and construct the substation. The following is a general timeline for construction. Prior to beginning the construction work, NEPA and NHPA reviews would be completed. In addition, the project would be require a FERC license, which would take about 6 months to obtain.

Construction schedule for the hydroelectric power plant.



1. Engineering
2. Equipment Procurement
3. Construction

C. Projected Cost of the Project

The total estimated costs would be approximately $1,800,000. Given the relatively low cost of this Option 4 project, this project would be constructed as a supplement to other project(s) to the extent there are sufficient remaining funds from the subgrant.

City of Loveland Questions for COEM and FEMA

Timing of reimbursement

1. In that the options being considered are all large projects, each in excess of at least $1 million, would FEMA issue reimbursements at certain phases of the work prior to completion, or would the entire sum of the costs at or below the fixed subgrant amount be paid out at the time of completion of all the projects?

Cost estimates in proposal

2. Given that the City has a fixed subgrant for an alternate project, and any excess amounts would be borne by the City, are estimated total costs sufficient information for the final project proposal (for approval by March 14, 2015)?

3. To the extent that actual costs exceed the fixed subgrant amount, the City will pay for the costs in excess. In the project proposal to be submitted by the City for final approval by March 2015, is it required that the submittal indicate the specific source of funds for the excess costs.

Completion of the work

4. If several projects are approved, the total of which cost approximately $9,100,000, and two of the projects are completed but one of the projects is not completed by the deadline, would the City still be reimbursed / awarded FEMA funds from the fixed subgrant for the two completed projects?

5. Following on the above question, if, by the project completion deadline in September 2017, capital equipment has been purchased for one of the projects but installation or construction was not yet completed for that project, could the City be reimbursed / awarded FEMA funds from the fixed subgrant for at least the cost of the purchase of the capital equipment?

6. What "constitutes completion of the work"? For example, if the Boedecker Substation is constructed by the work deadline, but the substation is not yet connected to the grid with a distribution line, is the substation work eligible for reimbursement?

Project changes

7. If, during planning, engineering or actual work, it is determined that the project scope must be modified, would the City (though COEM as grantee) be obligated to notify, or obtain approvals from FEMA? The following is an example scenario: The City (though COEM as grantee) selects a solar project option, and in the FEMA-approved project submittal, the solar project is described as being 3MW in size. Later, during planning or even during an early construction phase, the City determines the project will need to be smaller, 1MW, or larger, 4MW; therefore, the City would like to modify the scope, such as the size, of the project. If a modification such as this arises, would the City (though

COEM as grantee) be required to notify FEMA? Would the City (though COEM as grantee) be required to obtain advance approval from FEMA? Would such requirements change depending on whether costs would remain within the fixed subgrant amount, knowing that, to the extent costs may exceed the fixed subgrant, for any project option, City funds would be used to cover the costs in excess of the subgrant?

8. The question above assumes that the City, as subgrantee, would work with COEM, and COEM would be the entity submitting any necessary notifications and requests for approvals, is that assumption accurate in circumstances that may arise after project approval by FEMA?

Land, leasing or easement costs

9. If the alternate project is construction of a facility, such as a solar facility, is the cost to purchase the land for the facility eligible for reimbursement by a portion of the fixed subgrant?

10. If the alternate project is construction of a facility, where a perpetual utility easement or a linear easement such as for a utility line is purchased to allow use of the land, would the easement costs be eligible for reimbursement?

11. If the alternate project is construction of a facility, where the land is leased overtime, are these leasing costs eligible for reimbursement?

Planning, design and engineering

12. Since the fixed subgrant will not be increased or decreased, are costs for planning, design and engineering eligible for reimbursement where the expenditures for such were made in compliance with the FARs?

FARs

13. Generally, Platte River Power Authority, the quasi-public entity owned by the City and other nearby municipalities, performs the engineering and design work on all the City's substations. There is a pre-existing agreement providing for this arrangement between the City and PRPA. The agreement was not issued in compliance with FARs. Would the engineering and design costs be eligible for reimbursement from the fixed subgrant?

14. Typically, City employees perform some of the actual specialized electrical construction work for substations such as cable installation and installation of distribution equipment. If City employees perform some of this work, is the project still eligible? i.e., does the use of City employees for planning, construction or other work need to comply with FARs?

15. Assuming under FARs the use of City employees is allowable, what types of costs incurred by the use of City employees are reimbursable (direct costs, indirect costs, overhead costs, etc…)?

City of Loveland Questions for COEM and FEMA

The responses from the State and FEMA for each question are listed below in blue.

Timing of reimbursement

1. In that the options being considered are all large projects, each in excess of at least $1 million, would FEMA issue reimbursements at certain phases of the work prior to completion, or would the entire sum of the costs at or below the fixed subgrant amount be paid out at the time of completion of all the projects?
   The State makes progress payments on a reimbursement basis. The payments for PAAP are reimbursed the same as all other PA projects. Once Loveland receives an invoice, they may request reimbursement understanding that all of the reimbursement and documentation requirements must be met.

Cost estimates in proposal

2. Given that the City has a fixed subgrant for an alternate project, and any excess amounts would be borne by the City, are estimated total costs sufficient information for the final project proposal (for approval by March 14, 2015)?
   Yes, please provide estimates for completing the projects in their entirety including any costs that will be borne by the City.

3. To the extent that actual costs exceed the fixed subgrant amount, the City will pay for the costs in excess. In the project proposal to be submitted by the City for final approval by March 2015, is it required that the submittal indicate the specific source of funds for the excess costs.
   Yes.

Completion of the work

4. If several projects are approved, the total of which cost approximately $9,100,000, and two of the projects are completed but one of the projects is not completed by the deadline, would the City still be reimbursed / awarded FEMA funds from the fixed subgrant for the two completed projects?
   Yes. You will be reimbursed for all eligible activities that are within the project scope of work and completed within the allotted time period.

5. Following on the above question, if, by the project completion deadline in September 2017, capital equipment has been purchased for one of the projects but installation or construction was not yet completed for that project, could the City be reimbursed / awarded FEMA funds from the fixed subgrant for at least the cost of the purchase of the capital equipment?
   Yes, you will be paid for whichever eligible portions of the scope of work are completed. In this example, the installation or construction would not be reimbursable since it was not completed.

6. What "constitutes completion of the work"? For example, if the Boedecker Substation is constructed by the work deadline, but the substation is not yet connected to the grid with a distribution line, is the substation work eligible for reimbursement?
   Completion of work means completing what is outlined in the scope of work of the PW. Yes, the construction of the substation is eligible; but the connection costs would not be.

Project changes

7. If, during planning, engineering or actual work, it is determined that the project scope must be modified, would the City (though COEM as grantee) be obligated to notify, or obtain approvals from FEMA? The following is an example scenario: The City (though COEM as grantee) selects a solar project option, and in the FEMA-approved project submittal, the solar project is described as being 3MW in size. Later, during planning or even during an early construction phase, the City determines the project will need to be smaller, 1MW, or larger, 4MW; therefore, the City would like to modify the scope, such as the size, of the project. If a modification such as this arises, would the City (though COEM as grantee) be required to notify FEMA? Would the City (though COEM as grantee) be required to obtain advance approval from FEMA? Would such requirements change depending on whether costs would remain within the fixed subgrant amount, knowing that, to the extent costs may exceed the fixed subgrant, for any project option, City funds would be used to cover the costs in excess of the subgrant?
   Yes, the State and FEMA shall be notified of any and all changes prior to starting the work. The approval is not dependent upon costs but upon the area impacted and what environmental clearance is needed.

8. The question above assumes that the City, as subgrantee, would work with COEM, and COEM would be the entity submitting any necessary notifications and requests for approvals, is that assumption accurate in circumstances that may arise after project approval by FEMA?
   Yes. This is also applies to this request that is forthcoming.

Land, leasing or easement costs

All of these options can be further discussed once Loveland decides how they wish to proceed.

9. If the alternate project is construction of a facility, such as a solar facility, is the cost to purchase the land for the facility eligible for reimbursement by a portion of the fixed subgrant?
   Yes, purchasing land is eligible for reimbursement as part of an alternate project.

10. If the alternate project is construction of a facility, where a perpetual utility easement or a linear easement such as for a utility line is purchased to allow use of the land, would the easement costs be eligible for reimbursement?
    Yes, easements are eligible for reimbursement.

11. If the alternate project is construction of a facility, where the land is leased overtime, are these leasing costs eligible for reimbursement?
    No, leasing costs are not eligible as they are seen as an ongoing maintenance/operating cost of the facility.

Planning, design and engineering

12. Since the fixed subgrant will not be increased or decreased, are costs for planning, design and engineering eligible for reimbursement where the expenditures for such were made in compliance with the FARs?
    Yes, as long as they can be tied to the scope of work in the PW. Expenses that were incurred prior to the incident period are not eligible.

FARs

13. Generally, Platte River Power Authority, the quasi-public entity owned by the City and other nearby municipalities, performs the engineering and design work on all the City's substations. There is a pre-existing agreement providing for this arrangement between the City and PRPA. The agreement was not issued in compliance with FARs. Would the engineering and design costs be eligible for reimbursement from the fixed subgrant?
    Typically no, but we would need more information as to why the agreement is not in compliance. We have some alternatives depending on the issues with the agreement.

14. Typically, City employees perform some of the actual specialized electrical construction work for substations such as cable installation and installation of distribution equipment. If City employees perform some of this work, is the project still eligible? i.e., does the use of City employees for planning, construction or other work need to comply with FARs?
    This question is a little unclear. Are you referring to in house city employees who constitute force account labor? Or are you referring to contract employees? In house employees who are on your payroll do not need to comply with acquisition or procurement guidelines because it does not apply to them. Contract employees who work for the city might. We would have to discuss specifics to better answer this question.

15. Assuming under FARs the use of City employees is allowable, what types of costs incurred by the use of City employees are reimbursable (direct costs, indirect costs, overhead costs, etc…)?
    Direct costs that can be tied to the PW and specific PW activities are reimbursable. Overhead costs are reimbursable on a case by case basis depending on what you are referring to. Indirect costs are eligible as well. Please note that under the Public Assistance program, direct costs and indirect costs have specific definitions and there are activity lists that are associated with both. Any cost submitted for reimbursement must be an eligible activity and attributed to the project.

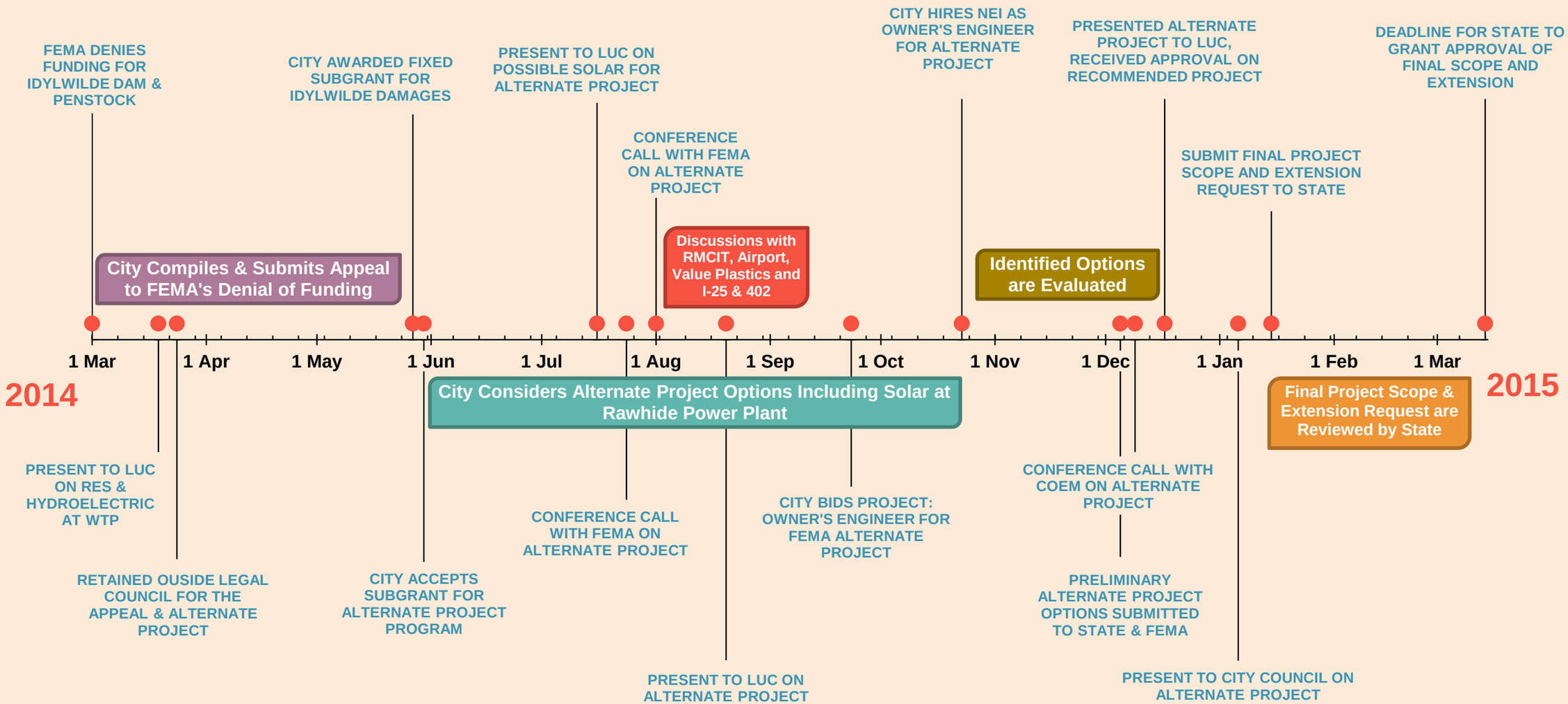
FEMA Alternate Project Comparison Spreadsheet
Developed by City Staff, NEI Electric Power Engineering Inc., and Environmental Consultants

			Financial Information						Land Use				Environmental Requirements			Timeline	
Option #	Project Description	Risk Level	*Estimated Costs	Payback Period (Total Cost) Years	Payback Period (Loveland's Cost) Years	Avoided Costs	Output Potential	% Towards RES	Acreage Needed	Acreage Available	Land Cost	Land Considerations	404 Permitting	NEPA/SHPO	1041 Process	Environmental Timeline	Engineering, Procurement & Construction
1A	Value Plastics Solar Project	LOW	$9.1M	30 to 36 Years	2 Years	$9.1 to $11.3M over the life	3.1 to 3.5 MW	0.73%	27 acres	50 acres	$383,000 to $391,000	• Permanent Utility Easement Needed • A Special Review Application will be required (3-5 month timeline) • Proposed site is located in a retention pond area	None	Utility PEA, $8,000, 90 days	Applicability TBD If required $10,000 ~4 months	3-6 months	12 months
1B	I-25 and Hwy 402 Solar Project	HIGH	$9.1M	38 to Years	7 to 9 Years	$7.5 to $9.3M over the life	2.5 to 2.9 MW	0.60%	22 acres	37 acres	$1.5 Million Land purchase from General Fund	• Site will need to be rezoned from E-Employement to Industrial (6-8 month timeline)	None	Utility PEA, $8,000, 90 days	Applicability TBD If required $10,000 ~4 months	3-6 months	20 months
1C	Airport Solar Project	MEDIUM/ LOW	$9.1M	48 to 61 Years	1 to 14 Years	$9.2 to $11.5M over the life	3.1 to 3.6 MW	0.74%	28 acres	41 to 59 acres	$265,000 per year	• Land Lease from Airport per FAA Rules • A Special Review Application will be required (3-5 month timeline)	None	Utility PEA, $8,000, 90 days	No	3-6 months	12 months
1D	Larger Boedecker Solar Project	MEDIUM/ HIGH	$8.5 to $8.9M	30 to 36 Years	2 Years	$8.4 to $10.6M over the life	2.8 to 3.3 MW	0.67%	25 acres	25 acres	N/A	• Land will need to be annexed (6-8 month timeline)	None	Utility PEA, $8,000, 90 days	Applicability TBD If required $10,000 ~4 months	3-6 months	13 months
1E	Smaller Boedecker Solar Project	LOW	$4.6M	29 to 35 Years	2 Years	$4.7 to $5.9M over the life	1.5 to 1.8 MW	0.38%	14 acres	25 acres	N/A	• Land will need to be annexed (6-8 month timeline)	None	Utility PEA, $8,000, 90 days	Applicability TBD If required $10,000 ~4 months	3-6 months	8 months
2	Hydroelectric Power Plant	MEDIUM	$1.8M	38 Years	1 Year	$980K over the life	275 kW	0.11%	N/A	N/A	N/A	• FERC Licensing	Required	Utility PEA, $6,000, 90 days	Possibly Location and Extent Review $10,000 <4 months	3-6 months	22 months
3	Fiber Optic System	HIGH	$9.1M	N/A	N/A	N/A	N/A	N/A	Approximately 29 miles of fiber	N/A	Unknown	• Utility easements will need to be acquired	Possibly	Unknown	No	3-6 months	33 months
4	New Boedecker Substation	MEDIUM	$4.2M	N/A	N/A	N/A	N/A	N/A	4 to 5 acres	29.75 acres	N/A	• Land will need to be annexed (6-8 month timeline)	None	Utility PEA, $8,000, 90 days	Applicability TBD If required $10,000 ~4 months	TBD	26 months
5	Improving the West Substation	HIGH	$1.8 to $6.9M	N/A	N/A	N/A	N/A	N/A	Unknown	Unknown	Unknown	• West Substation site already owned by electric utility • Additional land needed if site is to be expanded	Required	CATEX XVI, $5,000, 30 days	No	3-6 months	7 months

* **Estimated costs do not includes additional land and environmental costs.**

Project Options Evaluation for FEMA Alternate Project

TIMELINE



Updated: 12/31/2014

Attachment G

ACRONYMS **WOUS** = Water of the US **LC** = Larimer County **NEPA** = National Environmental Policy Act **SHPO** = State Historic Preservation Office **PEA** = Programmatic Environmental Assessment **CATEX** = Categorical Exclusion	Wetlands and WOUS	404 Permitting	MBTA Compliance	Endangered Species Habitat	Cultural Resources	NEPA/SHPO	1041 Permit	Estimated Cost and Timeline plus buffer
Value Plastics ✓Acquire Land ✓Install Solar (aspects may be within both incorporated and unincorporated LC)	No wetlands No WOUS	No	Compliance w/ PEA No BGE likely	No Habitat Preble's Mouse No Habitat Ute Ladies' Tresses No Habitat Colorado Butterfly Plant	Part of NEPA process	Utility PEA $8,000 90 days	Applicability TBD If required $10,000 ~4 months	$18-20K 3-6 months
I-25 and Hwy 402 ✓Install Solar (aspects may be within both incorporated and unincorporated LC)	No wetlands No WOUS	No	Compliance w/ PEA No BGE likely	Low potential Habitat Preble's Mouse No Habitat Ute Ladies' Tresses No Habitat Colorado Butterfly Plant	Part of NEPA process	Utility PEA $8,000 90 days	Applicability TBD If required $10,000 ~4 months	$18-20K 3-6 months
Airport ✓Install Solar (Would be within incorporated LC)	No wetlands No WOUS	No	Compliance w/ PEA No BGE likely	No Habitat Preble's Mouse No Habitat Ute Ladies' Tresses No Habitat Colorado Butterfly Plant	Part of NEPA process	Utility PEA $8,000 90 days	No	$18-20K 3-6 months
Boedecker 1. Install Solar 2. Build Substation (currently site is within unincorporated LC)	(1 & 2) No wetlands No WOUS	(1 & 2) No	(1 & 2) Compliance w/ PEA No BGE likely	(1 & 2) No Habitat Preble's Mouse No Habitat Ute Ladies' Tresses No Habitat Colorado Butterfly Plant	(1 & 2) Part of NEPA process	(1) Utility PEA $8,000 90 days (2) - TBD	(1 & 2) Applicability TBD If required $10,000 ~4 months	(1) $18-20K 3-6 months (2) - TBD
West Substation ✓Flood Resiliency Improvements ✓Conduit	Wetlands (base of slope) WOUS (ditch)	Yes 75 days $3,000	Compliance w/ CATEX No BGE likely	Low potential Habitat Preble's Mouse Low Habitat Ute Ladies' Tresses Low Habitat Colorado Butterfly Plant	Part of NEPA process	CATEX XVI $5,000 30 days	No	$8-10K 3-6 months
Water Treatment Plant ✓In-line Turbine	No wetlands WOUS (small stream)	Yes 75 days $3,000	Compliance w/ PEA and BGE verification	Low potential Habitat Preble's Mouse Low Habitat Ute Ladies' Tresses Low Habitat Colorado Butterfly Plant	Part of NEPA process	Utility PEA $6,000 90 days	Possibly Location and Extent Review <$10,000 <4 months	$19-21K 3-6 months
Fiber Optic ✓Assume < 5 miles	Wetlands within vicinity	Possibly 75 days $3,000 ea	Compliance w/ PEA and BGE verification	Possible Habitat Preble's Mouse Possible Habitat Ute Ladies' Tresses Possible Habitat Colorado Butterfly Plant	Part of NEPA process	CATEX IX, XVI $8,000 ea 30 days	No	$21-23K 3-6 months

Updated: 12/23/2014

Water and Power FEMA Alternate Project

LOVELAND CITY COUNCIL

JANUARY 6, 2015

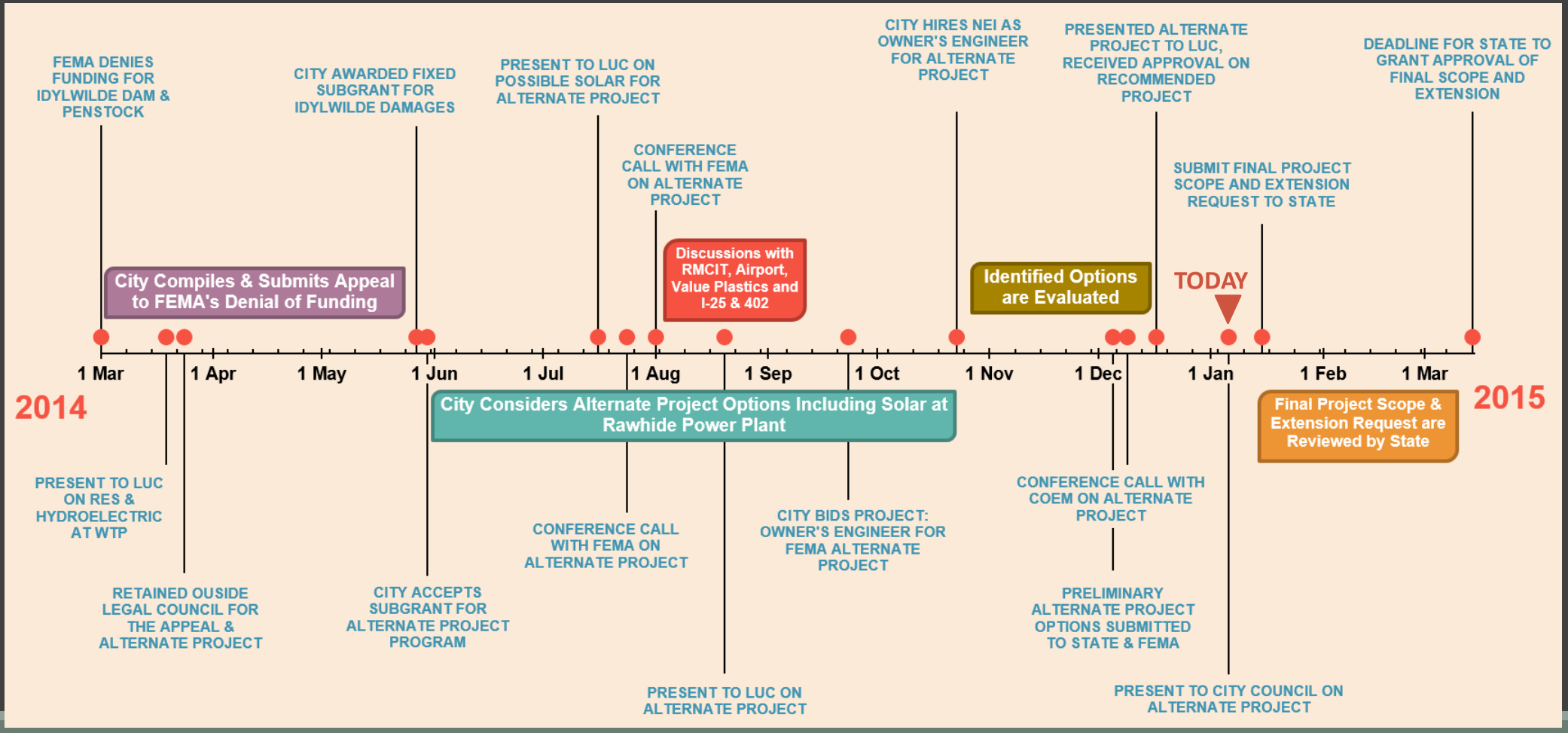
Agenda & Presenters

Description	Presenter, Title, Organization
Background	**Gretchen Stanford**, Customer Relations Manager
Requirements and Timeline	**Julie Rosen**, Outside Legal Counsel, Ryley Carlock & Applewhite (RCA)
Financial Impacts	**Gretchen Stanford**, Customer Relations Manager
Staff Recommendation	**Brieana Reed-Harmel**, Senior Electrical Engineer
Substation Benefits	**Brieana Reed-Harmel**, Senior Electrical Engineer
Solar Benefits	**Gretchen Stanford**, Customer Relations Manager
Project Information	**Brieana Reed-Harmel**, Senior Electrical Engineer
Questions	**Brieana Reed-Harmel**, Senior Electrical Engineer **Gretchen Stanford,** Customer Relations Manager

Project Background

September 2013	• Flood damages Idylwilde's dam, penstock and power plant
October - December 2013	• The City removes the dam and penstock
March 2014	• FEMA denies funding
May 2014	• The City appeals FEMA's denial and is awarded a $9.1M subgrant for an Alternate Project

Project Planning Timeline



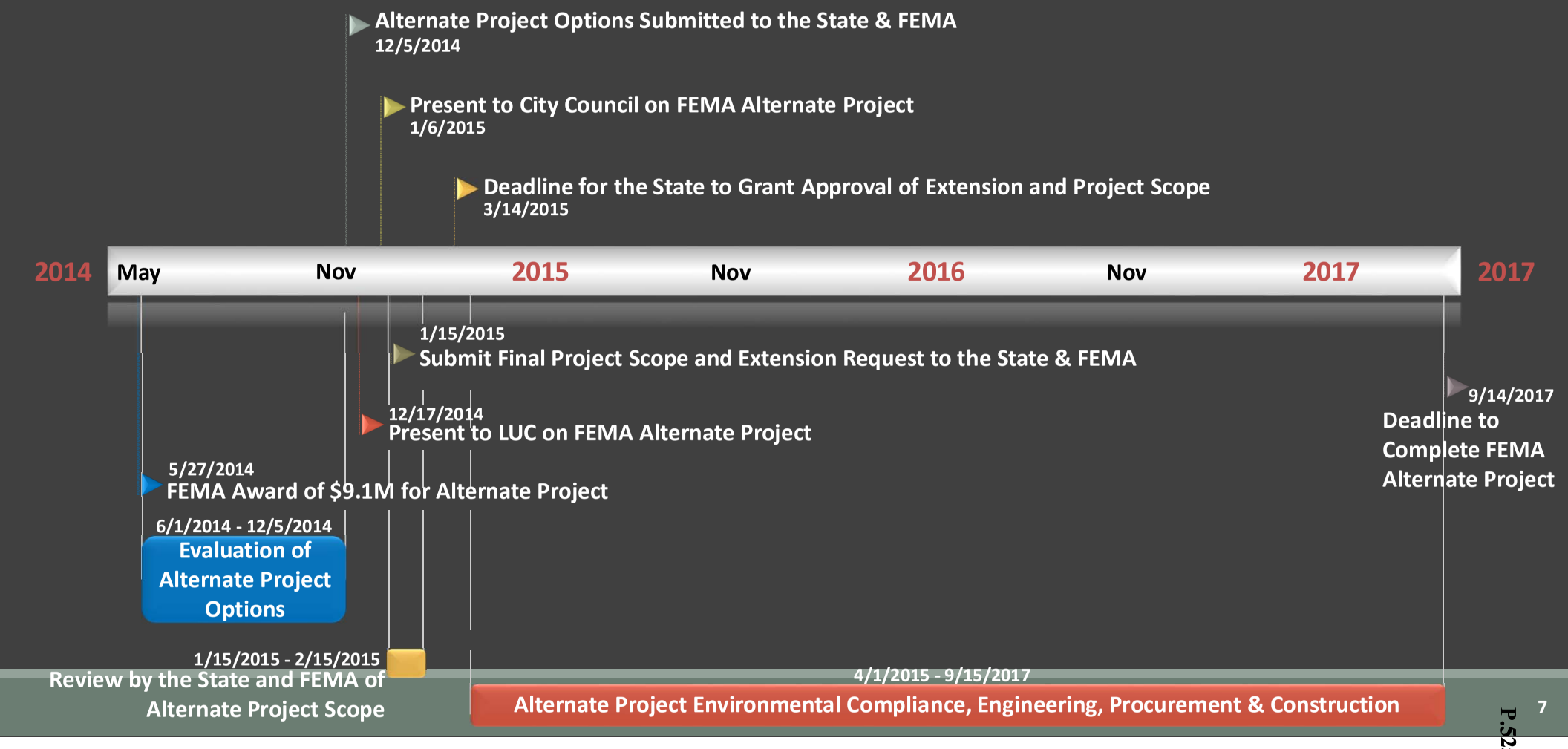
Alternate Project Program

- FEMA funds awarded on costs to repair eligible components of the dam and penstock
- Rebuilding the original facility is NOT in the best interest of the public
- Used on more than one eligible project
- FEMA requirements

Alternate Project Requirements

- Must be pre-approved by the Colorado Office of Emergency Management (COEM) and FEMA
- Must be located in the declared disaster area
- Must be owned by the City and the City must maintain legal responsibility
- Must follow Federal Acquisition Regulations (FARS) for procurement and construction
- Must comply with Environmental and Historic Preservation requirements
- Must be permanent and benefit the general public
- Must be completed in the established time frames
- Funding cannot be used to provide ongoing Operations & Maintenance or leasing costs

Alternate Project Timeline



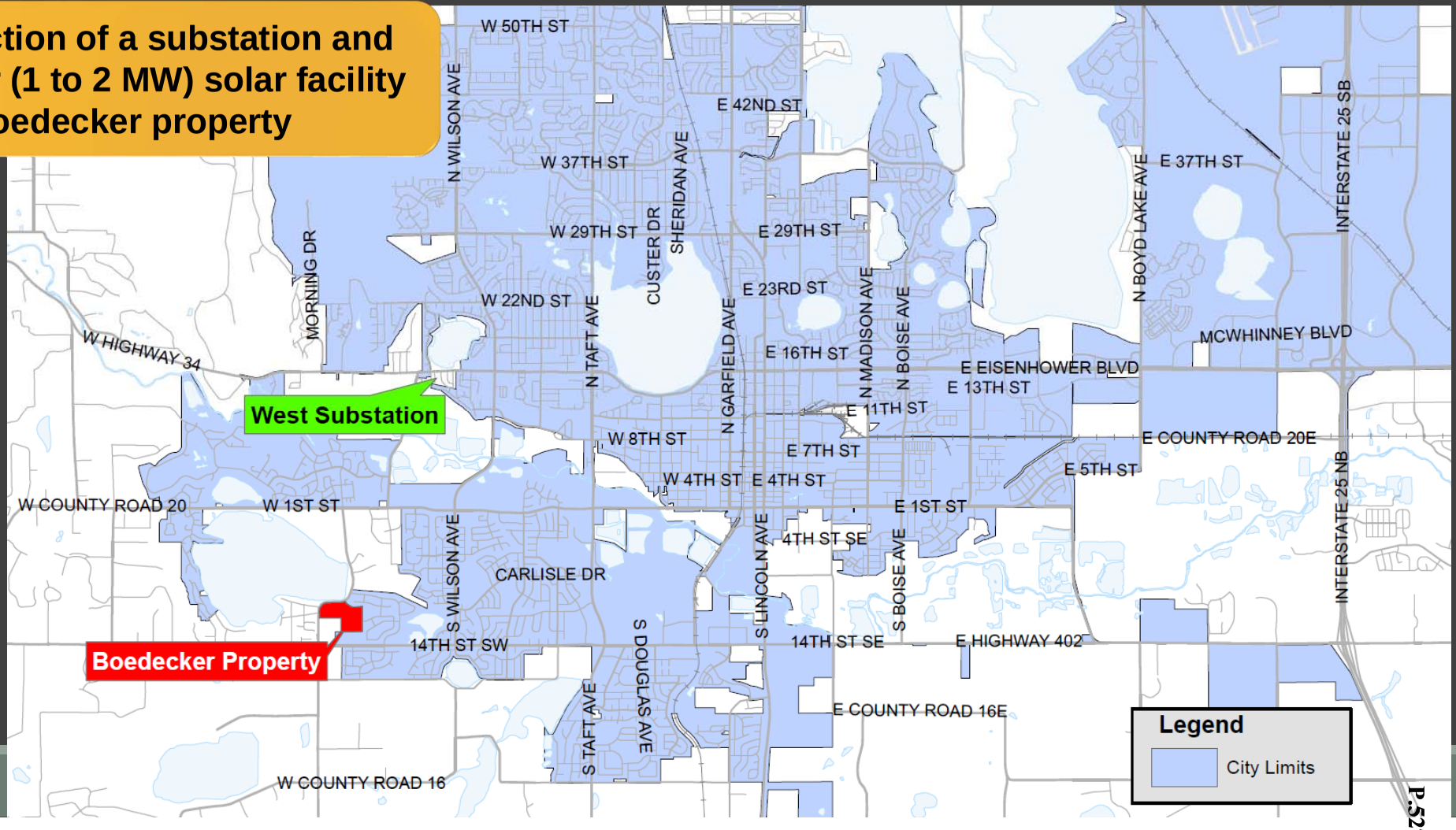
Financial Impacts

- Will receive 87.5% of subgrant - $7.93M total
- Required to pay expenses up front
- State reimburses as invoices are submitted, evaluated and approved
- Front-loaded costs are intended to be paid from the following funds:

Fund	Amount Needed for Alternate Project
Power Plant Investment Fee (PIF)	$3.0 Million
Power General Fund	$6.07 Million
Total =	**$9.07Million**

Staff Recommendation

Construction of a substation and a smaller (1 to 2 MW) solar facility on the Boedecker property



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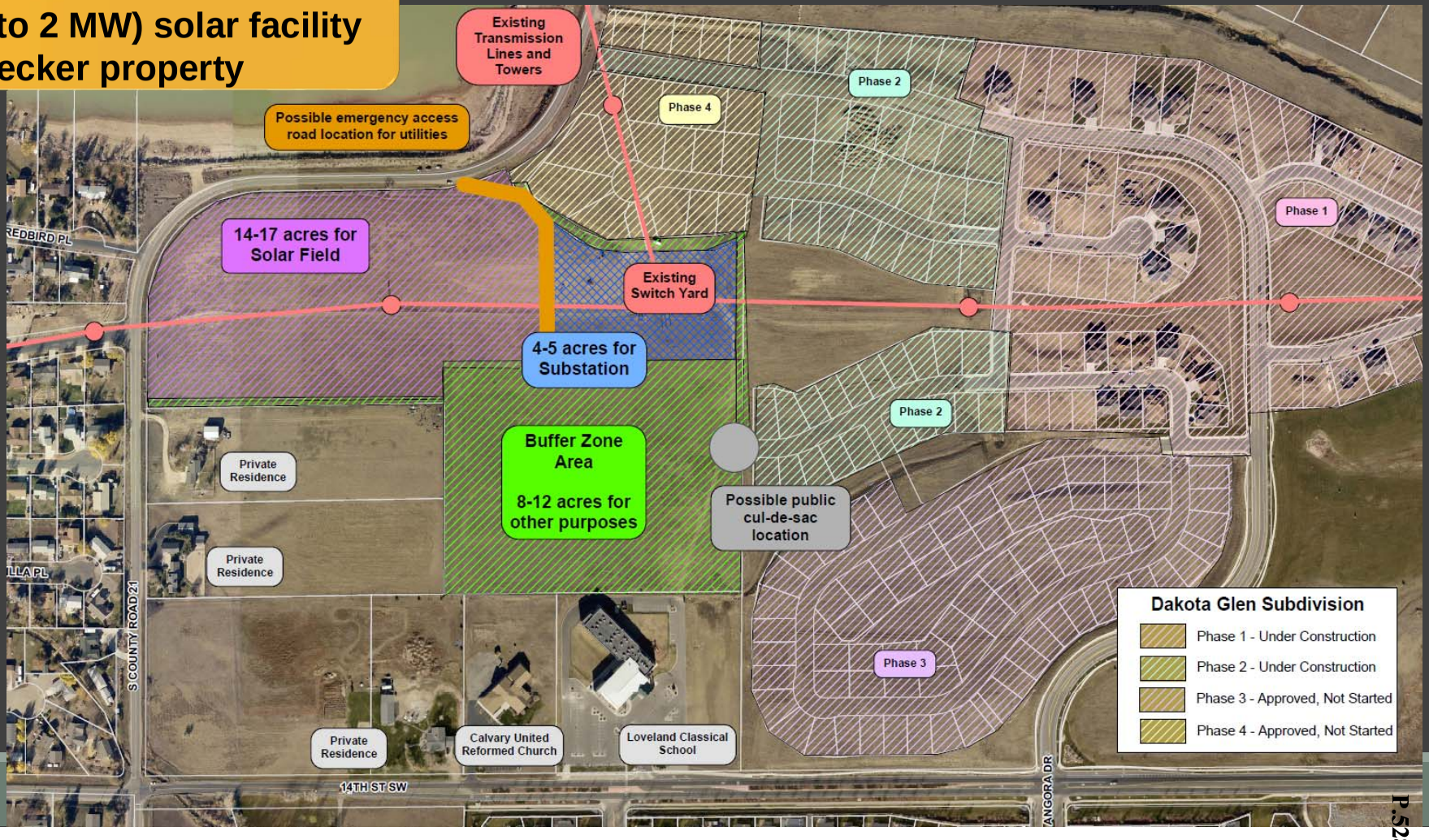


Substation Benefits

- Utility owns the property
- Reduces West Substation vulnerability
- Site identified in long term utility plan
- Near existing transmission lines
- Accommodates load growth
- Benefits entire City

P.529

Solar Benefits

Colorado Renewable Energy Standard (RES):

- Municipal utilities with 40,000+ customers
- Requires 10% of renewables in energy mix by 2020

Loveland's %	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Renewables mix for RES	8.19%	8.01%	7.84%	7.68%	7.52%	7.36%	7.21%	7.07%	6.94%	6.80%

Added Renewable % with Solar Project	
Smaller Boedecker Solar	Average
	0.38%

Customer Feedback:

Utility Survey:
Completed May 2014

- 1,526 residential
- 146 commercial

Residential Key Findings:

58% agree with ↓ Green House Gas emissions

75% agree with ↑ renewable energy sources

Commercial Key Findings:

44% agree with ↓ Green House Gas emissions

51% agree with ↑ renewable energy sources

Dixon Creek Substation
Fort Collins, CO
Owned by Fort Collins Utilities and PRPA

Hangar Solar Field
Brighton, CO
Owned by United Power
2MW Solar Field

Project Information

Project Considerations

- Estimated Costs – Solar = $4.3M; Substation = $3.6M
- Adjacent to residential areas, school and church
- Installation of distribution feeders at utility's expense
- Recommended project approved by LUC December 17, 2014

Environmental for Solar

- Utility Programmatic Environmental Assessment (PEA)
- Total Cost - $18K to $20K

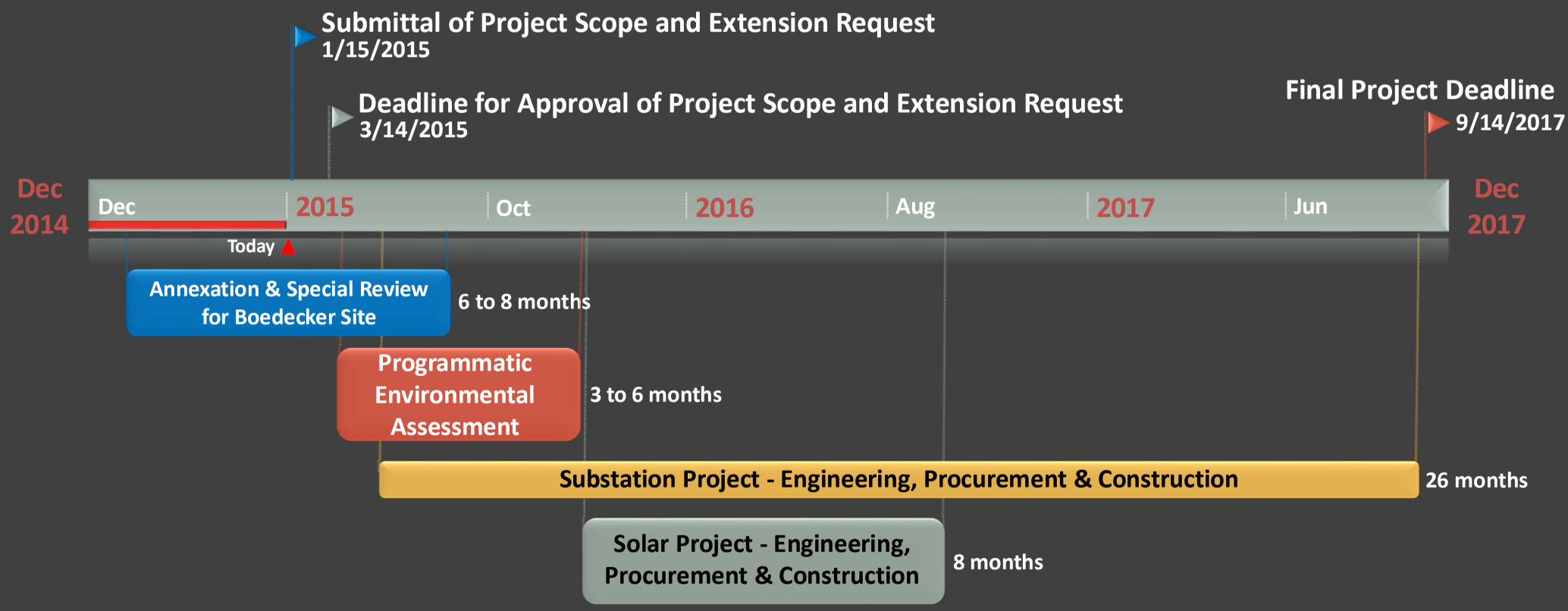
Environmental for Substation

- TBD if PEA applies from FEMA
- Total Cost – Depending on PEA and 1041 permit

Current Planning

- Special review process in conjunction with annexation process
- Mitigate property owner concerns
- Zone as Developing Resource

Proposed Project Timeline



Questions?