# Water and Power FEMA Alternate Project

LOVELAND UTILITIES COMMISSION

DECEMBER 17, 2014

## Agenda & Presenters

| Item # | Description | Presenter, Title, Organization |
|---|---|---|
| 1. | **Background** | **Brieana Reed-Harmel**, Senior Electrical Engineer |
| 2. | **Requirements and Timeline** | **Julie Rosen**, Outside Legal Counsel, Ryley Carlock & Applewhite (RCA) |
| 3. | **Evaluation** | **Keith Malmedal**, President, NEI |
| 4. | **Environmental** | **Tracy Turner-Naranjo**, Environmental Compliance Administrator, City of Loveland Risk Management |
| 5. | **Electric Utility Benefits** | **Brieana Reed-Harmel**, Senior Electrical Engineer |
| 6. | **Green Benefits** | **Gretchen Stanford**, Customer Relations Manager |
| 7. | **Financial Impacts** | **Darcy Hodge**, Utility Financial/Rate Analyst |
| 8. | **Submittal to FEMA and Response** | **Brieana Reed-Harmel**, Senior Electrical Engineer |
| 9. | **Other Considerations** | **Bob Miller**, Power Operations Manager |
| 10. | **Comments** | **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 |

# Idylwilde Hydroelectric Damages

**FEMA Reimbursable Projects**

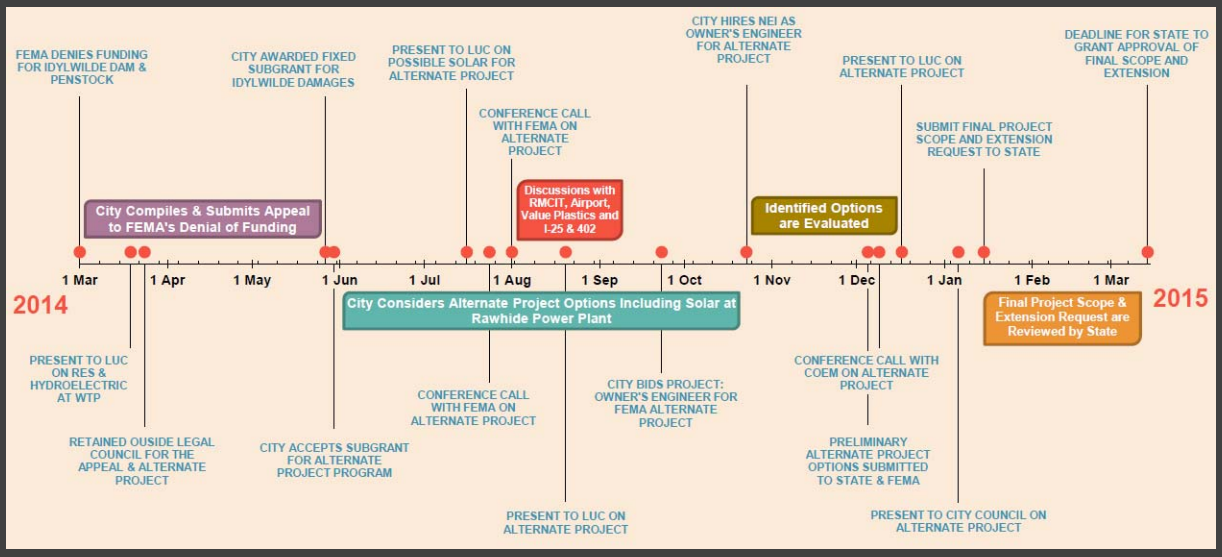
**Dam**

**Penstock**

**CIRSA Reimbursable Project**

**Power Plant**

# Project Options Evaluation Timeline



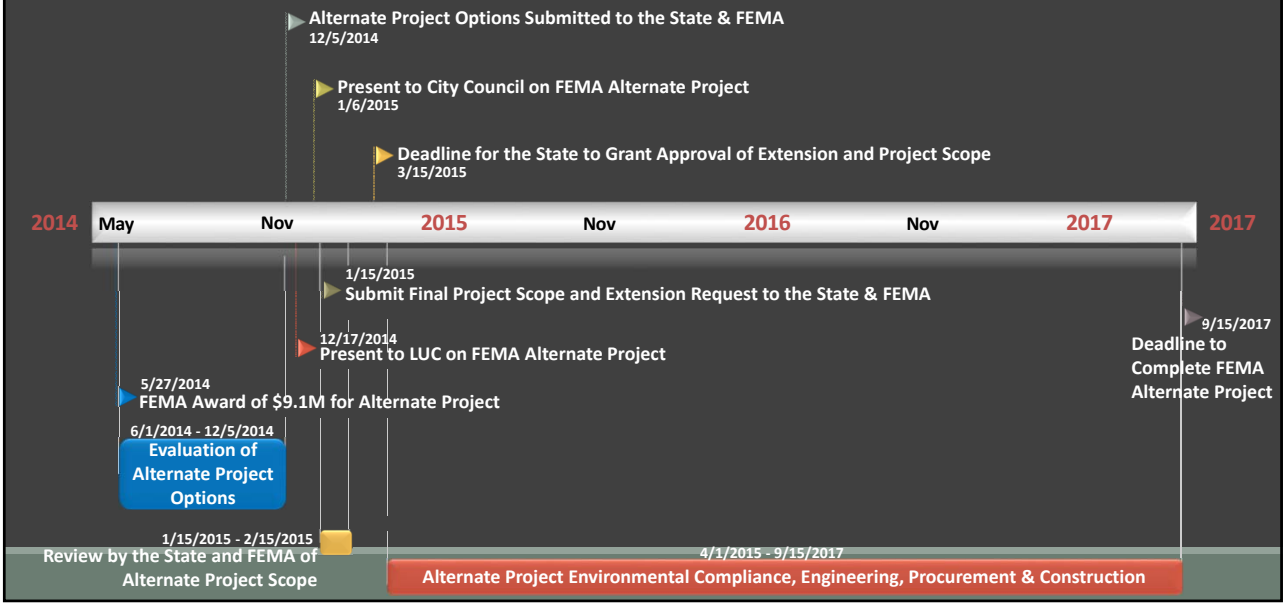

# Alternate Project Program

- ✓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
- ✓Must meet specific FEMA requirements

# Alternate Project Requirements

- ✓Must be pre-approved by 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 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 O&M or leasing costs

# Alternate Project Timeline



# Evaluated Alternate Projects Options

| Option # | Project Description | Project Location |
|---|---|---|
| 1A<br>1B<br>1C<br>1D<br>1E | Building a Solar Photovoltaic Power Plant | • Value Plastics, 805 W. 71st St.<br>• I-25 and Hwy 402<br>• Loveland/Fort Collins Airport<br>• Larger Solar, Boedecker Property<br>• Smaller Solar, Boedecker Property |
| 2 | Building a Hydroelectric Power Plant at the Loveland Water Treatment Plant | Water Treatment Plant |
| 3 | Improving the City's Fiber Optic Network | City-wide |
| 4 | Build a New Substation on the Boedecker Property | County Rd 21, West Loveland |
| 5 | Improve the West Substation Site to Resist Future Flooding | Hwy 34 and Namaqua Rd. |

# 1A Solar at Value Plastics Site

**Land** — Approximately 50 acres available
27 acres needed

**Cost** — $9.1 million for PV array and interconnection costs

**Generation** — 3.1 to 3.5 MW output

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

**Timeline** — Approximately 12 months for engineering, procurement and construction

**Financial Impact** — Payback Period Total Cost (Years) – 30 to 36 Years
Payback Period Loveland Cost (Years) – 2 years
Equivalent Cost of Generation - $0.082 - $0.088

**All figures are estimates*

## 1B Solar at I-25 & Hwy 402 Site

| | |
|---|---|
| **Land** | Approximately 37 acres available<br>22 acres needed |
| **Cost** | $9.1 million for PV array and interconnection costs |
| **Generation** | 2.5 to 2.9 MW output |
| **Timeline** | Approximately 20 months for engineering, procurement and construction |
| **Financial Impact** | Payback Period Total Cost (Years) – 38 to 47 Years<br>Payback Period Loveland Cost (Years) – 7 to 9 years<br>Equivalent Cost of Generation - $0.104 - $0.112 |

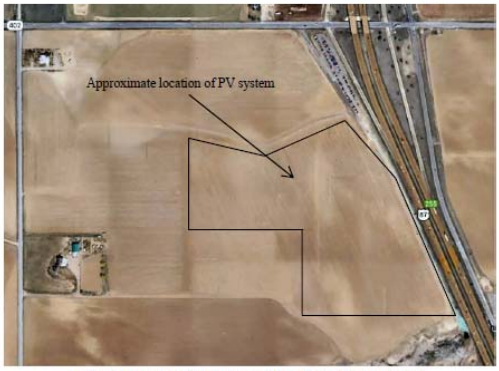


Figure 3: I-25 and Hwy 402 PV Solar Project Site.

**All figures are estimates*

## 1C Solar at Airport Site

| | |
|---|---|
| **Land** | Approximately 41-59 acres available<br>27 acres needed |
| **Cost** | $9.1 Million for PV array and interconnection costs |
| **Generation** | 3.1 to 3.6 MW output potential |
| **Timeline** | Approximately 12 months for engineering, procurement and construction |
| **Financial Impact** | Payback Period Total Cost (Years) – 48 to 61 Years<br>Payback Period Loveland Cost (Years) – 1 to 14 years<br>Equivalent Cost of Generation - $0.111 - $0.121 |

Figure 5: Airport Solar Project site.

**All figures are estimates*

## 1D Larger Solar at Boedecker Site

| | |
|---|---|
| **Land** | Approximately 25 acres available<br>25 acres needed |
| **Cost** | $8.5 - $8.9 million for PV array and interconnection costs |
| **Generation** | 2.8 to 3.3 MW output potential |
| **Timeline** | Approximately 13 months for engineering, procurement and construction |
| **Financial Impact** | Payback Period Total Cost (Years) – 30 to 36 Years<br>Payback Period Loveland Cost (Years) – 2 years<br>Equivalent Cost of Generation - $0.082 - $0.088 |

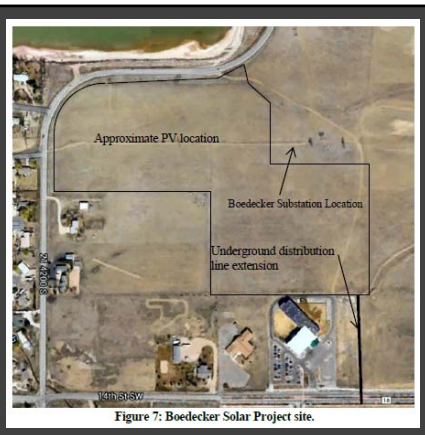


Figure 7: Boedecker Solar Project site.

**All figures are estimates*

## 1E Smaller Solar at Boedecker Site

| | |
|---|---|
| **Land** | Approximately 25 acres available<br>14 acres needed |
| **Cost** | $4.6 million for the PV array and interconnection costs |
| **Generation** | 1.9 to 2.2 MW output |
| **Timeline** | Approximately 8 months for engineering, procurement and construction |
| **Financial Impact** | Payback Period Total Cost (Years) – 29 to 35 Years<br>Payback Period Loveland Cost (Years) – 2 years<br>Equivalent Cost of Generation - $0.080 - $0.085 |

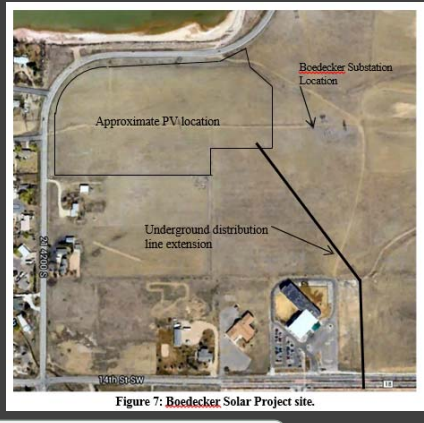


Figure 7: Boedecker Solar Project site.

**All figures are estimates*

## 2 Hydroelectric Power Plant

| | |
|---|---|
| **Land** | No land needed |
| **Cost** | $1.8 Million for generating plant and interconnection costs |
| **Generation** | 275 kW output potential |
| **Timeline** | Approximately 22 months for engineering, procurement and construction |
| **Financial Impact** | Payback Period Total Cost (Years) – 38 Years<br>Payback Period Loveland Cost (Years) – 1 year<br>Equivalent Cost of Generation - $0.111 |

Figure 8: Proposed hydroelectric power plant location.

**All figures are estimates*

## Comparison of Generating Project Options

| Site | Generation System Type | Array Size (kW) | Electrical Energy Annually Generated (MWh) | Equivalent Cost of Generation Cents/kWh | Payback Period Total Cost (years) | Payback Period Loveland Cost (years) |
|---|---|---|---|---|---|---|
| Value Plastics Solar Project | Solar: 1-Axis | 3,060.34 | 6,975.75 | $0.082 | 30 | 2 |
| I-25 and Hwy 402 Solar Project | Solar: 1-Axis | 2,517.24 | 5,737.80 | $0.104 | 38 | 7 |
| Airport Solar Project | Solar: 1-Axis | 3,120.69 | 7,113.30 | $0.111 | 48 | 1 |
| Larger Boedecker Solar Project | Solar: 1-Axis | 2,873.56 | 6,550.00 | $0.082 | 30 | 2 |
| Boedecker Solar Project | 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 |

**The output of the Idylwilde facility was 900 kW*

# 3 Fiber Optic System

**Support future electric utility need**

- Connectivity through PRPA for substation, no pay back

**Support present needs of various city departments**

- Several smaller projects identified to create system redundancy

**Support City as a retail broadband internet provider**

- Ensure this option meets state law

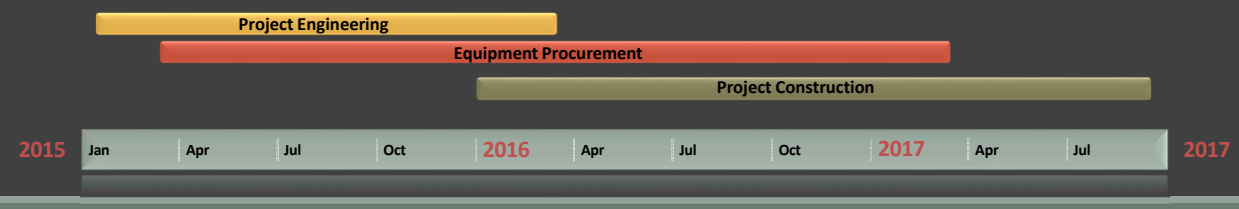
**Support use by a commercial communication or internet provider**

- Sell the fiber network to a communications company and leasing the utility's infrastructure

# 3 Fiber Optic System

| 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** |

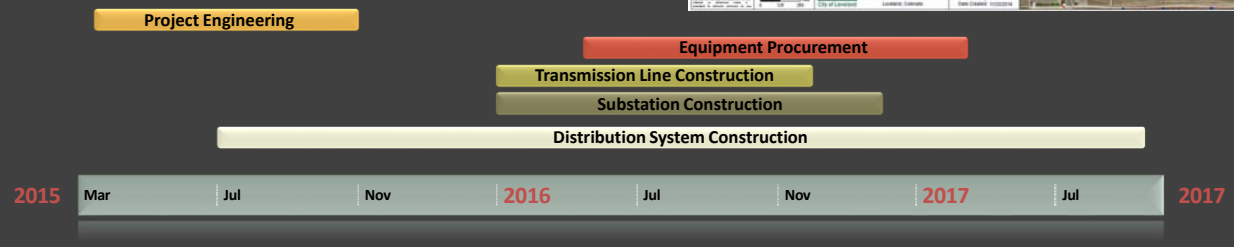
| Cost Item | Estimated Cost |
|---|---|
| Central office and equipment | $1,100,000.00 |
| Fiber trunk line to one substation | $350,000.00 |
| Fiber lines to customer and end use equipment—4,500 customers | $7,650,000.00 |
| **Total Estimated Cost** | **$9,100,000.00** |




**All figures are estimates*

# 4 New Boedecker Substation

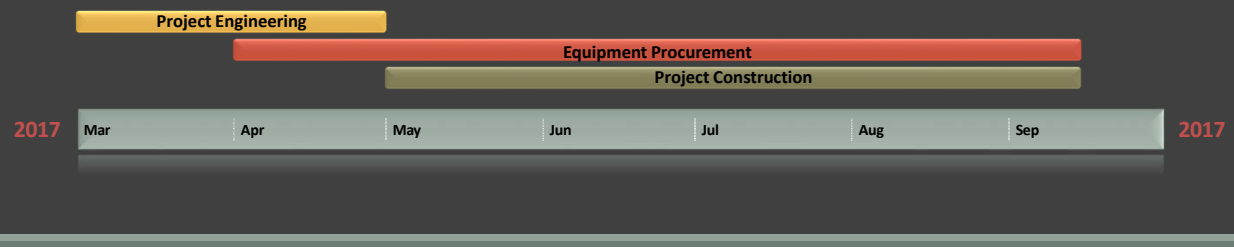
| Cost Item | Estimated Cost |
|---|---|
| Substation Construction | $4,200,000.00 |
| **Total Estimated Cost** | **$4,200,000.00** |


**All figures are estimates*

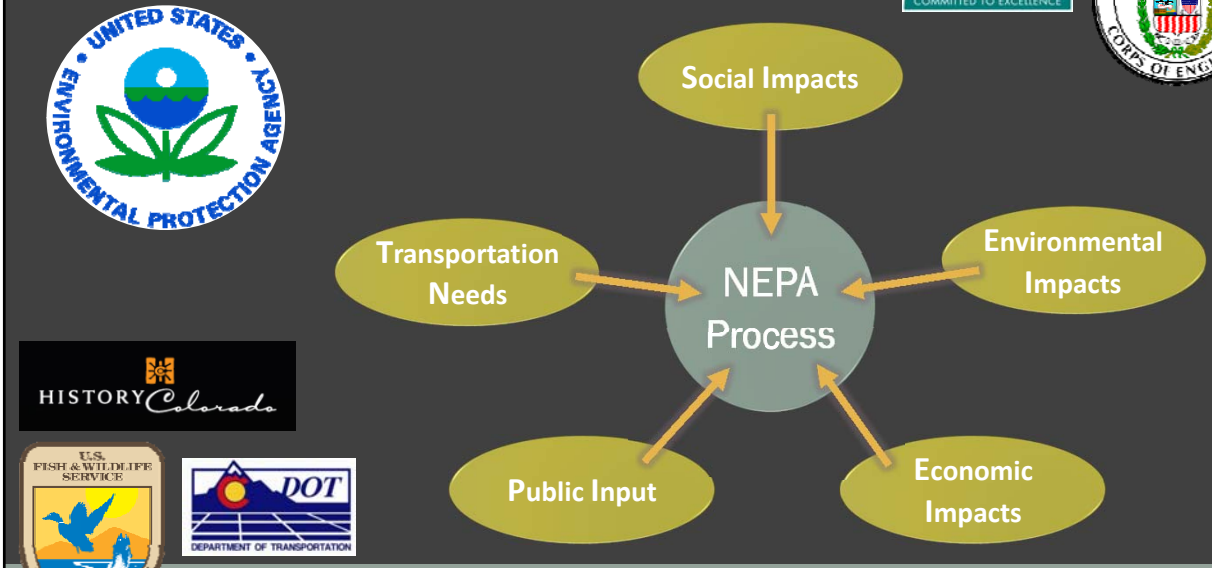
# 5 Improving the West Substation

| 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** |




**All figures are estimates*

# Environmental Requirements




# Environmental Requirements

| | Solar Project Options | Environmental Requirements |
|---|---|---|
| 1A | Solar at Value Plastics | **NEPA:** Utility PEA ($8K); **County 1041 Permit:** Possible ($10K); **3-6 months** |
| 1B | Solar at I-25 & Hwy 402 | **NEPA:** Utility PEA ($8K); **County 1041 Permit:** Possible ($10K); **3-6 months** |
| 1C | Solar at Loveland/Fort Collins Airport | **NEPA:** Utility PEA ($8K); **County 1041 Permit:** Possible ($10K); **3-6 months** |
| 1D | Larger Solar on Bodecker Property | **NEPA:** Utility PEA ($8K); **County 1041 Permit:** Possible ($10K); **3-6 months** |
| 1E | Smaller Solar on Bodecker Property | **NEPA:** Utility PEA ($8K); **County 1041 Permit:** Possible ($10K); **3-6 months** |
| 2 | Hydroelectric Power Plant at Water Treatment Plant | **NEPA:** Utility PEA ($6K); **County 1041 Permit:** TBD (Possible at $10K); **3-6 months** |
| 3 | Fiber Optic Network | **NEPA:** CATEX IX and XVI ($8K ea.); **County 1041 Permit:** TBD (Possible at $10K); **3-6 months** |
| 4 | Build a New Substation on the Boedecker Property | **NEPA:** Possible Utility PEA ($8K); **County 1041 Permit:** Possible ($10K); **3-6 months** |
| 5 | Improve the West Substation | **NEPA:** CATEX XVI ($5K); **County 1041 Permit:** Not Likely; **3-6 months** |

**PEA** = Programmatic Environmental Assessment
**CATEX** = Categorical Exclusion

## 1A Solar at Value Plastics Site

| Pros | Cons |
|---|---|
| ✓ Renewables for renewables | ✓ Acquire a long-term or permanent easement |
| ✓ Located near existing electrical infrastructure and Horseshoe Substation | ✓ Retention pond causes the site to be partially submerged during heavy rain events |
| | ✓ Development agreement considerations between the Cities of Loveland and Fort Collins |

## 1B Solar at I-25 & Hwy 402 Site

| Pros | Cons |
|---|---|
| ✓ Renewables for renewables | ✓ No existing electrical infrastructure in the area |
| ✓ Future substation to accommodate growth | ✓ The NEPA process could delay the project |
| | ✓ Rezoned and a new Conceptual Master Plan developed |

## 1C Solar at Airport Site

| Pros | Cons |
|---|---|
| ✓ Renewables for renewables | ✓ Land leased due to FAA restrictions |
| ✓ Several solar projects have successfully completed | ✓ FAA guidelines will need to be strictly followed |
| | ✓ Coordination will be required with the City of Fort Collins |

## 1D Large Solar at Boedecker Site

| Pros | Cons |
|---|---|
| ✓ Renewables for renewables | ✓ Annexed into the City |
| ✓ Owned by the Electric utility | ✓ Mitigation may be needed |

## 1E Smaller Solar at Boedecker Site

| Pros | Cons |
|---|---|
| ✓ Renewables for renewables | ✓ Annexed into the City |
| ✓ Owned by the Electric utility | ✓ Mitigation may be needed |
| ✓ Reserves acreage for Parks | |

## 2 Hydroelectric Power Plant

| Pros | Cons |
|---|---|
| ✓ Renewables for renewables | ✓ FERC licensing process |
| | ✓ 275 kW compared to the 900 kW |
| | ✓ Operations and maintenance needed, requiring expertise that staff does not have |
| | ✓ Risk to the City's main water supply |

## 3 Fiber Optic System

| Pros | Cons |
|---|---|
| ✓ Shared long-term benefits | ✓ Obtain easements |
| | ✓ Limit the use of the fiber by the City in the future |
| | ✓ True benefits not realized until further technology is installed |

## 4 New Boedecker Substation

| Pros | Cons |
|---|---|
| ✓ Owned by the electric utility | ✓ Annexed into the City |
| ✓ Leaves additional acreage for other uses | ✓ Mitigation may be needed |
| ✓ Future substation to accommodate growth | |

## 5 Improving the West Substation

| Pros | Cons |
|---|---|
| | ✓ Extensive upgrades are needed |
| | ✓ No room to expand the site |
| | ✓ No guarantee its not affected by flood waters again |

## Green Benefits

- ✓ Marketing opportunities
- ✓ Renewables for a renewables, rates for rates
- ✓ Avoiding mandates
- ✓ Avoided costs from PRPA
- ✓ Avoid Purchase Power Agreement requirements

| Renewable Options | |
|---|---|
| Value Plastics Solar | Average |
| | 0.73% |
| I-25 & Hwy 24 Solar | Average |
| | 0.60% |
| Airport Solar | Average |
| | 0.74% |
| Larger Boedecker Solar | Average |
| | 0.67% |
| Smaller Boedecker Solar | Average |
| | 0.38% |
| Hydroelectric Inline Turbine | Average |
| | 0.11% |

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|
| % renewables for RES | 8.19% | 8.01% | 7.84% | 7.68% | 7.52% | 7.36% | 7.21% | 7.07% | 6.94% | 6.80% |

# PRPA Strategic Vision

**In May 2013 - Community Listening Sessions**
**20 attendees in Loveland**
**Seeking input on PRPA's 2014 Integrated Resource Plan**

## Key Findings:

- Diversify generation resources in order to reduce greenhouse gas (GHG) emissions
- Increase the % of renewable energy resources
- Very supportive of energy efficiency (EE) programs
- General understanding - reducing GHG and increasing renewables will increase cost

## Key Messages:

- Interested in rooftop solar and solar gardens, more wind, no more coal, natural gas is a good complement if methane can be controlled, storage, new technologies, anticipate future regulation on carbon
- Best practices for EE, demand response and distributed generation, increase EE programs, integrate electric vehicles, regulations for new construction
- Reduce GHG 20% below 2005 levels by 2020, some question if that is enough, balance reductions and cost

# 2014 Utility Survey

In May 2014 - 1,526 residential and 146 commercial completed
Seeking input on PRPA's 2014 Integrated Resource Plan

**Residential Key Findings:**

58% agree with ↓ GHG emissions 20% below 2005 levels by 2020

75% agree with ↑ renewable energy sources to 30% by 2020

Pay $10/$20/$30 more per month to meet GHG reduction and renewable goals:

- 16% - $30
- 16% - $20
- 34% - $10
- 35% - $0

**Commercial Key Findings:**

44% agree with ↓ GHG emissions 20% below 2005 levels by 2020

51% agree with ↑ renewable energy sources to 30% by 2020

Pay 20%/15%/10%/4% more to meet GHG reduction and renewable goals:

- 10% - 20%
- 12% - 15%
- 23%– 10%
- 34% - 4%

# Financial Impacts

- 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 | $4.1 Million |
| Loan from Raw Water Fund | $2.0 Million |
| **Total =** | **$9.1 Million** |

# Submitted Project Options

- **Four Preliminary Project Options were Submitted to COEM and FEMA December 5, 2014**

**1.** New Substation on the Boedecker property with a smaller solar facility

**2.** Larger solar facility on the Boedecker property – no substation at this time

**3.** Large solar facility on at Value Plastics site

**4.** Hydroelectric in-line turbine at the Water Treatment Plant

# COEM & FEMA Feedback

- **December 5, 2014** –Project options with questions
- **December 8, 2014** – COEM and FEMA responds
- **December 9, 2014** – City and COEM discuss responses

**Three points reiterated by the COEM for the Alternate Project:**

**The project should provide benefit to the ENTIRE community**

**Federal regulations and procurement guidelines MUST be followed**

**The project must go through the NEPA process**

# Financial Considerations

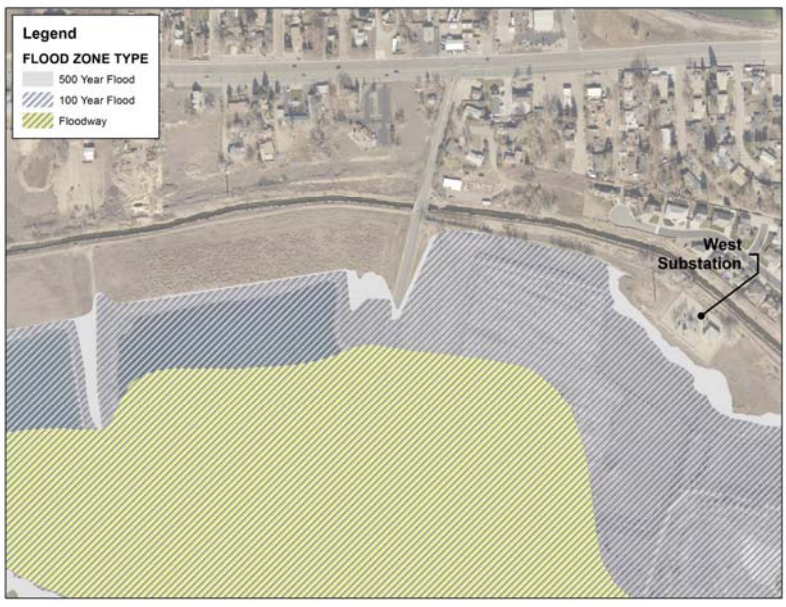
**2014 Cash Reserves (YTD November)**

| | |
|---|---|
| $22,976,450 | = Total Ending Cash Balance |
| − $6,565,845 | = Expected Capital Expenses |
| **$16,410,605** | = Remaining Ending Cash Balance |
| − $8,684,430 | = Required 15% of Operating Expenses |
| **$7,726,175** | = Projected Ending Cash Balance (less required reserve) |

| 10-Year Financial Plan | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |
|---|---|---|---|---|---|---|---|---|---|---|
| Projected Rate Increases | 8.3% | 7.6% | 2.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 2.8% | 2.8% |

# West Substation

- 1 of 7 substations
- Serves **28 MW** of load
- Serves **19%** of peak load
- **40+** years old
- Limited property available for expansion
- Vulnerable to flooding



# Bodecker Substation

- Distribution line extensions from substation
  - To Wilson = approximately 4,000 ft
  - To Namaqua = approximately 12,600 ft

| Estimated Feeder Extension Costs | |
|---|---|
| Substation Cost | $4.2 |
| To Wilson (4 circuits) | $1.6 |
| To Namaqua (2 circuits) | $2.5 |
| **Total** | **$8.3 Million** |

# Solar Considerations

- More flexibility installing solar with our own funds
- Can't install a solar garden with FEMA money (customers purchase panels)
- Our installed solar costs .08 vs. .04 purchasing PRPA's mix of energy
- PRPA installing 30 MW solar at Rawhide
  - Adds approximately 7MW to Loveland's renewables
- Customers support Solar Gardens
  - PVREA 1st site 500 kW
  - 2nd site customers on waiting list

# Recommendations

1. Build Boedecker Substation including distribution tie lines

2. Construct a Solar Garden on Boedecker property
   a. Use our funds
   b. Construct only what customers are willing to pay for.

3. Construct a park on the property

# Other Possible Contingency Projects

**Purchase 10 acres at I-25 and Hwy 402**
- Approximate cost $700,000
- Future substation site
- Possible future solar site

**Extend a distribution line to I-25 and 402**
- Approximate cost $2 million
- Encourages economic development
- In 10 year financial plan
- PVREA currently serves some of our customers

**Improve security of our substations**
- Approximate cost $1 million per station
- Construct block walls
- Install advanced camera systems

# LUC Feedback

1. Provide comments to the Water and Power staff on projects that should be considered and presented to City Council
2. Provide feedback on spreadsheet