

Cogeneration Feasibility Potential Design Review



<http://www.uidaho.edu/~media/Images/orgs/Natural-Resources/Facilities%20and%20Labs/Policy%20Analysis%20Group/steam-plant.ashx>

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Presentation Outline

I. Introduction of Current System

Current System



Front Profile of Existing Boilers

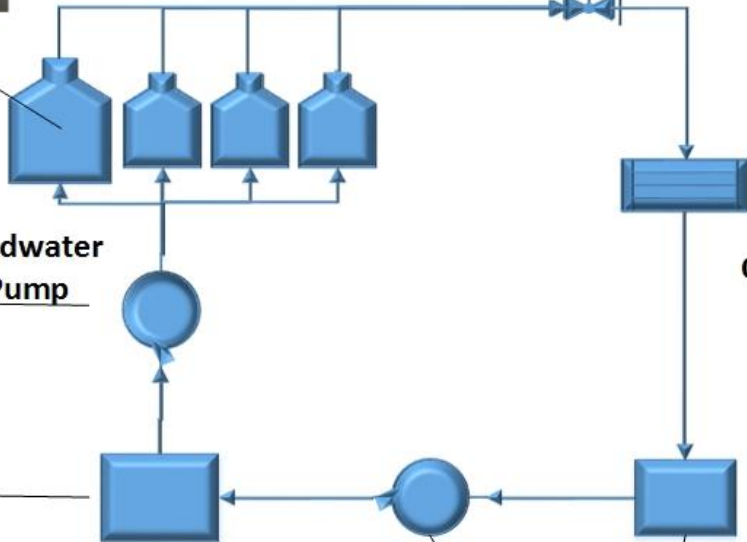
**This block diagram is neglecting the presence of boiler intake air economizer*



Pressure Reducing Valve (PRV)



Feedwater Pump



Condenser (University of Idaho Campus Steam Distribution)



Deaerator Tank



Condensate return tank (right side of image)

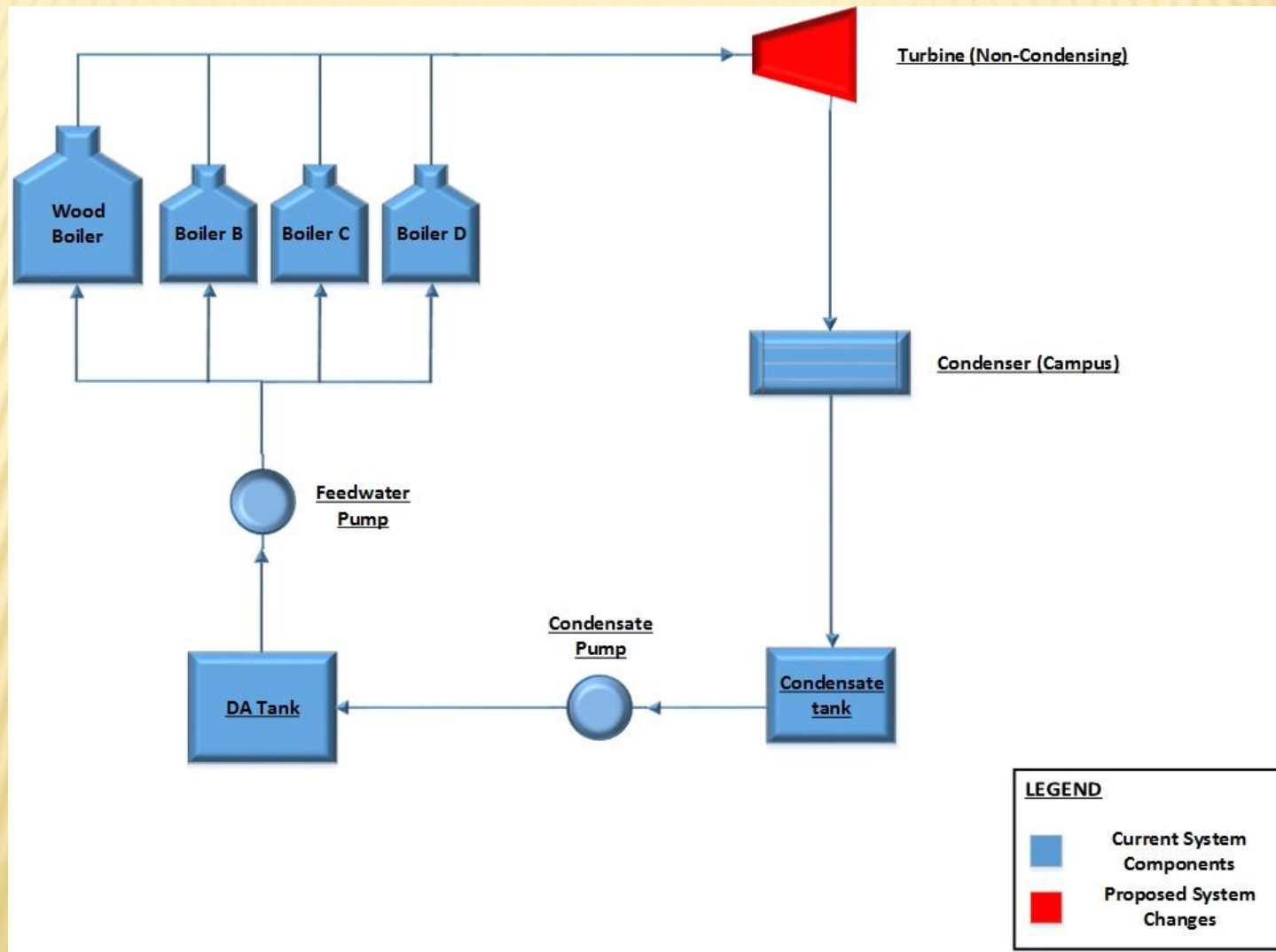
Condensate pump (middle of image)

Presentation Outline

II. Boilers Follow Campus Load—Non-Condensing

1. Simple Turbine Model
2. Two Turbine Model
3. Reheat Turbine Model

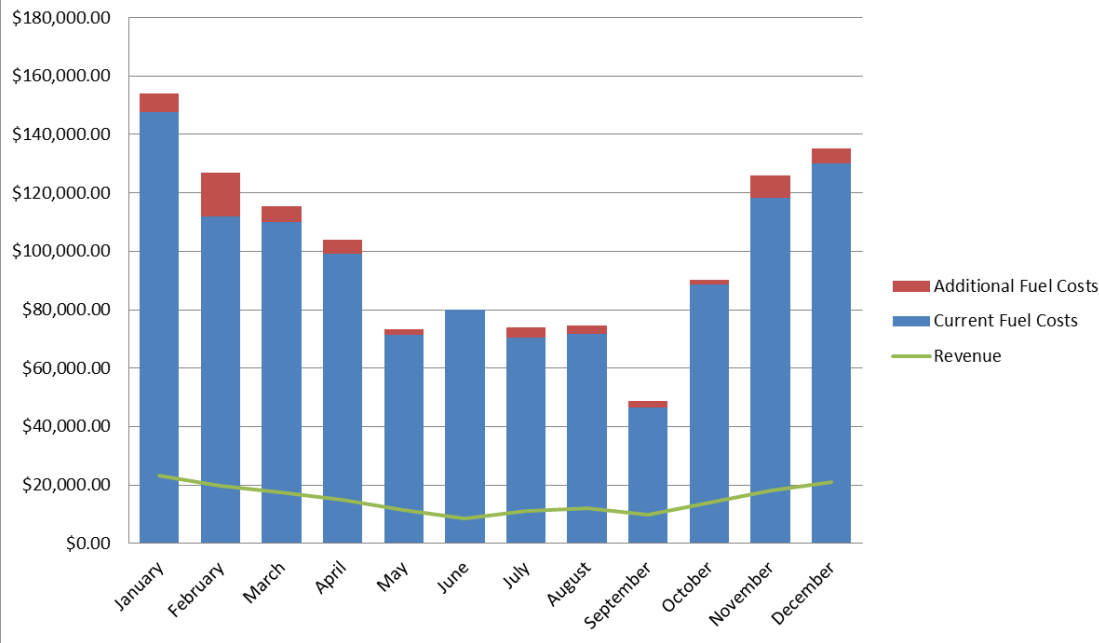
Simple Turbine Model



Simple Turbine Model

- Average generation: 400 kW
- Peak generation: 630 kW
- Annual savings: \$132,000

Simple Turbine Monthly Costs and Revenue



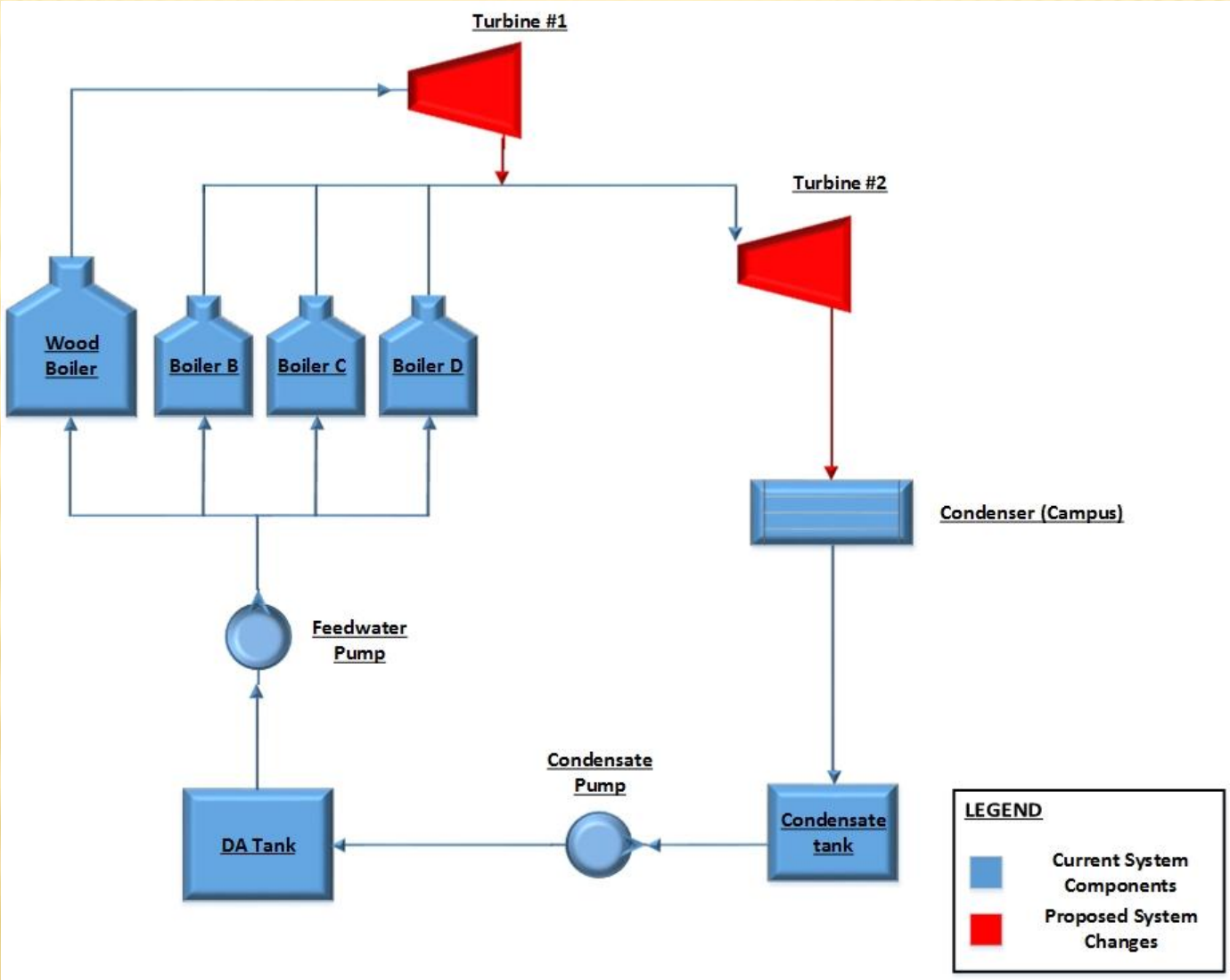
Pros

- Minor system modification
- Similar operation parameters to current system
- Established implementation at University of Montana

Cons

- Low power generation

Two Turbine Model



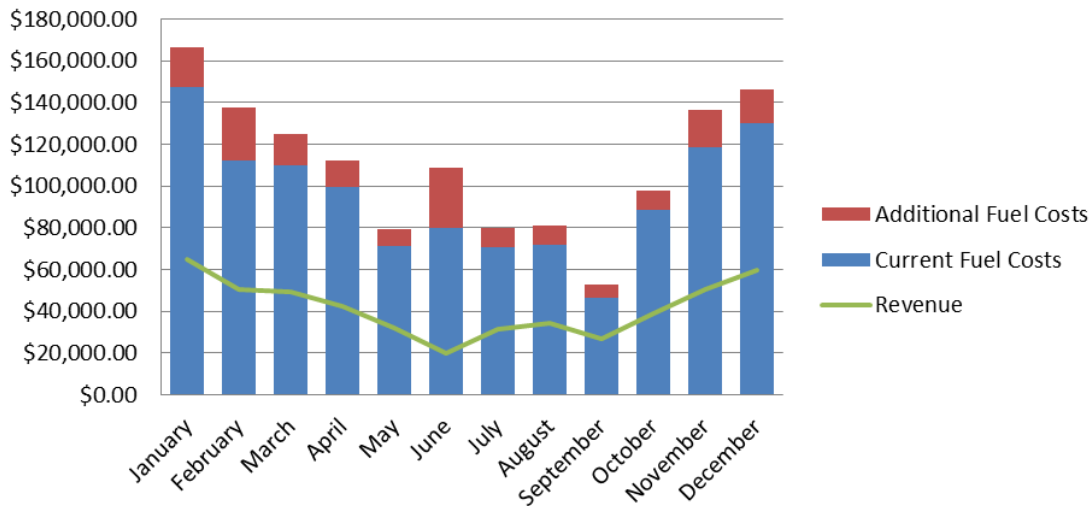
Two Turbine Model

- Average generation: 1100 kW
- Peak generation: 1800 kW
- Annual savings: \$324,000

Pros

- Higher power generation

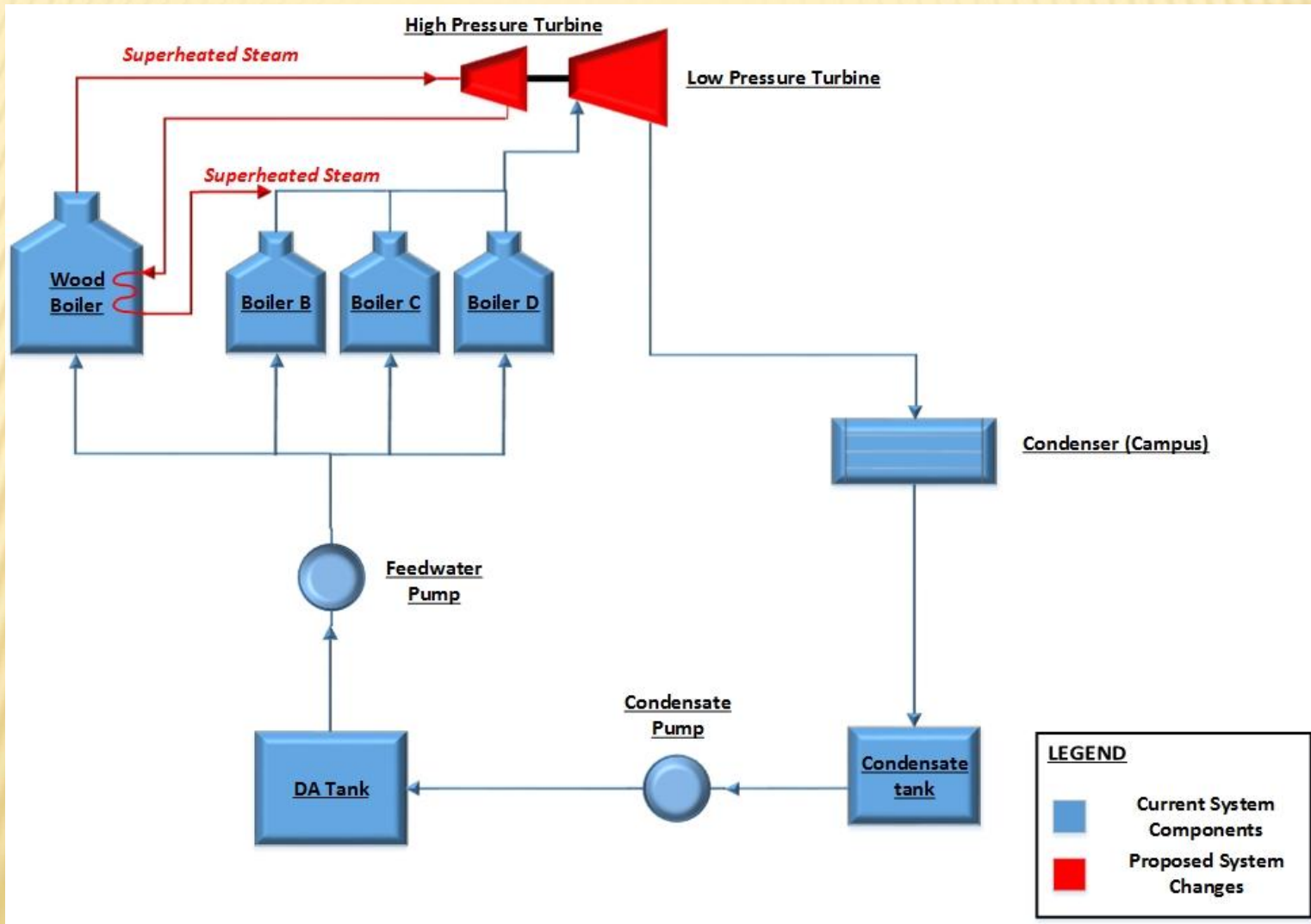
Two Turbine Model Monthly Costs & Revenue



Cons

- Increased costs and complexity
- Alteration of system operating parameters

Two Turbine Reheat Model



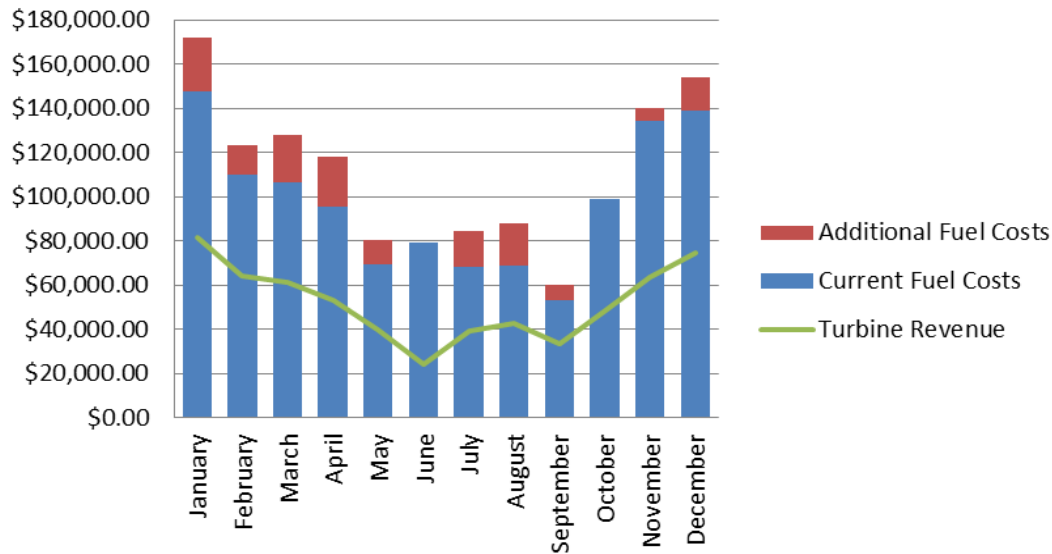
Two Turbine Reheat

- Average generation: 1400 kW
- Peak generation: 2200 kW
- Annual savings: \$475,000

Pros

- Highest non-condensing option power output

Two Turbine Reheat Model Monthly Costs and Revenue



Cons

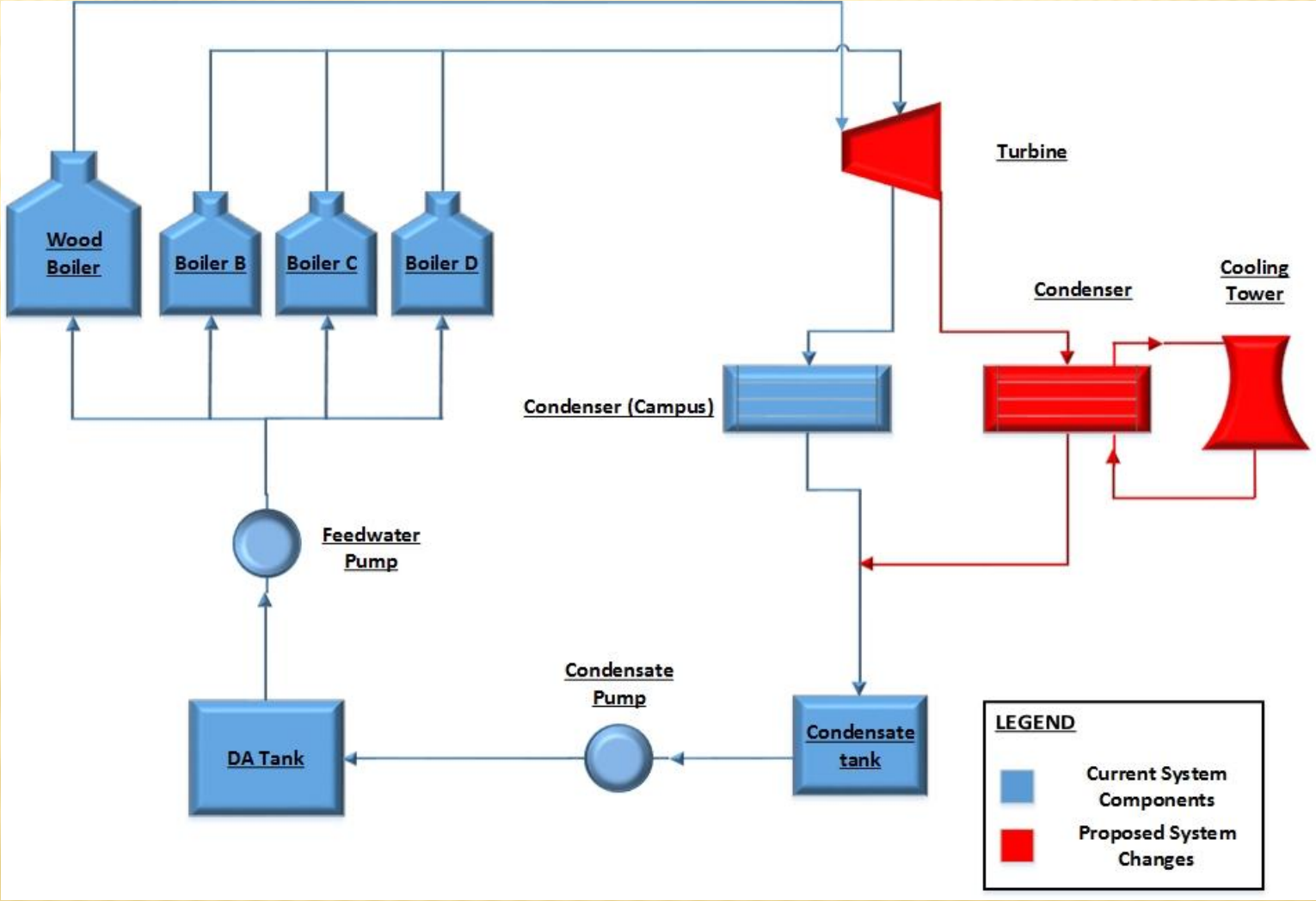
- Major system modification and cost
- Alteration of system operating parameters
- Potentially requires a new boiler

Presentation Outline

III. Boilers At Constant Load—Condensing

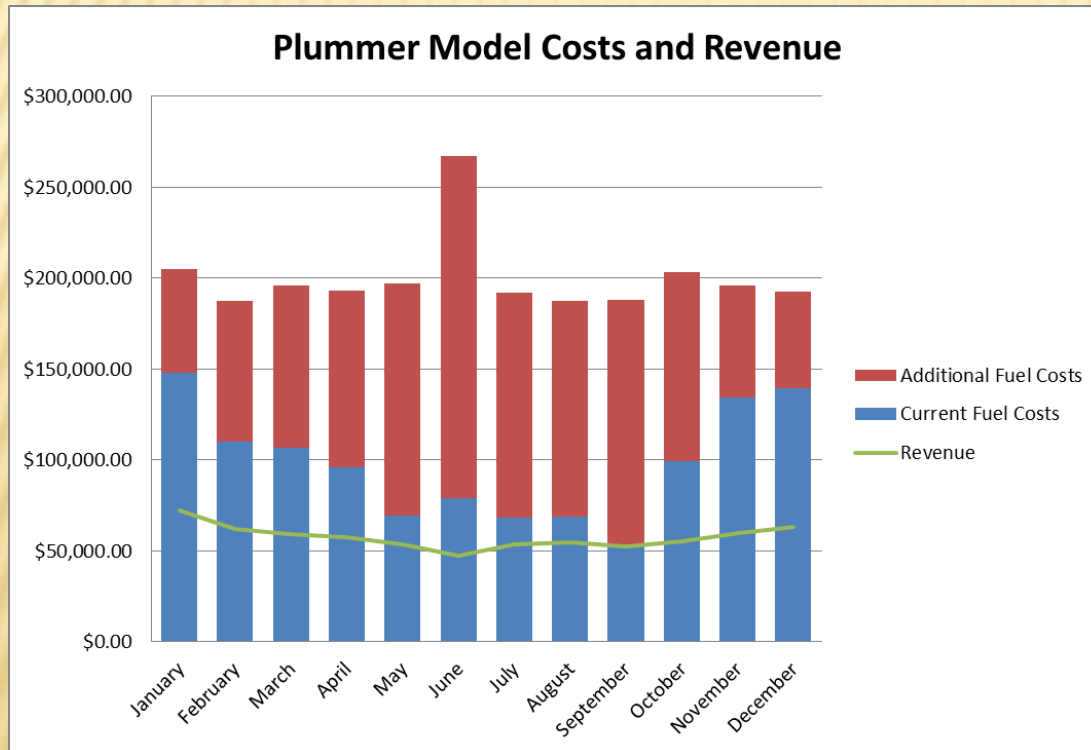
- 1. Plummer Model Non-Superheated**
- 2. Plummer Model Superheated**
- 3. Maximum Generation Model**

Plummer Model Non-Superheated



Plummer Model Non-Superheated

- Average generation: 1700 kW
- Peak generation: 2000 kW
- Annual savings: -\$541,000



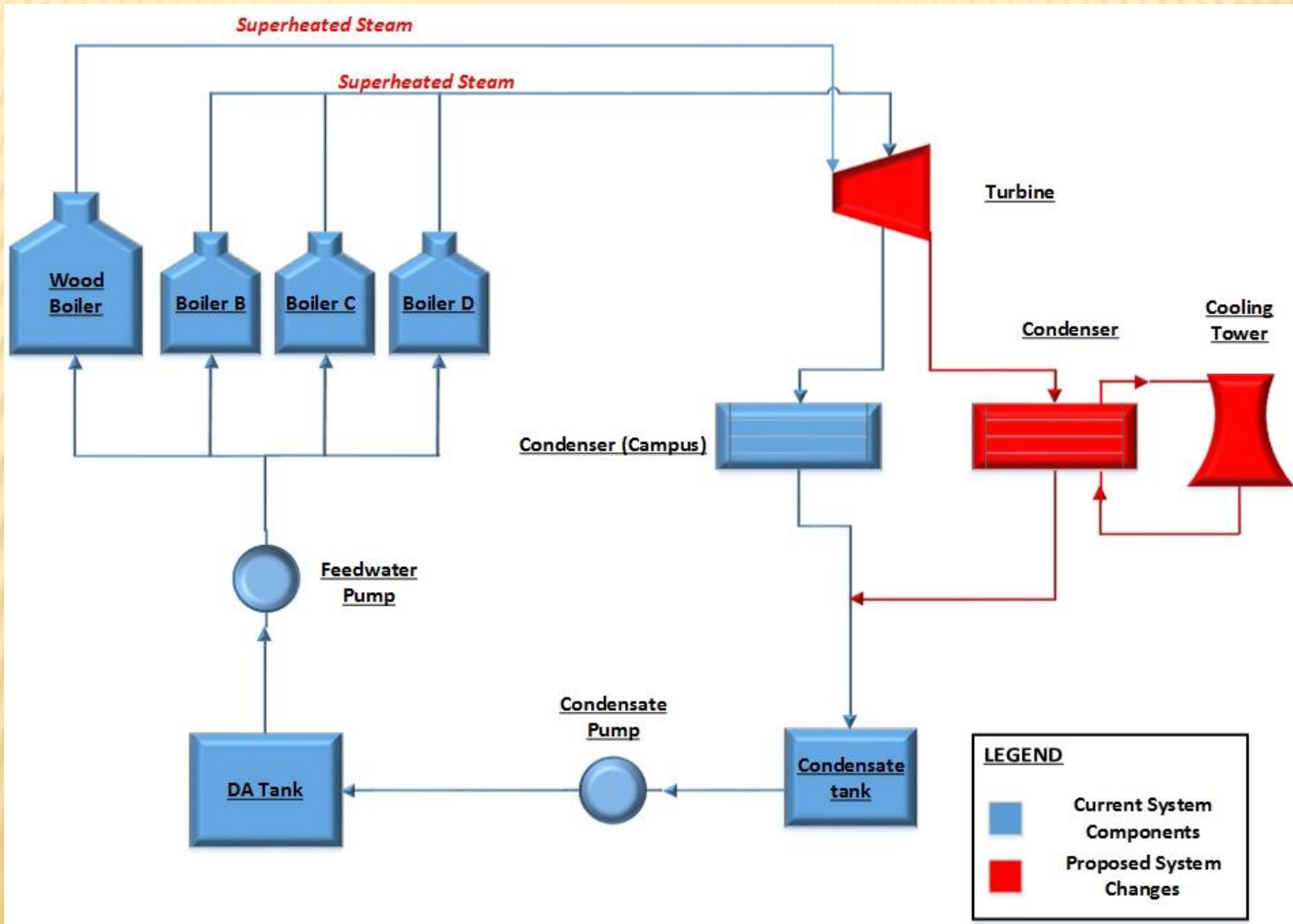
Pros

- Close to constant power generation

Cons

- Requires a full condensing system
- High cost implementation

Plummer Model Superheated



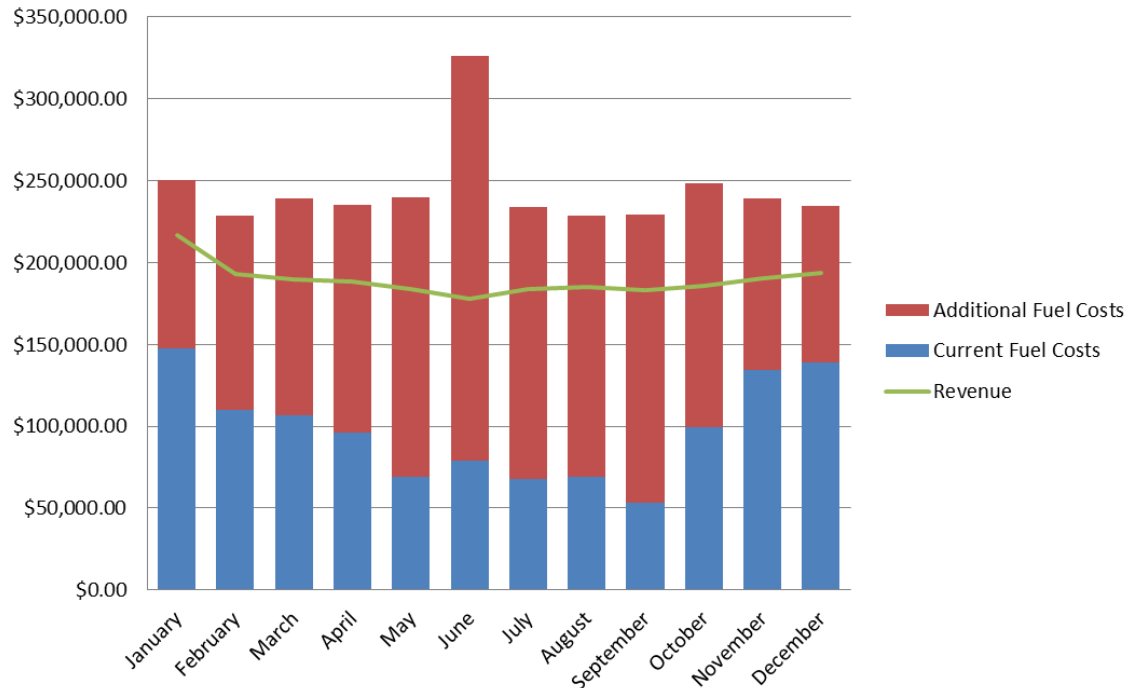
Plummer Model Superheated

- Average generation: 5500 kW
- Peak generation: 5800 kW
- Annual savings: \$510,000

Pros

- Close to constant power generation

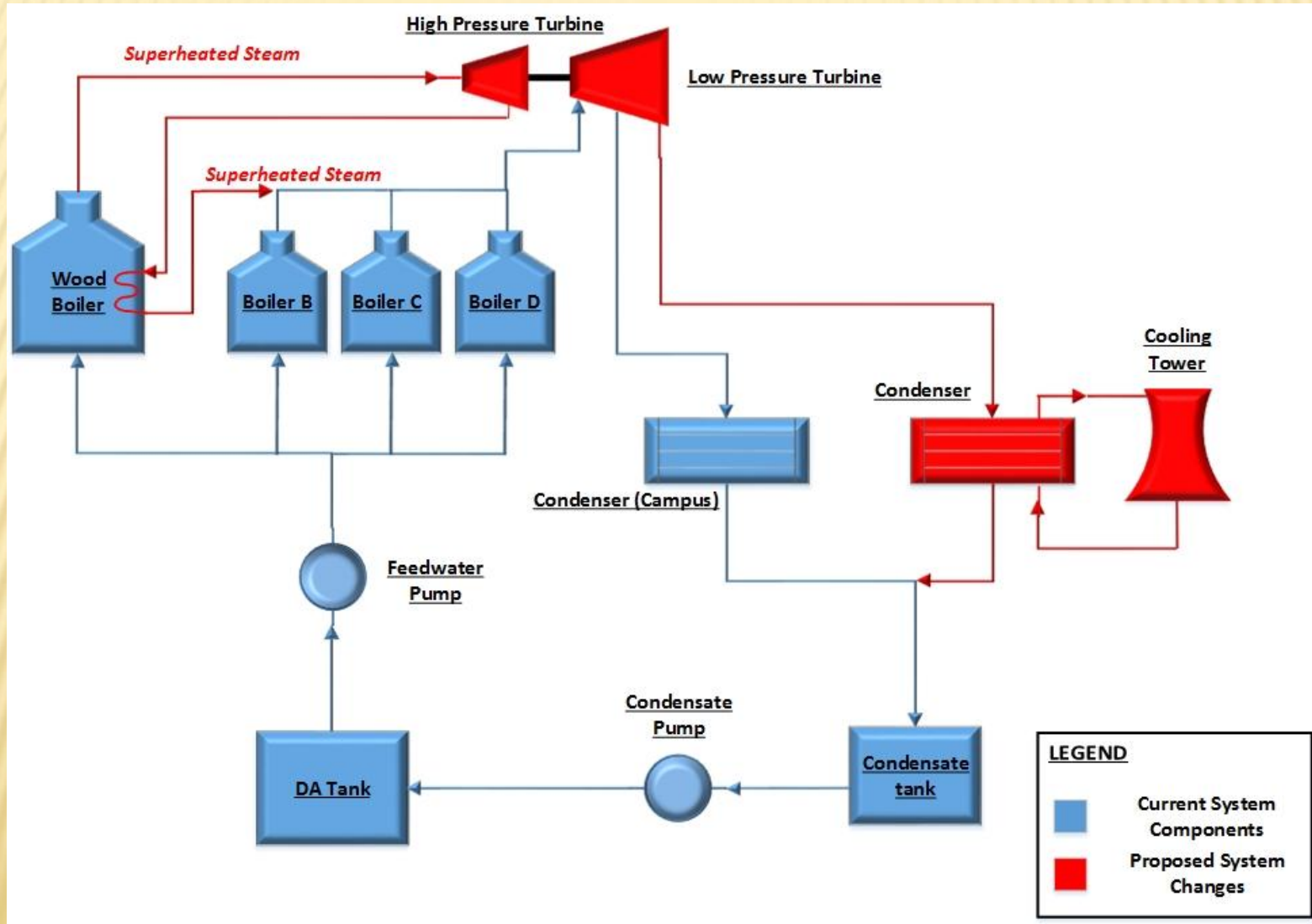
Plummer Model Costs and Revenue



Cons

- Requires a full condensing system
- High cost implementation
- Large increase in fuel consumption

Maximum Generation Model



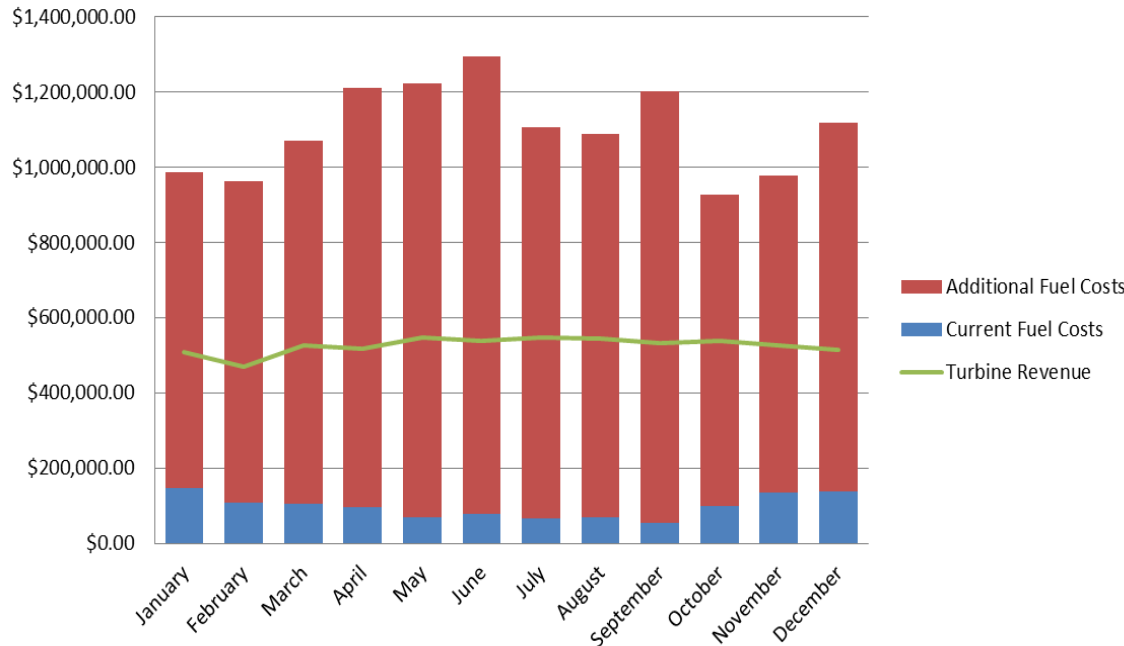
Maximum Generation Model

- Average generation: 14500 kW
- Peak generation: 15000 kW
- Annual savings: -\$5,680,000

Pros

- Maximum power generation

Maxi Model Costs and Revenue



Cons

- Fuel costs extreme
- Large system modifications

Question and Answer Session