ATTACHMENT “D”

TVA BUSINESS CASE FOR ENERGY SAVINGS
BUSINESS CASE
UPGRADES AT FORT PAYNE WASTEWATER TREATMENT PLANT
PROPOSED ENERGY EFFICIENCY IMPROVEMENTS
SRF LOAN AND GRANT INCLUDING TVA ENERGY EFFICIENCY PROGRAM

SITE LIGHTING

The existing site lighting is high pressure sodium, 1000 HPS Highbays. There is a total of 21 fixtures on the treatment plant site. The proposed project includes installed LED lighting in lieu of the high pressure sodium in order to realize an energy savings. The City had an energy efficiency study performed, and the following chart summarizes the existing and proposed system:

<table>
<thead>
<tr>
<th></th>
<th>Electrical Cost:</th>
<th>$ 0.10 per kW-hr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. Fixtures</td>
<td>kW per Fixture</td>
</tr>
<tr>
<td>Existing System:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000 HPS Highbays</td>
<td>21</td>
<td>1.10</td>
</tr>
<tr>
<td>Proposed System: LED Flood FL560L4A</td>
<td>21</td>
<td>0.235</td>
</tr>
<tr>
<td>ENERGY SAVINGS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERCENT SAVINGS:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The proposed lighting will realize an energy savings of 79% for the City compared to the existing lighting system. Refer to the attached study performed on behalf of the City.

The total existing wattage is $21 \times 1.1 \text{ kW} = 23.1 \text{ kW}$. The total proposed wattage is $21 \times 0.235 \text{ kW} = 4.935 \text{ kW}$. The total power savings is $(23.1 - 4.935) / 2.31 = 79\%$. 
Calculate the energy costs associated with existing and proposed lighting systems and (optional) show environmental impact. Click on the first "Blue" cell and tab to the other input cells.

<table>
<thead>
<tr>
<th>Existing Systems</th>
<th>Fixture count</th>
<th>Watts/Fixture</th>
<th>Hr burn per year</th>
<th>Energy $ per yr</th>
<th>Proposed Systems</th>
<th>Fixture count</th>
<th>Watts/Fixture</th>
<th>Hr burn per year</th>
<th>Energy $ per yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 HPS HIGHWAYS</td>
<td>21</td>
<td>1100</td>
<td>4380</td>
<td>$10,118</td>
<td>LED FLOOD FL590L4A</td>
<td>21</td>
<td>235</td>
<td>4380</td>
<td>$2,162</td>
</tr>
</tbody>
</table>

**Potential Energy Savings per year**

- **Energy used per yr. (Existing System):** $10,118
- **Energy used per yr. (Proposed System):** $2,162

**Estimated total cost for complete upgrade**

- **Electrical Load (kilo-watts) (Existing System):** 23.1
- **Electrical Load (kilo-watts) (Proposed System):** 4.9

**Kilowatt load reduction:** 18.2

**Simple Payback (based on energy savings alone):** $7,956 per year

**Cost of Waiting**

- **Cost of postponing the Lighting Upgrade:** $653 per month or $7,956 per year

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**Environmental Impact of Lighting Upgrade**

**Changing your lights can benefit the environment!**

- **Equivalent acres of forest added:** 15 acres
- **Equivalent cars removed from road for a year:** 11 cars
- **50% US Electric Power is from coal-burning power plants.**

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**Annual Carbon Dioxide emission reduction:** 122,527 lbs.

**Coal burning avoided (EPA Nov. 2004):** 57,255 lbs. or 26 tons

**Atmospheric mercury contamination avoided:** 1,237 mg.

**Numbers used** (based on EPA Energy Star Facts and Assumptions sheet, 2007)

- **Emission Factors: gases released per kWh of electricity generated (EPA 2007):**
  - lbs. of CO₂ released: 1.54
  - lbs. of SO₂ released: 0.00604
  - lbs. of NOₓ released: 0.00267

- **Carbon dioxide and mercury released per lb. of coal burned (EPA 2007):**
  - lbs. of CO₂ generated: 2.14
  - lbs. of mercury released: 0.0216

- **Annual carbon dioxide (lbs.) sequestration by forest and emission by cars (EPA 2007):**
  - CO₂ sequestration per acre: 8,066
  - CO₂ emission per average car: 11,470

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**Customer:** WASTE WATER TREATMENT FORT PAYNE

**Prepared by:** JOOG SANTIAGO ELECTRICAL DIVISION MANAGER

9/15/15

The Lighting Assistant examines the projected impact of lighting decisions. Neither this tool nor the analysis generated by this tool in any way constitutes or implies either a warranty of lamp or ballast performance or a guarantee of the actual costs or savings that will be realized or the appropriateness of the solutions suggested. Kindly see and examine the Full Disclaimer; use of this tool constitutes your acceptance of the Full Disclaimer. All Rights Reserved.