

CFPP AACE Class 3 Cost Estimate Discussion Points

Background: UAMPS members need energy that is clean, reliable and affordable over the life of energy projects – the Triple Crown of energy. Renewable energy like solar and wind must be backed up by reliable, dispatchable (always available) non-carbon energy. Significant load growth is expected with increasing population and the electrification of transportation, building heat and manufacturing.

UAMPS continues to review completed and updated cost estimates for project design, as well as current commodity and labor markets for the Carbon Free Power Project (CFPP). The CFPP American Association of Cost Engineering (AACE) Class 3 cost estimate and updated project financial model are expected to show the following updates from the current AACE Class 4 cost estimate and current financial plan:

- An increase in capital expense, including the effects of recent extreme escalation of commodity costs
- A significant increase in the life cycle financing costs driven by recent increases in the costs of borrowing money
- Benefit from the clean energy investment tax credits in the recently passed Inflation Reduction Act
- An increased LCOE driven by the increased capital expense and increased financing costs, likely exceeding the project LCOE price target of \$58/MWh in 2020\$

Inflation and increases in interest rates are major reasons for the cost increases in the updated estimate and financial plan. Unfortunately, both of these impacts are external factors beyond CFPP's control. Both are expected to ebb and flow in the future.

- Inflation is higher than at any time in the last 40 years. Commodity prices, especially for materials typically used in construction of a facility like CFPP, have escalated as much as three or more times the rate of general inflation, driven by the pandemic and supply chain disruptions. For example, in the past two years:
 - Stainless Steel Piping is up 80%
 - Carbon Steel Plate is up 417%
 - Carbon Steel Piping is up 110%
 - Structural Steel is up 58%
 - Electrical equipment like switchgear and controls are up 22%

The CFPP has large amounts of each of these commodities, so inflation has a large impact.

- Interest rates have risen dramatically, about 150% in the past 12 to 18 months, having a sizeable impact on project costs.

The Inflation Reduction Act is a positive development. It will provide a direct benefit on the order of \$30/MWh reduction in LCOE offsetting a measurable fraction of the inflationary and interest rate increases.

Thus, the bottom-line questions become:

- **How does the price of CFPP energy compare to the price of energy from other non-carbon, dispatchable (always available) generation resources?**
- **What are the realistic alternatives, and how much do they cost?**

The CFPP LCOE will be cost-competitive with other forms of dispatchable resources like natural gas fired generation, and importantly other carbon-free baseload options. Further, the price of CFPP energy has the important advantage of being relatively flat over the 40- to 60-year life of the plant (one of the key benefits of carbon-free nuclear energy). Life cycles of natural gas generation, wind and solar are much shorter before they must be replaced.

Other forms of firm, reliable, non-carbon energy include the following:

- **Hydro, Geothermal and Waste heat** (Affordable, limited dispatchability, won't provide the scale needed)
- **Fossil fuel with carbon capture and storage** (Unproven at scale; no accurate LCOE cost projections; but likely higher than nuclear)
- **Green hydrogen** (Unproven at scale; LCOE cost much higher than nuclear if truly green)
- **Solar/wind with battery storage in some form** (Proven technology; geographical and transmission constraints; LCOE cost at equivalent output is much higher than nuclear)

Summary: Given that UAMPS members need large amounts of clean, reliable and affordable energy early in the 2030s to replace coal generation, deal with electrification load growth, and to back up additional amounts of intermittent renewable energy, the CFPP remains, by far, the most attractive option, especially as the anchor of a portfolio of low/no carbon resources that complement the CFPP (e.g., wind, solar, etc.).