APPENDIX E. FUEL STORAGE TANK COSTS

Introduction

While storage tanks for liquid fuel are one of the most obvious requirements for power plant dual-fuel capability, their capital cost is a significant, but not overwhelming portion of the total incremental capital cost. Distillate fuels such as ULSD are generally stored in above-ground, field-fabricated tanks made from welded steel plate. They are surrounded by a concrete containment dike sized to handle the full capacity of the tank in the event of leak or rupture. The tank capacity is determined by the hourly burn rate of the power plant and the number of hours of inventory deemed necessary to maintain operation during a natural gas curtailment or price spike. The cost of the tank and its spill containment components is seldom reported as a breakout for new power plants, so LAI has relied on other public sources for estimates of tank cost as a function of capacity and location. A primary source is the "Petroleum Infrastructure Study Final Report' prepared for the New York State Energy Research and Development Authority by ICF Consulting LLC and Applied Statistical Associates in September 2006 ("the ICF Study"). The tabulated costs in the ICF Study are supplemented or confirmed with scattered reports of tank costs for new plants and modifications in the public record and a few data points from confidential documents available to LAI.

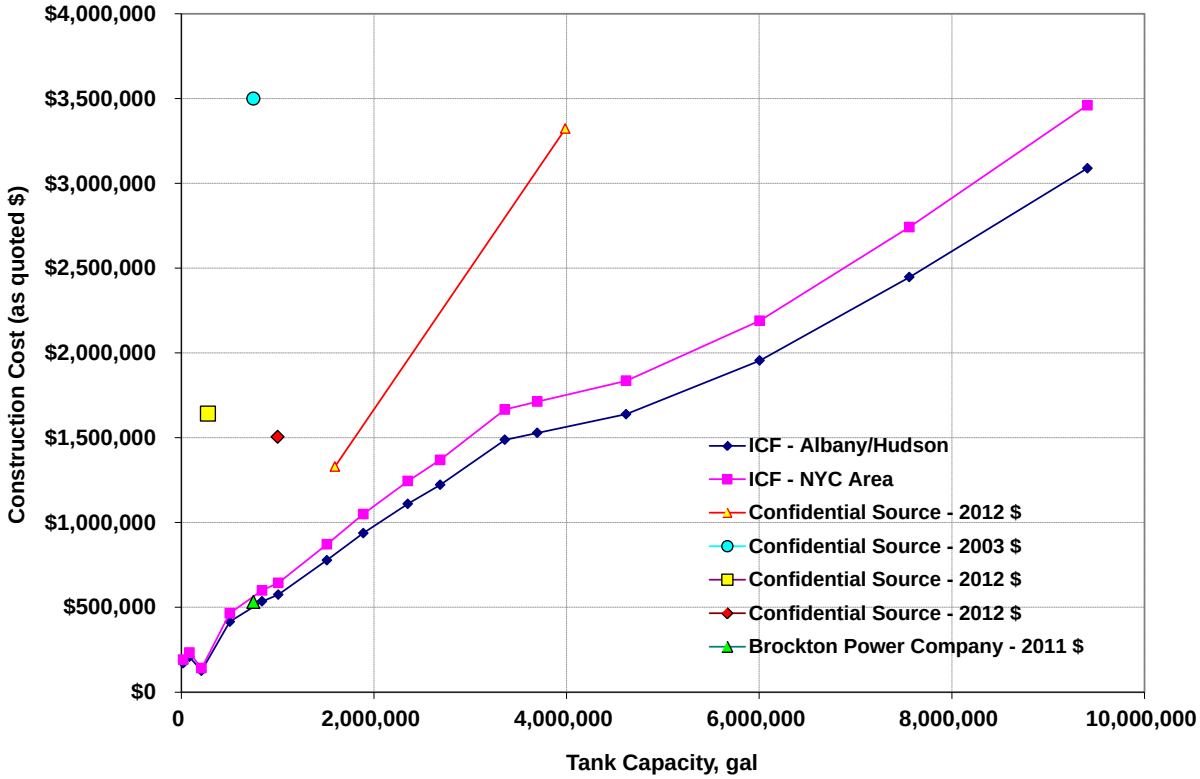
Fuel Tank Capacity

As indicated in the research conducted under Task 1 of Target 4, the capacities of on-site liquid fuel storage tanks for existing dual-fuel power plants, relative to full load burn rates, varies over a wide range. LAI has determined that a reasonable rule-of-thumb is to provide storage for 72 hours of full load fuel requirements, although this guideline is subject to variation based on application-specific variables such as the availability of near-by off-site storage and delivery capacity from fuel dealers and the expected operating profile of the plant. For a 2x1 7FA CC unit, the winter condition fuel burn rate is 4,540 MMBtu/hr (HHV) on ULSD, or 30,600 gallons per hour. A 72-hour supply would therefore be 2.2 million gallons. Roughly the same math would hold for a 2-unit 7F.05 SC station. For a 2-unit LMS100 SC station, the 72-hour requirement would amount to 0.9 million gallons.

Fuel Tank Cost Data

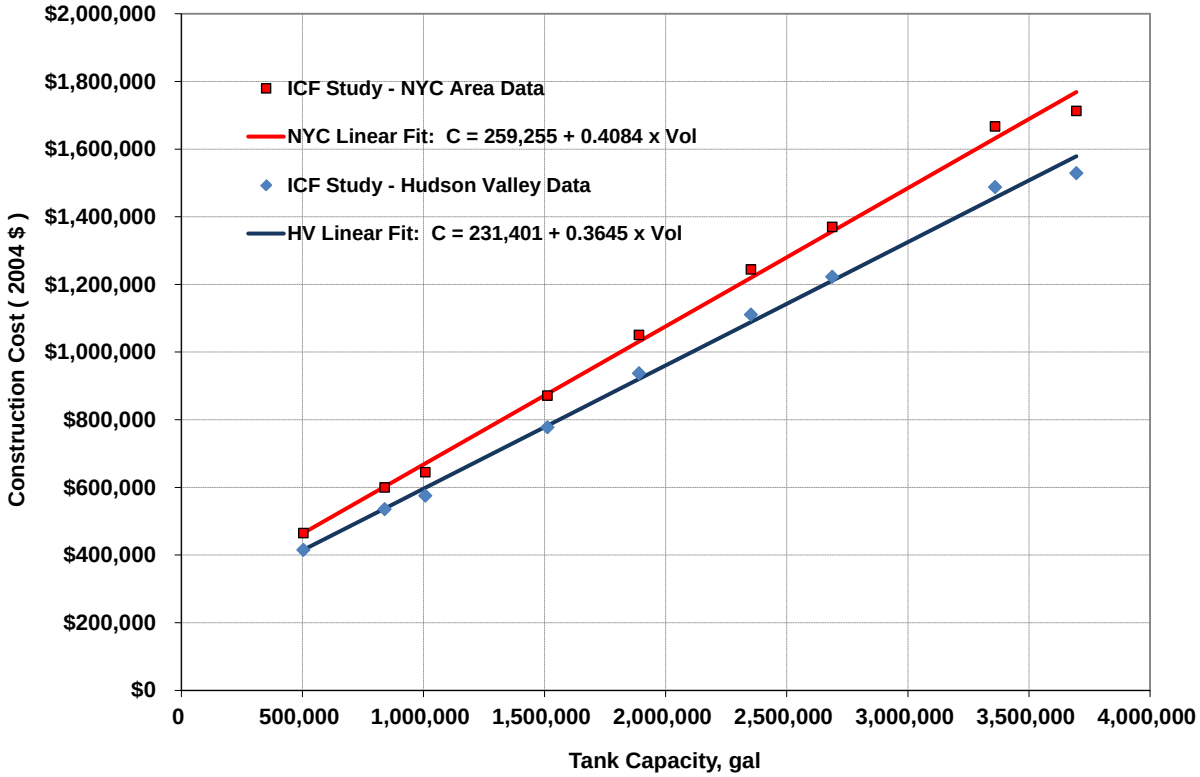
Cost data points for the tanks identified in the ICF Study and for several examples identified by LAI are shown in Figure E1. Costs from the ICF study are provided in 2004 dollars for the New York City area and for the Lower Hudson Valley. Dates for the other points are indicated in the labels.

Figure E1. As-Quoted Tank Costs v. Capacity



LAI used the ICF Study data point for capacities from 500,000 gallons to 4,000,000 gallons to derive linear best-fit equations for New York City and Lower Hudson Valley tank costs, as shown in Figure E2.

Figure E2. Regression Analysis on ICF Study Cost Data



The regression equations were then adjusted from 2004 dollars to 2018 dollars to obtain the cost functions used in this study:

For New York City: C = 371,829 + 0.5857 x Vol (gallons)
For Lower Hudson Valley: C = 331,881 + 0.5228 x Vol (gallons)

Land Requirements for Tanks

Land requirements for fuel storage tanks are estimated based on the following assumptions:

- Tank effective height (excluding dome top) is 40 ft for volumes from 500,000 gallons to 4,000,000 gallons
- Containment dike is square, and wall height is 8 ft.

Tank diameter (ft), square area containing tank (acres), and square area of dike (acres) are plotted in Figure E3.

Figure E3. Tank Diameter and Land Requirements v. Capacity