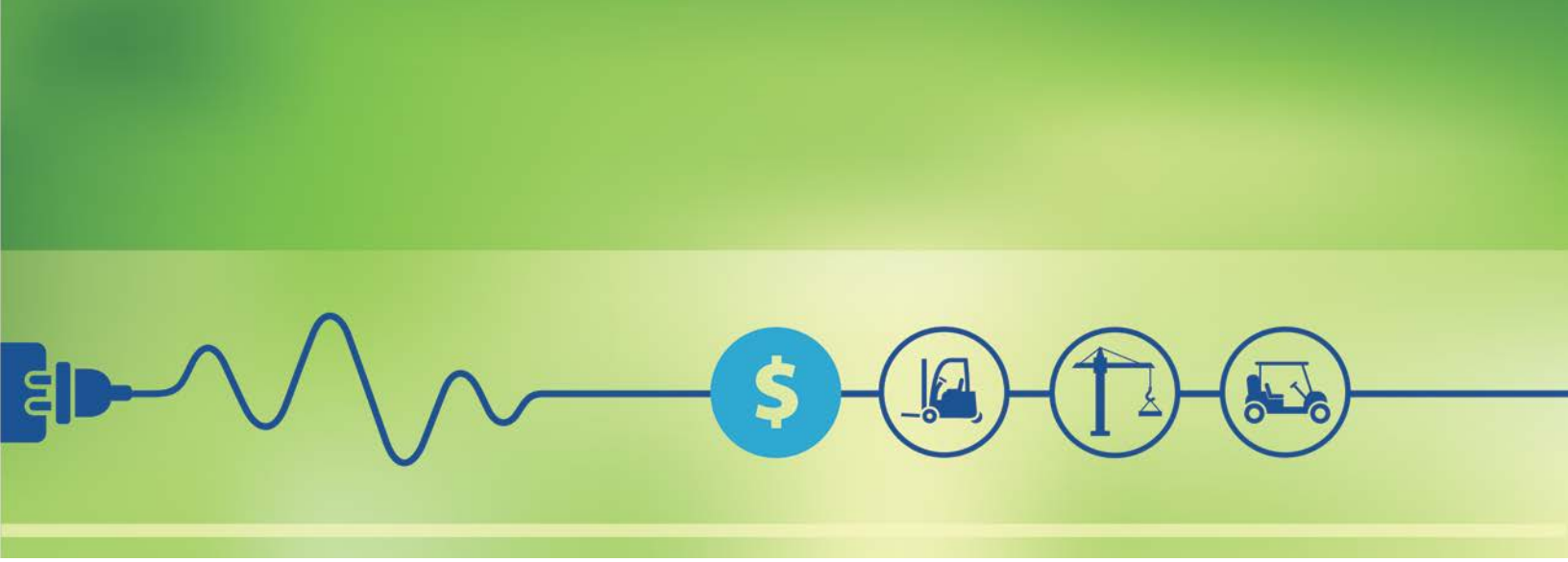

JEA: NON-ROAD ELECTROTECHNOLOGY STUDY

MARKET ASSESSMENT

Prepared by: ICF International
December 19, 2014

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EXECUTIVE SUMMARY

Air quality concerns and climate change impacts continue to be major drivers for an increased interest in electrotechnologies across the U.S. In general, electricity as a power source has lower carbon intensity than fossil fuels such as gasoline and diesel, resulting in electrotechnologies having near-zero or zero emissions of criteria pollutants. Studies have shown that electrically driven non-road equipment can lessen the environmental impacts of user operations and reduce end-user life cycle costs by cutting fuel costs, improving operating efficiencies, and lowering maintenance expenses.

The market assessment presented herein is the initial step in determining the technical potential of any given electric technology within JEA's service territory. The goal of the market assessment is to quantitatively characterize the total number of fossil fuel equipment in the marketplace that could be replaced by electric equivalents for each technology. This assessment focuses on the following technologies: forklifts (conventional and rapid charge), airport ground support equipment (aircraft tractors/pushbacks, baggage/tow tractors, belt loaders, and ground power units), truck refrigeration units, heavy-duty truck stop electrification, golf carts, Shore Power, and cranes (ship-to-shore, wide-span, and rubber tired gantry). Some of the tools and techniques used to characterize the market are: past studies and reports, federal, state and local records, engaging with industry groups, survey methods, and census data. Subsequent to the market assessment, we will apply typical market penetration rates, characterize the age of the existing stock, apply incremental costs (electric vs. fossil fuel), and present the achievable potential for electric technologies. It is important to note that due to the results of the cost benefit analysis, market penetration rates, and the age of the existing stock, the achievable potential will be significantly lower than the technical potential that is presented in this document.

The findings in the market assessment indicate an estimated technical potential of 107,041 kW demand and 176,916,727 kWh of annual electricity consumption across JEA's service territory, and the results are summarized in Table 1 below. The remainder of the document presents the detailed methodology, assumptions, and findings on a more granular level for each technology.

Table 1 – Electrotechnologies Technical Potential: Entire JEA Service Territory

Technology Type	Population - Inventory	Demand (kW)	Annual Electricity (kWh)
Rapid Charge Forklifts	1,584	27,086	23,945,328
Conventional Charge Forklifts	1,056	7,392	15,304,608
Aircraft Tractors / Pushbacks	20	1,520	1,420,580
Baggage / Tow Tractors	60	1,920	1,682,100
Belt Loaders	40	672	543,840
GPUs	20	1,622	1,291,540

TRU	512	5,888	10,107,904
H-D TSE	400	2,840	5,964,000
Golf Carts	213	895	722,070
Shore Power	1	7,040	4,280,320
Ship-to-Shore Cranes	17	3,475	3,946,164
Wide-Span Cranes	2	43,250	103,800,000
Rubber Tired Gantry Cranes	8	3,442	3,908,273
Totals		107,041	176,916,727

It should be noted that the two Naval Stations located in JEA's service territory would be good candidates to engage with for this market assessment because ICF believes there are various types of equipment that could qualify for this project. However, at the time of this assessment, communication is ongoing. In addition, ICF and JEA conducted a meeting with the Jacksonville Chamber of Commerce to give some background information to the staff about the JEA NRE Program. The Chamber was receptive to the information, and further communication will most likely occur in the future as the program develops.

JEA OVERVIEW

The City of Jacksonville established JEA in 1895 to operate and manage the city's electric, water, and sewer systems. Today they serve an estimated 427,000 electric, 313,000 water and 240,000 sewer customers. JEA is also the largest not-for-profit, community-owned utility in Florida and the eighth largest in the United States. Through a network of over 745 miles of transmission lines and more than 6,500 miles of distribution lines, this local utility delivers power to homes, businesses, and industries throughout Duval County and parts of St. Johns and Clay counties.

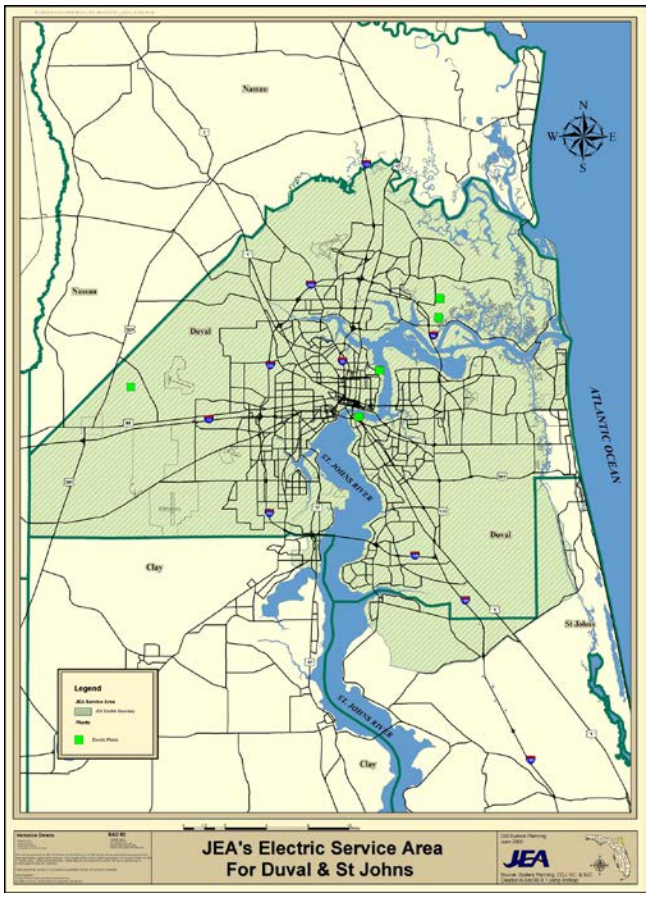


Figure 1 : JEA Electric Service Territory Map

JEA AND AIR QUALITY

Public service also means public responsibility, and power generation for 900 square miles of service area cannot help affecting the

environment. More than half of JEA's power is generated by the burning of fossil fuels, and this process inevitably releases chemical emissions into the atmosphere. JEA made a public commitment to green power with a voluntary agreement with the local chapters of the Sierra Club and American Lung Association to achieve 7.5% clean power capacity by 2015.

POWER GENERATING PLANTS

Greenhouse gas emissions associated with power generation and fossil fuels are harmful to the environment. JEA burns primarily four types of fossil fuels to generate electricity: coal, petroleum coke, natural gas, and oil. JEA employs various techniques at each of their generation plants to help reduce the emitted greenhouse gases.

- St. Johns River Power Park (SJRPP):
    - Uses electrostatic precipitators to remove most particulate matter emissions.
    - Uses scrubbers to remove the majority of sulfur dioxide emissions.
    - Advanced low nitrogen oxide burners.
    - Nitrogen oxide reducing over-fire air system.
    - Selective catalytic reduction technologies to provide state-of-the-art nitrogen oxide reduction.
- Northside Generating Station (NGS):
    - Reduced sulfur dioxide, nitrogen oxide, and particulate matter emissions by more than 10% from 1994-1995 (while increasing output by 2.5%).
    - Converted Units 1 and 2 to state-of-the art solid fuel CFBs with high performing particulate matter sulfide dioxide emission and nitrogen oxide control technology.
    - JEA will be retiring Northside Unit 3 in December 2015, four years ahead of schedule, to remove a less efficient system.
- Natural Gas-Fired Combustion Turbine Technology:
    - JEA installed four new state-of-the-art natural gas-filled combustion turbines.
    - Converted two of these to combined cycle operation to capture waste heat and produce additional capacity.

ALTERNATIVE ENERGY SOURCES

In response to the Environmental Protection Agency's current rules on carbon emissions (subject to change in June 2015), Florida's state implementation plan calls for a 38% reduction in CO2 emissions statewide by 2030. JEA started adding some alternative energy sources and plans to make additional changes to its generation strategy by 2020. To date, JEA achieved 95 MW of clean power capacity including solar, thermal, wind, landfill gas, digester biogas, and biomass energy sources.

- Jacksonville Solar: JEA entered a 30-year purchase power agreement with Jacksonville Solar, LLC in 2009. The PSEG Solar Source, LLC owned facility consists of 200,000 solar panels on a JEA-leased 100-acre site.
- Trail Ridge Landfill: JEA receives methane-generated power from Trail Ridge Landfill through a Purchase Power agreement with Landfill Energy Systems. JEA currently receives a 9.6 MW net output from the landfill and signed an agreement to purchase an additional 9.6 MW form the facility if it is expanded.
- Wind: JEA entered into a 20 year agreement to purchase 10 MW of capacity with Nebraska Public Power District (NPPD) to participate in a wind generation project in Ainsworth, Nebraska.
- Nuclear Power: JEA will receive about 13% of the nuclear energy generated by Southern Company's Plant Vogtle in Waynesboro, Georgia when it launches in 2018.

ELECTRIFICATION INITIATIVES

In fall 2014, JEA identified additional environmental projects that support cleaner air across the region, such as electrotechnologies. Developing programs that increase the market share of electric-powered non-road technologies not only help to improve air quality, but electrotechnologies offer several key benefits to end users over their internal-combustion (IC) counterparts. The benefits of electrotechnologies include:

- Reduced maintenance – can typically have approximately 90 percent fewer moving parts with no engine fluids or hoses.
- Lower fuel consumption – have reduced exposure to gasoline prices, and for instances where charging is necessary, the overall cost to charge is much less to the end user.
- Safer and more efficient work atmosphere – electric-powered technologies allow the end user to strategically place chargers throughout the business to avoid traffic congestion.
- Less noise – much quieter while lifting or transporting products, making it easier for workers to pay better attention to what is happening around them.
- Cleaner and healthier work atmosphere – produce zero site emissions, and therefore do not add NOx, particulates, hydrocarbons, and carbon monoxide into the air of the work areas.

JEA CUSTOMER SERVICE TERRITORY

JEA's electric service area covers all of Duval County and portions of Clay and St. Johns Counties. The area covers about 900 square miles and services more than 426,711 customers. For the purpose of the JEA Market Assessment, the analytics will focus on Duval County.

FORKLIFTS

DESCRIPTION

www.industrialstoragesolutionsinc.com

Forklifts are an essential piece of equipment that ca found in a variety of logistical applications such as distribution warehouses and shipping depots, and a primarily used for lifting and moving heavy loads arc facilities. Due to the various requirements of a forkli these pieces of equipment are available in a variety of different fuel types and lifting capacities. The available fuel types include electric, diesel, propane (LP), and unleaded gasoline. The lifting capacities of forklifts can range up to 20,000+ lbs. Most often referred to as a forklift, other names include “lift truck” and “fork truck”.

Within the industry, forklifts are categorized under five different classes and may operate throughout the day and night depending on the user’s specific operation, number of hours used, and number of shifts. Classes 1, 2, and 3 represent all electrics, and Classes 4 and 5 account for the internal combustion (IC) portion of the overall forklifts market. Class 1, 2, and 3 electric forklifts are typically found in indoor applications where the floor surfaces are smooth and the environment is closed to the outside elements; however, technology now exists for Class 1 electrics to operate outdoors. Electric forklifts are often used in multi-shift operations by warehousing, distribution centers, and third-party logistics suppliers, shipping and receiving, and manufacturing. Some industries where electric forklifts are prevalent include confined spaces, cold storage, and food retail (grocery stores and restaurants). Table 2 summarizes the descriptions of the five forklift classes.

Table 2 – Forklift Class Definitions

Forklift	Description
Class 1	Electric Motor Rider Trucks: counterbalanced rider, stand up, 3-wheel or 4-wheel sit down, cushion or pneumatic tires
Class 2	Electric Motor Narrow Aisle Trucks: order picker, high lift straddle, side loaders, turret trucks, high- or low-lift pallet
Class 3	Electric Motor Hand Trucks: low-lift walkie pallet, tractors, high lift counterbalanced, single face pallet lift
Class 4	Internal Combustion Engine Trucks: counterbalanced, solid/cushion tires
Class 5	Internal Combustion Engine Trucks: counterbalanced, pneumatic tires

RAPID CHARGE VS CONVENTIONAL CHARGE

For electric forklifts to run they need their fuel source, electric power. Electric power is provided as the result of an industrial battery being physically on the truck and the batteries serve as the counter balance weight. For the battery to maintain enough power, it must be charged by one of two methods – conventional charge or rapid/opportunity charge (also referred to as fast charge). Conventional charging applications are ideal for a 1-shift operation in which the battery runs for eight hours, then charges for eight hours, and must cool for eight hours before it is used again. Conventional charging can be used in 2- and 3-shift operations, but a battery room capable of storing two additional batteries per forklift will always be necessary to ensure there are enough charged-up batteries to swap out. Rapid charging systems are ideal for a 2-shift operation in that the battery stays on the forklift, and throughout the day, the forklifts can receive many short charges to allow the battery to remain at 20%-80% charged. The short, rapid charges will usually occur when the forklift operator is taking a break or having lunch; however, one 8-hour equalization charge is required at some point during a 7-day period.

METHODOLOGY

To gain a full understanding of the forklifts market in JEA's service territory, ICF used a three-step process. First, ICF gathered actual sales data from the forklift dealers for the JEA service territory. This sales data is from 2014 and comes from the Industrial Truck Association (ITA), which is the industry tracker of sales for the forklifts industry across the U.S., Canada, and Mexico. The forklifts sales data includes a county-by-county breakdown for all five forklifts classes. Second, in order to illustrate existing forklift populations, ICF downloaded published databases to estimate the forklift population based on a 10-year lifecycle using four primary sectors of establishments that typically operate fleets of forklifts. Furthermore, ICF was able to correlate the ITA sales data with the estimated population of forklifts by multiplying the annual ITA sales data by a factor of 10, which represents the typical 10-year lifespan of forklifts. Third, using feedback from the forklift and battery dealers and the ITA sales data, ICF determined a potential number of electric forklifts that could be installed and separated by charge type – rapid charge and conventional charge. ICF went through the following steps:

- Contacted forklift and battery dealers and gathered ITA data
- Used online databases
- Determined breakdown of rapid/opportunity charge versus conventional charge forklifts

FORKLIFTS MARKET CONTACTS

ICF researched JEA's service territory and identified the appropriate contacts within Duval County for forklifts. These contacts included the forklift dealers and battery dealers. Table 3 shows the

industry players that ICF communicated with to gather the sales data for forklifts sold in JEA's service territory.

Table 3 – Forklifts Contacts

Company	Address
Southern States Toyotalift (Toyota)	500 Cynthia St., Jacksonville, FL 32254
Raymond Handling Consultants (Raymond)	13291 Vantage Way, Suite 106, Jacksonville, FL 32218
Ring Power Lift Trucks (CAT, Linde, Jungheinrich)	8040 Philips Hwy, Jacksonville, FL 32256
Lift Power, Inc. (Crown Lift Trucks)	6801 Suemac Place, Jacksonville, FL 32254
EnerSys	8110 Cypress Dr., Suite 403, Jacksonville, FL 32256
Johnson Battery Company (Deka)	6973 Highway Ave., Jacksonville, FL 32254

FORKLIFT AND BATTERY DEALERS AND ITA DATA

As mentioned previously, market data for forklifts was obtained from the forklift dealers, which included a county breakdown of forklift sales from the ITA for 2014. ITA's membership is comprised of industry manufacturers of forklifts, tow tractors, rough terrain vehicles, hand-pallet trucks and automated guided vehicles throughout the U.S., Canada, and Mexico. ITA's membership represents 90% of the forklift manufacturers in the U.S. and Canada. Based on actual information supplied by its members, ITA tracks shipments in the U.S. for electric rider trucks and narrow-aisle riders (Class 1 & Class 2), motorized hand trucks (Class 3) and IC-powered trucks (Class 4 & Class 5). The battery dealers provided additional input about the market for charging technologies, such as market percentages and characteristics of conventional and rapid/opportunity charge installations.

ONLINE DATABASES

In addition to gathering the ITA sales data for JEA's service territory, online databases were used to estimate the number of forklift shipments in JEA's service territory. ICF used the U.S. Census Bureau's 2012 U.S. County Business Patterns online database, based on the North American Industry Classification System (NAICS), to correlate business patterns in Duval County and compare it with the entire United States. NAICS is the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. Table 4 compares the 2012 U.S. County Business Patterns for JEA's service territory and the rest of the U.S. The table highlights key sectors that are known for forklift use: manufacturing, wholesale trade, retail trade, and transportation and warehousing.

Table 4 – 2012 Duval County Business Patterns (NAICS)[1]

NAICS Classification	US # of Establishments	Duval County # of Establishments	Duval County Percentage
Total for all sectors	7,431,808	23,538	0.32%
Agriculture, forestry, fishing and hunting	22,046	19	0.09%
Mining, quarrying, and oil and gas extraction	28,909	6	0.02%
Utilities	17,833	15	0.08%
Construction	652,902	2,095	0.32%
Manufacturing	297,221	597	0.20%
Wholesale trade	420,501	1,264	0.30%
Retail trade	1,063,842	3,245	0.31%
Transportation and warehousing	214,492	946	0.44%
Information	135,185	409	0.30%
Finance and insurance	474,510	1,628	0.34%
Real estate and rental and leasing	349,776	1,177	0.34%
Professional, scientific, and technical services	859,182	3,089	0.36%
Management of companies and enterprises	52,247	199	0.38%
Administrative, support, waste management and remediation services	387,465	1,550	0.40%
Educational services	95,872	334	0.35%
Health care and social assistance	833,883	2,536	0.30%
Arts, entertainment, and recreation	125,082	279	0.22%
Accommodation and food services	662,757	1,924	0.29%
Other services (except public administration)	730,999	2,218	0.30%
Industries not classified	7,104	8	0.11%

TECHNICAL POTENTIAL

The objective is to identify the technical potential (total market population) of forklifts across JEA's service region. For the purposes of this market assessment and as mentioned earlier, ICF researched two different sets of numbers to aid in providing a good illustration of the full technical potential of the forklifts market. All of the percentages provided herein for the forklifts section of the assessment are based on feedback from the forklift dealers, battery dealers, and trends noticed from the market data.

[1]U.S. Census Bureau: 2012 County Business Patterns (NAICS), http://censtats.census.gov/cgi-bin/cbpnaic/cbpsect.pl

ITA SALES DATA

ITA has been the leading organization for industrial truck manufacturers and suppliers of component parts and accessories that conduct business in the United States, Canada and Mexico. Table 5 shows the shipments for all five classes in the U.S. since 1990. Classes 1 and 2 are combined to illustrate the total electric riders and stand-ups, Class 3 is shown separately, and Classes 4 and 5 IC forklifts are combined to show all IC forklifts.

Table 5 – US Factory Shipments – Forklifts[2]

YEAR	ELECTRIC RIDER (Classes 1 & 2)	MOTORIZED HAND (Class 3)	IC ENGINE (Classes 4 & 5)
1990	27,877	26,941	47,702
1991	24,565	23,599	38,406
1992	28,277	27,700	46,183
1993	29,210	28,492	48,947
1994	36,747	34,127	65,027
1995	44,087	37,746	72,685
1996	42,263	35,375	60,287
1997	42,675	38,538	64,946
1998	48,923	40,428	80,554
1999	49,843	41,899	74,994
2000	56,090	49,121	85,993
2001	45,980	37,210	61,507
2002	39,235	36,445	55,928
2003	40,463	36,659	63,365
2004	46,886	44,308	74,228
2005	50,604	46,206	83,725
2006	53,806	50,950	85,038
2007	50,260	48,615	76,664
2008	45,361	43,716	62,104
2009	28,409	28,635	28,740
2010	31,759	36, 637	36,896
2011	44,720	42,213	58,483
2012	49,126	47,339	56,618
2013	52,834	52,766	66,473

[2] Industrial Truck Association, http://www.indtrk.org/

ICF interviewed forklift dealers across Duval County to gather the sales data to provide a good reflection of the current forklifts market. Table 6 shows the ITA sales data for Duval County for September 2014 and YTD up until that month. From this data we were able to determine the average number sold per month (by subtracting the number of forklifts from September and dividing the answer by the 8 remaining months) and an estimate for the whole 2014 year. In the table below, out of a total of an estimated 986 forklifts sold in 2014, Class 4 and 5 IC forklifts account for about 309 sales, which represents 31% of the forklifts market share in sales.

Table 6 – 2014 ITA Forklift Orders for Duval County

	Class 1	Class 2	Class 3	Class 4	Class 5	TOTAL
ITA DATA: SEPT 2014	23	13	8	47	22	113
ITA DATA: YTD 2014	95	93	317	129	114	748
Average per month	9	10	39	10	12	79
2014 Estimated	***122***	***123***	***433***	***160***	***149***	***986***

ESTIMATED FORKLIFTS MARKET DATA

To estimate the number of forklift shipments in JEA's service territory, research was undertaken to correlate businesses patterns[3] in Duval County and compare them with the entire US. As mentioned previously, the 2012 County Business patterns for key sectors, known for forklift use, specifically manufacturing, retail trade, transportation and warehousing, and wholesale trade were analyzed for each JEA region and the rest of the U.S. There is a correlation between the ITA forklift shipments nationally and the number of business establishments in the four primary market sectors in JEA's service territory.

Due to the global economic downturn that affected the entire forklifts market, forklift shipments in 2009 went down by 50% when compared to the previous year. Between the years 2010 through 2013, forklift shipments showed upward movement when compared to the previous years, indicating the market is recovering. For purposes of this market assessment, ICF looked at shipments from 1999 to 2008 to characterize the market, assuming a 10-year forklift lifecycle. Table 7 shows the shipments of IC engine forklifts in the U.S. from 1999 to 2008.

Table 7 – Shipments of IC Forklifts[4]

YEAR	US Factory Shipments IC ENGINE Forklifts
1999	74,994

[3] U.S. Census Bureau: 2012 County Business Patterns (NAICS), http://censtats.census.gov/cgi-bin/cbpnaic/cbpsect.pl

[4] Industrial Truck Association, http://www.indtrk.org/

2000	85,993
2001	61,507
2002	55,928
2003	63,365
2004	74,228
2005	83,725
2006	85,038
2007	76,664
2008	62,104
TOTAL	**723,546**

The next step in estimating the forklifts population was to evaluate the county business patterns and calculate the number of establishments in JEA's service territory. Table 8 below illustrates the total number of business establishments in the U.S. and Duval County from the four primary market sectors.

Table 8 – Duval County Key Sector Establishments as a % of US Totals

	Manufacturing	Wholesale Trade	Retail Trade	Transportation & Warehousing	
US # of Establishments	297,221	420,501	1,063,842	214,492	
Duval County # of Establishments	597	1,264	3,245	946	**Average**
Duval County Percentage	**0.201%**	**0.301%**	**0.305%**	**0.441%**	**0.312%**

Since there is proportional linkage between the number of forklift shipments (supply) and number of establishments that use forklifts in key sectors (demand), it was determined that roughly 0.312% of all forklift shipments in the U.S. are likely to occur in establishments within JEA's service territory.

Table 9 shows the total market potential for the existing population of forklifts as per the theoretical method. This is an estimated population of IC forklifts to be replaced with electric equivalents in JEA's territory using the business sector breakdowns.

Table 9 – JEA Estimated Population of IC Forklifts to be Replaced

Year	IC Engine: US Shipments	IC Engine: Calculated Duval County Shipments
1999	74,994	234
2000	85,993	268
2001	61,507	192
2002	55,928	174

2003	63,365	198
2004	74,228	232
2005	83,725	261
2006	85,038	265
2007	76,664	239
2008	62,104	194
Theoretical Average:		226

Table 10 shows the ITA sales data from 2014 and the estimated market data. The data from both sources is comparable, which provides validation for using the ITA data as a source for planning program goals and in cost benefit calculations.

Table 10 – ITA Shipments in Duval County vs. Theoretical Calculation

Forklift Class	2014 ITA Forklift Orders	Theoretical Average
4 & 5	309	226

Assuming a 10-year life cycle for forklifts, the total number of IC forklifts (Class 4 and 5) based on the 2014 ITA forklift orders will be 3,090, or 1,600 Class 4 and 1,490 Class 5 forklifts.

RAPID/OPPORTUNITY CHARGE VS CONVENTIONAL CHARGE ELECTRIC FORKLIFTS

In addition to the total market numbers for Class 4 and Class 5 IC forklifts, ICF further analyzed the data to determine a potential number of electric forklifts broken down by charge type. Rapid charge/opportunity charge forklifts continue to be a growing segment of the charging industry; however, conventional charging systems still occupy a significant portion of the existing and new market. Based on feedback from the forklift and battery dealers about available electric equivalents for IC forklifts, ICF made some assumptions to help calculate the full technical potential for both types of charge technologies. In addition, ICF used kW and kWh impacts to calculate the resulting demand and electricity that JEA can attribute to the electric forklifts. Table 11 shows the assumptions used to identify the potential number of Class 4 and 5 forklifts that could be converted to electric equivalents. Table 12 shows the deemed values of demand (kW) and electricity (kWh) used to calculate the electrical load of electric forklifts.

Table 11 – Key Assumptions – Forklifts

Key Assumptions	
Estimated % Class 4 w/ Electric Equivalents	100%
Estimated % Class 5 w/ Electric Equivalents	65%
Class 4 & 5 - Rapid Charge Conversions	60%
Class 4 & 5 - Conventional Charge Conversions	40%

Table 12 shows deemed values that were obtained from metering studies performed on electric forklift charging stations.

Table 12 – Deemed Values – Forklifts

Deemed Values	Demand (kW)	Electricity (kWh)
Rapid	17.1	15,117
Conventional	7	14,493

Table 13 shows the total technical potential for JEA's service territory with the charging type separated based on the previously mentioned assumptions. The total number of forklifts using actual ITA sales data shows parity with the theoretical methods that were used to estimate conventional charge forklift populations but was higher for rapid charge forklifts. ICF decided to use ITA sales data to determine technical potential, and as mentioned previously, the annual sales data was multiplied by a factor of 10.

Table 13 – Technical Potential – Forklifts (ITA Sales Data) JEA Service Territory

Forklift Type – Target Market	Installs	Demand (kW)	Electricity (kWh)
Class 4	1,600		
Rapid Charge	960	16,416	14,512,320
Conventional Charge	640	4,480	9,275,520
Class 5	1,040		
Rapid Charge	624	10,670	9,433,008
Conventional Charge	416	2,912	6,029,088
Total Rapid Charge	**1,584**	27,086	23,945,328
Total Conv. Charge	**1,056**	7,392	15,304,608

GROUND SUPPORT EQUIPMENT

DESCRIPTION

Airport Ground Support Equipment (GSE) is found at all airports across the country and encompasses several different pieces of equipment. GSE provides ground support services, which includes pushing or towing aircraft as well as handling baggage or cargo. GSE's primary purpose is to provide support services while an aircraft is parked at the terminal gate between flights. Four primary types of GSE were analyzed for this assessment: aircraft tractors/pushbacks, baggage/tow tractors, belt loaders, and ground power units.

AIRCRAFT TRACTORS/PUSHBACKS

Aircraft tractors/pushbacks are used to push or tow an aircraft. These vehicles are very powerful, and because of their large engines, they are sometimes referred to as an engine with wheels. Different-sized aircraft tractors/pushbacks are required for different-sized aircraft or other moving tasks. Some aircraft tractors/pushbacks use a tow-bar as a connection between the tractor and the aircraft, while other tractors lift the nose gear off the ground to make it easier to tow or push.

BAGGAGE/TOW TRACTORS

The baggage/tow tractor is the most diverse piece of equipment used at an airport with a capacity to tow between 15 and 17 tons. The baggage/tow tractor is used primarily to pull trains of baggage carts from the bag room to the aircraft and back to the bag room. In some hub applications, the baggage/tow tractor is utilized to move baggage from an arriving aircraft directly to a departing aircraft for passengers connecting to another flight on the same carrier.

BELT LOADERS

Belt Loaders are medium-sized GSE vehicles with movable belts for unloading and loading of baggage and cargo. Belt loaders park adjacent to the aircraft when unloading and loading baggage and cargo from baggage- and cargo-hauling carts. Belt loaders can lift up to 2,000 lbs. of baggage and/or cargo from ramp level to the lower belly of the aircraft.

GROUND POWER UNITS

Ground power units (GPUs) are essentially mobile ground-based generator units that supply aircraft with electricity while they are parked at the facility. GPUs are sometimes also referred to as generators.

ELECTRIC GSE

Airlines are going through a very challenging period as they are regularly faced with many cost pressures, compliance issues, and operational challenges caused by competition and growth in the industry. GSE operations are an area often impacted by these challenges, including the rising cost of fuel and pressure from environmental groups to reduce air pollutants in many of the cities that airlines operate in. In addition, GSE operations are often impacted in cities and counties that have been designated in nonattainment by the Environmental Protection Agency (EPA). Many airlines, power utilities, and other GSE industry stakeholders are examining the cost-effectiveness of utilizing electric ground support equipment (eGSE) versus gasoline and diesel-fueled internal combustion engine (IC-GSE) alternatives. Since as early as the mid-1990s, the airline industry has been investigating the benefits of using electricity or alternative fuels instead of gasoline and diesel fuel

in GSE vehicles. Bulleted below are some selected facts and figures about several airlines that represent successful GSE conversions from IC-GSE to eGSE:

- United Airlines has more than 3,600 GSE vehicles (26% of the entire fleet), that are electric or alternatively fueled.
- Delta Airlines has deployed more than 1,200 electric GSE vehicles. In 2010, Delta opened its new GSE facility at Atlanta's Hartsfield-Jackson International Airport where it conducts the majority of its GSE fuel conversions. Delta has also announced plans to purchase approximately 600 new GSE units valued at $50 million including approximately 100 electric GSE units for airports that have the infrastructure to support electric.
- Continental Airlines (now United Airlines) reports that NOx emissions from GSE have been reduced by approximately 75% at Bush Intercontinental Airport in Houston by switching to electric GSE and other emission-reduction technologies.
- As of March 2012, Southwest Airlines has purchased or converted more than 850 GSE units to electric including baggage tractors, belt loaders, lavatory trucks, carts, and pushback tractors. In doing so, the carrier reduced its GSE fuel consumption by approximately 700,000 gallons annually. Additionally, Southwest has converted to gate service electricity in 61 of the 64 airports it serves, reducing GPU fuel consumption by more than 15 million gallons in 2007. Southwest has committed to enter all new markets with electric belt loaders.

METHODOLOGY

The airport analyzed for this assessment is Jacksonville International Airport. In order to be able to contact the appropriate personnel at the airport, JEA furnished ICF with the appropriate name and contact information shown in Table 14. However, at the time of this report the contact was still waiting on the airlines to provide data on their existing ground support equipment. GSE are typically owned and maintained by the tenant airlines, unless there is a specific arrangement whereby the airport authority owns and maintains the GSE fleets.

Table 14 – JEA Airport Contacts

Airport	Contact	Title
Jacksonville International Airport	David Jones	Facilities Director

Since ICF was unable to obtain actual data, to gain an understanding of the GSE in operation throughout JEA's service territory, ICF used a theoretical approach. ICF contacted airport GSE industry experts who provided rules of thumb that tied the number of gates to the GSE equipment at any given airport. Table 15 shows assumptions used for calculations based on the number of gates at Jacksonville International Airport.

Table 15 – Assumptions for GSE Calculations

Equipment	# GSE / per gate
Pushbacks/Tugs - Aircraft	1
Tow/Baggage Tractors	3
Belt Loaders	2
Ground Power Units (GPUs)	1

TECHNICAL POTENTIAL

Jacksonville International Airport has two concourses, A and C, with 20 gates total. Using the theoretical approach and the assumptions listed previously, ICF estimated how many pieces GSE are at the airport.

Table 16 – JEA Airport – Theoretical Estimation of GSE Populations

Airport	Aircraft Tractors / Pushbacks	Baggage / Tow Tractors	Belt Loaders	GPUs
Jacksonville International Airport	20	60	40	20

Deemed values of kW and kWh impacts were used to illustrate the load growth potential for conversion of the GSE populations at the primary airport in JEA's service territory. Table 17 below shows the deemed values for kW and kWh impacts, which were used in the GSE calculations.

Table 17 – Deemed Values for GSE Vehicles[5]

Deemed Values	Demand (kW)	Electricity (kWh)
Aircraft Tractors (Pushbacks)	76	71,029
Baggage/Tow Tractors	32	28,035
Belt Loaders	16.8	13,596
GPUs	81.1	64,577

The deemed values shown above were obtained with the help of a technical reference document from the EPA in conjunction with discussions with manufacturers of the electric GSE and other prior metering studies.

[5] http://www.epa.gov/otaq/stateresources/policy/transp/airports/r99007.pdf

- Refer to pdf tab 52/144 for horsepower of fossil fuel engines. This was compared with the available horsepower in the marketplace.
- Refer to pdf tab 54/144 for load factors.
- Refer to pdf tab 126-127/144 for operating hours per year.

Table 18 shows the estimated demand and electricity for GSE fleets at Jacksonville International Airport.

Table 18 – Technical Potential – Jacksonville International Airport IC GSE Populations

GSE Equipment	Estimated Inventory	Demand (kW)	Electricity (kWh)
Aircraft Tractors / Pushbacks	20	1,520	1,420,580
Baggage / Tow Tractors	60	1,920	1,682,100
Belt Loaders	40	672	543,840
GPUs	20	1,622	1,291,540

TRUCK REFRIGERATION UNITS

DESCRIPTION

A Truck Refrigeration Unit (TRU), also known as a "reefer", is essentially a refrigerator on wheels or a mechanical system that cools the truck or trailer "box," and consists of the following components:

www.truckinginfo.com

- Refrigeration compressor
- Auxiliary drive engine, usually diesel, to power the compressor and the rest of the system
- Optional electric-standby motor (E/S) to provide dockside grid connected power
- Condenser (heat exchanger) and fan to condense the refrigerant and exhaust waste heat
- Evaporator (heat exchanger) and fan to transfer low temperature air to cool the box
- Microprocessor based controls to optimize the cooling cycle and store run data
- TRU chassis with frame, housing, clutches, belts, wiring and drive components

Refrigerated trucks, trailers, and ocean containers are used to transport, deliver and store fresh and frozen foods from producers, ports, and distribution centers throughout the country. Power for their on-board refrigeration systems typically comes from auxiliary diesel engines or grid-connected electric motors. These engines or electric motors are vital for pre-cooling empty trailers prior to loading and for maintaining product temperature control while the vehicle is on the road or waiting at a distribution facility or end use business. Nearly all refrigerated trucks and trailers utilize an auxiliary diesel engine to directly drive their refrigeration compressors. Most medium and large van trucks use similar, but smaller, versions of the same system. In addition, most ocean containers are

all-electric, but use a diesel generator set to power the on-board electric compressor drive motor while the containers are transported overland.

TRUs are used for everything from long haul transportation of goods across the country to short haul local deliveries. Use of diesel trucks and TRUs has increased in recent decades as a result of the relocation of manufacturing plants overseas and reduced shipping costs. These same factors, however, have also contributed to reduced revenue and margins for transportation companies and owner-operators, making it harder to replace dirty, aging equipment.

A semi-trailer diesel TRU engine can emit more NOx per hour than the idling main truck engine. For example, a 34 horsepower (hp) semi-trailer TRU (without electric standby) can emit 500 to 1,260 pounds per year of NOx and other reactive organic gases (ROG), and 45 to 119 pounds per year of PM. These emissions occur both on road and at distribution centers as diesel-powered TRUs cool down, load or unload, and await dispatch. Locations where many TRUs congregate, such as ports, large distribution centers, and rail yards, have been shown to have particularly high concentrations of pollutants and diesel exhaust particulates from idling diesel trucks and TRUs. These port and warehouse facilities are frequently located in low income or minority communities, creating emissions "hot spots" that can lead to environmental justice concerns with both public health and political implications.

ELECTRIC TRUS

Over the last few years, there has been renewed interest in electric-powered or electric-standby TRUs (known as e-TRUs or E/S TRUs) as a result of new non-road engine standards proposed by the EPA. The E/S TRU is a dual fuel technology where the TRU is powered using grid-electricity at the "home-base" or other stationary location, but still uses an auxiliary diesel-powered compression ignition (CI) engine to refrigerate the produce or frozen food while on the road. The main truck engine is generally not used for refrigeration, except in the case of small vehicles. The electrical load created by TRUs provides a significant market opportunity for electric utilities seeking to increase electric grid load. The energy load of semi-trailer e-TRUs varies from 5 kW to 19 kW depending on the evaporator return-air temperature, i.e. the warmer the box, the more power required to cool it to the desired set-point. With a projected average energy use of 8 kWh per hour, annual usage would be between 8000 kWh and 24,000 kWh. The energy use for box van e-TRUs varies from 2 kW to nearly 6 kW, with a projected average of 2.5 kWh per hour (roughly 2500 to 7500 kWh per year). Peak loads might be as high as 15 kW for the semi-trailer e-TRUs and 6 kW for the box van e-TRUs.

METHODOLOGY

In order to assess the market of TRUs across JEA's service territory, ICF identified contacts from the two primary manufacturers of TRUs, and contacted the local dealers. With the dealer's assistance,

ICF accessed FleetSeek's online database, which tracks a limited number of reefer populations operating in the market place. The database is limited because it only tracks reefers registered or owned in Duval County, it does not include reefers that might be owned or registered in neighboring counties but used and operated in Duval County.

TRU DEALER CONTACTS

ICF researched JEA's service territory and identified the appropriate contacts within the service territory for TRUs. Table 19 shows the dealers ICF communicated with to gather the names of end users who operate fleets of TRUs in JEA's service territory.

Table 19 – TRU Dealer Contacts

Company	Address
Sunbelt Transport Refrigeration (Carrier Transicold)	2800 Imeson Rd., Jacksonville, FL 32225
Thermo King - North Florida	2733 Pickettville Rd., Jacksonville, FL 32220

TECHNICAL POTENTIAL

In order to provide JEA with the population of TRUs operating in its service territory, ICF communicated with the TRU dealers. There is not actual sales data available from the dealers; however, the TRU dealers can provide estimates of fleet sizes that they service. Using the FleetSeek data provided by the local Sunbelt Transportation Refrigeration dealer, ICF determined there are 512 TRUs registered in JEA's service territory as shown in Table 20**Error! Reference source not found.**.

Table 20 – JEA Service Territory TRU Registrations

FL County	TRU Registrations
Duval	512

Deemed values of kW and kWh impacts were used to illustrate the load growth potential as a result of converting the current diesel-powered TRUs to E/S TRUs. Table 21 below shows the deemed values for kW and kWh impacts, which were used in the TRU calculations. These deemed values were obtained from a metering study performed on an electric-standby TRU installation.

Table 21 – Deemed Values – TRUs

Deemed Values	Demand (kW)	Electricity (kWh)
TRUs	11.5	19,742

As a result of calculating the number of business establishments that typically have TRU fleets in JEA's service territory, ICF determined that there is a proportional linkage between the number of establishments that are being serviced and the number of refrigerated trucks. Using the

corresponding percentages mentioned previously, reefer populations can be estimated in Duval County. It should be noted that the estimated reefer populations with electric-standby capabilities are a small minority in the overall trucking population. The true achievable potential will be calculated by applying typical market penetration curves during the cost benefit analysis phase. These numbers serve strictly as the technical potential of TRUs based on a typical 10-year life of TRU equipment. Due to the lack of existing penetration of the electric-standby TRU technology, both the "old" and "new" trucks would be likely candidates. The targets for this technology will be the companies with fleets of reefers and their associated warehouses. Table 22 shows the estimated populations of reefers in Duval County that can be targeted as replacements and the resulting kW and kWh impacts.

Table 22 – Estimated TRU Populations Targeted as IC Replacements

JEA Service Territory	Estimated TRU Population	Demand (kW)	Electricity (kWh)
Duval County	512	5,888	10,107,904

Table 23 shows the number of reefers at select establishments (with greater than 10 TRUs) obtained from FleetSeek for the JEA service territory.

Table 23 – TRUs – Duval County

Company	Address	TRU Population
North Florida Sales	3601 Regent Boulevard, Jacksonville	88
SYSCO Jacksonville, Inc.	1501 Lewis Industrial Drive, Jacksonville	84
ES Express LLC	13453 N Mainn Street, Unit 204, Jacksonville	80
Customized Distribution LLC / CDI	5545 Shawland Road, Jacksonville	46
Severt Trucking, Inc.	3160 W Beaver Street, Jacksonville	42
Champion Brands, Inc.	5571 Florida Mining Boulevard S, Jacksonville	40
Logistic Professionals of FL, Inc. / LPF, Inc.	5310 Phillips Highway, Jacksonville	16
Penser Transportation, Inc.	11001 Pritchard Road, Jacksonville	15
N G H Trucking, Inc.	5310 Phillips Highway, Jacksonville	14
Yusen Logistics (Americas) Inc.	13901 Sutten Park Dr. S, Ste. 270, Jacksonville	10

END USERS OF TRUS WITH DISTRIBUTION WAREHOUSES

ICF was able to gather a list of end users with sizable fleets of TRUs that can be targets for conversion in the future. In addition to targeting companies with fleets of TRUs, ICF gathered a list of companies with distribution warehouse facilities. Table 24 lists the companies located across JEA's service territory with distribution warehouses in which electrical infrastructure would be necessary. If a truck has an E/S TRU with a place to plug in, such as at a warehouse while it's parked, the E/S TRU is a very beneficial electrotechnology.

Table 24 – TRU End Users with Distribution Warehouses

Company	Warehouse Bays (and docks)
Champion Brands, Inc.	1 bay, 6 dock
Customized Distribution LLC / CDI	5 bays, 5 dock
Dandee Foods	6
Miss Becky's Seafood, Inc. / Safe Harbor	3
North Florida Sales	10 to 15
Penser Transportation, Inc.	36
Sunrise Fresh Produce LLC	16
SYSCO Jacksonville, Inc.	30 to 40
The Garden Wholesale	21

HEAVY-DUTY TRUCK STOP ELECTRIFICATION

DESCRIPTION

www.shorepower.com

Heavy-Duty Truck Stop Electrification (H-D TSE) gives large commercial trucks, with trailers up to 53', the ability to shut off their diesel engines, eliminating idling emissions while parked in a warehouse parking lot, freight dock, or at a rest stop. The purpose of H-D TSE is to allow the interior of the truck cab to maintain a comfortable temperature while parked for several hours or more. H-D TSE consists of a heavy-duty truck being equipped with an onboard device that can be powered by the electric grid. This device can either be installed by the manufacturer or purchased and installed as a retrofit. Electrification devices allow trucks to have adequate heating, cooling, electricity, and communications all while using electricity, rather than diesel fuel. Usually, the power required is single-phase at 110 volts, which means a normal extension cord can be used when the truck is parked near power pedestals with electrification facilities.

During a typical shift, heavy-duty truckers will rest for eight to ten hours at a time, and often, truckers will use rest stops that have designated parking spaces for truck trailers. While parked at rest stops, truckers need electric power in order to have cooling, heating, and internet capabilities. Rarely will truckers need this type of power while sitting at a warehouse as a typical heavy-duty truck trailer never stops moving for long periods unless required.

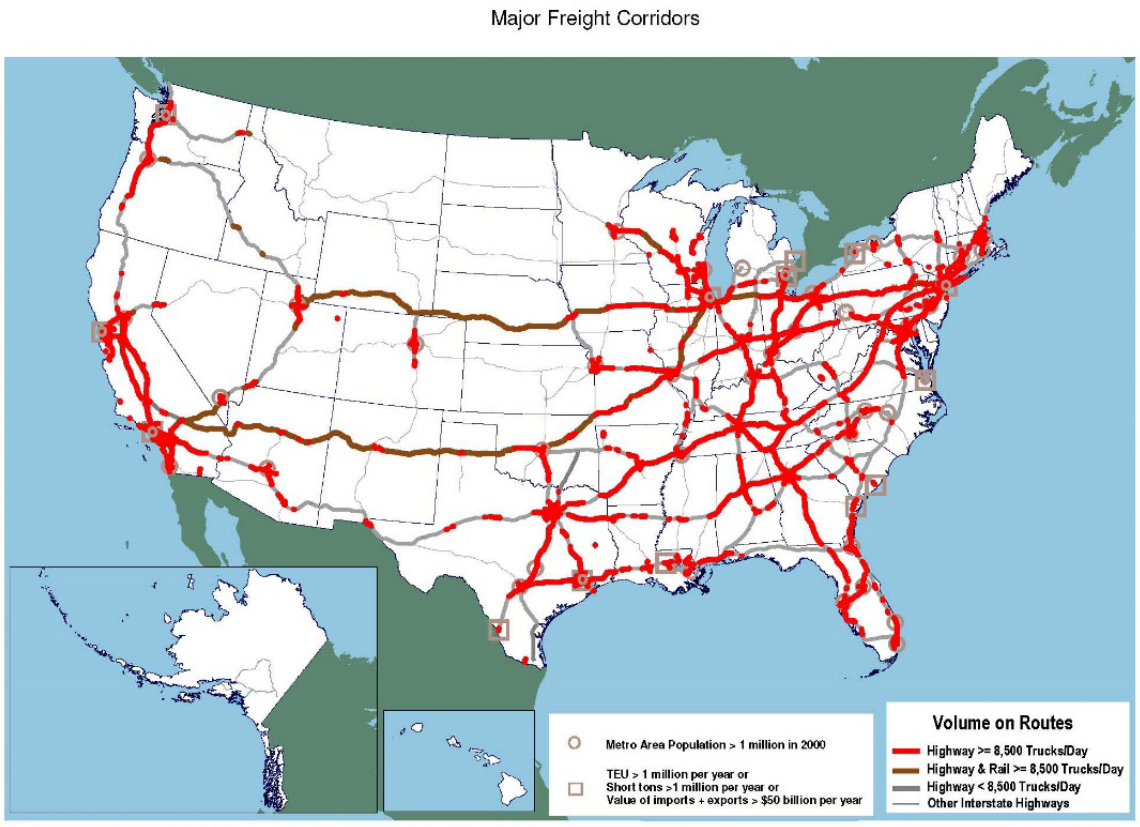
H-D TSE equipment, such as the power pedestals located at truck stops, is absent from JEA's service territory. The power receptacles located on the long-haul trucks is an optional feature installed by the truck manufacturers, such as Volvo and Peterbilt; however, typically, the manufacturers go ahead and order them as a standard feature before the trucks are delivered to the dealerships.

METHODOLOGY

JEA's service territory has many different distribution channels, including the intersection of I-10 with I-95, which would include use by heavy-duty trucks. In fact, the interstates in JEA's service territory each have over 8,500 trucks per day using the highway system. By 2040, heavy-duty truck traffic across the country is expected to increase dramatically on the major Interstate arteries, and daily miles traveled could exceed 662 million miles per day.

Figure 2 illustrates the current major highway arteries passing through JEA's service territory, and as can be seen, Jacksonville serves as a main artery for goods distributed by heavy-duty trucks.

Figure 2 : Highway Arteries & Truck Volume – US



Note: Highway & Rail is additional highway mileage with daily truck payload equivalents based on annual average daily truck traffic (2011) plus average daily intermodal service on parallel railroads. Average daily intermodal service is the annual tonnage moved by container-on-flatcar and trailer-on-flatcar service divided by 365 days per year and 16 tons per average truck payload.
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, 2013

H-D TSE MARKET CONTACTS

To determine the potential market size and opportunities for the H-D TSE technology, ICF interviewed Shorepower Technologies, a manufacturer of power pedestals in which power is supplied to the truck cab through an electrical outlet rather than a window unit. ICF also identified online resources typically accessed by truckers for locating fuel stops, and was able to identify numerous truck stops throughout JEA's service territory. Using the major metropolitan areas as a guide along with maps of the entire JEA service territory, ICF identified the major routes that traverse throughout the service territory in order to develop the list of truck stops to target. Truck stops with a minimum of 25 parking spaces were selected because the assumption is that JEA will want to target facilities in which a larger amount of equipment can be installed to remain cost effective.

PLUG IN CHARACTERISTICS AND ASSUMPTIONS

Typically and on average, a truck will plug in for nine hours, due to the rest requirements set by the U.S. Department of Transportation. For this assessment, we assumed a 9-hour charge time and 260 days to maintain a conservative approach. This number of days was based on the information contained in a study performed by Texas A&M University's Transportation Institute.[6]

Over the next several years and as more truck manufacturers install the TSE power receptacles, more heavy-duty trucks will have the capability to plug in using a common extension cord, a power connection plug, or have other idle-reducing equipment onboard in order to turn off engines when resting. Eventually, based on increasing pressure to improve air quality and reduce emissions across the country, it is anticipated that many truck rest areas will offer accommodations for truckers to plug in while resting. As a result, truck stops are a viable target to have this TSE technology installed. In addition, H-D TSE presents JEA with an avenue to improve air quality while also realizing the benefits of increased revenue.

TECHNICAL POTENTIAL

The objective of H-D TSE is to identify the technical potential (total market population) of available parking spaces for TSE across the JEA service area. ICF gathered the available number of parking spaces at the truck stops located in JEA's service area.

Table 25 shows the deemed values on a per-parking-space basis that were used for these calculations.

[6] http://tti.tamu.edu/

Table 25 – Deemed Values – H-D TSE

	Demand (kW)	Electricity (kWh)
Truck Stop Parking Space	7.1	14,910

The deemed values shown above for H-D TSE were derived from the following reports:

- Reference pdf tab 6/26 for the average demand value of 7.1 kW at http://www.ctre.iastate.edu/pubs/truck_idling/virden.pdf
- Operating Hours and reference Page 3, second paragraph, use 2,100 hrs at http://tse.tamu.edu/pdfs/Truck_Stop_Electrification_as_a_Strategy.pdf
- Multiply Demand by 2,100 to get the kWh value

Table 26 illustrates the number of parking spaces and the associated truck stops in Duval County along with the cumulative demand and electricity consumption.

Table 26 – Truck Stops and Parking Spaces – Duval County

Truck Stop Name	Address	City	Parking Spaces
KANGAROO EXPRESS	1001 Lane N Ave	Jacksonville	50
KANGAROO EXPRESS	4129 Sportsman Club Rd	Jacksonville	50
PILOT TRAVEL CENTER	1625 County Road 210 West	Jacksonville	30
TRAVEL CENTERS OF AMERICA	1650 County Road 210 West	Jacksonville	130
TRAVEL CENTERS OF AMERICA	1024 US 301 South	Baldwin	90
PILOT TRAVEL CENTER	1050 US 301 South	Baldwin	50
		Total	**400**
		Demand	**2,840 kw**
		Electricity	**5,964,000 kWh**

GOLF CARTS

DESCRIPTION

A golf cart is a small vehicle originally designed to carry two golfers and their golf clubs around a golf course or on desert trails with less effort than walking. Golf carts come in a wide range of formats and are generally used to carry small numbers of passengers for short distances at speeds of less than 15 mph. The price of a golf cart can range anywhere from under $1,000 to well over $20,000 per cart, depending on several factors.

www.globaltrailer.net

These factors may include whether or not a fleet of carts is being purchased for a golf course or a country club, and whether the carts are new or used. Other factors may include options such as equipment requirements, and how many people the cart is meant to transport. With the rise in popularity of golf carts, many golf clubs or country clubs offer storage and energy options to golf cart owners. Typical modifications for golf carts include windshields, ball cleaners, cooler trays, upgraded motor or speed controller (to increase speed and/or torque), and lift kits.

Originally, golf carts were electrically powered, but in time, gasoline-powered variants started to occur. The electric variety is now used in many communities where their lack of pollutants, lack of noise, and safety for pedestrians (due to slow speeds) are beneficial. When purpose-built for general transportation, golf carts are often called Neighborhood Electric Vehicles (NEVs), but with various operating limitations such as top speed and heavy regulation on which type of streets these types of carts are permitted to be used. NEVs may resemble golf carts, although some are now being made with all-weather car-like bodies.

METHODOLOGY

During past market assessments, ICF interviewed golf cart manufacturers and several golf cart dealers, but all parties were reluctant to share actual sales data. It should be noted that all contacts shared the same consensus for the breakdown of electric- to gas-powered golf carts sold, which was that electric-powered golf carts comprise approximately 80% of the new sales.

ICF identified the web sites for the Florida State Golf Association and the Professional Golfers Association (PGA) as resources to obtain a directory of golf courses in Duval County and how many holes each course has. Upon review of data from both of these sources, ICF determined there are 22 golf courses in JEA service territory in Jacksonville, Mayport, Jacksonville Beach, and Atlantic Beach. All 22 golf courses were contacted to obtain data regarding their golf cart populations but only 12 responded. Table 27 shows the market contacts for golf carts that were successfully contacted for this assessment.

Table 27 – Golf Course Contacts

Golf Course Contacts
The First Tee of Jacksonville/Brentwood
Bent Creek Golf Course
Blue Cypress Golf Club
Fiddler's Green At Cecil Field
Hyde Park Golf Club
Jacksonville Beach Golf Club
Jacksonville Golf & Country Club

NAS Jacksonville Golf Club
San Jose Country Club
The Deerwood Country Club
Windsor Parke Golf Club
Windy Harbor Golf Club

Golf carts are also often popular modes of transportation in assisted living or retirement communities. ICF contacted 3 retirement communities in JEA's service territory, shown in Table 28, to learn about their current golf cart populations. However, all three communities did not own any golf carts. This may be because they are more compact, urban-based communities that do not require walking long distances.

Table 28 – Retirement Community Contacts

Retirement Communities
Atria San Pablo
Augustine Landing
Camellia at Deerwood

ICF also contacted the Data Listing Unit of the Florida State Division of Motorist Services to obtain information regarding registered golf carts, but golf carts are no longer allowed to be titled or registered unless they are classified as low speed vehicles, which would be crossing into on-road technologies. Since this market assessment focuses on non-road technologies, the Florida State Division of Motorist Services was not able to provide any relevant data.

TECHNICAL POTENTIAL

As a result of the interviews and based on the feedback obtained, ICF was able to calculate the approximate population of golf carts in Duval County. ICF interviewed twelve golf courses within the JEA service territory to gain an understanding of how many golf carts are typically used at golf courses. Table 29 lists the data obtained from those sources.

Table 29 – Golf Course Data

Golf Course	Number of Golf Carts	Electric	Gas/Diesel	Holes	Carts/Hole
Bent Creek Golf Course	**75**	75	0	**18**	4.17
Blue Cypress Golf Club	**32**	0	32	**9**	3.56
Fiddler's Green At Cecil Field	**61**	16	45	**18**	3.39
Hyde Park Golf Club	**70**	70	0	**18**	3.89
Jacksonville Beach Golf Club	**68**	68	0	**18**	3.78
Jacksonville Golf & Country Club	**52**	52	0	**18**	2.89

NAS Jacksonville Golf Club	**110**	110	0	**24**	4.58
San Jose Country Club	**64**	64	0	**18**	3.56
The Deerwood Country Club	**66**	56	10	**18**	3.67
The First Tee of Jacksonville/Brentwood	**26**	0	26	**9**	2.89
Windsor Parke Golf Club	**70**	70	0	**18**	3.89
Windy Harbor Golf Club	**75**	75	0	**18**	4.17
TOTAL	**769**	656	113	**AVERAGE CART/HOLE:**	3.70
	PERCENT OF POUPLATION:	85.3%	14.7%		

Based on feedback from the golf courses and golf cart dealers, ICF determined that there are approximately 3.7 golf carts per hole at each golf course, and across the industry, about 85.3% of the existing golf carts are already electric-powered. ICF used the patterns found in the golf course data in Table 29 to estimate the golf car populations for the remaining 10 golf courses in JEA service territory, the results are shown below in Table 30.Table 30 – Golf Course Estimated Data

Table 30 – Golf Course Estimated Data

Golf Course	Holes	Estimated Golf Carts	Electric	Gas/Diesel
Atlantic Beach Country Club	18	67	57	10
Blue Sky (formerly Mill Cove Golf Club)	18	67	57	10
Champions at Julington Creek	18	67	57	10
Cimarrone Golf & Country Club	18	67	57	10
Deercreek Country Club	18	67	57	10
Glen Kernan Golf & Country Club	18	67	57	10
Hidden Hills Country Club	18	67	57	10
Pablo Creek Club	18	67	57	10
Queens Harbour Yacht & Country Club	18	67	57	10
Timuquana Country Club	18	67	57	10
TOTAL	180	670	570	100

The existing golf course data combined with the estimated data totals 1,439 golf carts with about 213 of them being gas or diesel powered.

Table 31 shows the deemed values for golf carts and Table 32 lists key assumptions used in their derivation. The deemed values were derived from the following: Environ 2013 Report – National Inventory of Off-Road Electric Equipment.

Table 31 – Deemed Values – Golf Carts

Deemed Values	Demand (kW)	Electricity (kWh)
Golf Carts	4.2	3,390

Table 32 - Calculation Assumptions – Golf Carts

	Average Load Factor	Average Horse Power	Total No. Equipment	Total Energy Used (kW-hr)
Golf Carts	0.6	9	193,284	655,184,199
Demand per Unit	4.2	Average Horsepower *Average Load Factor * 0.746		
kWh per Unit	3,390	Total Energy/Total number of Equipment		

Table 33 lists the technical potential for golf carts in JEA's service territory.

Table 33 – Technical Potential – Golf Carts

Golf Carts	
Golf Courses	22
Carts per Hole	3.7
Golf Cart Population	1,439
Electric	1,226
Gas	213
Demand (kW)	894.6
Electricity (kWh)	722,070.0

SHORE POWER (COLD IRONING)

DESCRIPTION

www.marineinsight.com

Shore Power (a.k.a. cold ironing) is the process of powering an ocean-going vessel or other craft with shore-based electrical power in lieu of the vessel using its on-board auxiliary engine generator sets when the vessel is at the dock. The period of time when the vessel is at the dock is referred to as "hoteling". Cold Ironing has been used by the US military for over 50 years and has recently been applied in Juneau, Alaska and the Port of Seattle for cruise ships. Ships at berth require power for minimal functions. Typically, an ocean-going ship ready for shore power has a large cable that plugs into a very large electrical "outlet" at the dock. This connection allows electricity from the electric grid to power the berthed vessel so that the ship's diesel engines can be

turned off. Thus, shore power nearly eliminates diesel emissions and reduces emissions of other air pollutants that would otherwise come from a vessel at berth running its diesel engines. It is generally easier to retrofit or convert a cruise ship to be shore power-capable since they are typically more modern compared to cargo ships.

Currently Jacksonville's Port, JAXPORT, is home to one cruise ship, Carnival Fascination, which offers four-day and five-day cruises from Florida to the Bahamas and Key West. The Carnival Fascination accommodates up to 2,052 passengers and sails from Jacksonville with an average of 120 percent occupancy (a cruise ship is considered 100 percent occupied when two passengers are booked per cabin).

METHODOLOGY

To calculate the technical potential of cruise ship shore power in Jacksonville, ICF used a theoretical approach to determine the average demand for cruise ships based on typical auxiliary engine power for cruise ships. In 2006, ICF prepared a report, "Current Methodologies and Best Practices for Preparing Port Inventories," for the EPA which included estimates regarding cruise ship auxiliary power during different modes, including "hoteling". At the time of this assessment, attempts were made to gather information from JAXPORT regarding Carnival Fascination's actual horsepower or typical energy consumption but ICF was unable to establish a reliable source.

ICF was able to obtain the annual schedule for Carnival Fascination using the dates and times posted on the Carnival Cruise Lines website.[7] Using this data, ICF determined the time spent at port and calculated the annual electricity required (kWh).

TECHNICAL POTENTIAL

Table 34 shows cruise ship auxiliary engine estimates used by ICF in their report for the EPA on port emission inventory methodologies. According to the data, an average cruise ship has about 4.7 auxiliary engines totaling around 11,000 kW when all are in use. While hoteling the cruise ship uses about 0.64 of the load factor, which is 7,040 kW of the total auxiliary engine power.

Table 34 – Cruise Ship Demand[8]

Ship Type	Average Propulsion Engine (kW)	Average Auxiliary Engines			Load Factor while Hoteling	Total Power while Hoteling (kW)
		Number	Power Each (kW)	Total Power (kW)		
Cruise Ship	39,600	4.7	2,340	11,000	0.64	7,040

[7] http://www.carnival.com/cruise-ships/carnival-fascination.aspx

[8] http://epa.gov/ttnchie1/conference/ei15/session1/browning.pdf

For each take it makes, the Carnival Fascination docks at JAXPORT from 8AM to 4PM, with a total berthing time of 8 hours. When accounting for the time it takes to transition the ship from ship to shore power (about 1 hour both when it docks and leaves), this leaves about 6 hours for shore power. Table 35 shows the annual docking habits for Carnival Fascination.

Table 35 – Carnival Fascination Docking Habits

Ship	Annual Visits	Total Berthing Time (hrs)	Time Available for Shore Power (hrs)	Annual Time to Plug In (hrs)
Carnival Fascination	76	8	6	608

Carnival Fascination spends 20.8% of its time at dock in Jacksonville. It is also notable that 7% of its schedule (or 33% of its time spent at dock) is spent there on weekends during off peak hours. Table 36 illustrates the resulting technical potential for shore power for cruise ships at JAXPORT.

Table 36 – Shore Power – Technical Potential

Shore Power Technical Potential	
Cruise Ships	1
Annual Plug-In Time (hrs)	608
Demand (kW)	7,040
Electricity (kWh)	4,280,320

CRANES

DESCRIPTION

Cranes are equipment that can be used to maneuver heavy goods and items from one place to another. There are three types of cranes: overhead, mobile and fixed.

An overhead crane, also known as a bridge crane, is a type of crane where the hook-and-line mechanism runs along a horizontal beam that runs along two widely separated rails. Oftentimes but not always the case, these cranes are found in long factories and run along rails between two long walls.

A mobile crane is a cable-controlled crane mounted on crawlers or rubber-tired carriers or a hydraulic-powered crane with a telescoping boom mounted on truck-type carriers or as self-propelled models. They are designed to transport to a site and to use with different types of load and cargo with little or no setup or assembly. There are various kinds of mobile cranes:

- Truck-mounted crane
- Side lift crane

- Rough Terrain crane
- Pick and carry crane
- Gantry crane
- Carry deck crane
- Telescopic handler crane
- Crawler crane
- Railroad crane
- Floating crane
- Aerial crane

The fixed crane gives up mobility for the ability to carry greater loads and reach greater heights due to increased stability, these types of cranes are characterized by the fact that their main structure do not move during the period of use. However, many can still be assembled and disassembled.

There are several different kinds of fixed cranes:

- Tower crane
- Self-erecting crane
- Telescopic crane
- Hammerhead crane
- Level luffing crane
- Deck crane
- Jib crane
- Bulk-handling crane
- Loader crane
- Stacker crane
- Gantry Crane

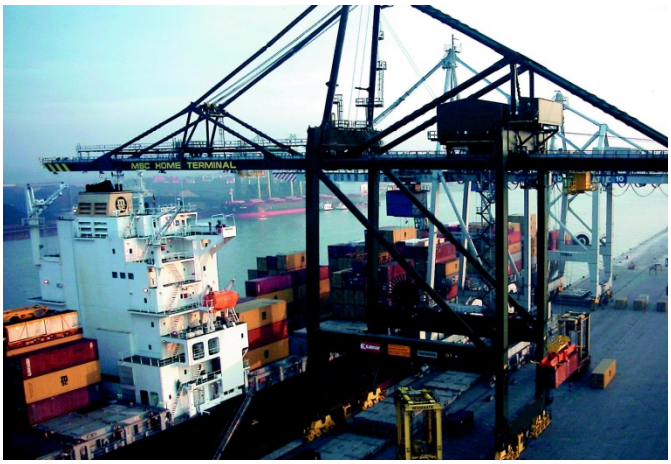
The lifting capacities of container cranes are actually what determine the crane's classification. Each of the classifications[9] is named for cranes that are fully capable of loading and unloading ships

- A Panamax crane can handle ships with 12 to 13 rows wide of containers. These ships can pass through the Panama Canal.
- A Post Panamax crane can handle ships with 18 rows wide of containers, but the ships are usually too large to pass through the Panama Canal.
- A Super-Post Panamax is the classification given to cranes that can handle ships with 22 containers wide or more.

[9] IntlMOVE Moving Overseas Blog, http://intlmove.info/tag/containers-cranes/

CARGO HANDLING CRANES

Cargo handling cranes are commonly found at ports and at rail intermodal facilities. There are several different types of cranes used for cargo handling duties at these sites. The most common types of cranes found at ports and rail intermodal facilities are fixed, deck cranes, also called Ship-to-Shore (STS) cranes, and mobile cranes known as Rubber-Tired or Rail-Mounted Gantry cranes (RTG and RMG). Both types of cranes can also be purchased as wide-span gantry cranes (WSC).



www.maritimejournal.com

The STS cranes tend to move containers to and from ships at Ports. Container cranes are generally classified by their lifting capacity, and the size of the containers on ships they can load and unload. These cranes, which are commonly available in either diesel or electric mode, stay in a well-defined area of the dock and typically work and idle constantly while a container ship is at port. STS cranes are either diesel or electric and the electric models get power from the dock with an electrical service requirement ranging from 4,160 to 13,800 volts depending on use[10].

RTG and RMG cranes are large mobile cranes in widespread use at ports around the world. They are used land-side to stack and move containers around a terminal. The gantries on which the cranes are mounted move either on rails (rail-mounted, RMG) or rubber tires (RTG). RTG cranes typically ride on 16 wheels. At busy container ports, gantry cranes can be run almost around the clock; it is common to find gantry cranes working 4,000–5,000 hours per year[11].

RTGs are used at container terminals and container storage yards to straddle multiple lanes of rail/road and container storage, or when maximum storage density in the container stack is desired. Conversely, RMGs are specialized yard container handling machines, and travel on rails to lift and stack 20’ or 40’ containers in the yard area. The container is lifted by a spreader attached to cables. RMGs come in a variety of models with different spans and overhangs. RMGs are specifically designed for intensive container stacking due to its automation and less need for human handling. RMGs are particularly effective for rail and/or road shipments of large quantities of containers. RTGs and RMGs can greatly improve air quality by loading and unloading cargo from ships that call

[10] *Electric Ship to Shore Cranes: Costs and Benefits.* EPRI, Palo Alto, CA: 2009. 1020510.

[11] *Electric Cable Reel Rubber-Tired Gantry Cranes: Costs and Benefits.* EPRI, Palo Alto, CA: 2010. 1020646.

on the ports while being powered by electricity. When these cranes are powered by diesel fuel, many harmful emissions can stay in the region while the cranes are operating. Once a diesel-powered crane has been replaced with an electric equivalent, the crane is powered by a direct electrical feed, which is necessary due to the large power requirements. The layout of the port facilities will often determine how the cranes are installed and whether or not they will operate with electric power.

WIDE-SPAN GANTRY CRANES

As the volume of container-packed goods being shipped continues to rise around the world, an increasing need for trimodal cargo handling equipment, such as wide-span gantry cranes, continues to rise as well. Wide-span gantry cranes (WSGs), which are cranes that can conceivably move cargo between water, rail, and roads, are gaining increased interest from ports and intermodal facilities around the country. WSGs are wider, driven by electrical power, and have a faster speed while handling cargo, when compared to RTGs and/or RMGs. WSGs can easily process more cargo because they offer higher stacking densities and greater lifting capabilities. WSGs are often quieter and have no direct on-site emissions.

METHODOLOGY

To determine the technical potential for cranes in JEA's service territory, ICF researched existing crane populations at CSX Corporation's intermodal facility and Jacksonville's port, JAXPORT. At the time of this assessment, ICF was unable to successfully contact a representative from JAXPORT and instead used data provided on the port's website. However, ICF was able to contact a representative from CSX, and their contact information is shown in Table 37.

Table 37 – JEA Crane Contacts

Company	Contact	Title
CSX Corporation	Meaghan E. Atkinson	Manager Environmental Programs and Sustainability

TECHNICAL POTENTIAL

CSX is one of the nation's leading transportation suppliers and its headquarters located in Jacksonville. The CSX transportation network includes over 21,000 route miles of track in 23 states, and ICF was able to obtain information about their Jacksonville facilities. CSX has one intermodal facility in Jacksonville with the following diesel-powered cargo handling technology: 3 overhead cranes (RTGs), 3 side loaders, and 3 empty handlers. The side loaders and empty handlers are not technically cranes nor do they have electric equivalents at this time. CSX provided the overhead cranes' horsepower which can be converted to predict the specific unit and total demand and kWh shown in Table 38.

Table 38 – CSX Jacksonville Cranes

# Overhead (RTG)s	Horsepower (hp)	Demand (kW)	Electricity (kWh)
Per Unit Spec	*330*	*246*	*279,363*
3	990	738	838,089

CSX's cranes in Jacksonville are used to transport goods to and from the rail, truck, and ground. There is already some penetration of electric cranes at CSX's facilities- their facilities in Northwest Ohio (NWOH), Columbus, and Winter Haven all have electric wide span cranes. Their facility in Worcester has Hybrid Diesel-Electric RTGs.

JAXPORT has 3 terminals: Blount Island, Talleyrand, and Dames Point with the mechanical handling facilities detailed in Table 39.

Table 39 – JAXPORT Mechanical Handling Facilities

Terminal	Container Cranes			Whirly Crane		Rubber Tired Gantry Crane (RTGs)		Container Stacker
	50-ton	45-ton	40-ton	112-ton	100-ton	50-ton	40-ton	40-ton
Blount Island	5	1	2	1				
Talleyrand	1	2	1		1	2		1
Dames Point	2		4				6	
TOTAL	17			2		8		1

Since ICF was unable to meet with or speak to a representative from the port, data regarding the crane energy usage, horsepower, and uses were unable to be obtained. Container cranes most likely refer to ship-to-shore (STS) cranes. Whirly cranes can rotate 360 degrees but can often be replaced or compared to wide-span ship-to-shore cranes. At this time, there is not an electric alternative for container stackers. ICF used the following deemed values in Table 40 for estimating the technical potential for the cranes at JAXPORT in Table 41.

Table 40 – Deemed Values – Cranes

Deemed Values	Demand (kW)	Electricity (kWh)
Ship-to-Shore	204.4	232,127
Wide-Span	21,625	51,900,000
Rubber Tired Gantry	337.94	383,773

Table 41 – Crane Technical Potential

	Ship-to-Shore Cranes	Wide-Span Cranes	Rubber Tired Gantry Cranes	Total Technical Potential
Number of JAXPORT Cranes	17	2	8	
Estimated Demand (kW)	3,474.8	43,250.0	2,703.5	
Estimated Electricity (kWh)	3,946,164	103,800,000	3,070,184	

Number of CSX Cranes	0	0	3	
Demand (kW)	0	0	738.0	
Electricity (kWh)	0	0	838,089	
Total Demand (kW)	3,474.8	43,250.0	3,441.52	50,166.3
Total Electricity Consumption (kWh)	3,946,164	103,800,000	3,908,273	111,654,437

CONCLUSION

Growing the market presence and operation of electric-powered non-road transportation technologies increases load which directly results in increased revenue for JEA while also putting downward pressure on rates and keeping rates affordable for utility customers. This market assessment illustrates the technical potential for the ten selected technologies summarized in Table 42.

Table 42 – Electrotechnologies Technical Potential: Entire JEA Service Territory

Technology Type	Population - Inventory	Demand (kW)	Annual Electricity (kWh)
Rapid Charge Forklifts	1,584	27,086	23,945,328
Conventional Charge Forklifts	1,056	7,392	15,304,608
Aircraft Tractors / Pushbacks	20	1,520	1,420,580
Baggage / Tow Tractors	60	1,920	1,682,100
Belt Loaders	40	672	543,840
GPUs	20	1,622	1,291,540
TRU	512	5,888	10,107,904
H-D TSE	400	2,840	5,964,000
Golf Carts	213	895	722,070
Shore Power	1	7,040	4,280,320
Ship-to-Shore Cranes	17	3,475	3,946,164
Wide-Span Cranes	2	43,250	103,800,000
Rubber Tired Gantry Cranes	8	3,442	3,908,273
Totals		107,041	176,916,727

The next step will be to conduct a cost benefit analysis of the selected technologies for the electrotechnology incentive program. In addition, an implementation plan detailing potential marketing activities for the technologies will be developed and provided to JEA.

NON-ROAD ELECTRIFICATION IMPLEMENTATION PROGRAM
APPENDIX A - TECHNICAL SPECIFICATIONS

1. JEA BACKGROUND AND OVERVIEW

JEA is the 8th largest municipal utility in the country and provides electric, water, and sewer utility services to customers in Jacksonville, Florida and parts of three adjacent counties. JEA has over 460,000 electric customers, of which included over 52,000 Commercial and industrial (C&I) customers.
JEA owns four power plant sites in Jacksonville, has an ownership interest in a power plant in Georgia, and purchases power from several solar fields and landfill gas facilities. The total summer net capacity is 3,007 MW, and the total available winter net capacity is 3,330 MW. See more information on JEA at https://www.jea.com/About/Electric_Systems/.

1.1. JEA GENERATION

JEA solely owns and operates four generating plants: the J. Dillon Kennedy Generating Station (Kennedy), the Northside Generating Station (Northside), the Brandy Branch Generating Station (Brandy Branch), and the Greenland Energy Center (GEC). JEA and FPL are also joint owners of Unit 4 at Georgia Power Company's coal fired Robert W. Scherer Plant (Scherer), which is located in Macon, Georgia and operated by Southern Company. JEA has power purchase contracts for a total 33 MW solar PV and 15 MW landfill generations.

1.2. PEAK AND NON-PEAK LOAD CONSIDERATIONS

Significant consideration will be given to amount of peak vs non-peak MWH with the desire for as **much non-peak as possible** to prevent unnecessary burden of the additional costs of peak generation.
As a dual peaking utility, JEA's winter peaks (5 mos) are more severe peak demands for short periods of time and summer peaks (7 mos) longer duration.
For completion of Quotation of Rates table within Proposal Response form and for purposes of characterizing peak vs non-peak percentages, reference JEA Rate Tariff COM23TODhttps://www.jea.com/My_Account/Understand_My_Bill/Rates/Tariff_Schedule/ using following definition of peak pricing periods for your calculations of peak vs non-peak:

On-Peak periods shall be defined as follows:
6 a.m.-10 a.m. - November through March; weekdays only
6 p.m.-10 p.m. - November through March; weekdays only
12 Noon-9 p.m. - April through October; weekdays only

1.3. BACKGROUND - JEA COMMERCIAL AND INDUSTRIAL (C&I) CUSTOMERS

1.3.1. COMMERCIAL CUSTOMER ACCOUNT STATISTICS

	SA Count*	MWH billed FY 2017*	Percent of Total Billed
COM20 General Service (Small Commercial) – No KW charges only kWh	45,033	1,243,858	10.37%
COM30 GSD (Mid-Size) – 75KW monthly or more, billed for KW and Kwh	4,020	2,733,769	22.80%
IND40 GSLD (Large industrial) - 1,000KW or more monthly, billed for KW and Kwh	140	1,364,551	11.38%
Curtailable & Interruptible (Must be GSLD customer)	63	1,075,413	8.97%
Totals (C&I)	49,256	6,417,591	
Total Billed**	463,279	11,989,950	
*SA Count and MWh from UBR Elec Revenues Report Sept 2017			
**Total billed include all classes minue Internal JEA			

1.3.2. ACCOUNT EXECUTIVES (AE'S)

AE's serve as customer liaison to provide ongoing support for power quality, T&D services, conduct annual rate reviews, review account services and assist customer's budget analysis with regards to energy expenditures. For purposes of support to the NRE program, the AE's can provide knowledge of introductions to major accounts including all large commercial and industrial accounts and NRE programs. JEA would utilize similar AE engagement model used for our Investsmart Custom programs. In the Customer energy efficiency program AE's arrange for the initial customer contact, help qualify projects and remain in communication with Implementation Contractor as projects evolve. AE's play a key role as a bridge between the NRE Implementation Contractor, customer and JEA.

1.4. OTHER C&I PROGRAMS

JEA's commercial programs are diverse, JEA offers education and audits which helps to inform and target cost effective opportunities. JEA offers smaller disadvantaged businesses Energy Management education and assistance in energy planning, some small Direct Install, as well as access to the commercial prescriptive rebates. Commercial programs provide incentives to upgrade to more efficient products such as energy efficient lighting, appliances, controls, HVAC, refrigeration, and various building insulation measures. JEA also provides incentives to tune - up existing systems such HVAC systems and building envelope systems. JEA's custom program offers diversity to commercial businesses in tackling specialized processes and applications. For more information on C&I programs visit jea.com at: https://www.jea.com/ways_to_save/commercial_rebates/

1.5. PURPOSE OF NON-ROAD ELECTRIFICATION (NRE) PROGRAM(S)

Previous studies have revealed opportunities for reducing emissions and fuel consumption of non-road vehicles and stationary goods-moving equipment by converting them to electric drive. The studies have shown that electric drive non-road equipment can lessen the environmental impact of user operations and reduce end-user life cycle costs by cutting fuel costs, improving operating efficiencies, and lowering maintenance expense. The advantages of electric drive have been verified in various locations: at seaport loading docks, on airport runways, and in warehouses and manufacturing plants.

This **Non-Road Electrification (NRE)** program is intended to provide JEA with load growth/preservation with **priority on building the non-peak loads** also known as "valley-filling." As a municipal utility, JEA has obligation to the community to provide load build/preservation programs that operate to maintain

system integrity i.e. Off Peak, prevent upward pressure on rates, and enable customers to improve their operations.

JEA seeks, first, an experienced Company, which can immediately transition to and successfully continue the existing NRE programs in the market. Second, the winning bidder is to show strong experience and ability to conduct a comprehensive update to the original market analysis (attached) focusing on innovative and appropriate expansion of this program as best indicated for the enhancement and benefit of JEA customers. JEA is seeking a competent bidder who can support JEA in the development of an electrification strategic plan for the next 1 to 3 years. The market forecast will provide additional opportunities for NRE programs and continue to characterize achievable potential for NRE in the JEA service territory. The winning company will plan the NRE program features for the remainder of the contract period based on the most advantageous results of this forecast. The winning company will provide evidence of experience in acting as an expert consultant in leading JEA in the development and implementation of a state of the art NRE program over the next ten years.

1.5.1. NRE PROGRAM BENEFITS

The anticipated benefits include:

- Identifying opportunities to reduce carbon emissions and environmental impacts
- Effectively apply investments to achieve lower energy costs for commercial and industrial customers
- Understanding the environmental impact of new technologies, and their potential for meeting environmental and efficiency policies and standards
- Quantify the economic impact to the customer and energy provider of the implementation of an non-road electric-drive conversion program
- Responsible, cost effective load growth/preservation

1.6. SCOPE OF SERVICES

1.6.1. Budget and Contract Term

The initial contract for implementation services and market potential study is 3 years.

1.6.2. IMPLEMENTATION SERVICES AND MARKET FORECAST

The IC will provide those services that include:

1. Perform Market Outreach Activities to drive NRE project activity
2. Develop Trade Ally Network
3. Provide Cost-effectiveness analysis tool
4. Perform rebate processing services
5. Provide call center support and call center quality assurance
6. Provide Project management software to track individual NRE projects and provide management reporting to support decision making
7. Develop Cost/Benefit model in collaboration with JEA Portfolio services
8. Provide engineering support services to qualify/review projects against cost /benefit model
9. Provide a Market Analysis Forecast according to the following:

1.6.3 MARKET STUDY

Perform an update to the existing Market Potential Study (attached as Appendix A) which will include adjustments for current participants, new technology and standards, and growth. The study will include an outlook for the next 10 years and will include annual achievable potential for on-peak and off-peak energy, and on peak capacity for both summer and winter. This market assessment is to quantify the technical and economic potential of available fossil fuel equivalents that can be converted to electric equivalents or have electric chosen as method of fuel for new equipment. Based on the forecast results, JEA is seeking a competent bidder who can support JEA in the development of an electrification strategic plan for the next 1 to 3 years. The market study shall be complete by December 2018.

1.6.3. SERVICE LEVELS

1	MWH Goals
1.1	Annual Gross MWH Growth = Contract Value
1.2	Annual Off Peak MWH = Contract Value Minimum 66% Off peak required
1.3	Annual On Peak MWH = Contract Value Maximum 33% On peak required
1.4	Semi-Annual kWh >= 90% of Proposed – See Appendix B – Response Workbook
2	**Program Design and Implementation**
2.1	Completion of Program Implementation Manual, change order request process procedures, and detailed start-up and launch plan within 1 month of contract signing
2.2	Develop Cost/Benefit model within 3 months of contract sign
2.3	Full transition of existing incentive program(s)within 2 months of contract signing
2.4	Fully Supports program design and implementation. This may include but is not limited to refinement of incentive levels, recommendations for addition or removal of specific measures, revision of program materials and creation of documents for JEA . Additionally, Vendor may provide expert witness support and assist in drafting responses to FL Public Service Commission upon request.
3	**Development/Management of Trade Ally network**
3.1	Active list of Trade Ally (contractor) network provided monthly
3.2	100% of qualified Trade Allies meet JEA insurance requirements upon application
3.3	Provide program communications and information to Trade Ally network as needed
3.4	If agreed to JSEB local contractors for set up of local office, provide documentation of outreach efforts & monthly JSEB reports as required.
3.5	Provide documentation of promotional efforts for JSEB trade allies
4	**Application/Incentive Processing**
4.1	Application processed and rebate checks issued within 30 days of project complete date determined via project management software
5	**Program Continuity**

5.1	Vendor will manage pipeline and completed project incentives to prevent funds shortage and program closure during every 12 month contract period
6	**Call Center / Customer Satisfaction**
6.1	Call Center will answer 80% of all calls within 30 seconds with no more than a 5% abandonment rate for annual call volume, tracked monthly
6.2	Quarterly survey of program participants results in 90% respondents answering with 8,9 or 10 on 10 point scale (8,9 & 10 are satisfied to very satisfied)
7	**Program Tracking Database/Dashboard**
7.1	Vendor to develop/utilize program tracking database consistent with specifications requested by JEA
7.2	Program project data transfer to JEA performed at end of each 12 months (Format to be agreed upon)
8	**Marketing / Outreach**
8.1	Vendor's marketing materials and outreach strategy reviewed and approved by JEA 100% of the time
9	**Reporting**
9.1	Vendor will prepare and provide monthly forecast and meeting to recap results and review forecasts each month of contract
9.2	Vendor will provide monthly reports of projects completed, related kWh on and off peak for completed units, and cumulative fiscal year data totals by the third of the month following the reported data period, to meet the JEA Scorecard deadline.
10	**Invoicing**
10.1	Vendor will submit T&M invoices for month by the 15th day of following month
10.2	Monthly Time & Materials(T&M) expenses for during initial contract 12 months not to exceed 1/24th of T&M total contract amount
11	**Market Potential Study**
11.1	Progress report update of market potential forecast each month for first 12 months of contract
11.2	Technical and economic potential study complete by 12th month of contract

1.7. JEA RESPONSIBILITIES

JEA will provide high-level administrative, contract management and oversight of program design, delivery, marketing of the selected Implementation Contractor.
In summary, the anticipated responsibilities for JEA utility staff are the following:

- Provide guidance and available inputs for market assessment
- Review and approval of final program design, measures, incentive levels, and marketing and outreach materials and strategy.
- Program contract oversight of management, financial planning, budgeting,
- Provide high-level guidance and direction to the Implementation Contractor
- Review and revision of Contractor proposed annual implementation plans and proposed milestones
- Engage with the Contractor team on a daily basis as a team player when working through strategy and policy issues
- Review and approve contractor invoices
- Ensure program activities are within budget and on schedule,
- Review of participation levels, MWH estimates, and progress toward MWH goals
- Oversight of the Evaluation, Measurement, & Verification activities with the Implementation Contractor,
- Field visits and speaking engagements at related community events,
- Provide guidance and direction on Contractor proposed new initiatives or strategies,
- Communicate to Contractor other JEA initiatives that may provide opportunity for cross-program promotion,
- Conduct field customer satisfaction surveys to evaluate customer awareness and participation in the NRE programs over time.
- Coordination of support systems including JEA.com
- Review and approval of printed materials and advertising plans
- Evaluation of program effectiveness and recommend modifications to programs and approach on an as needed basis,
- Perform periodic review of program metrics, conduct budget analysis and review evolving program design.
- Conduct periodic vendor performance reviews

1.8. NRE IMPLEMENTATION CONTRACTOR RESPONSIBILITIES

The following is a high-level review of JEA expectations for the Implementation Contractor's roles and responsibilities:

- Meeting Service Levels defined in Section 1.6.4. of the Technical Specifications
- Contract financial planning and budgeting
- Implementation and delivery planning
- Develop and Propose annual delivery plans, timelines, and milestones
- Conduct adaptive re-design analysis to optimize MWH objectives, work with JEA to determine individual program evolution
- M&V of projects to validate MWH
- Work closely with Commercial Account Executives to ensure smooth communication and contacts with JEA commercial customers.
- Cross-program promotion when appropriate.
- Maintain and manage contractor's operational database/Program Management Software which has a capability to deliver data extracts compatible with JEA's data import/export requirements and has functionality to allow JEA to review and track participation, spending, etc. via password protected entry.
- Incentive processing and payment services
- Field inspections of projects to ensure compliance

- In close coordination with JEA, develop marketing materials, including technical fact sheets, incentive forms, web-based incentive forms, mass media marketing materials, articles for trade association newsletters, radio promotions, and newspaper ads, as necessary
- Trade ally recruitment, screening, enrollment, training, quality assurance, technical seminars, and workshops,
- Provide training for JEA staff to help facilitate success and program coordination (e.g., orientation for JEA customer service operators)
- Policy/strategy and implementation planning/updates with JEA's program managers
- Coordinate with JEA, marketing efforts with JEA Marketing team
- Provide Call center – Supported by staff experienced and trained in providing NRE program assistance to commercial customers. Will coordinate customer interactions with JEA business center staff, contractor to set up single 800 number to manage customer/trade ally questions/concerns
- Monitor call center customer satisfaction and implement a system for tracking complaints to satisfactory resolution
- As requested, assist JEA with Florida Public Service Commission (FPSC) data requests and explanations, including participation (as requested) with any stakeholder meetings

MARKET STUDY FORECAST RESPONSIBILITIES

- Conduct updated market assessment for JEA based on original study provided.
- Include adjustments for current participants, new technology and standards and market growth.
- Include a 10 year outlook with annual achievable potential for on-peak energy, off-peak energy, and on-peak capacity for both summer and winter.
- Quantify the technical and economic potential of available fossil fuel equivalents that can be converted to electric equivalents or have electric chosen as method of fuel for new equipment.
- Complete the report within six months of award.
- Based on the forecast results, provide expert support to assist JEA in development of an electrification strategic plan for the next 1 to 3 years.

Appendix B - Minimum Qualification Form
xxx-18 Non-Road Electrification Program

GENERAL

THE MINIMUM QUALIFICATIONS SHALL BE SUBMITTED ON THIS FORM. IN ORDER TO BE CONSIDERED A QUALIFIED RESPONDENT BY JEA YOU MUST MEET THE MINIMUM QUALIFICATIONS LISTED BELOW, AND BE ABLE TO PROVIDE ALL THE SERVICES LISTED IN THIS SOLICITATION/TECHNICAL SPECIFICATION.

THE RESPONDENT MUST COMPLETE THE RESPONDENT INFORMATION SECTION BELOW AND PROVIDE ANY OTHER INFORMATION OR REFERENCE REQUESTED. THE RESPONDENT MUST ALSO PROVIDE ANY ATTACHMENTS REQUESTED WITH THIS MINIMUM QUALIFICATIONS FORM.

PLEASE SUBMIT THE ORIGINAL AND THREE (3) COPIES AND ONE (1) CD OF THIS FORM AND ANY REQUESTED ADDITIONAL DOCUMENTATION WITH THE BID SUBMISSION.

RESPONDENT INFORMATION

COMPANY NAME:_____

BUSINESS ADDRESS:_____

CITY, STATE, ZIP CODE:_____

TELEPHONE:_____

FAX:_____

E-MAIL:_____

PRINT NAME OF AUTHORIZED REPRESENTATIVE:_____

SIGNATURE OF AUTHORIZED REPRESENTATIVE:_____

NAME AND TITLE OF AUTHORIZED REPRESENTATIVE:_____

MINIMUM QUALIFICATIONS:

- Proposer must demonstrate experience performing a minimum of two similar (2) Technical Potential Market studies for electric utility providers in the past five (5) years ending April 1st, 2018.

  AND

- Respondent shall demonstrate successful completion of two (2) similar contracts providing implementation program services similar to those described in Appendix A – Technical Specifications in the past five (5) years ending April 1st 2018.
  - A similar contract is defined as providing implementation of electrification program services for customer incentives for an electric utility provider.

JEA will accept either two inclusive or four separate references to satisfy both of the minimum qualifications above.

Respondent shall provide references using the space indicated below.

Appendix B - Minimum Qualification Form
xxx-18 Non-Road Electrification Program

SIMILAR TECHNICAL POTENTIAL MARKET STUDY 1

Client Name_____

Client Address_____

Client Contact Person Name_____

Client Contact Person Telephone Number_____

Client Contact Person Email Address_____

Description of Services _____

SIMILAR TECHNICAL POTENTIAL MARKET STUDY 2

Client Name_____

Client Address_____

Client Contact Person Name_____

Client Contact Person Telephone Number_____

Client Contact Person Email Address_____

Description of Services _____

Appendix B - Minimum Qualification Form
xxx-18 Non-Road Electrification Program

SIMILAR CONTRACT REFERENCE 1

Client Name_____

Is this Reference an electrical utility provider? ☐ Yes ☐ No

Client Address_____

Client Contact Person Name_____

Client Contact Person Telephone Number_____

Client Contact Person Email Address_____

Date _____
The date when the service was implemented

Description of Services
Description of services provided should be similar to the services outlined in the scope of work. The description of services should also include the size, scope, goals, metrics, and performance of each referenced project

Appendix B - Minimum Qualification Form
xxx-18 Non-Road Electrification Program

Team Members
Identify the involved in the project implementation and their corresponding experience

Proposer's Involvement
Nature and extent of proposer's involvement as the prime consultant/contractor (also indicate area of secondary responsibility, if applicable). Identify services, if any, subcontracted and to what other company.

Contract Term
(start and end date, or indicate if currently providing services)

Contract Value
The total dollar value of the Contract.

SIMILAR CONTRACT REFERENCE 2

Client Name

Is this Reference an electrical utility provider? ☐ Yes ☐ No

Client Address

Client Contact Person Name

Client Contact Person Telephone Number

Client Contact Person Email Address

Appendix B - Minimum Qualification Form
xxx-18 Non-Road Electrification Program

Date _____
The date when the service was implemented

Description of Services
Description of services provided should be similar to the services outlined in the scope of work. The description of services should also include the size, scope, goals, metrics, and performance of each referenced project

Team Members
Identify the involved in the project implementation and their corresponding experience

Proposer's Involvement_____
Nature and extent of proposer's involvement as the prime consultant/contractor (also indicate area of secondary responsibility, if applicable). Identify services, if any, subcontracted and to what other company.

Appendix B - Minimum Qualification Form
xxx-18 Non-Road Electrification Program

Contract Term_____
(start and end date, or indicate if currently providing services)

Contract Value_____
The total dollar value of the Contract.