Electric Vehicle Battery Pack Leasing: The Merits of a Battery Pack Leasing Company

Primary and Secondary Market Opportunities

June 2011

The Challenge of Commercial EVs

- Barriers to commercial electric vehicle investments include
  - *It's the MSRP, stupid!*
    - Typical medium duty conventional fuel truck ~$45,000 *versus*
    - Medium-duty EV with battery back ~$140,000
      - Battery pack alone can cost upwards of $55k
  - Rapid technological change and concerns about dynamism of battery market

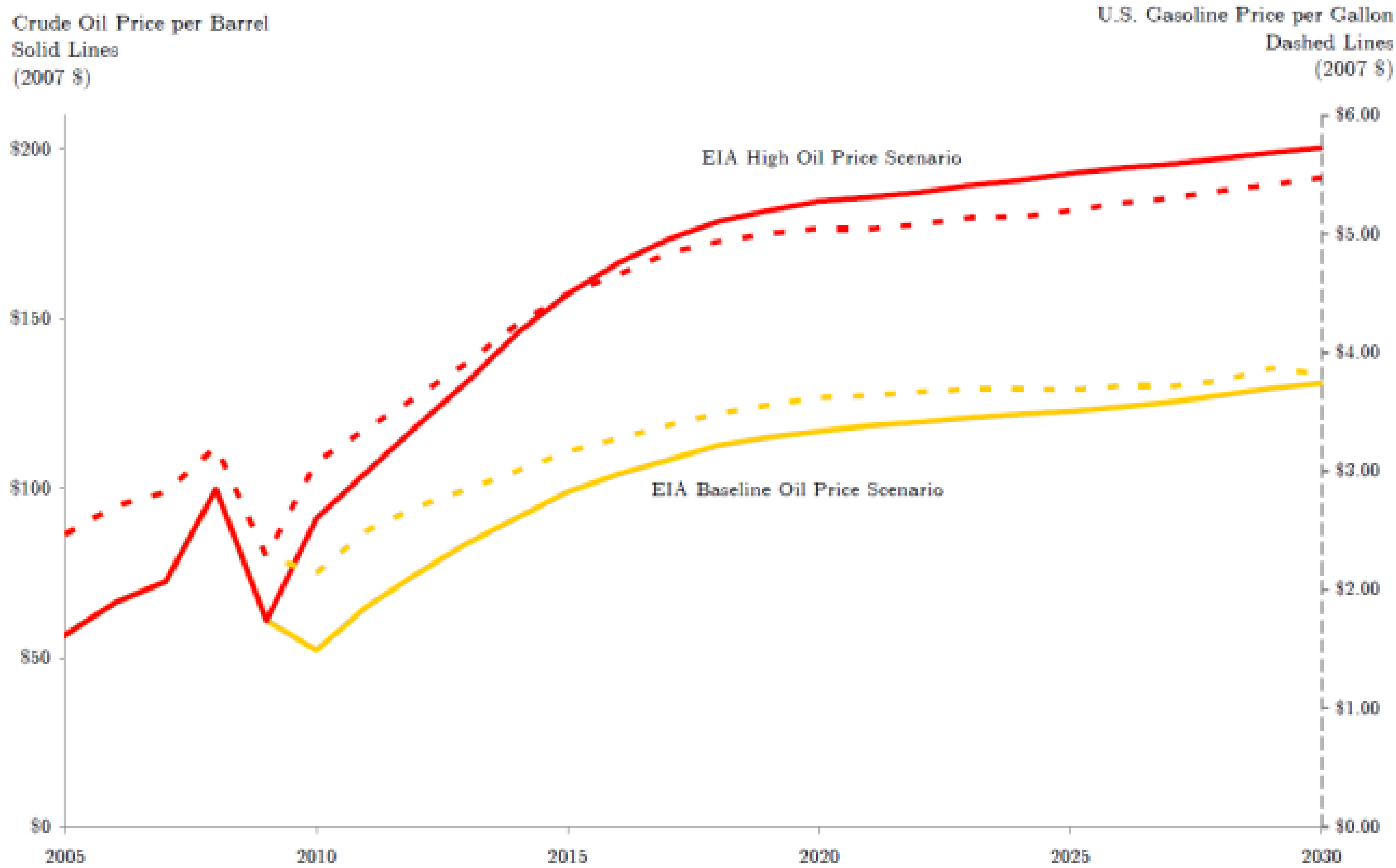
The Opportunity

- Create a “LeaseCo” to separate the battery from the vehicle and lease the battery separately
    - Fleet owner owns or leases the truck and leases the battery
- Battery leasing reduces the MSRP of a medium duty EV by 30 – 50%
    - Brings cost of vehicle in line with traditional vehicles
    - Monthly lease payment plus electricity costs in line with monthly fuel costs for comparable ICE vehicle

The Opportunity con't.

- A fixed monthly lease payment, when combined with electricity costs, is **lower and less volatile** than fuel costs for a comparable vehicle
  - Current fuel costs for a typical medium duty ICE truck in major urban markets are approximately $1,000/ month* and are likely to increase (see next slide)

** Based on 70 miles/day and $4 per gallon for fuel*


Crude Oil Price per Barrel
Solid Lines
(2007 $)
U.S. Gasoline Price per Gallon
Dashed Lines
(2007 $)
EIA High Oil Price Scenario
EIA Baseline Oil Price Scenario
$200
$150
$100
$50
$0
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
2005
2010
2015
2020
2025
2030

The Context

- Four OEMs have entered the US commercial EV market
- Two of four entrants source battery packs from one manufacturer
  - A third entrant is in discussions with this manufacturer
- Separating the battery from the truck lowers the MSRP of a medium-duty EV to a price point that is 5% - 30% higher than that of an internal combustion engine vehicle
  - This represents a much smaller "green premium” for a fleet operator
- Secondary market partners report 500 mW pipeline for LI ion packs and high comfort level deploying depreciated traction batteries

The LeaseCo Model

- LeaseCo provides an EV battery to one fleet customer for a 3-4 year period and then to a secondary market user for a second 7-8 year period
- Projected monthly **lease payments are $150 lower than typical monthly fueling costs** for same ICE vehicle
- LeaseCo will leverage pre-existing dealer networks for service, battery swap-outs, and temporary warehousing
    - LeaseCo will also operate warehouse space and facilitate battery transfers between primary and secondary users
- Five year battery pack warranty will be honored by manufacturer in secondary market deployment

The LeaseCo Model cont.

Commercial EV purchased with leased battery in vehicle

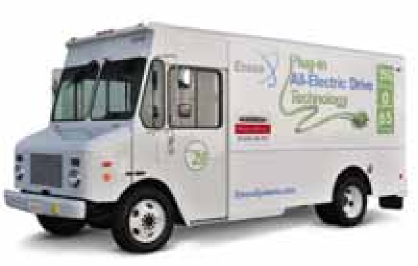
Leased battery transferred to secondary customer

Battery transferred to recycling facility

Years 1 - 3

Years 4 - 10

Year 10



Contours of Joint Venture

- LeaseCo structured as joint venture between grid services company and equipment leasing entity
- LeaseCo will enter into supplier agreements with makers of commercial EVs
- Battery maker will enter into a preferential purchasing agreement with LeaseCo
- Grid services company will act as the secondary lessee and take possession of depreciated battery packs at the end of primary user's lease term (3 or 4 years)
- **NYS pilot will target 250 battery pack leases in Year 1**

LeaseCo Financial Fundamentals

- The projections for a LeaseCo business are highly profitable
  - Beginning with 250 batteries year 1 and growing at reasonable annual rates (10%–25% per year)
- Initial start-up capital of $1.25 mm required
  - Covers LeaseCo operations in year 1
- Bank loan to finance batteries upfront required
- **Return on investment (ROI) ranges from 9% - 30% annually**
  - Includes initial capital repayment after 3 – 5 years