October 1, 2014

New Approaches to Financing the Publicly Available Electric Vehicle Charging Network

Janet Peace, Nick Nigro, and Matt Frades

Advisory Panel Meeting

CENTER FOR CLIMATE AND ENERGY SOLUTIONS

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Workshop Agenda

10:00 a.m.	**Welcome and Introductions**
10:15 a.m.	**Plenary: The Business Challenge of a Publicly Available EV Charging Network** *Janet Peace, C2ES*
11:15 a.m.	**Breakout 1: Interregional Charging Gaps**
12:00 p.m.	Lunch
12:30 p.m.	**Breakout 2: Urban Public Charging Gaps**
1:15 p.m.	**Breakout 3: Destination Charging Gaps**
2:00 p.m.	*Break*
2:15 p.m.	**Summary, Discussion and Next Steps** *Nick Nigro, C2ES*
3:00 p.m.	Adjourn

Project Timeline

Task 1: Evaluate Current Status of EV Charging in Washington

- Establish a stakeholder network
- Construct Public Charging Network Database
- Create interactive maps for charging suitability assessment
- Provide insights into role of public charging networks in encouraging EVs
- Summarize findings

May – August

Task 2: Develop Business Models

- Leverage C2ES's AFV Finance Initiative
- Conduct Business Model Workshop
- Create 2-3 Business Model Summaries

July – November

Task 3: Identify Public & Private Roles

- Execute financial analysis on business model viability
- Identify public sector role in addressing barriers to private investment

October – December

The Business Challenge of a Publicly Available EV Charging Network

Janet Peace, C2ES

Session Overview

- **Introduce key concepts and issues surrounding EV charging infrastructure**
- **Present financial model of DC fast charging based on assumptions and data previously analyzed by Washington**
  - Illustrate basic barrier to profitable EV charging business
  - Establish a base case for us to explore in breakout sessions
- **Introduce Solutions Toolbox**
- **Review breakout group process**

Electric Vehicles 101

- **Battery Electric Vehicle: all-electric car only powered by batteries**

Nissan LEAF 

 Tesla Model S

- **Plug-in Hybrid Electric Vehicle: vehicle that can be powered by either batteries, a gasoline engine, or both**

Toyota Prius Plug-In 

 Chevy Volt

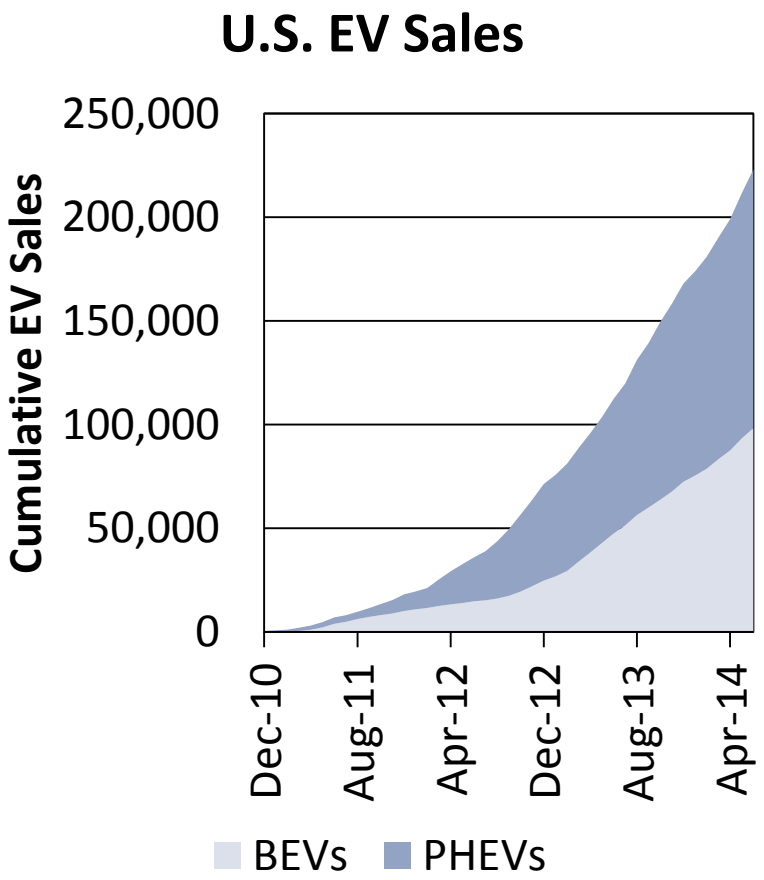
Charging 101

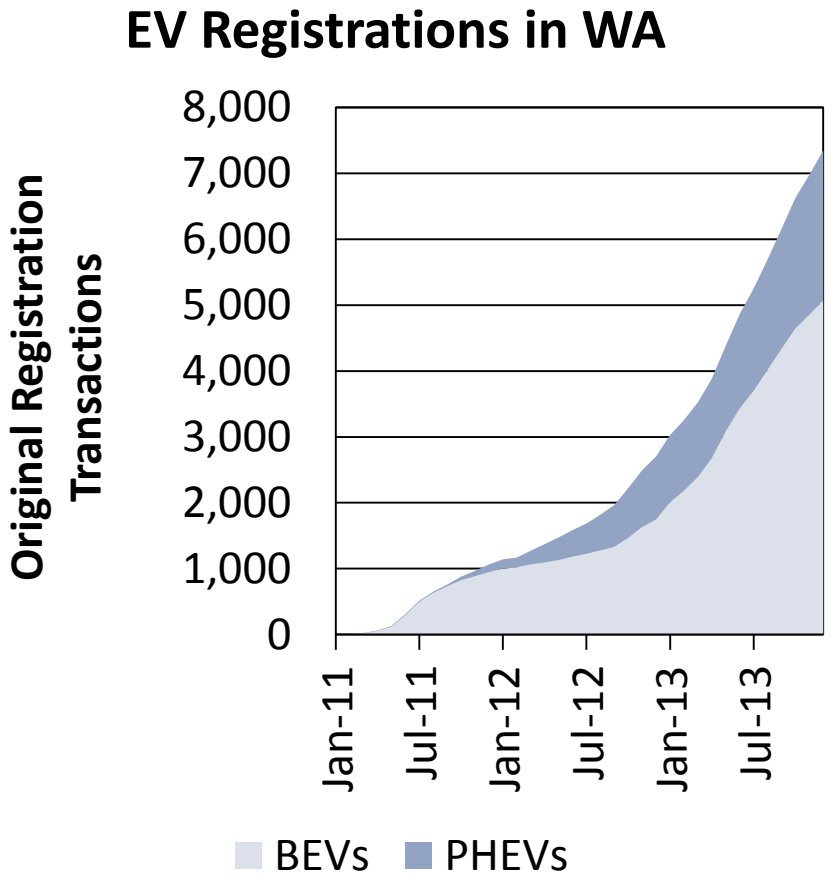
- **DC Fast Charging: quick charging at high power (up to 50 kilowatts)**
  - Typically located along roadways to enable longer distance travel
  - Competing standards

- **AC Level 2 Charging: slower charging up to 6.6 kilowatts**
  - Typically located in parking lots where vehicles spend longer than 1 hour

Washington EV Market Statistics (1 of 2)

- **Washington sells more BEVs than PHEVs, which is contrary to the national trend**





Washington EV Market Statistics (2 of 2)

- **Publicly available charging network as of September 2014**
  - 4th highest number of locations in United States
  - 44 DC fast charging locations (121 ports)
  - 400 Level 2 charging locations (1,061 ports)
- **Over 100 BEVs for each DC fast charging location**
  - DC fast charging locations in Washington only allow one port to be active at a time
- **Almost 10 EVs for each Level 2 charging port**

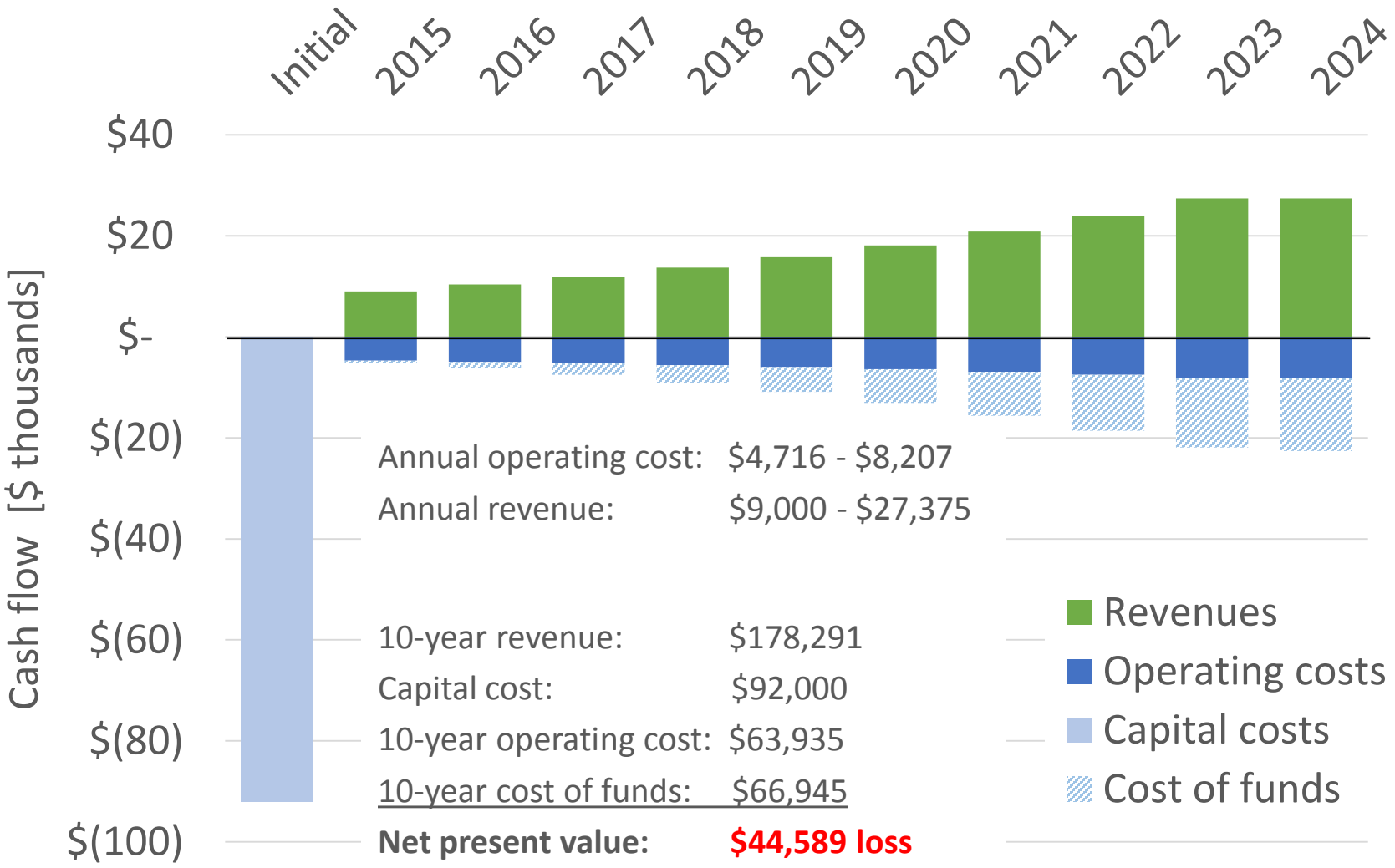
Basic Barrier to Profitable Operation of an EV Charging Network

- $Direct\ \&\ Indirect\ Revenue\ [R] > Capital\ Costs\ [C] + Operating\ Costs [O] + Cost\ of\ Funds\ [F]$
  - *Capital Costs* are cost of equipment and installation
  - *Operating Costs* are ongoing costs to maintain and run station
  - *Cost of Funds* are cost of paying interest on debt and investor returns on equity
  - *(PxQ) Direct Revenue* are funds attributable to direct use of a charging station (e.g., per-use fee).
  - *Indirect Revenue* are funds realized through sales of other products but could be attributed to charging station (not always captured by project developer)

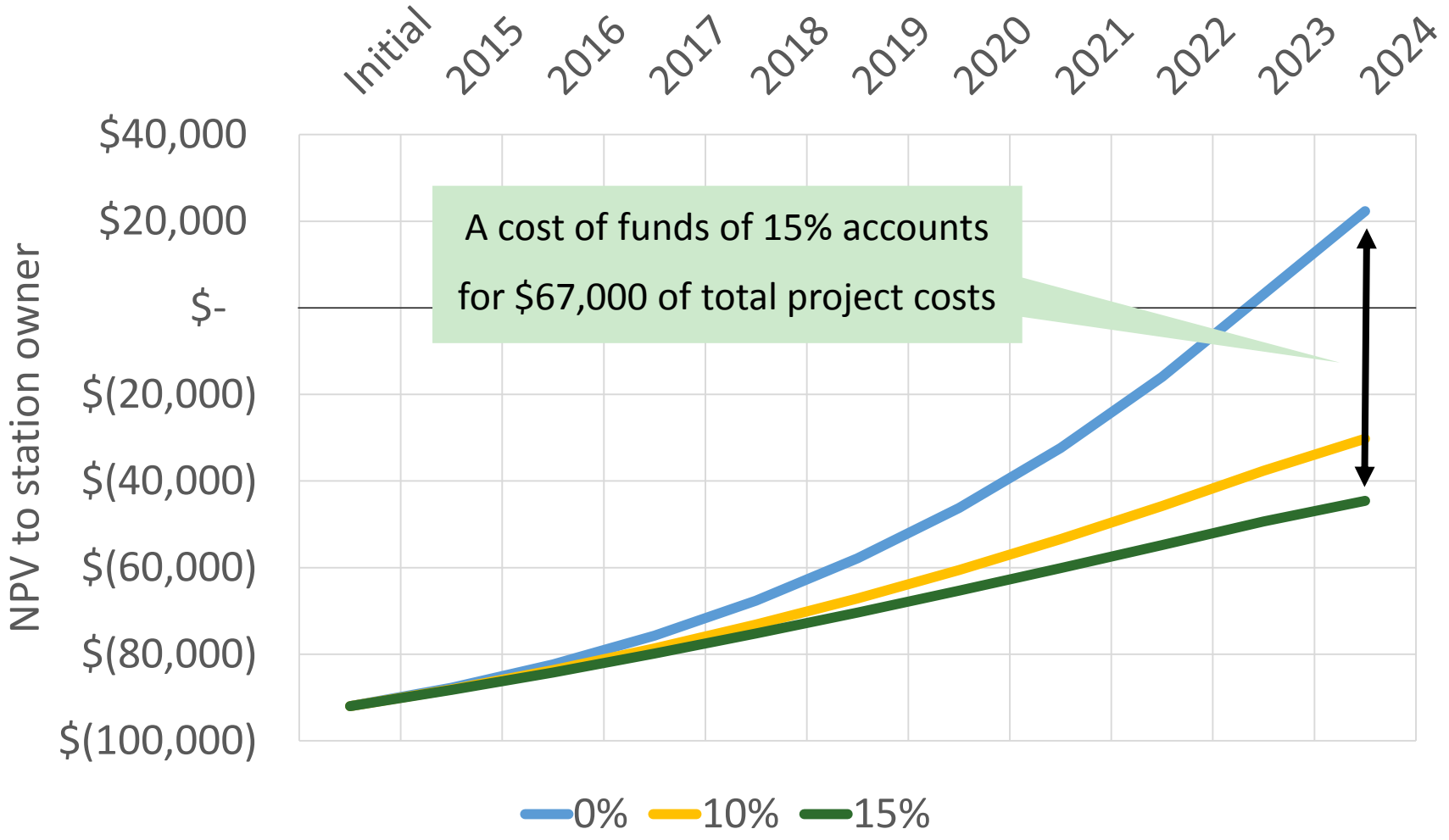
Finance and Project Economics 101

- **Net Present Value**
  - Net value of a project to developer over project's lifetime.
- **Discounted Payback Period**
  - Time required for project to generate net positive value to developer.
- **Cost of Funds**
  - Weighted average of interest on debt and return on investor equity.
  - Applied as "discount factor" of future cash flows.
  - Generally higher for private developers than for the public sector because the expected return on equity investment is higher than bond rates

DC Fast Charging Station Cash Flow is Net Negative over Project Lifetime



Cost of Funds Significantly Reduces Net Present Value of DC Fast Charging Station Projects



Making DC Fast Charging Project Profitable

- **Project could be profitable through capital cost subsidies, additional revenue, or mix**
- **Significant capital cost subsidies needed for project to achieve payback within 5 years**
  - Assume revenues held constant
  - Capital cost subsidy of $70,381 (76% of capital costs subsidized)
- **Additional revenue needed for project to achieve payback within 5 years**
  - Assume no capital cost subsidy
  - Additional annual revenue of $22,100 (between 1.8x and 3.4x greater revenue needed)

Solutions Toolbox

Solutions Toolbox

- **Identify strategies that help private sector address publicly available charging infrastructure gaps**
- **Solutions toolbox provides examples**
  - Illustrative list of strategies to demonstrate potential of targeted interventions
  - Combinations of ideas or new ideas are encouraged
- **Strategies focus on three main problems identified in base case financial model**
  - Cost: the upfront costs of projects are too high
  - Revenue: the annual expected revenue is too low
  - Finance: the cost of funds is too high

Solutions Toolbox: Cost Strategies

C1	**Low-Power DC Fast Charging** Charging service provider offers lower-powered DC fast-charging stations to save on capital and operating costs.
C2	**Automaker-Supported EV Charging** Automaker subsidizes charging service provider's capital costs (and may provide station utilization guarantee to reduce risk for charging service provider.)
C3	**Electric Utility Charging Site Partnership** Electric utility subsidizes charging service provider's capital costs.

Solutions Toolbox: Revenue Strategies

R1	**Retail Sales Boost through On-Site EV Charging** Retailer subsidizes charging service provider's capital costs and waives site access fees for station.
R2	**Pooled Capital Investments to Promote EV Tourism** Businesses and government pool funds to subsidize charging service provider's capital costs.

Solutions Toolbox: Finance Strategies

F1 Public-Private Partnerships in EV Charging

Government shares utilization risk with charging service provider by lending project funds to be repaid with low interest rate if project meets performance targets.

Example: Retail Sales Boost through On-Site EV Charging

- **Opportunity: Offering EV charging at retail locations may increase sales revenue by drawing in EV drivers and increasing customer time spent parked at these locations**
- **Revenue Strategy for EV Charging Projects**
  - Retailers may be willing to offer free or discounted access to their property for third-party EV charging projects
  - Retailers may be willing to contribute funds to offset project upfront and/or operating costs
- **Locations: Retail destinations**
- **Main Challenge: Retailers may not be confident enough about impact of EV charging stations on sales to contribute funds towards their deployment**

Barriers Addressed with Retail Sales Boost Model

- **Capital Costs (Equipment, Installation)**
  - Equipment and installation costs could be reduced via a retailer subsidy.
- **Operating Costs – Site Access**
  - Retailer could offer land used by charging station free of charge.
  - Retailer could reduce operating costs of a charging location by up to several hundred dollars annually.
- **Indirect Revenue – Increased Retail Sales**
  - Retailers estimate shoppers spend $1/minute spent in stores and an EV driver may spend 30 minutes longer in stores than a conventional vehicle driver.
  - Level 2 charging site with 5 stations and 1,000 charging sessions per year, the incremental retail sales revenues could be around $30,000 per year.
  - Assuming a retail net profit margin of 3%, resulting incremental profit to retailer would be $900 per year.

Impact Model on Base Case Financial Model

SCENARIO	DESCRIPTION & ASSUMPTIONS MODIFIED	NET VALUE TO PROJECT DEVELOPER	PAYBACK PERIOD	COST TO RETAILER
DC Fast Charging Station				
Base case	n/a	–$44,589	n/a	n/a
R1	Capital costs subsidized by $10,000 Site access fees waived ($1,200 per year)	–$28,567	n/a	$10,000 (+ $12,000 in foregone site access fees)
Level 2 Charging Station Site				
Base case	n/a	–$26,076	n/a	n/a
R1	Capital costs subsidized by $10,000 Site access fees waived ($1,200 per year)	–$10,053	n/a	$10,000 (+ $12,000 in foregone site access fees)

Breakout Group Process

1. **Discuss materials for session**
2. **Identify key financial assumptions and logical relationships**
3. **Weigh pros and cons of potential solutions and assess their viability and rank them using the following three criteria:**
   - Financial sustainability: Will the private sector invest in this solution?
   - Ease of implementation: Is this solution actionable today with current technology and market conditions?
   - Replicability: Can this solution be implemented in more than one location?
4. **Report out findings**

Breakout 1: Interregional Charging Gaps

Breakout 2: Urban Public Charging Gaps

Breakout 3: Destination Charging Gaps

Summary, Discussion and Next Steps

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FOR MORE INFORMATION

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