

NYC Electric Vehicle Adoption

Ari Kahn
NYC Office of Long-term
Planning & Sustainability

November 30, 2010



Initial Interest

In 2007, Mayor Bloomberg announced PlaNYC, his 127-point vision for a greener, greater New York.



Land

- 1** **Create** enough housing for our growing population
- 2** **Ensure all New Yorkers have parks** within a 10-minute walk
- 3** **Clean up all contaminated land** in New York City

Water

- 4** **Develop water network** back-up systems
- 5** **Open 90% of our waterways** and protect natural areas

Transportation

- 6** **Improve travel times** by adding transit capacity for millions
- 7** **Achieve "State Of Good Repair"** on our transportation system

Energy

- 8** **Upgrade our energy infrastructure** to provide clean energy

Air

- 9** **Achieve the cleanest air** of any big city in America

Climate Change

- 10** **Reduce global warming emissions** by 30%

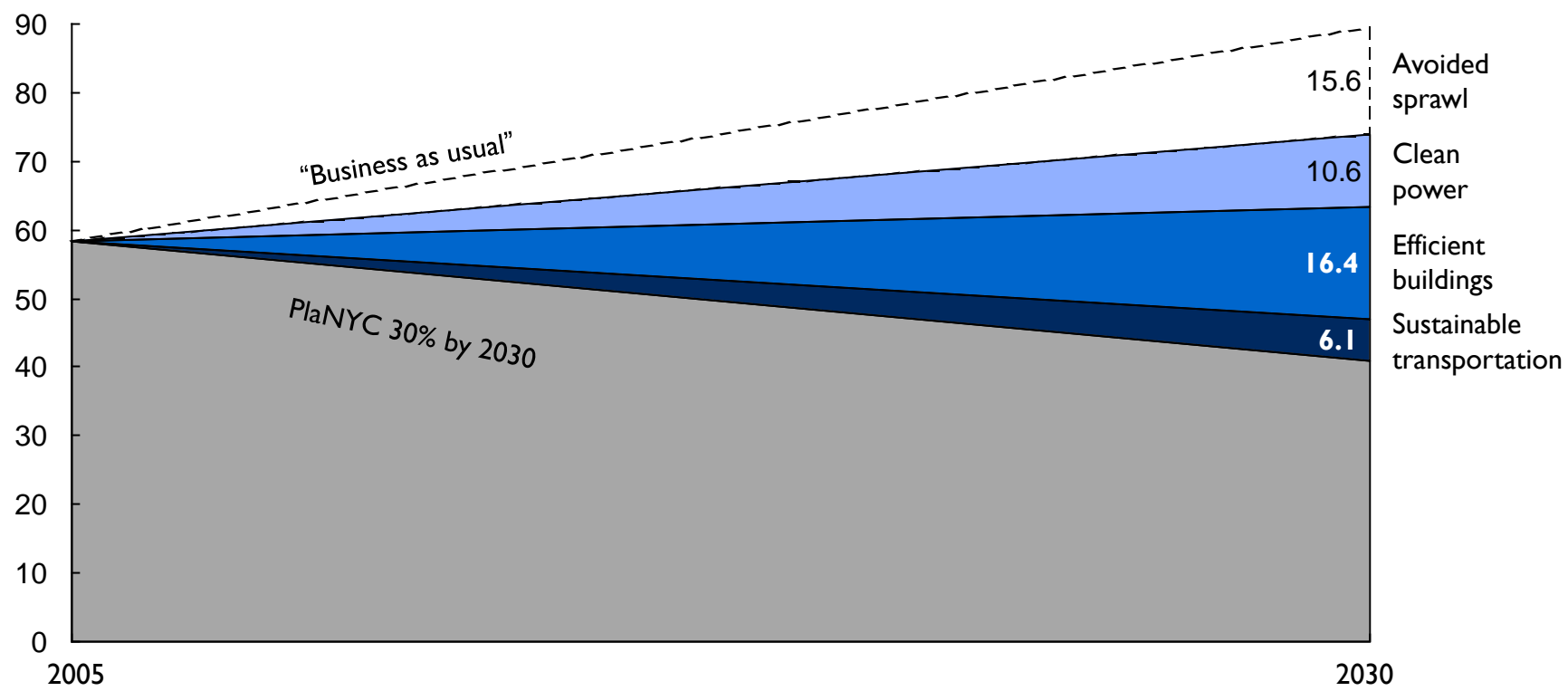
To reduce carbon emissions by 30% by 2030, NYC must address the 22% of emissions resulting from the transportation sector.



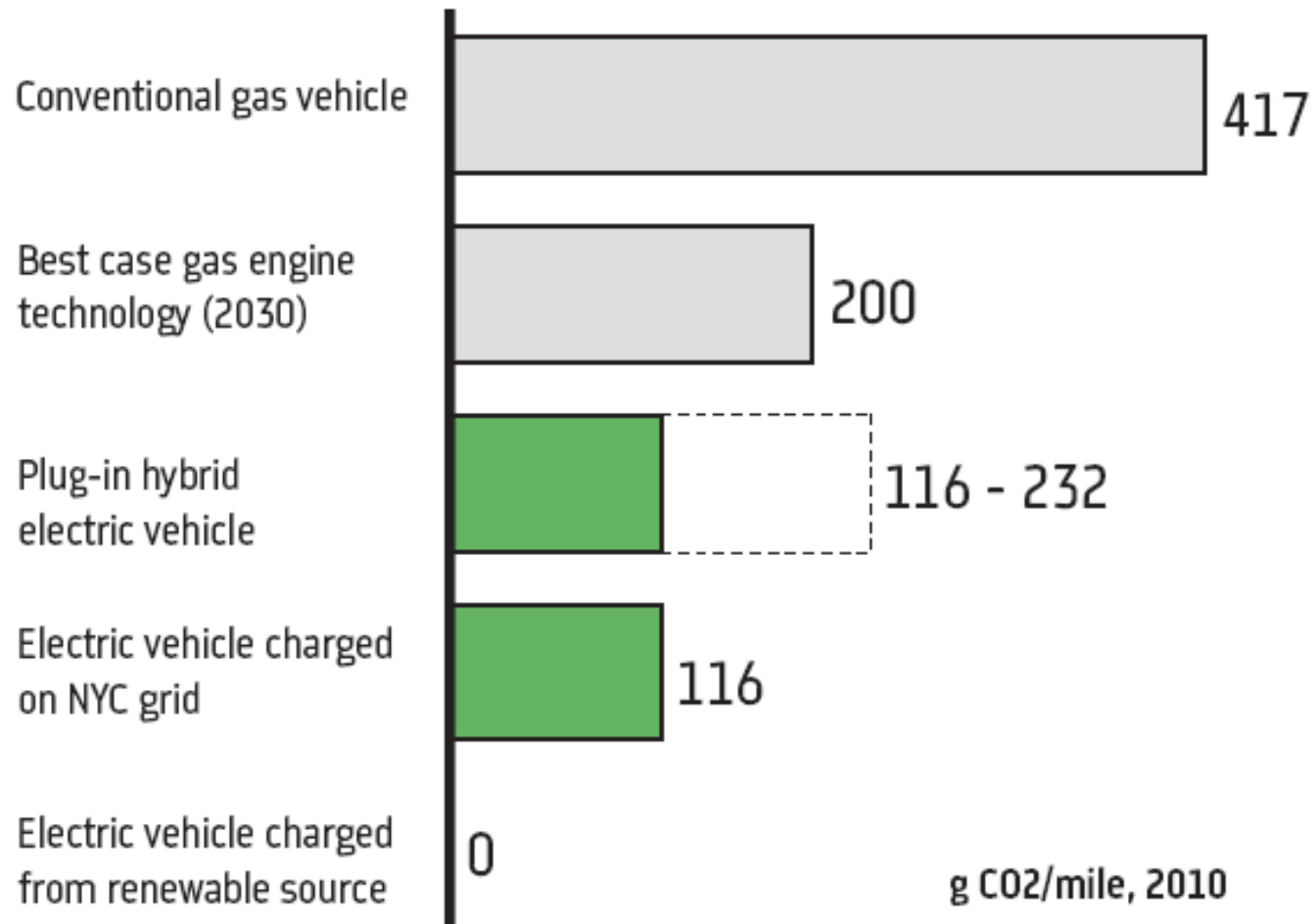
New York City intends to reduce transportation CO2 emissions 6.1m tons or 44% by 2030, much of which could come from EVs.



NYC carbon abatement targets
Millions of metric tons CO₂ per year



New York City's power grid mix has the potential to enable significant GHG emission reduction from EVs.



Other City/State Actions

- **San Francisco / San Jose / Oakland**
 - Announced program to make Bay Area the "Electric Vehicle Capital of the US"
 - Better Place taxi pilot
 - Expedite permitting and provide incentives for charging stations
 - Link EV programs to regional transit
 - Pooled-purchase orders for EVs in government fleets

- **London**
 - Program to have 1,300 charge points by 2013
 - Exempt EVs from congestion charge

- **Hawaii**
 - Good market for EVs due to high gasoline prices, small geography, and environmentally conscious population
 - Partnership with Better Place to build EV network of battery-swap stations by 2010

- **Los Angeles**
 - Launched one-year test of all-electric MINI Cooper



What should New York City do?

- The City has been approached by a variety of stakeholders over the last two years to support electric vehicle adoption through a mix of:
 - Tax incentives
 - Private charging infrastructure
 - Public charging infrastructure
 - Consumer education
 - Other policies
 - Preferred traffic lanes
 - Discounted tolls
 - Discounted/preferred parking

NYC has unique auto characteristics...

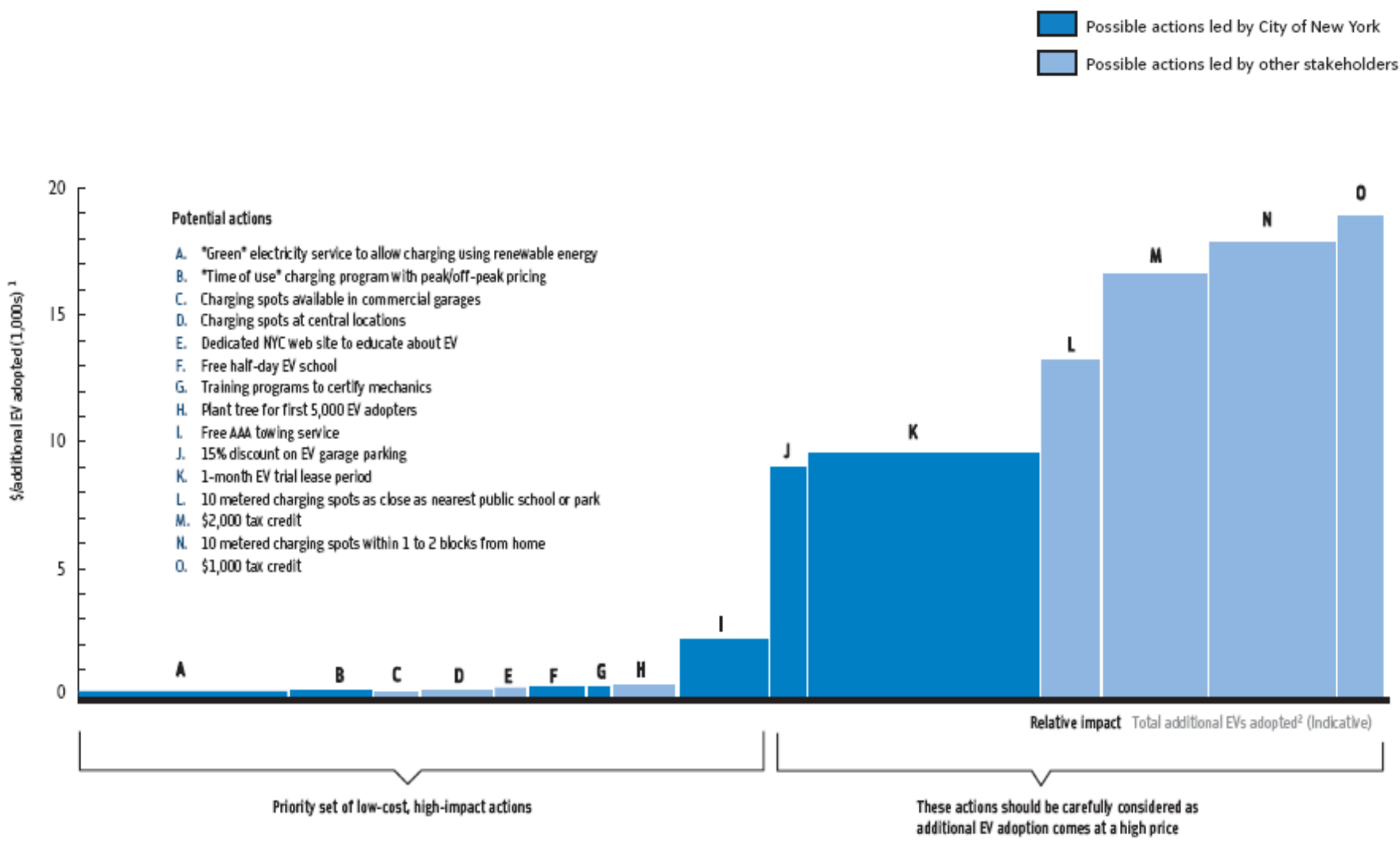
- Relatively low rate of vehicle ownership among residents
 - 44% of households, but only 22% in Manhattan, own vehicles
- Diversity of parking places amongst boroughs
 - 70% of car owners in Staten Island have home parking, compared with only 11% in Manhattan
- High use of public transportation amongst car owners
 - Nearly 70% of NYC car owners reported using public transportation within city limits in last 3 months

... so understanding potential demand is a necessary first step before taking policy actions.

- Who is the target market for the first EVs in New York City?
- How many EVs can we expect to have?
- What are the key factors and barriers for EV adoption?
- Do we need a major infrastructure investment, or significant subsidies, to promote EVs?
- Would EV usage threaten the electrical grid?

The Study

Early adopters do not appear to need a high-density public charging network or local tax incentives.



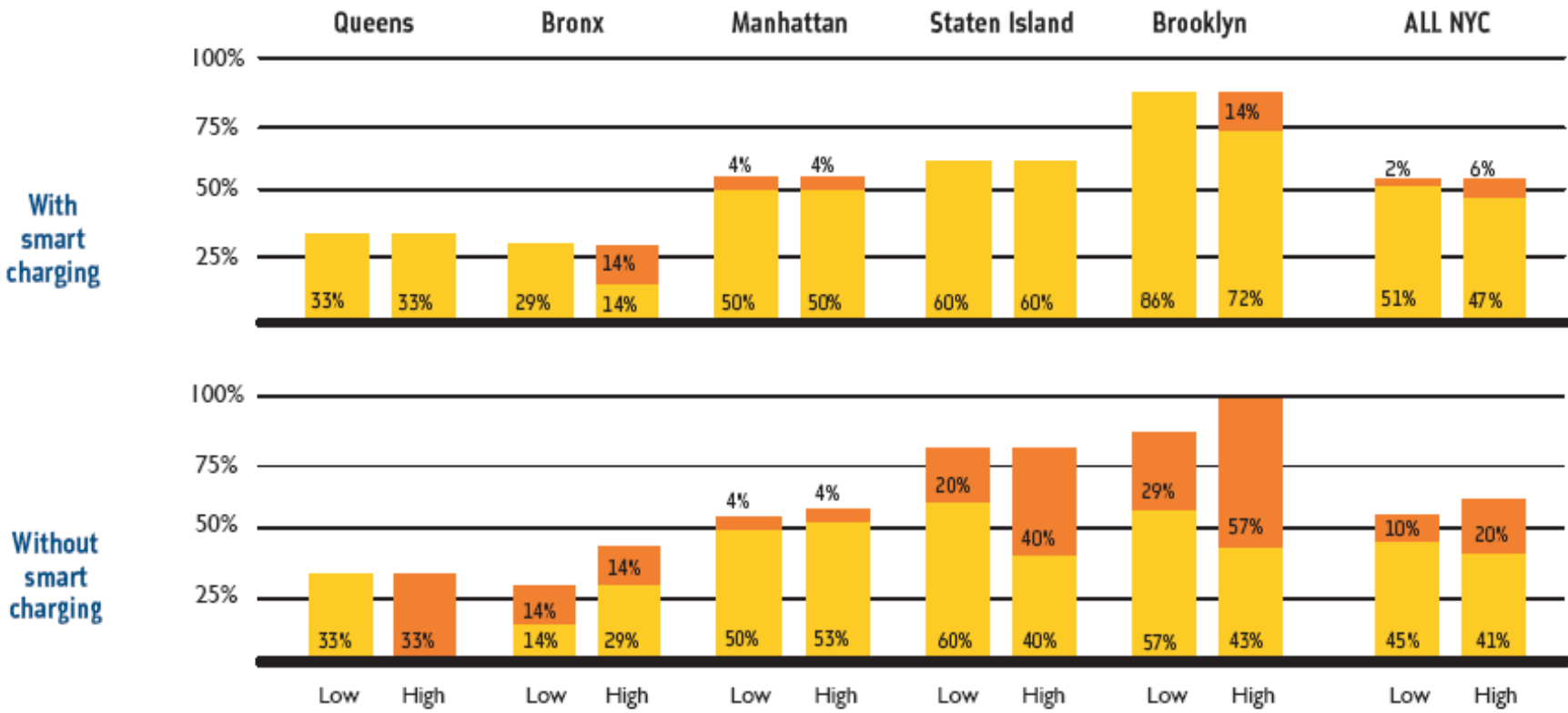
1. Height of each column represents amount of money spent to have one additional EV adopted as a result of action taken; note: incremental impacts of actions are not additive.
 2. Width of each column represents total # of additional EVs adopted as result of action taken; note: incremental impacts of actions are not additive. Source: NYC Electric Vehicle Adoption Survey. McKinsey & Co., 2009.

Projected EV early adoption should not threaten the electrical grid if “smart” charging is the norm.



Percent of area sub-stations impacted by low and high scenarios of EV adoption
 (Low scenario = 140,000 EVs in 2018. High scenario = 230,000 EVs in 2018.)

■ Demand exceeds capacity
■ Demand within 5% of capacity



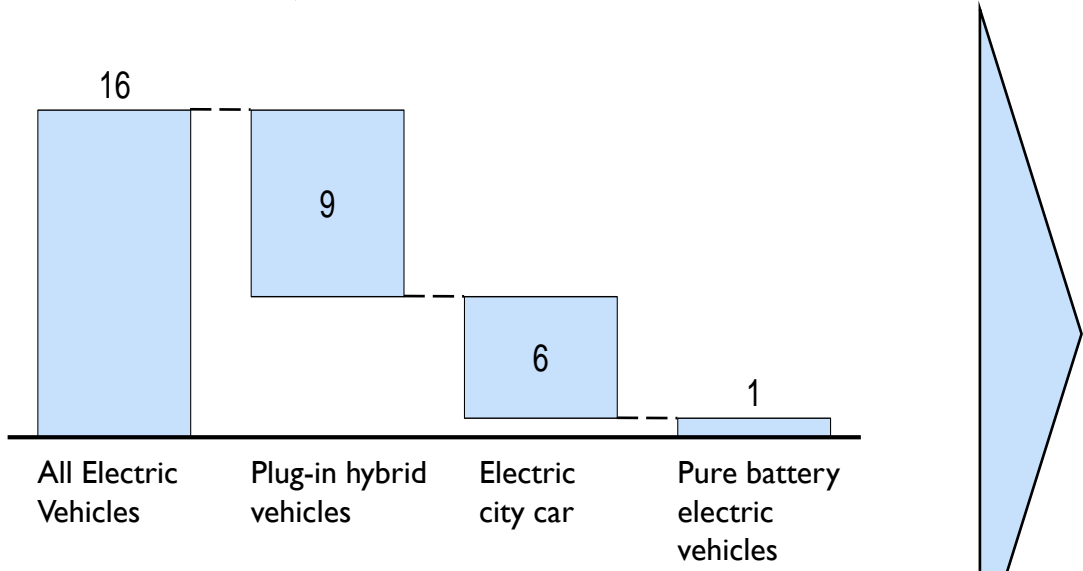
Disclaimer: Some of this material may contain or be based on information received from Consolidated Edison Company of New York, Inc. (Con Edison). Con Edison makes no representation, warranty, covenant, assurance or guaranty as to the accuracy, completeness, quality or materiality of such information and expressly disclaims any and all liabilities arising out of the use of or reliance on such information or from any omissions therefrom. Source: Con Edison analysis, NYC Electric Vehicle Adoption Survey. McKinsey & Co., 2009.



The study identified a large group of “early adopters” in NYC that would likely purchase EVs in the next 5 years.



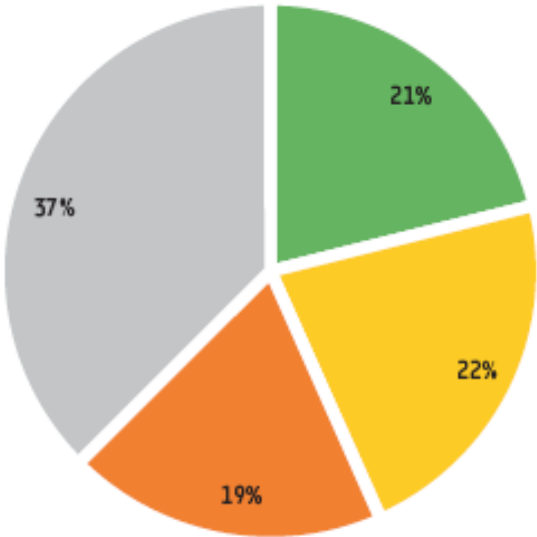
EV demand potential in NYC
 % of new car sales, 2015



Cumulative number of EVs by 2015 ~ 50,000
 % of all vehicles owned that are EVs by 2015 2.5

- **Assumptions:**
 - 80% of New Yorkers are educated about pros/cons of EVs
 - Sufficient volume and types of EVs will be allocated to NYC by auto manufacturers
 - Battery costs will continue to decline
 - Federal tax credit of \$7,500 continues
- **Attitudes towards “green” vehicle technology will drive adoption not whether consumer has access to charging, where they live, how far they drive per day, etc.**

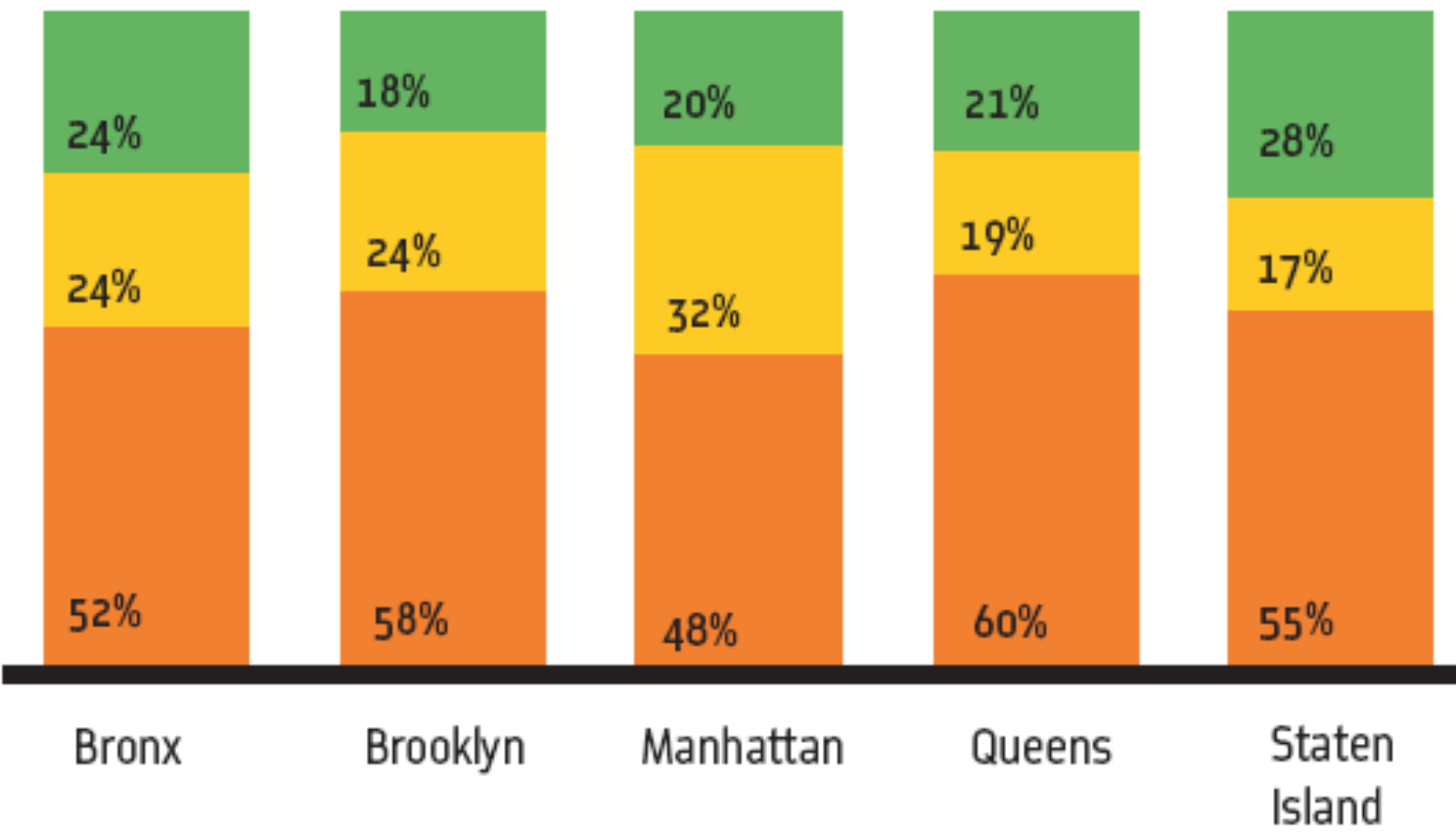
Attitudes towards technology and the environment will drive early adoption.



- Potential Early Adopters
- Probable Late Adopters
- Probable Laggards
- Not Included in Survey

Green Auto Aficionados	7%
Uses car everyday. Loves latest car technology & wants to be "green". Willing to pay upfront premium.	
Simple Greens	7%
Uses car on weekends and for occasional errands. Looking for basics in a car & wants to be very "green." Willing to pay premium but more budget-conscious.	
Progressive Pragmatists	7%
Uses car on weekends and for occasional errands. Looking for basics in a car & wants to be somewhat "green". Willing to pay premium to some degree.	
Early Adopters	21%

Early adopters will be found throughout all five boroughs.

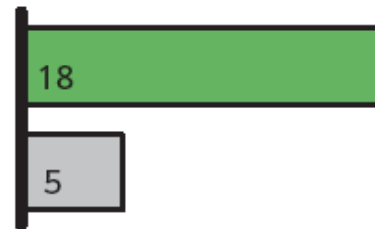


- Potential Early Adopters
- Probable Late Adopters
- Probable Laggards
- Not Included in Survey

“I will pay more upfront to save on gas and maintenance in the long-term” *



“I am willing to make significant sacrifices (e.g. higher price, not exact features I want) for a product to be truly green” *



“I do not think it would be worth it to pay more upfront for an EV than a gas car”**



“I will pay more to have the newest technology in my car” *



* Percent responding “strongly agree” or “agree”

** Percent responding “yes”

Potential Early Adopters

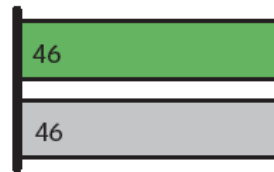
All Other Segments

Early adopters have the same parking options as other drivers...

“Do you use personal garage/driveway parking more than 10 days per month?” **

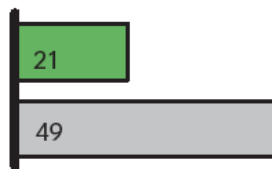


“Do you use on-street parking overnight more than 10 days a month?” **

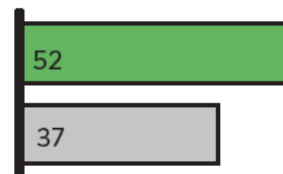


...But they are more willing to move where they park to access charging – even if they had to pay to do so.

“It would be difficult for me to find a place to charge my car” **



“To charge your EV overnight, would you be willing to switch your parking to the commercial garage most convenient to your home?” *



“I will pay more for an assigned parking spot if it meant I could get an EV” **



* Percent responding “strongly agree” or “agree”

** Percent responding “yes”

Potential Early Adopters

All Other Segments

Consumer awareness of EVs and associated benefits/barriers

- Adoption estimates were based on a survey that first educated consumers about electric vehicles
- As consumers learned more about electric vehicles, their adoption likelihood changes and increases as a whole, showing the importance of educating consumers

Ability to install EV chargers at “home garages” with ease

- Adoption estimates were based on assumption that consumers will be able to charge electric car in their garages: either home garage or apartment building /monthly garages
- Current charger installation processes present an opportunity for further improvement

Recognizing early adopters

- Consumers indicated that they would be more receptive to adoption if they were publicly recognized as such - they want to be known as “first on the block” to adopt

Difficulty negotiating charger installation in commercial garages

Pain points

- Garages concerned about **space and costs**
- **Limited initiative** by garage owner to install charger

Considerable time required to install charger in home (garage or driveway)

- Installation can take **up to 8 weeks**

Root causes

- **Limited exposure** to charging units (limited size)
- **Failure to understand** that customer/3rd party will pay for installation
- **Misalignment of incentives** between garage owners and operators (operators capture premium while owners cover capital cost)
- Customer/contractor and customer/utility **scheduling issues**
- **Permitting** of charger by local inspectors (in some cities, but not in NYC)

Possible solutions

- **Educate garage owners/operators** on
 - Technical feasibility of installation
 - Marketing possibilities
- Create arrangements to **align owner/operator incentives**, e.g.
 - Operator and owner share a fixed premium paid by EV owners based on expected electricity use
- Provide both **utility upgrade and charger installation in one visit** to customer site through either
 - Utility/electrician partnership
 - Integrated utility offering

Conclusion




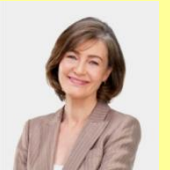



Ari Kahn

akahn2@cityhall.nyc.gov

(212) 442-6365

Overview of consumer segmentation



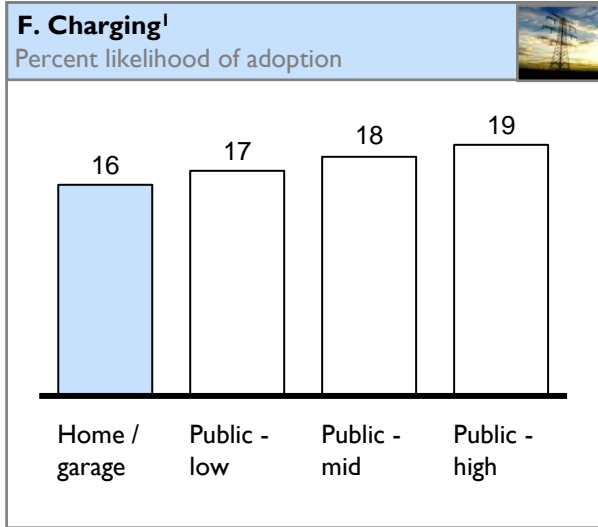
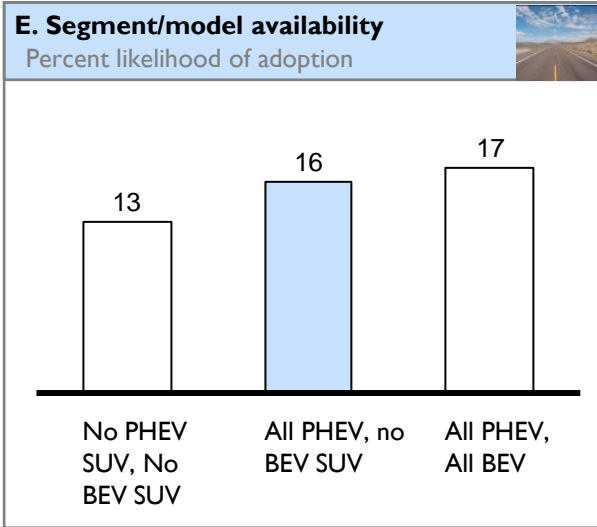
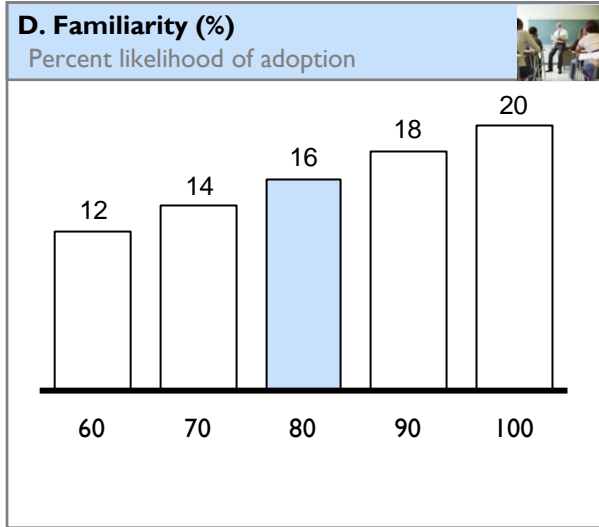
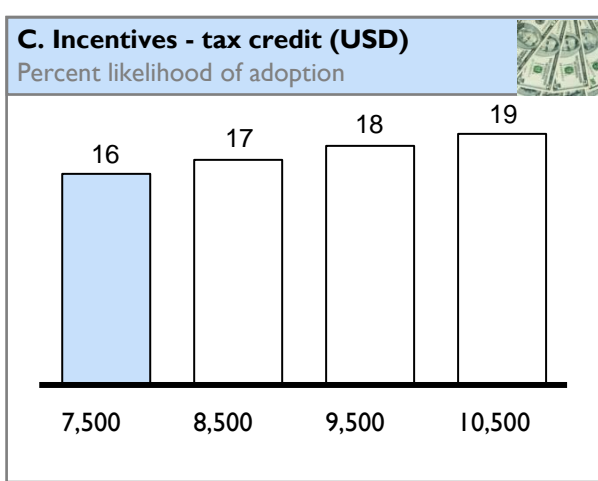
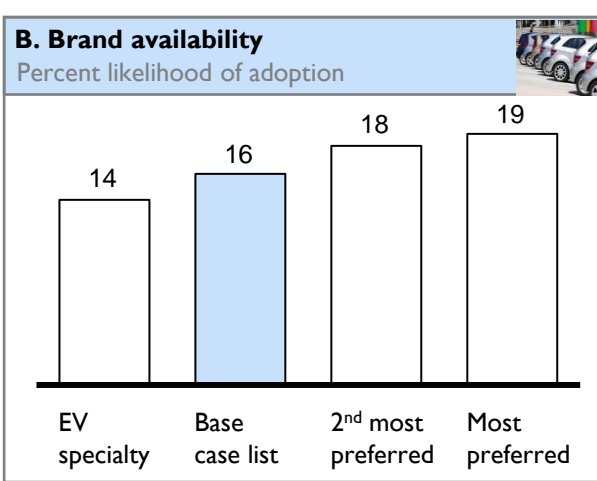
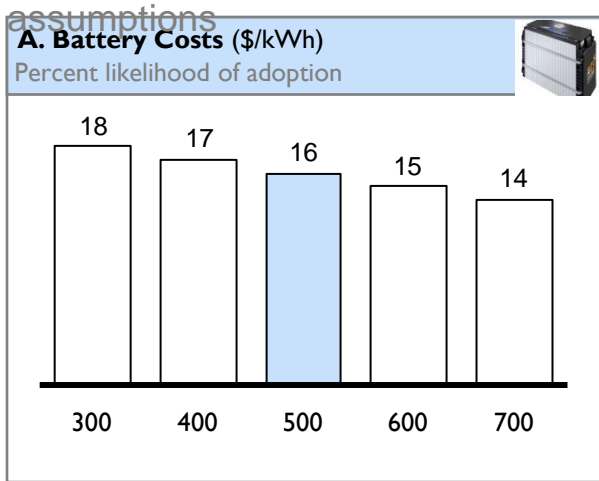
	Potential early adopters			Probable late adopters			Probable rejecters
	1 Green Auto Aficionados	2 Simple Greens	3 Progressive Pragmatists	4 Unfit Urbanites	5 Open But Unconvinced	6 Luxury Loyals	7 Unwilling Conventionals
Car preferences	 <ul style="list-style-type: none"> Vehicle used daily Feels EV is great for daily and long trips 	 <ul style="list-style-type: none"> Vehicle used less frequently Feels EV is great for daily and long-trips 	 <ul style="list-style-type: none"> Vehicle used daily Feels EV is okay for daily driving 	 <ul style="list-style-type: none"> Vehicle used less frequently Feels EVs won't fit trip patterns (mostly long trips) 	 <ul style="list-style-type: none"> Feels EV won't work for daily driving 	 <ul style="list-style-type: none"> Vehicle used daily Feels EV won't fit with short or long trip driving 	 <ul style="list-style-type: none"> Vehicle used daily Feels EV won't fit with short or long trip driving
Status attitudes	<ul style="list-style-type: none"> Status and brand matters Performance & features focus 	<ul style="list-style-type: none"> Basic features 	<ul style="list-style-type: none"> Family car Basic features Brand does not matter 	<ul style="list-style-type: none"> Not family car Basic features 	<ul style="list-style-type: none"> Not a family car Status matters 	<ul style="list-style-type: none"> Status matters Performance & features focus Brand matters 	<ul style="list-style-type: none"> Family car Status and performance don't matter
Tech attitudes	<ul style="list-style-type: none"> Wants and will pay for new tech 	<ul style="list-style-type: none"> Wants and might pay for new tech 	<ul style="list-style-type: none"> Doesn't want new tech 	<ul style="list-style-type: none"> Not interested in new tech 	<ul style="list-style-type: none"> Interested in tech but risk averse 	<ul style="list-style-type: none"> Interested in tech but risk averse 	<ul style="list-style-type: none"> Doesn't want new tech or risk
Green attitudes	<ul style="list-style-type: none"> Strong green, will make sacrifices 	<ul style="list-style-type: none"> Strongest green, will make sacrifices 	<ul style="list-style-type: none"> Medium green, can give up on features 	<ul style="list-style-type: none"> Slight green, but no sacrifices 	<ul style="list-style-type: none"> Conflicted on green; doesn't want green in car 	<ul style="list-style-type: none"> Mix of green and not green but will never sacrifice 	<ul style="list-style-type: none"> Averse to green messaging
Cost sensitivity	<ul style="list-style-type: none"> WTP for TCO WTP for green 	<ul style="list-style-type: none"> WTP for TCO 	<ul style="list-style-type: none"> WTP for TCO Value buyer 	<ul style="list-style-type: none"> Some WTP for TCO 	<ul style="list-style-type: none"> Doesn't believe EV would lower cost 	<ul style="list-style-type: none"> No WTP for TCO 	<ul style="list-style-type: none"> Value buyer Won't accept any upfront increase
What will it take to adopt?	<ul style="list-style-type: none"> Need supply Recognition incentives, if any 	<ul style="list-style-type: none"> Streamline home charger install Minimize cost 	<ul style="list-style-type: none"> Insulate from risk Highlight operating cost savings 	<ul style="list-style-type: none"> Streamline home charger installation, especially for apt dwellers 	<ul style="list-style-type: none"> Insulate from risk Provide charging infrastructure 	<ul style="list-style-type: none"> Convince of EV value proposition Associate EVs with luxury 	<ul style="list-style-type: none"> Lower upfront cost and appeal to rational (vs attitudinal) decision

1 WTP = Willingness-to-Pay
 2 TCO = Total cost of ownership

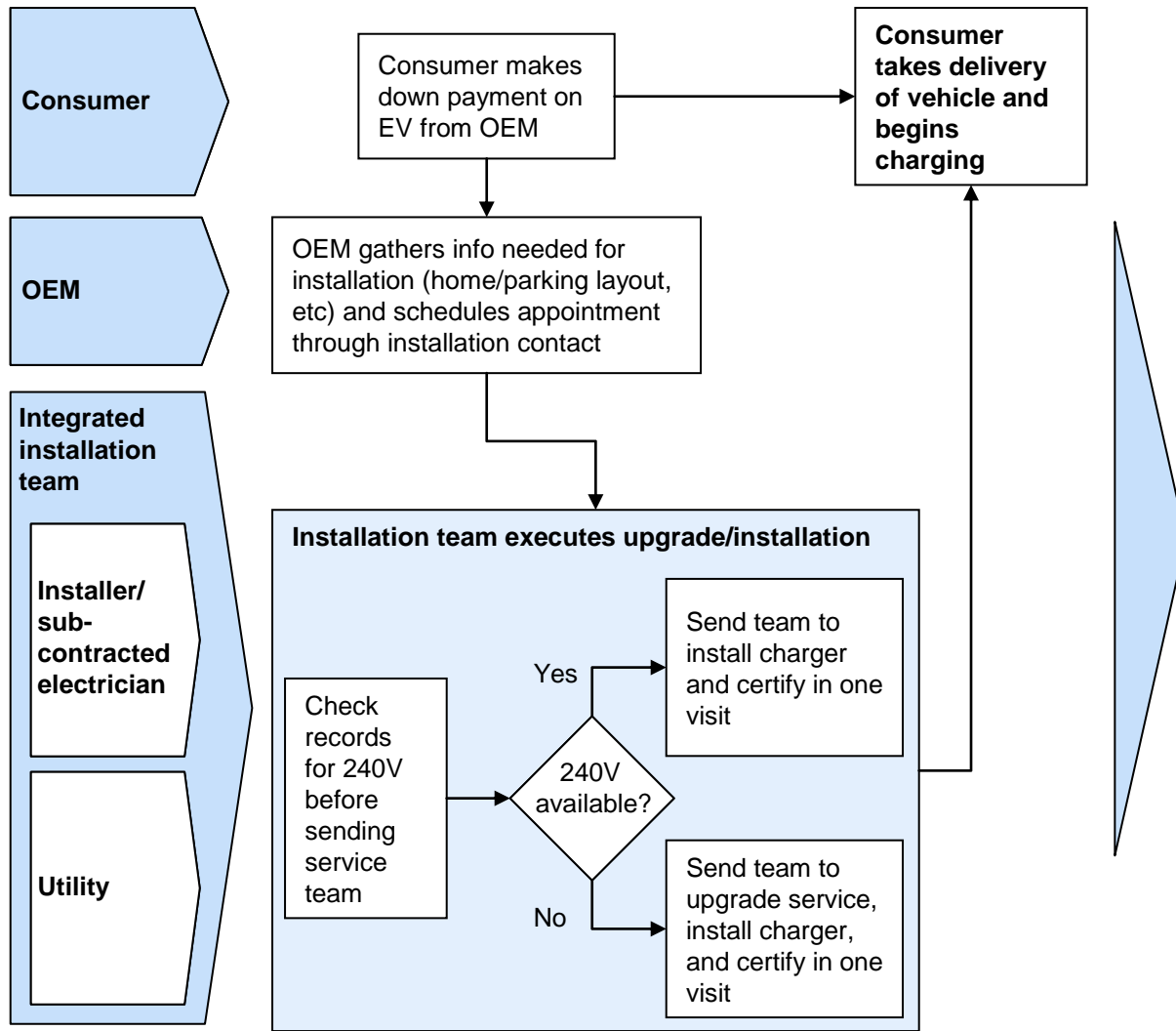
The projected adoption rate varies depending on changes to certain assumptions, but not significantly.



Sensitivity of EV adoptions towards variation of assumptions



¹ Home / garage: Able to install charger at home and garage; Public - low: 10 charging spots within 2 miles of home; Public - mid: 10 charging spots as close as nearest school/park; Public - high: 10 charging spots within 1-2 blocks of home



Best-practice process improves customer experience

- At point of sale, OEM arranges upgrade/installation and schedules car delivery for time of installation
 - No customer scheduling, no period with vehicle but no charger
- Customer meets installation team and accepts delivery of the vehicle within 1 week
- Total time from purchase to use shortened to 10 days¹, from 30+**

¹ Assuming scheduling requires 7 days (low end of Con Ed service upgrade wait) and installation takes 1-3 days

Ron Gulmi



NATIONAL GRID