



EPRI Electric Transportation Analysis & Economic Development Roadmap for the Greater Cleveland Area

Executive Briefing

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Vehicles in the Pipeline

Toyota Prius



Chevy Volt



Ford Escape



Volvo Recharge



Daimler Sprinter



Mitsubishi Miev



Saturn Vue



BMW Mini



Daimler Smart



Nissan Cube

**Declared Production Programs
From GM, Nissan, Ford 2010- 2012**

Forces Promoting Electric Vehicular Transportation

- Obama Administration has publicly stated its support for PHEV development and application in federal fleets
 - Suggested a market penetration of 1 million PHEVs by 2015
- The American Recovery and Reinvestment Act of 2009 includes billions of dollars for advanced battery research, battery plant construction and PHEV tax credits and demonstration programs
- Government loans to the U.S. auto industry have been granted with an emphasis on the industry embarking on an expanded initiative to develop and market fuel-efficient electric drive vehicles
- Likelihood of climate change legislation

Why the Greater Cleveland Area?

- Available resources given decline of manufacturing over the last decade
 - Skilled labor
 - Manufacturing plants, capacity and equipment
- Follow-on benefits as transportation is electrified:
 - Lower fuel / O&M prices for vehicles
 - More disposable income for other items
 - Cleaner air and smaller carbon footprint
 - Improved Energy security
 - Source of off-peak load sink (aligns well with wind generation)



Vehicle Industry Critical to Greater Cleveland Area

- Ohio is located in the center of the country's automotive heartland, second only to neighboring Michigan in production of cars and light trucks, representing 16.5% of total U.S. output – General Motors, Honda, Ford and Chrysler all have a major presence in Ohio
- 12% of North America's tier-1 motor vehicle suppliers have at least one facility in Ohio and among the surrounding states and provinces, this state is again second to neighboring Michigan – Major suppliers that call Ohio home include Eaton, Dana, Delphi, Parker Hannifin, and Visteon
- Ohio leads the nation in polymer production and employment, including the headquarters for Goodyear Rubber and Tire, Cooper Tire and Rubber, Poly One, A. Schulman, and Swagelok



Located in the heart of the nation's industrial corridor, northern Ohio is crisscrossed by interstate highways, including (I-71, 75, 77 and 80) major rail lines from CSX and Norfolk and Southern and inland waterways on Lake Erie and the Ohio River

Businesses can access 60% of the US and Canadian population is within a 600-mile circumference

Advantages of the Greater Cleveland Area?

- Ohio's revamped tax structure is the lowest in the Great Lakes region, with an effective tax rate of 3.6% for new capital investments compared to the region's average of 5.7%
- Significant university R&D capabilities, with over 250,000 degree-seeking students enrolled in Northern Ohio, representing one of the strongest concentrations of educational institutions in the US, with particular strengths in engineering and technology
- The only NASA facility in the northern United States, with expertise and emphasis on power and propulsion Ohio's cost of doing business and cost of living are below the national average and lower than competing states

EPRI Deliverables

Two Aligned Efforts to Provide Guidance to Cleveland Area Stakeholders on Opportunities Afforded by Encouraging Shift to Electric Transportation

What is the economic value to the area?

- Regional Economic Impacts of Electric Drive Vehicles and Technologies: Case Study of the Greater Cleveland Area

What are the actions required to acquire the value?

- Cleveland Transportation Electrification Roadmap

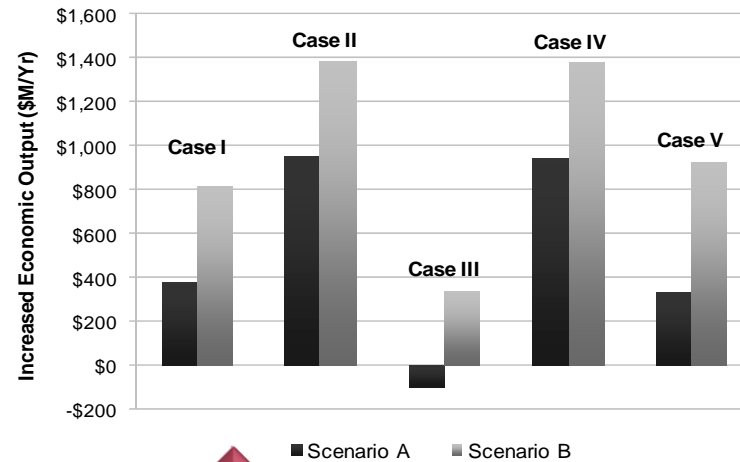
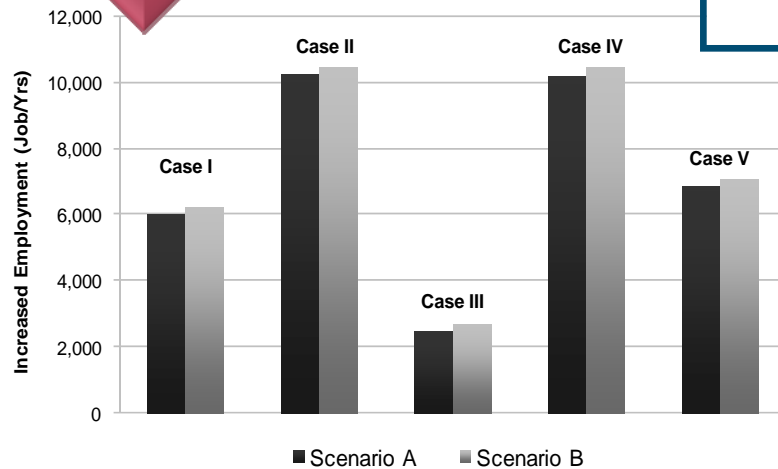
EPRI Deliverable I

Regional Economic Impacts of
Electric Drive Vehicles and
Technologies: Case Study of the
Greater Cleveland Area

RIO Results: Direct Jobs & Economic Output

Jobs

- Increase of 2,500 to nearly 10,500 jobs



Economic Output

- Change in Output of -96 M\$/yr to +1.4 B\$/Yr

* Phase I HDV and Phase II impacts are proportional by case, but of a smaller scale

RIO Results: Total Employment, Output and Labor Income

EDV Industry Development Scenario Inputs:

- 4650 construction jobs (auto & battery production plants)
 - 9250 vehicle production jobs
 - 1,138 auto supplier jobs
 - 535 infrastructure supplier jobs
- \$10M/year research & development

Estimated
Direct
Impacts

+

Indirect and
Induced
Impacts

=

Total EDV Industry Development Scenario Outputs:

- ~24 \$Billion increased output
- 86,000 - 88,000 more jobs
- \$4.7 - 4.8 \$billion increased labor income

Total
Economic
Impacts

Results:

Direct Shifts in Fuel Expenditures (LDVs*)

Affected Industry/ Household	Case I 2006 (\$M/yr)	Case II 2008 (\$M/yr)	Case III 2030L (\$M/yr)	Case IV 2030H (\$M/yr)	Case V VHElec (\$M/yr)
Petroleum	-1,010	-1,413	-710	-1,358	-1,358
Electricity	267	276	255	273	546
<i>Household Savings</i>	743	1,137	455	1,085	812

Conclusion: Significant benefits for the Greater Cleveland Area under every scenario studied

* Phase I HDV and Phase II impacts are proportional by case, but of a smaller scale

Implications

- EDV Industry development can result in positive economic impacts for the Greater Cleveland Area (GCA)
 - Thousands of additional jobs
- Money saved from PHEV– and EDV– related fuel switching can free up cash for other GCA economic opportunities
- As petroleum prices rise, the economic benefits are amplified

EPRI Deliverable II

Cleveland Transportation Electrification Roadmap



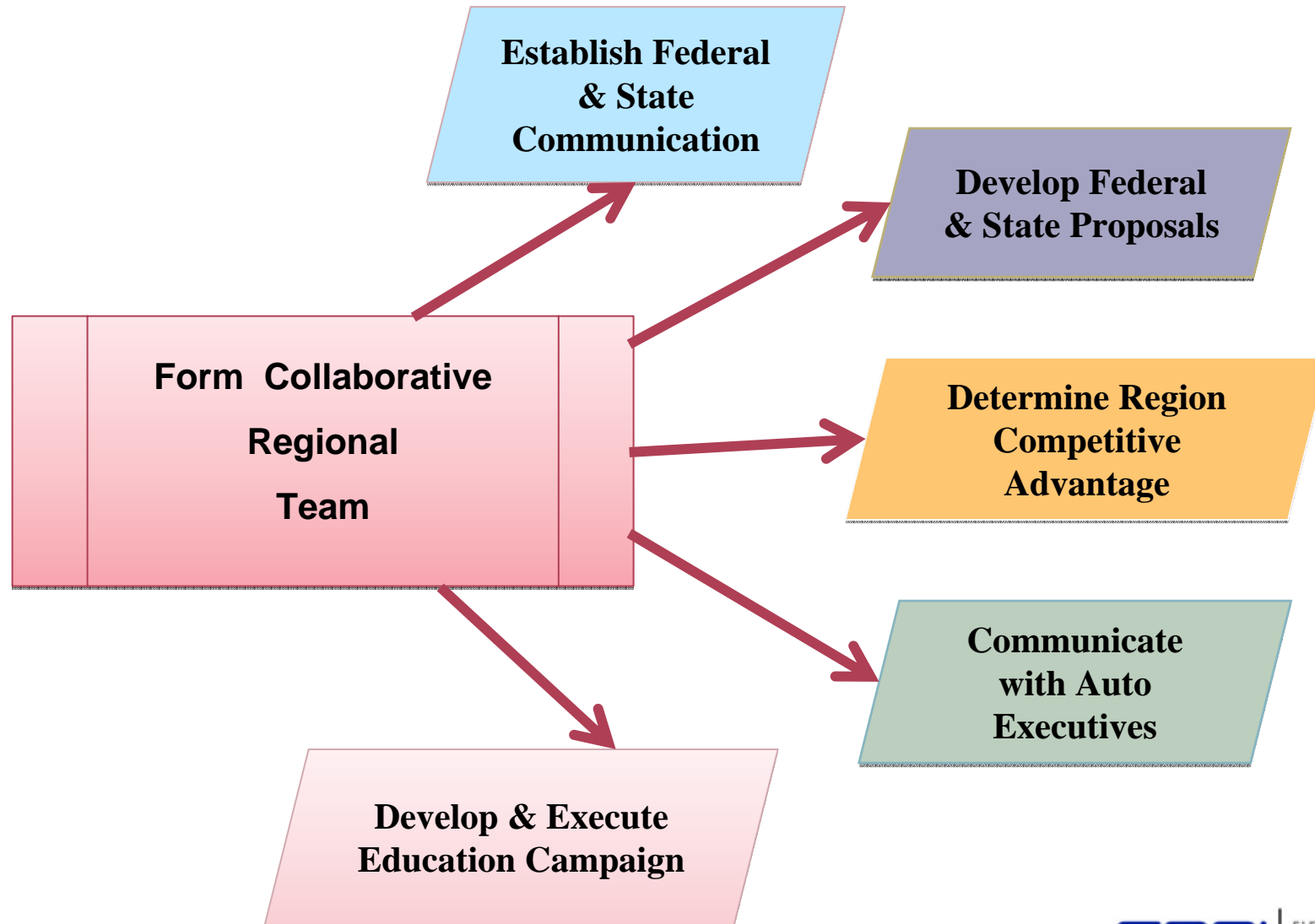
**What should
Cleveland Area do to
Capture Value?**

Roadmap

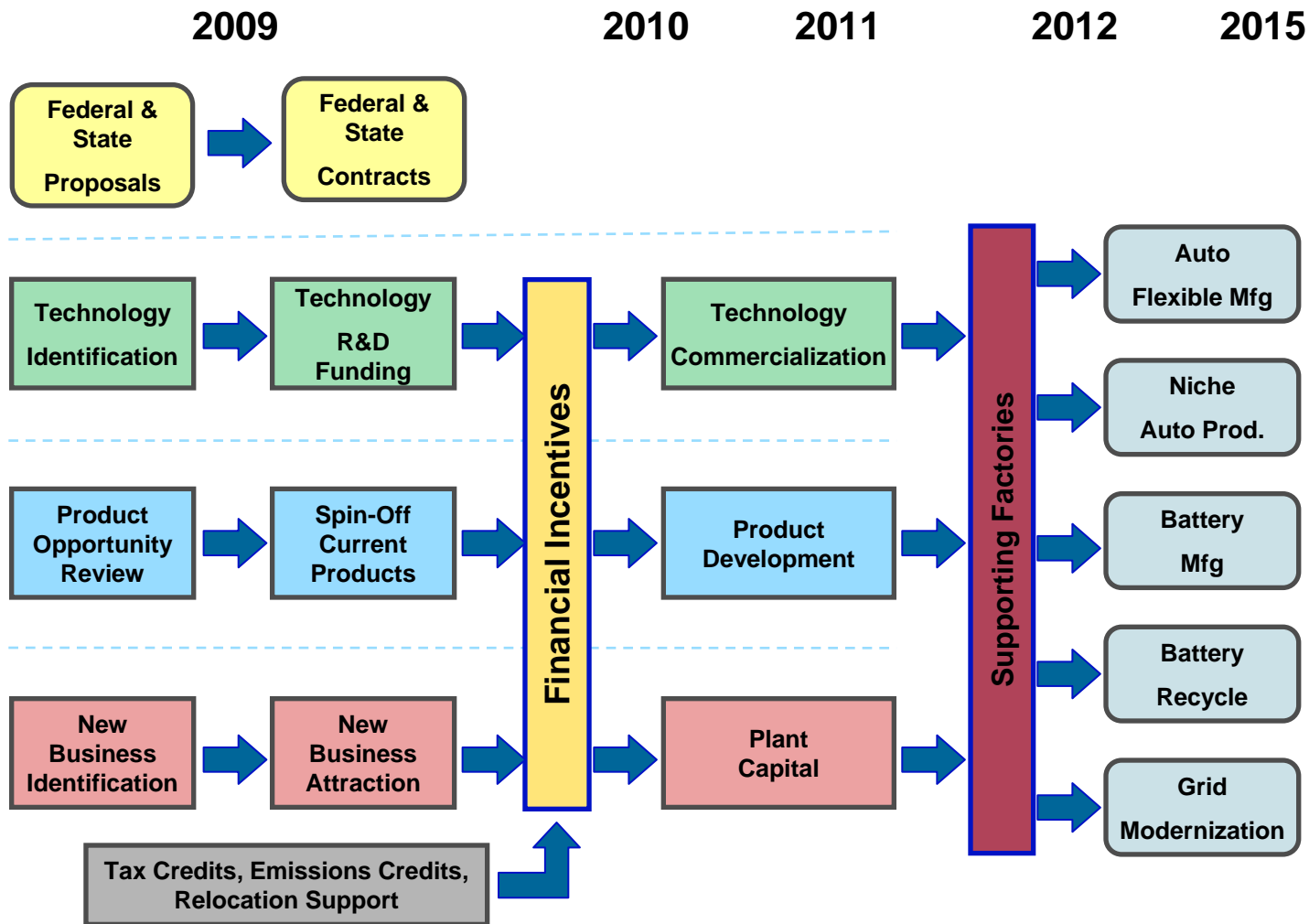
Roadmap – “A strategic planning and-action oriented document that conveys a sense of urgency and what is possible”

- Action-based strategy to enable Cleveland Area Stakeholders to participate in new opportunities
- Identification of the region’s competitive advantage
- Review of the employment and environmental benefits
- Establishing R&D and commercialization focus
- Strategic action recommendations

Roadmap Immediate Actions



Roadmap & Proposed Timeframe



Conclusions

- Forces clearly pushing towards electric vehicles for transportation
- Significant opportunities for Cleveland to prove industry-building electric vehicles – and clear risks if action aren't taken
- Cleveland area needs to get started to avoid risks and capture opportunities

TIME FOR ACTION

- Create a sense of urgency
- Seek stimulus funding
- Identify an Executive Leader & Team
- Highlight regional competitive advantages
- Engage state and federal funding opportunities
- Aggressively develop business opportunities
- Plan and execute for the long term
 - Research & Development
 - Commercialization
 - Education
 - Job Attraction
 - Job Training

APPENDIX

ET and Energy Storage and the Stimulus Bill

- The existing plug-in vehicle **tax credit was dramatically expanded**. the phase-out period starts when each carmaker reaches 200,000 units. The basic tax credit stays the same \$2,500 to \$7,500 depending on the size of the battery.
- **\$2 billion for manufacturing grants** for advanced batteries and other components
- New funds for DOE **research and demonstration programs on advanced batteries**, energy storage and plug-in vehicles (part of a \$2.5 billion research fund at EERE).
- **Energy storage is also included in new programs for the smart grid** and at the Department of Defense.

ET and Energy Storage and the Stimulus Bill

- Temporary increase in the **alternative fuel infrastructure tax credit** in 2009 and 2010 including plug-in vehicle infrastructure (from 30% to 50% of costs up to a maximum of \$2000 per residence and \$50,000 per business site).
- A new plug-in vehicle manufacturing and advanced energy investment tax credit
- A new **tax credit for plug-in conversions** if they meet federal safety and emissions (10% of the cost up to \$4,000)
- A new tax credit for small plug-ins including neighborhood EVs, two and three-wheel EVs (10% of the cost up to \$4,000).
- **Deployment funding – \$1.1 billion** – includes \$400 million for Electric Transportation deployment programs under section 131, Includes \$300 million for federal fleet purchases of advanced vehicles such as plug-in hybrids and battery EVs.

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