Johnson Controls Inc. domestic advanced battery industry creation project

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Johnson Controls

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ARRAVT019

Introduction to Johnson Controls

Power Solutions

- World's largest manufacturer of lead-acid automotive batteries
  - 97% recycling rate in the US
- The leading independent supplier of fully integrated battery systems for hybrid and electric vehicles
- Joint venture with Saft formed in 2006

Building Efficiency

- Global leader in energy efficiency for buildings with a portfolio of over $3.8 billion in performance guarantees in the U.S.
- World's largest provider of energy efficiency and comfort solutions involving heating, cooling, fire, security, and lighting

Automotive Experience

- World's largest provider of automotive interiors, including seats, door systems, cockpits, overhead systems, and electronics

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Johnson Controls domestic advanced battery industry creation project overview

Timeline

Grant Award: 11/6/2009
Pack Assembly: 9/12/2010
Cell Assembly: 3/5/2011

Budget

- Total Project Size: $599.4M
- DOE share: $299.2M
- Johnson Controls share: $300.2M

Barriers

- Market demand vs. capacity
- Lack of diversification/development of domestic supply chain
- Lack of commercialization of U.S.-developed technologies

Partnerships

- Johnson Controls-Saft
- Entek Membranes
- Azure Dynamics
- Argonne National Laboratory

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Johnson Controls Project Objectives

Stand up a domestic advanced battery industry scaled to be globally competitive

- Build a demand base
- Manufacture battery cells and systems
- Create jobs
- Build a domestic supply chain
- Accelerate the deployment of charging infrastructure

Our advanced battery manufacturing plant being constructed and equipped in Holland, Michigan

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Meeting Goals

American Reinvestment and Recovery Act (ARRA) Goals

- Create new jobs and save existing ones
- Spur economic activity and invest in long-term growth
- Foster unprecedented levels of accountability and transparency in government spending

DOE Vehicle Technologies Program Goals

- Develop energy efficient and environmentally friendly highway technology
- Use less petroleum
- Increase mobility
- Promote energy security
- Lower cost and reduced impact on environment

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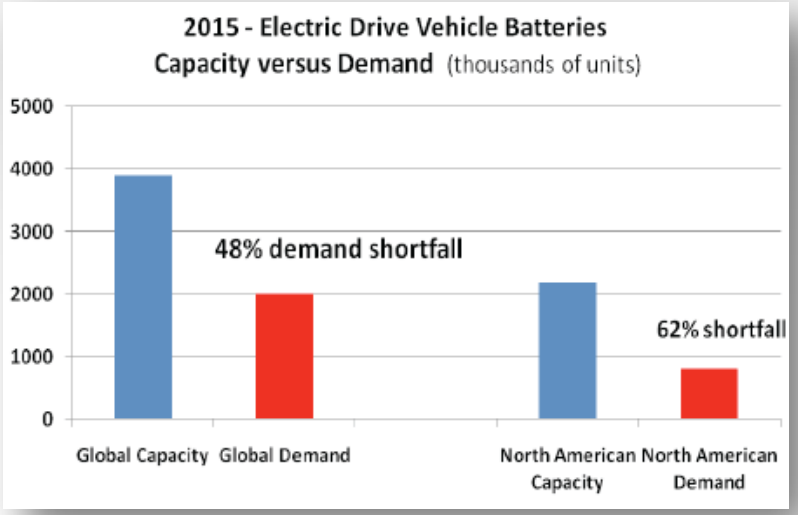
Addressing market demand vs. capacity barriers

- Issue

  Market demand for advanced energy vehicle batteries is projected to lag manufacturing capacity

- Solution
  - Accelerating market demand of electric drive vehicles
    - Providing a value-added vehicle solutions to fleet operators
    - Transition Government fleets to xEVs
    - Aggressively addressing the cost side of the electric vehicle equation



- Takeaway
  - Market demand will only increase when the economics are equal or better than internal combustion engines. Johnson Controls is leveraging our position as a technology leader and investigating the electrification of our fleet

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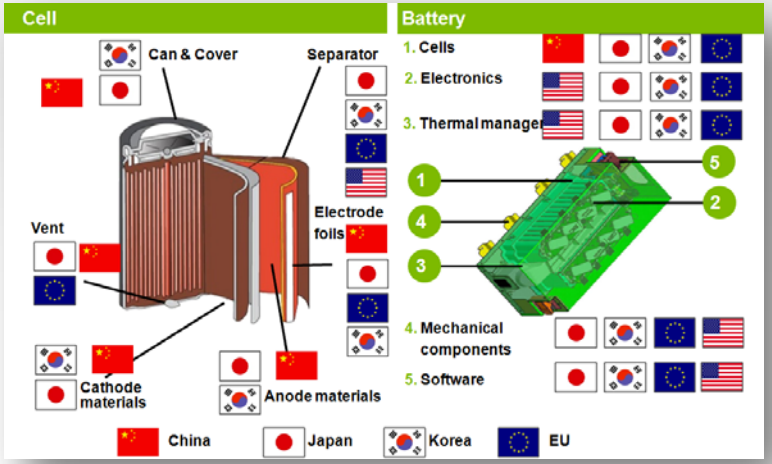
Addressing the domestic supply chain barrier



- Issue

  Nearly all the batteries for hybrid electric vehicles and plug-in electric vehicles, along with the materials and equipment to manufacture them, are made in Pacific Rim countries

- Solution
  - Developing a domestic supply base throughout the advanced battery value chain
  - Giving first consideration to US-sourced materials
  - Recruiting foreign suppliers to locate in the US

- Takeaway
  - Johnson Controls, with ARRA matching grant funding as a catalyst, is developing a domestic supply base. We are sourcing all major components of our cells domestically.

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Addressing the barriers to domestic technology development

- Issue

  America needs to reestablish our position as the world leader in transferring innovation into commercially successful products that are made in the US

- Solution
  - Johnson Controls is building a domestic plant to produce high-tech products
  - Our plant is designed to launch breakthrough technologies, after Government incentives expire
  - We are addressing the full product supply chain by working with the DOT, United Nations, and the agencies of foreign nations to accelerate the harmonization of transportation regulations on advanced energy batteries
- Takeaway
  - The ARRA matching grant has knocked down the barrier to building manufacturing domestically. The matching grant solidified Johnson Controls' decision to expand advanced battery production in the US versus Europe or Asia.

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Accomplishments towards Johnson Controls goals - overview

- Investing in America
  - We are making an investment in the U.S. to build an advanced energy industry
  - Developing and bringing advanced products to market
- Investing in people
  - We are hiring engineers, technicians, and an experienced manufacturing workforce in the U.S.
- Delivering successes
  - Vehicles that use our batteries, like the Ford Transit Connect Electric, are reaching the public with great interest and success
  - We are building a domestic supply base, as well as anchoring foreign suppliers in the U.S.
  - Our plant is on track to begin domestic production of complete advanced battery systems **this year**, full ramp-up next year



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Accomplishing Johnson Controls goals – manufacturing excellence

- Installing state-of-the-art equipment delivers:
  - Automotive quality product
  - High volume capability
  - Significantly reduced cost
  - Minimized environmental impact
  - Processing efficiency
- Reducing costs
  - Domestic production will allow us to reduce shipping and duty costs from our European plant
  - Domestic sourcing
  - Design optimization
  - Manufacturing process optimization
  - Johnson Controls operational excellence, Best Business Practices, and continuous improvement

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Accomplishing Johnson Controls' goals – sustainability

- Certified LEED® factory
  - Our plant performs more efficiently with less impact on the environment
- Cooling for free
  - Our plant's cooling towers relieve significant pressure from our facility's chiller plant
  - As a result, the plant will have more consistent operating costs throughout the year
- Recovering heat
  - Heat from the battery formation process is captured and used in other areas of battery manufacturing
- Reclaiming what would have been wasted
  - We have designed our processes to reclaim materials used in manufacturing to save time, cost and energy

The Power Solutions plant has leveraged our Building Efficiency expertise to design our plant to maximizes energy efficiency to meet our aggressive environmental goals and set the standard for green domestic manufacturing

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Accomplishing Johnson Controls' goals – employee safety

At Johnson Controls, maintaining a safe, clean and sustainable environment for our employees is our top priority. Our safety plan is explicit:

Equipment must provide adequate protection from hazards or safety risks to the operators or to those who are working on or in the area during normal operation, standing alone or during its non-production functions (e.g., manual cycles, set up modes, re-work modes, etc.). Servicing and Maintenance for equipment must be user friendly, safe, and convenient. In order that these goals may be met, Johnson Controls has compiled this specification, which represents Johnson Controls' interpretation of applicable standards and laws. Johnson Controls must authorize all deviations from this specification…

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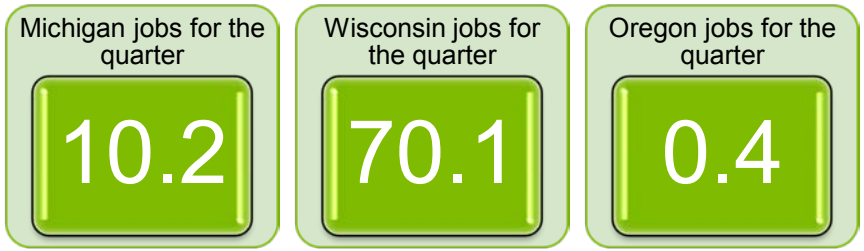
Accomplishments towards ARRA goals

- Employing people – high quality jobs are being created
  - In the last quarter, this project has resulted in direct 80.7 FTE jobs in the U.S.
  - The Holland, Michigan plant will employ 98 workers by the end of next year. 303 permanent full time jobs will be created when at full capacity
- Spurring economic activity
  - $39.6M has been spent on customer programs, materials, equipment and service suppliers



- Growing for the long-term
  - We are building a sustainable business model that does not rely on Government subsidies
- Defining accountability
  - Meeting all reporting requirements of the ARRA and the DOE
  - Our program office proactively self monitors and self audits internal processes and procedures to ensure uncompromised integrity in the use of tax payer dollars

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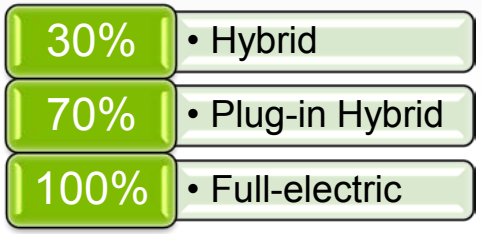
Accomplishments towards DOE Vehicle Technology goals

- Energy efficient and environmentally friendly highway technology
  - Vehicles powered by our Li-ion batteries, including Daimler, BMW, Azure Dynamics, and Ford, produce fewer emissions and get better fuel economy than conventional internal combustion engines
- Reduced petroleum consumption
  - Our combination of HEVs, PHEVs, and Evs reduce or eliminate petroleum usage



Reduction in petroleum usage

- Freedom of mobility
  - Battery technology gains in cycle life and energy density are providing Americans with extended all-electric range vehicles to eliminate range anxiety
- Energy security
  - Domestic advanced energy products improve energy security by reducing petroleum imports and minimizing the possibility of a foreign battery cartel
- Lower cost and reduce impact on environment
  - Batteries manufactured at our facility are optimized for cradle-to-cradle product lifecycle, including recycling and the recovery of key materials

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Project status and milestones

- Environmental Assessment
  - Johnson Controls' plant poses no threat to the environment around our plant and area of operations
  - Finding of No Significant Impact (FONSI) was issued March 2010
- Milestones

Event	Date
Project kick-off	August 2009
Prototype assembly	July 2010
Pack Production	September 2010
Cell production ramp-up	February 2011
Scale cell production	July 2011

Early next year, complete advanced battery systems will be produced in the US and will power vehicles on US roads

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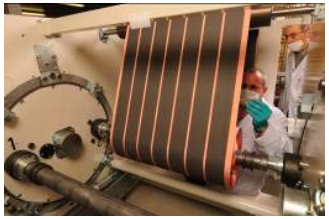
Johnson Controls' Collaborations and Partnerships

- **Johnson Controls – Saft**
  - Sub-recipient to the grant
  - Leader in Li-ion batteries, involved within the Vehicle Technology (VT) Program
  - Johnson Controls – Saft is our joint venture that brings electrification to vehicles through battery leadership
- **Entek Membranes**
  - Sub-recipient to the award
  - Leader in the industry, involved within the VT Program
  - Entek provides state-of-the-art Li-ion battery separators
- **Argonne National Laboratory**
  - Service provider to Johnson Controls
  - Federal laboratory, involved outside the VT Program
  - Unmatched expertise in characterizing and validating cell materials
- **Azure Dynamics**
  - Partner in innovation
  - Established leader in sustainable vehicle technologies, involved within the VT Program
  - Azure provides vehicle powertrain electrification expertise

Future Work

- Within the Fiscal Year
  - Our Holland, Michigan plant will begin assembling battery packs
  - We will deliver market-derived solutions to transportation needs
- In the remainder of the project
  - Our Holland, Michigan plant manufacture advanced Li-ion cells
  - We will be assembling complete battery packs with domestically produced cells
  - Accelerate market demand to support the full capacity of our plant
  - Continue to win production contracts to produce xEVs
  - Continue to develop our technology roadmap to maintain Johnson Controls leadership position



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Summary

- Johnson Controls is committed to being a leader and establishing a domestic advanced battery industry
  - Building a significant manufacturing presence in Holland, Michigan
  - Establishing a domestic supply chain and using US-produced components
- Johnson Controls is meeting the goals of the ARRA and the DOE Vehicle Technologies programs
  - In the past quarter, this project has resulted in the creation of 80.7 jobs
  - We have spent $39.6M to deliver customer products, design and outfit our plant, and build our supply base, spurring economic activity
  - We are committed to putting environmentally friendly vehicles into the market including our fleet
  - Our business is positioned for long-term growth

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