

inventev

The Energy SWAT Truck

Dave Stenson
Founder & CEO

info@inventev.com
+1.248.340.3063

inventev (an ARPA-E grant award company)

- Up-fit commercial medium-duty trucks with a new transmission architecture
- Create hybrid electric mobility, job-site tools and nimble power generation...

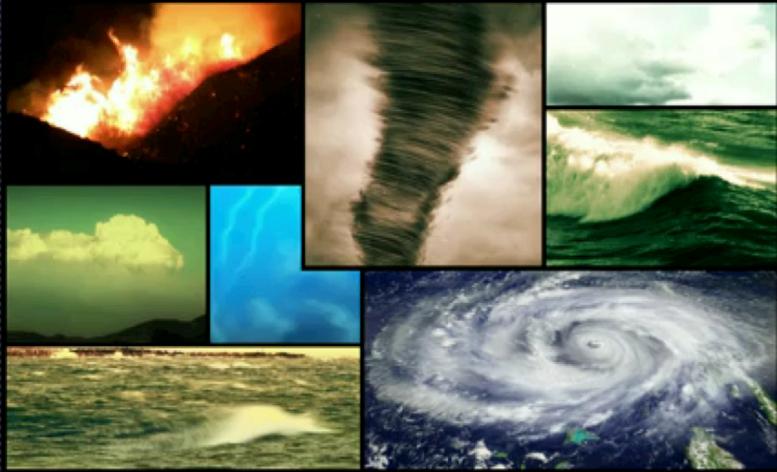
Work Electric

Drive Electric

Generate Electric

- Sell this enhanced OEM truck offering directly to commercial fleets

Problem 1: Power needs during outages and emergencies...



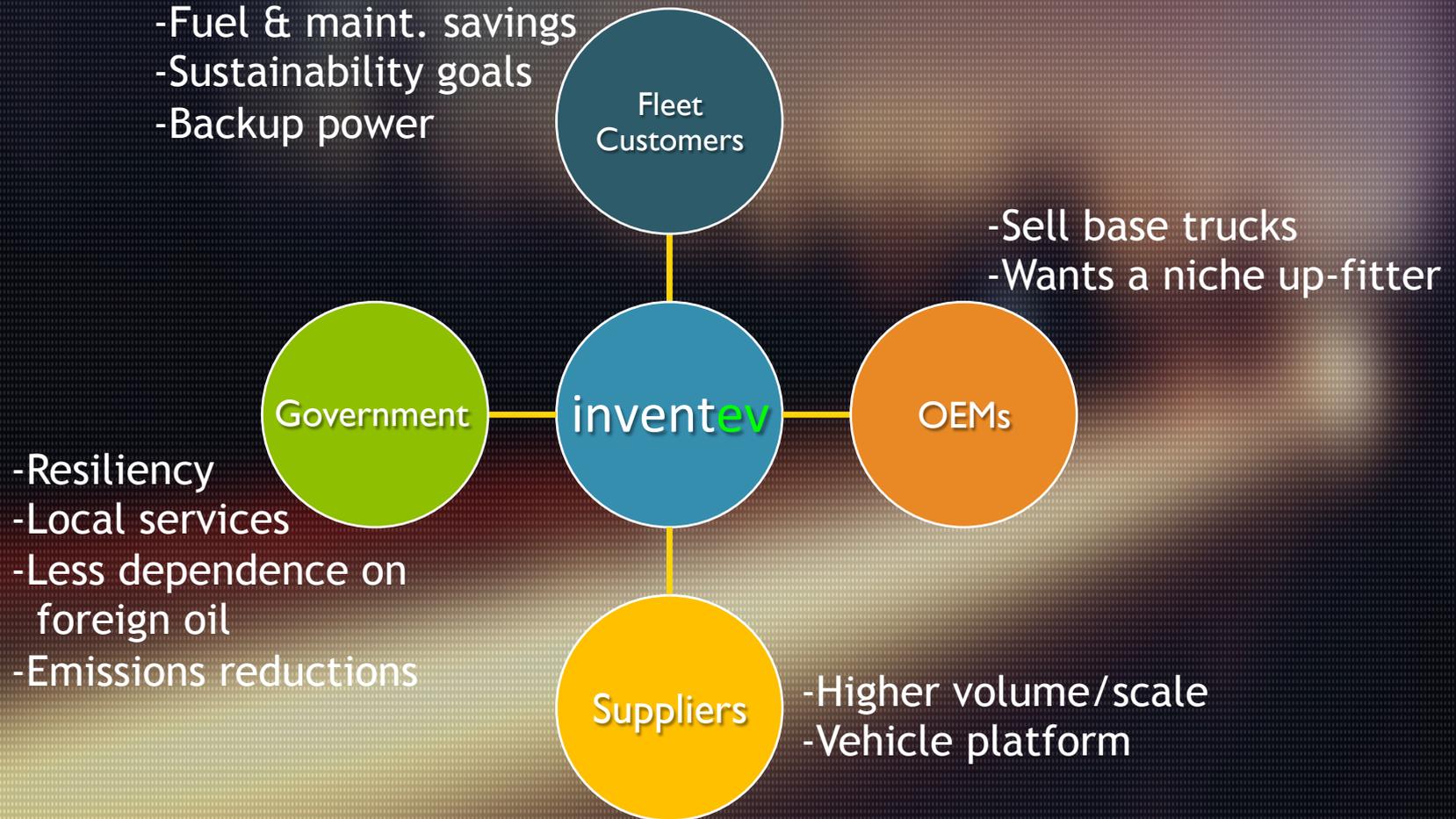
...with aging grid infrastructure



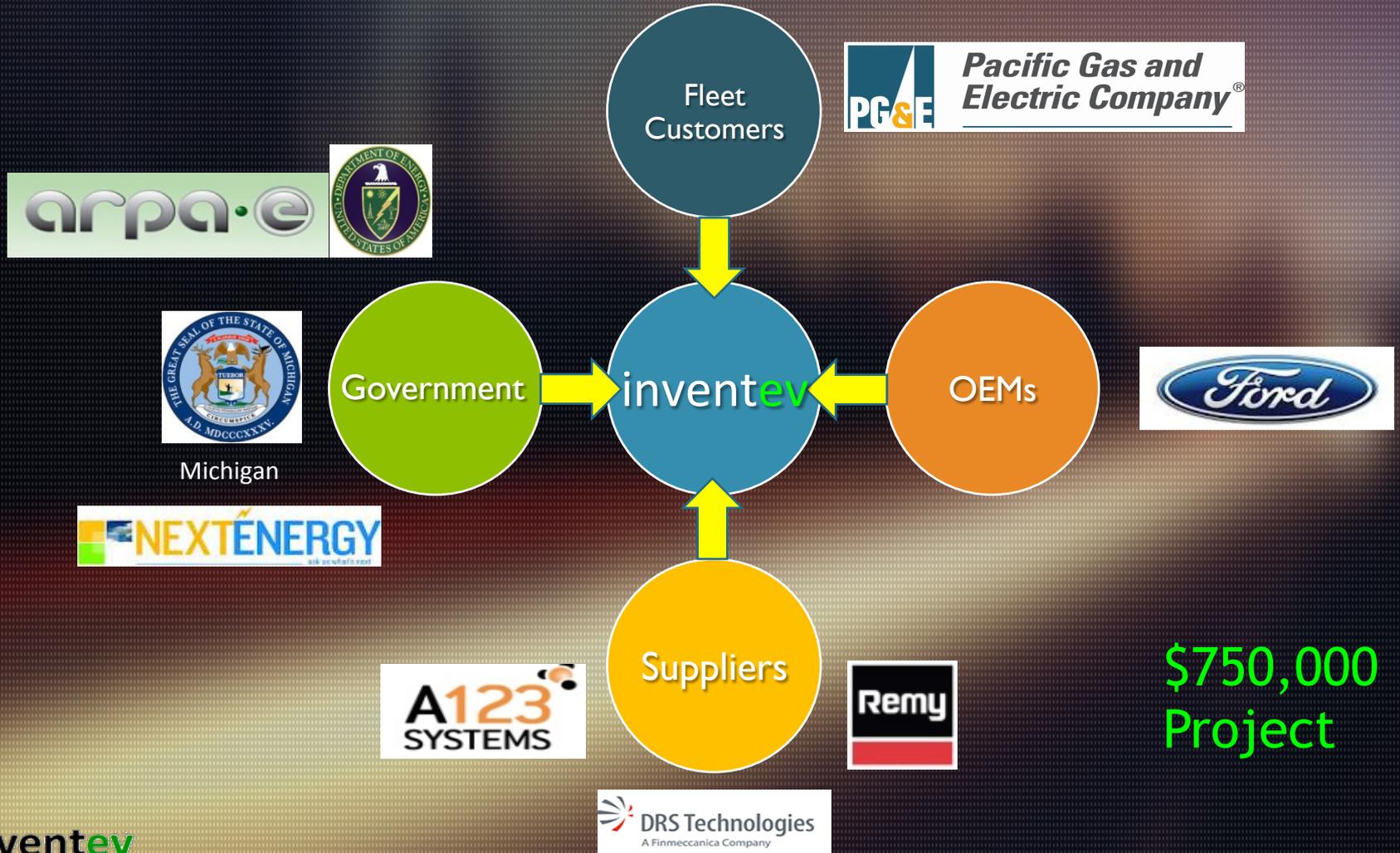
Select Other Customer Problems...

- Not enough generators when needed
- Jobsite idling wasting money, polluting
- Various EV technology adoption hurdles

Stakeholder Needs Requiring Integrated Solution



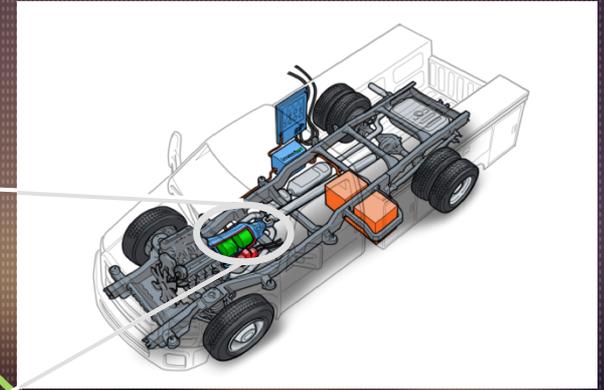
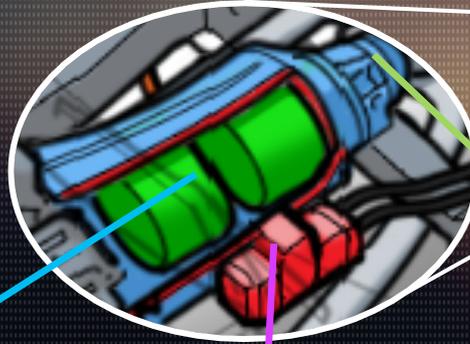
ARPA-E Grant Award Strategic Participants



How are we different?

Energy SWAT Truck

Core IP
Integrated
Transmission:
3 Value
Propositions



Generate Power

Temporary
& backup power

Work Idle Free

Work quiet,
clean, safe

Move Electrically

Save fuel &
maintenance; avoid
diesel \$8K premium

Customer Value



*Fuel savings
(drive & idle)*



*Maintenance
savings*



*Avoid \$8,000
diesel premium*

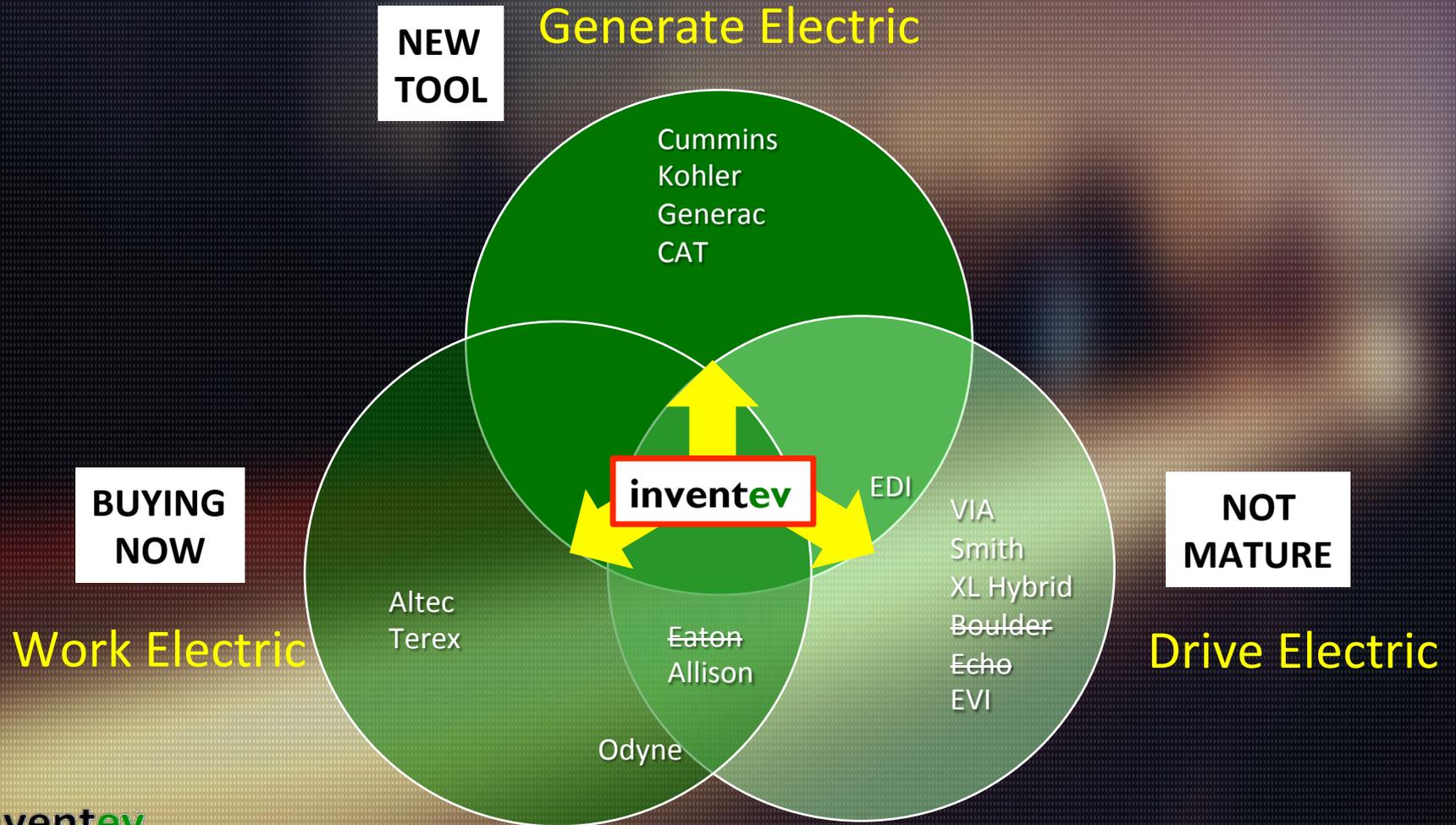
**3-year
Payback**

**10-year
Asset**

Plus:

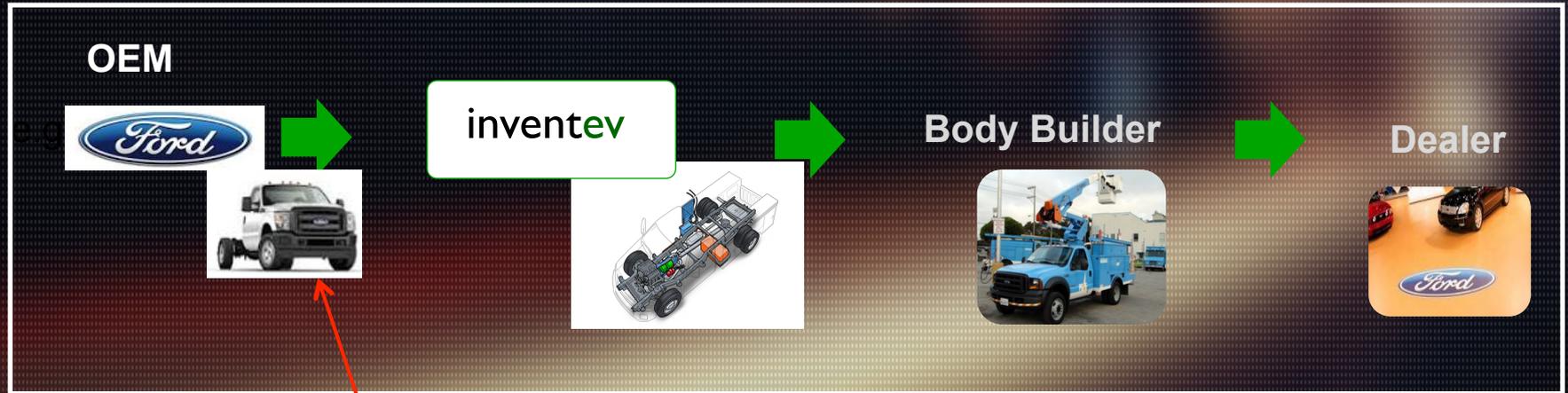
- ✓ Utility-grade generator
- ✓ Extended hours (no idle)
- ✓ Petroleum fuel price hedge
- ✓ Sustainability goals

Market: Competitive Landscape by Value Prop



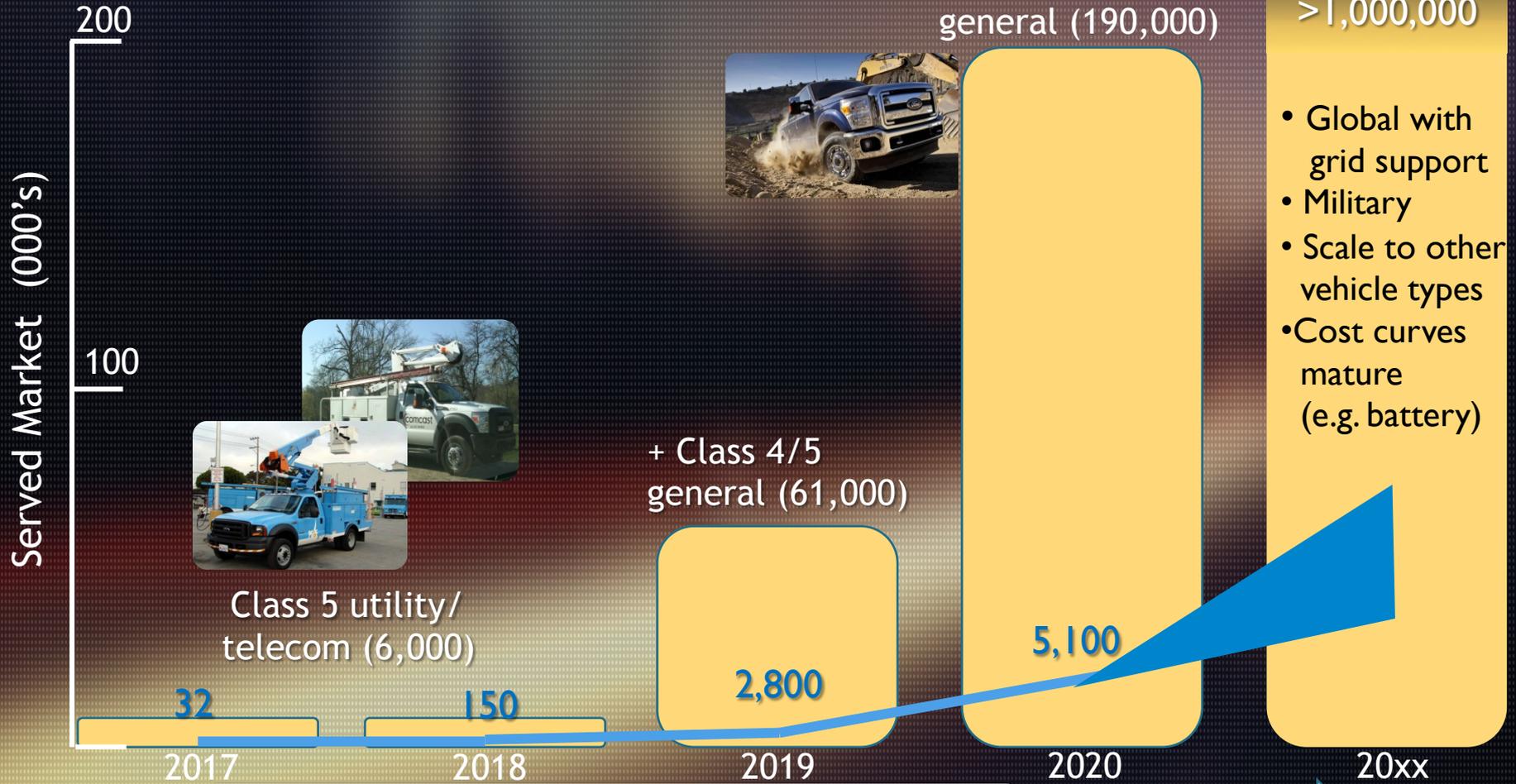
Business Model **Proven Distribution Channels**

Common Industry Flow (up-fit model); no process change required



Technology enables gasoline base engine (vs. diesel)

Market: over \$20B U.S. alone



Highly Experienced Team

Dave Stenson

Founder & CEO

- GM Vehicle Line Director-Solstice
- Chief Engineer-Mexico & Performance Div.
- CTO Hummer; Truck PHEV start-up
- DOE technology merit reviewer

Mark Davison

Operations & Supply Chain

- Tier 1 suppliers
- Start-up Assembly Operations
- BOSCH, Director- Business Development

Ed Mussi

Chief Technical Officer

- Ricardo, Chief Engineer, Advanced Technology
- Energy storage, fuel cells
- Azure Dynamics, Program Manager- Hybrids

Jim Powell

Planning & Analytics

- GM Truck Planning
- Chevy Volt team
- International Market Requirements

Albert Steurer

Strategy and Markets

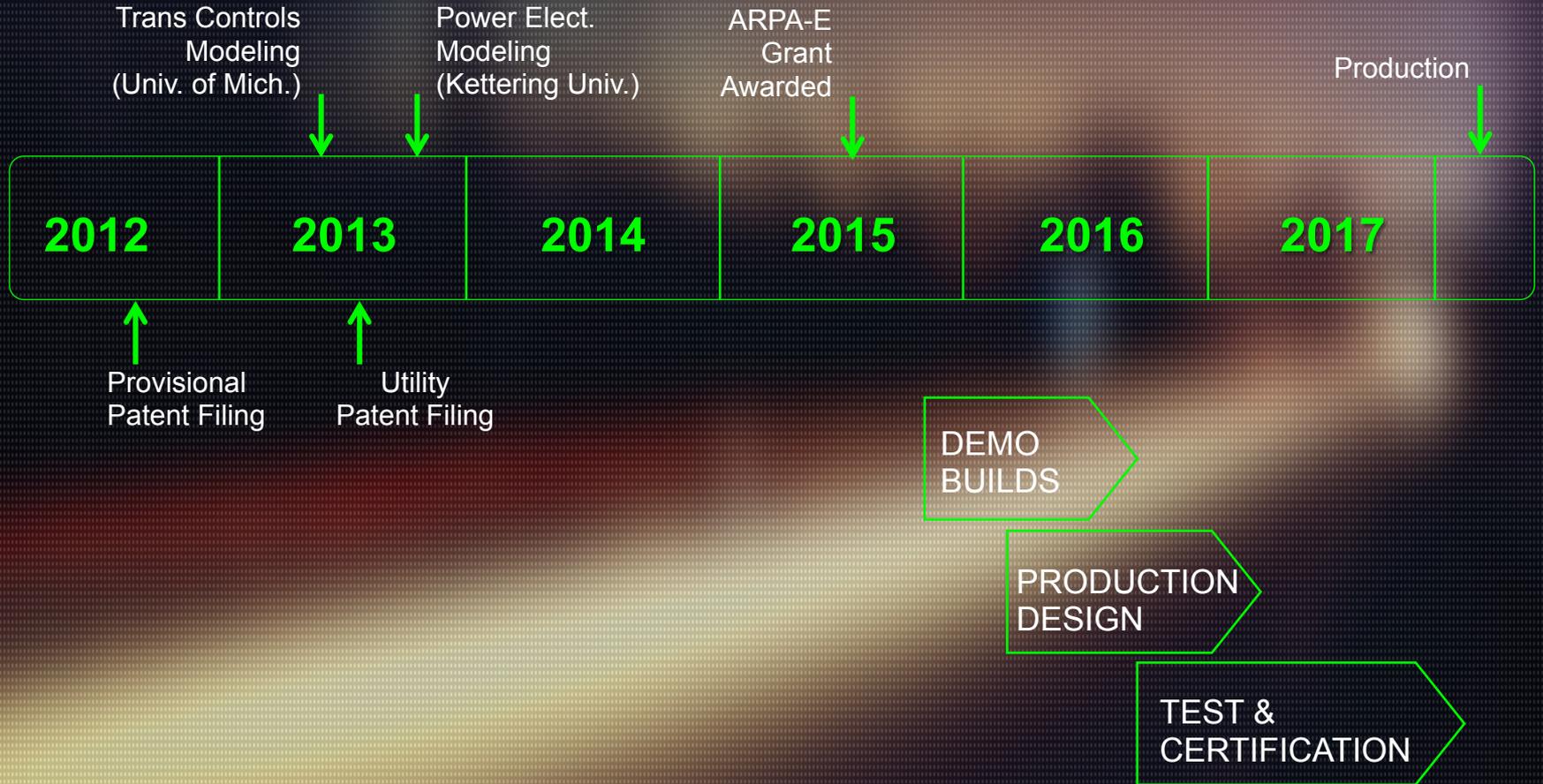
- GM Powertrain & Vehicle Planning
- GM EV-1 (Electric Vehicle 1 program)
- Manufacturing Operations

Neil Zeller

Finance & BD

- Multiple start-ups: ops, BD, finance
- Technology investment banking
- Fleet industry background

Milestones



Prototype Funding Pathway & Industry Support

Lab-based Prototype

ARPA-E grant award  \$500,000
 Cost share funding \$250,000



Michigan

\$750,000

Prototype Level	Generate Electric	Work Electric	Drive Electric
v1.0 lab			
v1.1 drive			

Vehicle-integrated, Drivable (parallel path with arpa-e)

Funding needed to complete drivable unit: **\$850,000**

2016 Funding to complete Seed plus Series A **\$5,000,000**



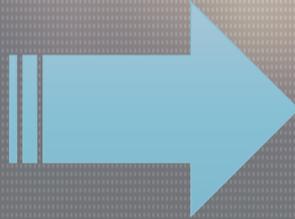
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- Commercial & Policy Need
- Technology
- Team
- Industry & Govt. Support

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Supplemental Slides

Integration + Convenience = New Demand



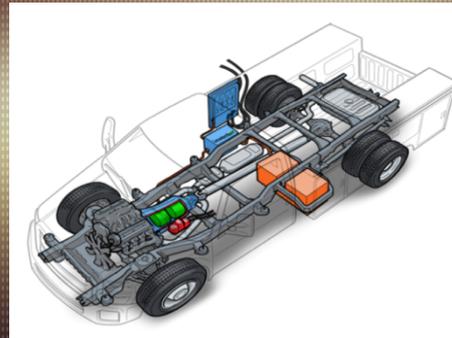
As the smartphone led to proliferation of picture-taking....

Classic becomes specialty

- Convenient
- Cost effective



Integrate



...the Energy SWAT Truck creates new applications for temporary and back-up grid-quality power

Environmental Benefit

- Anti-idle and Plug-in Hybrid modes of our system eliminate between 30 and 100% of petroleum-based fuel consumption and harmful emissions depending on application.
- For example, saving 2,500 gallons of fuel per vehicle per year equates to 22 metric tons of CO₂ equivalent or the Green House Gas emissions of:
 - a) 4.7 average passenger vehicles
 - b) 8 tons of waste to a landfill
 - c) 51 barrels of petroleum
- In year 5 at 5,100 units, Inventev systems could be avoiding the importation of over a quarter million barrels of oil annually and growing.



Large Market: \$20B in the US Alone



WEIGHT
CLASS:

1-2A

2B-3

4-5

6-8

OEM focus: CAFE
fuel econ. regs.

Target Segments: Up-fit plan

Over \$20B
Annually

Heavy OEM
Core

Avoiding direct threat to OEM core markets;
Ford joined Inventev's ARPA-E grant project

Team Recognition



DOE ARPA-E
2015 Grant
Awardee



2013 Cleantech Open
To Whom It May Concern
NextEnergy is one of the na
for alternative and renewal
years of experience workin
business development, ve
industry.

Endorsements



04 November 2013

Inventev
440 Burroughs, Suite
Detroit MI 48202-3429

Subject: Inventev Export Pow

To Whom It May Concern

Subject: *Inventev Collaboration and Technical Meet*

As background, I have known Dave Stenson for a number of years as General Motors in technical and vehicle program executive roles. It has been a natural evolution to now collaborate with his startup, Inventev, particularly in the area of hybrid transmission design. For nearly 30 years, I have developed a career in transmission design and development.

September 5, 2013

L.B.#: LKK/INVENTEV/13-023



Inventev for a New Breed Hybrid
Low-Cost System to Install on OEM-Branded New Trucks

Michigan start-up Inventev is aiming for the afterwork with a low-cost hybrid system that will allow work trucks to travel as far as 50 miles on batteries alone, and provide power takeoff electricity for tools and lifts and even small windblowdowns at the jobsite.



NTEA Work
Truck Show



Inventev Reaches National Cleantech Open Semifinals
Participating in the Cleantech Open national business competition, Inventev has been named a semifinalist from the Midwest region. The company is the developer of a plug-in hybrid electric truck propulsion system that provides power on job sites and for disaster response with mobile temporary power generation.

"We plan to integrate no fleets of hybrid generating capacity, saving fuel while also has standby generating capability when needed," said Inventev CEO Dave Stenson. "By using the trust-



Utility Fleet
Professional

Publications

TV Segment



Dave Meisel
Director of Transportation Services, Pacific Gas and Electric



Marc Miles
Senior Vice President, Altec, Inc.



Dave Stenson
Founder & CEO, Inventev



Competitions

- Accelerate Mich. Transp. Sector Winner (2014)
- 1st place Great Lakes Entrepreneurs Quest (2014)
- Clean Energy Challenge Finalist (2014)
- Cleantech Open Semifinalist (2013)
- Rice Alliance: Top 10 Most Promising
- NREL Industry Growth Forum presenter (2011, 15)



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Not Enough Generators at Crucial Times

Insufficient supply and unreliable equipment conditions at worst possible times

High Expense

~\$50,000



Little Use

can be <1%

People Died

Slow Recoveries

Utilities Pressured

Expensive & Polluting Fuel Wasted at Jobsites

Diesel/gas idling costs money, creates emissions, noise and restricts working hours



- Regulatory limits (hours/day) for neighborhood work
- Power aerial devices
- Provide crew comfort

Technology: Meeting Customer Needs

inventev Propulsion System

Inventev exclusive integrated propulsion unit allows all-electric drive for 30-50 miles plus range extension; includes regenerative braking and power boost from engine when needed.

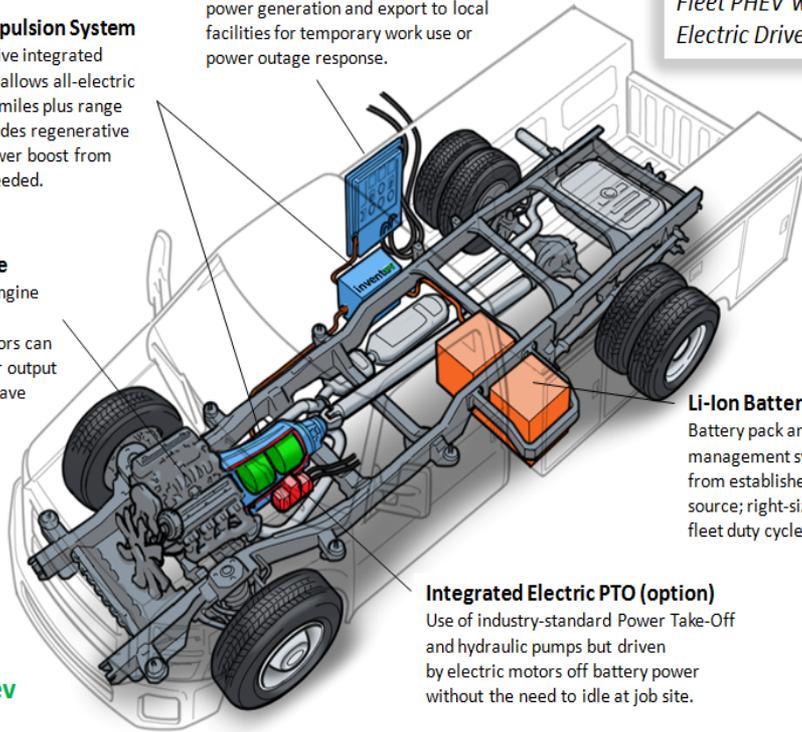
OEM Base Engine

Standard gasoline engine for range extension combined with motors can exceed diesel power output for peak loads and save up-front capital and maintenance costs. Diesel integration is a potential for unique needs.

Mobile Power Generation

Architecture supports high capacity power generation and export to local facilities for temporary work use or power outage response.

*Job-site or Delivery
Fleet PHEV with
Electric Drive Bias*



Li-Ion Battery Pack

Battery pack and battery management system from established industry source; right-sized for key fleet duty cycles.

Integrated Electric PTO (option)

Use of industry-standard Power Take-Off and hydraulic pumps but driven by electric motors off battery power without the need to idle at job site.

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Electric motors generate high torque for peak needs in **patent pending** transmission architecture

Fuel source efficiency:

- Needs-driven settings for optimal use of electric power
- Battery storage, – plug in and / or re-charge with engine
- Natural gas options

Continuous power supply via external natural gas connection under development with ARPA-E grant award