



**The Delicate Balance of Supply and Demand
for Green**

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Agenda

- ▶ Exploring the Options: IC Engines vs HEV/EV – Different technologies and manufacturing
- ▶ Drivers for Change – What we have to prepare for...and why
- ▶ Reality Check – Do we have the proper balance and focus?
- ▶ The Prognosis – Where is the market going and how do we prepare?

Conventional Engines: Why are they so successful?

1876 Nicolas Otto develops 4-stroke, spark-ignition (SI) engine



1892 Rudolf Diesel develops 4-stroke, compression-ignition (CI) engine



After 100+ years, these are still the primary power plants of choice for personal mobility

- Low cost density (<\$30/kW)
- High power density
- Robust, versatile
- Matched to 'cheap', available fuel
- Near-zero emissions
- Historically efficient enough

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The Combustion Engine is a Long-Term Player – Proven Technology and Manufacturing Efficiency

Technology Designed to Improve Fuel Economy:

- ▶ Engine Downsizing
- ▶ Turbocharging
- ▶ Direct Injection...

All while keeping driving fun!

Manufacturing Efficiency:

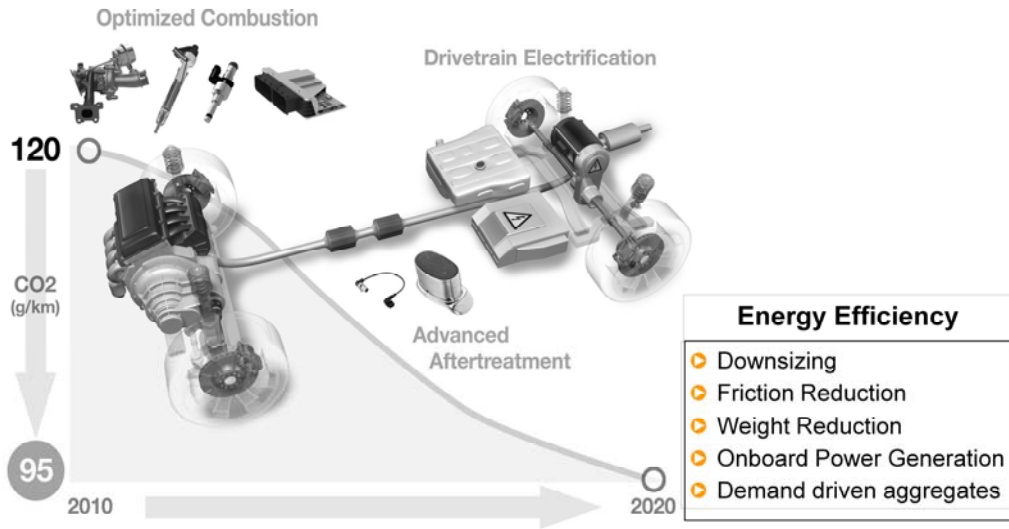
- ▶ Decades of improvement
- ▶ Design for efficient manufacturing
- ▶ Economies of scale
- ▶ Installed manufacturing capacity

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Yet, We Still Face Challenges – Global Emissions Legislation



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Key Technologies for Future Emissions Reduction

Continental offers solutions from single components up to complete systems

Combustion Systems

Diesel



≈ 25% Piezo Common Rail *

Gasoline



≈ 15% Solenoid Direct Injection homogeneous *

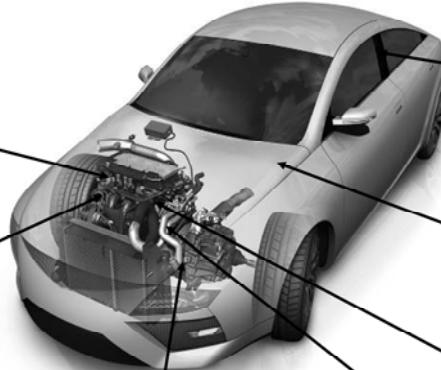


≈ 20% Piezo Direct Injection stratified *

Measurement & Control



Smart Sensors



Fuel Supply



≈ 1% Demand Controlled Fuel Supply Unit

Exhaust Aftertreatment



≈ 5% SCR-Systems

Turbo



≈ 15% Engine Downsizing and Turbocharger

Transmission



≈ 3% Transmission

Hybrid / EV



≈ 25% Hybrid Electric Drive *

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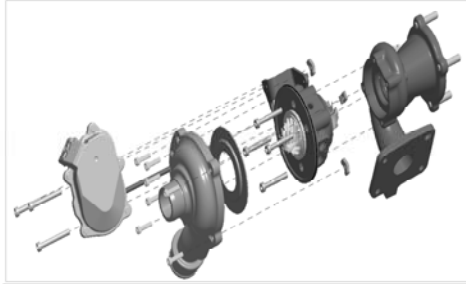


*Reduction of fuel consumption versus Multi Point Injection

Continental is Investing in the Future of the Combustion Engine

All-New Turbocharger -- Basic Design Features and Highlights

- ▶ New design solutions with innovative details
 - ▶ Thermodynamic efficiency
 - ▶ Reliability
 - ▶ Process control and cost

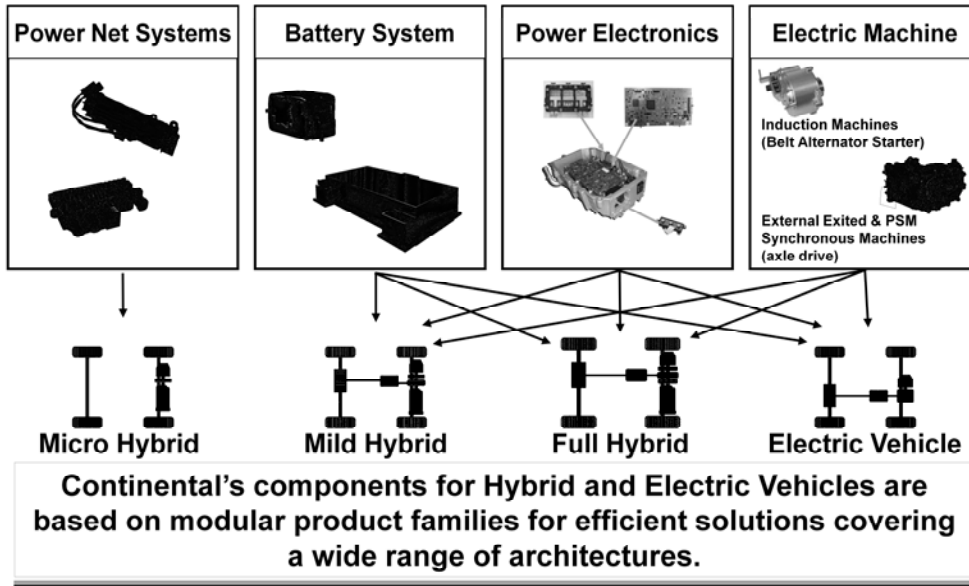


- ▶ Designed for a fully integrated robotized assembly process

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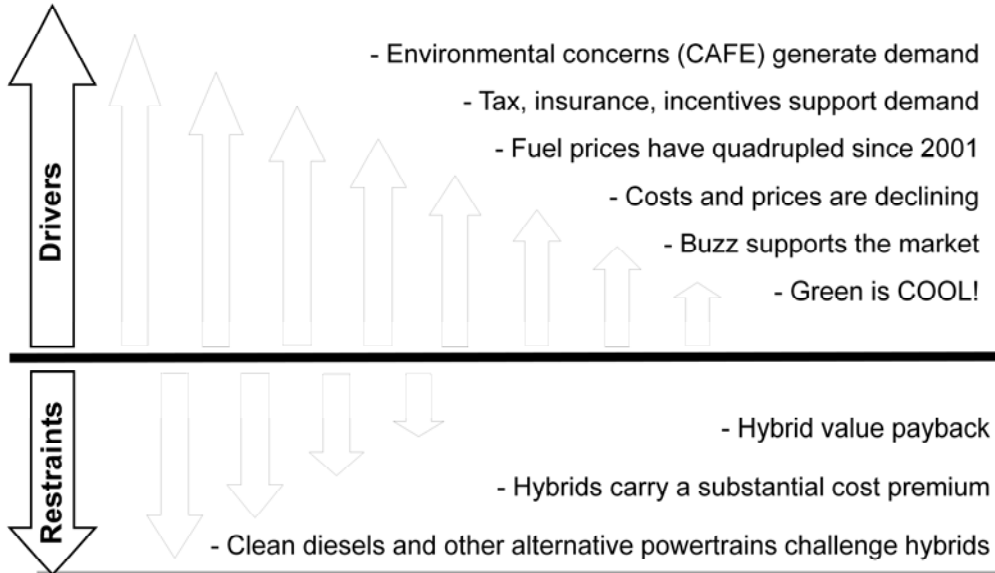
Additionally, We are Investing in Powertrain Electrification



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Drivers outweigh restraints, forecasting EV growth



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Source: Frost & Sullivan

Projected HEV Penetration into US Market Sales

	2010	2015	2020
HEVs	5.5%	7.6%	11.8%
EVs (inc. RX)	0%	1.4%	3.5%
Total	5.5%	9.0%	15.3%

Strong HEV growth in specific market segments driven by private/public incentives and increasing consumer demand



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The United States: Investing to Be a Leader

Federal Investment in Advanced Vehicle Technology / Electrification is Increasing

- ▶ \$25 billion: Advanced Technology Vehicles Manufacturing Loan Program
- ▶ \$2.4 billion: American Recovery and Reinvestment Act of 2009
- ▶ \$5 billion: Electric Drive Vehicle Deployment Act of 2010



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The United States: Investing to Be a Leader

Recent U.S. Battery Cell and Pack Production Capacity Announcements:

Holland, MI	Compact Power
Brownstown Twp. MI	GM
Holland, MI	JCI-Saft
Livonia, MI	A123
Midland, MI	Dow Kokam
Indianapolis, IN	EnerDel
Rawsonville, MI	Ford
Smyrna, TN	Nissan
TBD, OH	Coda



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Production Capacity vs Demand – How do we balance?

- ▶ In 2009, the US produced less than 2 percent of the world's advanced batteries
- ▶ By 2012, the US will produce 20 percent

This is great progress!

However...

- ▶ It is estimated that advanced battery capacity from the stimulus-funded US plants alone will be **THREE TIMES** greater than global demand by 2014*

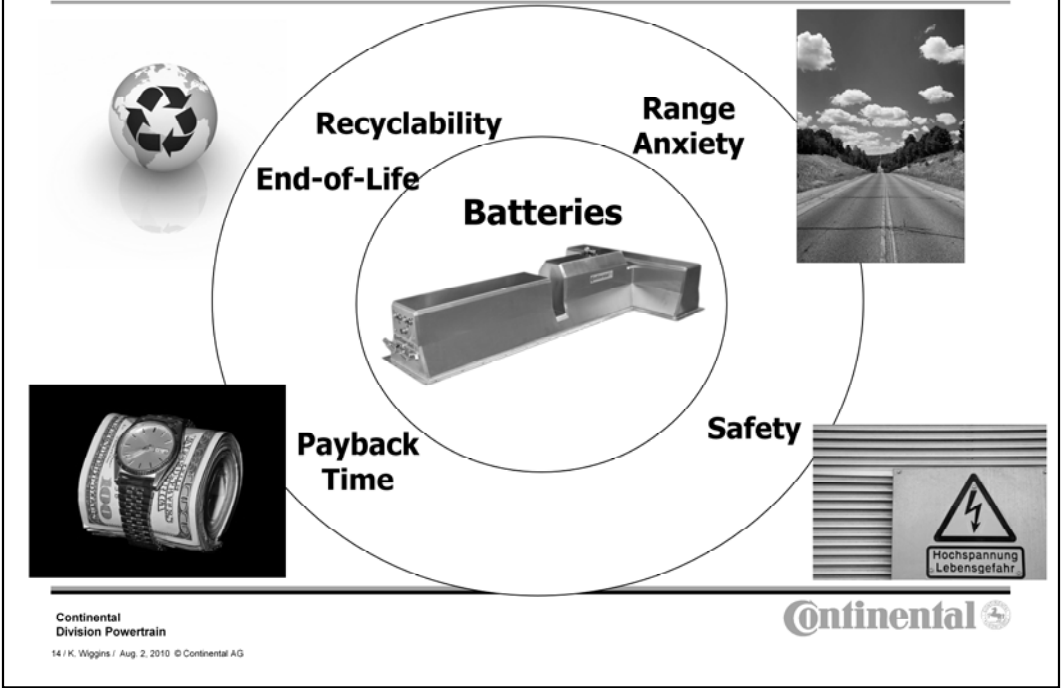
* Estimate from Total Battery Consulting

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**Time for a Reality Check...
Are We Balancing Investment Properly?**



Out of Juice



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Tough Questions for the Road Ahead:

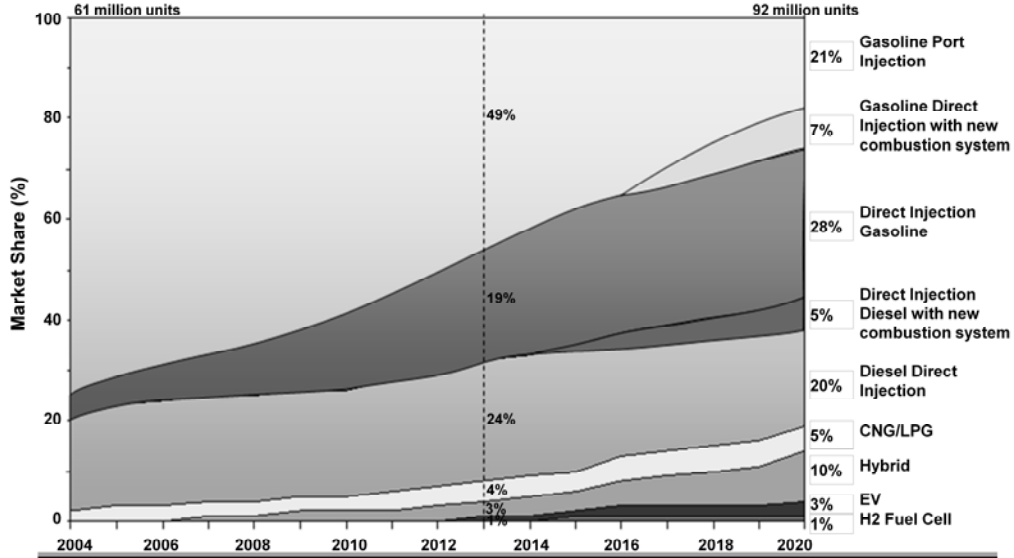
- ▶ Infrastructure support and investment – is it adequate?
- ▶ Communication surrounding infrastructure – how do we educate consumers?
- ▶ How do we avoid trading dependence on one commodity for dependence on others?
- ▶ What should be done to balance supply and demand?
- ▶ How do we install the right amount of manufacturing capacity for the “right” technology?

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Market Share of Various Powertrains

New Passenger Cars & Light Commercial Vehicle (-5t) worldwide



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Study based on: Deutsche Bank, Boston Consulting, Oliver Wyman, VDA, CVA, Internal

The Prognosis?



*"I was telling my editor battery-powered cars
are the future... but my cell phone died."*

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