



Go Further

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Vice President Research and Advanced Engineering

May 4, 2016



Go Further

PARTNERING FOR INNOVATION



| URBANIZATION



| GLOBAL MIDDLE CLASS
GROWTH



| AIR QUALITY



| CHANGING CONSUMER
ATTITUDES

Global Mega Trends

MAKING PEOPLE'S LIVES BETTER



WORKING BOTH OUR CORE BUSINESS AND EMERGING OPPORTUNITIES ALLOWS US TO BUILD AN EVEN STRONGER FUTURE





Drive green

econetic

ecoboost

ENERGI

Europe

Americas

Asia - Pacific

ONE FORD
ONE TEAM • ONE PLAN • ONE GOAL

Vehicle Electrification



Research & Advanced Engineering

Joining Technologies

Carbon Fiber

Drive quality



HFTA

Henry Ford Tech Fellow

Technical Specialist Program

Patent Award

HYDROFORMING

Analytics



Drive safe



THO

G

RCS

T

CR

D

AR

S

DJ

Driver Assistance Technology

APP Challenges

OpenXC

golddrive

DYNAMIC SOCIAL SHUTTLE

Urban Mobility



Drive smart

Multi Contour Seats





**Small Smart
Sensors**



Biotech



**Cloud
Computing**



**Internet of
Things**

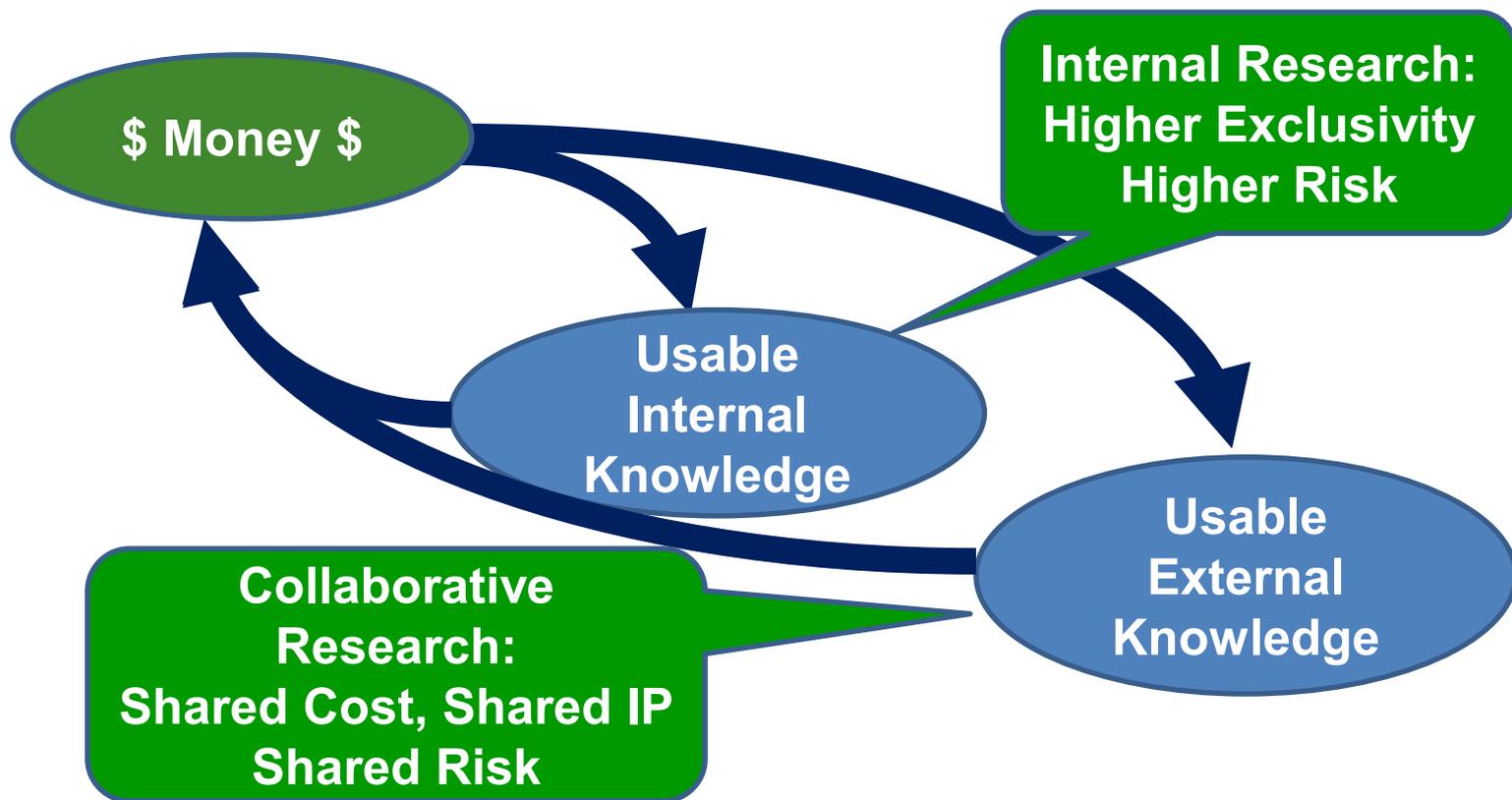


**Additive
Manufacturing**



**Robotics &
Machine Learning**

RESEARCH = INNOVATION



RESEARCH = THE PROCESS OF TURNING MONEY INTO NEW KNOWLEDGE.
INNOVATION = THE PROCESS OF TURNING KNOWLEDGE INTO NEW MONEY.



Full Vehicle



Department of Energy – Multi-Material Lightweight Vehicle Program

Body Structure

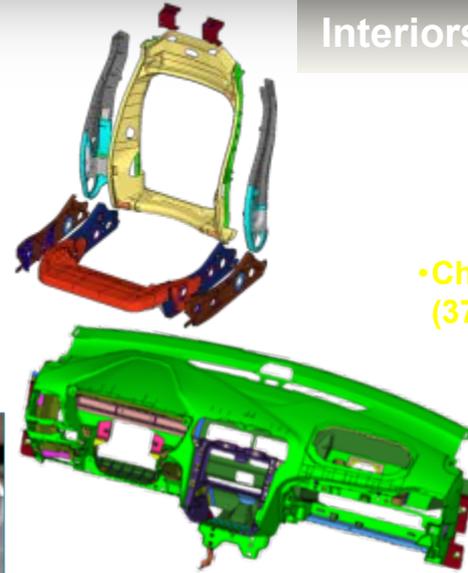
EcoBoost 1.0 l

1.0 Engine (Weight Savings)



Chassis

Interiors & Glazings



• Chemically Toughened Glass (37%)



• Carbon Fiber Wheels (30%)

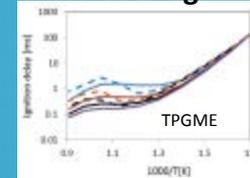


POWERTRAIN R&A – COLLABORATION

Engine Combustion
Network



Kinetics
Modeling

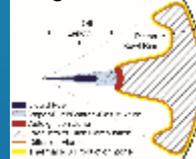


Sandia
Laboratories

Spray Combustion
Consortium (SCC)



Leaner Lifted
Flame Combustion
Non-sooting diesel combustion



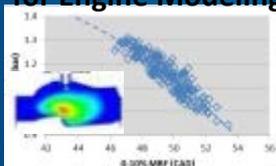
Lawrence Livermore
National Laboratory

POWERTRAIN R&A – COLLABORATION

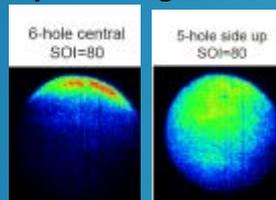
Next Gen
Three-Way Catalysts
- Gasoline Engines



Parallel Computing
for Engine Modeling



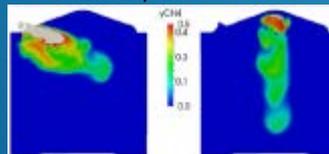
H₂ Combustion
Optical Diagnostics



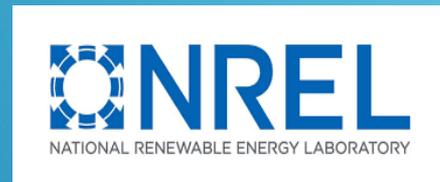
OH Intensity



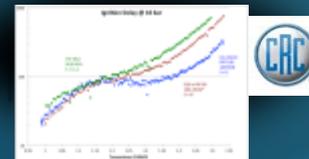
Dual Fuel Combustion
CNG-DI/Gasoline-PFI



Fuel Heat
of Vaporization



Ignition Delay for
High Octane Fuels

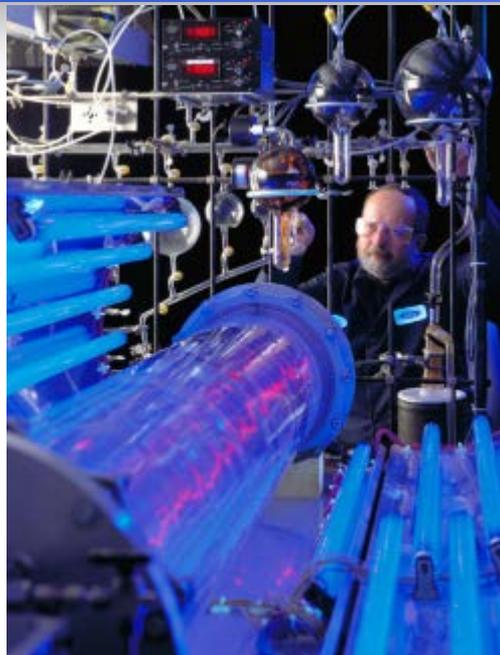


**VIEW FROM FORD OFFICE
IN BEIJING**

Clear day



Polluted day



*The Mechanisms of
Reactions Influencing
Atmospheric Ozone*

Jack G. Calvert
John J. Orlando
William R. Stockwell
Timothy J. Wallington

**Air quality textbooks by NCAR
& Ford scientists published by
Oxford University Press (2008,
2011, 2015).**

USCAR, Tesla,
U.S. Dept. of Energy,
12 National Labs &
Energy Companies



Challenges, &
Technical Gaps
or Targets

U.S. National Labs,
Industry & Universities

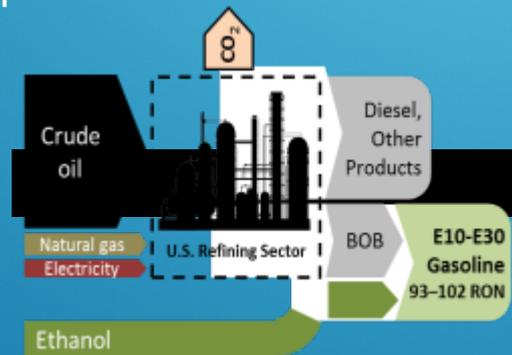
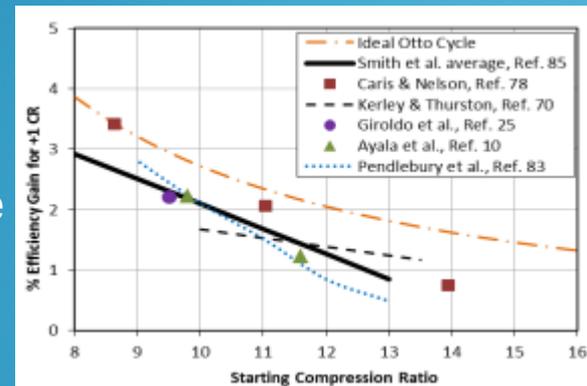
Driving Sustainable Advanced Powertrain and Materials
Innovations & Enabling Future Transportation Infrastructure

**NATIONAL LABS – BRINGING WORLD CLASS CAPABILITIES AND USER FACILITIES TO
SUPPORT THIS MISSION**

USCAR FUELS WORKING GROUP

Leading and conducting pre-competitive, collaborative research with a fuel focus:

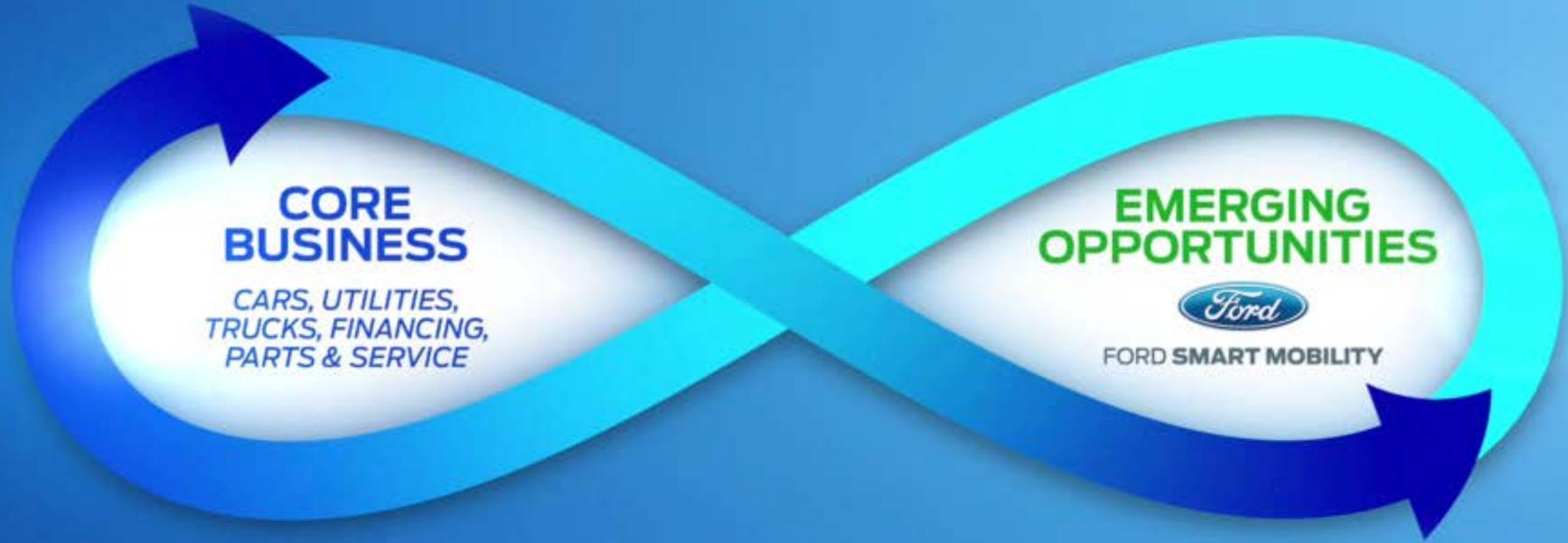
- Fuel effects on engine efficiency, emissions, & performance
- Alternative fuels
- Members lead projects at CRC on fuel interactions with engines
- Members chair/lead efforts at U.S. DRIVE Fuels Working Group



SUMMARY

- Labs are the Crown Jewels of our nation
- US Industry has uniquely interesting and challenging technical problems to solve
- We have successfully leveraged this in the past and continue to do so
- Growing challenges remain on the horizon that labs can further help us address
- Shared understanding of unique lab and industry challenges can help facilitate new collaborative efforts
- US Government can help by holding labs accountable for helping industry
- US Industry can help by taking the time to understand the unique nature of the labs

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