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Green Stimulus:

The Economic Impact of Funding the Diesel Emissions Reduction Act

A Preliminary Analysis Prepared By:

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Two Birds, One Stone

- A significant fiscal stimulus is required to provide a short-term boost to economic growth and avoid significant job losses.
- Improved environmental and health outcomes remain a national priority.
- Fully funding the Diesel Emissions Reduction Act (DERA) represents a unique opportunity to invest in clean technology and cost-effectively satisfy both of these policy objectives.

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The Diesel Emissions Reduction Act

- The Diesel Emissions Reduction Act (DERA) was enacted as the Energy Policy Act of 2005.
- Its purpose is to provide $1 billion over five years (FY06-FY10) to finance installation of retrofits on existing heavy-duty diesel vehicles.
- DERA was authorized for $600 million between FY06-FY08, but only $50 million of these funds have been appropriated.
- Funds are divided into a two primary components: a national program (70%) and a state program (30%).
- Applicants are incentivized to provide matching funds, which further leverage federal investments.
- If fully funded, DERA would dramatically accelerate technology deployment and significantly reduce particulate matter ("PM") emissions, which is a threat to human health and a likely contributor to global warming.

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DERA is Good Public Policy

- Diesel retrofit programs have extremely high benefit-cost ratios.
  - ✓ $13 of economic benefit is generated for every $1 invested. (Voinovich, 2008)
- Diesel retrofit programs are a highly cost-effective.
  - ✓ Out of more than 20 widely employed emissions reduction strategies, diesel retrofits are second only to vehicle emissions inspections in terms of cost effectiveness. (Keybridge, 2007)
- Diesel retrofit programs enjoy broad-based support.
  - ✓ DERA authorizing statute was co-sponsored by President-elect Obama and passed the Senate by a vote of 92 to 1.
  - ✓ President-elect Obama cosponsored the original bill and cosigned three letters to President Bush to secure DERA funding.
  - ✓ DERA is supported by a coalition of more than 250 environmental, public, industry, and labor groups.

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DERA is Effective Fiscal Stimulus

(1) Timely: Rapid implementation is highly feasible.

- ✓ ***Demand:*** Existing pipeline is substantial. Current requests for the national program component ($144M) far exceed appropriated funds ($27.6M) – that is, $5 of requests for every $1 of funding. (EPA 2008)
- ✓ ***Supply:*** Substantial excess production capacity for diesel retrofit technology manufacturers; substantial unemployment among auto parts workers.

(2) Targeted: Projects likely to yield maximum "bang for the buck".

- ✓ ***High Leverage:*** Applications for the national component of DERA suggest a matching rate of $1.38 for every $1.00 of federal funding. (EPA 2008)
- ✓ ***Vulnerable Industry:*** Significant dislocations and layoffs in the diesel retrofit manufacturing industry are occurring and likely to continue in the absence of an immediate increase in product demand or a rapid return to normal business conditions.

(3) Temporary: Full funding would provide one-time boost to the economy over the next 1-2 years.

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Study Overview

Objective: Quantify the likely impact on the U.S. economy if DERA is fully funded through the fiscal stimulus package.*

Five Key Questions

(1) What is the likely impact on economic output?

(2) What is the likely impact on jobs?

(3) What is the likely impact on household earnings?

(4) What is the likely impact on value-added?

(5) How will economic benefits be shared across industries?

** The results in this document are considered preliminary. Keybridge intends to conduct additional analysis that will likely include a more detailed characterization of the diesel retrofit supply chain, the deployment of DERA funds, and the geographic distribution of expenditures and impacts. Keybridge will make the final analysis and results available to interested parties upon completion.*

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Analytical Approach

(1) Specify key assumptions.

(2) Estimate initial stimulus to demand, including federal funding and state matching funds.

(3) Allocate initial stimulus to appropriate industry expenditure categories.

(4) Apply industry-specific "multipliers" for output, employment, household earnings, and value-added provided by the Bureau of Economic Analysis RIMS II model.

(5) For each economic measure, aggregate industry outcomes to calculate total impact.

(6) Perform sensitivity analysis and verify robustness of results.

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Baseline Assumptions

- Matching funds for the National Clean Diesel Funding Assistance Program (80% of the total national component of DERA) are supplied in same proportion as indicated by existing applications ($1.38 matched for every $1 requested).
- Total DERA funding, including matching funds, is allocated to one of three uses:
  (1) Retrofit Technologies (e.g., DOCs, DPFs, CCVs) = 60%
  (2) Engine/Vehicle Replacement = 30%
  (3) Other Measures (e.g., Anti-Idling) = 10%
- Purchaser price of retrofit technologies consists of 80% equipment costs and 20% installation costs.
- Key affected industries suffer from an excess of capacity (i.e., no significant second-order wage-price effects).

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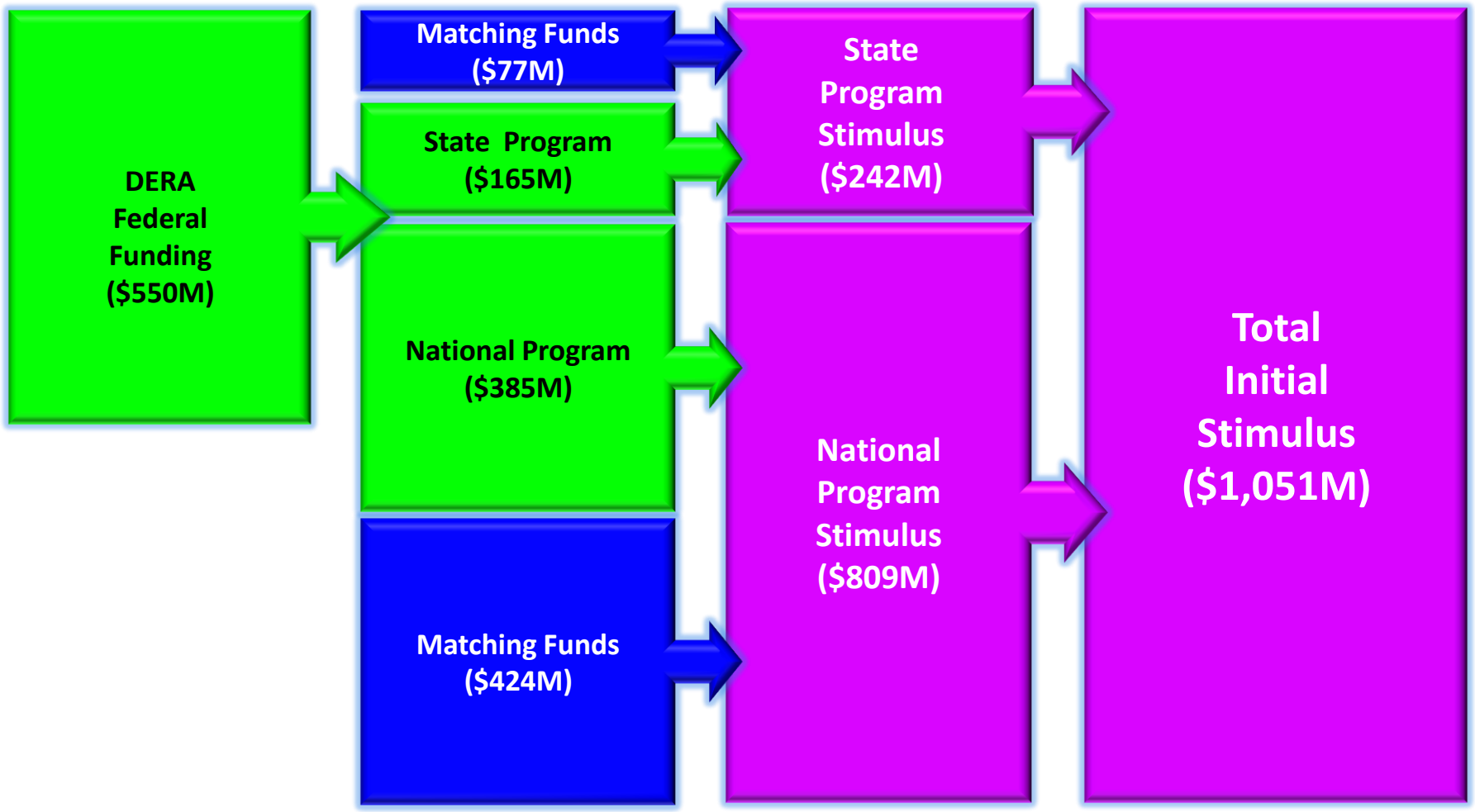
DERA Leverages Federal Funds



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Decomposing Stimulus into Expenditure Types

- **Step 1:** Total initial stimulus deflated from 2008$ to 2006$, as required by proper application of BEA RIMS II multipliers for employment.
- **Step 2:** Total initial stimulus first decomposed into diesel retrofit costs, transportation costs, wholesale margins, and retail margins.
  - ✓ Utilizes BEA input-output data on consumption expenditures.
  - ✓ Effectively converts expenditure data from "purchaser's costs" to "producer's costs", as required to properly apply RIMS II multipliers.
- **Step 3:** Diesel retrofit costs further decomposed into: (1) equipment manufacturing costs and (2) installation costs.

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Applying Industry-Specific Multipliers

- Multipliers provided by the BEA RIMS II model.
- The analysis assumes that the impacts of spending in each major expenditure category are best approximated by the following detailed industries within the BEA RIMS II model:
  - ✓ Diesel Retrofit Manufacturing = Auto Parts Manufacturing
  - ✓ Diesel Retrofit Installation = Auto Repair & Maintenance
  - ✓ Diesel Truck & School Bus Replacement = Heavy-Duty Truck Manufacturing
  - ✓ Other Fund Uses (e.g., anti-idling measures) = General Household Expenditures*

** Due to the significantly undefined nature of spending in the "Other Uses" category, multipliers for general household expenditures are used as default values, as they are the closest approximation of general expenditures in the economy. Sensitivity analysis shows that additional detail is highly unlikely to significantly change the magnitude and nature of the results.*

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Examples of Industry-Specific Multipliers

	Output	Earnings	Jobs	Value-Added
Auto Parts Manufacturing	3.3	0.83	18.0	1.5
Auto Repair & Maintenance	3.1	0.87	26.3	1.6
HD Truck Replacement	3.4	0.72	15.6	1.4

Note: Output and earnings multipliers expressed as impact per $1 of final expenditures. Jobs multipliers expressed as jobs per $1 million of final expenditures in 2006$.

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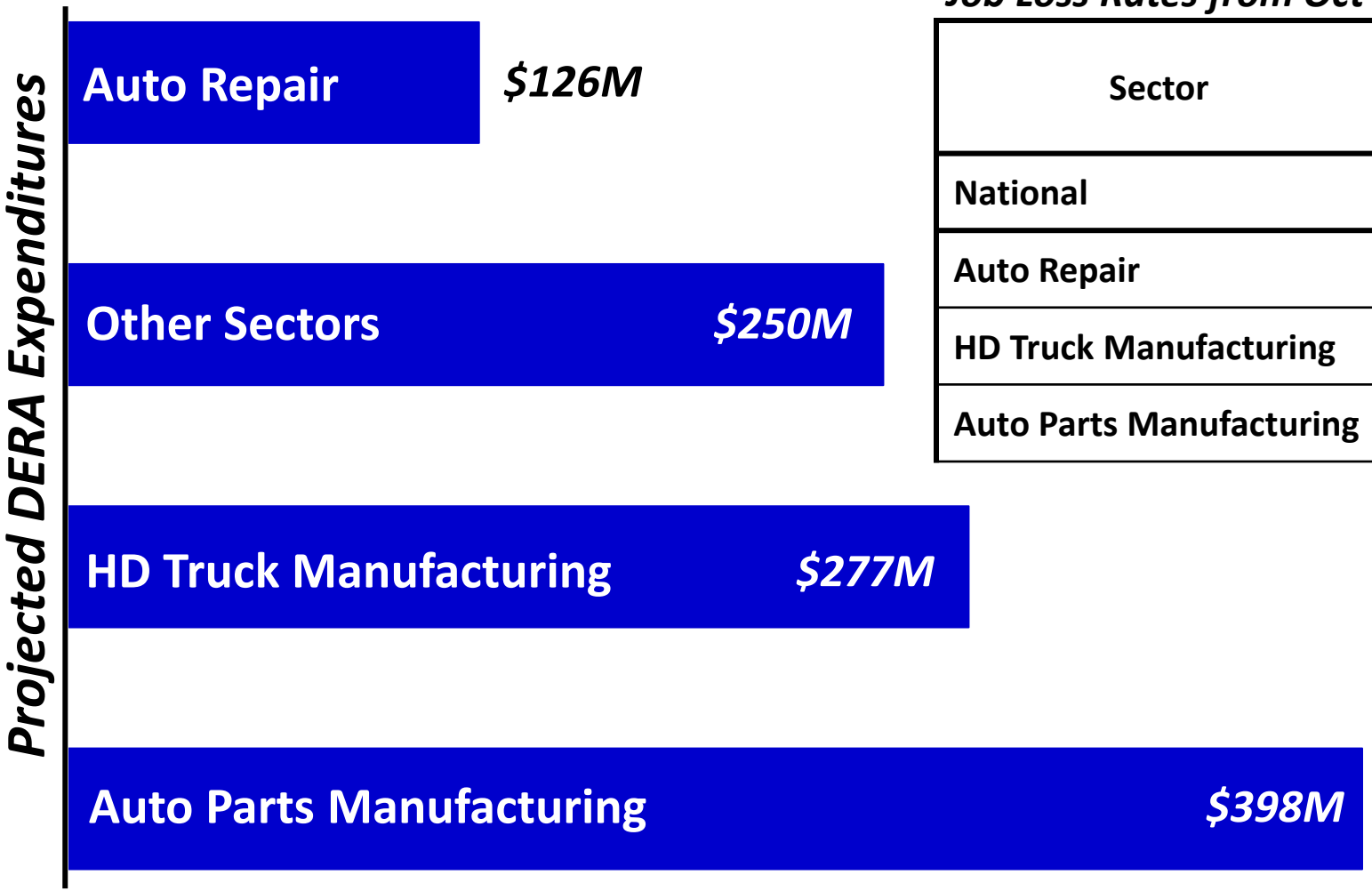
DERA Funding Directly Boosts Demand in Several Vulnerable Sectors



Job Loss Rates from Oct'07-Oct'08

Sector	Job Loss (Y/Y %)
National	-1.3%
Auto Repair	-2.9%
HD Truck Manufacturing	-9.5%
Auto Parts Manufacturing	-12.2%

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Economic Impact by Industry

	Output (Million 2008$)	Earnings (Million 2008$)	Employment (# Jobs)	Value-Added (Million 2008$)
Manufacturing	$1,478	$254	4,110	$428
Real Estate, Rental, & Leasing	$216	$14	520	$165
Wholesale Trade	$208	$67	1,079	$134
Other Services (Inc. Auto Repair)	$198	$62	2,265	$102
Retail Trade	$194	$66	2,636	$115
Finance & Insurance	$174	$48	695	$102
Health Care & Social Assistance	$132	$64	1,527	$82
Transportation & Warehousing	$130	$41	904	$66
Professional, Scientific, & Technical	$121	$54	893	$84
Other Industries Not Specified	$482	$164	4,637	$280
TOTAL	**$3,332**	**$835**	**19,266**	**$1,556**

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Sensitivity Analysis

- Sensitivity analysis performed to test the robustness of the results to two key assumptions:
  - ✓ The distribution of the use of funds (retrofit, replace, other)
  - ✓ The matching rate of the national clean diesel program.
- When 100% of DERA funds are assumed to be distributed to the least productive and most productive use category, all impacts deviated from the baseline estimate by less than 20%, and most deviated by less than 10%.
- Increasing or decreasing the matching rate for the National Clean Diesel Funding Assistance Program by 50% produces results that are systematically 20% higher and 20% lower than the baseline estimates.
- Ultimately, even under the most extreme assumptions about uses of funds and matching rates, economic impact estimates are highly unlikely to deviate more than 20% above or below the baseline estimates.

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Summary of Results

- DERA generates approximately $6 of increased economic output for every $1 of federal expenditures.
- Full funding is likely to result in approximately 19k new jobs created (or job losses avoided).
- The economic impact is likely to be greatest in auto parts manufacturing and heavy-duty truck (e.g., school bus) manufacturing sectors, which have sustained job losses at nearly 9-times and 7-times the national rate.
- Results prove to be robust to a series of extreme sensitivity analysis exercises.

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Policy Conclusions

- Fully funding DERA is likely to be an efficient and effective use of taxpayer money.
  - ✓ Stimulates economic growth in the short-run
  - ✓ Improves environmental and health outcomes in the long-run.
- DERA provides a direct injection of funds into extremely vulnerable and fragile sectors, such as auto parts manufacturing and heavy-duty truck /bus manufacturing.
- Additional steps to compress administrative timelines and accelerate fund deployment will enhance short-run impacts.

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About Keybridge Research

Dr. Robert F. Wescott (Principal Investigator), is President of Keybridge Research LLC. Dr. Wescott has more than 25 years of professional experience working on macroeconomic and public policy issues. During the Clinton Administration, Dr. Wescott served for four years as Special Assistant to the President for Economic Policy at the White House and as Chief Economist at the President's Council of Economic Advisers. From 1982-93 he was Senior Vice President and Chief Economist at Wharton Econometrics (today Global Insight, Inc.), the private economic modeling and analysis firm, where he oversaw a staff of 60 and was responsible for all economic modeling, forecasting, and consulting operations. Dr. Wescott also was Deputy Division Chief in the Research Department of the International Monetary Fund, where he did research on global economic risks and policy challenges. In 1989-90 he was Research Director at the International Center for the Study of East Asian Development in Kitakyushu, Japan. He holds a Ph.D. in Economics from the University of Pennsylvania.

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