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Economic Impact of the Industrial Energy Consumers of America's Sustainable Manufacturing & Growth Initiative

Prepared For:
Industrial Energy Consumers of America

Prepared by:
Keybridge Research LLC

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EXECUTIVE SUMMARY (1/2)

In the past decade, the U.S. manufacturing sector has been challenged by a series of unfavorable trends, including persistently low investment, reduced competitiveness, and the loss of 6 million jobs. Compounded by the severity of the "Great Recession" of 2008-09, these trends have manifested themselves in the form of aging capital equipment, ballooning trade deficits, and the deterioration of local communities that rely on manufacturing as a source of jobs and income.

Nevertheless, the U.S. manufacturing sector remains a critical source of economic growth, jobs, and innovation — contributing $1.6 trillion to GDP, employing 12 million workers, supplying roughly 58% of the nation's exports, and directly investing more than $160 billion in domestic research and development activities each year. The importance of a thriving and globally competitive manufacturing sector is only heightened by the need to revive U.S. exports and rebalance economic growth. At the same time, the challenge of recapitalizing the manufacturing sector creates a unique opportunity to improve energy efficiency and reduce GHG emissions.

With these challenges and opportunities in mind, Industrial Energy Consumers of America (IECA) has developed the *Sustainable Manufacturing & Growth Initiative* — a set of ten policy recommendations designed to jumpstart the U.S. economy in the short-term while creating sustainable economic and environmental benefits in the long-term. Specifically, IECA's recommendations aim to:

(1) Jumpstart the U.S. economy by leveraging public funds with private funds to achieve rapid increases in domestic manufacturing investment and maximize "bang for the buck" for U.S. taxpayers.

(2) Eliminate regulatory barriers to enable investment in energy efficiency and protect manufacturers against the potential costs of future GHG regulation.

(3) Rebuild the U.S. middle class by creating new, high-paying jobs in the manufacturing sector and the communities that rely on them.

(4) Revitalize the U.S. manufacturing sector by making energy efficiency investments more affordable — thereby reducing energy costs and enhancing long-run competitiveness.

(5) Reduce GHG and criteria pollutant emissions by improving energy efficiency and accelerating the development and deployment of advanced technologies.

EXECUTIVE SUMMARY (2/2)

Commissioned by IECA and conducted by Keybridge Research and the University of Maryland Inforum Modeling Project, this study quantifies the potential impact that the IECA policy package, if adopted, would have on the U.S. economy during the next two decades. Two scenarios, a "Baseline Scenario" and an "IECA Policy Scenario", were simulated using the University of Maryland's Long-term Inter-industry Forecasting Tool (LIFT) — a fully articulated, dynamic general equilibrium model of the U.S. economy. To construct the Baseline Scenario, the LIFT model was calibrated to the EIA's Annual Energy Outlook 2010 "Reference Case" scenario. To construct the IECA Policy Scenario, key elements of the IECA policy proposal were layered on top of the Baseline Scenario in the form of detailed modeling inputs and assumptions. The impact of the IECA policy recommendations are then measured as the difference in key outcomes in the two scenarios.

In short, the modeling results indicate that the IECA policy recommendations are likely to achieve the stated objectives of improving economic growth, creating jobs, enhancing competitiveness, and reducing GHG emissions. Specifically, the study finds that the IECA policy package would:[1]

- Increase real GDP by $77 billion in 2020.
- Increase cumulative employment by 9.4 million job-years in 2010-2030.[2]
- Increase cumulative private investment by more than $1 trillion in 2010-2030.
- Increase family income by an average of $788 in 2020.
- Increase cumulative net exports by $392 billion in 2010-2030.
- Reduce energy-related GHG emissions by 13% in 2020.

Furthermore, it is estimated that the net fiscal cost associated with the IECA policy recommendations will be less than 0.1% of discretionary government spending between 2011-2030. Indeed, it is estimated that the policies will result in a cumulative increase in real GDP growth that is approximately **20 times greater** than the cumulative net fiscal cost — providing U.S. taxpayers with significant "bang for the buck".

[1] All results are expressed relative to the Baseline Scenario. Dollar-denominated results are reported in 2010 constant dollars.
[2] A job-year is defined as one job for one year.

Results Summary

(Difference Relative to Baseline Scenario[1])

	Annual Impacts in 2020	Cumulative Impacts in 2010-2020	Cumulative Impacts in 2010-2030
Real Gross Domestic Product	$77 billion	$389 billion	$1,227 billion
Employment	567,000 jobs	3.2 million job-years[2]	9.4 million job-years
Average Household Income	$788	$4,277	$12,244
Private Fixed Investment	$71 billion	$407 billion	$1,058 billion
Net Exports	$13.8 billion	$14.2 billion	$392 billion
Energy Intensity	-17%	-10%	-15%
Energy-related GHG Emissions	-13%	-7%	-12%

[1] Dollar-denominated results are reported in 2010 constant dollars.
[2] A job-year is defined as one job for one year.

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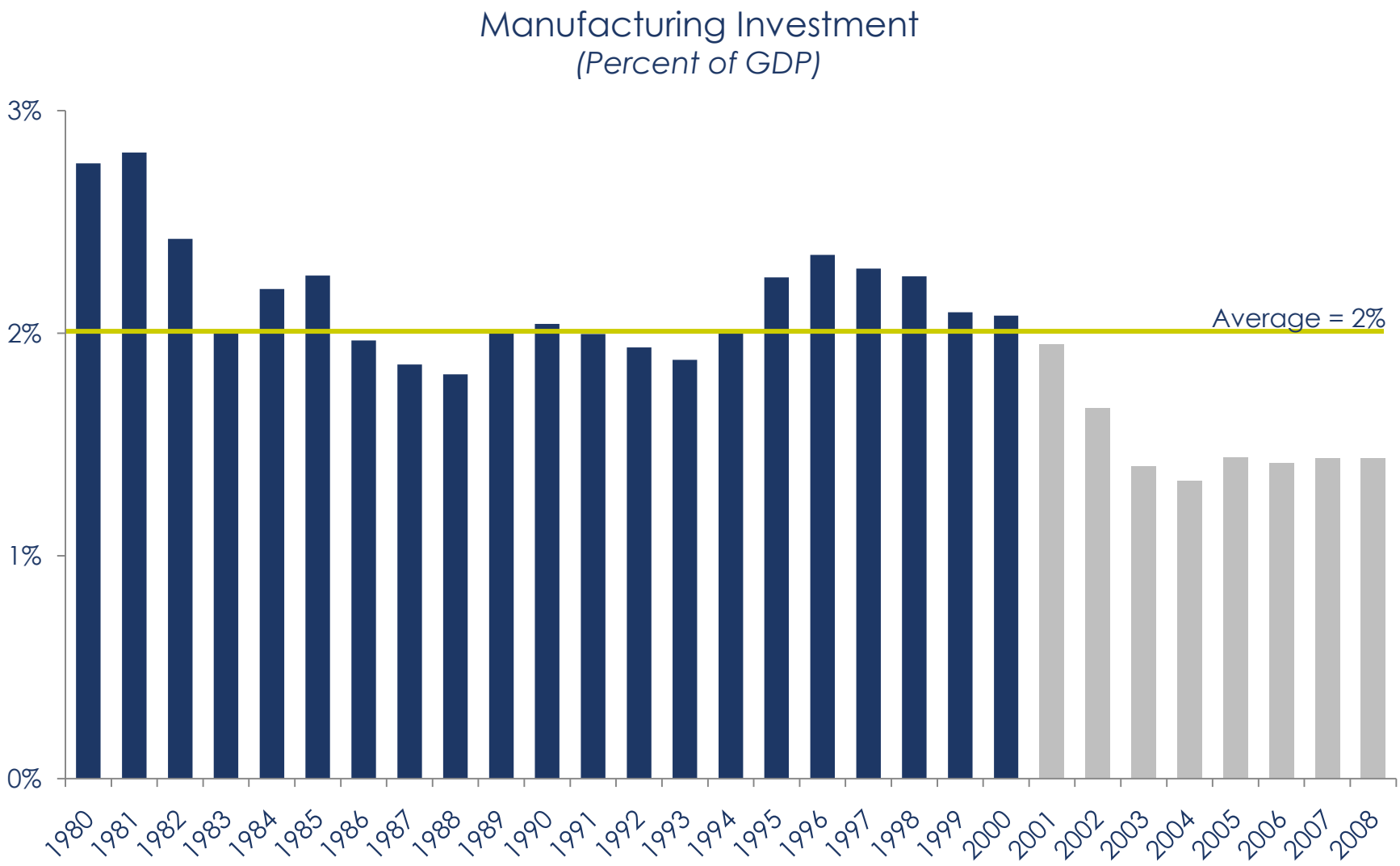
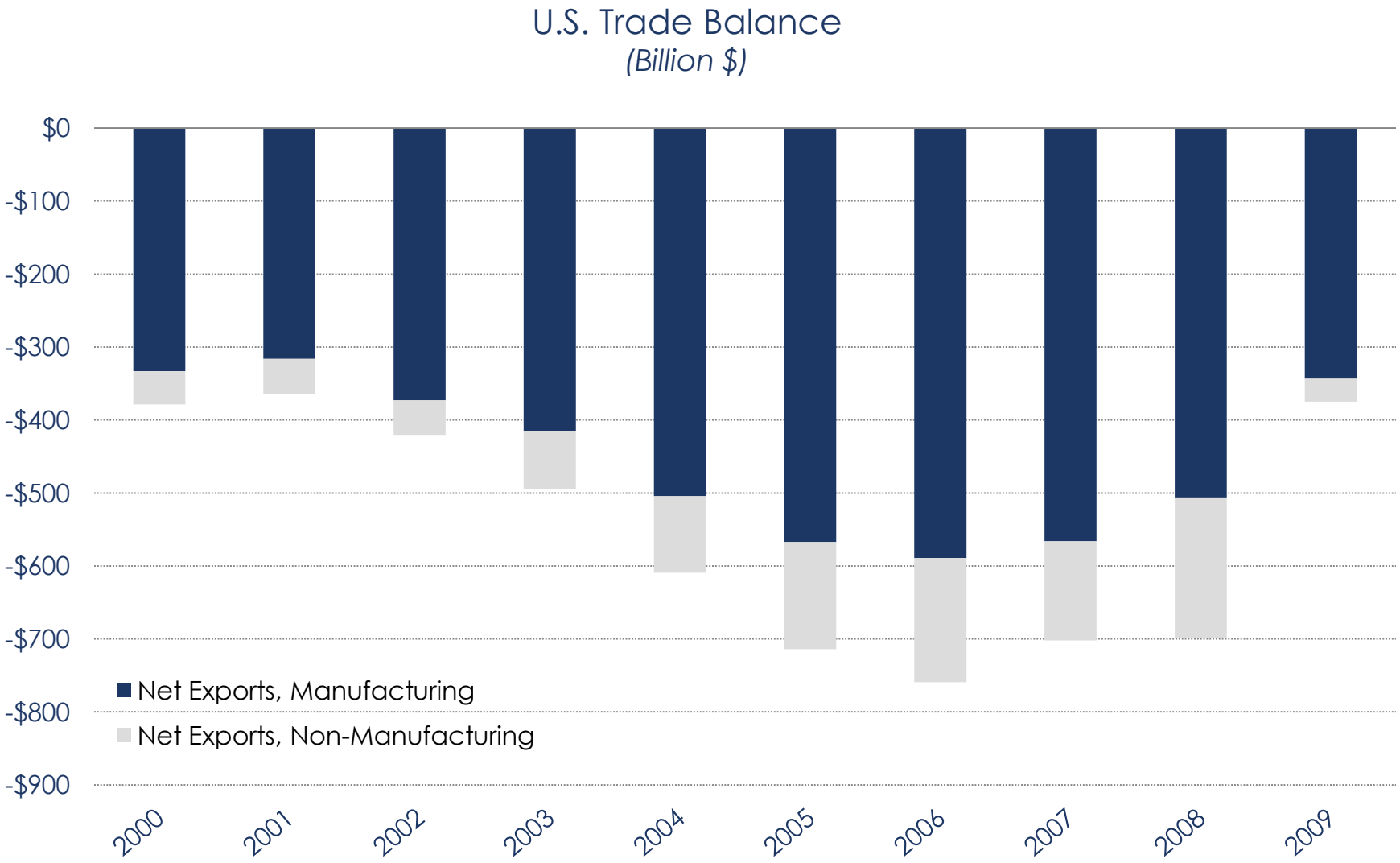
The U.S. manufacturing sector has suffered from almost a decade of persistently low investment.



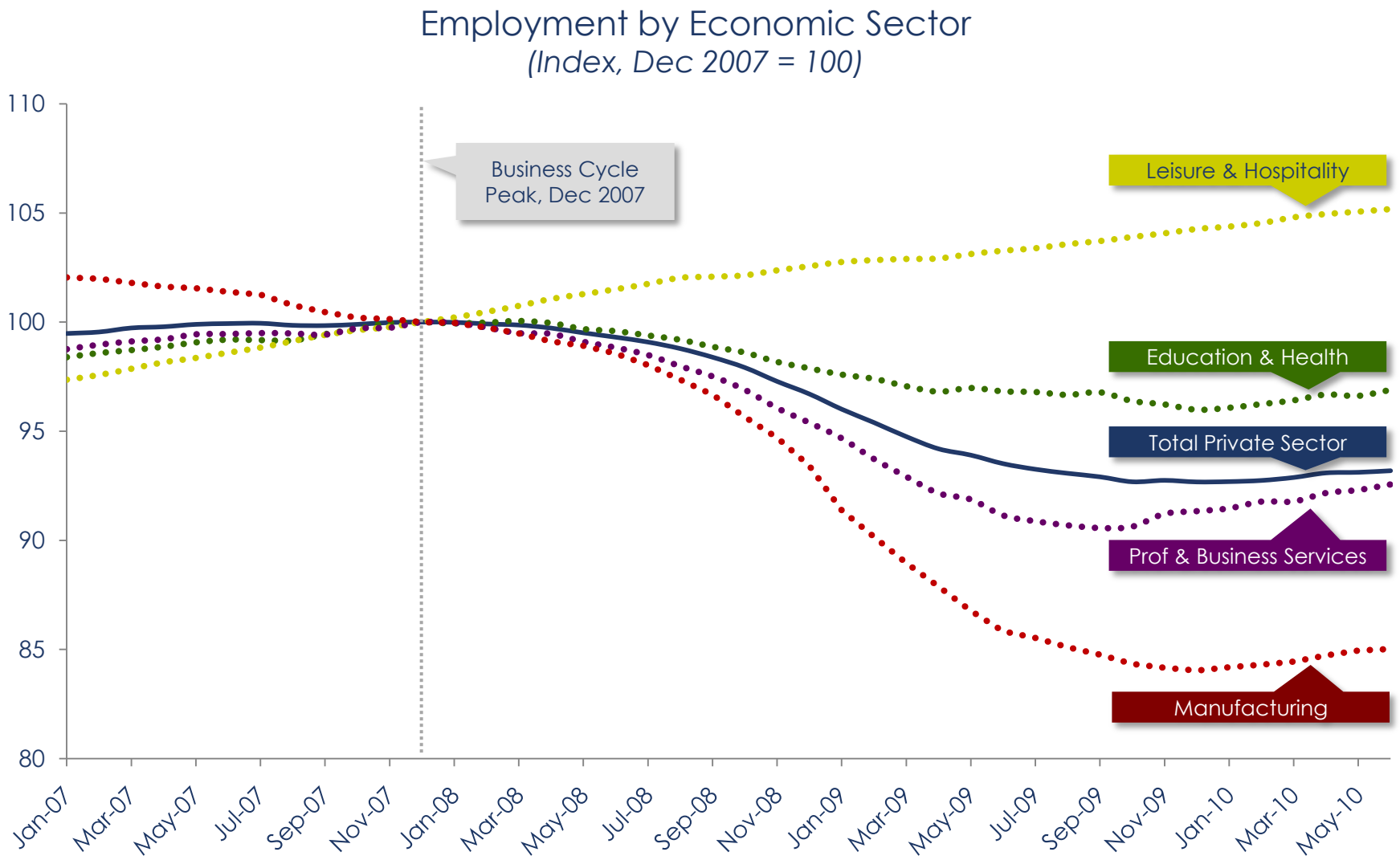
Source: U.S. BEA, National Income and Product Accounts

This decline in investment contributed to a loss of manufacturing competitiveness, as is evidenced by a ballooning trade deficit.



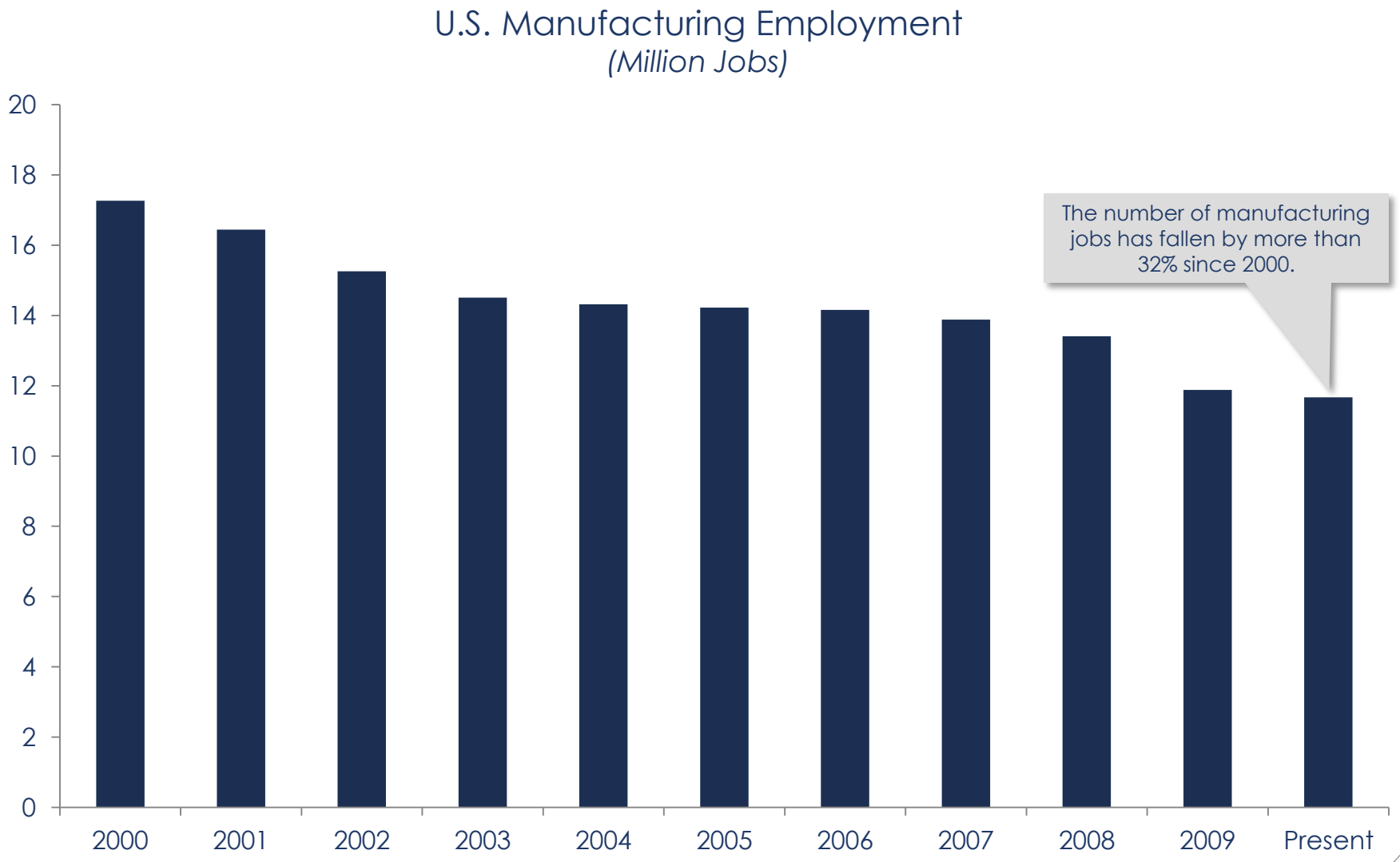
Source: Census Bureau, *U.S. International Trade in Goods and Services;* U.S. International Trade Commission, *Dataweb.*

Compounding already unfavorable trends, the impact of the "Great Recession" on manufacturing was particularly severe.



Source: BEA, NIPA Table 1.1.5; BLS, Current Employment Statistics

In the past decade alone, the U.S. manufacturing sector has lost nearly six million jobs.



Source: BLS, Current Employment Statistics

Nevertheless, the manufacturing sector remains a critical source of growth, jobs, and innovation in the U.S. economy.

Key Facts & Figures:
The Manufacturing Sector's Contributions to the U.S. Economy

$1.6 Trillion

value-added to the U.S. economy by the manufacturing sector in 2009.

12 Million

jobs provided by the U.S. manufacturing sector in 2009.

58%

percentage of U.S. exports supplied by the manufacturing sector in 2009.

$160 billion

direct domestic R&D spending by U.S. manufacturing companies in 2008.

Source: BEA, *National Income and Product Accounts*; BLS, *Current Employment Statistics*; USITC, *Dataweb* & Census Bureau, *U.S. International Trade in Goods and Services;* National Science Foundation, *U.S. Businesses Report 2008 Worldwide R&D Expense of $330 Billion: Findings from New NSF Survey.*

And a globally competitive manufacturing sector will be critical to reviving U.S. exports and rebalancing economic growth.

"We need to export more of our goods. Because the more products we make and sell to other countries, the more jobs we support right here in America. So tonight, we set a new goal: we will double our exports over the next five years, an increase that will support two million jobs in America."

- President Barack Obama, *State of the Union*, January 2010

EASTMAN

"Industry is the key contributor to the United States' export base. It is critical that U.S. policies support domestic industrial growth, investment and expansion if we want to increase exports and achieve job growth in this country."

-Jim Rogers, President & CEO Eastman Chemical Company, July 2010

Peterson Institute for International Economics

"Every $1 billion of additional exports will produce about 7,000 very good jobs. Robust export expansion would also reduce our large trade deficits and resultant need to borrow abroad to finance them."

- Fred Bergsten, *Peterson Institute for International Economics*, February 2010

At the same time, efforts to recapitalize the U.S. manufacturing base can also advance the nation's environmental interests.

GHG Emissions by Sector in 2008
(Million Metric Tons CO_2)

● = Direct CO_2 Emissions (50 MMT) ★ = Indirect CO_2 Emissions (50 MMT)

2,023

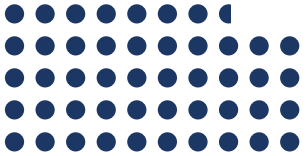
million metric tons of direct and indirect emissions from
Manufacturing

2,451

million metric tons of direct and indirect emissions from
Buildings

1,891

million metric tons of direct and indirect emissions from
Transportation



2,383*

million metric tons of direct emissions from
Electric Power

Source: U.S. EPA. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008: Public Review Draft (March 9, 2010).
* Direct emissions from electric power sector are also included as indirect emissions in end-use sectors.

IECA has developed an initiative that aims to achieve short- and long-term economic goals while delivering environmental benefits.

IECA Sustainable Manufacturing & Growth Initiative: Objectives

1	Jump Start the Economy	Revitalize the U.S. economy by leveraging public funds with private funds to achieve rapid increases in domestic manufacturing investment and maximize "bang for the buck" for U.S. taxpayers.
2	Remove Barriers to Investment	Eliminate regulatory barriers to investment in energy efficiency and protect manufacturers against the potential costs of future GHG regulation.
3	Create Jobs	Rebuild the U.S. middle class by creating new, high-paying jobs in the manufacturing sector and the communities that rely on them.
4	Enhance Competitiveness	Revitalize the U.S. manufacturing sector by making energy efficiency investments more affordable — thereby reducing energy costs and enhancing long-run competitiveness.
5	Reduce Emissions	Reduce GHG and criteria pollutant emissions by improving energy efficiency and accelerating the development and deployment of advanced technologies.

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*. Pg. 1.

IECA's proposal consists of ten policies designed to catalyze, accelerate, and leverage investments in U.S. manufacturing.

IECA Sustainable Manufacturing & Growth Initiative: Policy Recommendations

Policy #1	*Establish a 30% tax credit for capital investment projects that will unlock investment and improve energy efficiency and reduce GHG emissions intensity.*
Policy #2	*Establish a loan program that provides access to low-cost capital for investment projects that improve energy efficiency and reduce GHG emissions intensity.*
Policy #3	*Establish a Clean Energy Standard Offer Program (CESOP) for combined heat and power (CHP) projects.*
Policy #4	*Establish a Clean Energy Standard Offer Program (CESOP) for recycled energy projects.*
Policy #5	*Narrowly reform New Source Review (NSR) for energy efficiency projects in the manufacturing sector.*
Policy #6	*Preempt the manufacturing sector from EPA and state action to regulate GHG emissions under the Clean Air Act.*
Policy #7	*Provide early action credit for direct and indirect GHG emission reductions, with such credits being bankable and applicable to compliance with future GHG regulations.*
Policy #8	*Provide 100% expensing of capital expenditures for high-risk, long-term research, development, and deployment (RD&D) projects.*
Policy #9	*Increase R&D funding under the DOE Industrial Technologies Program to develop break-thru technologies in energy-intensive industries.*
Policy #10	*Strengthen building standards to improve energy efficiency in new and existing residential homes and commercial buildings.*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

This study quantifies the potential impact that the IECA policy package, if adopted, would have on the U.S. economy.

Study Overview

Study Objective	*Quantify the potential impact of the IECA Sustainable Manufacturing & Growth Initiative policy recommendations on the U.S. economy, including key macroeconomic, energy, and environmental outcomes.*
Analytical Approach	*Simulate a general equilibrium model of the U.S. economy under two scenarios: (1) a "baseline scenario" that assumes that existing policies remain in place and (2) a "policy scenario" that assumes that the IECA policy recommendations are adopted. Compare key outcomes from the two scenarios to determine the potential impact of the IECA proposal.*
Modeling Tool	*The University of Maryland's Inforum Long-term Inter-Industry Forecasting Tool ("LIFT") — a fully articulated and dynamic model of the U.S. economy with a "bottom-up" structure and significant industry detail.*
Key Findings	*It is estimated that the IECA policy package would:* • *Increase real GDP by $77 billion in 2020.* • *Increase cumulative employment by 9.4 million job-years in 2010-2030.*[2] • *Increase cumulative private investment by more than $1 trillion in 2010-2030.* • *Increase family income by an average of $788 (0.68%) in 2020.* • *Increase cumulative net exports by $392 billion in 2010-2030.* • *Reduce energy-related GHG emissions by 13% in 2020.*

[1] All results are expressed relative to the Baseline Scenario. Dollar-denominated results are reported in 2010 constant dollars.

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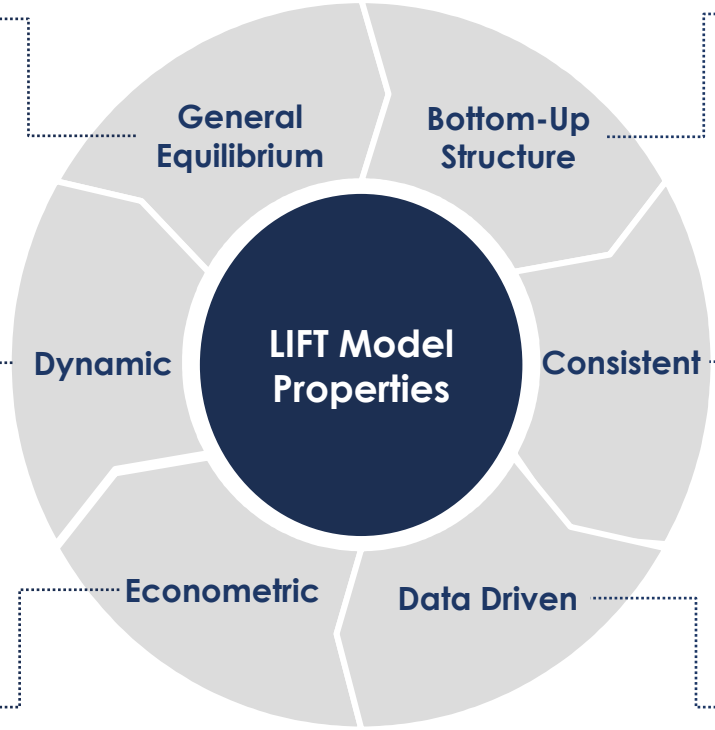
The impact of the IECA proposal was simulated using the University of Maryland's Long-term Inter-industry Forecasting Tool (LIFT).

The University of Maryland Inforum LIFT Model: Key Properties



Relative prices are integral and based on industry conditions. Macro properties Keynesian in SR and neoclassical in LR.

Aggregates are summations of detailed industry results. Provides an explicit linkage between micro/industry studies and macro economy.

Models the economy year-by-year. Input-output coefficients change over time. The time path of response is important.

Growth and structure of real economy reconciled with nominal balances (e.g., deficits) to evaluate sustainability of growth.

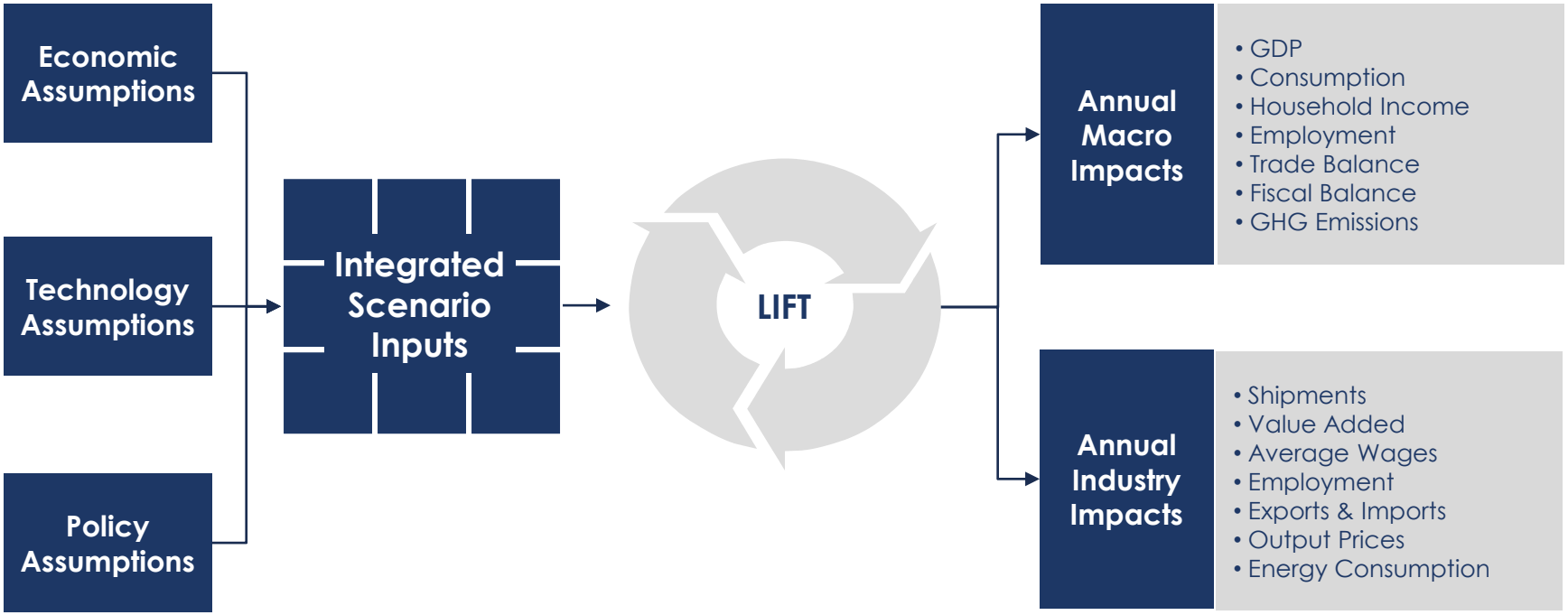
Based on empirically estimated relationships using detailed historical data. Simple and direct methodology with flexible functional forms.

Utilizes a specific type of analysis with emphasis on economic data and structure.

Note: For a more detailed description of the LIFT model, see Appendix E.

LIFT utilizes economic, technology, and policy inputs to simulate a wide range of macroeconomic and industry-level impacts.

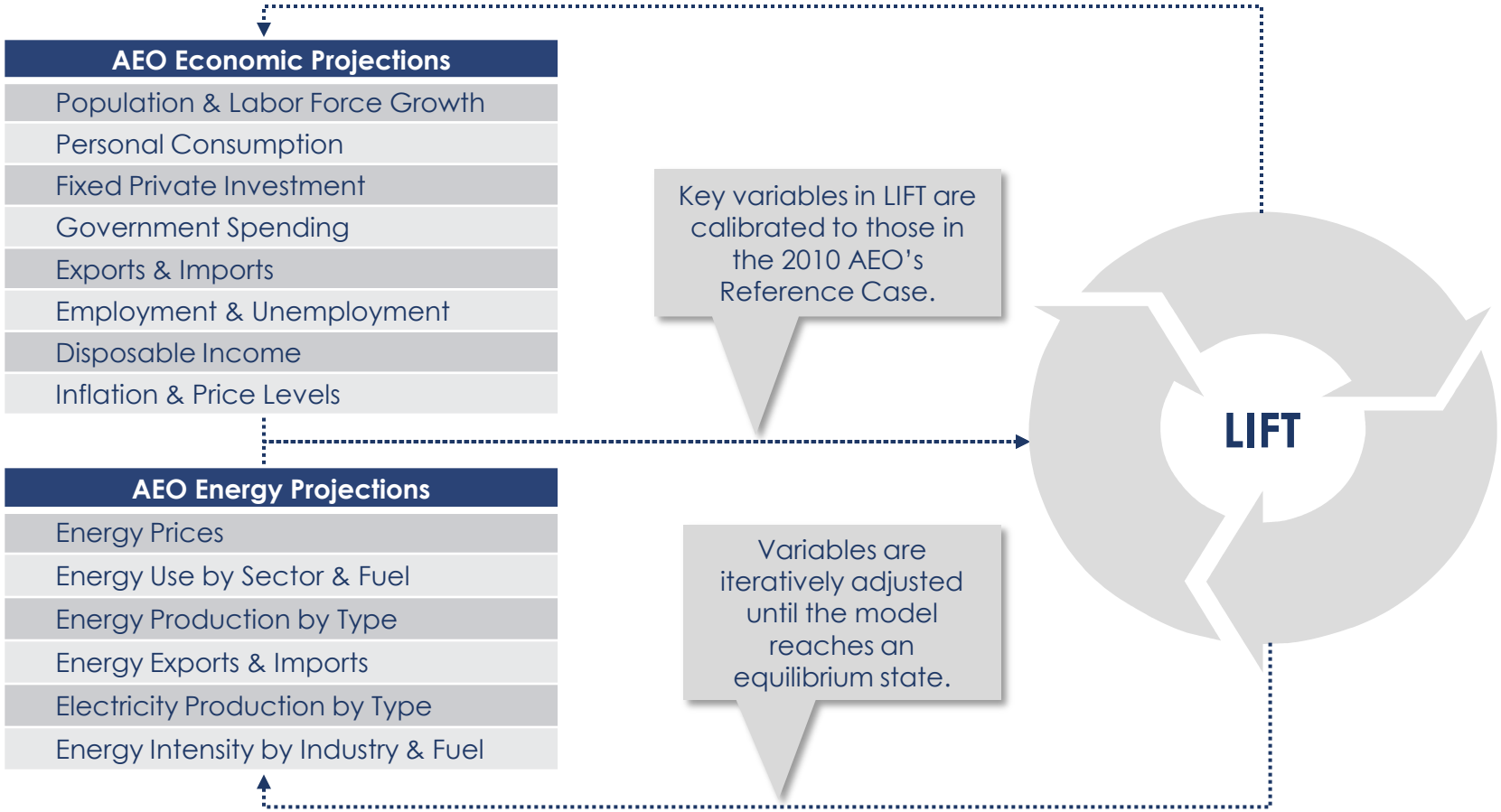
The University of Maryland Inforum LIFT Model: Key Inputs & Outputs



Note: For a more detailed description of the LIFT model, see Appendix E.

The Baseline Scenario was constructed by calibrating LIFT to the EIA's 2010 Annual Energy Outlook Reference Case scenario.*

Calibrating the LIFT Model to the AEO 2010: Key Variables



*Calibration to the most recent version of the EIA's Annual Energy Outlook (2010 AEO) is common practice in modeling analyses of federal energy or climate legislation. The adoption of the AEO's forecasts in the Baseline Scenario for this study does not suggest that IECA or the modeling team endorse those forecasts.

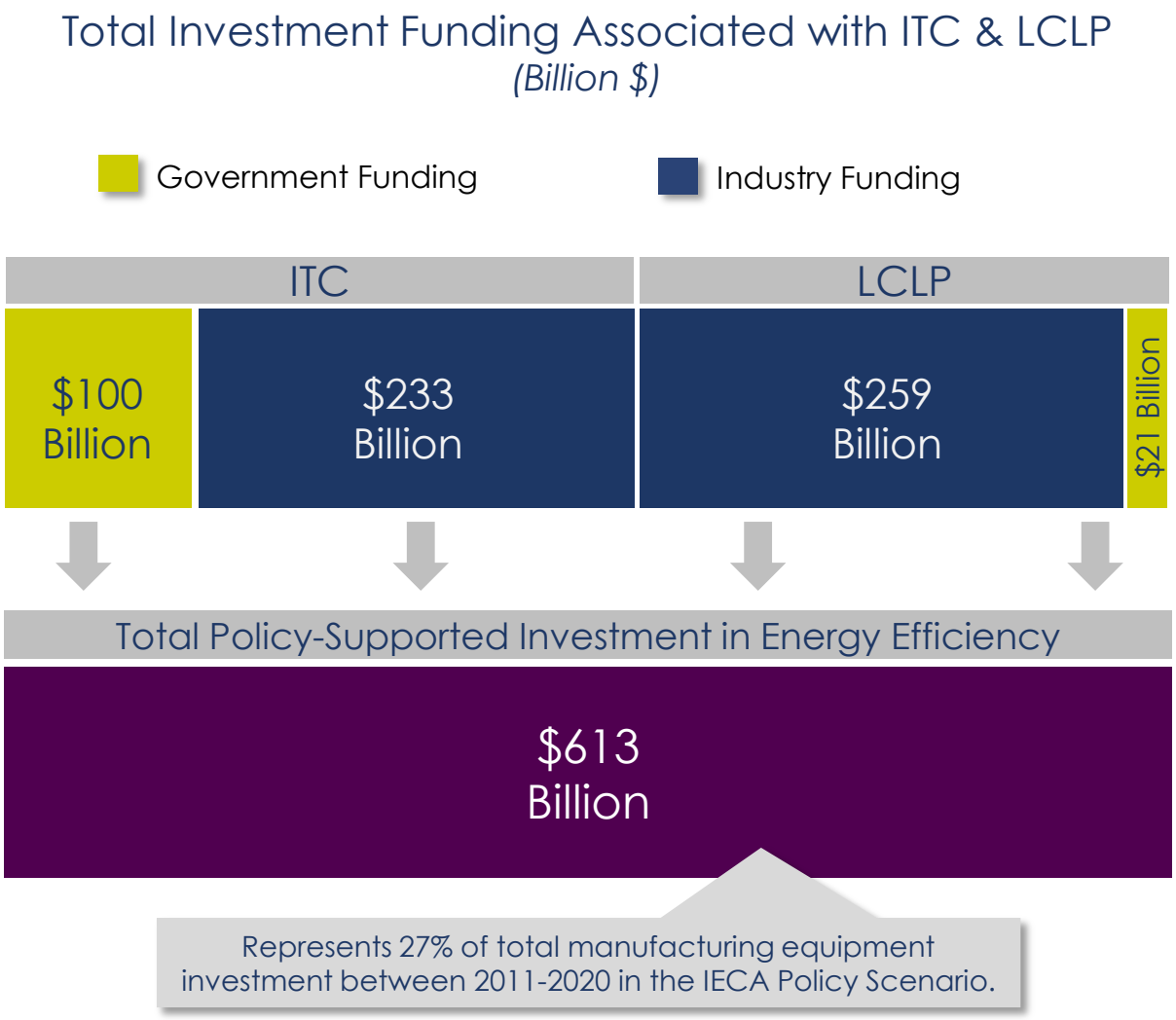
The Policy Scenario was constructed by integrating six elements of the IECA policy proposal into the Baseline Scenario.

IECA Policy Recommendations Simulated in the LIFT Model*

Policy #1: Investment Tax Credit (ITC)	The ITC is modeled as changes in the cost of capital for energy efficient equipment, affecting investment levels & energy efficiency in manufacturing processes.
Policy #2: Low-Cost Loan Program (LCLP)	Similarly, the LCLP is modeled as changes in the cost of capital for equipment, affecting investment levels & energy efficiency in manufacturing processes.
Policy #3: CESOP for CHP	The Clean Energy Standard Offer Program (CESOP) for CHP is modeled as changes in CHP deployment and thus electricity and natural gas demand, investment, and employment in certain industries.
Policy #4: CESOP for Recycled Energy	The CESOP for Recycled Energy is modeled as changes in recycled energy project deployment and thus electricity demand, investment, and employment in certain industries.
Policy #5: Narrow NSR Reform	New Source Review (NSR) reform is assumed to enable timely deployment of cost-effective energy efficiency technologies that would otherwise be delayed or avoided due to the burden of NSR.
Policy #10: Building Efficiency Standards	Strengthened building standards & appliance efficiency mandates are modeled as changes in the energy efficiency of residential, commercial, and industrial buildings.

*Policies #6-9 were not simulated, as they were deemed to be exceedingly difficult to model with sufficient precision.

Combined, the ITC and LCLP are designed to directly support $613 billion in energy efficiency investments in the next 10 years.*

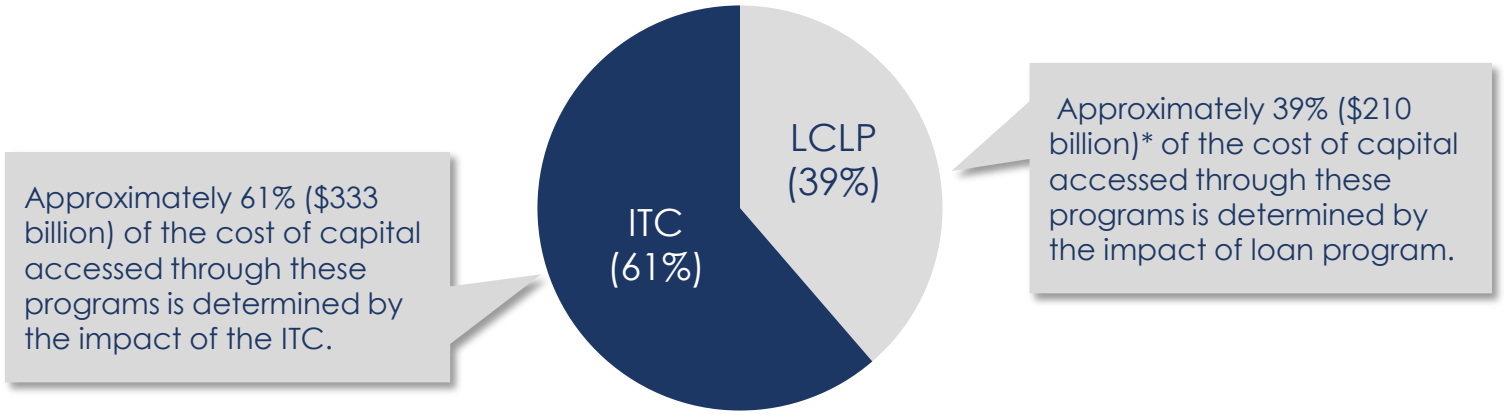


*The IECA policy package provides that investments utilizing the ITC should not also be able to utilize the LCLP and vice versa.

The modeling analysis assumes that all $613 billion will be utilized, with each industry using a blend of the two programs.

ITC & LCLP Modeling Inputs: Reductions in the Cost of Capital

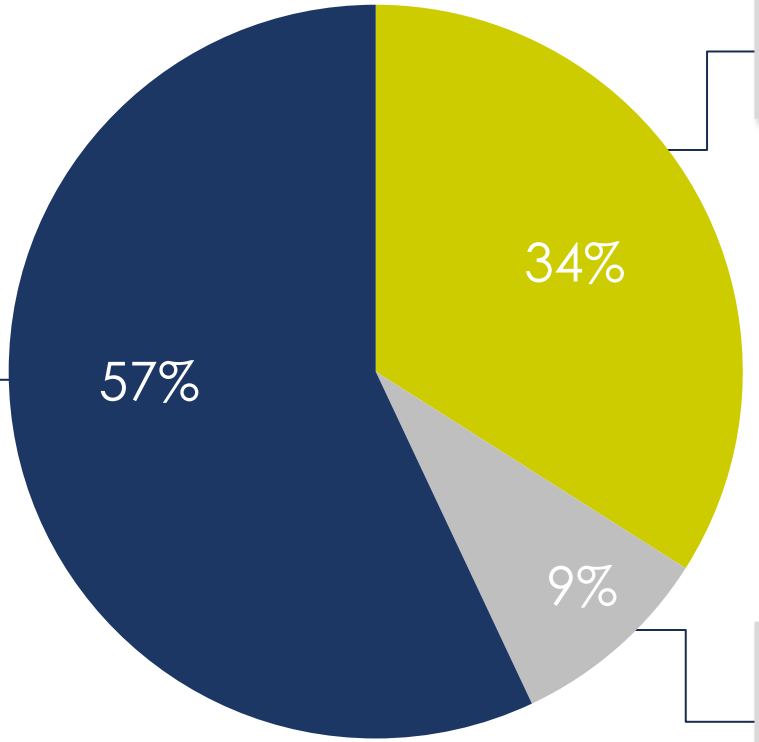
- Given the choice between the two programs, most firms are likely to favor the ITC. However, depending on its financial structure, a given manufacturer may be unable to economically benefit from the ITC and, therefore, will utilize the LCLP instead.
- In the absence of comprehensive investment and financial projections at the firm-level, it is difficult to identify *a priori* the extent to which a given industry will utilize each program. Rather, it is assumed that each industry uses a mix of both programs.
- Given this assumption, the impact of the two programs are simulated by reducing the cost of capital for energy efficiency investments within each industry by a blended rate, which is weighted by the overall size of the two programs.



**Only $210 of the $280 billion in total investment is assumed to be loaned at 10-year treasury rates because $.25 cents of every dollar of investment using the low cost loan program has to be provided by the borrower.*

The modeling approach disaggregated manufacturing energy use into three components, per the AEO 2010.

Manufacturing Energy Use by Application
(Percent)

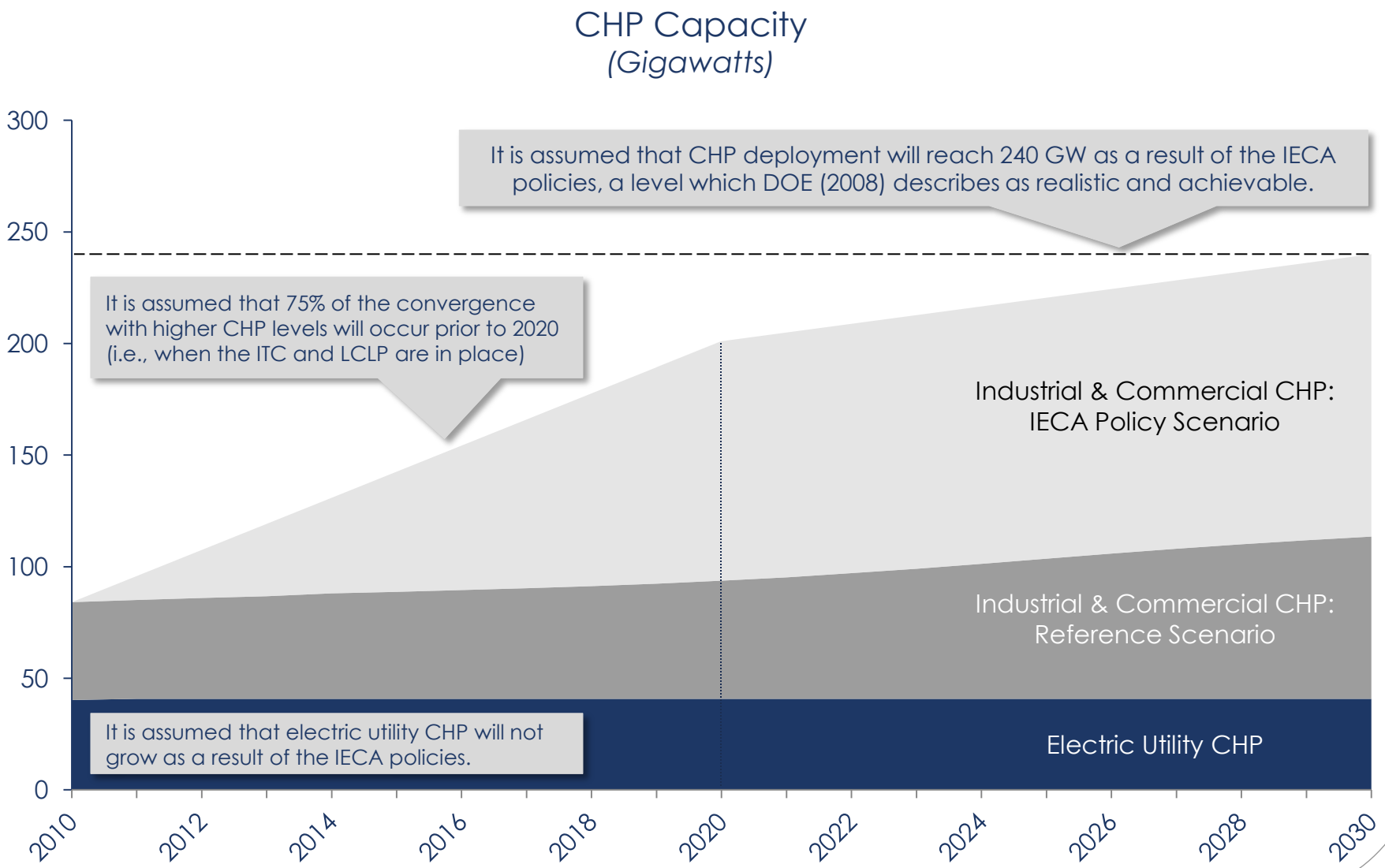


Steam/Boiler: Energy efficiency improvements are driven by CHP deployment assumptions.

Manufacturing Processes: Energy efficiency gains driven by assumptions of: (1) technological potentials as given by the AEO 2010 and (2) the amount of ITC and LCLP financing accessed by industries.

Building Structures: Energy efficiency improvements are assumed to improve relative to the Baseline Scenario at the same rate as commercial buildings.

CESOP for CHP and low-cost capital policies are assumed to significantly increase CHP deployment in the IECA Policy Scenario.



Increased recycled energy deployment is assumed to result in 34 GW of additional electricity capacity from industrial waste energy.

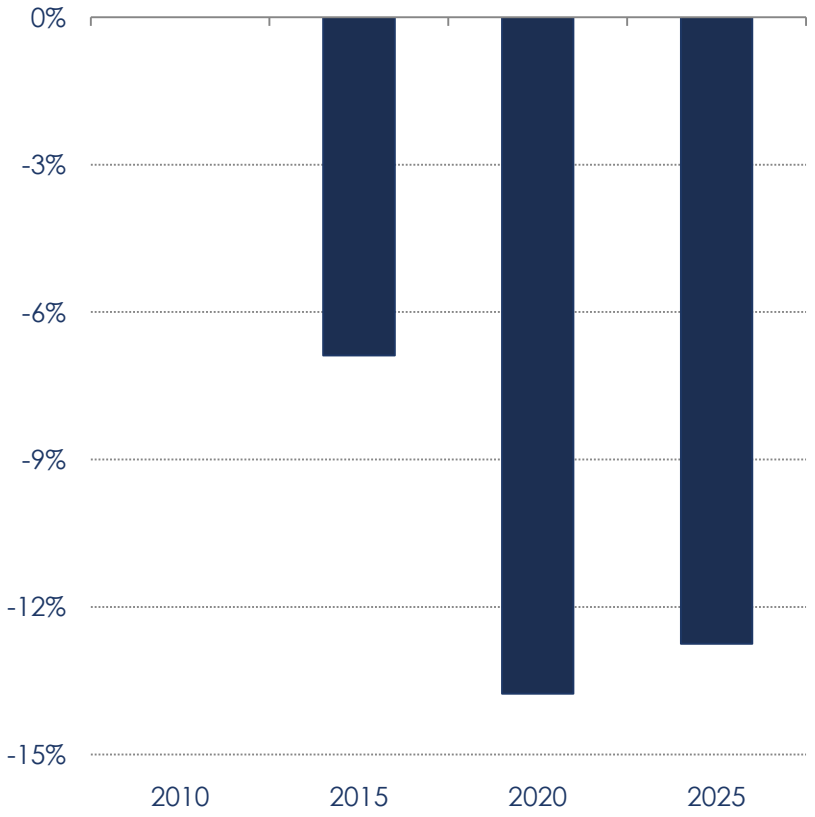
- Based on a 2005 EPA study and additional data provided by Recycled Energy LLC, it is estimated that 34 GW of cost-effective, non-CHP waste energy recovery opportunities will benefit from a CESOP and be deployed by 2030.
- Industries producing electricity with either CHP or recycled energy are assumed to receive payments per kWh equal to the avoided costs of electric utilities, as estimated by the levelized cost of the lowest cost electricity generation technology in a given year, as provided in the 2010 AEO.
- It is assumed that independent project developers and unregulated arms of electric utilities provide 75% of CHP and recycled energy project financing while manufacturers provided 25%.
- Electricity produced using recycled energy is assumed to use no additional fuel.

Waste Recovery Option	Capacity* (Megawatts)	Capital Costs ($ per kW)
Anaerobic Digestion - Agriculture & Wastewater	1,074	$2,514
Black Liquor Gasification	6,050	$1,375
EPSI - VOC Control	13,500	$2,569
Fuels Cells in the Chlorine-Alkaline Industry	600	$1,927
Gas Recovery - Landfill, Flare, & Blast Furnace Gases	2,139	$1,590
Pressure Recovery - Steam, Natural Gas, & Flare Gas	6,429	$1,848
Waste Heat Recovery	4,127	$2,103
Total	**33,919**	**-**

Narrow reform of New Source Review is assumed to enable many of the improvements in energy efficiency discussed above.

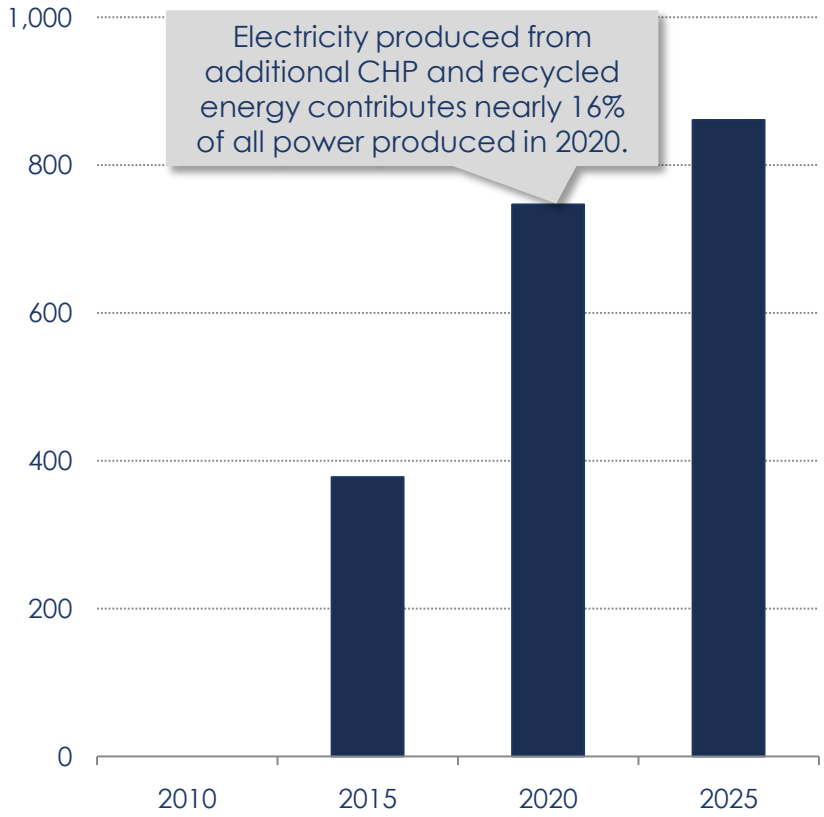
Energy Intensity in Manufacturing Processes in the IECA Policy Scenario

(Change Relative to Baseline, Percent)



Electricity Production from Industrial CHP & Recycled Energy in the IECA Policy Scenario

(Change Relative to Baseline, Billion kWh)

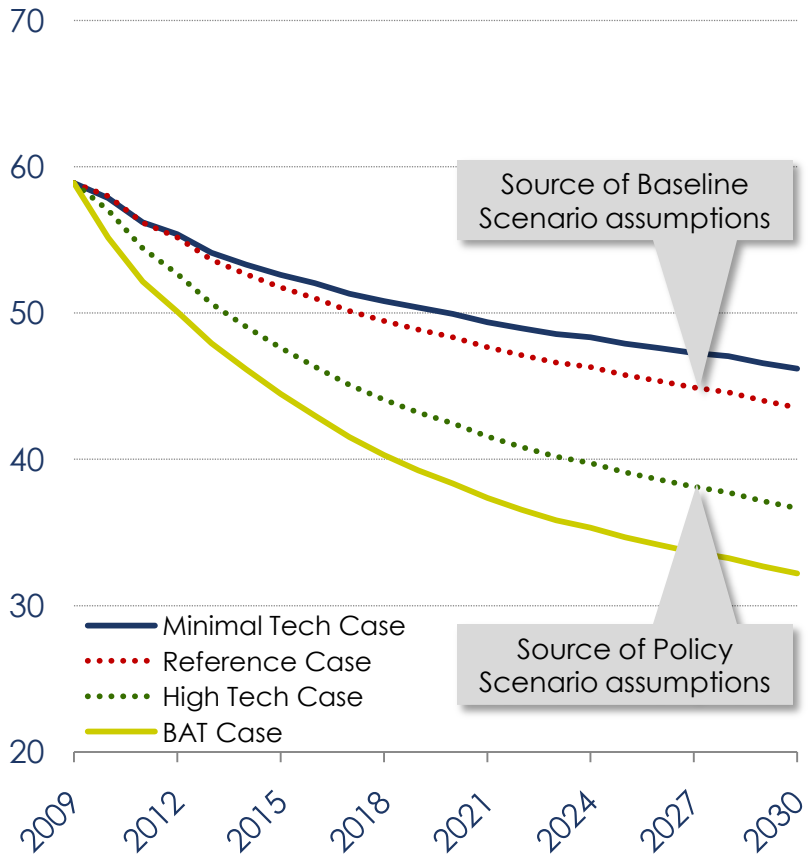


IECA estimates that, in the absence of reform, the administrative burden of NSR would delay increases in technology deployment by an average of 18-24 months and also prevent many otherwise cost-effective projects from ever being undertaken.

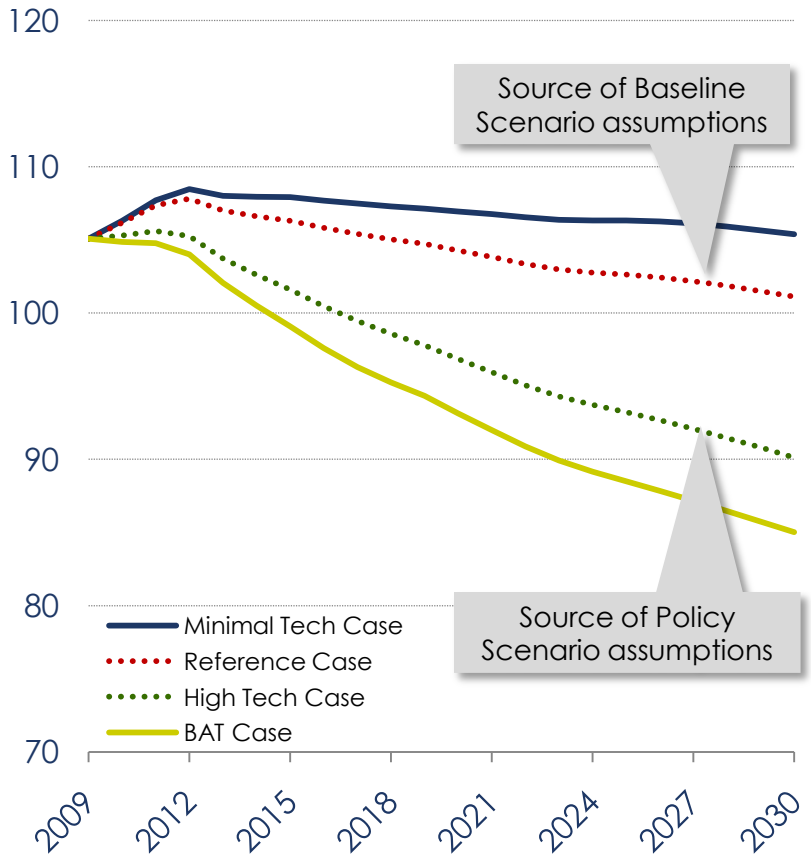
Building efficiency assumptions from two cases in the 2010 AEO are used as inputs for the Baseline and IECA Policy Scenarios.

Building Efficiency Projections by AEO 2010 Scenario

Residential Building Efficiency
(Thousand Btu per sq. ft. per year)



Commercial Building Efficiency
(Thousand Btu per sq. ft. per year)



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MODELING RESULTS: SUMMARY OF IMPACTS

Impact of the IECA Policy Proposal: Key Results*

$77 Billion

Increase in real GDP in 2020.

9.4 Million

Increase in net job-years between 2010-2030.

13%

Decrease in CO_2 emissions in 2020.

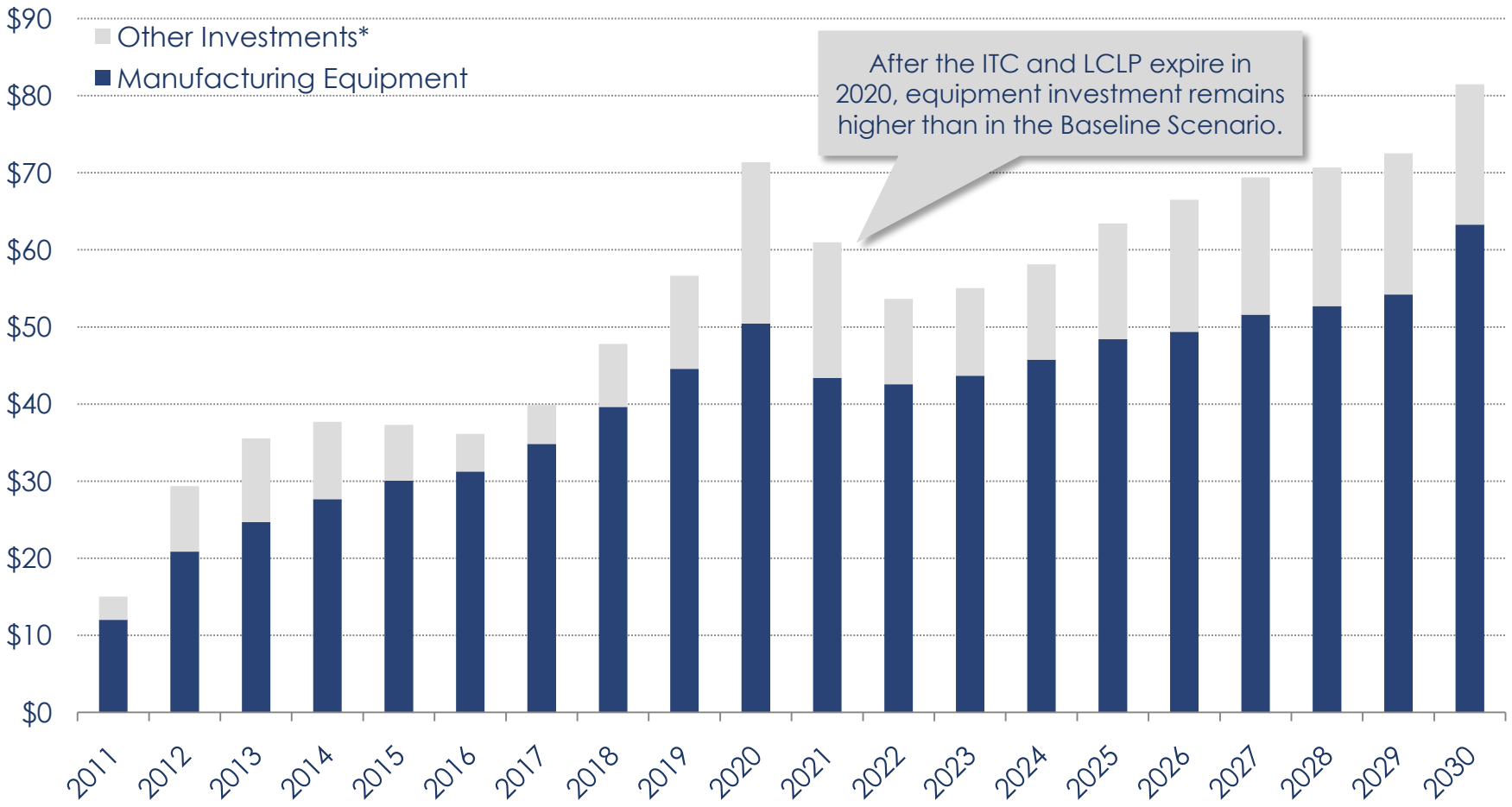
$392 Billion

Increase in net exports between 2010-2030.

Source: Keybridge Research and University of Maryland Inforum Modeling Project.
* All results are expressed relative to the Baseline Scenario. Dollar-denominated results are reported in 2010 constant dollars.

The IECA policy package is estimated to drive significant increases in private fixed investment.

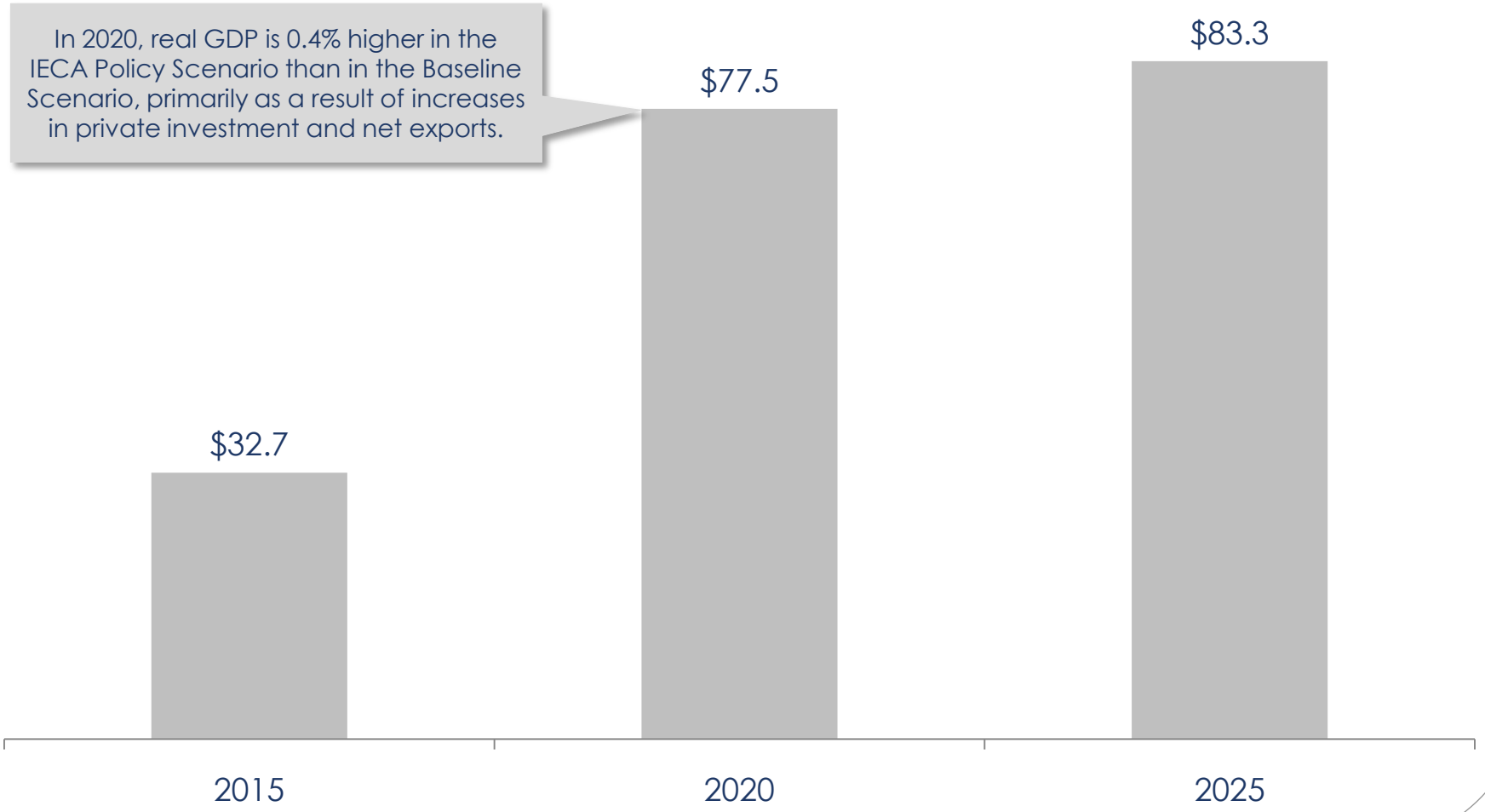
IECA Policy Scenario: Fixed Private Investment
(Difference Relative to Baseline Scenario, Billion $2010)



**Other investments* includes private fixed investment in other sectors and some manufacturing investments in new structures.*
Source: Keybridge Research and University of Maryland Inforum Modeling Project.

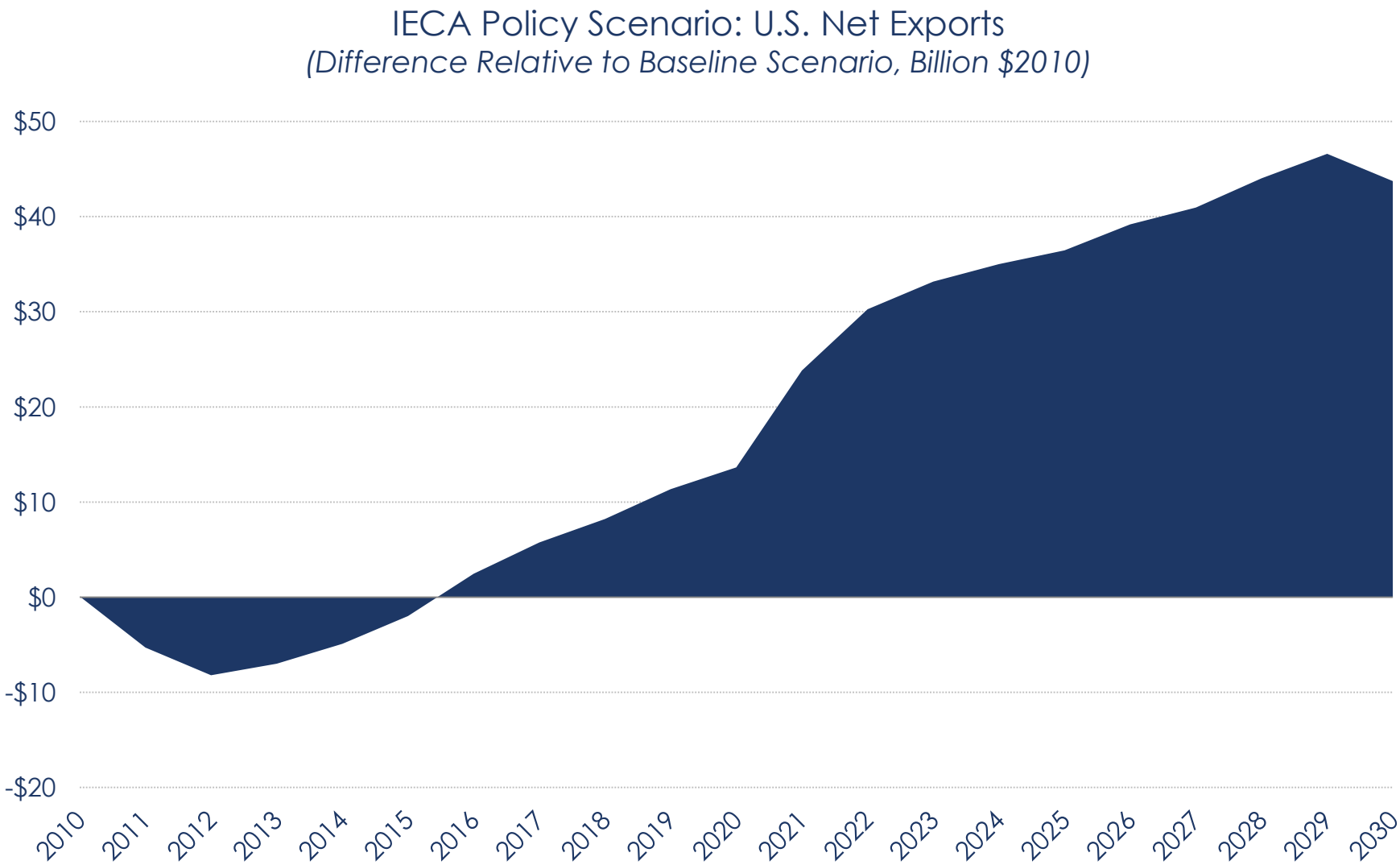
Higher investment levels contribute to a $77 billion increase in real annual gross domestic product in 2020.

IECA Policy Scenario: U.S. Gross Domestic Product
(Difference Relative to Baseline Scenario, Billion $2010)



Source: Keybridge Research and University of Maryland Inforum Modeling Project.

Increased investment improves manufacturing competitiveness and boosts cumulative net exports by $392 billion in 2011-2030.

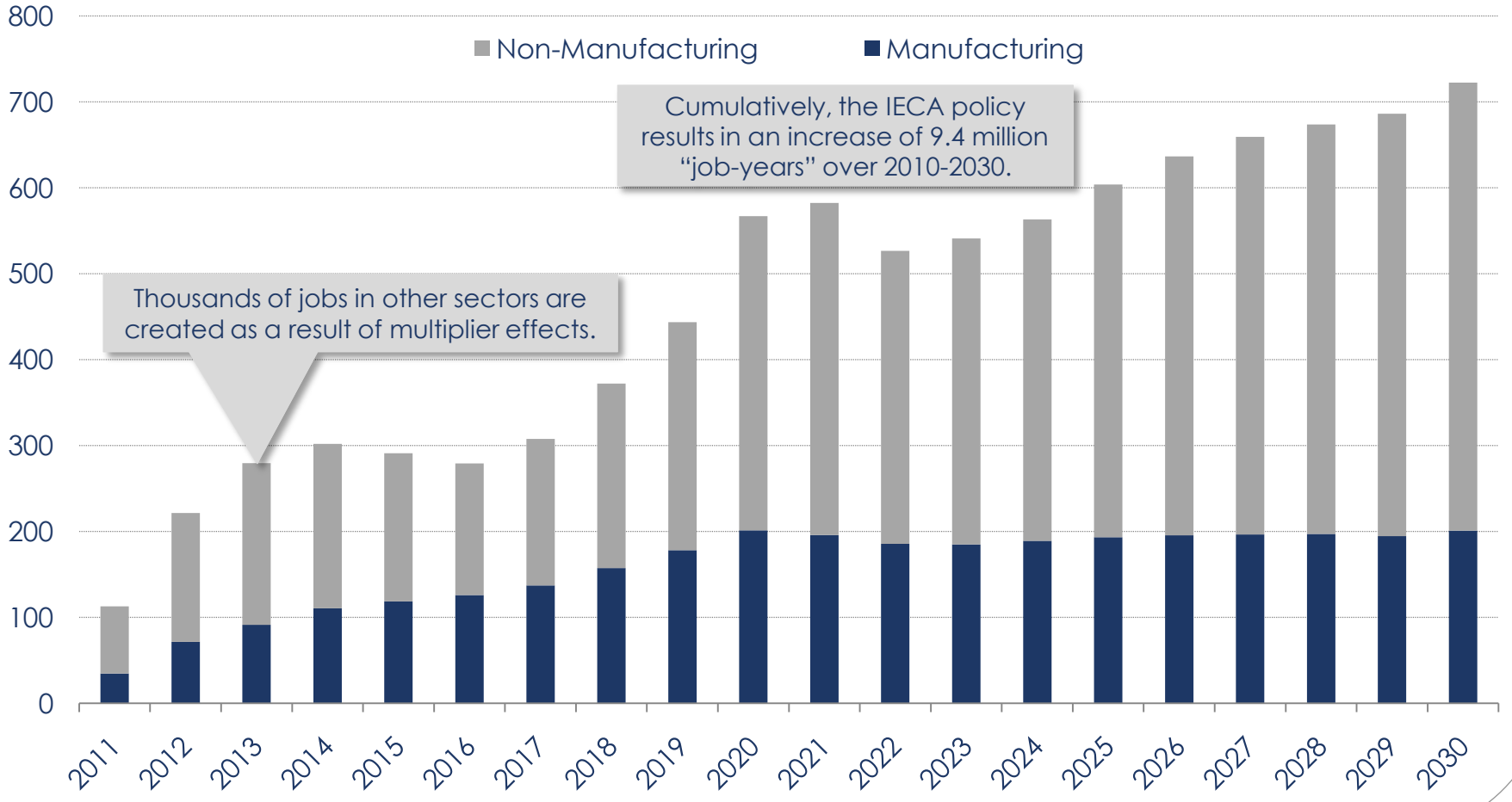


Source: Keybridge Research and University of Maryland Inforum Modeling Project.

As a result, approximately 567,000 new jobs are created by 2020, including 200,000 in the manufacturing sector.

Net U.S. Job Creation

(Difference Relative to Baseline Scenario, Thousand Jobs per Year)

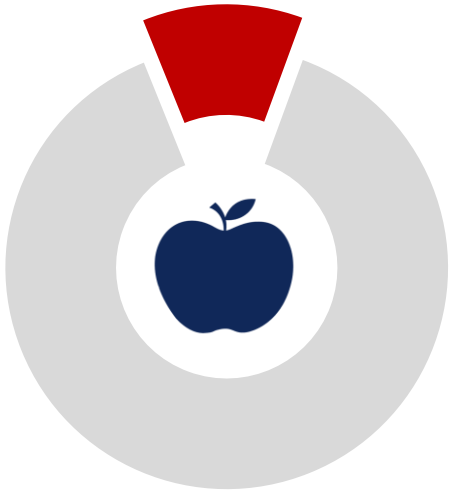


Source: Keybridge Research and University of Maryland Inforum Modeling Project.

Furthermore, it is estimated that the average U.S. household will earn an additional $788 in 2020 if the IECA policies are adopted.

Increase in Family Income Relative to Expenditures on Key Items
($788 as a Percent of Annual Household Expenditures on Essential Items in 2020)

12% of Annual Grocery Expenses

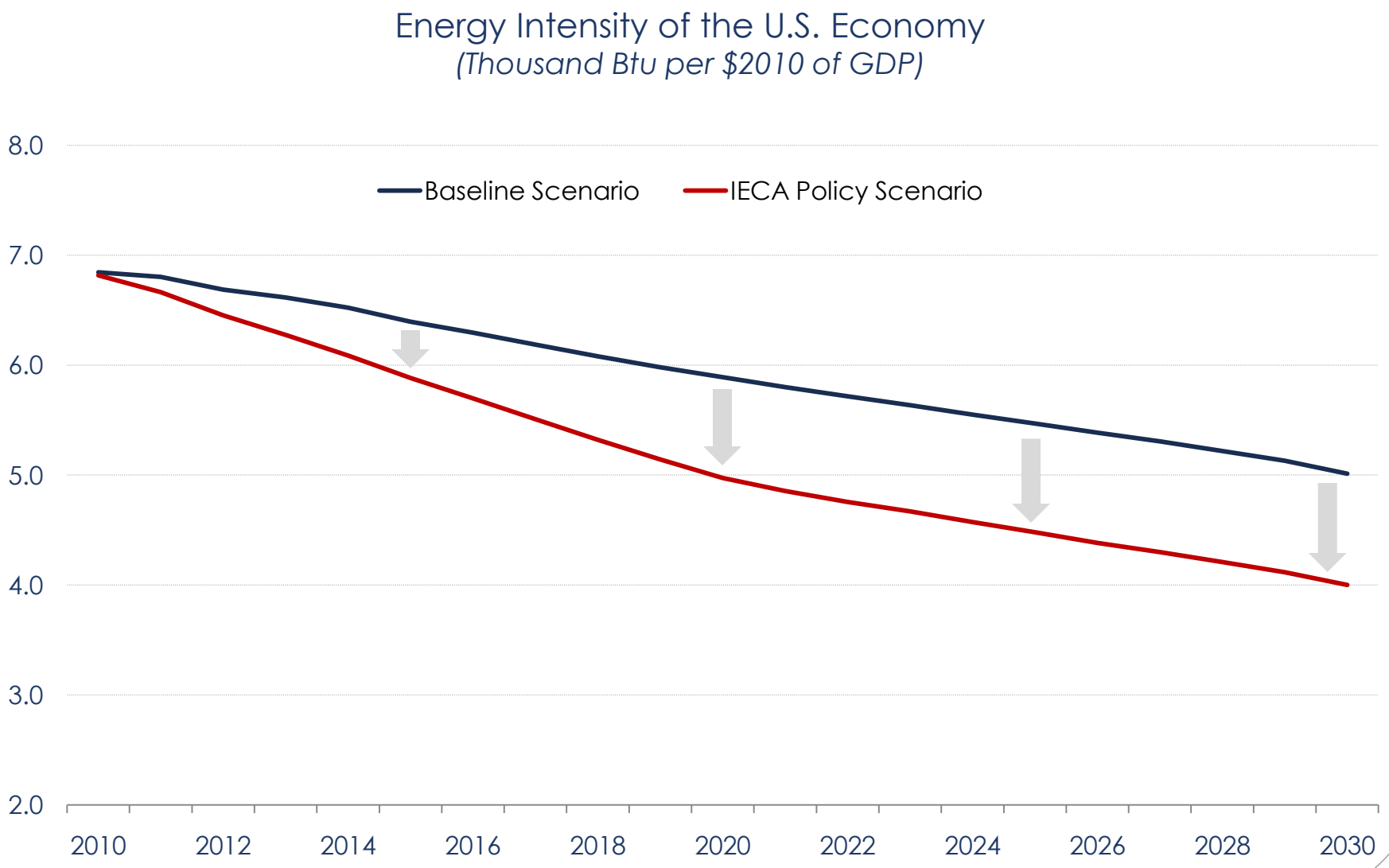


20% of Annual Apparel Expenses

24% of Annual Gasoline Expenses

Source: Keybridge Research and University of Maryland Inforum Modeling Project.

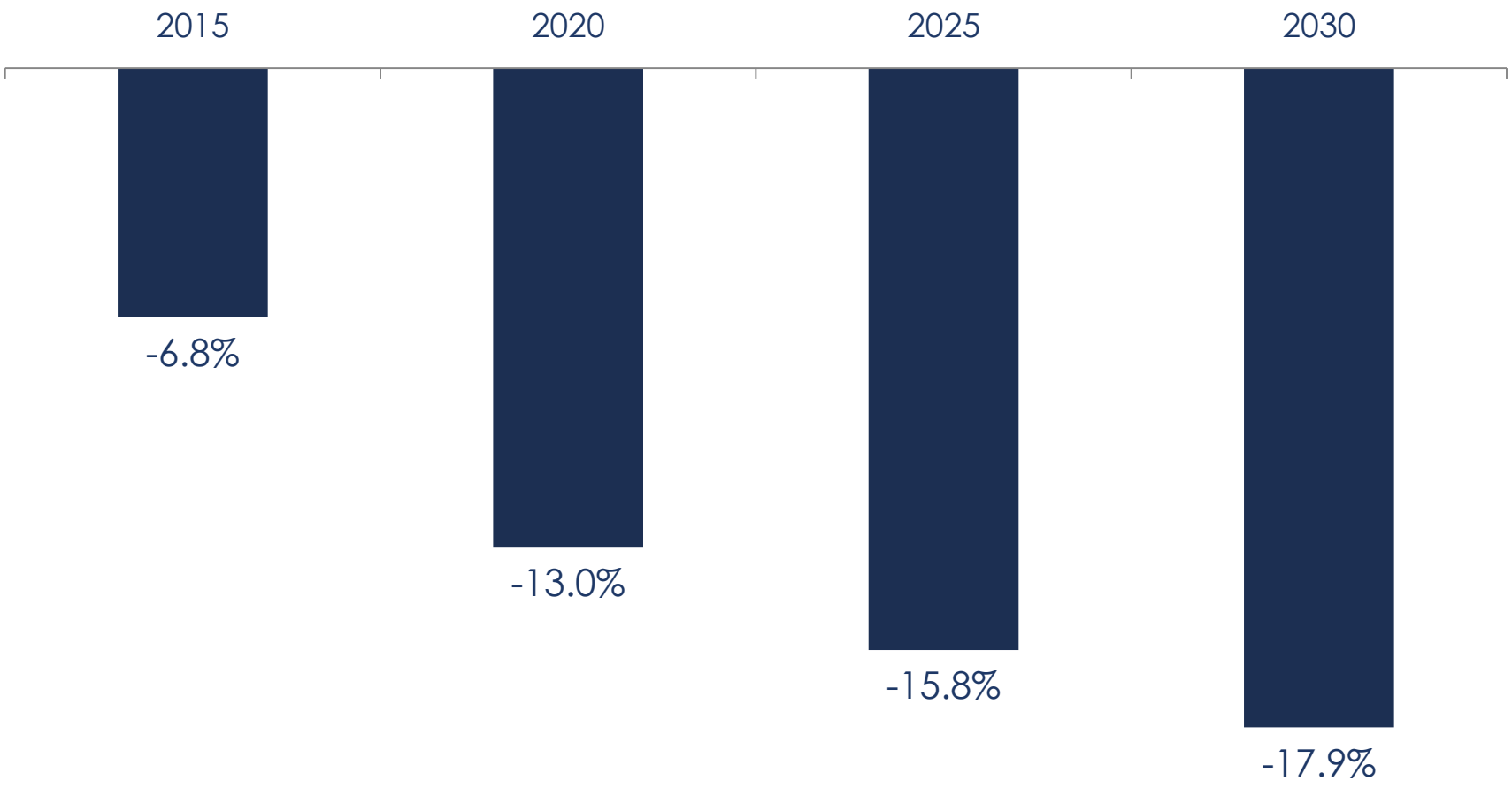
At the same time, policy-related investments reduce the energy intensity of the U.S. economy by 17% in 2020.



Source: Keybridge Research and University of Maryland Inforum Modeling Project.

Consequently, energy-related GHG emissions decrease by 13% in 2020 and 18% in 2030.

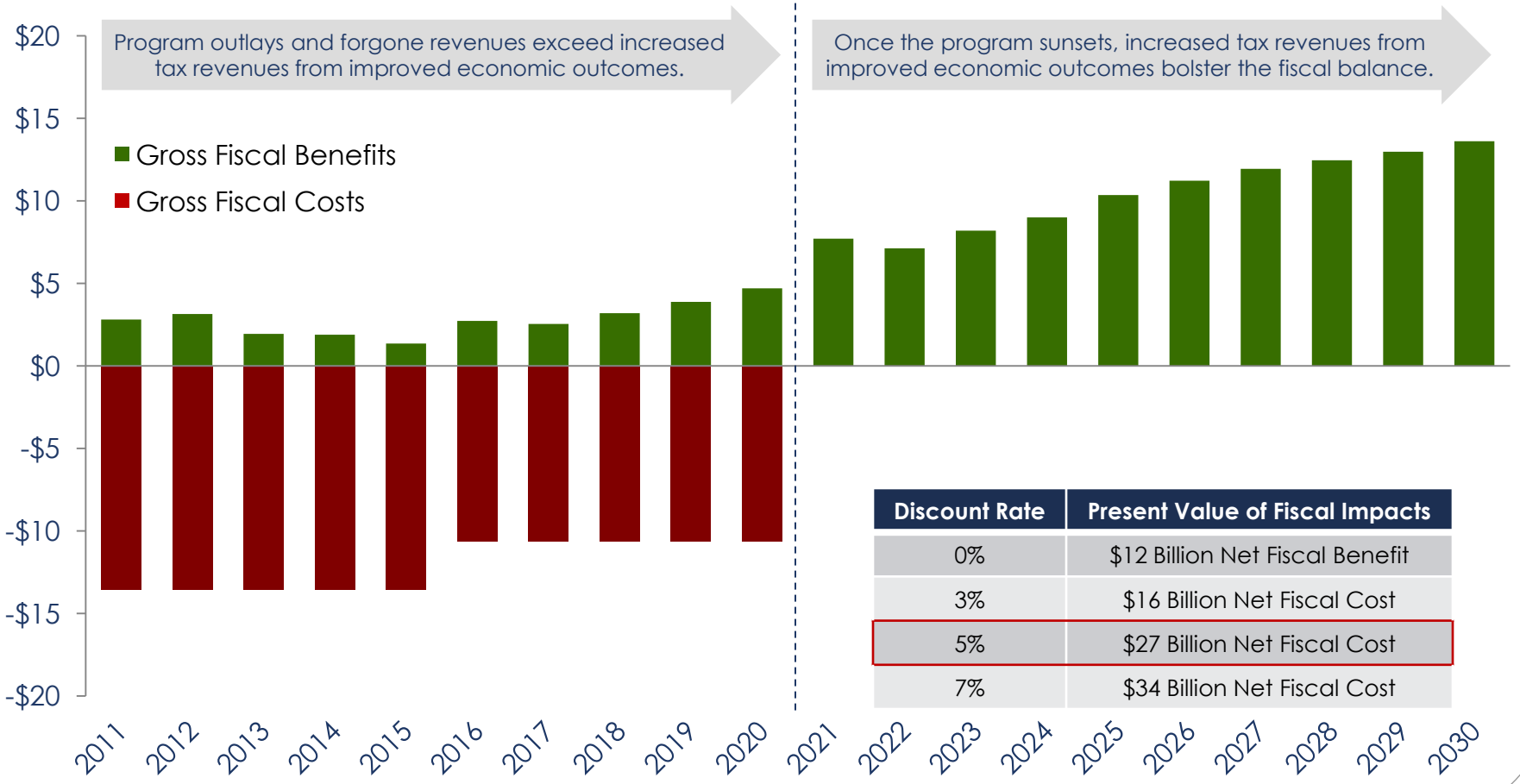
IECA Policy Scenario: GHG Emissions
(Difference from Baseline Scenario, Percent)



Source: Keybridge Research and University of Maryland Inforum Modeling Project.

Furthermore, additional tax revenues in a stronger economy help the IECA policy package largely "pay for itself" by 2030.

IECA Policy Scenario: Federal Fiscal Impact
(Difference Relative to Baseline Scenario, $2010)



Discount Rate	Present Value of Fiscal Impacts
0%	$12 Billion Net Fiscal Benefit
3%	$16 Billion Net Fiscal Cost
5%	$27 Billion Net Fiscal Cost
7%	$34 Billion Net Fiscal Cost

Source: Keybridge Research and University of Maryland Inforum Modeling Project.

With economic benefits 20 times greater than fiscal costs, the IECA policies provide U.S. taxpayers with significant "bang for the buck".

Program Costs vs. Change in GDP
(Difference Relative to Baseline Scenario, $2010)

Net Fiscal Costs
*($27 Billion Over 20 Years)**

Cumulative Increase in GDP
*($675 Billion Over 20 Years)**

Source: Keybridge Research and University of Maryland Inforum Modeling Project.
*Values discounted at a 5% rate.

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CONCLUSIONS FOR POLICYMAKERS

The modeling results indicate that the IECA policy recommendations are likely to achieve the stated objectives of improving economic growth, reducing investment barriers, creating jobs, enhancing competitiveness, and reducing GHG emissions. Specifically, the study finds that the IECA policy package would:[1]

- Increase real GDP by $77 billion in 2020.
- Increase cumulative employment by 9.4 million job-years in 2010-2030.[2]
- Increase cumulative private investment by more than $1 trillion in 2010-2030.
- Increase family income by an average of $788 (0.68%) in 2020.
- Increase cumulative net exports by $392 billion in 2010-2030.
- Reduce energy-related GHG emissions by 13% in 2020.

Furthermore, it is estimated that the net fiscal cost associated with the IECA policy recommendations will be less than 0.1% of discretionary government spending between 2011-2030. Indeed, it is estimated that the policies will result in a cumulative increase in real GDP growth that is approximately **20 times greater** than the cumulative net fiscal cost — providing U.S. taxpayers with significant "bang for the buck".

[1]All results are expressed relative to the Baseline Scenario. Dollar-denominated results are reported in 2010 constant dollars.

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APPENDIX A:
Summary Results Tables

Summary of Key Outcomes

(Baseline Results* = Levels, IECA Scenario Results = Differences)

Variable	Units	Scenario	2010	2015	2020	2025	2030
Gross Domestic Product	Billion $2010	Baseline	14,408	16,776	19,403	22,075	24,839
		IECA	0	33	77	83	92
Total Employment	Thousand Jobs	Baseline	119,383	130,909	139,935	146,087	151,382
		IECA	6	291	567	604	723
Energy-Related CO_2 Emissions	Million Metric Tons	Baseline	5,509	5,903	6,111	6,357	6,372
		IECA	-33	-400	-796	-1,005	-1,138
Gross Private Fixed Investment	Billion $2010	Baseline	1,771	2,785	3,277	3,825	4,494
		IECA	0	37	71	63	81
Disposable Income per Household	$2010	Baseline	94,669	103,869	115,090	128,838	142,103
		IECA	12	430	788	777	922
Exports	Billion $2010	Baseline	1,671	2,488	3,532	4,687	6,049
		IECA	0	11	39	63	86
Imports	Billion $2010	Baseline	2,155	2,776	3,474	4,390	5,663
		IECA	0	13	25	26	42
Net Exports	Billion $2010	Baseline	-484	-287	58	297	386
		IECA	0	-2	14	37	44

*Baseline Scenario results were calibrated to reflect the levels projected in the Base Case of EIA's *2010 Annual Energy Outlook*.

Summary of Key Outcomes

(Baseline Results* = Levels, IECA Scenario Results = Differences)

Variable	Units	Scenario	2010	2015	2020	2025	2030
Government Spending	Billion $2010	Baseline	2,573	2,547	2,680	2,811	2,951
		IECA	0	4	6	3	3
Government Receipts	Billion $2010	Baseline	2,331	2,928	3,797	4,775	5,859
		IECA	0	-9	0	14	17
Manuf. Equipment Investment	Billion $2010	Baseline	156	213	293	354	413
		IECA	0	30	50	48	63
Manufacturing Output	Billion $2010	Baseline	5,589	6,861	8,255	9,429	10,446
		IECA	0	12	29	38	59
Manufacturing Employment	Thousand Jobs	Baseline	13,340	14,201	14,891	14,804	14,398
		IECA	1	118	201	193	201
Total Energy Use	Quadrillion Btu	Baseline	97	106	113	119	123
		IECA	0	-8	-17	-21	-24
Energy Intensity of U.S. Economy	Thousand Btu/$2010	Baseline	6.75	6.31	5.81	5.40	4.95
		IECA	-0.16	-0.62	-1.00	-1.06	-1.08

*Baseline Scenario results were calibrated to reflect the levels projected in the Base Case of EIA's *2010 Annual Energy Outlook*.

Summary of Key Outcomes

(Cumulative Differences Between the Baseline and IECA Policy Scenarios)

Variable	Units	2011-2020	2021-2030	2011-2030
Gross Domestic Product	Billion $2010	389	839	1,227
Total Employment	Thousand Jobs	3,176	6,196	9,372
Energy Related CO2 Emissions	Million Metric Tons	-4,423	-10,046	-14,468
Gross Private Fixed Investment	Billion $2010	407	652	1,058
Real Disposable Income per Household	$2010	4,277	7,967	12,244
Exports	Billion $2010	161	650	812
Imports	Billion $2010	147	272	419
Net Exports	Billion $2010	14	378	392
Government Spending	Billion $2010	38	33	72
Government Receipts	Billion $2010	-54	138	84
Manufacturing Equipment Investment	Billion $2010	316	495	811
Manufacturing Output	Billion $2010	150	387	537
Manufacturing Employment	Thousand Jobs	1,226	1,933	3,159
Total Energy Use	Quadrillion Btu	-93	-215	-308
Energy Intensity	Thousand Btu per $2010	-7	-11	-17

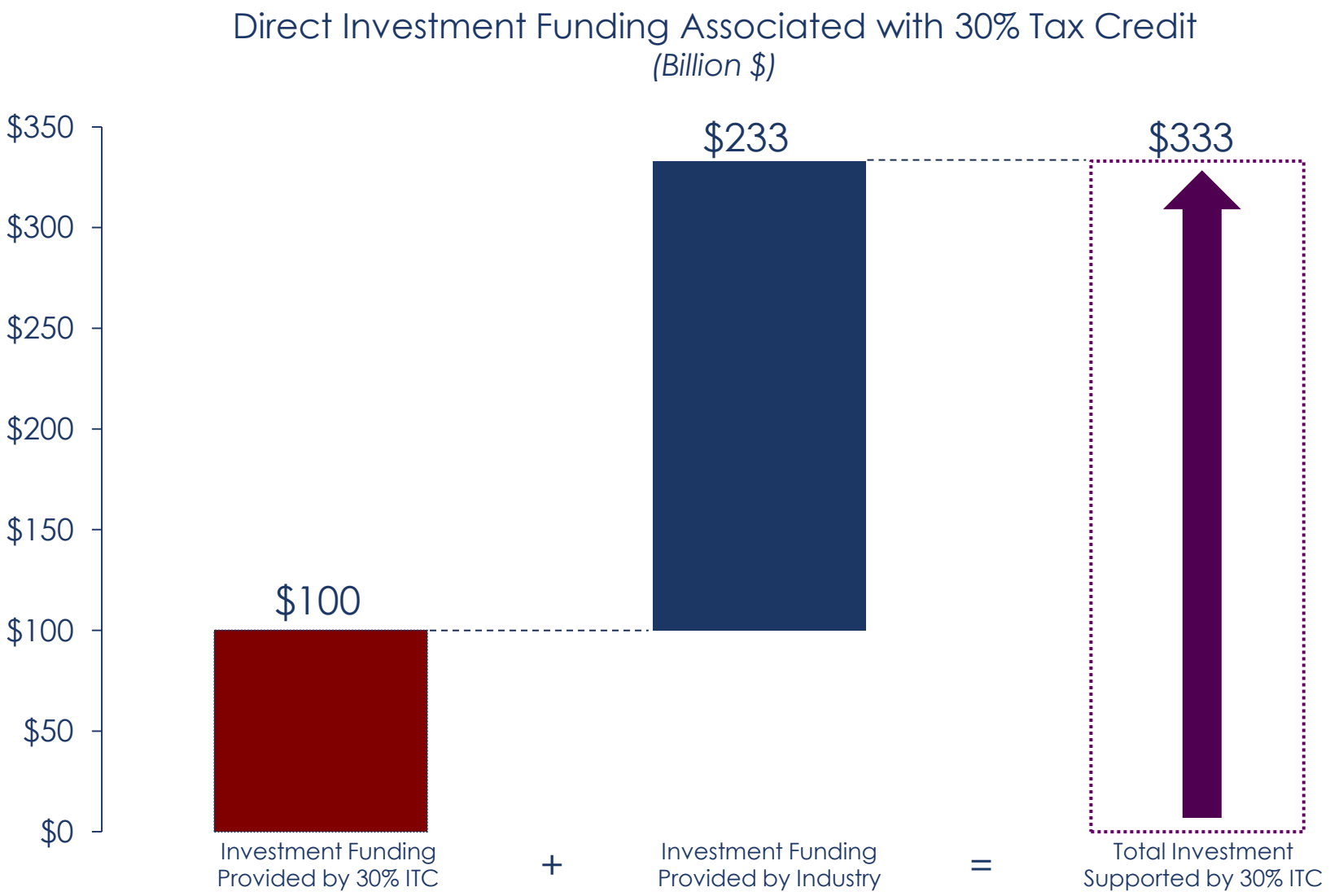
*Baseline Scenario results were calibrated to reflect the levels projected in the Base Case of EIA's *2010 Annual Energy Outlook*.

APPENDIX B:
Detailed Modeling Inputs

DETAILED MODELING INPUTS ROADMAP

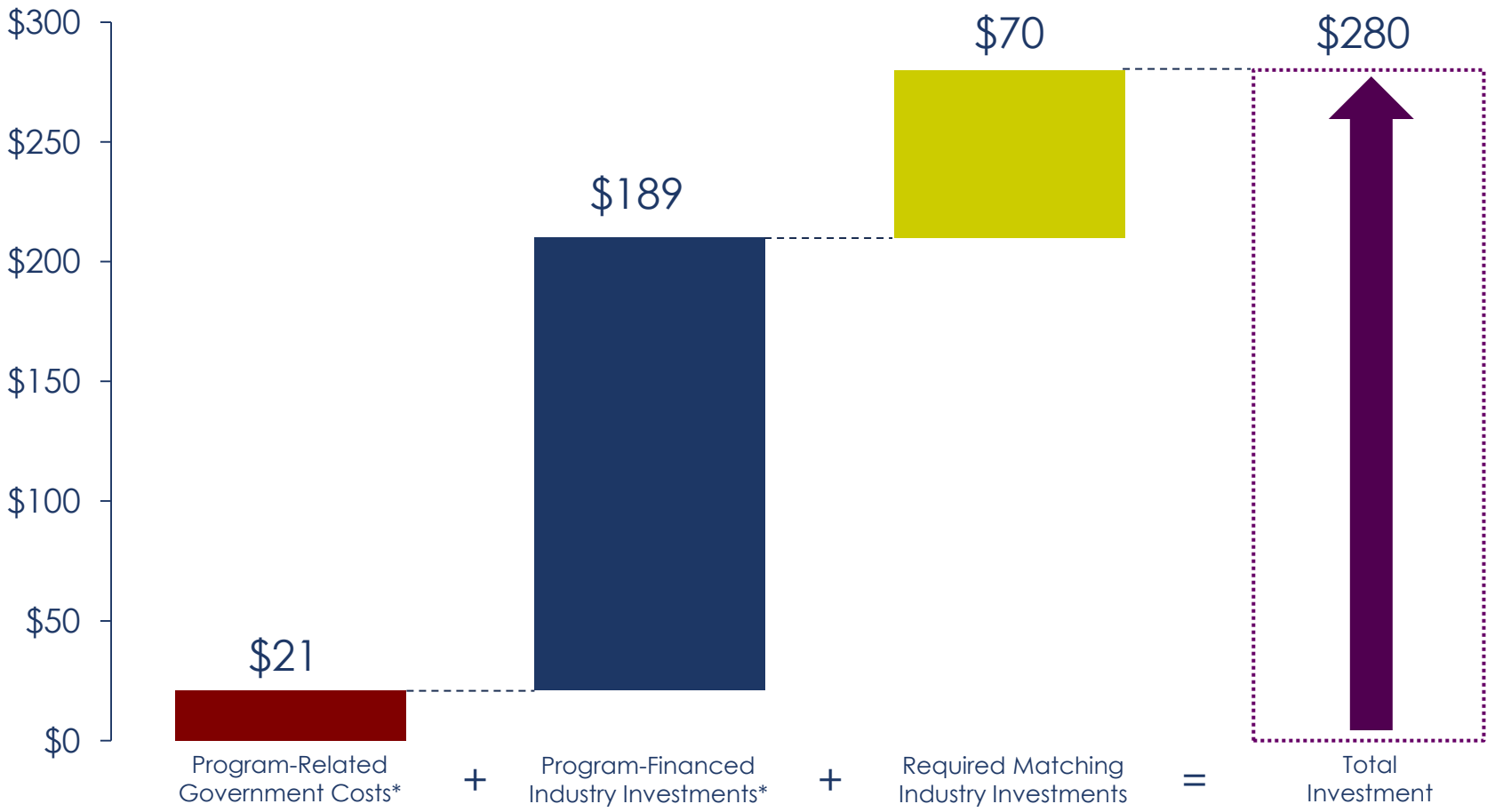
1. ITC & Low Cost Loan Programs: Impact on Investment
2. ITC & Low Cost Loan Programs: Impact on Industrial Energy Efficiency
3. Combined Heat & Power Deployment & Costs
4. Recycled Energy Deployment & Costs
5. New Source Review Reform: Impact on Investment
6. Building Efficiency: Impact on Commercial & Residential Energy Use

The investment tax credit (ITC) is designed to leverage $100 billion in federal funding with $233 billion in private investment.



Likewise, the low-cost loan program is designed to generate $280 billion in additional investment with minimal cost to the government.

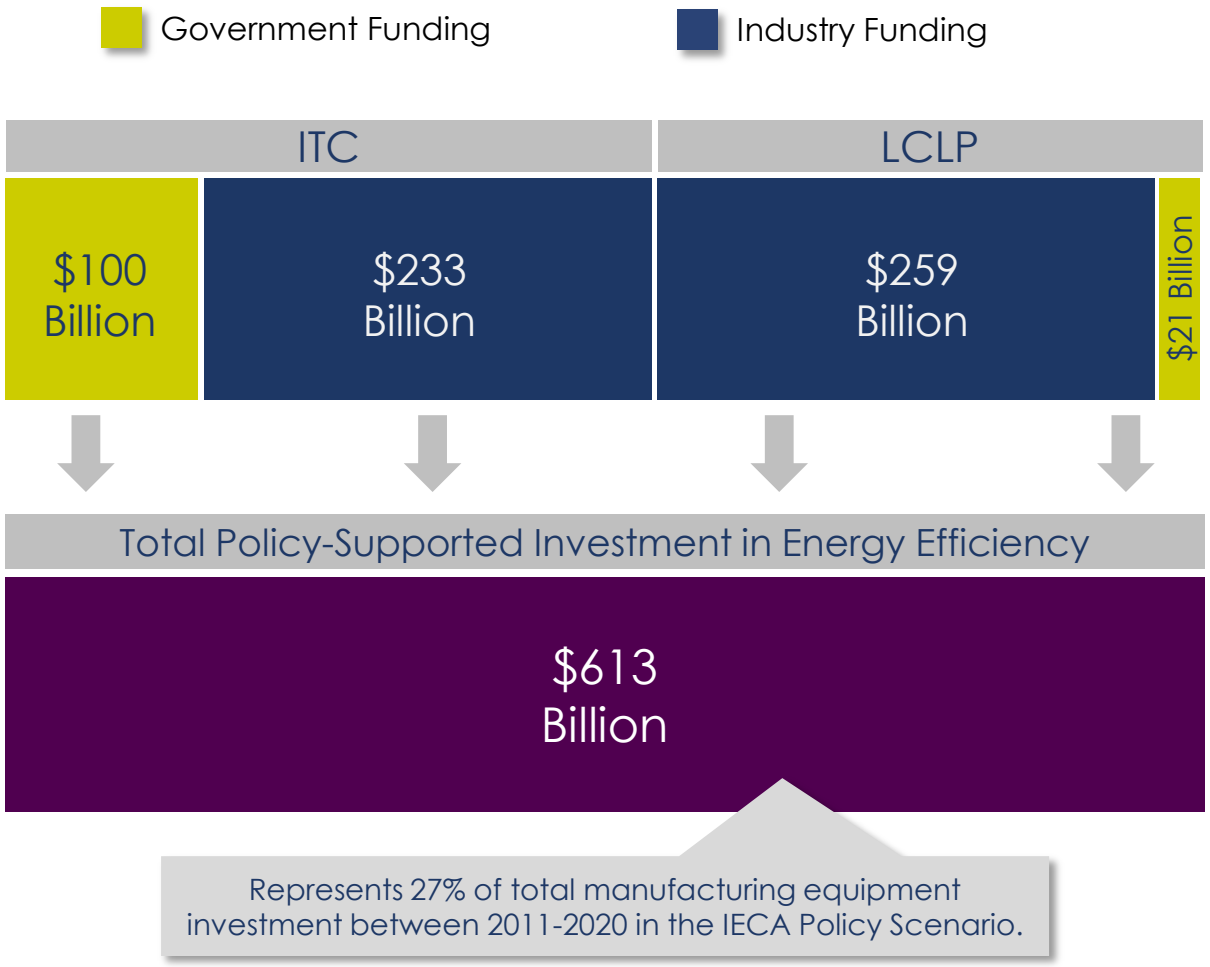
Direct Investment Funding Associated with Low-Cost Loan Program
(Billion $)



** Assumes a budget scoring factor of 10%. This is believed to be a conservative assumption, as: (1) Companies must invest $.25 to borrow $.75 from this program and (2) Borrowers must have an S&P credit rating of BB or better.*

Combined, the ITC and LCLP are designed to directly support $613 billion in energy efficiency investments in the next 10 years.

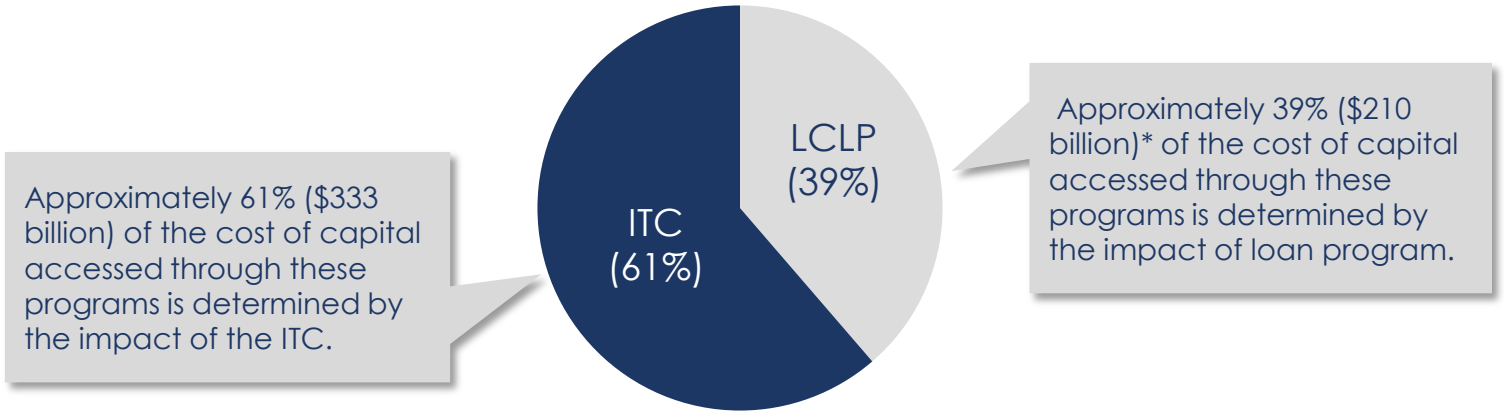
Total Investment Funding Associated with ITC & LCLP
(Billion $)



The modeling analysis assumes that all $613 billion will be utilized, with each industry using a blend of the two programs.

ITC & LCLP Modeling Inputs: Reductions in the Cost of Capital

- Given the choice between the two programs, most firms are likely to favor the ITC. However, depending on its financial structure, a given manufacturer may be unable to economically benefit from the ITC and, therefore, will utilize the LCLP instead.
- In the absence of comprehensive investment and financial projections at the firm-level, it is difficult to identify *a priori* the extent to which a given industry will utilize each program. Rather, it is assumed that each industry uses a mix of both programs.
- Given this assumption, the impact of the two programs are simulated by reducing the cost of capital for energy efficiency investments within each industry by a blended rate, which is weighted by the overall size of the two programs.



**Only $210 of the $280 billion in total investment is assumed to be loaned at 10-year treasury rates because $.25 cents of every dollar of investment using the low cost loan program has to be provided by the borrower.*

It is also assumed that the more energy-intensive manufacturing industries will use the ITC and LCLP more extensively.

Example: Discounted Investment Proportions by Industry

Estimates of energy-related investments represent the proportion of total investment toward which the ITC and LCLP can be applied.

More energy-intensive industries are assumed to use the ITC and LCLP more frequently than less energy-intensive industries.

It is assumed that industries use the ITC and LCLP more in the first 5 years of the programs.

Industry	NAICS	Energy Related Investments* (% of Total)	Energy Intensity** (Energy Costs/ Value Added)	Discounted Investment (% of Total, '11-'15)	Discounted Investment (% of Total, '16-'20)
Food manufacturing	3110	42%	5%	30%	15%
Tobacco manufacturing	3122	29%	0.4%	5%	3%
Pulp, paper, & paperboard mills	3221	62%	20%	62%	62%
Iron & Steel	331A	59%	15%	59%	49%

*Source: Keybridge Research; Based on U.S. Bureau of Economic Analysis (2003).
**Source : Keybridge Research; Based on 2008 data from U.S. Census Bureau, Annual Survey of Manufacturers.

Finally, it is assumed that the reduction in capital costs resulting from these programs would stimulate additional net investment.

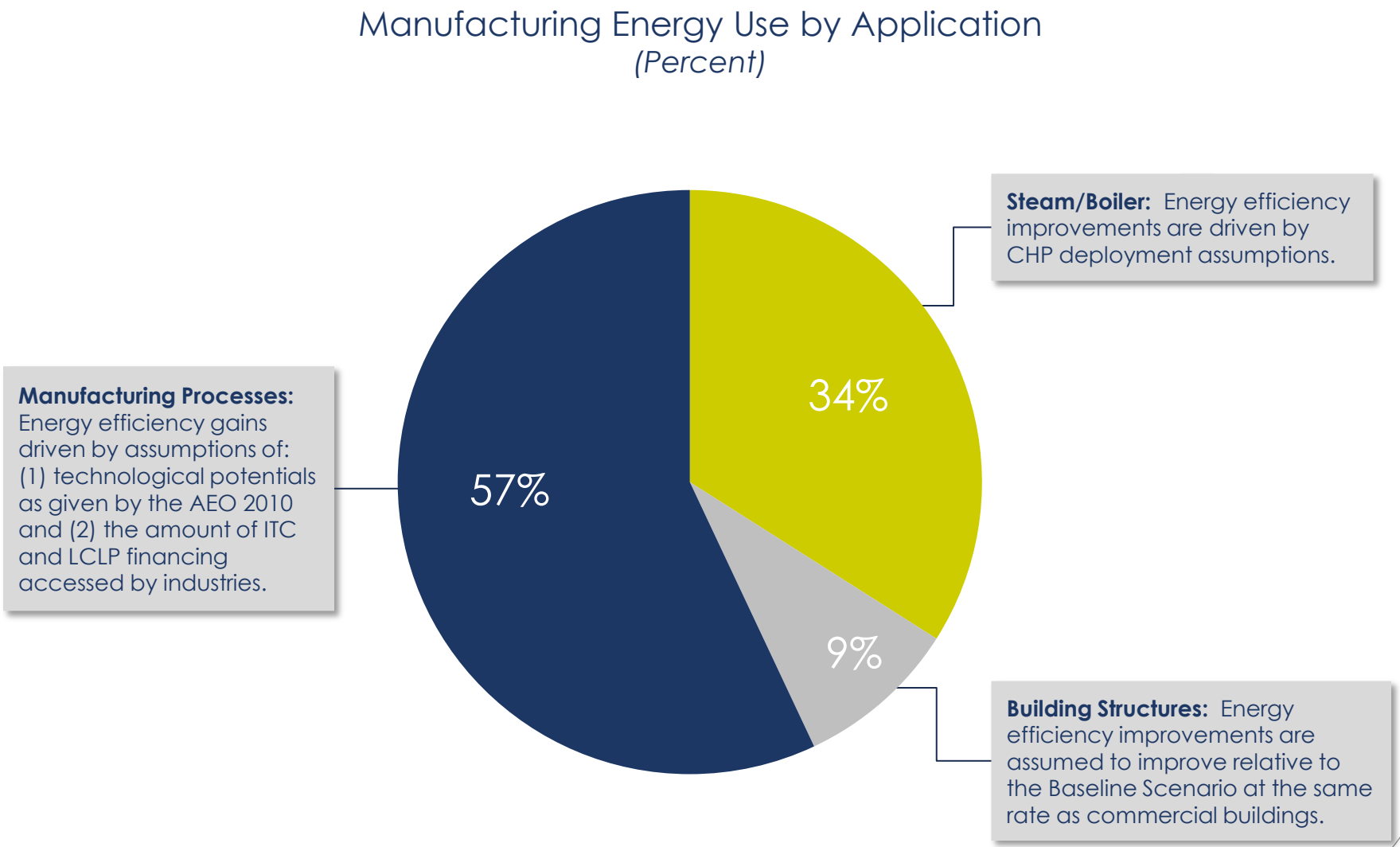
ITC & LCLP Modeling Assumptions: Net Impact on Additional Investment

- There is significant debate among economists regarding the extent to which investment tax credits, low-cost loan programs, and other public policy incentives affect investment decisions.
- The LIFT model assumes an elasticity for manufacturing investment to capital costs of approximately -0.5 (e.g., if the cost of capital decreases by 10%, net capital investment increases by 5%), which is believed to be a reasonable assumption.

Illustrative Example: Net Additional Investment

Change in Cost of Capital for Eligible Investment Projects		Eligible Investment Projects as a Share of Total Investment		Elasticity of Investment to Cost of Capital		Policy-Induced Increase in Investment
-0.20	x	0.50	x	-0.50	=	+5.0%

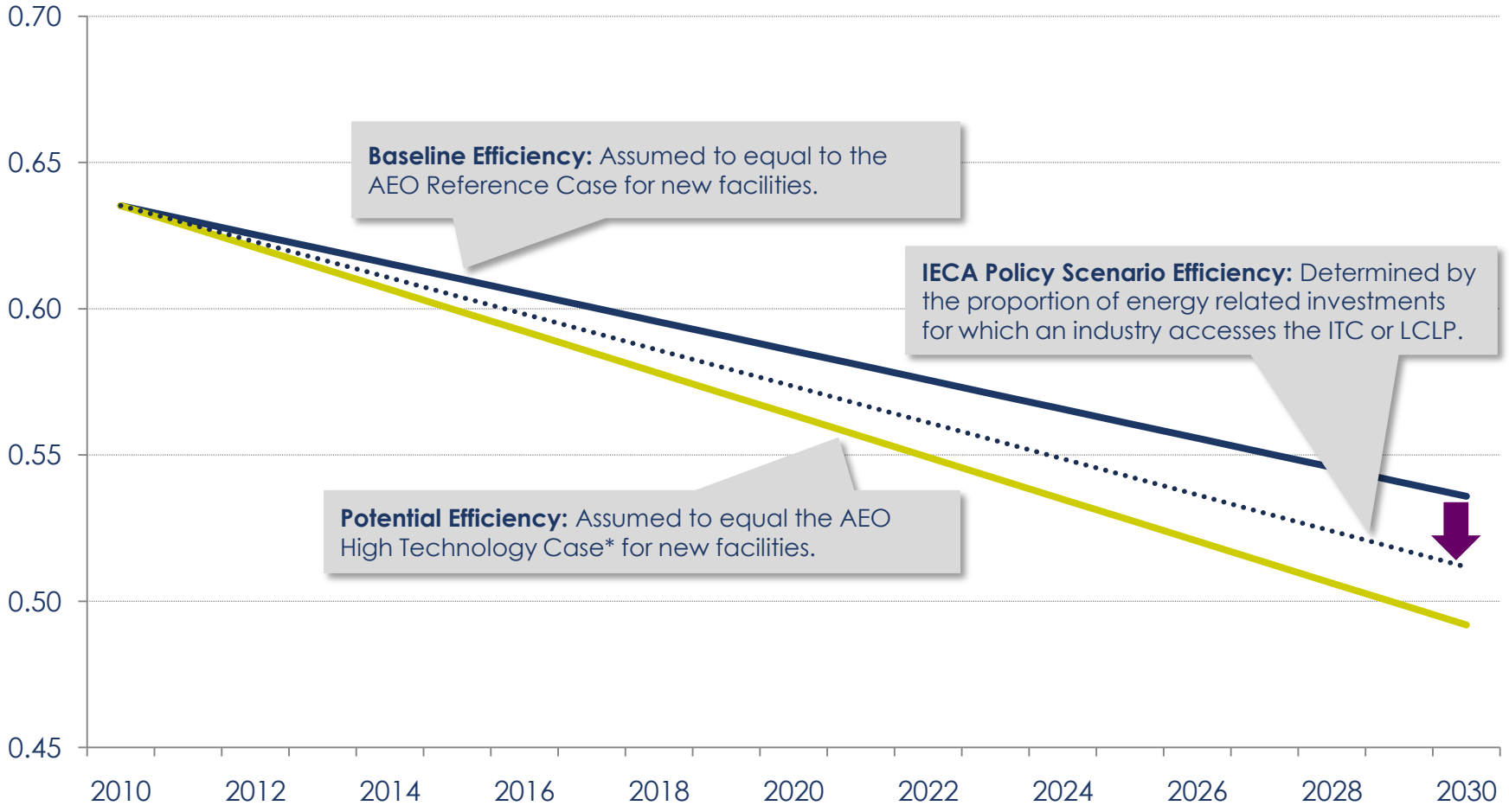
The modeling approach disaggregated manufacturing energy use into three components, per the AEO 2010.



Assumptions from two EIA scenarios establish the bounds of energy efficiency at new "state of the art" facilities.

Illustrative Example: Energy Efficiency Assumptions for New Facilities

(Relative to Efficiency of 2002 Capital Stock)

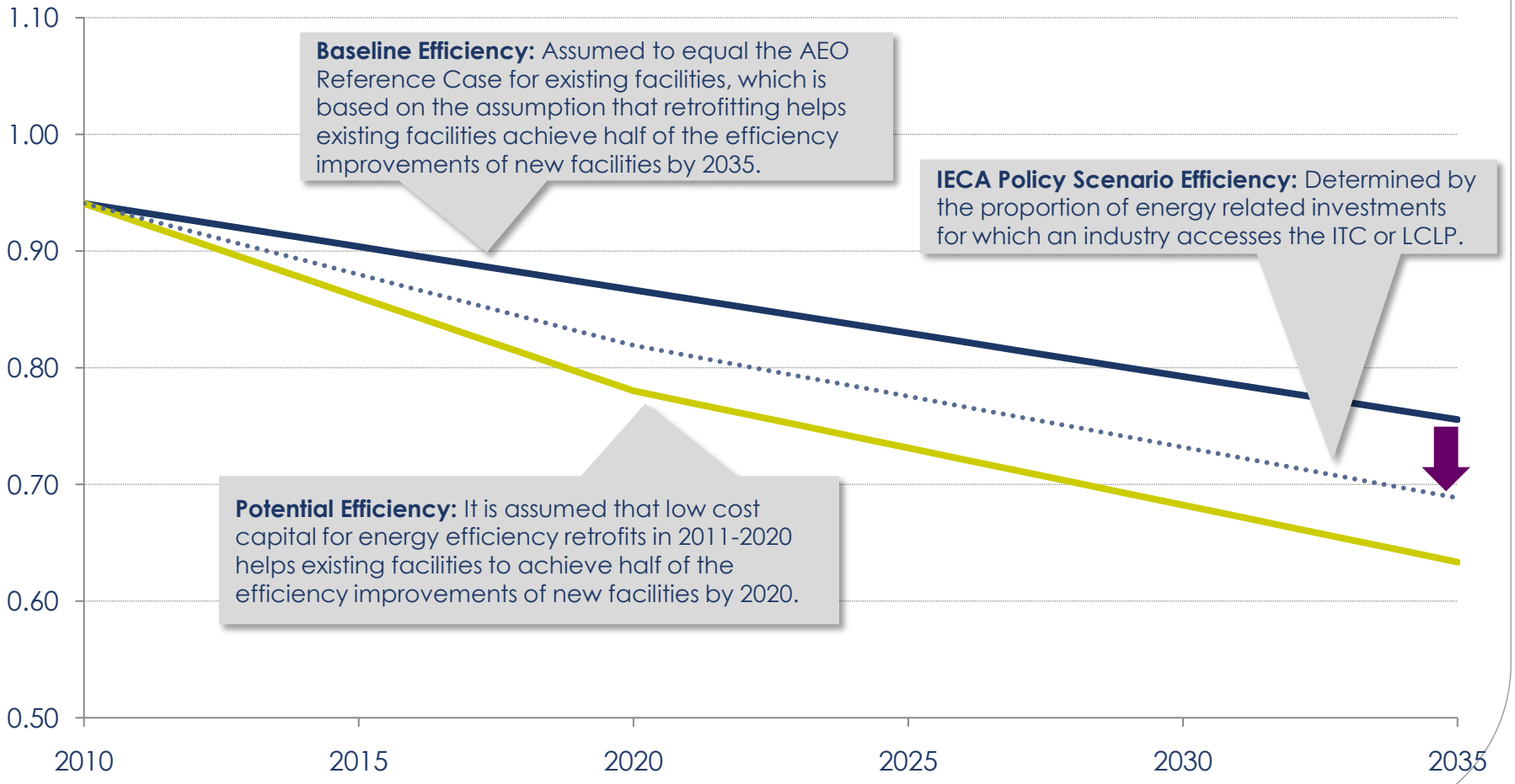


** The AEO High Technology Case does not assume "breakthrough technologies" are deployed, only that improvements in existing technologies are more rapidly adopted.*

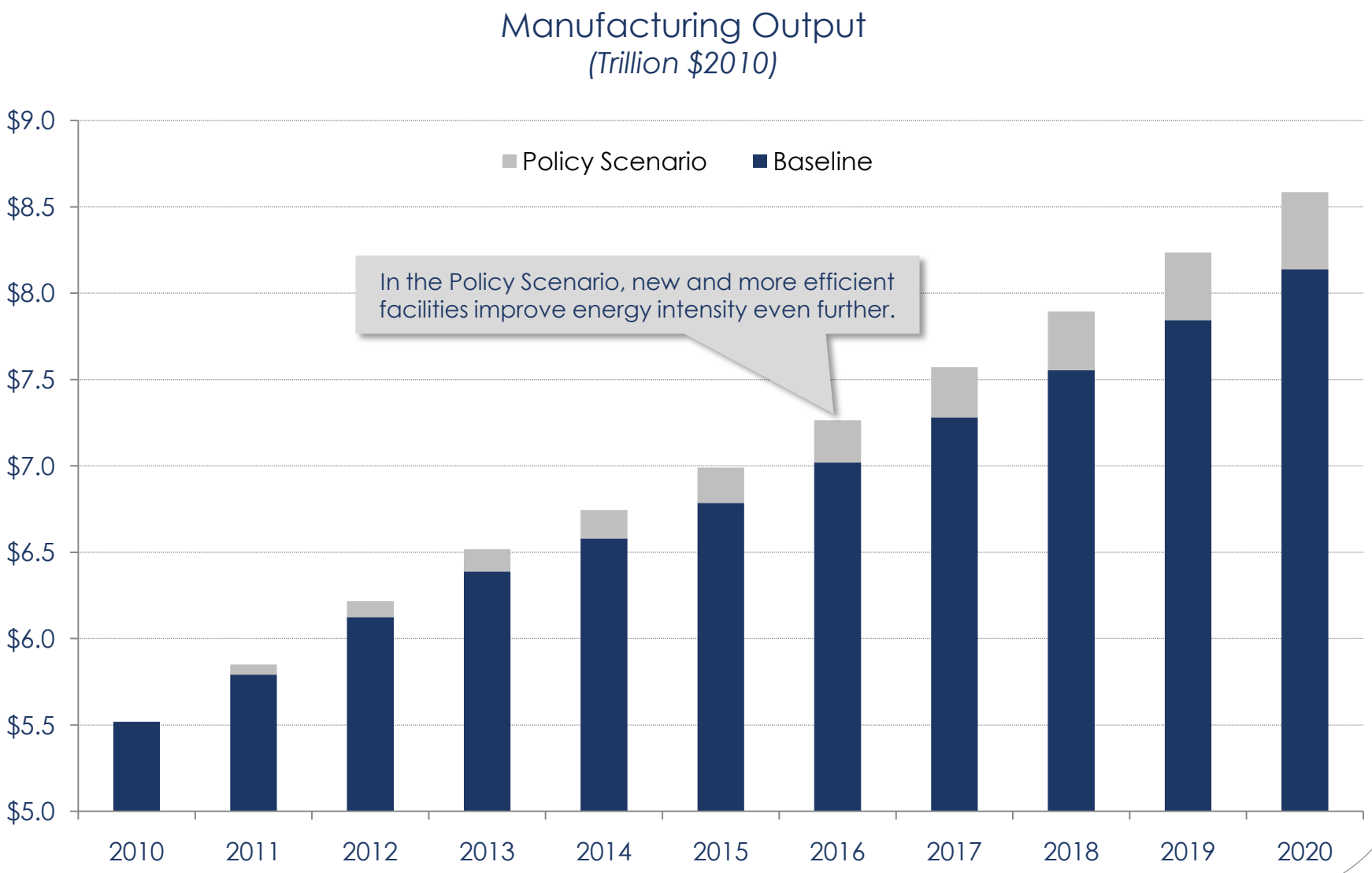
Access to the ITC and LCLP in 2011-2020 is assumed to accelerate energy efficiency retrofits at existing facilities.

Illustrative Example: Energy Efficiency Assumptions for Existing Facilities

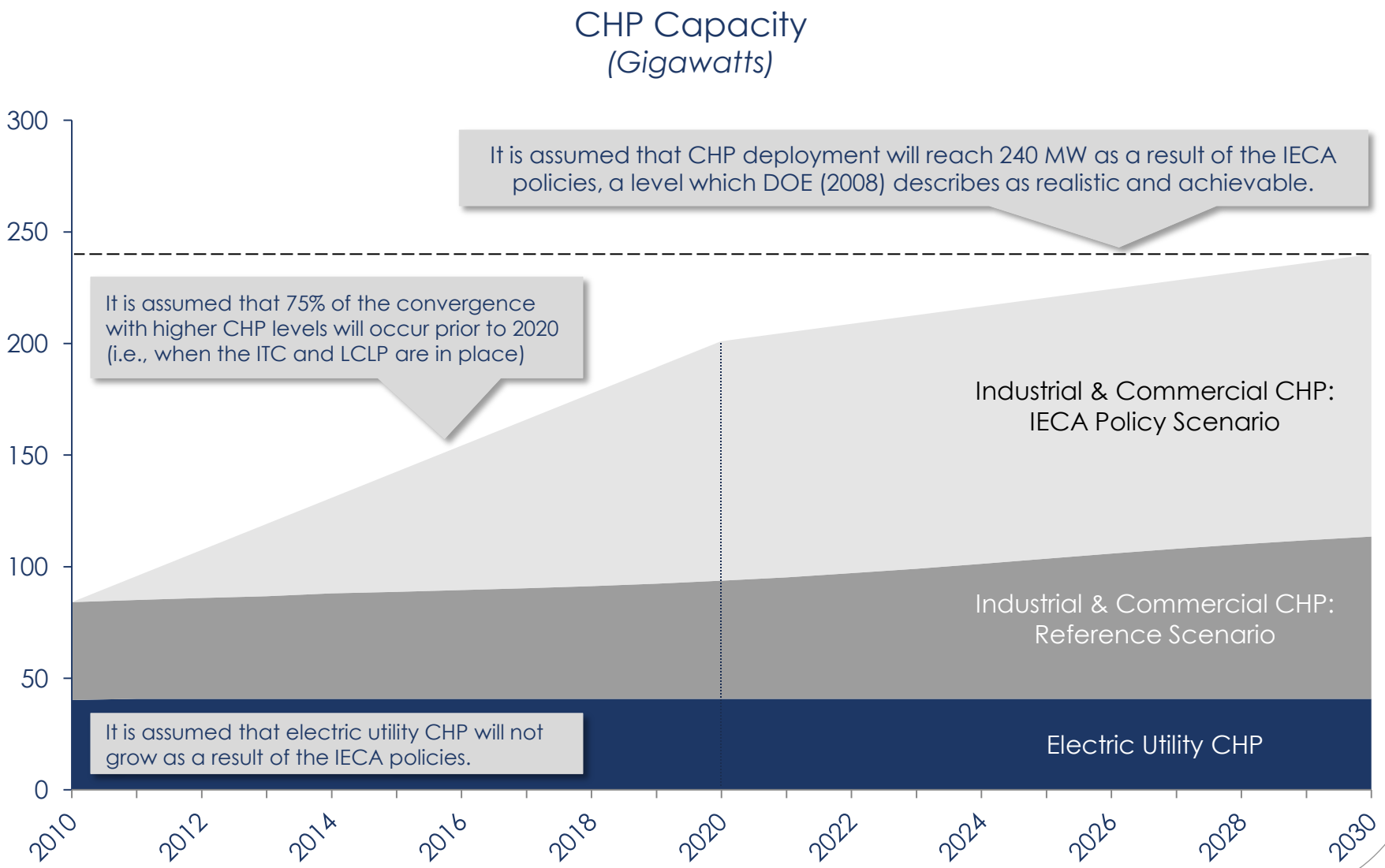
(Relative to Efficiency of 2002 Capital Stock)



Further reductions in energy intensities are assumed to occur as additional output results in the building of new production facilities.



CESOP for CHP and low-cost capital policies are assumed to significantly increase CHP deployment in the IECA Policy Scenario.



Increased CHP deployment was attributed to different industries based on EIA forecasts of untapped heat and steam energy.

CHP Capacity by Industry*
(Gigawatts)

Industry	2010	2020		2030	
		Base Case	Policy	Base Case	Policy
Chemicals	10.0	11.1	45.6	12.2	53.8
Food	1.5	1.8	19.8	2.2	26.7
Lumber	0.4	0.5	12.6	0.6	13.8
Metal products	0.4	0.5	16.1	0.6	17.5
Paper	7.6	9.1	11.0	9.8	11.9
Petroleum refining	4.2	8.7	8.7	22.6	22.6
Plastic products	14.2	14.2	14.2	14.2	14.2
Primary ferrous metals	1.4	1.4	2.5	1.5	2.5
Commercial	2.4	3.5	7.5	6.7	14.1
Electric utilities	40.3	40.8	40.8	40.8	40.8
Other Industries	1.8	2.1	20.1	2.3	21.9
Total	**84.1**	**93.7**	**200.0**	**113.5**	**240.0**

* Estimates based on CHP capital costs and heat rates from the 2010 AEO Assumptions Booklet .

Increased recycled energy deployment is assumed to result in 34 GW of additional electricity capacity from industrial waste energy.

- Based on a 2005 EPA study and additional data provided by Recycled Energy LLC, it is estimated that 34 GW of cost-effective, non-CHP waste energy recovery opportunities will benefit from a CESOP and be deployed by 2030.
- Industries producing electricity with either CHP or recycled energy are assumed to receive payments per kWh equal to the avoided costs of electric utilities, as estimated by the levelized cost of the lowest cost electricity generation technology in a given year, as provided in the 2010 AEO.
- Electricity produced using recycled energy is assumed to use no additional fuel.

Waste Recovery Option	Capacity* (Megawatts)	Capital Costs ($ per kW)
Anaerobic Digestion - Agriculture & Wastewater	1,074	$2,514
Black Liquor Gasification	6,050	$1,375
EPSI - VOC Control	13,500	$2,569
Fuels Cells in the Chlorine-Alkaline Industry	600	$1,927
Gas Recovery - Landfill, Flare, & Blast Furnace Gases	2,139	$1,590
Pressure Recovery - Steam, Natural Gas, & Flare Gas	6,429	$1,848
Waste Heat Recovery	4,127	$2,103
Total	**33,919**	**-**

30 of the 95 GW of recycled energy capacity highlighted in the EPA report are assumed to be additional cost-effective options.

Recycled Energy Technologies and Potential

Waste Recovery Option	Capacity (Megawatts)	Capital Costs ($ per kW)	Modeled industry
Fuels Cells in the Chlorine-Alkaline Industry	600	$1,927	Other Chemicals
Anaerobic Digestion - Agriculture	168	$2,569	Agriculture
Anaerobic Digestion - Municipal Wastewater	872	$2,569	Water and Sanitary Services
Anaerobic Digestion- Industrial Wastewater	34	$822	Multiple Industries
Landfill Gas Recovery	1800	$1,542	Water and Sanitary Services
Back-Pressure Turbine - District Heating	290	$694	Residential
Back-Pressure Turbine - Industry	2100	$694	Multiple Industries
Natural Gas Pressure Recovery Turbines	3800	$2,569	Multiple Industries
Pressure Power recovery	239	$1,927	Multiple Industries
Organic Rankine Cycle	750	$2,569	Multiple Industries
Flare Gas Recovery	260	$1,799	Multiple Industries
Black Liquor Gasification	6050	$1,375	Paper
EPSI - VOC Control	13500	$2,569	Multiple Industries

Capital cost estimates were inflated by 15% and converted into 2010 dollars.

3.5 GW of additional waste heat recovery opportunities were identified by Recycled Energy Development, LLC.

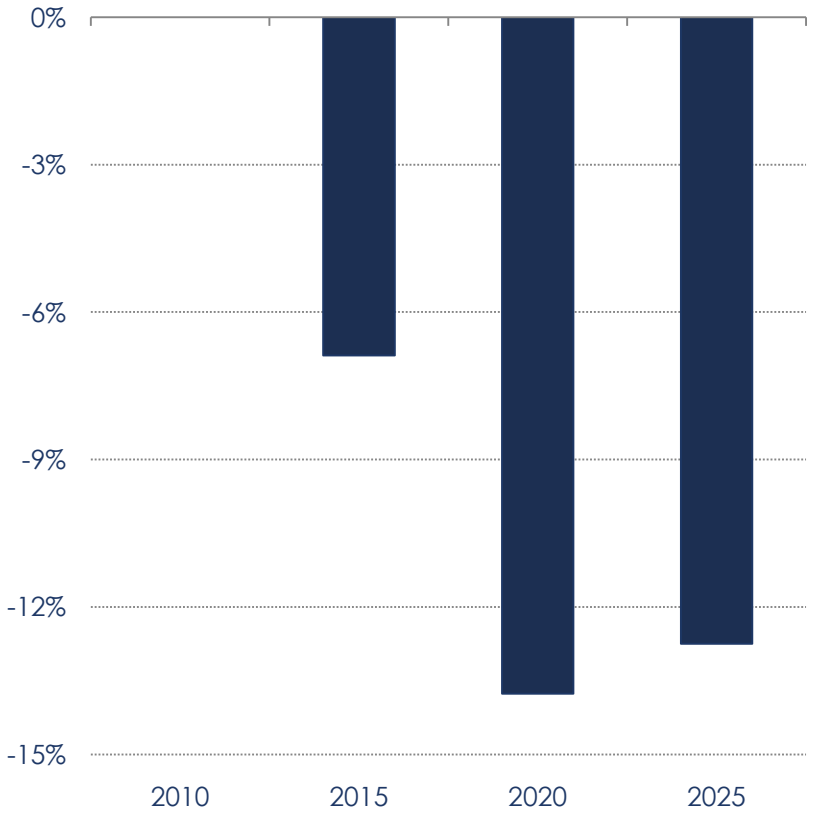
Recycled Energy Technologies and Potential

Waste Recovery Option	Capacity (Megawatts)	Capital Costs ($ per kW)	Modeled industry
Waste Heat Recovery from:			
Cement Kiln Preheater & Cooler	309	$2,000	Stone, Clay, & Glass
Lime Kiln	272	$2,000	Stone, Clay, & Glass
Glass Furnace Exhaust	75	$2,000	Stone, Clay, & Glass
Steel - Evaporative EAF cooling	85	$2,000	Primary Ferrous Metals
Natural Gas Compression Station Exhaust	2636	$2,000	Gas Utilities
Steel – Blast Furnace Gas Recovery	79	$2,000	Primary Ferrous Metals

Narrow reform of New Source Review is assumed to enable many of the improvements in energy efficiency discussed above.

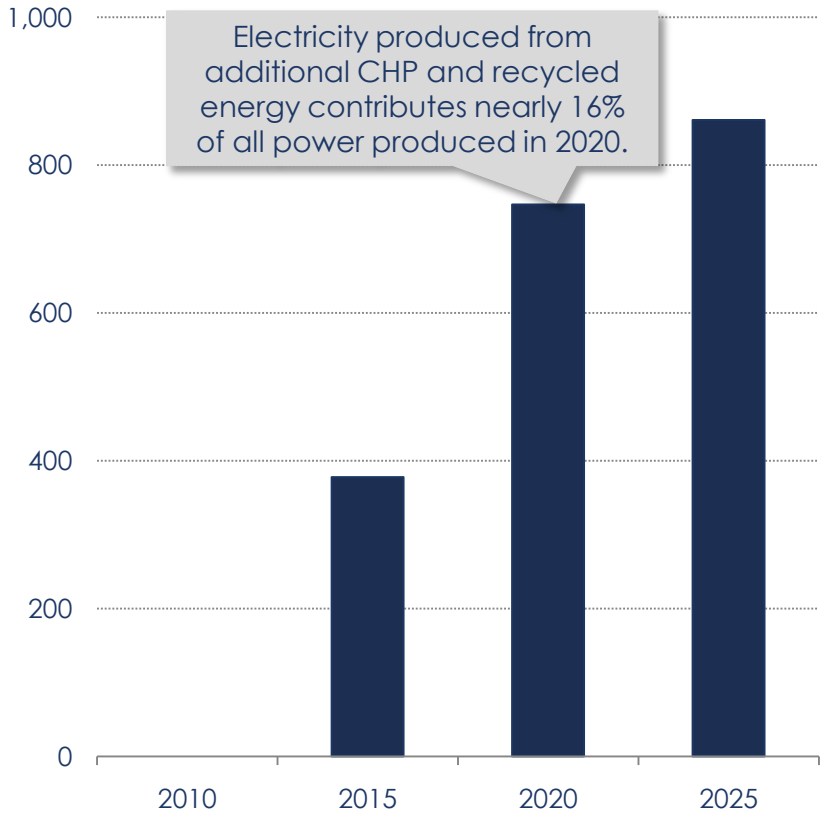
Energy Intensity in Manufacturing Processes in the IECA Policy Scenario

(Change Relative to Baseline, Percent)



Electricity Production from Industrial CHP & Recycled Energy in the IECA Policy Scenario

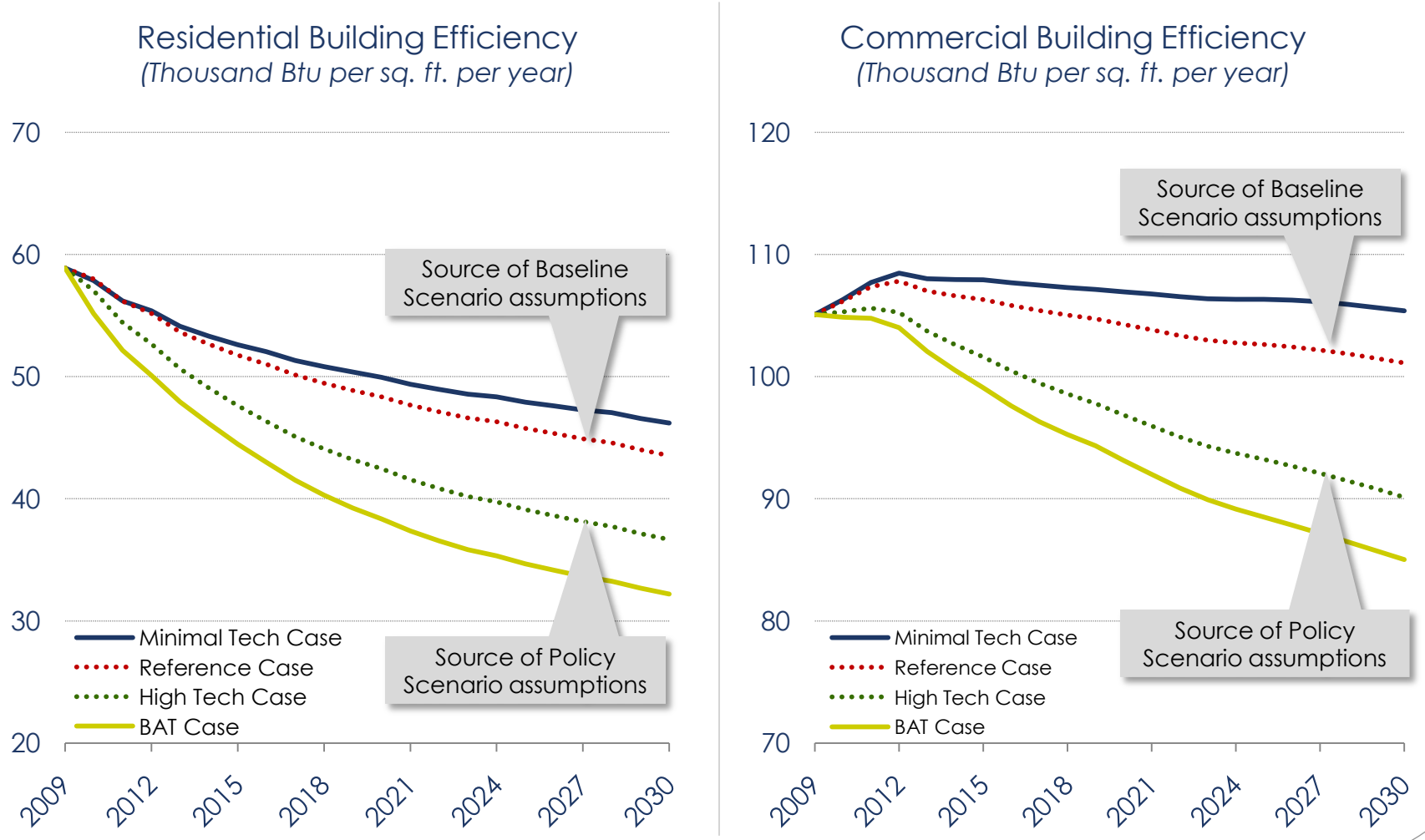
(Change Relative to Baseline, Billion kWh)



IECA estimates that, in the absence of reform, the administrative burden of NSR would delay increases in technology deployment by an average of 18-24 months and also prevent many otherwise cost-effective projects from ever being undertaken.

Building efficiency assumptions from two cases in the 2010 AEO are used as inputs for the Baseline and IECA Policy Scenarios.

Building Efficiency Projections by AEO 2010 Scenario



It is assumed that IECA's policies push building efficiency from EIA's Reference Case trajectory to its High Technology Trajectory.

Residential Building Efficiency
(Thousand Btu per sq. ft. per year)

Year	Electricity Use		Direct Fuel Use	
	Baseline	Policy	Baseline	Policy
2009	24.7	24.7	34.2	34.2
2015	22.3	20.5	29.4	27.1
2020	21.3	19.0	27.0	23.5
2025	20.8	18.2	25.0	21.0
2030	20.4	17.7	23.2	19.0

Notes: In the Baseline Scenario, residential energy efficiency improves by 18% over 2009-2020. In the IECA Policy Scenario, residential energy efficiency improves by 28% in the same period.

Commercial Building Efficiency
(Thousand Btu per sq. ft. per year)

Year	Electricity Use		Direct Fuel Use	
	Baseline	Policy	Baseline	Policy
2009	56.5	56.5	48.6	48.6
2015	58.8	55.8	47.5	45.8
2020	58.9	53.9	45.4	42.9
2025	59.0	52.3	43.6	40.9
2030	59.3	50.9	41.9	39.2

Notes: In the Baseline Scenario, commercial energy efficiency improves by 1% over 2009-2020. In the IECA Policy Scenario, commercial energy efficiency improves by 8% in the same period.

APPENDIX C:
IECA Policy Recommendations

A key element of the proposal is an investment tax credit for projects that improve energy efficiency or reduce GHG emissions.

Policy Recommendation #1: Investment Tax Credit

Policy Action	*Establish a 30% investment tax credit (ITC) for capital projects that improve energy efficiency or reduce GHG emissions.*
Purpose	*The ITC provides strong incentives for manufacturers to invest in energy efficiency enhancing projects, improving the competitiveness of their U.S.-based facilities and reducing GHG emissions.*
Program Duration	*10 Years.*
Public Investment	*$100 billion in tax credits over the 10-year period.*
Private Investment	*$233 billion in matching private sector investments over the 10-year period.*
Program Eligibility	*Available to manufacturing facilities in the U.S. that undertake capital project investments to: (1) improve energy efficiency, and/or (2) reduce GHG emissions. Cannot be used for projects already utilizing the low-cost loan program discussed below.*
Other Features	*Unused tax credits carried forward, but limited to a 20-year life; Tax credits transferrable to parties associated with the project; Requires quantification of energy efficiency improvement, GHG emissions reduction, and potential jobs created in first three years of the project; U.S. Treasury required to report annually to Congress on program performance.*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

The proposal complements the ITC with a low-cost loan program for manufacturers that may not benefit from tax credits.

Policy Recommendation #2: Low-Cost Loan Program

Policy Action	*Establish a loan program that provides access to low-cost capital for investments that improve energy efficiency or reduce GHG emissions.*
Purpose	*The low-cost loan program also provides strong incentives for manufacturers to invest in energy efficiency enhancing projects, improving the competitiveness of their U.S.-based facilities and lowering GHG emissions.*
Program Duration	*10 Years.*
Public Investment	*$210 billion in public sector financing made available over the 10-year period; Direct cost to the federal government depends on default rate (e.g., $0 assuming 0% default rate; $21 billion assuming a 10% default rate).*
Private Investment	*Up to $280 billion in private sector finance over the 10-year period: $70 billion in matching private sector investments under requirement that company commits $0.25 to a project for every $0.75 borrowed plus $210 billion less defaulted loan amounts.*
Program Eligibility	*Available to manufacturing facilities in the U.S. that undertake capital project investments to: (1) improve energy efficiency, and/or (2) reduce GHG emissions. Cannot be used for projects already utilizing the 30% tax credit program discussed above.*
Other Features	*Interest rates equal to 10-year Treasury yield at the time of approval; No payment requirement in first four years, with accumulated interest added to total repayment costs; Cannot be used for acquisitions; Borrowers must meet a minimum credit worthiness standard equal or greater than an S&P credit rating of BB or a Moody credit rating of Ba2 to qualify; Maximum loan amount of $200 million per company; Requires quantification of energy efficiency improvement, GHG emissions reduction, and potential jobs created in first three years of the project; U.S. Treasury required to report annually to Congress on program performance.*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

The IECA proposal calls for a "Clean Energy Standard Offer Program" for commercial and industrial CHP.

Policy Recommendation #3: CESOP for Combined Heat & Power (CHP)

Policy Action	*Establish a Clean Energy Standard Offer Program (CESOP) for CHP projects.*
Purpose	*The CESOP removes barriers to investments in combined heat and power, a process that could significantly reduce the amount of energy that gets wasted through the production of power and heat in separate processes.*
Program Duration	*20 year CESOP contracts.*
Program Eligibility	*CHP facilities must maintain an effective electric efficiency standard of at least 60% for natural gas fired facilities and 50% for solid fuels.*
Operating Standards	*Plants must provide at least 80% of name plate capacity during peak demand hours. Energy efficiency requirements must be met and verified by a third party. If either energy efficiency or capacity requirements are unmet, capacity rates paid for the plant's electricity output will be reduced.*
Compensation	*Qualifying CHP plants will receive annual fixed payments per MW of capacity equal to the avoided costs of new utility or merchant plants using similar fuel and combustion technology. Additional payment per MWh, equal to the avoided operating costs associated with a new utility plant, will also be made.*
Other Features	*CHP facility power must be accepted when available.*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

The IECA proposal also calls for a "Clean Energy Standard Offer Program" for recycled energy projects.

Policy Recommendation #4: CESOP for Recycled Energy

Policy Action	*Establish a Clean Energy Standard Offer Program (CESOP) for recycled energy projects.*
Purpose	*The CESOP removes barriers to investments in recycled energy projects that capture and make use of energy that would otherwise be wasted.*
Program Duration	*20 year CESOP contracts for power sales and back-up power purchase agreement*
Program Eligibility	*Projects that recover energy for sale or use.*
Operating Standards	*Plants that produce electricity for sale must operate to recover at least 80% of their design recoverable energy annually and during peak demand hours.*
Compensation	*In competitive markets, any excess power shall be sold at wholesale market rates. In regulated markets, the host utility avoided cost for power in accordance with PURPA shall be paid and rates for back-up power shall be without demand or stand-by charges.*
Other Features	*Recycled energy facility power must be accepted when available.*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

The IECA proposal aims to catalyze and accelerate investment by narrowly reforming New Source Review requirements.

Policy Recommendation #5: Reform of New Source Review

Policy Action	*Narrowly reform New Source Review (NSR) to exempt energy efficiency projects in the manufacturing sector.*
Purpose	*This reform will remove regulatory barriers that would otherwise prevent or delay investments in energy efficiency projects.*
Program Eligibility	*Projects at existing U.S. manufacturing facilities that: (1) improve energy efficiency, and/or (2) reduce GHG emissions intensity. Specifically, where projects at existing manufacturing facilities improve energy efficiency, Sections 111 (New Source Performance Standards), 165 (Prevention of Significant Deterioration), and 173 (non-attainment NSR) of the Clean Air Act shall not apply.*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

Other elements of the proposal aim to improve capital investment conditions by reducing regulatory costs and uncertainty.

Policy Recommendation #6: Preemption of EPA Clean Air Act Regulation

Policy Action	*Preempt EPA regulation of GHG emissions in the manufacturing sector under the Clean Air Act*
Purpose	*For the US to compete for capital globally, the U.S. must provide an improved investment environment. One such key determinant is regulatory costs. Regulating GHG emissions under the Clean Air Act would add significant costs to domestic manufacturing processes and negatively impact competitiveness and jobs. Costly US GHG regulations, relative to foreign countries, will shift investment and jobs to other countries.*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

Other policies can ensure against the costs and unpredictability of Congressional action on GHG emissions.

Policy Recommendation #7: *Allow Banking of GHG Emissions Reductions*

Policy Action	*Allow all direct and indirect GHG emissions reductions from this program to be bankable for potential application to future regulatory regimes.*
Purpose	*Regulating GHG emissions could add significant costs to domestic manufacturing processes and impact relative competitiveness and jobs . Allowing for the banking of GHG emissions reductions in the manufacturing sector provides assurances that they will not be disadvantaged competitively for the investments that they make in advance of any regulatory regime.*
Other Features	*Emissions reductions should be bankable to the EPA GHG registry and applicable to all future regulations to reduce GHGs*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

The policy package also encourages manufacturers to make investments in new and unproven energy efficiency equipment .

Policy Recommendations #8: Technology RD&D

Policy Action	*Full expensing of capital expenditures for high-risk research, development, and deployment (RD&D) projects.*
Purpose	*Allowing manufacturing companies to immediately write-off any capital expenditure for high risk, high-impact projects encourages capital investment in areas that may not otherwise occur.*
Program Duration	*10 years*
Public Investment	*Forgone tax revenues equal the value high risk-long term investments.*
Program Eligibility	*All manufacturing industries investing shall be eligible for full expensing of capital investments for high risk-long term RD&D projects with strong potential to demonstrate significant energy use or GHG emissions reductions beyond what is possible using commercially available technologies.*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

The policy package also supports increases in government funding for R&D in high-risk, high-impact technologies.

Policy Recommendations #9: Increase DOE Industrial Technology Program Funding

Policy Action	*Increase DOE Industrial Technologies Program R&D funding for energy intensive industries to develop break-thru next generation technology.*
Purpose	*The energy efficiency of many manufacturing technologies has plateaued and the costs of developing next generation technologies are too expensive for any one company to develop. The DOE Industrial Technology Program overcomes this hurdle while leveraging private sector dollars with federal funding. The policy package significantly increases funding for this program in order to encourage faster development of break-through technologies.*
Program Duration	*10 years*
Public Investment	*Gross funding of DOE Industrial Technology Program of $5.9 billion in 2011-2020: $500 million in FY 2011 increasing at 3.95% per year until 2020 (Note: current funding levels are approximately $100 million).*
Program Eligibility	*The DOE Industrial Technology Program will primarily support research in energy-intensive industries that represent the building block products from which other products are manufactured such as chemical, steel, paper, cement, and aluminum.*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

Finally, the IECA proposal calls for energy efficiency standards for new and existing homes and commercial buildings.

Policy #10: Energy Efficiency Building Standards

Policy Action	*Strengthen building standards to improve energy efficiency in new and existing residential homes and commercial buildings, per S. 1462*
Purpose	*Improving the efficiency of energy use using available cost-effective technologies helps to reduce the cost of energy throughout the economy resulting in stronger economic outcomes.*
Program Duration	*n/a*
Public Investment	*$50 million in federal funding over one fiscal year to states for code development and implementation; $100 million in federal funding to states over four years in additional funding*
Federal Action	*Department of Energy will update residential and commercial building codes every three years to achieve energy savings of 50% by 2016 – relative to existing codes.*
State Action	*Issue report by 2011 advising the federal government of progress made toward bringing state building standards in compliance with federal standards.*
Other Features	*New residential and commercial codes must be technologically feasible and be cost effective on a life-cycle basis; States are determined to be in compliance when 90% of new buildings meet or exceed federal efficiency standards; Federal assistance will be provided to states for designing and implementing state codes, as well as training and enforcement programs.*

Source: Industrial Energy Consumers of America (March 2010). *IECA Industrial Climate/Energy Legislative Policy*.

APPENDIX D:
Data Sources & References

DATA SOURCES & REFERENCES (1/2)

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APPENDIX E:
The Inforum Long-term Inter-industry Forecasting Tool (LIFT)

LIFT MODEL DESCRIPTION (1/2)

The Inforum Long-term Interindustry Forecasting Tool is unique among large-scale models of the U.S. economy. Containing full demand and supply accounting for 97 productive sectors, LIFT combines an interindustry (input-output) formulation with extensive regression analysis. The result is a "bottom-up" approach in which macroeconomic variables (e.g., employment, investment, exports) are not determined directly, but are computed as the sum of their parts (e.g., employment by industry, investment by industry, exports by commodity). This bottom-up technique possesses several desirable properties for analyzing the U.S. economy:

(1) The model works like the actual economy, building the macroeconomic totals from details of industry activity, rather than distributing predetermined macroeconomic quantities among industries.

(2) The model describes how changes in one industry affect related sectors and the aggregate quantities.

(3) Parameters in the behavioral equations differ among products, reflecting differences in consumer preferences, price elasticities in foreign trade, and industrial structure.

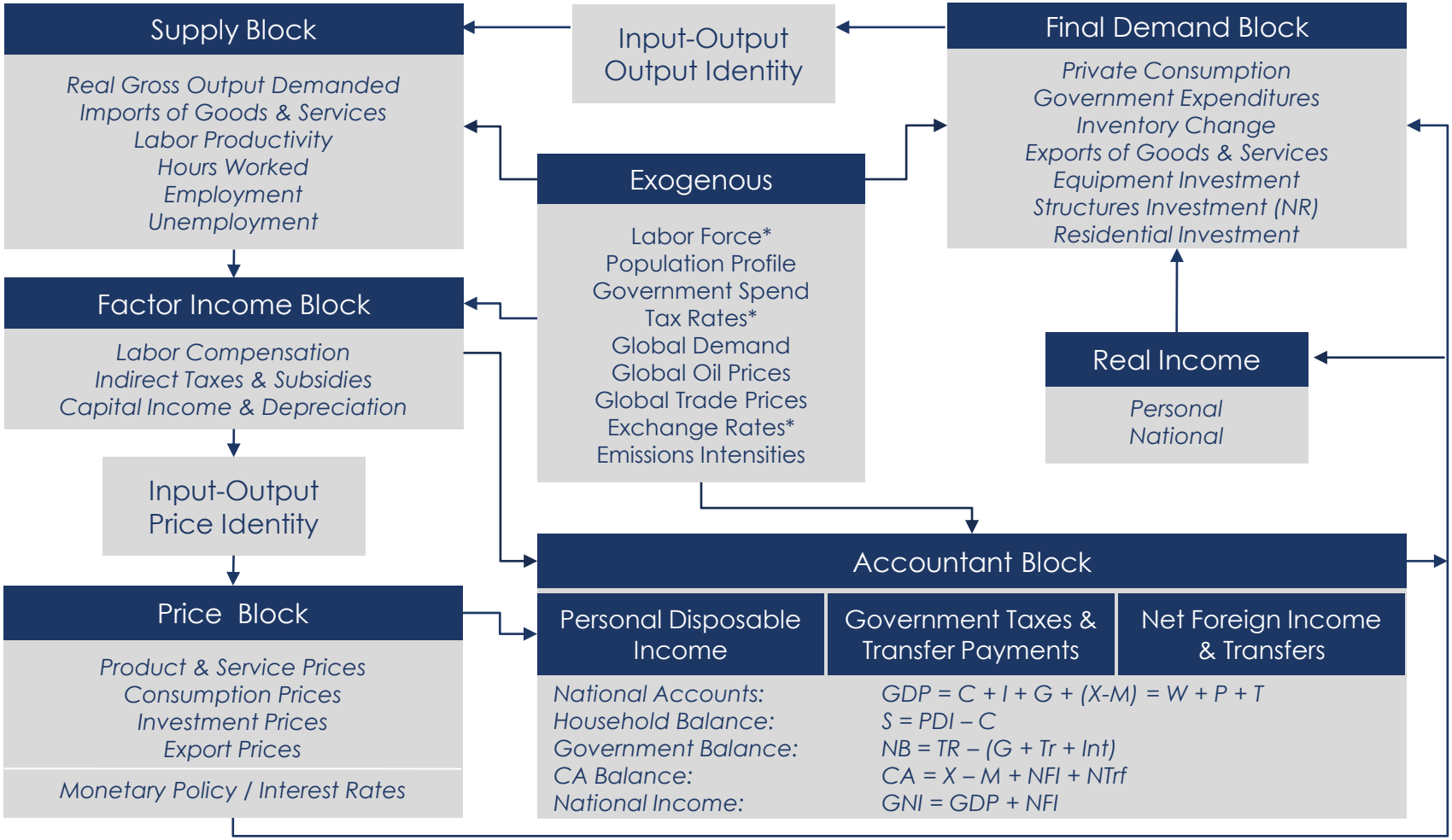
(4) The detailed level of disaggregation permits the modeling of prices by industry, allowing one to explore the causes and effects of relative price changes.

Despite its industry basis, LIFT is a full macroeconomic model, with more than 800 macroeconomic variables determined consistently with the underlying industry detail. This macroeconomic "superstructure" contains key functions for household savings behavior, interest rates, exchange rates, unemployment, taxes, government spending, and current account balances. In addition, LIFT is linked to the Inforum Bilateral Trade Model (BTM), which includes similar models for various countries (e.g., Japan, China, major European economies) — enabling the estimation of U.S. exports and imports based on responses to sectoral-level demand and price variables within the economies of major U.S. trading partners.

Given the combination of this unique bottom-up approach with a consistent macroeconomic superstructure, LIFT is particularly well suited to quantify the impacts associated with economic shocks, public policies, and other events that alter the composition of consumption, production, trade, and employment as the economy evolves over time.

LIFT MODEL DESCRIPTION (2/2)

The University of Maryland Inforum LIFT Model: Structure



** Variable can be endogenized depending on application.*

APPENDIX F:
About the Authors

KEYBRIDGE RESEARCH

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Keybridge Research LLC is a Washington DC based international economics and public policy consulting firm. Keybridge provides analytical support and strategic advice to a select clientele that includes Fortune 500 companies, global financial firms, G-7 governments, and premier industry associations. Keybridge's experience and expertise make it uniquely suited to assist organizations that operate at the interface of business, economics, and public policy.

Keybridge provides clients with access to a full suite of analytical services, including macroeconomic risk assessments, econometric modeling studies, policy impact studies, qualitative policy evaluations, and survey design and analysis. For clients requiring regular consultations, Keybridge offers on-going strategic advisory services in the areas of macroeconomic trends and risks, international trade and finance, and energy and environmental economics. Keybridge also assembles and manages inter-disciplinary teams of experts to conduct thought leadership projects to assist clients with building competitive advantages or reframing policy debates through the development, sharing, and application of innovative ideas. The firm's principals are regularly asked to present research and share insights with economic, financial, and policy audiences around the world, including corporate strategic planning committees, congressional committees, and international conferences.

KEYBRIDGE PROJECT TEAM MEMBERS

Dr. Robert F. Wescott (Principal Investigator), is President of Keybridge Research LLC. Dr. Wescott has nearly 30 years of professional experience working on macroeconomic and public policy issues. 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 IHS Global Insight), 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.

Mark W. McNulty is Director of Economic & Policy Analysis at Keybridge Research LLC and leads the firm's energy and environment practice. Before joining Keybridge, Mr. McNulty served as a consultant for U.S. financial institutions and rural development organizations, where he designed and implemented financial products tailored to the needs of low-income consumers. From 2000-2001, he served as the Staff Assistant for International Economics at the White House's National Economic Council, where he was responsible for research and analysis on global economic and financial risks. Mr. McNulty holds a B.A. in Business Administration & Economics from Rhodes College and a Masters in Public Policy from Harvard's Kennedy School of Government.

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Founded in 1967, the Interindustry Forecasting Project at the University of Maryland (Inforum) is dedicated to improving business planning, government policy analysis, and the general understanding of the economic environment. Working with government and private sector research sponsors, Inforum constructs and applies economic models to investigate a variety of issues, including energy and environmental public policies. Inforum is widely recognized as a pioneer in the construction and application of dynamic, interindustry macroeconomic models which portray the economy in a unique "bottom-up" fashion, and economic analyses using Inforum econometric models are distinguished by detail at the industrial and product level.

Inforum researchers explore economic phenomena and principles in a nonpartisan fashion, according to generally accepted economic theory and econometric methods, regardless of the implications for public policy or private strategy. It is known for it proficiency with specific economic data and methodologies, especially for industry-level data, input-output techniques, global data sets, international comparisons, and modeling software. Using this expertise Inforum also builds industrial forecasting and "satellite" models to connect data for more detailed sectors to a more aggregated environment. Indeed, many sponsors use Inforum software and models on their computers for routine analysis or issue-specific research.

INFORUM PROJECT TEAM MEMBERS

Dr. Jeffrey Werling is Executive Director of Inforum. In addition to managing the day-to-day activity at Inforum, he serves as principal investigator for special projects applying Inforum modeling systems. He has completed recent studies on the economic implications of energy policy, climate policy, immigration, exchange rate fluctuations, and port disruptions due to terrorist strikes. Dr. Werling also teaches undergraduate courses in economic development. Previously, he held positions as an international and industry economist with the Manufacturers Alliance (MAPI), and the WEFA Group (now IHS Global Insight). He hold a Ph.D. in economics from the University of Maryland.

Dr. Douglas Meade is Research Director at Inforum. He had over 20 years experience with economic modeling and data development. He returned to Inforum in 2006 after serving three years as Deputy Chief of the Industry Division at the Bureau of Economic Analysis (BEA). Before working for BEA, Dr. Meade contributed significantly to the development of the Inforum Lift, Iliad and DEPPS models for the U.S., and the Jidea model for Japan. He has served as principal investigator on a wide variety of projects for private sector and government clients, especially studies concerning energy and environmental issues. He is currently Inforum's representative with the Energy Modeling Forum (EMF) at Stanford University. He has also held positions at Data Resources Inc. (now IHS Global Insight), and the Bureau of Census. Dr. Meade holds a Ph.D. from the University of Maryland.