

KEVIN BOOK
MANAGING DIRECTOR



GLOBAL POLICY AND TECHNOLOGY DRIVERS

*EPRI Energy and Climate
Change Research Seminar
May 21, 2013*

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- ▼ We focus exclusively on U.S. and international energy and environmental policy.
- ▼ Our coverage of fuels, technologies and issues includes:
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 - Alternative power and efficiency
 - Climate change and emissions
 - Geopolitical risk and international policy
 - Oil, natural gas and refined products
 - Power generation, coal mining and nuclear power
 - Electric transmission and power markets
 - Natural gas, oil and refined product pipelines
 - U.S. energy policy, economics and tax policy.



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Risks

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I hereby certify that the views expressed in this presentation accurately reflect my personal views as of the date of this presentation.

I further certify that no part of my compensation was, is or will be directly or indirectly related to the specific recommendations or views contained in this presentation.

By: *Kevin D. E. Book*

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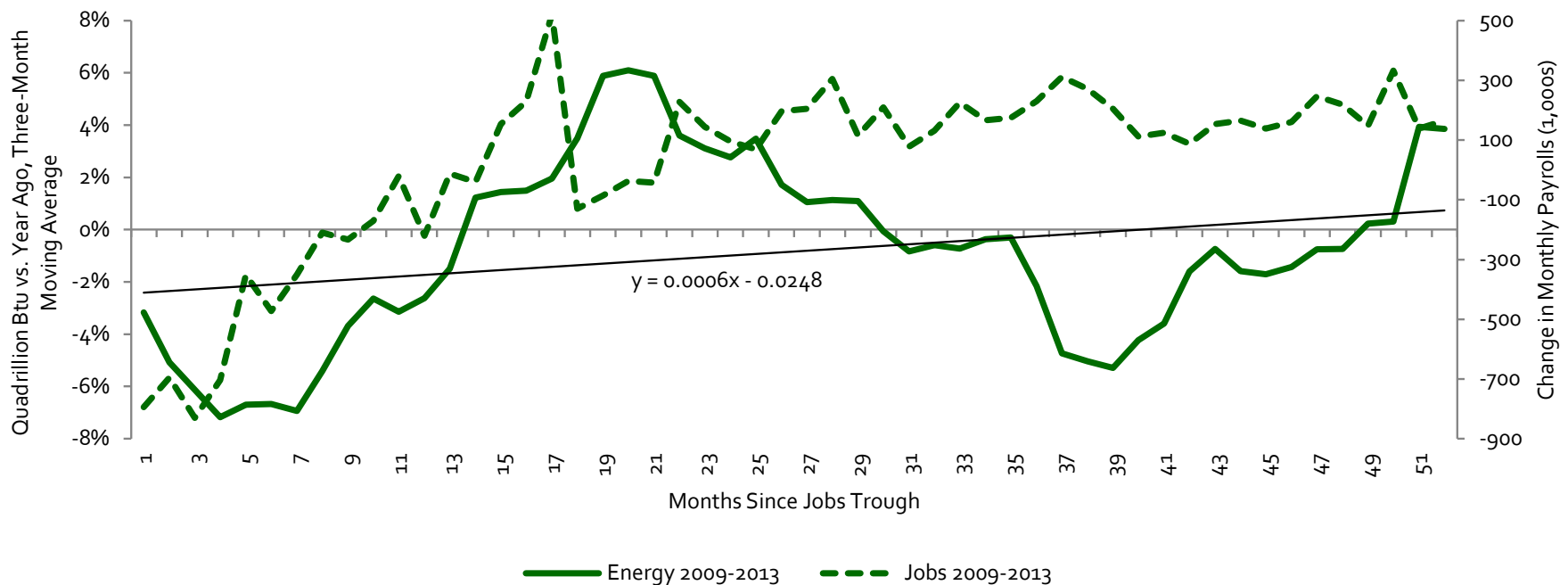
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OVERVIEW



- ▼ A Grim Demand Reality
- ▼ The Economic Case for Efficiency
- ▼ The Political Case for Efficiency
- ▼ Price-Sensitive Generators and the Fuel Fight
- ▼ Upside Risks to Gas Price?

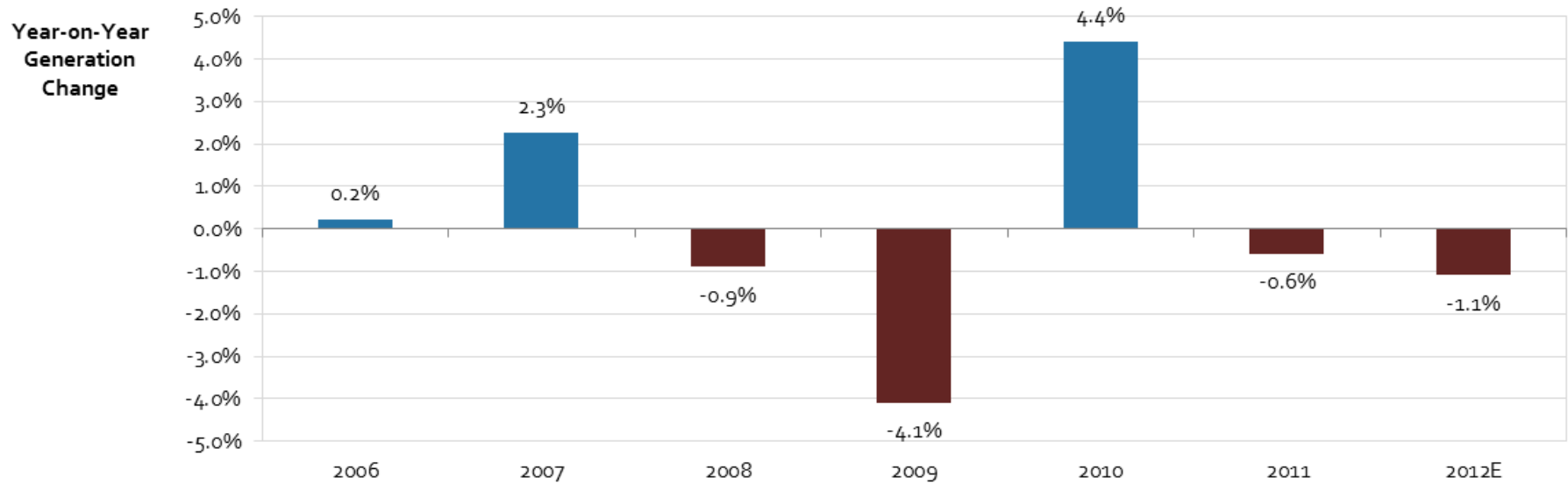
WELCOME TO THE LOW-ENERGY RECOVERY: JOB GAINS OUTPACE ENERGY CONSUMPTION GROWTH



Source: ClearView Energy Partners, LLC using BLS and EIA data

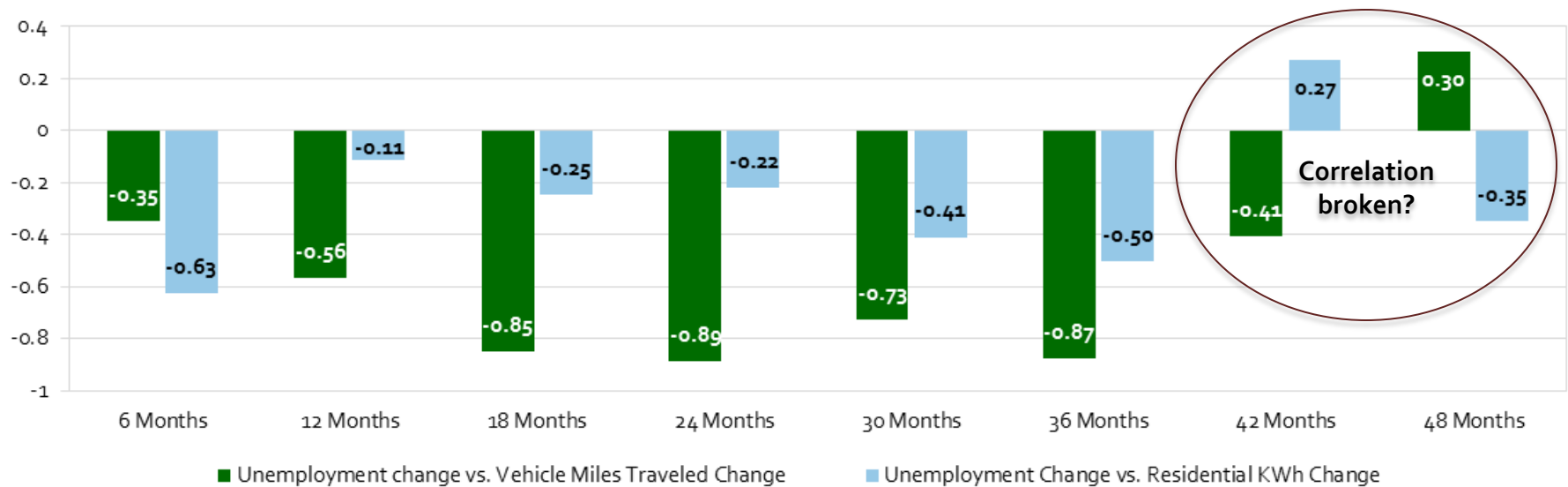
LESSONS FROM 2012: THIS IS NOT NEWS

GENERATION HAS BEEN DOWN 4 OUT OF PAST 5 YEARS



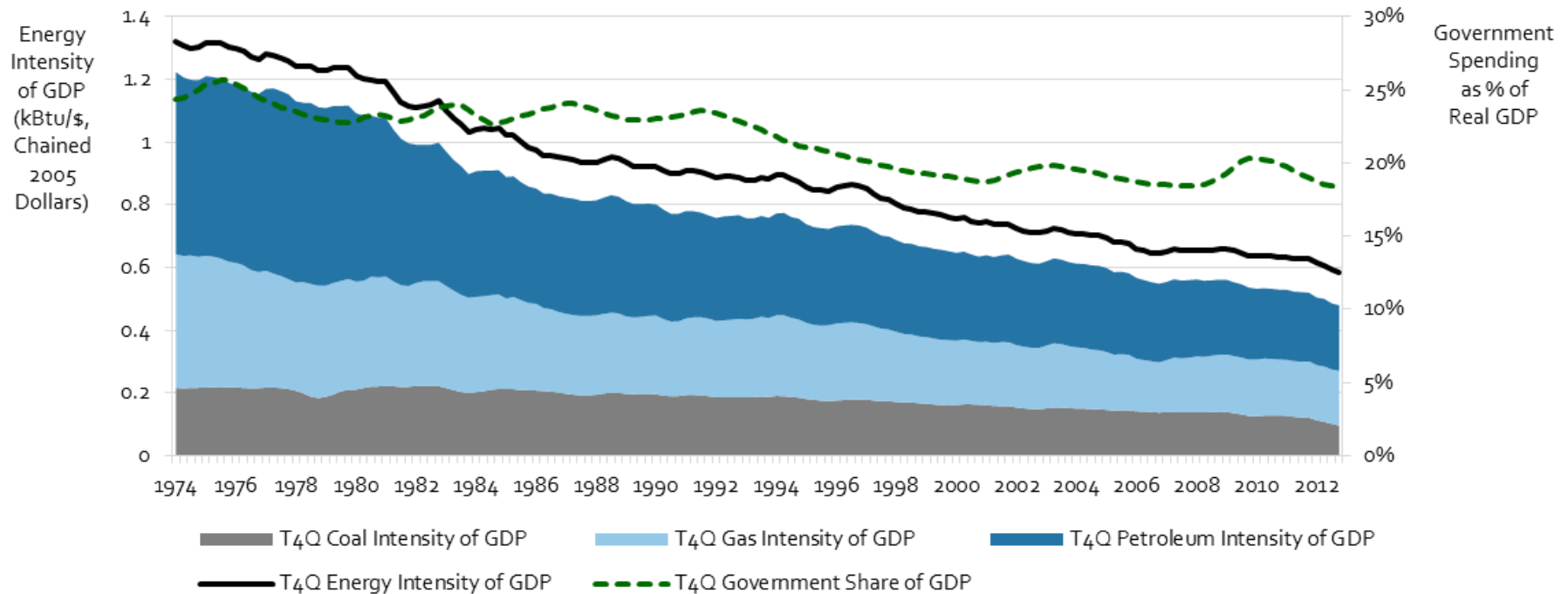
Source: ClearView Energy Partners, LLC using EIA data

2009-2012 CORRELATION BETWEEN Δ UNEMPLOYMENT AND Δ VMT/ Δ kWh (RESIDENTIAL) IN TEN HARDEST-HIT STATES



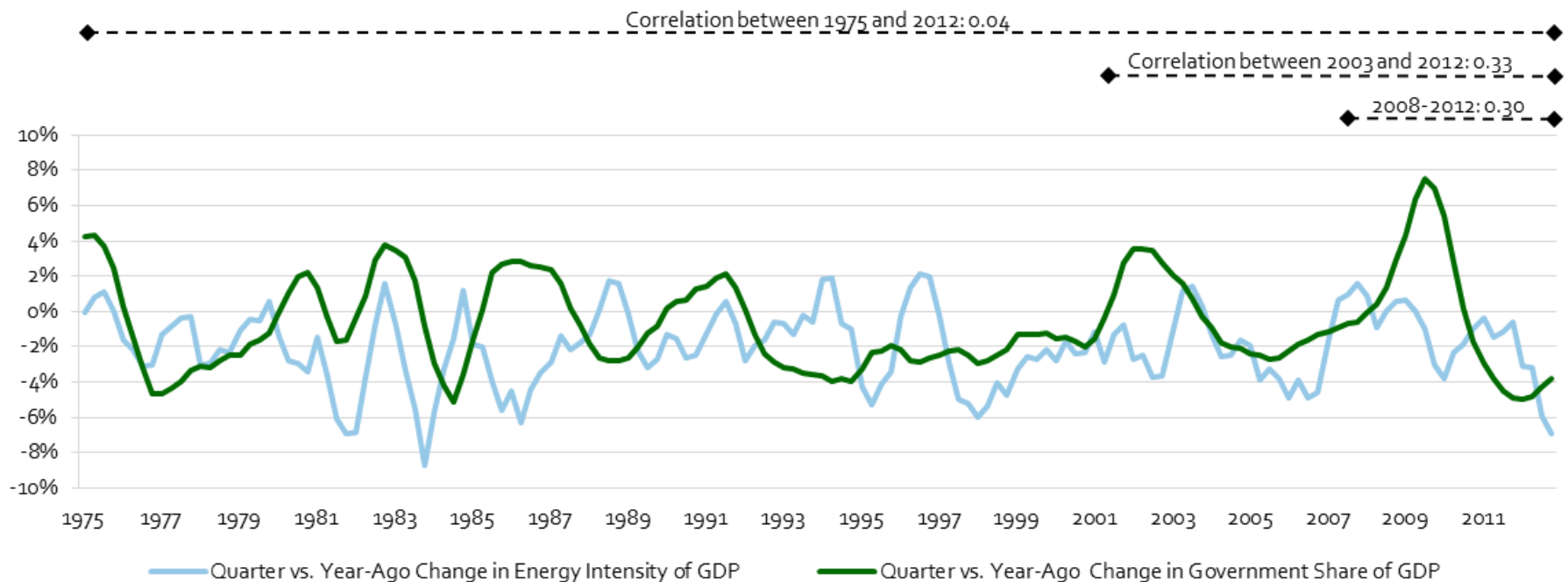
Source: ClearView Energy Partners, LLC, using BLS and EIA data

ENERGY INTENSITY OF GDP VS. GOVERNMENT SHARE OF GDP, BY FUEL, 1974-2012, TRAILING FOUR-QUARTER (T4Q) BASIS



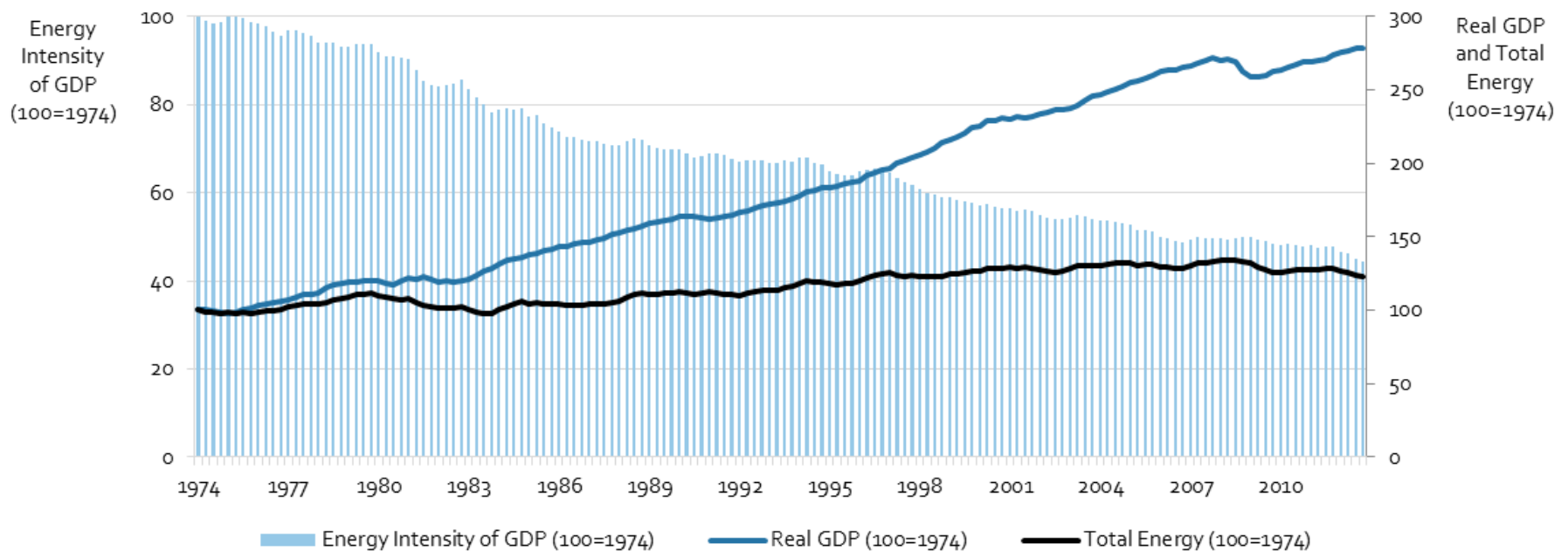
Source: ClearView Energy Partners, LLC, using BEA and EIA data

CHANGES IN ENERGY INTENSITY OF GDP AND GOVERNMENT SHARE OF GDP ARE ESSENTIALLY UNCORRELATED



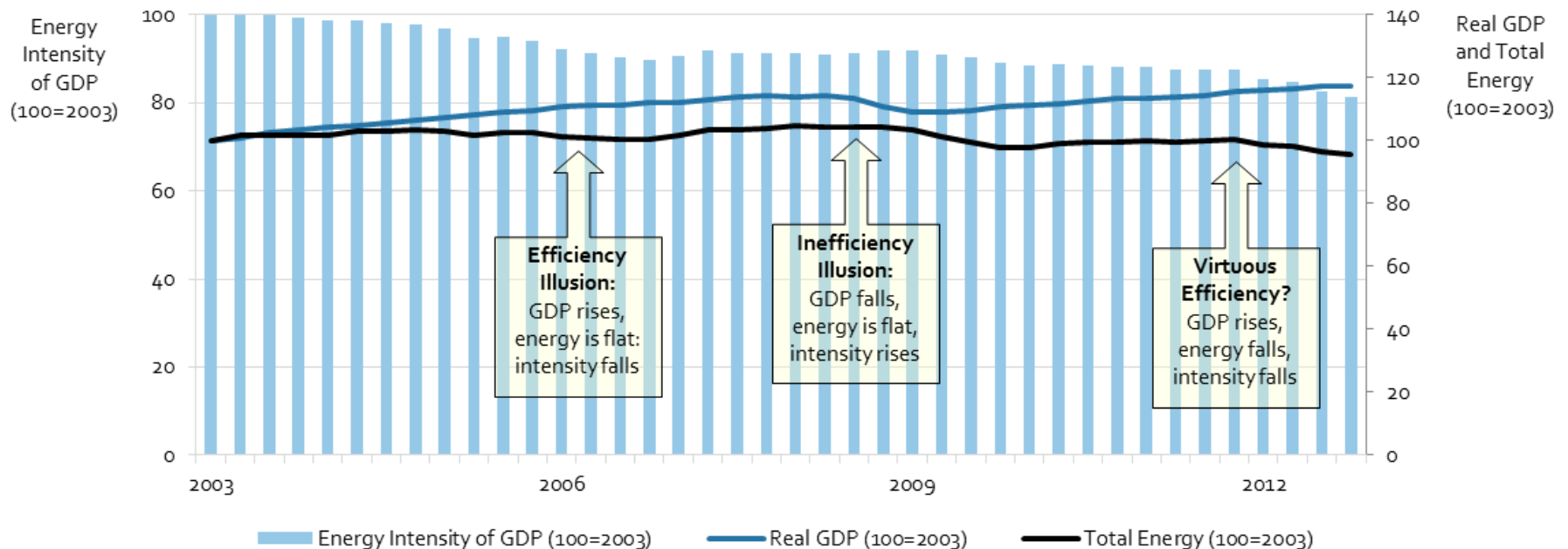
Source: ClearView Energy Partners, LLC, using BEA and EIA data

DEPARTMENT OF THE OBVIOUS: WHEN GDP RISES FASTER THAN ENERGY CONSUMPTION, ENERGY INTENSITY OF GDP FALLS



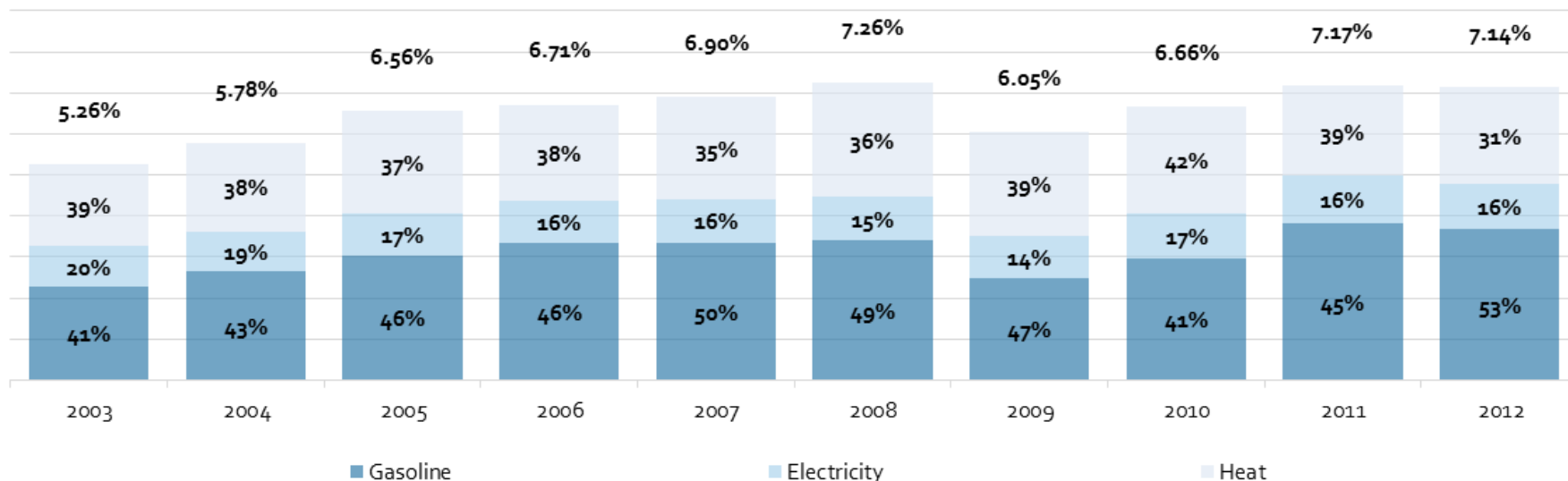
Source: ClearView Energy Partners, LLC, using BEA and EIA data

EFFICIENCY ILLUSIONS, INEFFICIENCY ILLUSIONS AND THE ADVENT OF VIRTUOUS EFFICIENCY GAINS?



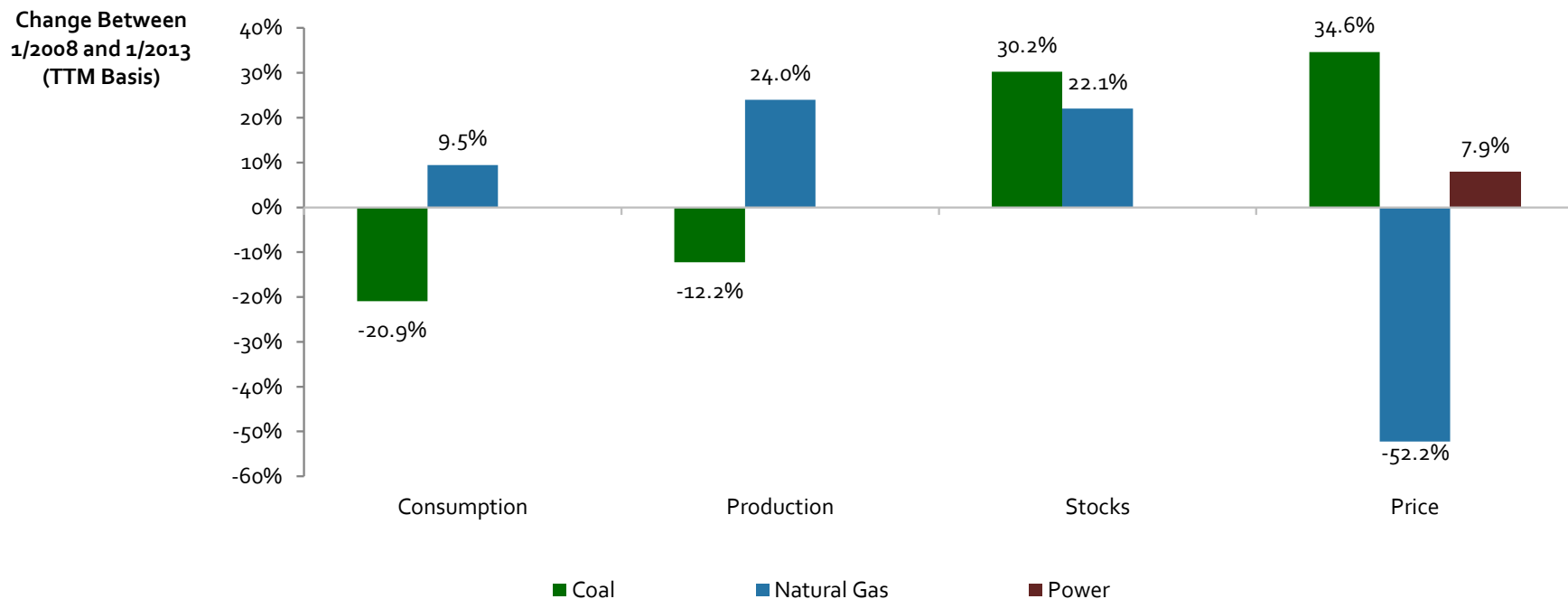
Source: ClearView Energy Partners, LLC, using BEA and EIA data

CONSUMER ENERGY LEVERAGE BY COMPONENT: A DECADE OF SPENDING MORE AT THE PUMP, LIGHT SWITCH AND THERMOSTAT



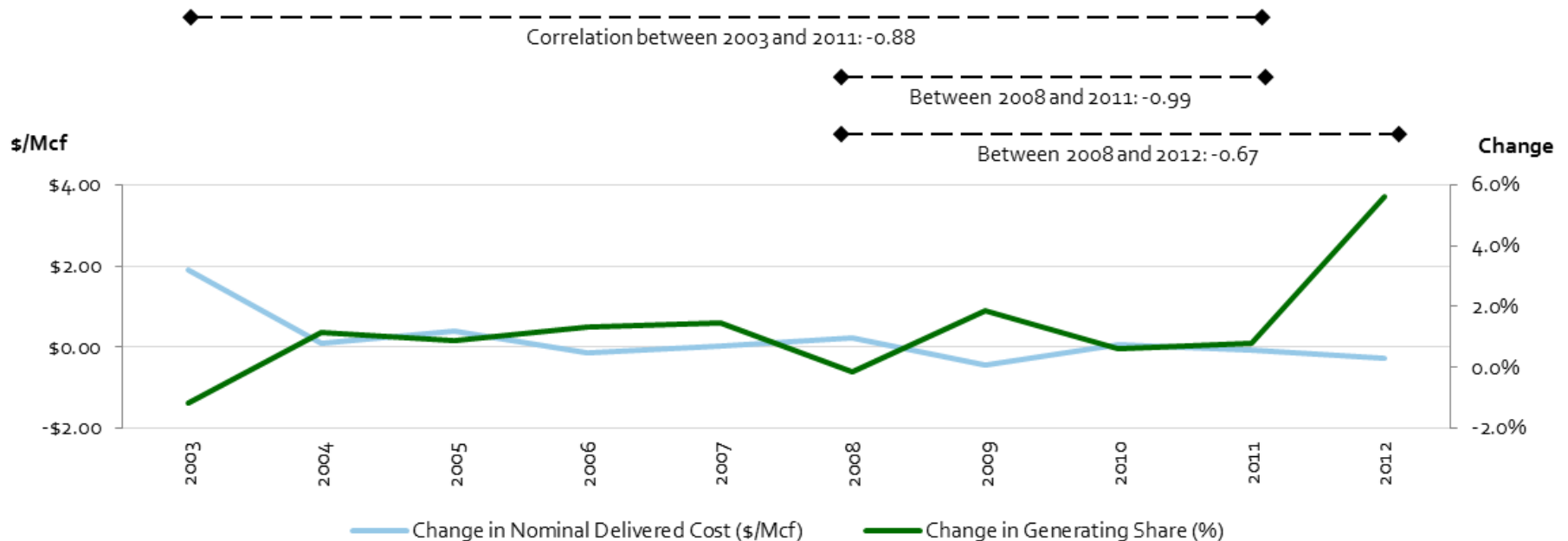
Source: ClearView Energy Partners, LLC, using data from BEA, BLS, EIA, EPA, FEC, FHWA, Gasbuddy, NPRA, RFA and Bloomberg

CONSUMPTION, PRODUCTION, STOCKS AND DELIVERED PRICE TO UTILITIES (TRAILING 12-MONTH BASIS) THRU 1/2013 VS. 1/2008



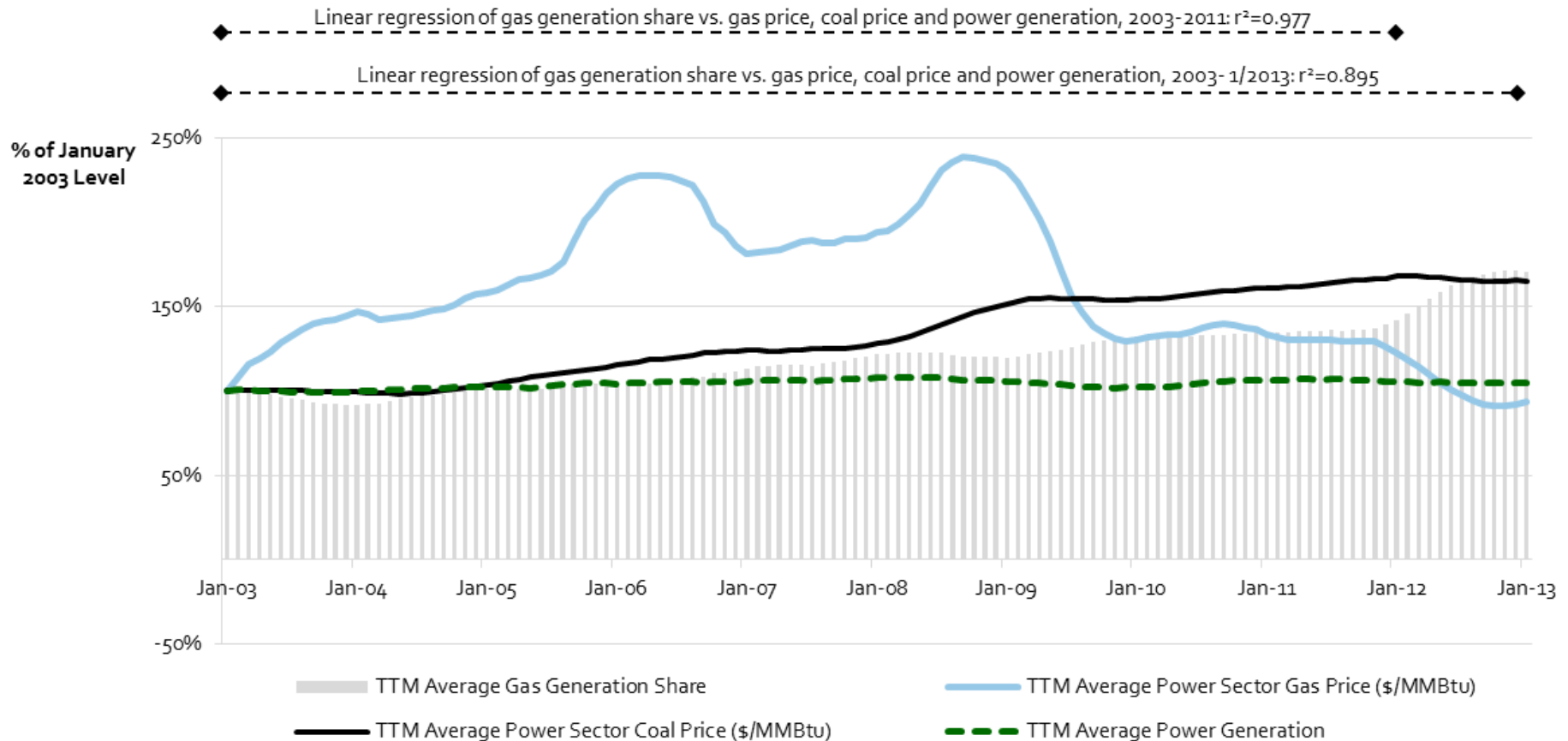
Source: ClearView Energy Partners, LLC using data from EIA

COAL-TO-GAS SWITCHING FOR NON-MARKET REASONS? CORRELATION BETWEEN PRICE AND GENERATING SHARE WEAKENS IN 2012



Source: ClearView Energy Partners, LLC using data from EIA

REGRESSING GAS GENERATION SHARE AGAINST GAS PRICE, COAL PRICE AND POWER GENERATION IMPLIES A SIMILAR DISCONNECT



Source: ClearView Energy Partners, LLC using data from EIA

POWER SECTOR NATURAL GAS DEMAND: COAL AND GAS PRICE SENSITIVITY ANALYSIS (HOLDING POWER DEMAND CONSTANT)

2012 Equation	Coal Price				
Gas Price	-20%	-10%	Base: \$2.255/MMBtu	+10%	+20%
+20%	19.52	20.53	21.54	22.56	23.57
+10%	19.76	20.78	21.79	22.80	23.82
Base: \$3.625/MMBtu	20.01	21.02	22.04	23.05	24.06
-10%	20.26	21.27	22.28	23.30	24.31
-20%	20.50	21.52	22.53	23.54	24.56

2011 Equation	Coal Price				
Gas Price	-20%	-10%	Base: \$2.255/MMBtu	+10%	+20%
+20%	18.48	19.40	20.31	21.23	22.14
+10%	18.60	19.52	20.43	21.35	22.26
Base: \$3.625/MMBtu	18.73	19.64	20.55	21.47	22.38
-10%	18.85	19.76	20.68	21.59	22.51
-20%	18.97	19.88	20.80	21.71	22.63

Source: ClearView Energy Partners, LLC using data from EIA

THE ELEMENTS OF FRACKING RISK: REGULATORY RISK AND ESTIMATED WELLHEAD COST IMPACTS

ELEMENT	AIR		WATER		EARTH		FIRE	
Issue	Air Quality	GHG Controls	Quality	Quantity	Induced Seismicity Leads to Injection Well Limitations		Well Integrity Standards	
(Estimated) or Planned Timeframe	2012	(2012-2013, with more possible on wellhead methane)	(2013-2014)	N/A	TBD		(2013 for Federal Lands)	
Potential Cost Impact (\$/Mcf)	Low-End	High-End	Low-End	High-End	Low-End	High-End	Low-End	High-End
	\$0.04	\$0.06	\$0.15	\$0.50	\$0.12	\$0.35	\$0.00	\$0.50
Low End*	\$0.31							
High End*	\$0.76							

Source: ClearView Energy Partners, LLC using EIA, EPA and industry sources

SUMMARY OF EIA'S RANGE OF PROJECTED, DIFFERENTIAL, AVERAGE OUTCOMES VS. "REFERENCE CASE"

SCENARIO	EXPORT VOLUME (TOTAL BCF/D)	PHASE IN RATE (BCF/D/Y)	GHG EMISSIONS DIFFERENTIAL CASE (%)*	WELLHEAD DIFFERENTIAL (2009\$/MCF)	HENRY HUB DIFFERENTIAL (2009\$/MCF)	END-USE POWER DIFFERENTIAL (2009\$/KWH)	RESIDENTIAL SECTOR GAS DIFFERENTIAL (2009\$/MCF)	INDUSTRIAL SECTOR GAS DIFFERENTIAL (2009\$/MCF)	DRY GAS PRODUCTION DIFFERENTIAL (TCF/Y)
"Low/Slow"	6	1	0.1 - 0.5	\$0.33 - \$0.88	\$0.37 - \$0.97	\$0.06 - \$0.20	\$0.32 - \$0.81	\$0.39 - \$0.90	0.92 - 1.04
"Low/Rapid"	6	3	0.3 - 0.5	\$0.60 - \$1.11	\$0.51 - \$1.22	\$0.11 - \$0.27	\$0.45 - \$1.03	\$0.54 - \$1.13	0.98 - 1.28
"High/Slow"	12	1	0.2 - 1.0	\$0.47 - \$1.32	\$0.51 - \$1.46	\$0.08 - \$0.34	\$0.44 - \$1.18	\$0.54 - \$1.33	1.19 - 1.33
"High/Rapid"	12	3	0.3 - 1.3	\$0.86 - \$2.11	\$0.95 - \$2.33	\$0.14 - \$0.53	\$0.80 - \$1.87	\$1.00 - \$2.09	2.04 - 2.35
No Exports				\$3.56 - \$6.52	\$3.92 - \$7.18	\$8.56 - \$9.44	\$9.92 - \$13.23	\$4.41 - \$7.50	19.8 - 26.4
Range of % Δ			0.1% - 1.3%	9.3% - 32.4%	9.4% - 32.5%	0.7% - 5.6%	3.2% - 14.1%	8.8% - 27.9%	4.6% - 8.9%

* GHG Emissions data were computed as a cumulative total relative to the EIA reference case, 2015-2035

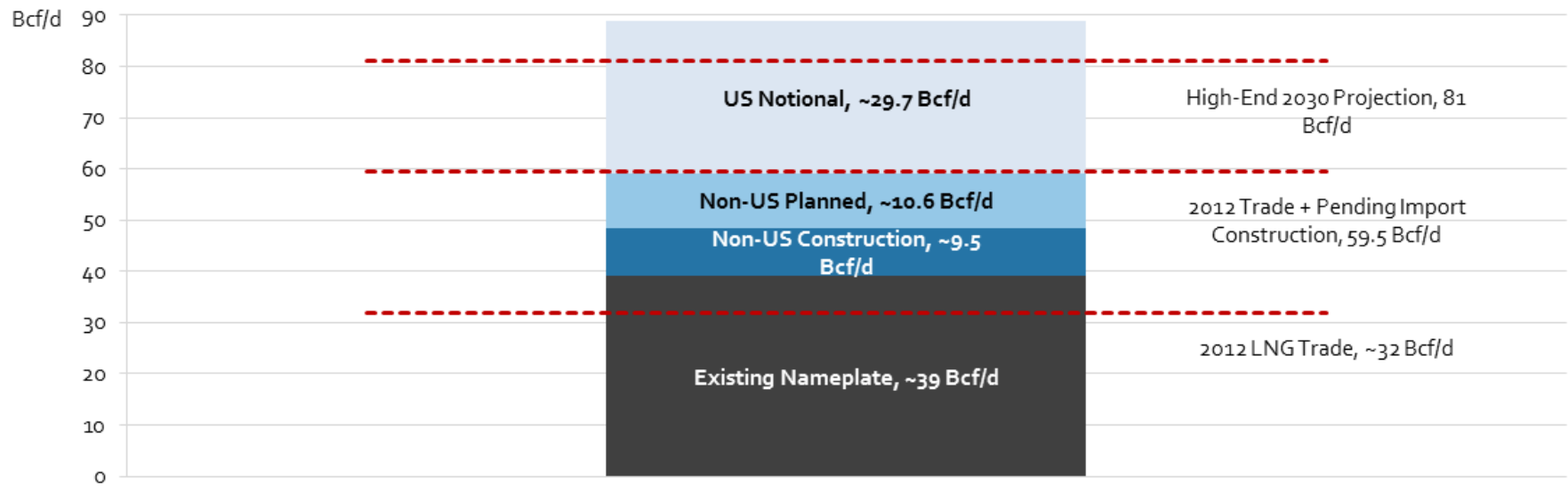
Source: ClearView Energy Partners, LLC, parsing EIA data

NERA REPORT CHANGE IN NATURAL GAS PRICES RELATIVE TO BASELINE OF ZERO EXPORTS IN 2010\$/MCF

U.S. CASE	INTERNATIONAL CASE	LNG EXPORT CAPACITY CASE	2015	2020	2025	2030	2035
Reference	Supply / Demand Shock	Low / Rapid	\$0.33	\$0.65	\$0.52	\$0.47	\$0.41
Reference	Supply / Demand Shock	Low / Slow	\$0.10	\$0.65	\$0.52	\$0.47	\$0.41
Reference	Supply / Demand Shock	High / Rapid	\$0.33	\$0.92	\$1.02	\$1.03	\$0.89
Reference	Supply / Demand Shock	High / Slow	\$0.10	\$0.65	\$1.02	\$1.03	\$0.89
Reference	Demand Shock	Low / Rapid	\$0.31	\$0.27	\$0.33	\$0.24	\$0.25
Reference	Demand Shock	Low / Slow	\$0.10	\$0.27	\$0.33	\$0.24	\$0.25
Reference	Demand Shock	Low / Slowest	\$0.05	\$0.27	\$0.33	\$0.24	\$0.25
High Shale	Supply / Demand Shock	High / Rapid	\$0.27	\$1.11	\$0.84	\$0.68	\$0.67
High Shale	Supply / Demand Shock	High / Slow	\$0.08	\$0.47	\$0.75	\$0.68	\$0.67
High Shale	Supply / Demand Shock	Low / Rapid	\$0.27	\$0.47	\$0.37	\$0.31	\$0.31
High Shale	Supply / Demand Shock	Low / Slow	\$0.08	\$0.47	\$0.37	\$0.31	\$0.31
High Shale	Supply / Demand Shock	Low / Slowest	\$0.04	\$0.22	\$0.34	\$0.31	\$0.31
Low Shale	Supply / Demand Shock	Low / Slowest	\$0.00	\$0.37	\$0.22	\$0.00	\$0.04

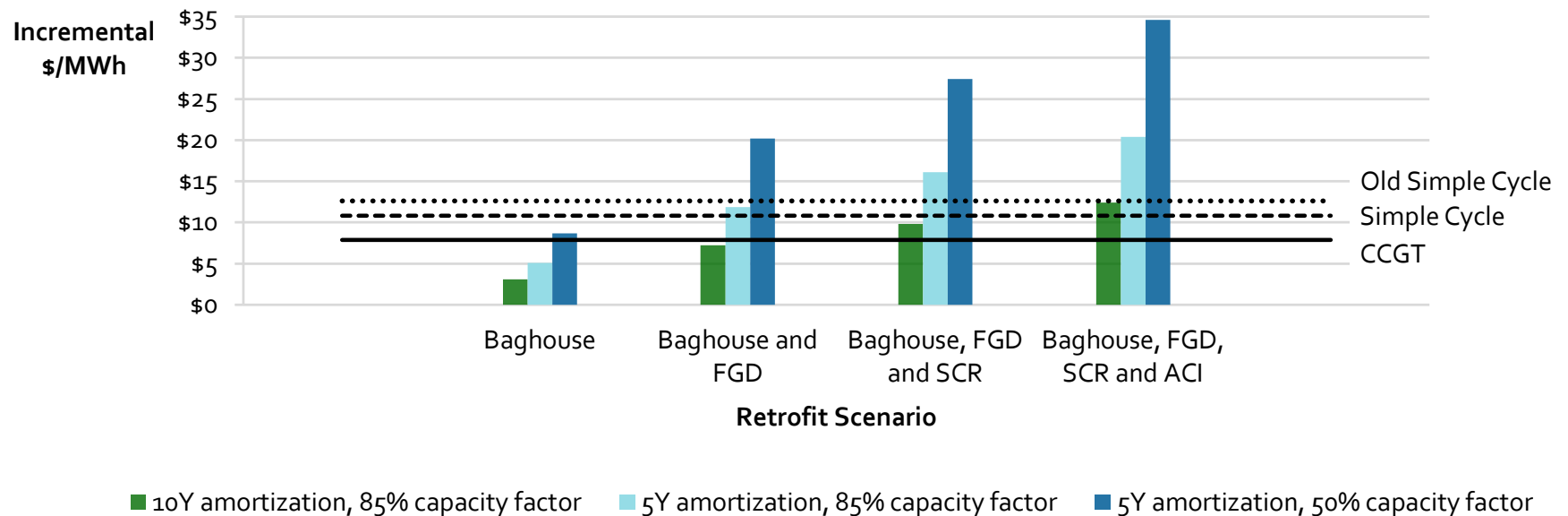
Source: ClearView Energy Partners, LLC using NERA Report

LOOKING PRETTY CROWDED ON THE OPEN SEAS: EXISTING, PLANNED AND NOTIONAL LNG CAPACITY VS. DEMAND ESTIMATES

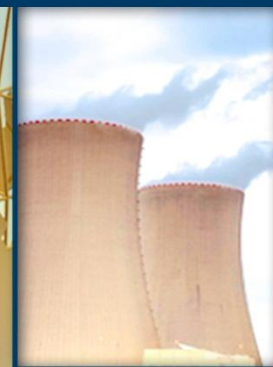


Source: ClearView Energy Partners, LLC using Bloomberg, BP, CRA, Ernst & Young, IGU and NERA data

WEIGHING WELLHEAD COST IMPLICATIONS OF EPA/BLM RULES AGAINST RETROFIT COST OBLIGATIONS FOR COAL-FIRED POWER



Source: ClearView Energy Partners, LLC using EIA, EPA and industry sources



QUESTIONS / DISCUSSION