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GLOBAL POLICY AND TECHNOLOGY DRIVERS

*EPRI Energy and Climate
Change Research Seminar
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- ▼ 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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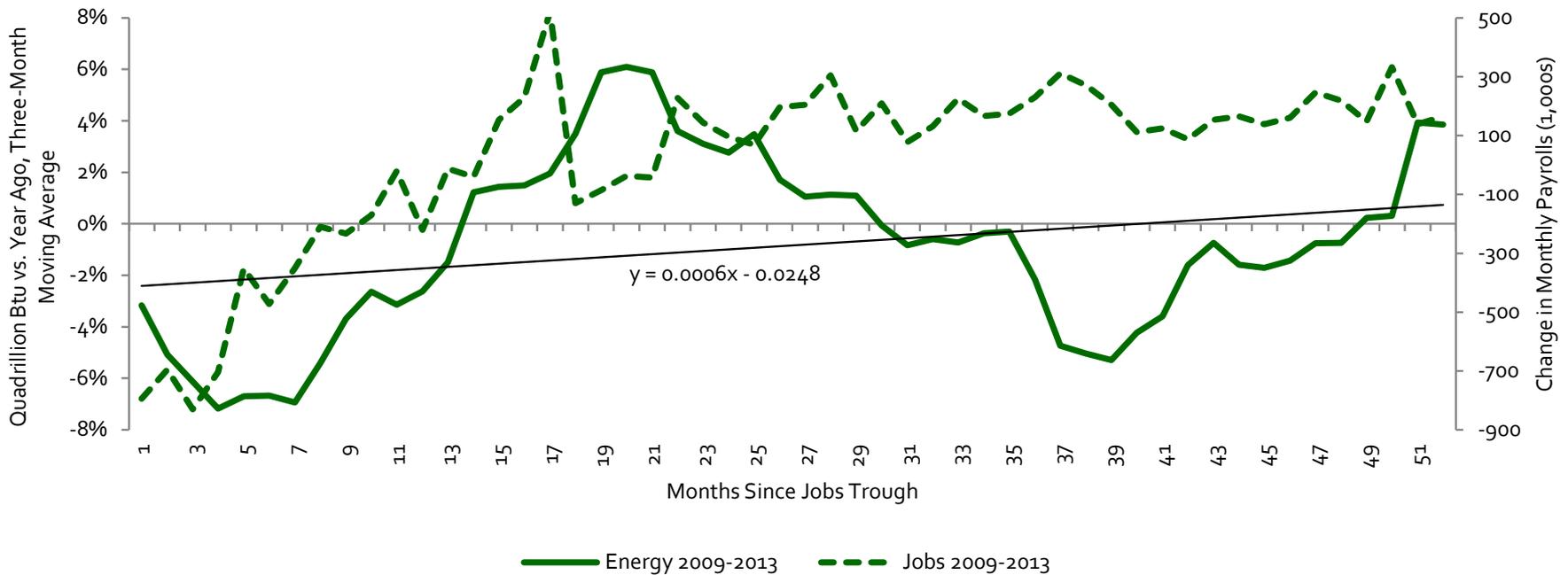
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OVERVIEW



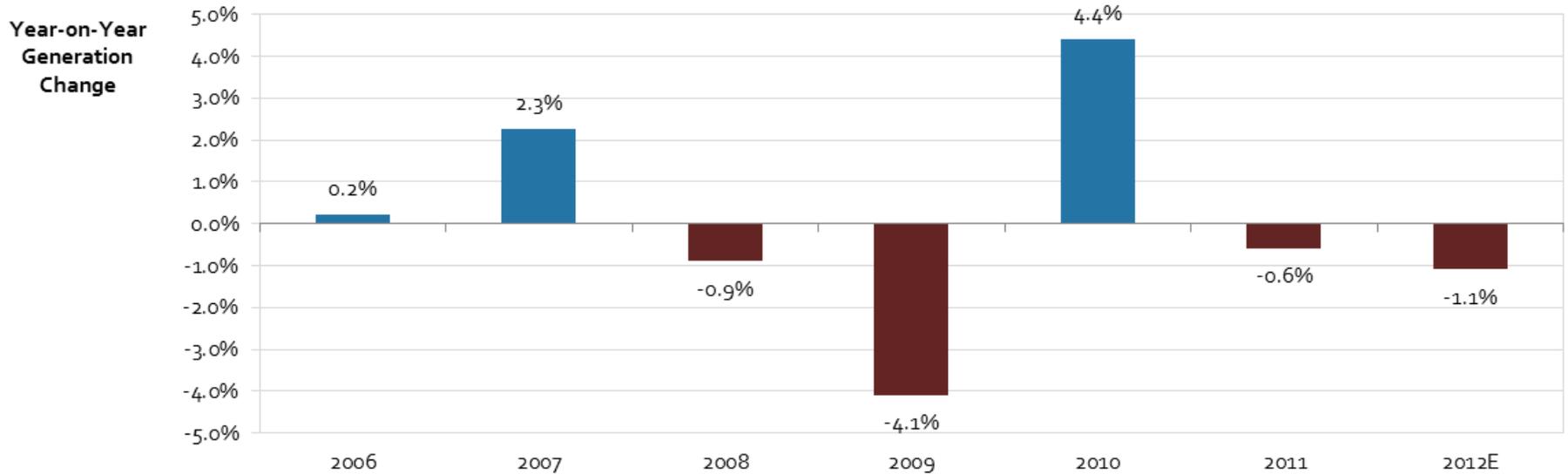
- ▼ A Grim Demand Reality
- ▼ The Economic Case for Efficiency
- ▼ The Political Case for Efficiency
- ▼ Price-Sensitive Generators and the Fuel Fight
- ▼ Upside Risks to Gas Price?

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



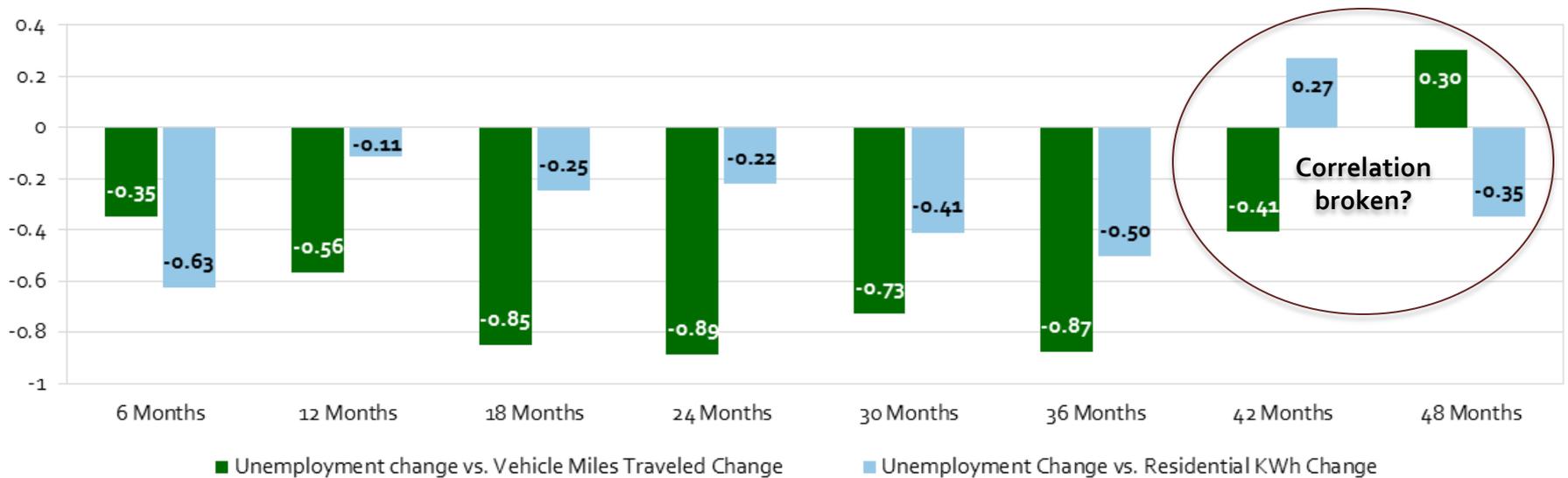
Source: ClearView Energy Partners, LLC using BLS and EIA data

LESSONS FROM 2012: THIS IS NOT NEWS GENERATION HAS BEEN DOWN 4 OUT OF PAST 5 YEARS



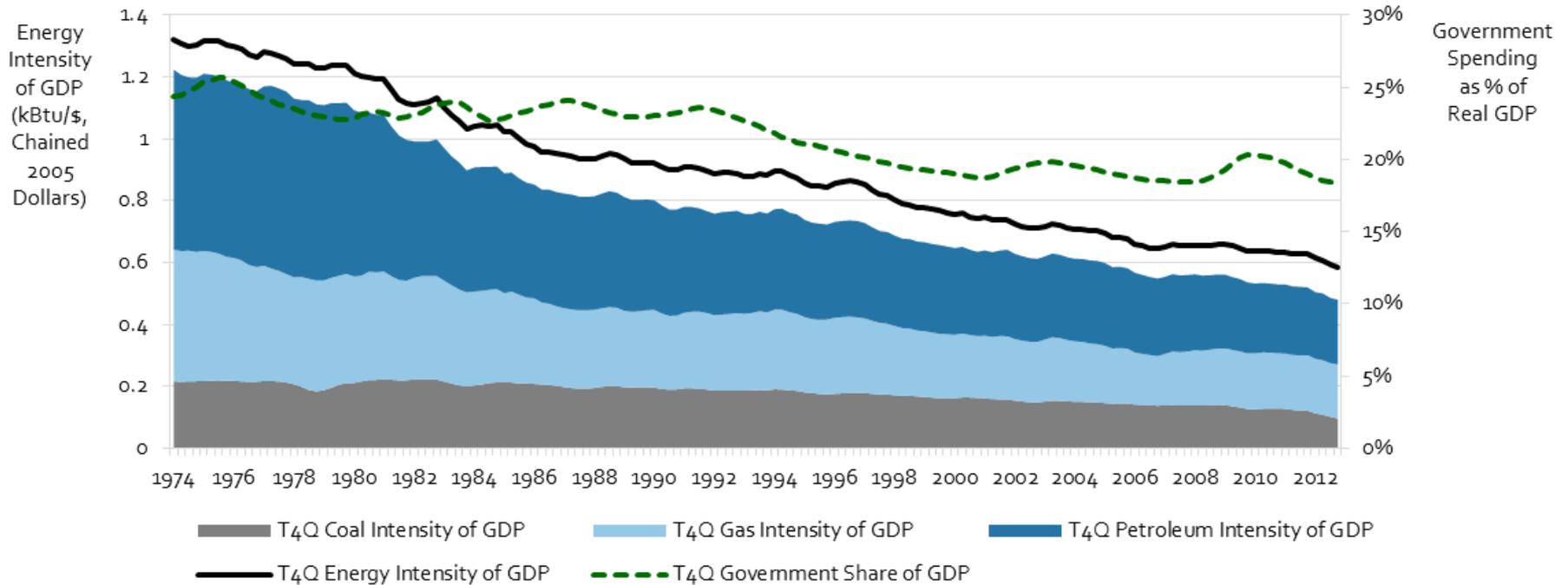
Source: ClearView Energy Partners, LLC using EIA data

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



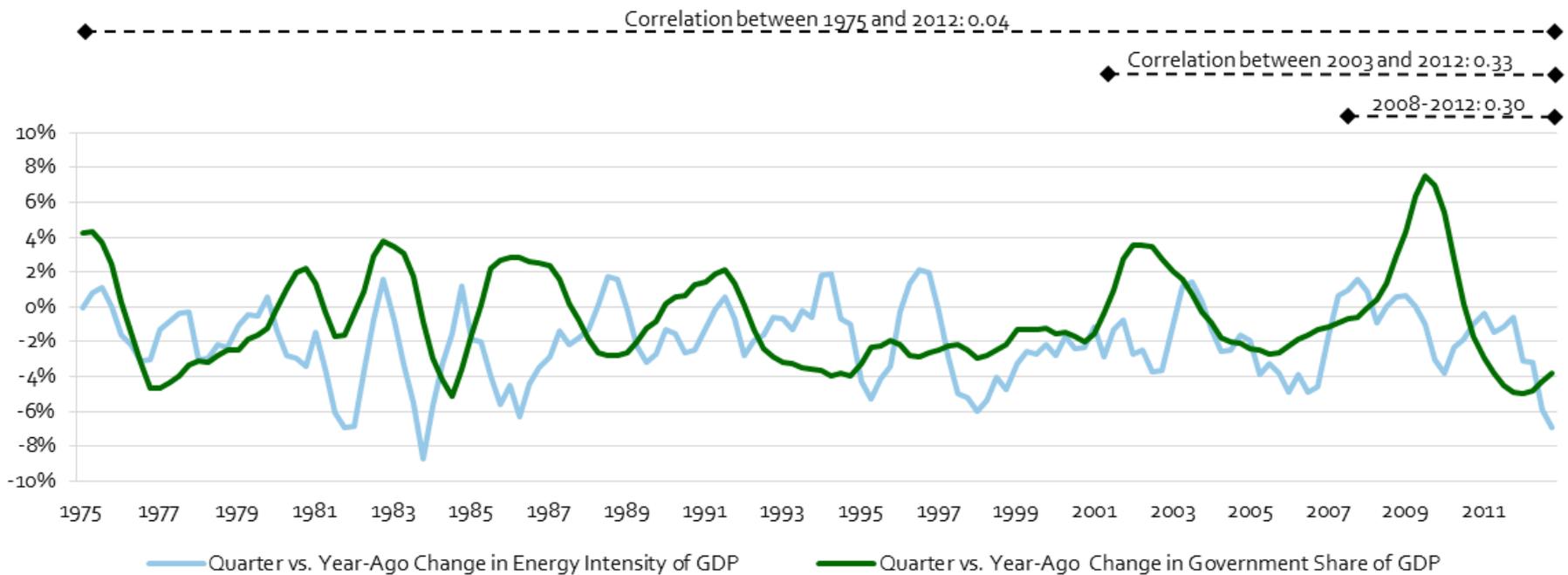
Source: ClearView Energy Partners, LLC, using BLS and EIA data

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



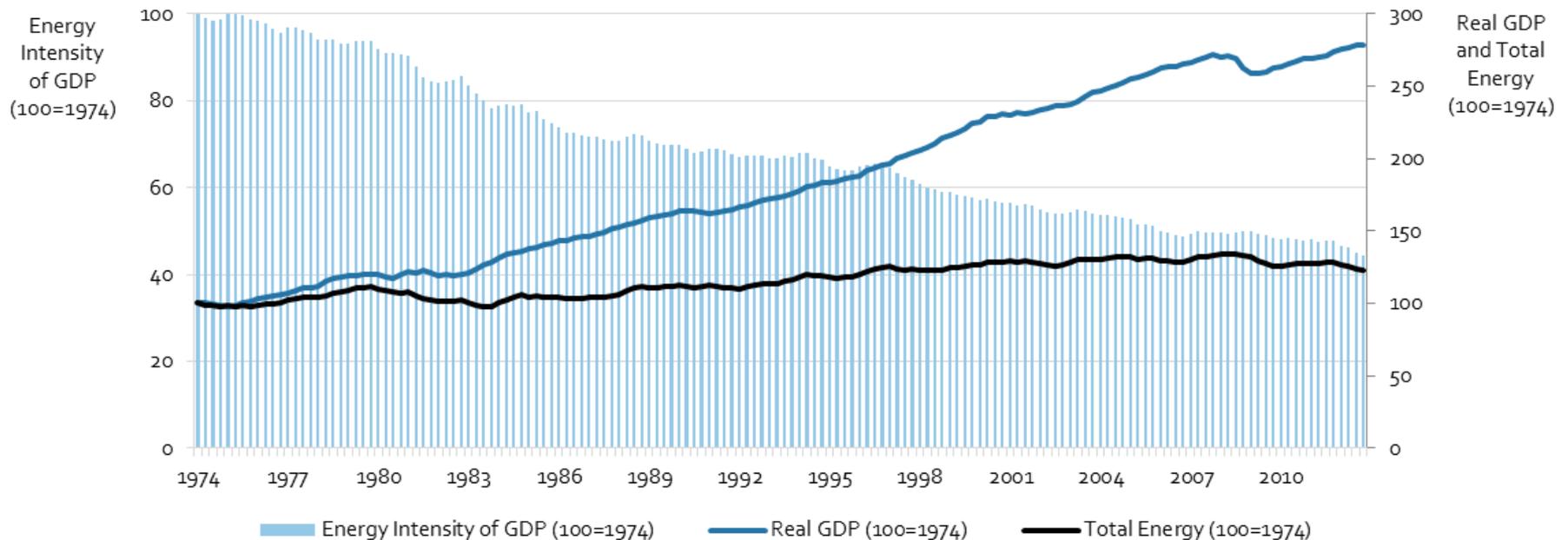
Source: ClearView Energy Partners, LLC, using BEA and EIA data

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



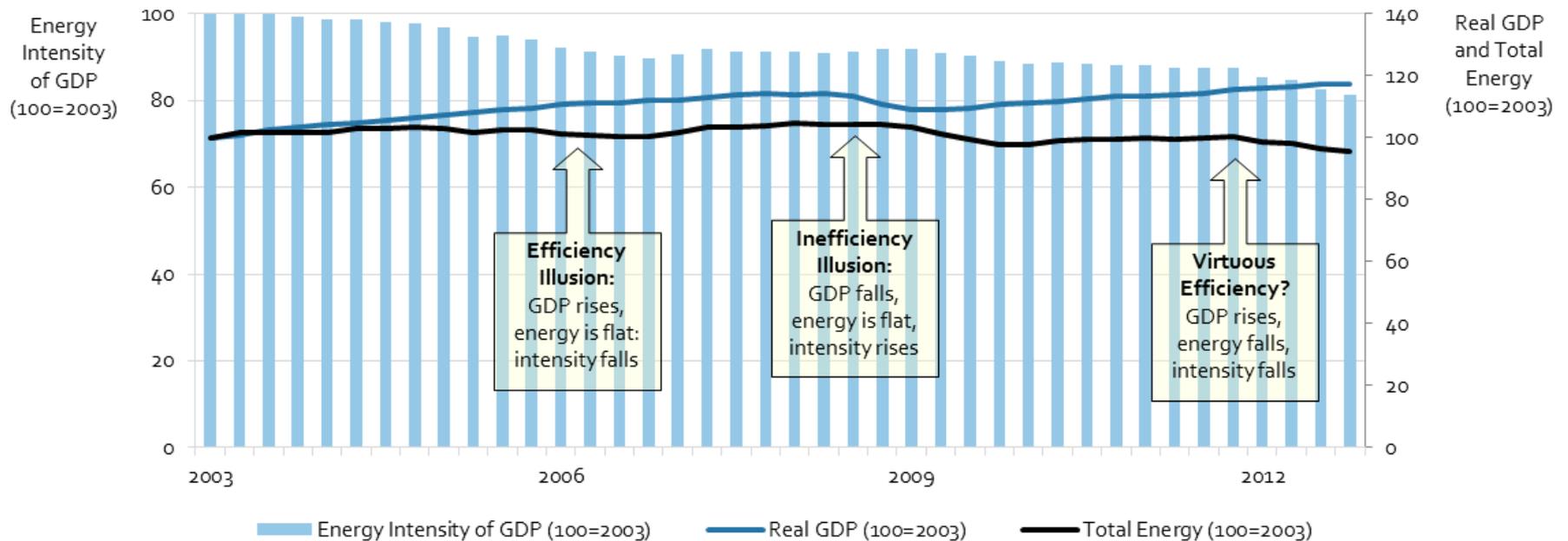
Source: ClearView Energy Partners, LLC, using BEA and EIA data

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



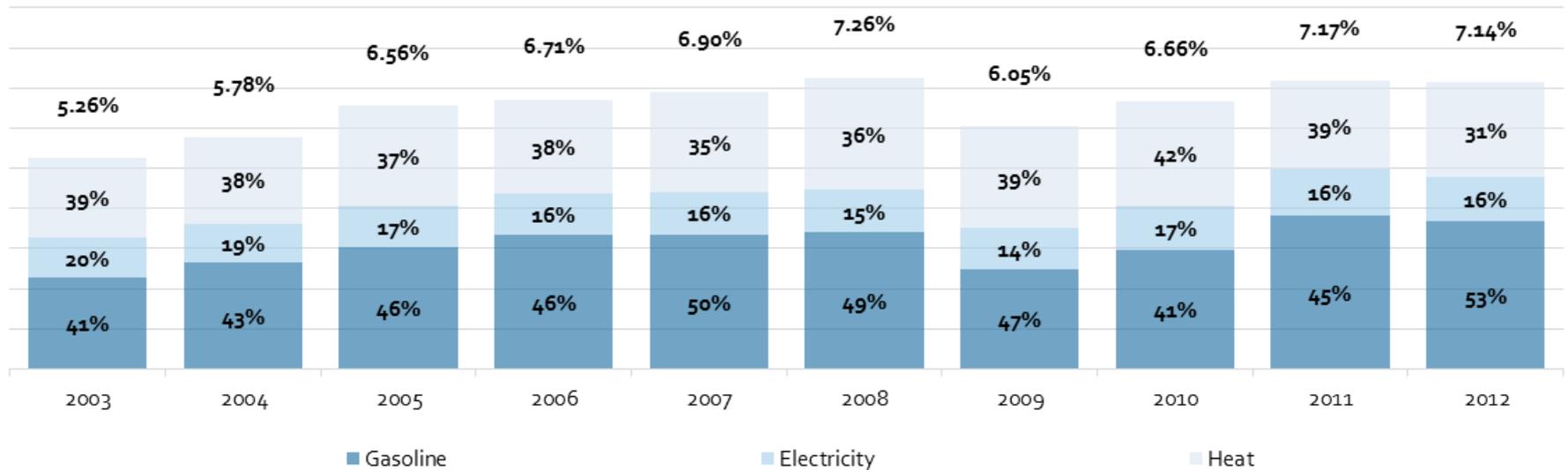
Source: ClearView Energy Partners, LLC, using BEA and EIA data

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



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

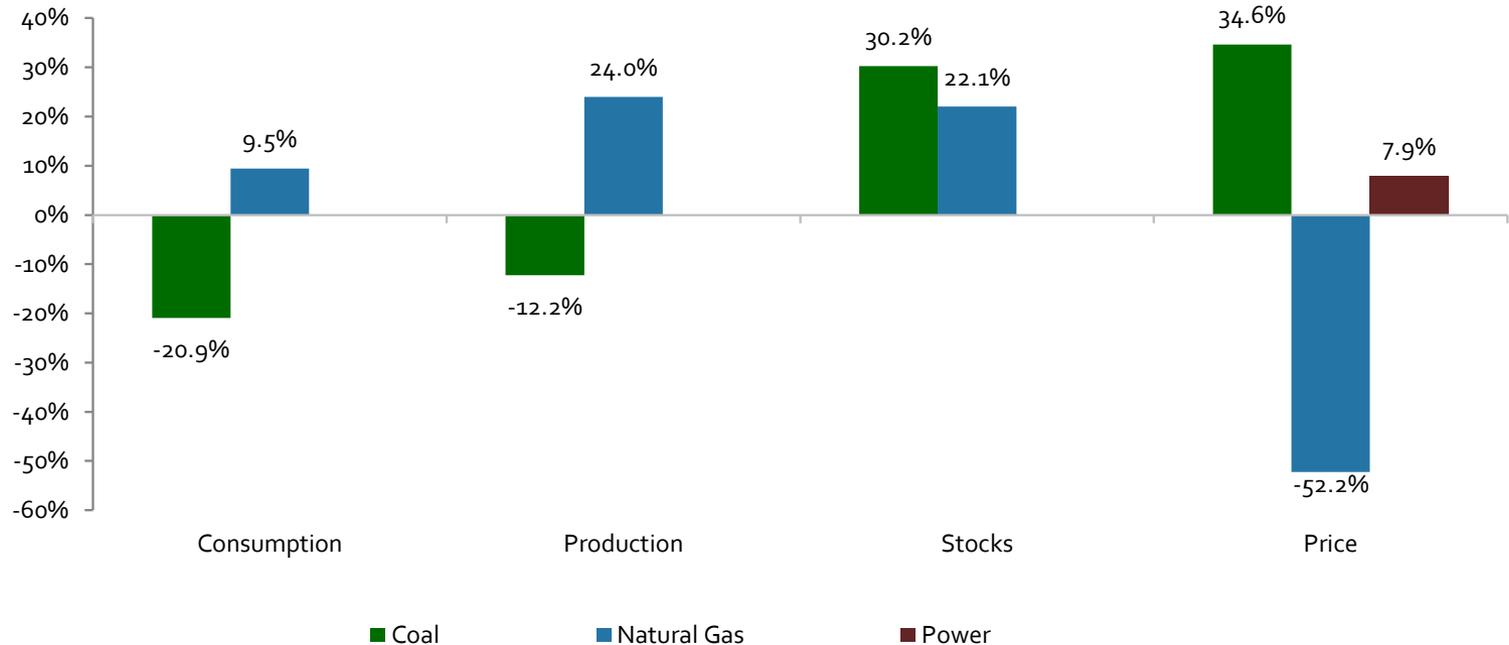
CONSUMER ENERGY LEVERAGE BY COMPONENT: A DECADE OF SPENDING MORE AT THE PUMP, LIGHT SWITCH AND THERMOSTAT



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

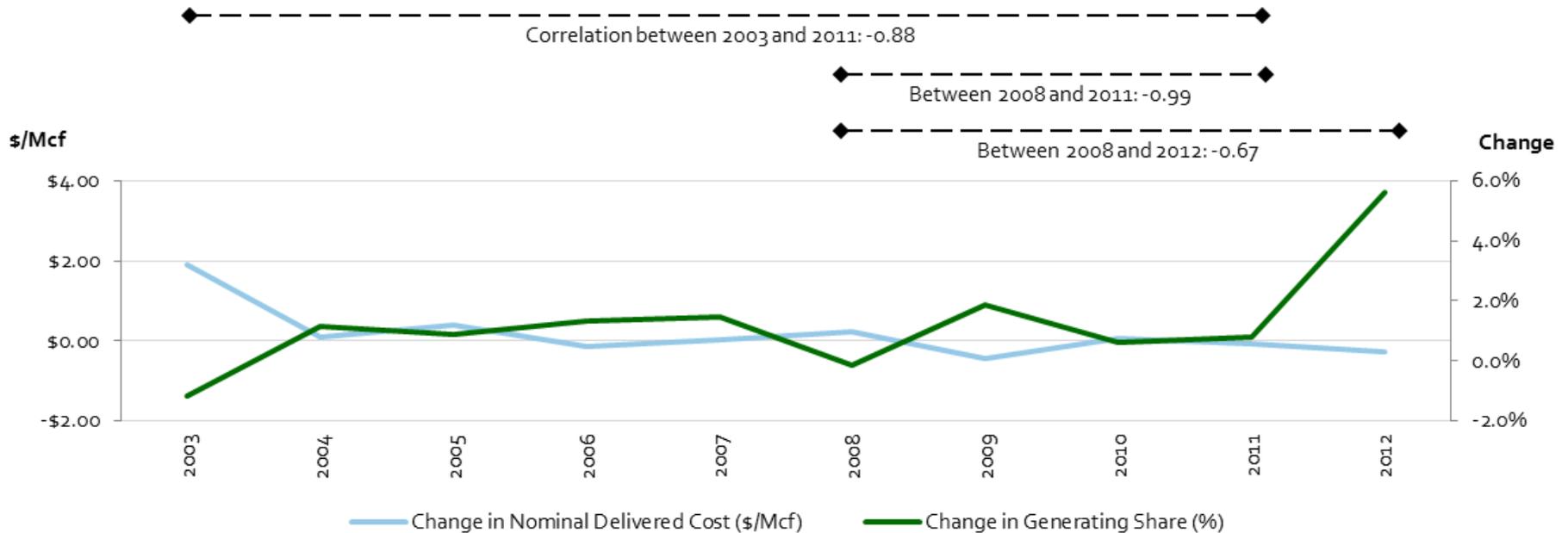
CONSUMPTION, PRODUCTION, STOCKS AND DELIVERED PRICE TO UTILITIES (TRAILING 12-MONTH BASIS) THRU 1/2013 VS. 1/2008

Change Between
1/2008 and 1/2013
(TTM Basis)



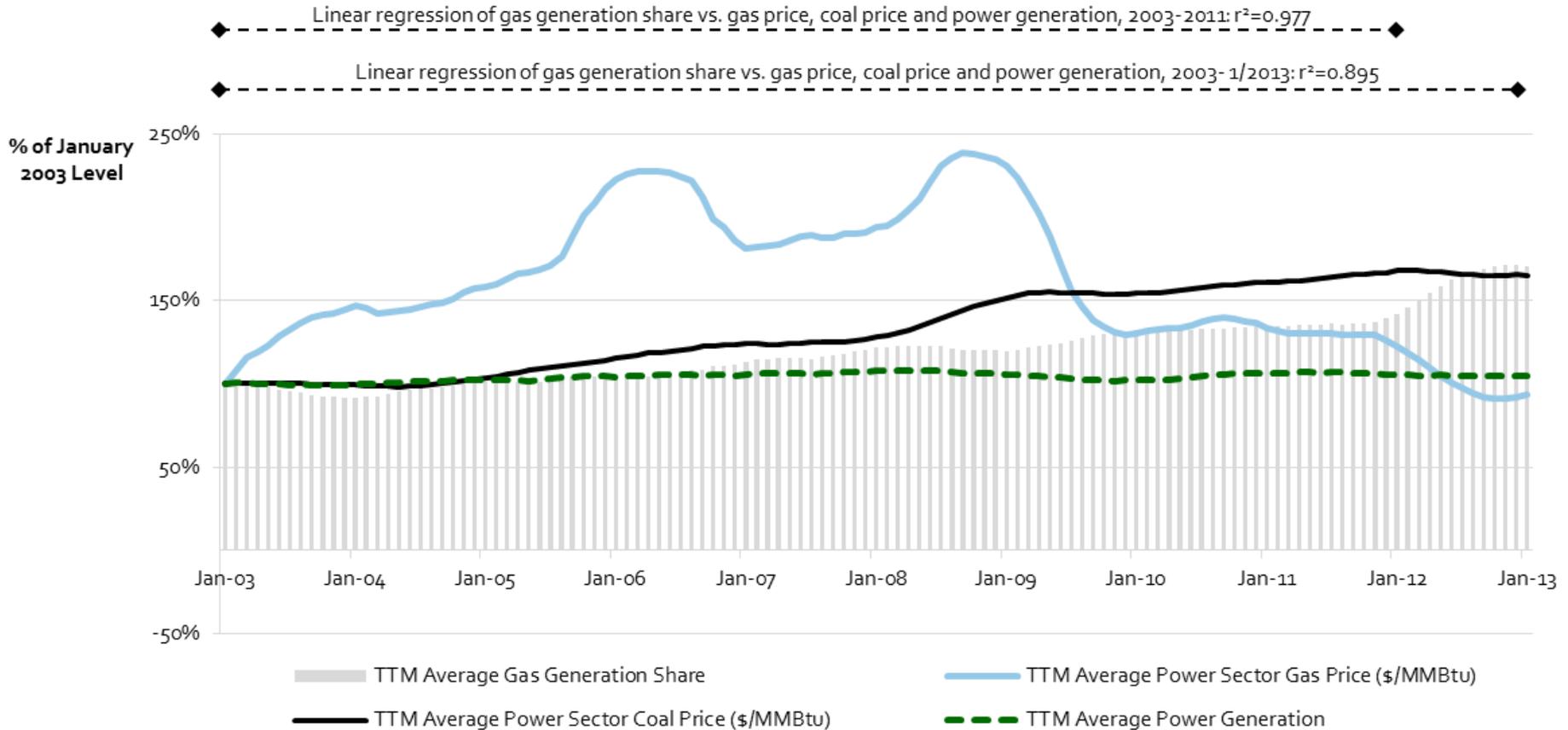
Source: ClearView Energy Partners, LLC using data from EIA

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

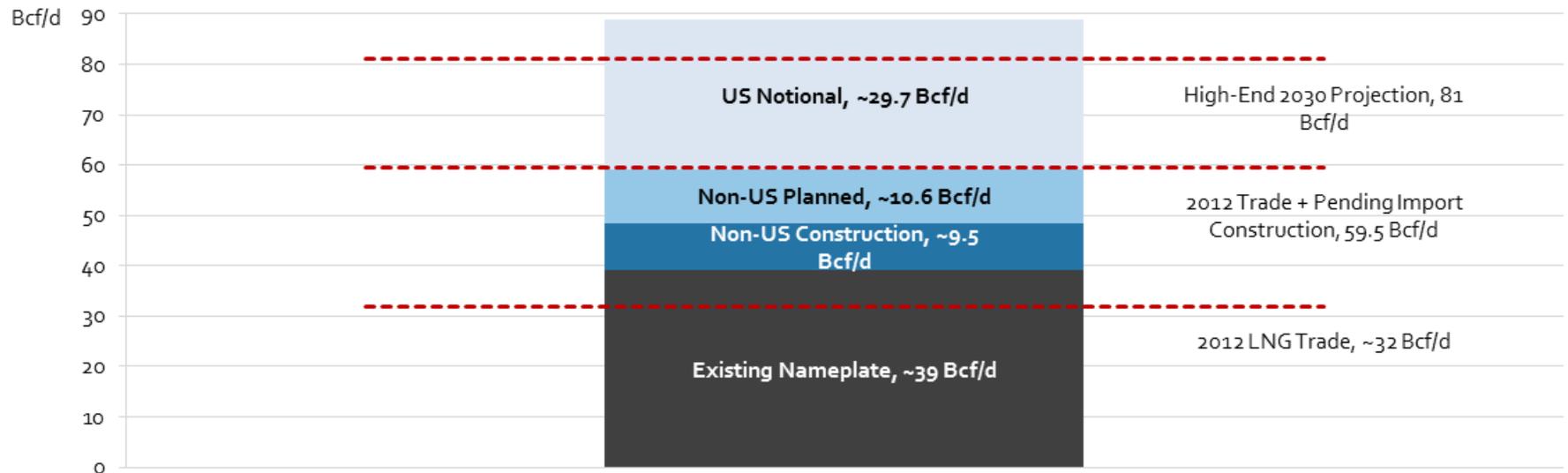
Source: ClearView Energy Partners, LLC, parsing EIA data

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 |

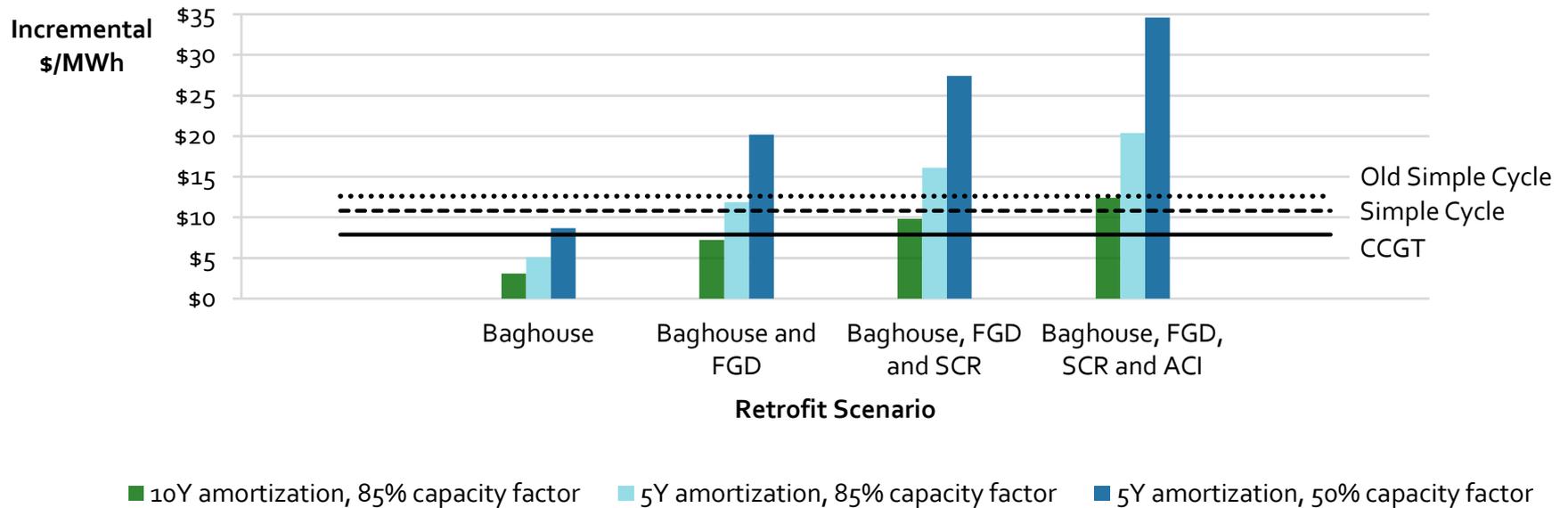
Source: ClearView Energy Partners, LLC using NERA Report

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

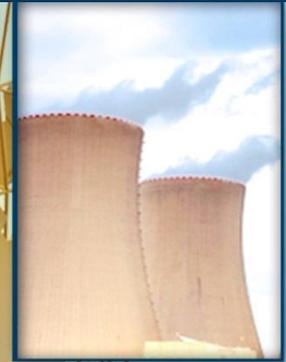


Source: ClearView Energy Partners, LLC using Bloomberg, BP, CRA, Ernst & Young, IGU and NERA data

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