



Is Abundant Natural Gas a Bridge to a Low-carbon Future or a Dead-end?

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Debate

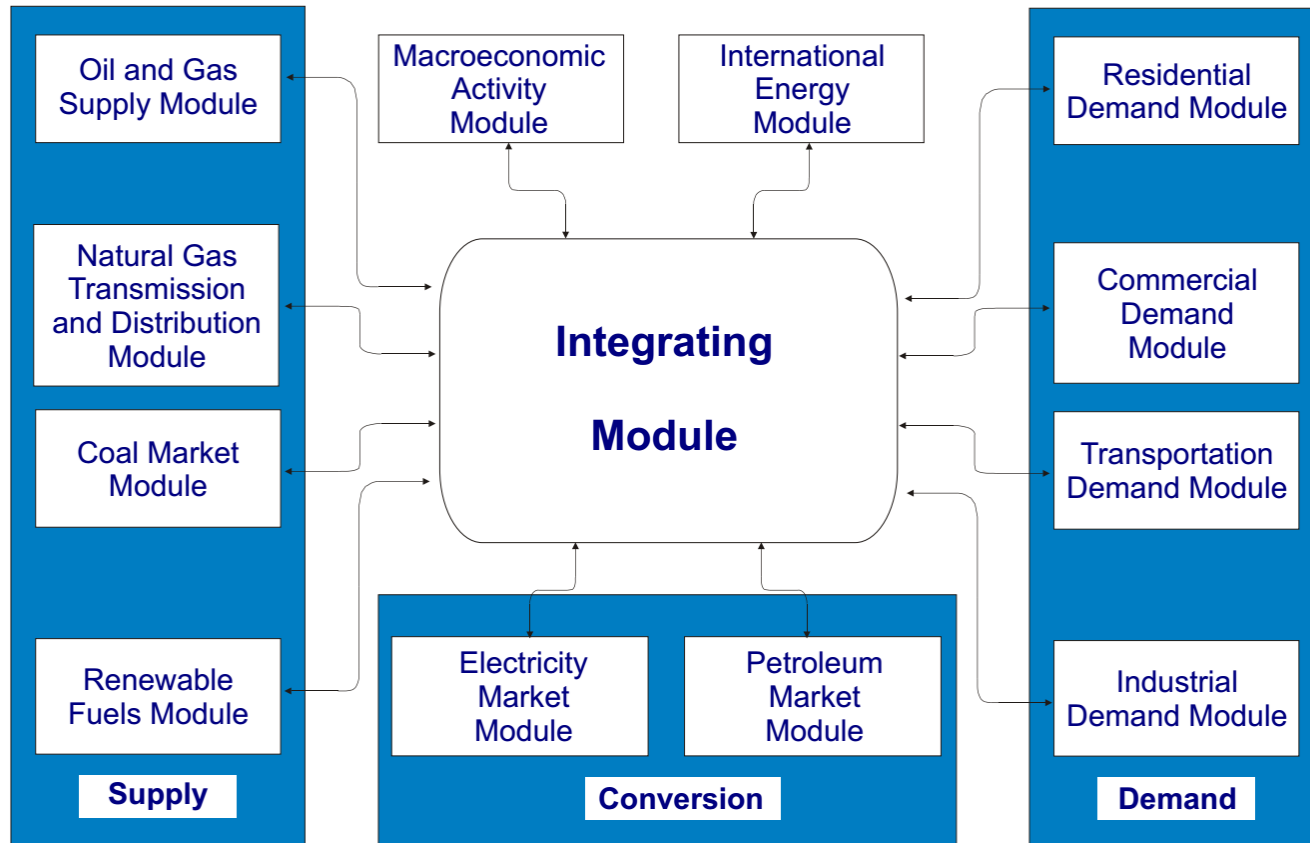
(+) Natural gas can reduce emissions due to lower carbon content of the fuel (e.g., Brown et al. 2010; McLeod et al. 2014)

(-) Natural gas may actually increase emissions in the *long-run* by leading to lock-in of a low-cost emitting technology (e.g., Shearer et al. 2014; McJeon et al. 2014)

Research questions

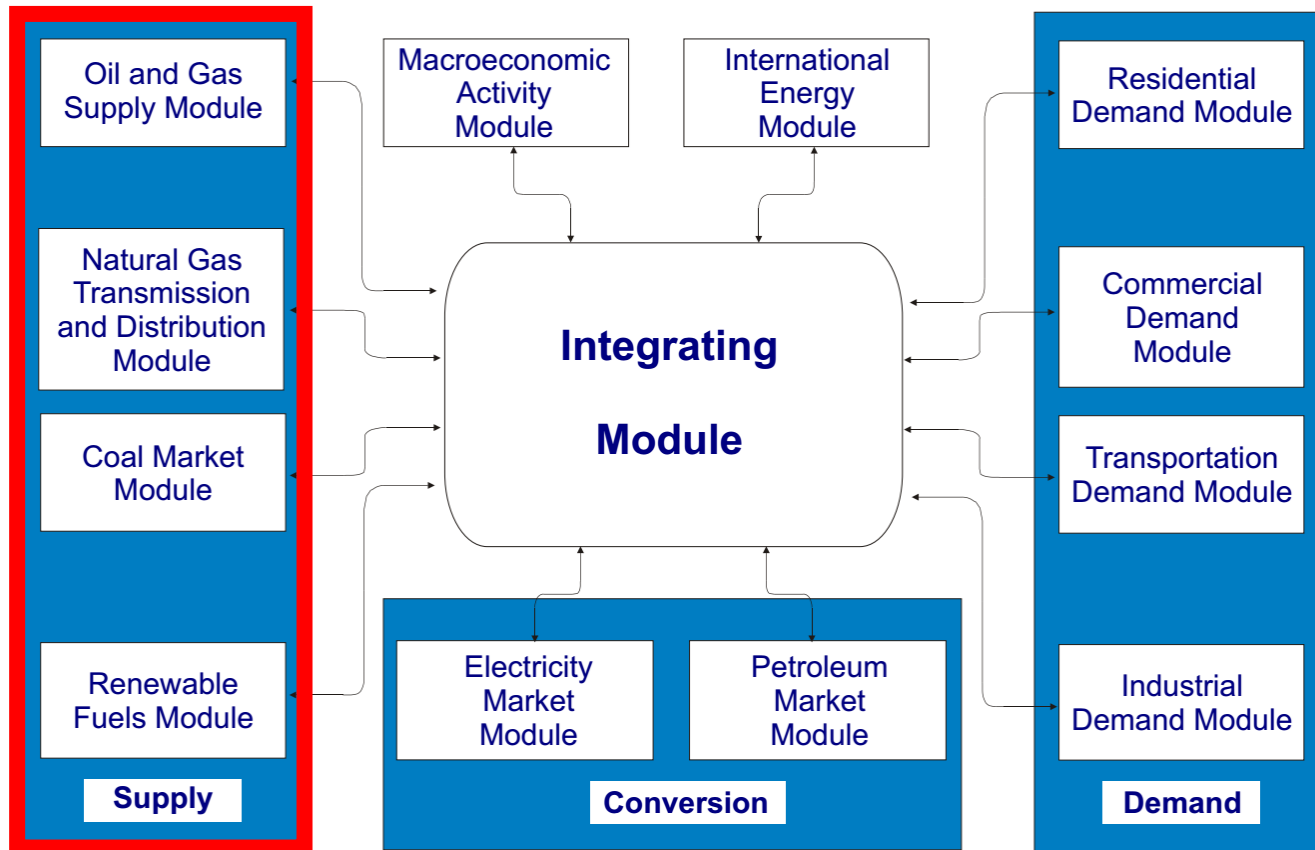
- Does abundant natural gas supply indeed lead to low carbon emissions?
- What are the effects on other local air pollutant emissions?
- What are the economic benefits and costs?
- Is abundant natural gas comparable to climate policy, e.g., carbon pricing?

Yale-NEMS



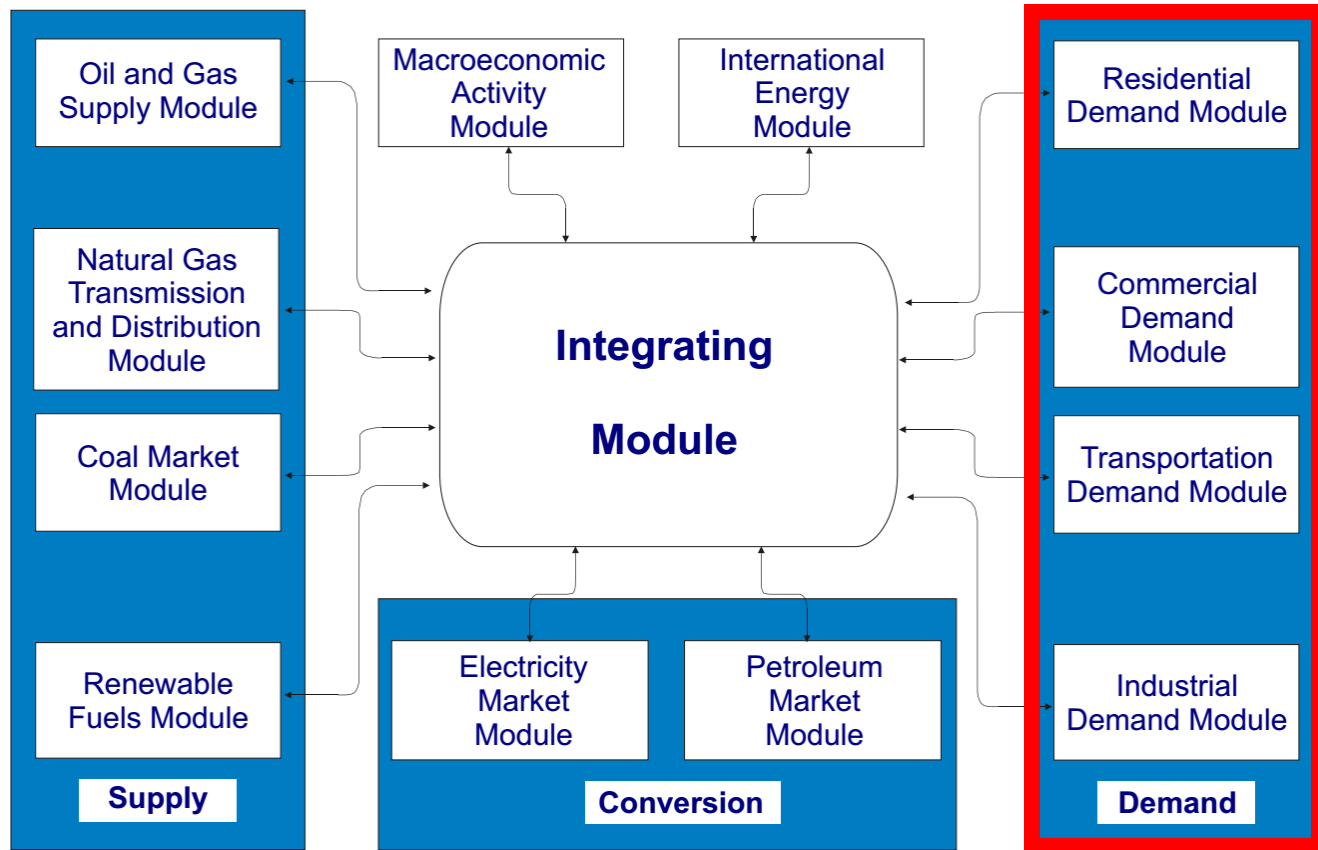
Source: EIA

Yale-NEMS



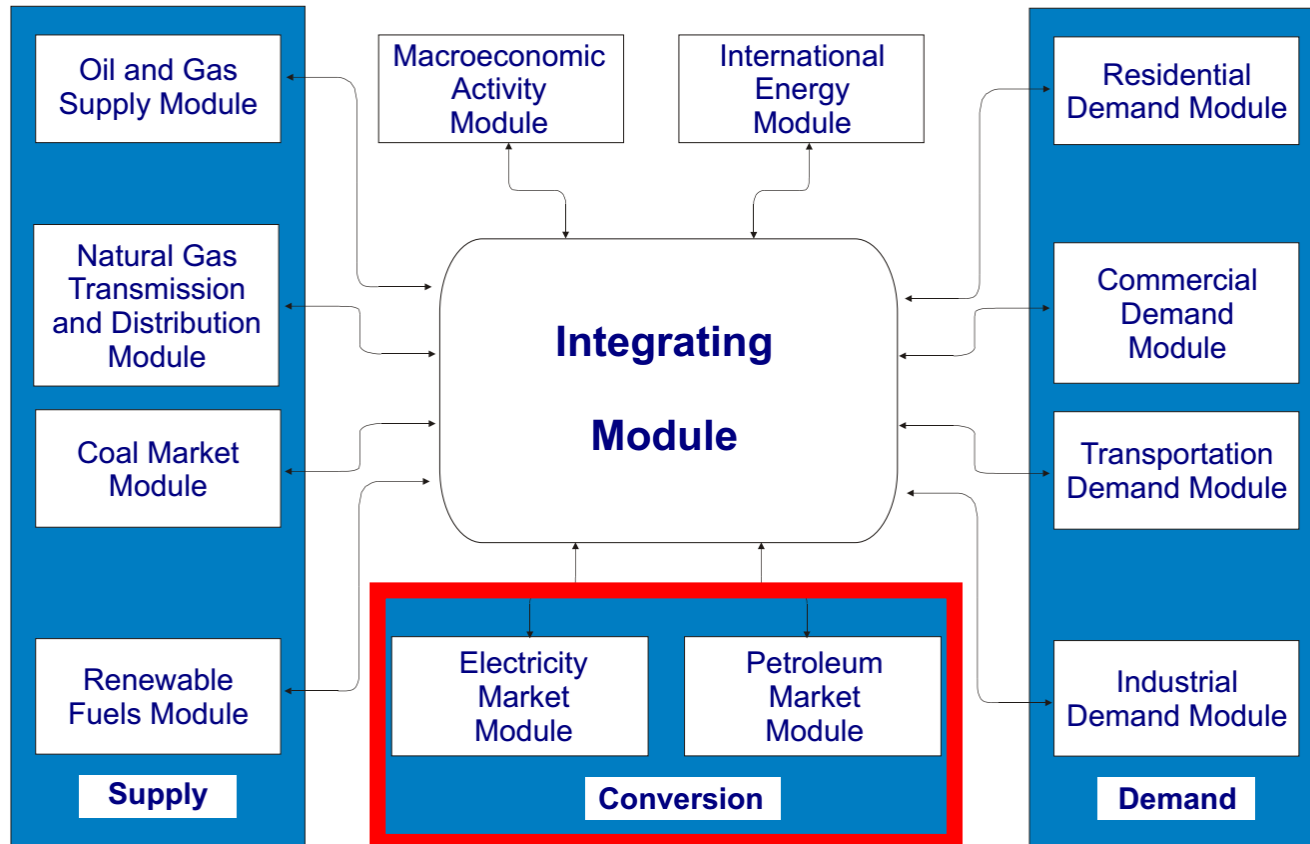
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Yale-NEMS



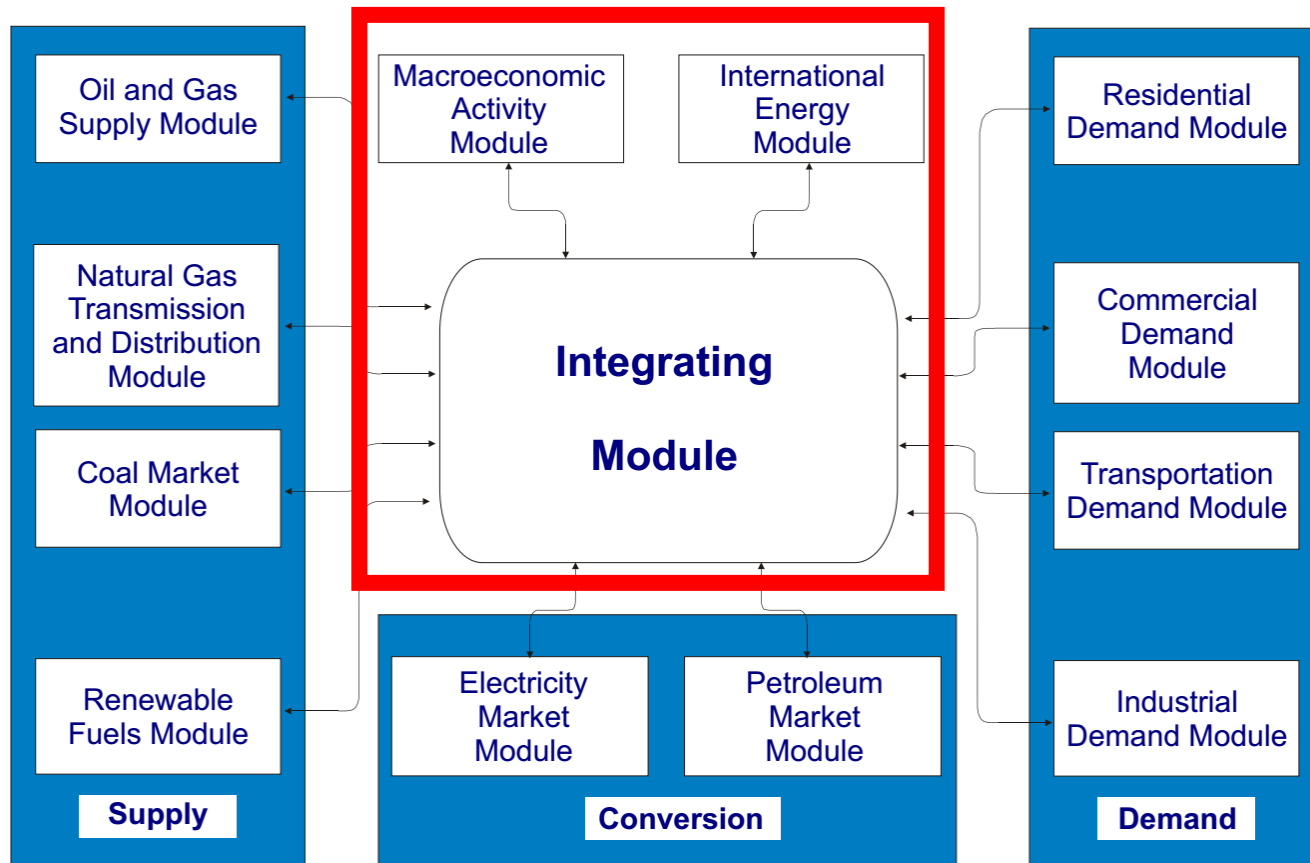
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Yale-NEMS



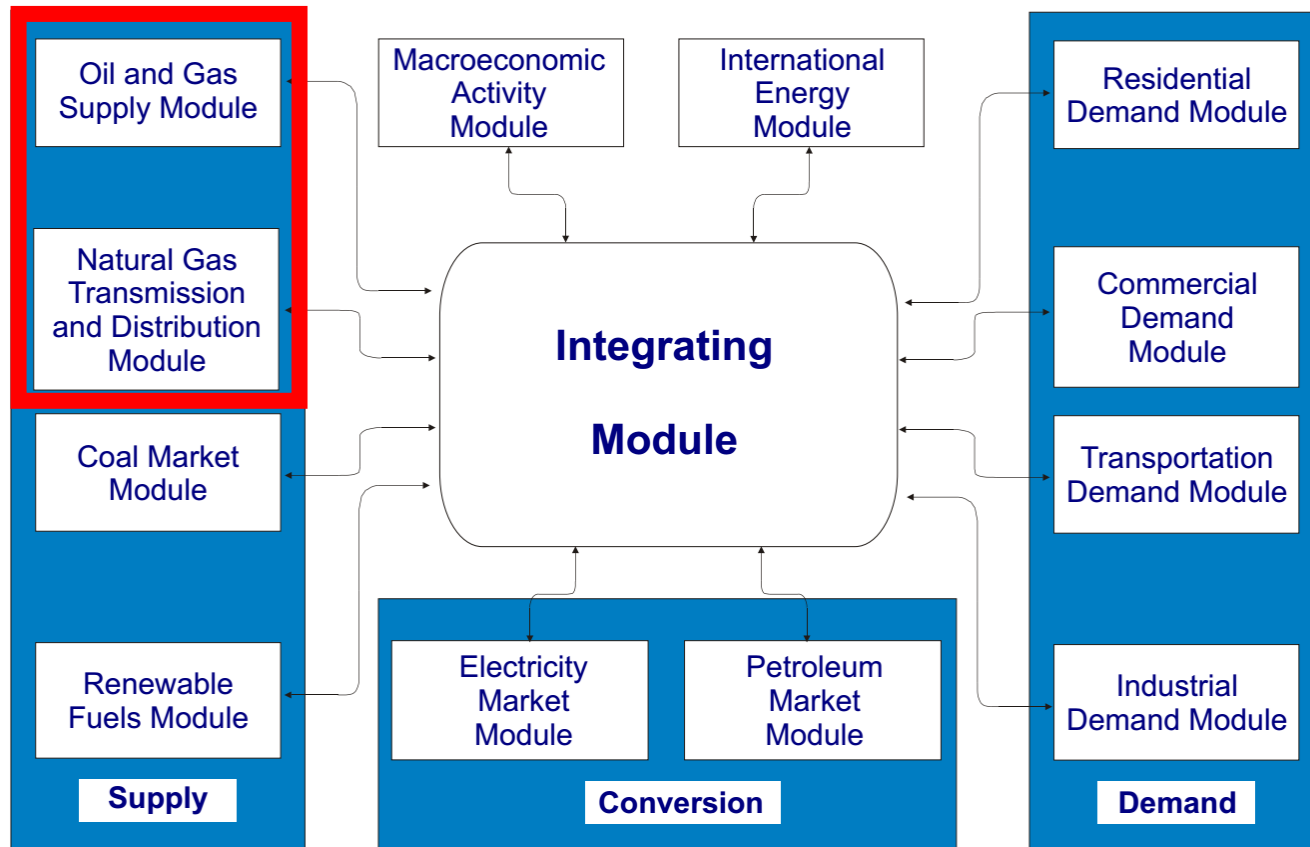
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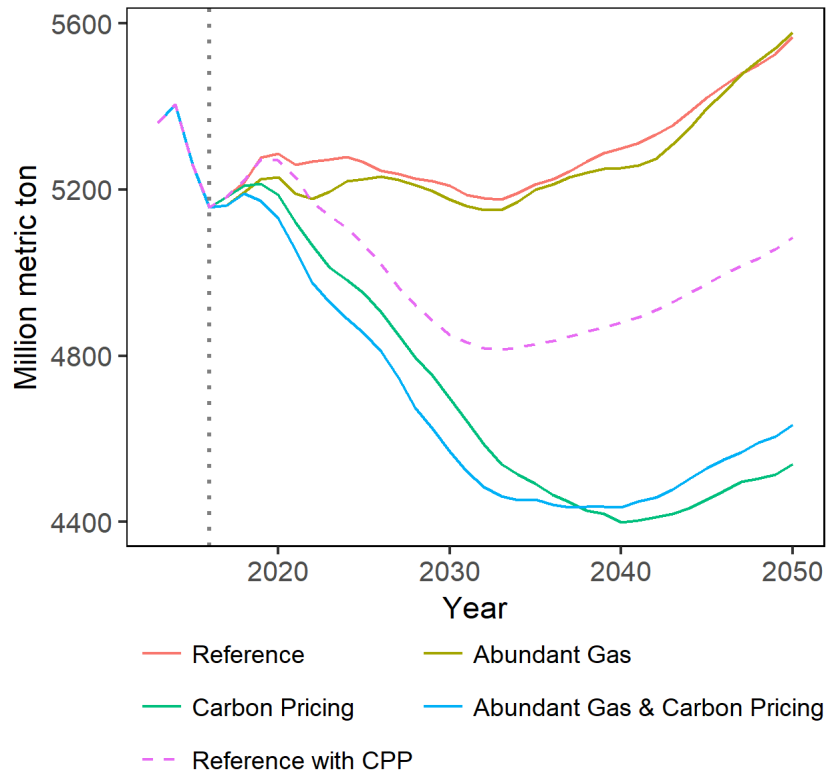


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Scenarios

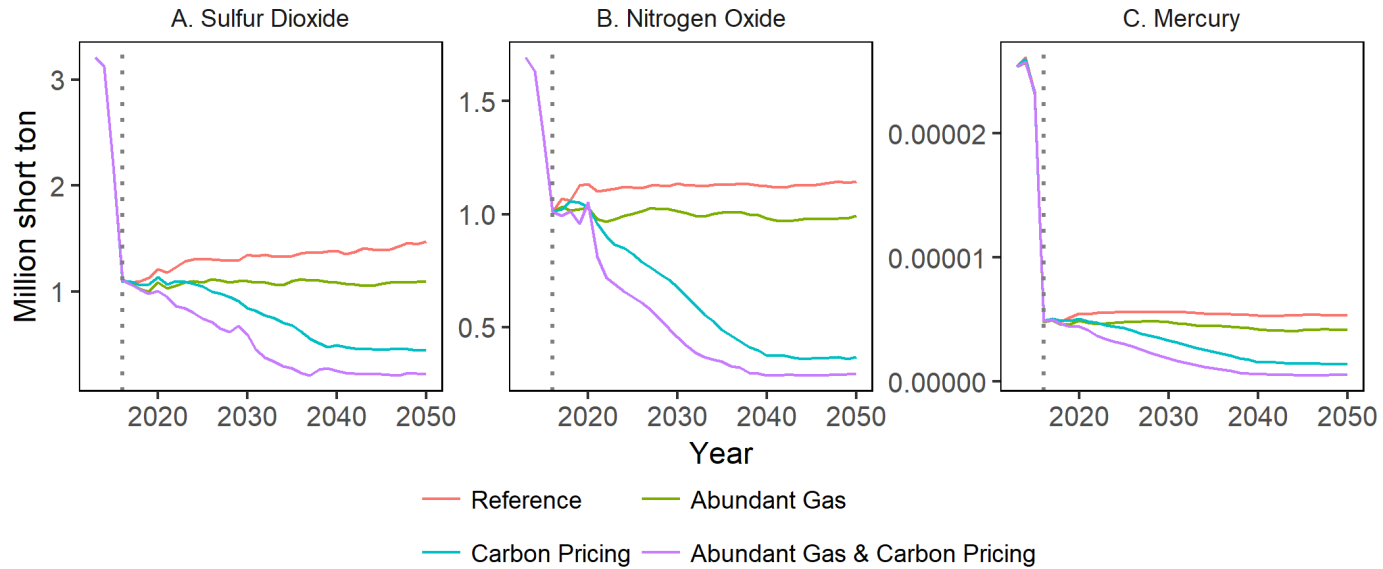
- Reference (AEO2017 without Clean Power Plant)
 - Published by EIA in January 2017
- Abundant Natural Gas
 - Potential Gas Committee (PGC) estimates for natural gas resource: 2,817 Tcf, much more than the Reference
- Carbon Pricing
 - A moderate carbon tax, increasing linearly to \$46/ton CO₂ in 2040
- Abundant Natural Gas & Carbon Pricing

Primary results - CO₂ emissions

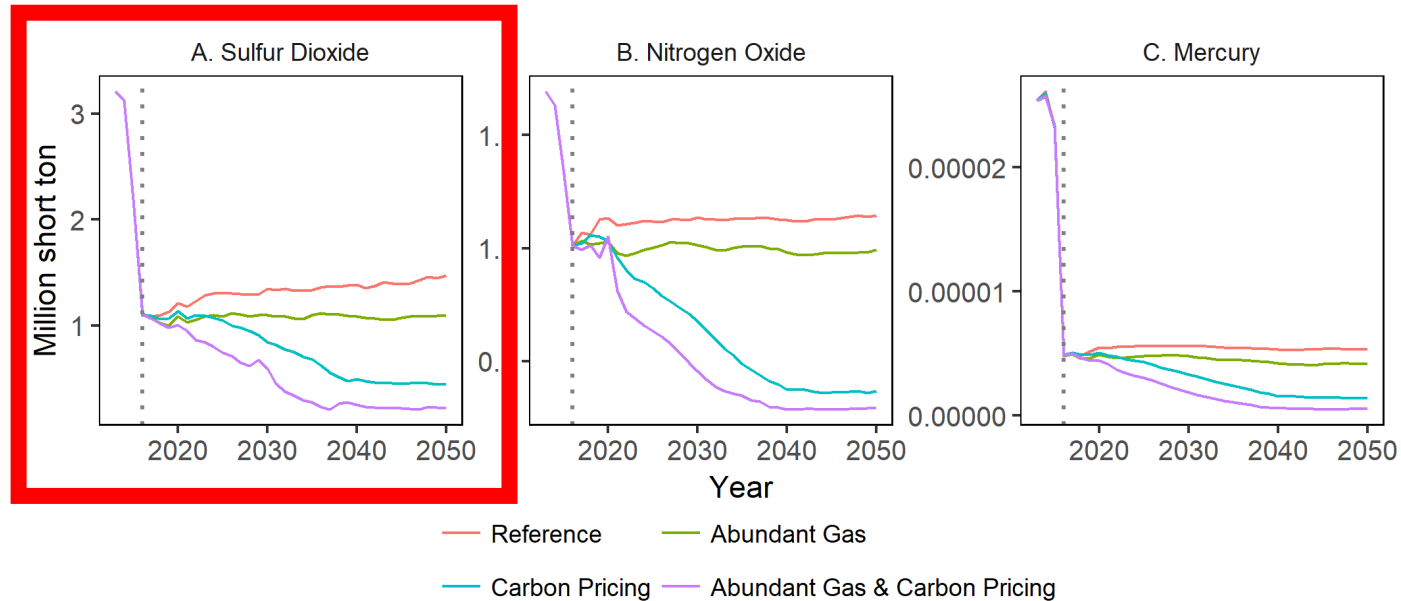


- The Carbon Pricing scenarios leads to substantially lower CO₂ emissions largely due to substitution from coal to natural gas and renewables
- CO₂ emissions in the Abundant Natural Gas scenario are very similar to emissions in the Reference case

Primary results - Pollutant emissions



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- Emissions decline in the Abundant Natural Gas and Carbon Pricing scenarios relative to the Reference case largely due to drop in coal consumption
- The lowest time path of emissions is the Carbon Pricing with Abundant Natural Gas scenario

Welfare implications

- National summary of change in welfare (unit: billion 2016\$)

	Abundant Gas vs. Reference		Carbon Pricing vs. Reference		Abundant Gas & Carbon Pricing vs. Reference	
	2030	2050	2030	2050	2030	2050
Change in consumer benefits	53.11	106.90	-98.78	-247.64	-46.86	-125.24
Change in producer benefits	-9.01	-10.77	-2.46	-5.24	-8.30	-22.43
Benefits from reducing CO ₂	1.94	-0.96	148.80	292.30	152.93	289.17
Benefits from reducing other pollutants	3.18	4.74	7.57	15.19	13.05	18.87
Total	49.23	99.91	55.12	54.61	110.81	160.36

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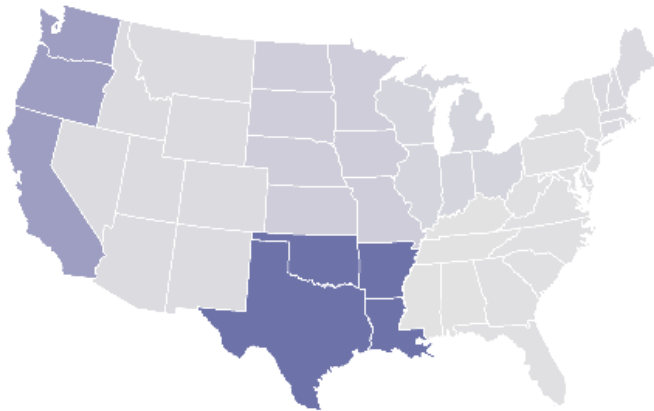
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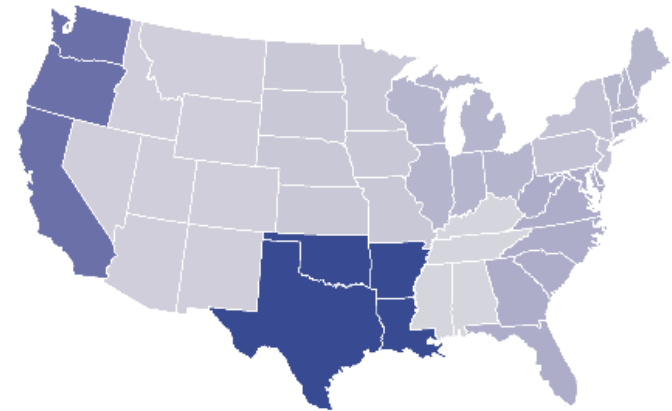
Regional welfare

Abundant Gas scenario vs. Reference

Reference - 2030



Reference - 2050



Bottom-line takeaways

- Abundant natural gas should not be seen as a “bridge” to a low-carbon future, but rather as a source of welfare improvements
- Abundant natural gas can provide substantial benefits from reduced local air pollutants
- While almost all regions gain, the welfare benefits are heterogeneous across regions