

An Unavoidable Truth

inconvenient or not

There is No Climate Solution without Low-Carbon Coal

Globally, coal is the fastest growing fuel of the 21st century. According to the *World Energy Outlook 2014* of the International Energy Agency (IEA), in every scenario used to forecast the future, coal will remain a primary source of energy for decades to come, both within the United States and around the globe. While coal may lose market share to other fuels over time, it will nonetheless remain a dominant and vital source of energy.

Simply put, coal cannot and will not be wished away. As a result, we have no choice but to learn to manage the carbon in coal if we are to have any hope of slowing, stopping, and reversing the growth in global CO₂ emissions. That is an unavoidable truth, inconvenient or not – there is no path forward to a clean, low-carbon world without clean, low-carbon coal.

No matter how you slice or dice the numbers, there is no getting to a climate solution without the development and deployment of fossil-based carbon-mitigating technologies such as carbon capture and use/storage (CCS).

Zero Out Coal Use in the Developed World

NOT ENOUGH

Under the IEA's Current Policies Scenario, worldwide consumption of coal will increase 51% between 2012 and 2040, rising 2% in developed (OECD) nations and 68% in developing and emerging (non-OECD) economies. Over the same time period, global CO₂ emissions will rise 47%.

Setting aside any sense of reality...

- If the United States were to stop burning coal tomorrow – and all of that coal power were replaced by zero-carbon fuels (i.e., **not** natural gas) – global CO₂ emissions would still rise 41%.
- If the entire developed world, including the United States, were to stop burning coal tomorrow, global CO₂ emissions would still rise 35%.

A 47%, 41%, or 35% *rise* in global CO₂ emissions between 2012 and 2040 is not a climate solution. Under the IEA's climate-stabilizing 450 Scenario, global CO₂ emissions must *decline* 38% between 2012 and 2040.

In other words, **even making a fantastical assumption that coal use in the developed world can be zeroed out leaves a yawning gap between where we would be under the IEA's Current Policies Scenario and where we would need to be under its climate-stabilizing 450 Scenario.** The climate challenge will be won or lost in the developing world, irrespective of what the developed world may do directly on its own.

Zero Out Coal Use in the Developed World & Stop Building New Coal in the Developing World

STILL NOT ENOUGH

Under the IEA's 450 Scenario, global CO2 emissions must be 8% lower in 2040 than they were in 1990 for the world to be on a 2-degree climate stabilization pathway. Yet, the IEA's Current Policies Scenario projects both coal consumption and CO2 emissions from coal *in the developing world alone* will be 2x greater in 2040 than total global coal consumption and CO2 emissions from coal in 1990. Moreover...

- Coal consumption *in the developing world alone* in 2012 – an actual, historical number that cannot be changed – was 28% greater than global coal consumption in 1990.
- CO2 emissions from coal *in the developing world alone* in 2012 were 21% greater than total global emissions from coal in 1990.

In other words, **even if (a) coal use in the developed world is completely zeroed out, (b) no new coal is built in the developing world going forward, and (c) all coal built in the developing world since 2012 is torn down – the world would still be burning more coal today and emitting more CO2 from that coal consumption than we were in 1990, and more than would be allowed in 2040 ... even allowing for a number of ridiculously fantastical assumptions.**

Meeting the climate challenge will not come from unrealistically hoping or wishing coal away, but from committing ourselves to accelerating the rapid development and broad deployment of technologies to manage the carbon in coal (and other fossil fuels).

Are Coal & Climate Action Compatible? **YES!**

Under the IEA's climate-stabilizing 450 Scenario, worldwide demand for coal is 16% higher in 2040 than in 1990. Global coal consumption keeps growing, and although the more rapid growth of other fuels causes its market share to decline, **coal remains the third-largest source of energy in the world in 2040.**

How is it possible for a high-carbon fuel such as coal to play any role, let alone such a prominent role, in a low-carbon world? By becoming a lower-carbon fuel – lower in CO2 emissions per unit of energy than both oil and natural gas in 2040.

| World Energy Outlook 2014 (IEA) | 1990 market share actual | change in demand 1990 to 2040 | 2040 market share 450 Scenario |
|---------------------------------|--------------------------|-------------------------------|--------------------------------|
| E | 100% | + 78% | 100% |
| Coal | 25% | + 16% | 17% |
| Oil | 37% | 0% | 21% |
| Natural Gas | 19% | + 108% | 22% |
| Fossil Energy | 81% | + 30% | 59% |
| Nuclear | 6% | + 219% | 11% |
| Hydro | 2% | + 225% | 4% |
| Bioenergy | 10% | + 180% | 16% |
| Renewables (non-hydro) | 0% | +4139% | 10% |

In the 450 Scenario, coal's carbon emissions per unit of energy are 53% lower in 2040 than 1990. How is that possible? The answer – CCS. In the 450 Scenario, 580 GW of coal-fired generating capacity – exactly twice the size of the U.S. coal fleet today – is equipped with CCS, with 80% of all coal-fired electricity coming from CCS-equipped plants. Moreover, 22% of all gas-fired generation also comes from CCS-equipped plants in 2040.) **The absence of CCS would leave a gaping hole in the IEA's 450 Scenario, and every other realistic climate strategy.**

Climate Stabilization (450 ppm) without CCS?

THE GLOBAL COST MORE THAN DOUBLES

According to the Intergovernmental Panel on Climate Change (IPCC), "stabilizing the climate" (i.e., keeping atmospheric concentrations of greenhouse gases at 450 ppm CO2 equivalent) in the year 2100, without CCS vs. with CCS, would more than double the cost (+ 138%) – an increase so great as to call into question the viability of such a scenario.

CCS is not an option, it's an imperative ... and that's an unavoidable truth, inconvenient or not.