



Powering the Working World.

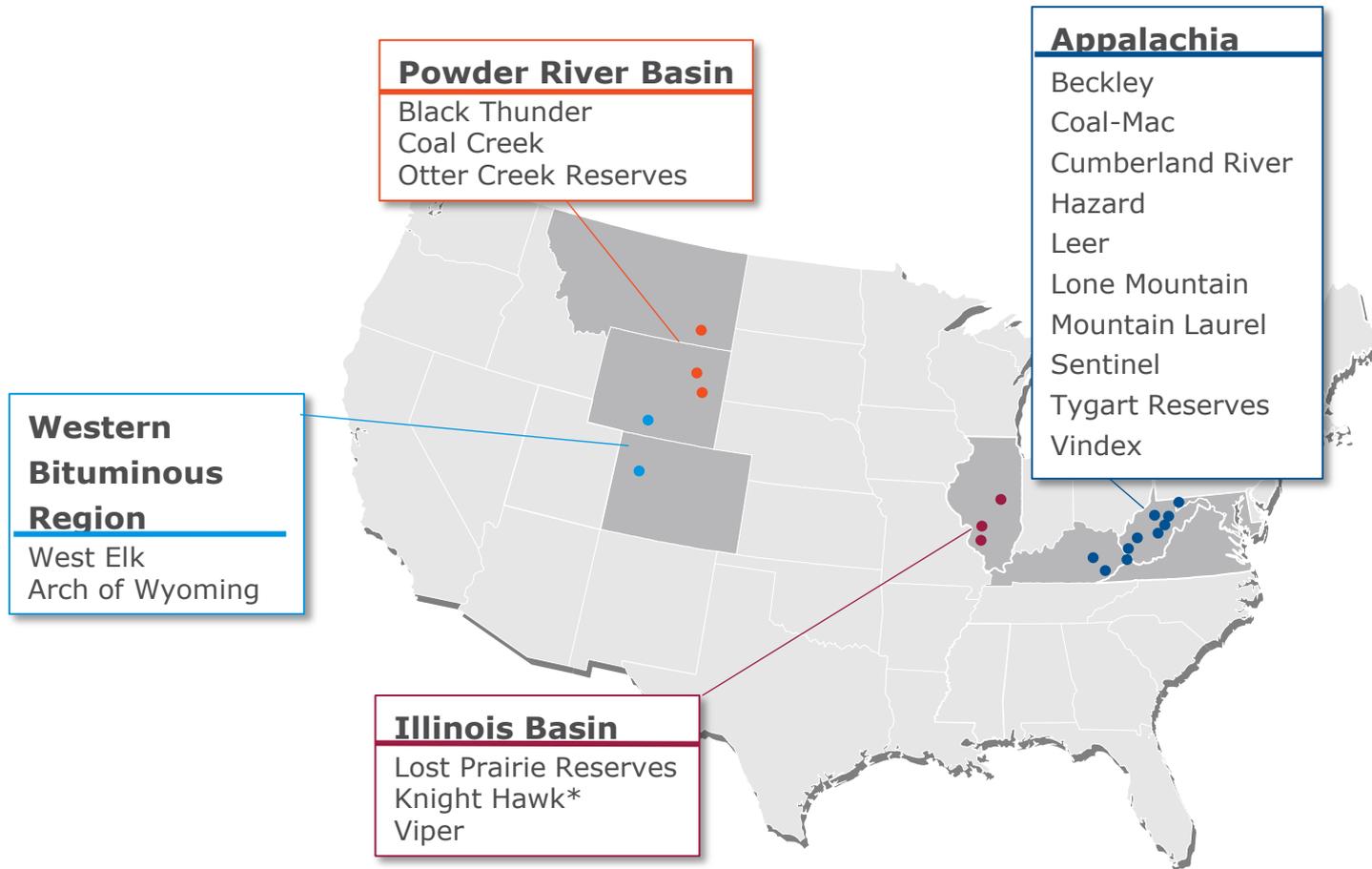
Meeting the Climate Challenge

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Charleston, West Virginia | December 17, 2013

Arch is the nation's second largest coal producer, with a significant focus in West Virginia

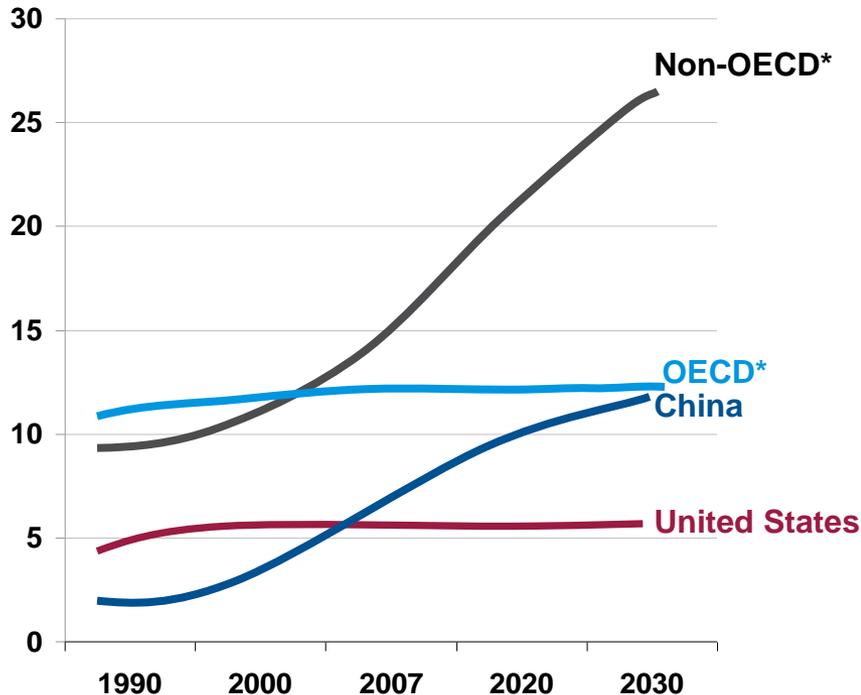


*49% equity interest

The developed and developing world must work together to address climate concerns

CO₂ Emission Trends

(in giga-tonnes of CO₂)



- Rapid increases in CO₂ emissions in emerging Asia underscore the need for global solutions
- China is now the largest emitter of CO₂ and the developing world has surpassed the OECD nations in total emissions

What's driving this huge increase in GHG emissions in the developing world?



- Asia is developing rapidly, led by China
- Urbanization in China has just crossed over 50%, so more growth is coming
- China alone expects to add 300 million people to the middle class over the next 15 years

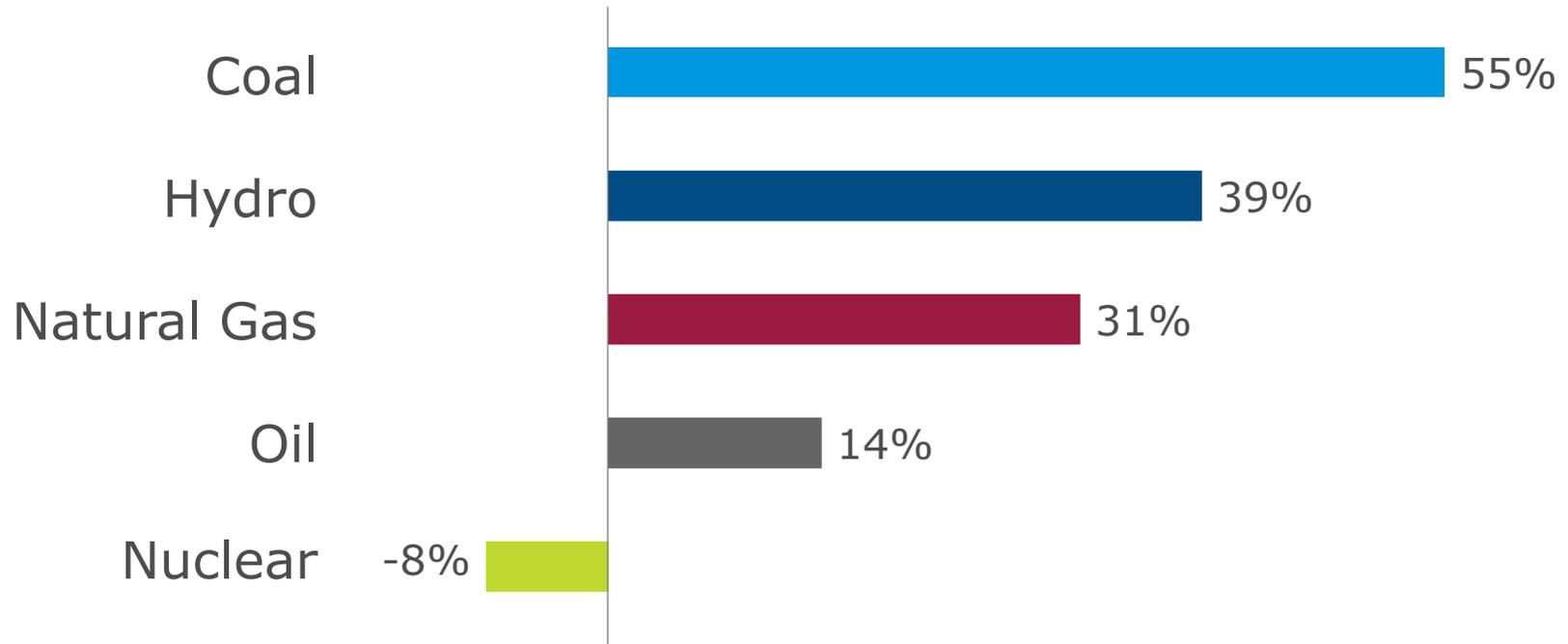


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- Meanwhile, in other parts of the emerging world, 1.3 billion people lack any access to electricity
 - 3 billion people lack clean cooking facilities
 - The challenges of climate change and energy poverty are inextricably entwined

Coal has been the world's fastest-growing major fuel source for more than a decade

Change in Global Energy Consumption between 2002 and 2012

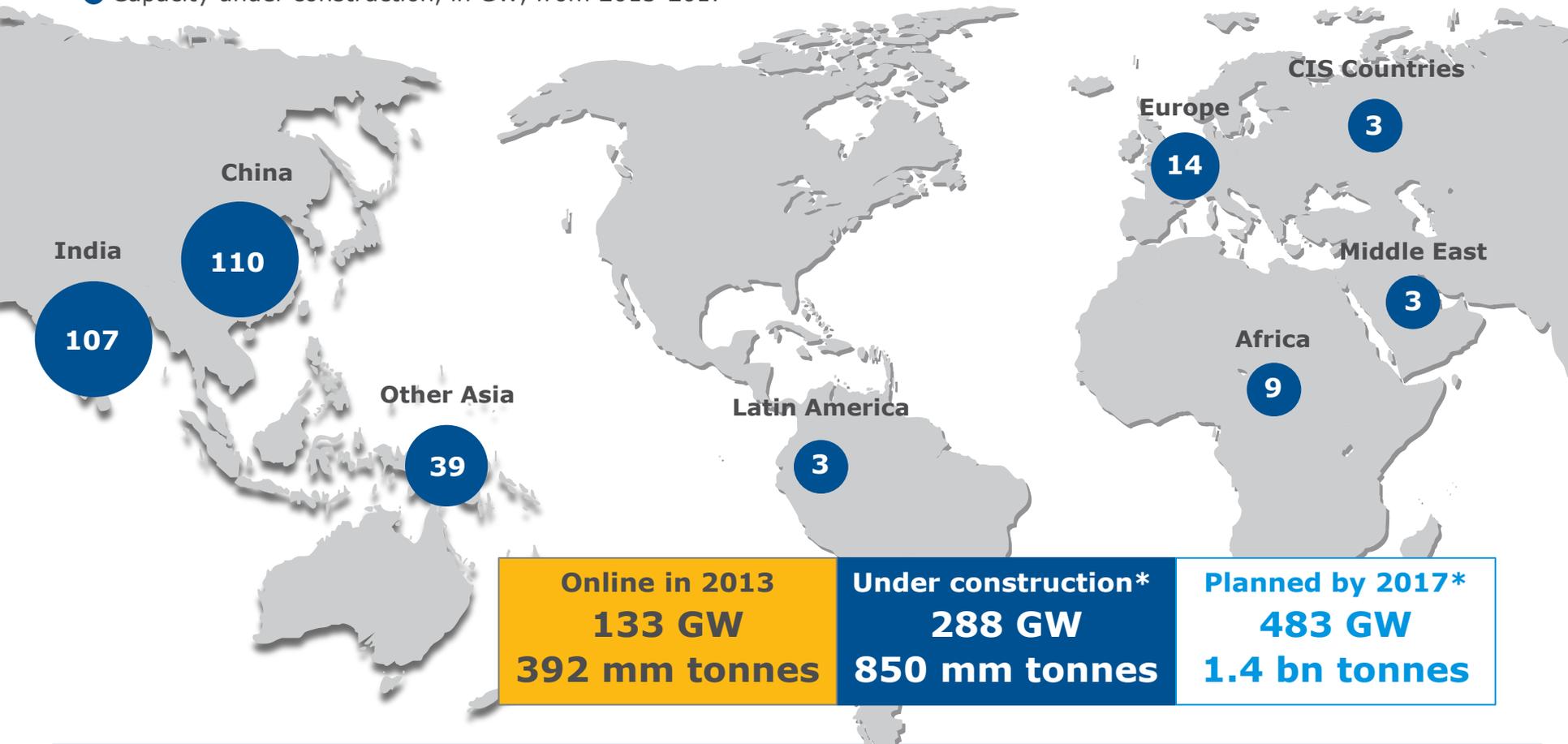
(percent change based on millions of tonnes of oil equivalent)



The build-out of coal-based capacity is continuing

New Coal-Fueled Generation Coming Online by 2017

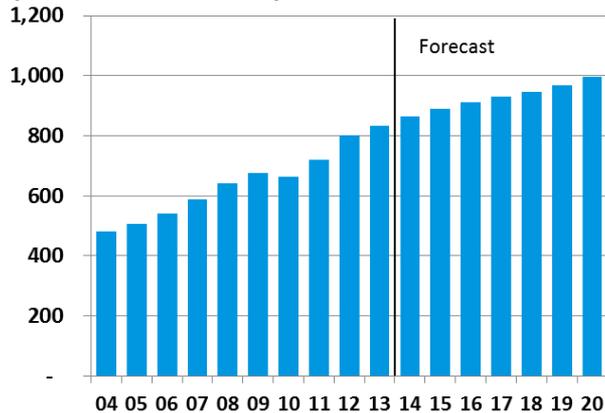
● Capacity under construction, in GW, from 2013-2017



Coal consumption in Asia continues to climb, with other nations following China and India's lead

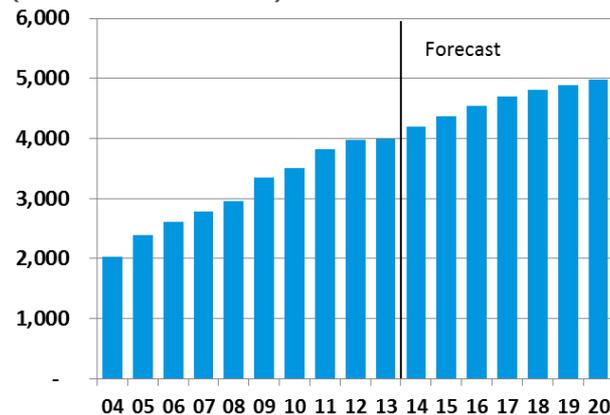
India coal consumption

(in millions of tons)



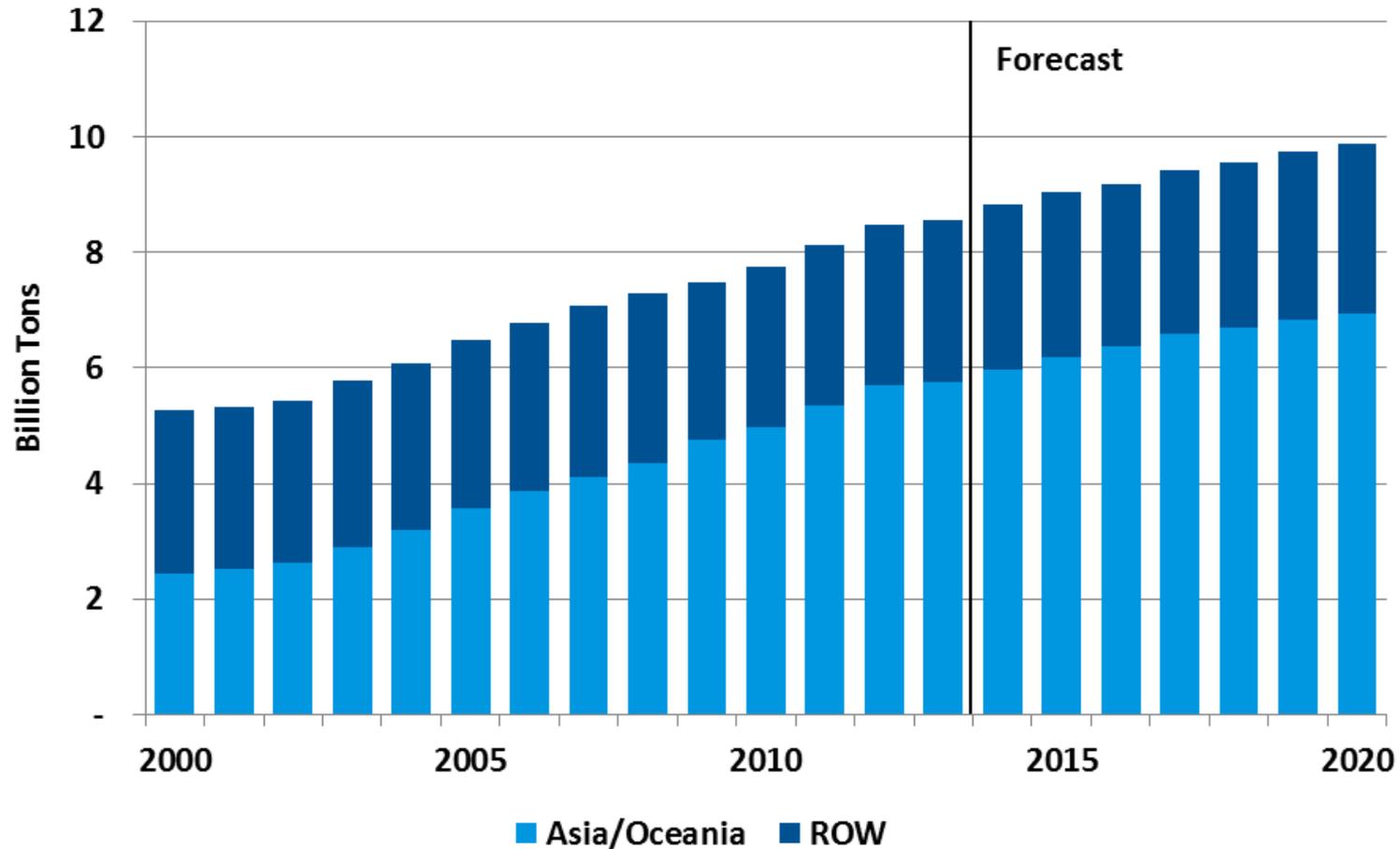
China coal consumption

(in millions of tons)



- The IEA projects that coal consumption in Southeast Asia will triple by 2030
- Vietnam plans to add more than 30 GWs of coal-based capacity this decade
- Thailand's energy agency expects power demand to double by 2030, and views coal as a lower cost and more secure option than LNG
- Japan's coal use rose 15% in 2013, and two new coal plants are scheduled to come online soon

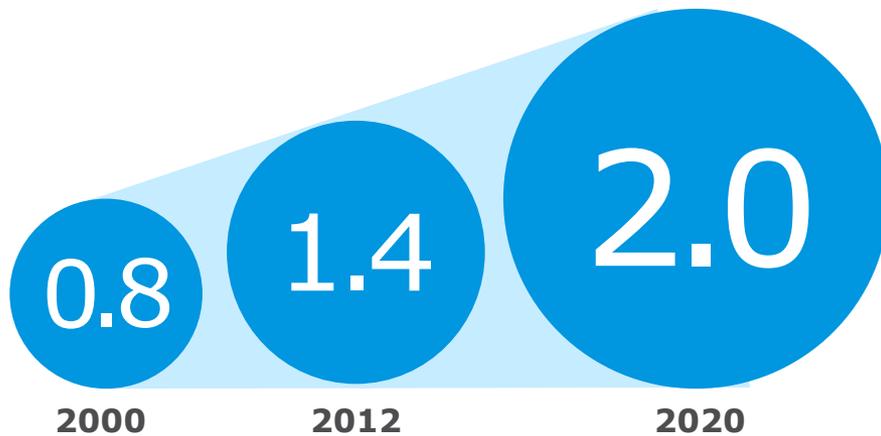
Global coal consumption is projected to continue to climb, despite relatively flat demand in the West



Industrialization and urbanization are also lifting the demand for steel ... and thus met coal

World Steel Production

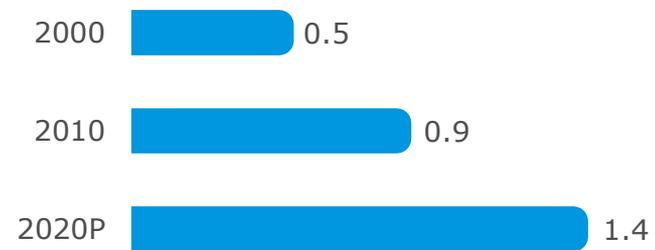
(in billions of tonnes of crude steel)



World steel consumption is also projected to increase significantly during the remainder of the decade and beyond

Global Metallurgical Coal Use

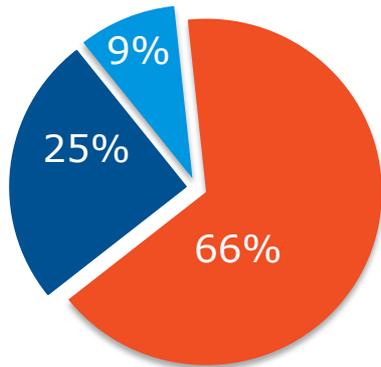
(in billions of tonnes of coal)



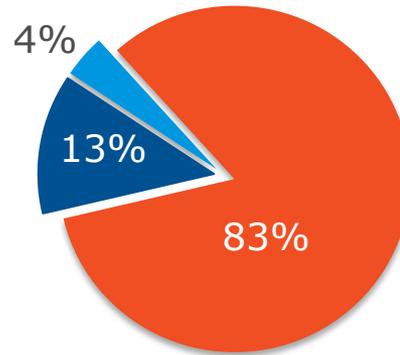
Demand for met coal will be driven by increased utilization at existing steel plants and the projected build-out of new steel capacity

In the U.S., the story is very different ... with one third of all coal-based units expected to retire

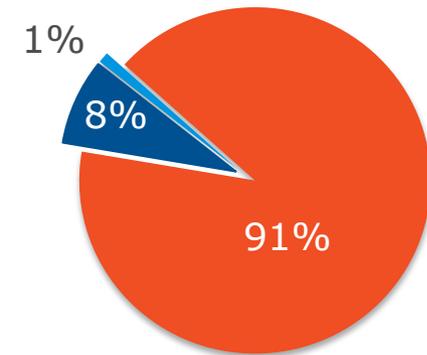
Number of units



Installed capacity



Coal consumption in 2012



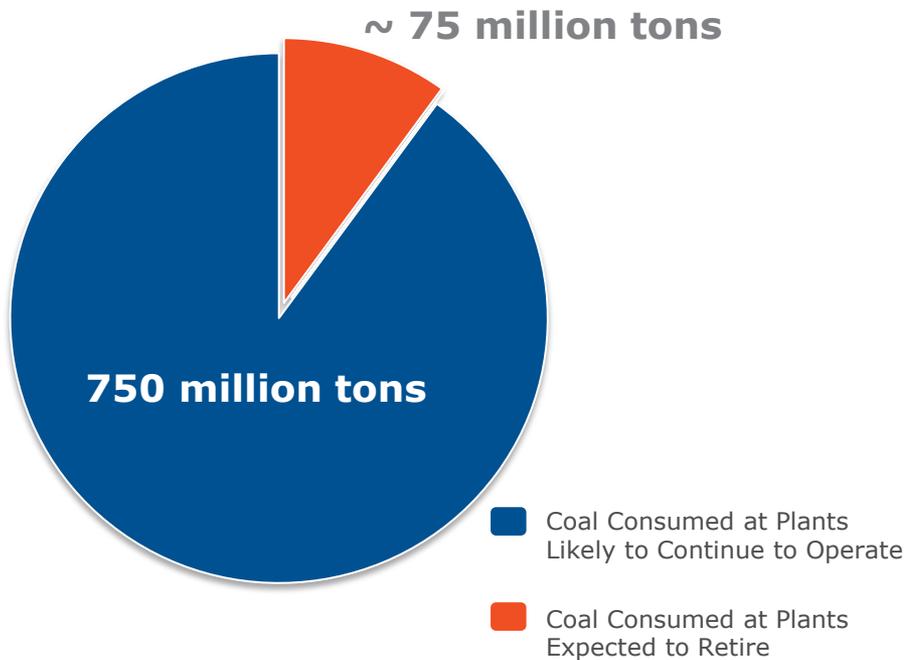
 Likely to Continue

 Likely to Retire

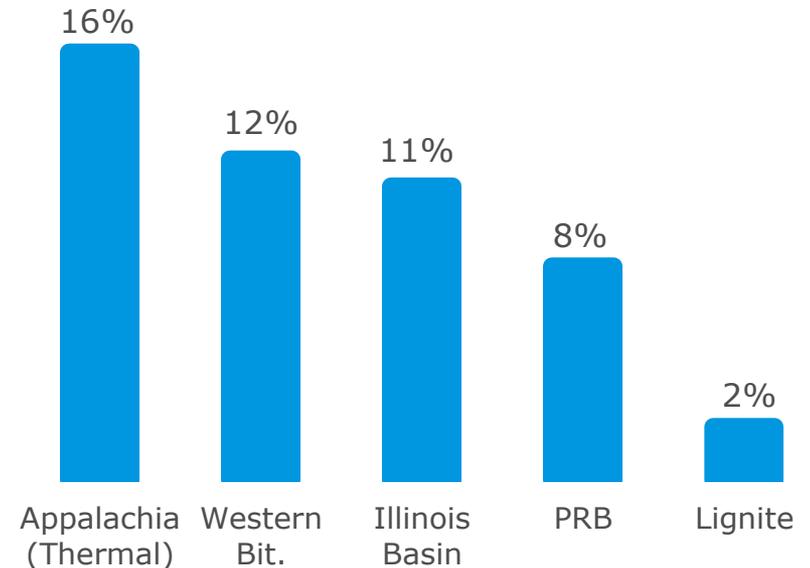
 Retired

In total, we expect that 55 GWs of capacity will retire by 2018 ... and that Appalachia will be disproportionately affected

Coal Consumption for Power Generation
(based on 2012 data)



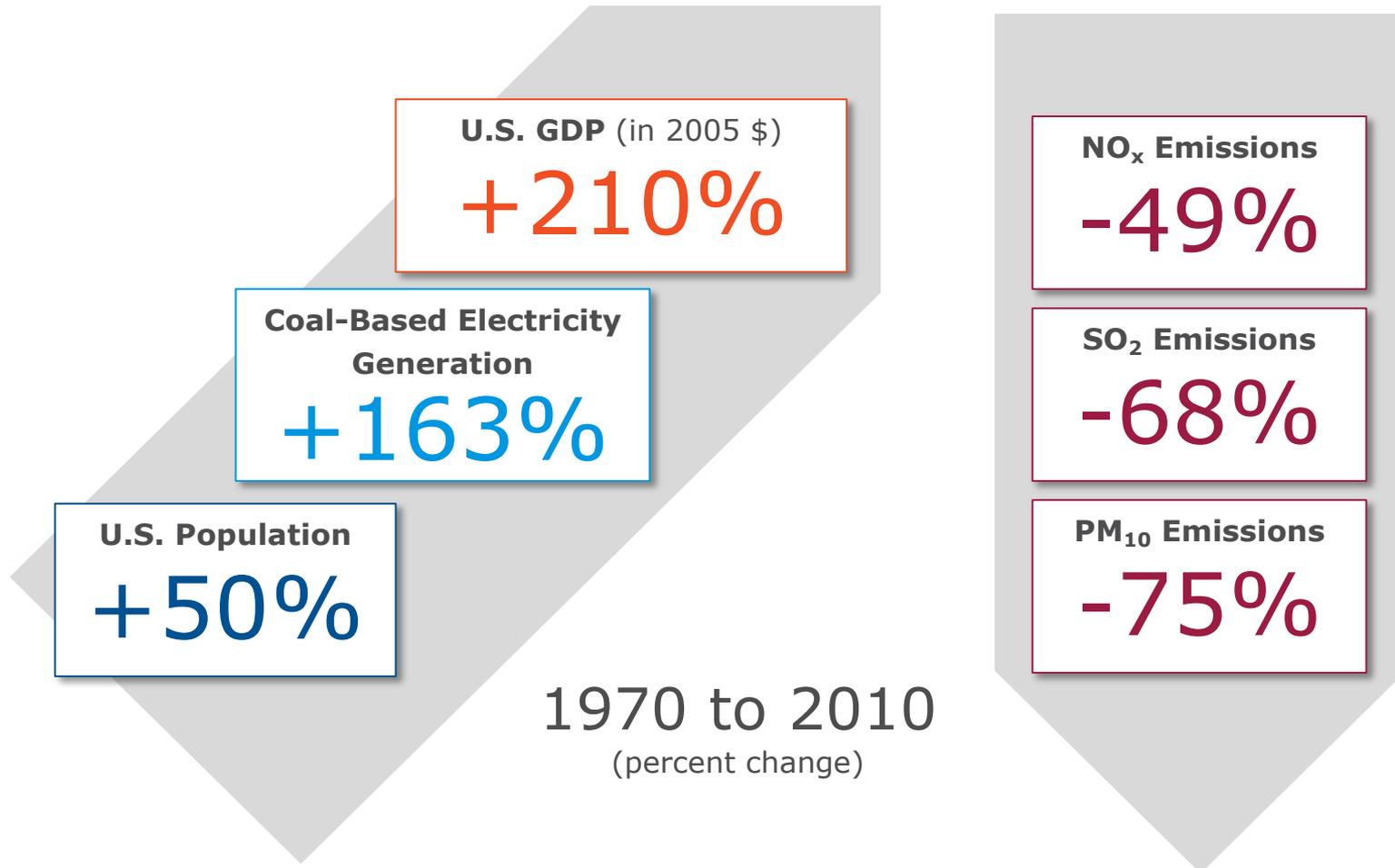
Percentage of Each Basin's Total Supply that was Delivered to At-Risk Plants in 2012



Energy markets are highly dynamic ... and thus there is great value in fuel diversity

1	Late 1990s	<ul style="list-style-type: none">• Natural gas plants in favor due to perceived “gas bubble”• Nuclear viewed as politically infeasible• Coal’s growth limited to higher utilization at existing base
2	Early 2000s	<ul style="list-style-type: none">• As natural gas prices rose, it fell out of favor• Coal became the fuel of choice, with 100 GW to be built• Nuclear remained on the sidelines
3	Mid 2000s	<ul style="list-style-type: none">• Climate concerns tempered coal’s growth• Natural gas viewed as too expensive and too volatile• Nuclear gained significant traction
4	Late 2000s	<ul style="list-style-type: none">• Nuclear renaissance gave way to Great Recession• Shale gas emerged; natural gas back in the spotlight• Challenge of rapid renewables build-out became clear
5	Early 2010s	<ul style="list-style-type: none">• Shale gas bubble hurts renewable build-out• Fukushima disaster and high costs set back nuclear• Coal retirements begin; will sentiment change again?

The U.S. power industry has a highly successful record of air quality improvements on which to build



We are confident we can achieve the same success with GHGs ... but it won't happen overnight



- Each aspect of carbon capture, utilization and storage (CCUS) has been demonstrated, but not in an integrated system
- Two such plants – Kemper County and Boundary Dam 3 – are scheduled to come online during 2014
- As first-of-kind projects, they were subsidized ... and expensive
- Still, their start-up represents real progress – and provides further evidence that large-scale deployment is possible

The key to success is investment rather than an overly aggressive and premature regulatory regime



- EPA is requiring that any new coal plant built in the U.S. be equipped with CCUS
- There are 7,200 coal-based power units operating worldwide – none with CCUS
- Unachievable standards for coal plants will drive fuel-switching, not technology deployment
- Investment will spur far more progress than overly ambitious regulations
- To have this important technology available by mid-century, we need more investment, not less ... and we need to start soon

The path to the future

- We cannot address climate concerns unilaterally ... and we cannot shrink our way to a low-carbon future
- There is no realistic path to a low-carbon future without a low-carbon fossil fuel solution
- Technology can and will provide that solution
- Investment is the key to moving technology forward ... not regulation
- CCUS is an essential mitigation tool, and we need to accelerate our efforts so that it is ready for large-scale deployment during the 2020s



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