

# Transforming the Global Energy Environment



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In the wake of the December 2015 COP meeting in Paris the world will be confronted by a host of energy and environmental policy issues on how to meet the burgeoning projected energy demand for the next 20 years.

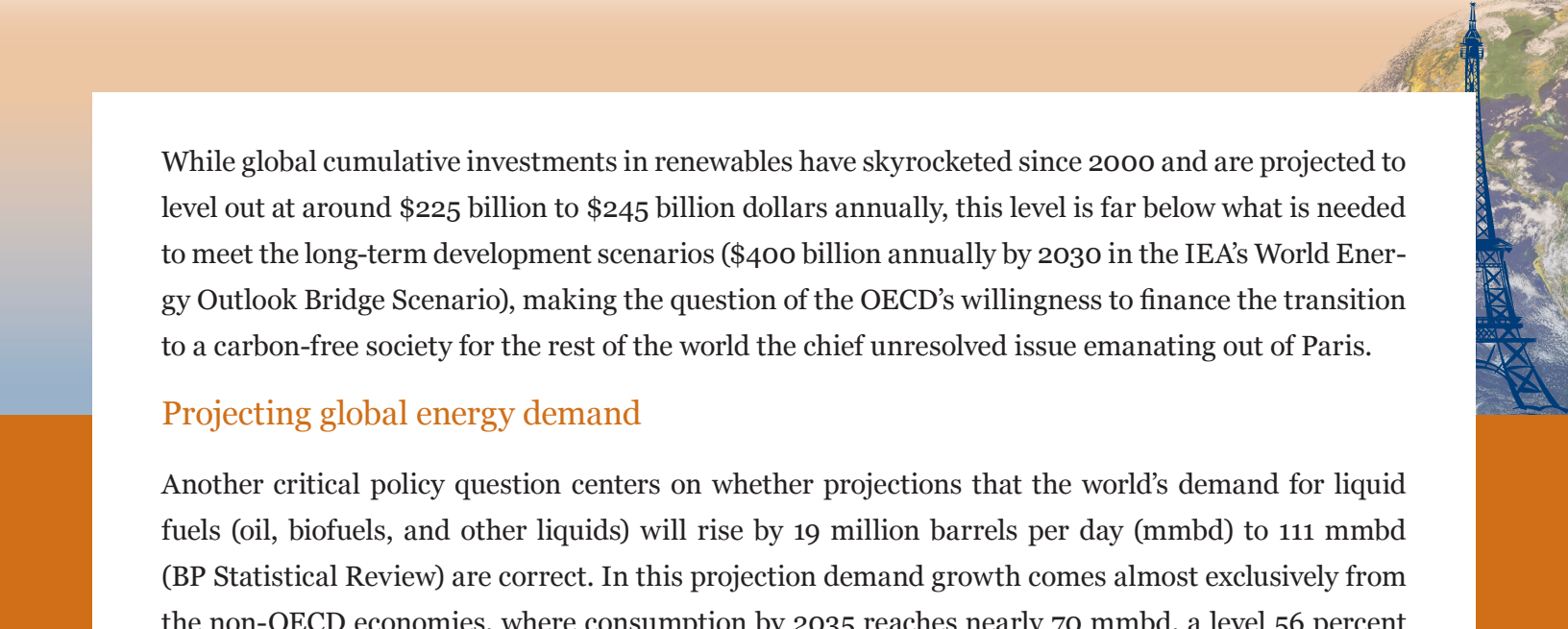
While there will be much talk about the role that the current 162 announced Intended Nationally Determined Contributions can play in holding future temperature increases to the global target of 2 degrees Celsius, in reality, the world is already well beyond any chance of meeting this target. According to Christina Figueres, executive secretary of the UNFCCC, even if all the Intended Nationally Determined Contributions (INDCs) are implemented the world would still be on a trajectory toward 2.7 C.

A world that is 3 degrees warmer will witness a significant drop in food production, an increase in urban heat waves (equivalent to the one that killed thousands of people in India), and more droughts and wildfires, according to Oxford physics professor Ray Pierrehumbert. A warmer world will witness more climate refugees. In this regard it is worth remembering that the Syrian crisis commenced as an environmental crisis.

Global climate change is leading to an accelerated thawing of the permafrost, at a rate far in excess of any existing climate models. Scientists estimate that by 2100 melting permafrost around the world could release as much as one-half the amount that the U.N. Intergovernmental Panel on Climate Change believes gives a 66 percent chance of making it impossible to keep the warming of the earth under 2 C apace.

## Financing challenges

While historically from 2007-2013 over 60 percent of global investment in renewable energy occurred in the OECD nations, this trend appears to be shifting dramatically. The International Energy Agency now predicts that between 2014-2020 countries outside the OECD will account for 53 percent of total renewable investment, with China alone accounting for 30 percent of global cumulative investment.



While global cumulative investments in renewables have skyrocketed since 2000 and are projected to level out at around \$225 billion to \$245 billion dollars annually, this level is far below what is needed to meet the long-term development scenarios (\$400 billion annually by 2030 in the IEA's World Energy Outlook Bridge Scenario), making the question of the OECD's willingness to finance the transition to a carbon-free society for the rest of the world the chief unresolved issue emanating out of Paris.

### Projecting global energy demand

Another critical policy question centers on whether projections that the world's demand for liquid fuels (oil, biofuels, and other liquids) will rise by 19 million barrels per day (mmbd) to 111 mmbd (BP Statistical Review) are correct. In this projection demand growth comes almost exclusively from the non-OECD economies, where consumption by 2035 reaches nearly 70 mmbd, a level 56 percent higher than in 2013. In this same period, OECD demand is projected to fall to around 40 mmbd, a level not seen since 1986.

While forecasts by OPEC, other oil companies, prominent consulting firms, and governments are a bit lower for 2035, almost all of them see robust growth in oil demand cumulatively adding anywhere from 12 to 19 mmbd of oil demand in the 2035 to 2040 period. Although not directly related to climate change, a major question is: Where is this volume of oil likely to come from?

Since the key known areas that could produce this oil are Iraq, Iran, the Orinoco Tar belt of Venezuela, the pre-salt offshore fields in Brazil, Saudi Arabia, the Arctic, and the deep offshore, there is little reason to be sanguine that this amount of oil will be produced unless political conflict can be overcome and prices rise to a level that justify production (\$90 or more) in these frontier regions. However, if this oil is not produced and we do not find a means to back out oil demand especially in fast-growing transportation sectors in non-OECD markets, global economic growth could be seriously impeded.

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While some renewable proponents argue that a combination of advanced biofuels, wind, solar, and enhanced efficiency will lead to the development of electric cars and replacing fossil fuels in electric generation, it is time to bring some reality into this debate. Currently in the United States there are only 330,000 hybrids and pure electric vehicles on the market out of a total vehicle fleet of over 260 million vehicles running on gasoline and diesel fuel. It is time to address scalability issues in earnest and stop wishing for a sectorial transformation that is at best several decades away.



The projected growth in fossil fuel consumption in the emerging markets of the world raises the critical question of how we deal with these market realities and also the emerging global consensus that we must act to address climate change. Increasingly there are clarion calls that the world cannot allow this amount of oil—as well as skyrocketing volumes on a global basis of coal, natural gas, and biofuels—to be burned, or there is no hope to keep temperatures from rising above 2 C. There are also movements for university endowments and public pension funds to divest fossil fuels stocks. Most alarmingly from an industry perspective is a view among some Wall Street analysts that the value of fossil fuel stocks should be downgraded since many of their reserves may never be allowed to be burned.

Another critical question for after the Paris meeting is whether investments in alternative energy sources and new transformative technologies such as large-scale battery storage could cut these pro-

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jections for oil consumption growth by half or more. However, for this to happen the consumption of all fossil fuels would have to be seen as socially and politically unacceptable. In addition there would have to be massive investments above those already projected in renewables, distributed electric generation, enhanced energy efficiency, the development of completely different automotive technologies, carbon capture and sequestration (CCS) for both gas and coal, advanced large-scale battery storage technologies, and new small-scale, or modular, fission reactors based on completely different technologies than the light water reactor.

A shift in investment policies away from traditional fossil fuels (i.e., oil, gas, coal) and their attendant delivery systems (pipelines, long distance transmission lines) on a global basis could create hundreds of billions of dollars of stranded investments.

In summary, while the euphoria going into Paris is commendable it is vital as we come out of meeting that we as a global society make a somber assessment of what technologies are scalable, and that we keep as diversified an energy portfolio as possible and live up to whatever financial commitments are promulgated.