

CHAZEN INSTITUTE RESEARCH BRIEF

# The Path to Decarbonizing Energy

## KEY TAKEAWAYS

- ✓ Decarbonizing power generation is much less expensive than most people think. An annual investment of \$6.1 billion would allow the US electricity generating sector to reach net-zero emissions by 2050.
- ✓ Switching consumers from fossil fuels to clean energy will require global utilities to rethink how they price electricity.
- ✓ While a carbon tax is an attractive idea in principle, it would have to be set at an astronomical level to achieve the desired results. A more plausible proposal would be to establish a universal equivalent of direct subsidies, renewable portfolio standards, and feed-in tariffs that have been implemented in the US and the EU.

The global energy transition is underway. Coal and gas, two of the greatest contributors of CO<sub>2</sub> emissions, are no longer the cheapest energy sources. Renewable energy prices are plunging. In some locations, wind and solar are now as little as one-third the cost of coal. Investments in clean energy are pouring in, set to reach nearly \$3 trillion this decade. So what is stopping us from achieving total decarbonization?

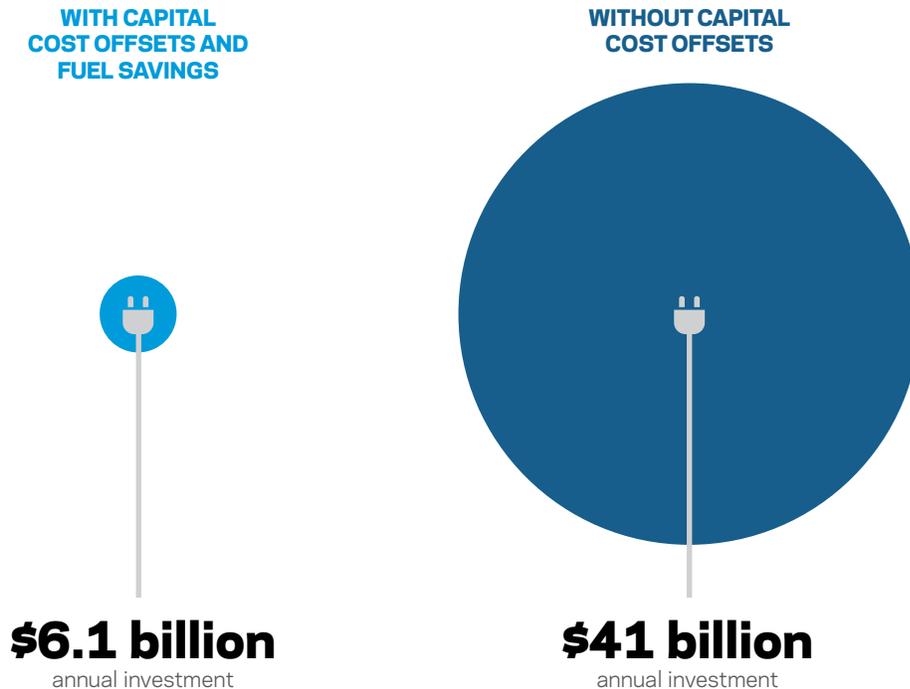
In “[Economic Aspects of the Energy Transition](#),” **Chazen Senior Scholar Geoffrey Heal** outlines three major barriers to the decarbonization of electric power generation on a global scale: the overall price tag, tax policy, and the cost to consumers.

## How much will the energy transition cost economies?

Heal calculates the cost for the United States to transition to a carbon-free power sector by 2050, explaining what exactly should be charged to the transition as opposed to the normal operation of the energy system. He takes the US Energy Information Agency current costs, as of mid-2019, and projects these costs forward.

The likely net investment required is US\$179 billion, Heal estimates. On an annualized basis, the investment would amount to \$6.1 billion from 2021-2050, assuming the US completes the transition to renewable power by 2050. This calculation includes offsets from fuel savings as the US will no longer need to buy coal or gas in a carbon-free economy. It also includes capital cost offsets, reflecting the fact that many coal plants in the US will need to be replaced

## US Cost to Transition (2021-2050)



before 2050, and estimated costs for battery storage and the grid. Taking out the capital cost offsets, the



**\$361 - \$888 billion per year**

The estimated cost of pollutants in the US

annual net investment would rise to \$41 billion. By comparison, Heal points out that the cost of pollutants in the US has been estimated at between \$361 and \$888 billion per year. So the US economy might end up saving money in the long-run by transitioning to clean energy.

What about the rest of the world? Heal says the same analysis applies, but notes that fossil fuels are more expensive in most countries, whereas renewable costs are much the same. That means renewable energy is even more competitive in those countries than in the US. In fact, countries like Denmark and Sweden are actually making more progress toward decarbonization than the US.

### What steps can governments take that will be politically palatable?

One of the most widely debated policies for reducing consumption



**The US economy might end up saving money in the long-run by transitioning to clean energy.**

of and emissions from fossil fuels is a carbon tax. Heal calculates that a tax that reduces oil consumption by 50% would be about \$575 per ton CO<sub>2</sub>, which translates into a tax of \$201 per barrel of oil or \$4.9 per gallon of gasoline, more than doubling the current US retail prices of gasoline. Therefore, a tax high enough to be effective in reducing oil

demand would likely be too high to be politically acceptable. A case in point is the political fallout in France from attempts to raise fuel prices, known as the “Mouvement des Gilets jaunes” or yellow vests movement.

Heal explores alternative policies that might be more politically feasible. He notes that, in the US, a combination of federal tax subsidies (production and investment tax credits) plus state-level renewable portfolio standards have worked well. In the EU, feed-in tariffs have driven rapid adoption. Similar measures could be adopted across the world to dissuade dependence on fossil fuels.

Fuel efficiency standards in the US and the EU have also proven politically viable and environmentally effective. Heal notes that direct subsidies for switching from a fuel-powered to electric-powered vehicle could be another approach — one that goes beyond power generation to address decarbonizing transportation.

## What will the shift to clean energy cost consumers?

The final piece of the power puzzle is electrification, or replacing electricity generated from fossil fuel sources (e.g. internal combustion engines, oil and gas heating) with renewables. Heal notes that, with current electricity tariffs, electrification from non-fossil sources would be outrageously expensive and impossible to sell politically. To provide the right incentives and ensure efficient use of electricity, prices would need to be near marginal cost, which for renewable

energy is close to zero, posing problems for funding of fixed-cost-intensive renewable energy.

At a time in which global utilities from California to Germany are increasingly facing bankruptcies, clean electrification presents a massive



### **Direct subsidies for switching from a fuel-powered to electric-powered vehicle could provide a path beyond clean power generation to address decarbonizing transportation.**

challenge that will require utilities to rethink how they price electricity. Heal predicts a shift in the utility business model to an unbundled energy cost, in which companies price electricity at cost and separate out the cost of maintaining the grid. There is a role for governments to play in that process: paying for infrastructure for the grid through subsidies.

Electrification would be the final step in the transition to carbon-free energy — from generation to consumption — and perhaps the greatest obstacle for the industry yet.

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