Cost of Electrification: A State-by-State Analysis

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Executive Summary

This Report estimates the capital cost associated with "electrification" in the forced transition to a "net zero" energy system in individual states and the entire United States. For the context of this report, electrification means converting the entire economy to use electricity instead of fossil fuels. This includes all appliances in residential and commercial buildings, as well as every transport vehicle.

Electrifying the entire nation, with a goal of *eliminating the direct consumption of fossil fuel would cost* ***at least $29 trillion*** *in first costs*, or more than a year's worth of GDP – without accounting for financing; future repairs, replacements and other ongoing costs; or the value of stranded fossil fuel assets. An additional $7 trillion would be needed to build a system robust enough to ride out severe winter weather.

Constructing and implementing an "all-electric" nation will also require careful consideration of two other significant costs: stranded assets[1] and deadweight losses.[2]

The cost per ton of reduced carbon emissions was determined by state and by end use. In no instance are the costs of universal electrification less than the benefits as "estimated" by the social cost of carbon. *Electrification using renewables is not a cost-effective means of reducing carbon emissions*, neither from commercial or residential buildings nor from transportation. There are more efficient and less costly means to reduce atmospheric carbon, including a range of carbon capture approaches.

Data come from the Energy Information Administration (EIA). This includes the existing consumption by state per fuel type and end use, as well as technology costs.

Also calculated are estimates to satisfy peak loads that may occur in a weather event or other emergency. In the recent past, during a hurricane or a polar vortex, natural gas was the fuel used to meet higher demand levels. *Satisfying peak loads with electricity would add at least $7trillion to our estimate.*

The workbook used to calculate the costs is available. The capital cost for each technology and other inputs can be modified to model other scenarios. This is to allow policy makers and interested members of the public the opportunity to see impacts of (for example) increased energy conservation or technological developments that drive prices.

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[1] Stranded assets are defined as the components of the natural gas system that are discarded before their useful life is over

[2] Deadweight losses are losses that occur when a beneficial good or service is not fully realized because of artificial scarcity, a tax or subsidy, or other government action. They are costs imposed when one party transfers to another party something the second party doesn't value or views as a negative. One example is the intermittency of wind and solar, if the second party values on-demand energy.