

ETHANOL BLENDING BOOSTS PROFITABILITY

A University of Illinois at Chicago study determined that adopting higher ethanol blends would not only provide substantial benefits in emissions reduction and environmental impacts but also increase refinery profits. The findings of this study – *The Impact of Higher Ethanol Blend Levels on Vehicle Emissions in Five Global Cities* – illuminate the benefits of higher ethanol blends, including:

1. Projected increased profits for refiners of **\$10 to \$27** per barrel of E20, depending on the city
2. Profitability gains of up to **\$12** per barrel of E10 blends

These findings topple the perception that earning a profit in the fuel industry requires sacrifices in stewardship.

Blending Ethanol Increases Gasoline Throughput

When refiners incorporate ethanol, which is an oxygenate, octane is added during gasoline blending. During the refining process, more hydrotreated naphtha feed can bypass the catalytic reforming unit and be blended directly into gasoline and/or the

severity of the catalytic reforming unit can be reduced. The result of the added oxygenate is more total gasoline production from the same amount of crude input.

Across the five cities studied, throughput (barrels per day) increased an average of **8.6%** and **25%** from blending E10 and E20, respectively.

Blending Ethanol Holds Profit Potential

While ethanol blending increases gasoline volume, less hydrogen is produced from refining, due to operating at lower severity and processing less total volume.

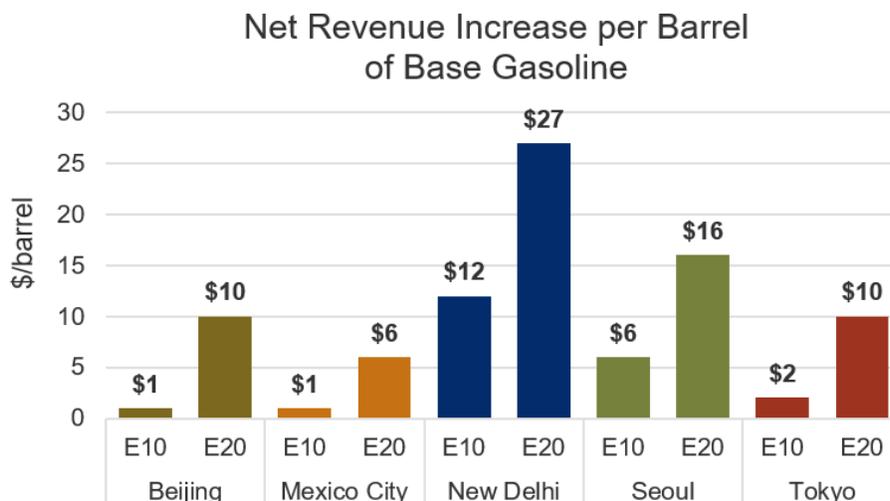
Therefore, a refinery producing gasoline with high blends of ethanol may need to replace the hydrogen energy lost, adding cost. Energy replacement is usually achieved by converting natural gas or refinery fuel gas into hydrogen.

Even after accounting for gasoline volume increases and supplemental hydrogen costs due to blending, net revenue per barrel is **as much or more** for E10 and E20 than base gasoline, as seen in the chart below.

Good for Society, Good for Refiners

Careful examination of the impacts of

ethanol on refinery profits shows that the decision to support higher blends can lead to economic benefits for refiners, incentivizing the adoption of blending.



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