

## Emission Reduction Costs for the Beyond-the-Floor Mercury Rate in the Toxics Rule

EPA's IPM modeling of beyond-the-floor (BTF) mercury reduction from subcategorized units subject to the proposed Toxics Rule projects two methods for compliance: fuel switching from lignite to subbituminous coal or retrofitting of activated carbon injection systems. This technical support document (TSD) presents the modeled ACI retrofit costs and incremental fuel switching costs from the proposed Toxics Rule policy case analysis. The estimated compliance cost can be compared with the projected mercury reductions to consider the cost-effectiveness on a cost-per-ton basis for beyond-the-floor mercury reductions from these subcategorized units.

### Fuel Switching costs (based on IPM modeling of unit coal choice):

EPA's IPM modeling of the proposed Toxics Rule projects that about 4.7 GW of capacity would switch from lignite to sub-bituminous fuel to meet the subcategorized beyond-the-floor mercury emissions rate standard, at a total incremental fuel cost (weighted by generation changes) of about \$24.8 million (in 2007-year dollars). These units collectively achieve about a 1,580-lb reduction in mercury emissions from the base case; therefore, the average emission reduction cost from fuel-switching at these units is about \$15,696 per lb Hg removed.

Subcategorized Capacity Projected to Switch Coal	Incremental Generation	Incremental Fuel Cost	Generation-Weighted Incremental Fuel Cost	Mercury Reduction	Cost of Mercury Removed
4.7 GW	-65 GWh	\$23.9 million	\$24.8 million	1,580 lbs	\$15,696/lb

### ACI Retrofit Costs (based on IPM modeling assumptions derived from Sargent & Lundy engineering analysis):

For units adopting ACI retrofits, this cost analysis is weighted based on whether the retrofitting capacity has a pre-existing fabric filter (IPM includes separate ACI retrofit options with and without Toxecon on this basis).

EPA's IPM modeling projects that about 3.2 GW of capacity would adopt ACI with Toxecon to meet the subcategorized beyond-the-floor mercury emissions rate standard, at a total annualized retrofit cost of about \$2.34 million (in 2007-year dollars). This analysis excludes capital costs for installing the Toxecon fabric filter system on the basis of its use for PM control under the Toxics Rule. The representative unit shown in the table below achieves a 180.9-lb reduction in mercury emissions from the base case at an annualized retrofit cost of \$2.34 million; therefore,

the average emission reduction cost from ACI retrofitting at these units is about \$12,935 per lb Hg removed. The proposed Toxics Rule modeling also projects that 2.2 GW of capacity with existing fabric filters would adopt ACI without Toxecon; the representative unit in this category would incur a total annualized retrofit cost of about \$5.09 million while achieving about 111.2 lbs of mercury emission reductions for an average cost of \$45,773/lb reduced.

Type of Retrofit	ACI with Toxecon	ACI without Toxecon
Subcategorized Capacity	3.2 GW	2.2 GW
Average Capacity per Unit	451 MW	247 MW
Average Capital Cost (excluding fabric filter)	\$9 /kW	\$13 /kW
Average Fixed Operation & Maintenance Cost	\$0.57 /kW	\$0.06 /kW
Average Variable Operation & Maintenance Cost	\$0.48 /MWh	\$2.56 /MWh
Total Annualized Cost of Retrofit	\$2.34 million	\$5.09 million
Mercury Reduction	180.9 lbs	111.2 lbs
Cost of Mercury Removed	\$12,935/lb	\$45,773/lb

(calculations assume an 85% capacity factor and a capital charge rate of 11.4%)

#### Average Cost-Effectiveness of Mercury Reduced for Beyond-the-Floor

Compliance Strategy	Estimated Annual Mercury Reductions	Estimated Annual Costs
Coal-Switching	1,580 lbs	\$24.8 million
Retrofit ACI with Toxecon	1,284 lbs	\$16.6 million
Retrofit ACI without Toxecon	990 lbs	\$45.3 million
<b>Total</b>	<b>3,854 lbs</b>	<b>\$86.7 million</b>

Based on total estimated mercury reductions and annual costs in the table above, the average removal cost for mercury emissions from these subcategorized units fuel-switching and retrofitting with ACI is estimated to be \$22,496/lb. Based on these results, EPA believes that the projected compliance behavior for the subcategorized capacity under the proposed Toxics Rule would yield cost-effective mercury reductions at the beyond-the-floor emissions rate standard.