ReACT™ (Regenerative Activated Coke Technology) is an advanced multipollutant technology that achieves simultaneous capture of SOx, NOx and mercury in one vessel.

The process was first developed in the 1970s in Germany, was subsequently advanced and commercialized in Japan where ReACT™ has been implemented at three large scale coal-fired power plants and at several steel mill and refinery applications:

- The J-Power 2 x 600 MW Isogo plant is among the world’s lowest emissions coal fired power plant.
- EPRI demonstration testing at Valmy station yielded results confirming the Isogo operation.

Hamon Research Cottrell offers ReACT™ under a license agreement from J-Power Entech.

### Typical Performance at J-Power Isogo (Since 2002):

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Emissions Permit</th>
<th>Operating Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Efficiency</td>
</tr>
<tr>
<td>SOx</td>
<td>10 ppm (0.025 lb/MMbtu)</td>
<td>&gt;98%</td>
</tr>
<tr>
<td>NOx</td>
<td>13 ppm (0.02 lb/MMbtu)</td>
<td>10% to 50%</td>
</tr>
<tr>
<td>Particulate</td>
<td>5 mg/Nm3 (0.004 lb/MMbtu)</td>
<td>&gt;95% (&gt;99.9% w/ESP)</td>
</tr>
<tr>
<td>Hg</td>
<td>-</td>
<td>&gt;90%</td>
</tr>
</tbody>
</table>

### Benefits of ReACT™

- **By-Product Revenue** - Sulfuric acid is the world’s number one commodity chemical with a market value of $50-$200 per ton. Instead of producing disposal gypsum or flyash/gypsum waste, ReACT™ produces saleable by-product.

- **Avoided Disposal Costs** - For every ton of SO2 controlled in conventional FGD, about three tons of solid waste is generated. More if flyash is part of the FGD waste stream.

- **Near Zero Water Use** - ReACT™ uses minimal water, in significant contrast to FGD systems. For a 500 MW plant, a WFGD system would require 275,000,000 gallons per year while ReACT™ would use near zero.

- **Minimal Plant Modifications** - ReACT™ can flow to the existing stacks with no change in liner materials. ReACT™ is located downstream of existing equipment and does not necessitate modifications to upstream equipment.

- **NOx Performance Options** - ReACT™ systems may be designed for a range of NOx reduction options - from co-benefit levels of 30% through alternative designs reaching 80%.
Hamon Research-Cottrell has received the contract for the engineering, procurement and installation of a ReACT™ system at the 321-megawatt net Wisconsin Public Service Weston Power Plant, Unit 3.

The ReACT™ system will reduce plant SO₂ emissions by more than 90%, mercury by 90% or more, and provide additional co-benefit NOx reduction, while producing approximately 50 MTD of industrial grade sulfuric acid for the market.

The project is scheduled to start up in Spring 2015.

**THREE STAGE PROCESS**

1) **Adsorption** - In the adsorber, flue gas and ammonia pass through a slowly moving bed of activated coke. The activated coke adsorbs SOx and mercury at high efficiency and reduces NOx as a co-benefit.

Activated Coke (AC) is produced from coal and activated by steam. It has high mechanical strength against abrasion and crushing and high specific surface area for adsorption.

2) **Regeneration** - AC with adsorbed SOx and mercury is conveyed to the regenerator. Here, sulfuric acid or ammonium salts in the AC are thermally desorbed and decomposed to form a sulfur-rich gas steam for by-product recovery by thermal desorption.

After desorption the AC is cooled and passed through a vibrating screen to remove undersized particles. Replacement AC is added to the system, and the regenerated AC returns to the adsorber for use.

3) **By-product recovery** - The sulfur-rich gas from the regenerator is converted into a marketable sulfuric acid.
Hamon Research-Cottrell is part of the worldwide Hamon Group and is a major provider of air pollution control technology. HR-C serves the North American market from its main office in Somerville, NJ.

Hamon Research-Cottrell provides innovative clean air technologies to a wide array of industries including power generation, pulp & paper, petrochemical, chemical, glass, cement, steel, food, and pharmaceuticals. Hamon Research-Cottrell is a worldwide leading supplier of:

- Electrostatic Precipitators
- Fabric Filters
- ReACT™ multi-pollutant control technology
- Dry and Wet Flue Gas Desulfurization Systems
- DeNOx Systems (Selective Non-Catalytic Reduction - SNCR)
- Urea to Ammonia (U2A®) Systems
- ExxonMobil Wet Gas Scrubbers

Hamon Research-Cottrell provides solutions and project services that include new and retrofit equipment, engineering and fabrication, parts and aftermarket support, field services, trouble-shooting, fluid dynamics and specialty consulting.

INTEGRATED SOLUTIONS FOR A CLEAN ENVIRONMENT

The Hamon Group is a global source for engineering and contracting.

Its activities include the design, the manufacturing of critical components, the installation and the after-sale services of cooling systems, process heat exchangers, air pollution control (APC) systems, HRSG’s and chimneys.