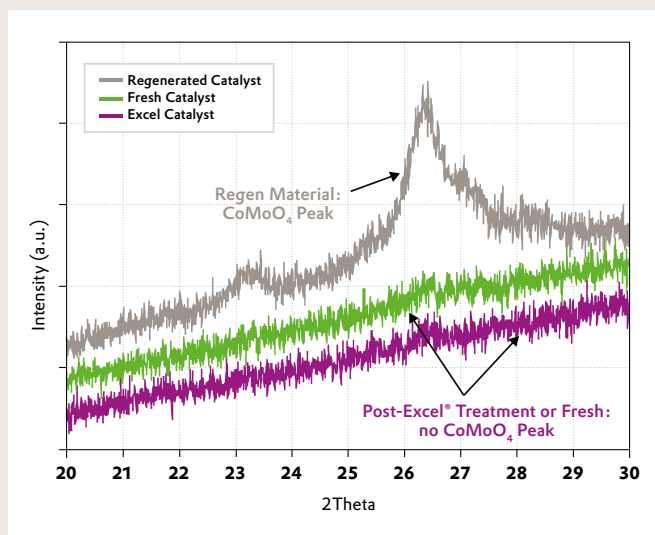


## Restores Regenerated Catalyst Activity to Fresh Levels

## Description

Evonik's patented Excel<sup>®</sup> rejuvenation process is a step beyond standard catalyst regeneration. It offers a means for restoring spent catalysts, especially the highly active Type 2, to greater than 95% of the catalyst's original activity. The Excel rejuvenation process gives refiners an excellent alternative to near fresh levels for most hydrotreating applications: Naphtha, Kerosene, Diesel, ULSD and VGO pretreat (CFH). Excel rejuvenation has been in commercial service since 2015, installed in more than 60 reactors around the world and has met or exceeded expectations in every case.

Excel rejuvenation redisperses active sites on any hydrotreating catalysts by dissolving activity inhibitors, such as  $\text{CoMoO}_4$  or  $\text{NiMoO}_4$  and redistributing the catalytic metals in their most active form. Efficiency of the redispersion can be monitored during the Excel treatment by X-Ray Diffraction (XRD).



## Benefits

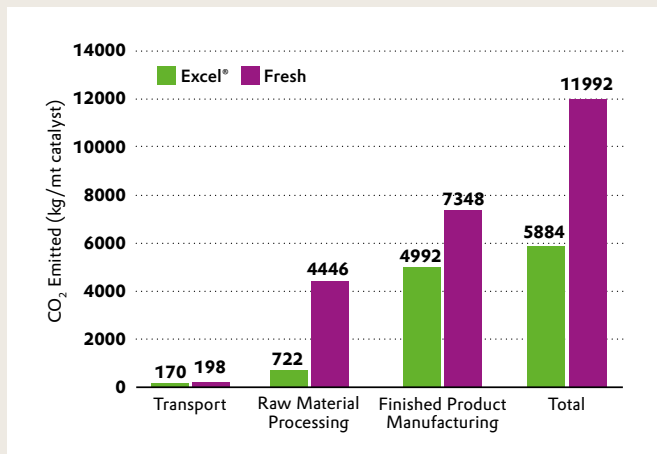
- Catalytic activity can be restored to the same tier as many fresh catalysts at about half the cost.
- Technology can be applied to all Type 1 and Type 2 hydrotreating catalysts.
- Regeneration and rejuvenation facilities in North America, Europe and Asia are able to serve the global refining market.
- Excel Rejuvenation can be provided as a service on your catalyst or supplied from Evonik's extensive global inventory of high quality catalysts.
- Your use of rejuvenated catalyst reduces waste and provides significant cost savings with respect to fresh catalysts, especially as metals prices increase.
- Evonik can provide worldwide technical support:
  - Assistance in catalyst selection
  - Technical proposals (kinetic modeling and performance predictions)
  - Start-up support
  - Long-term unit monitoring

## Sustainability & Excel® Rejuvenation

Using Excel rejuvenated catalyst reduces CO<sub>2</sub> emissions by about 65% compared to fresh production by avoiding:

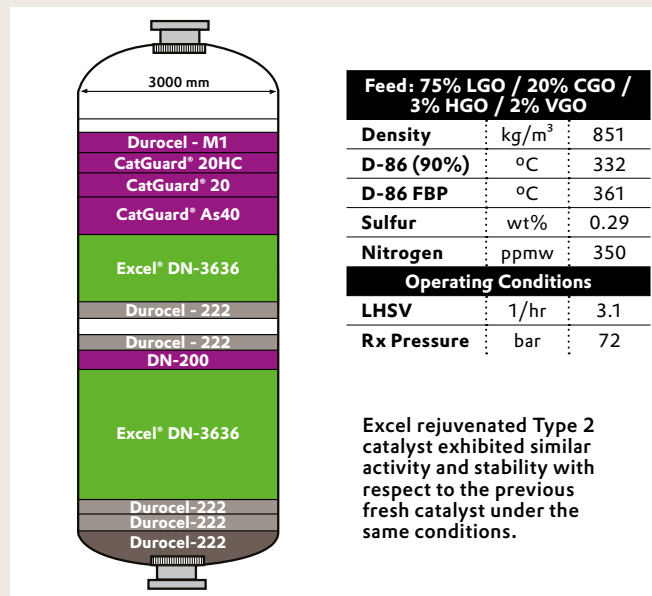
- Mining of metals and bauxite
- Producing raw material (metal oxides, metal nitrates or carbonates)
- Manufacturing catalyst carrier (Al<sub>2</sub>O<sub>3</sub>) for further metal impregnation

## CO<sub>2</sub> Emissions Involved in HPC Catalyst Production Comparison of Fresh vs Excel

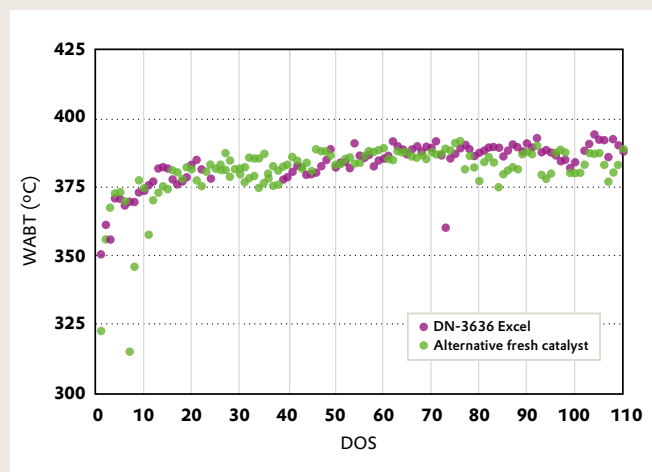
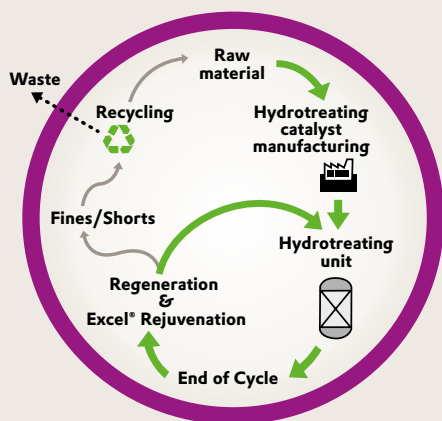


## European ULSD Case Study

Excel rejuvenated Type 2 catalyst has demonstrated performance in a commercial ULSD unit located in Europe. This hydrotreating unit processes a blend of LGO, HGO, VGO and CGO at high pressure (72 barg) and severe LHSV (3.1 h<sup>-1</sup>).



## Circular Economy & Excel® Rejuvenation



### Disclaimer

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