Abstract:

Solvay is a global chemical company whose chemicals and plastics products serve diversified markets worldwide, from consumer goods to energy. The group is established in 53 countries and owns 15 units in France. In 2014, Fives Pillard provided 1 PILLARD NANOxFLAM® natural gas burner of 11,1 MW to fit a 13 t/h Foster Wheeler AGM 144 water tube boiler. The main target of this revamping project was to match with the environmental French regulation, especially NOx and CO pollutants (< 100 mg/Nm3@3%O2). The commissioning results are NOx = 47 mg/Nm3@3%O2, CO = 0 mg/Nm3@3%O2.

Technology:

The PILLARD NANOxFLAM® burner is new generation of Ultra low-NOx burners based on a lean premix combustion and dedicated to boiler applications. NOx emissions of a lean premix combustion burner (before fuel staging injection) in a gas boiler depend on the excess air levels and on the quality of the mix between air and gaseous fuel. NOx emissions are very sensitive to excess air levels. An excess air level of 40–80% is needed in order to achieve very low NOx emissions (less than 20 mg/Nm3). Below this threshold of 40%, NOx emissions promptly increase and reach usual NOx values. Above 80%, the flame temperature is very low and the stability of the lean premix combustion may be affected. NOx levels below 50 mg/Nm3 are generally achieved with this technique.
Results:

The PILLARD NANOxFLAM® burner is a new technology which is already applied on boilers in France, Germany and South Korea.

2012 : experimental development through a 5 MW prototype mounted on a water-tube boiler in our Research and Tests Center
2013 : experimental development through a 5 MW prototype mounted on a fire-tube boiler in our Research and Tests Center
2014 : 11 MW burner achievement «first industry» on a water-tube boiler through an industrial partnership in France (NOx < 50 mg/Nm3@3%O2)
2015 : launch on the market
2015 – 2017 : last design including 5% NOx reduction and cost effectiveness

Between 2012 and 2014, the innovative PILLARD NANOxFLAM® development has received a funding and has been supported by the French Environment and Energy Management Agency (ADEME).
Applicability:

This technology can be used on water-tube and fire-tube boilers with natural gas.

Economics:

The use of PILLARD NANOxFLAM® technology has shown that the NOx value of 50 mg/Nm³ at 3% O2 is achievable without external flue-gas recirculation, avoiding the expense of higher capex and opex.