

7. According to currently available data, the costs of combustion modifications can be considered as small for new plants. However, in the case of retrofitting, for instance at large power plants, they ranged from about 8 to 25 Swiss francs per  $\text{kW}_{\text{el}}$  (in 1985). As a rule, investment costs of flue gas treatment systems are considerably higher.

8. For stationary sources, emission factors are expressed in milligrams of  $\text{NO}_2$  per normal ( $0^\circ\text{C}$ , 1013 mb) cubic metre ( $\text{mg}/\text{m}^3$ ), dry basis.

#### Combustion plants

9. The category of combustion plants comprises fossil fuel combustion in furnaces, boilers, indirect heaters and other combustion facilities with a heat input larger than 10 MW, without mixing the combustion flue gases with other effluents or treated materials. The following combustion technologies, either singly or in combination, are available for new and existing installations:

- (a) Low-temperature design of the firebox, including fluidized bed combustion;
- (b) Low excess-air operation;
- (c) Installation of special low- $\text{NO}_x$  burners;
- (d) Flue gas recirculation into the combustion air;
- (e) Staged combustion/overfire-air operation; and
- (f) Reburning (fuel staging). **\*\*\***/

Performance standards that can be achieved are summarized in table 1.

10. Flue gas treatment by selective catalytic reduction (SCR) is an additional  $\text{NO}_x$  emission reduction measure with efficiencies of up to 80 per cent and more. Considerable operational experience from new and retrofitted installations is now being obtained within the region of the Commission, in particular for power plants larger than 300 MW (thermal). When combined with combustion modifications, emission values of  $200\text{ mg}/\text{m}^3$  (solid fuels, 6%  $\text{O}_2$ ) and  $150\text{ mg}/\text{m}^3$  (liquid fuels, 3%  $\text{O}_2$ ) can be easily met.

11. Selective non-catalytic reduction (SNCR), a flue gas treatment for a 20-60%  $\text{NO}_x$  reduction, is a cheaper technology for special applications (e.g., refinery furnaces and base load gas combustion).

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**\*\*\***/ There is limited operational experience of this type of combustion technology.