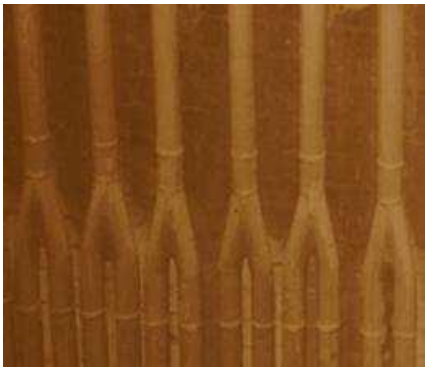
Catalyzer against boiler pollution

Catalyst SP ECO SOTIN causes consumption reduction of coal and oil fuels between 3% and 8%. SOX, NOX, CO and ash emissions are reduced too

Fuel combustion for the production of energy takes place according to the following chemical reaction
Carbon + Oxygen = CO2
However, because the fuels used don't consist of pure carbons, some pollutants leave the hot zone area as unburned particles, thus slag settle on heating surfaces and dramatically reduces heat exchange and energy efficiency of whole process. By coal fuel are the most problematic particles of SO_2 and SO_3 meanwhile by oil fuel it is V_2O_5.


Heating surface before cleaning


Cleaning process


After cleaning

Slag settled on heating surface causes corrosion of metallic parts. Low melting point makes slag a liquid, thus covering of surfaces is quick, efficient and constant. Chemical reactions of pollutants are consuming O_2 what in effect changes combustion process and drops efficiency even further.

ECM ECO Monitoring, a.s., Nevädzová 5, 821 01 Bratislava, Slovak Republic

Phone: +421 2 4342 9418
+421 2 4342 7408
Fax: +421 2 4342 7465

E-mail: ecm@ecm.sk
http:// www.ecomonitoring.com

Company Reg. No.: 17312094
VAT No.: SK2020317244

How SP – ECO works

Two types of steel corrosion are found in boilers:

Low temperature corrosion (acid corrosion)
High temperature corrosion (vanadium corrosion)

Reactions

Reduction of negative effects of ash and slag is accomplished by the following reactions:

a) SO3-bonding and SO3-collection:

$2\ KOH + SO_3 = K_2SO_4 + H_2O$
$2\ KOH + SO_2 = K_2SO_4 + H_2$

The result is a considerable reduction in the concentration of

SO_3. b) Bonding of vanadium oxides

2 KOH + V2O5 _ 2 KVO3 +H2O

This reaction shows that V2O5 compounds are transformed to potassium vanadate salt. In the high temperature range potassium vanadate salt forms an enamel-like coating that serves as a protective film against corrosion.

The main fireclay compounds are: Al2O3, SiO2, CaO and aluminium silicate. KOH (particularly in fluid form) can be melted with aluminium silicates without negative side-effects on the structure and consistency of the fireclay.

Together with ash components, SP-ECO form eutectoids with high melting points. Thus it is not possible for agglomerates of ash and slag to form and attach to the heating surfaces. Existing agglomerates of ash and slag crumble under the effect of the catalyst and drop off.

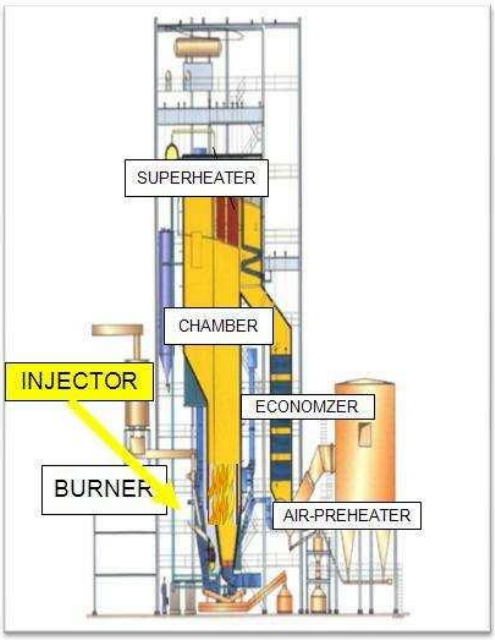
SP-ECO advantages

SP-ECO changes chemical reactions with following results:

Both SO_2 and SO_3 react to K_2SO_4 with melting point of 1069°C, thus become solid without ability to accumulate on any surfaces. Existing deposits react to K_2SO_4 with same results. **It is not needed to increase temperature in boiler due to pollutants.**
SP-ECO is an oxidant and reactions driven by it consumes less of oxygen to let combustion be as effective as possible.
SP-ECO limits creation of NO_2 and causes mainly NO, while created CO is converted to CO_2
with high efficient rate too.
Since it is not needed to increase temperature as mentioned above some of polluting and corrosive reactions won't take place at all and unburned particles finish as solids in ash.
In case of vanadium pollution/corrosion SP-ECO converts V_2O_5 to KVO_3 (+ H_2O) which doesn't accumulate any deposits and doesn't react with metal pipes.

SP-ECO has no side-effect on the structure and consistency of the fireclay

Application



direct injection into the combustion chamber
forms a concentrated grayish white gas cloud which fills the entire interior of the boiler
penetrates the flue gas deposits to form a eutectic system with different melting points the resulting thermal stresses crumble these deposits, which are then gradually stripped away
after deposits have been eliminated, the pipeline system is directly exposed to SP ECO which prevents any new deposits and corrosion
Ignites at 321 ⁰C
Contains oxygen, therefore does not consume oxygen during combustion
Consists of Potassium Nitrate + combustion
materials Does not contain any aggressive
chemicals or chlorides Does not damage the boiler
or the walls of the boiler
Is non explosive
Is odourless
UN number 1479
Class 5.I

SP ECO SOTIN is injected directly into the combustion chamber every 6-8 hours.

First dosage 40 days: 300g/t
Continuous operation: 100 g/t
No additional investment costs
Manually dosed (small boilers)
Or mobile injector connected to compressed- air supply (4 – 6 bar)
Duration of in jection (max 60 seconds)

Phone: +421 2 4342 9418
+421 2 4342 7408
SK2020317244
Fax: +421 2 4342 7465
E-mail: ecm@ecm.sk
http:// www.ecomonitoring.com
Company Reg. No.: 17312094
VAT No.:

The injector is installed according to the technical conditions of the boiler and will be supervised by ECM technical service. ECM will perform a test dosage and train the staff.

SP-ECO pays off (sample calculation – coal fuel)

Technical inputs

Steam production:	208 t/h
Efficiency factor:	86,97%
Operating hours per year:	5 800 h
Operating months:	8
Coal consumption:	33,4 t/h
Coal/day:	801,6 t

Savings 1

Raise of efficiency factor: 1 to 3 %
(*better results are possible but depend from boiler to boiler and current level of efficiency*)
Expected coal savings: 3 to 8 %
Coal saving: 1,00 /tons/hour
= 24,05 t/day
= 3,0%
Coal savings year: 5.796,05 tons
Cost /ton of coal: 60 EUR
Cost / 100 g/ SPS: 1,10 EUR
Cost 5.796,05 t coal/year: 347.763,00 EUR
Cost SPS/year: 19.319 kg
=210.529,00 EUR
SAVINGS: 137.234,00 EUR

Savings 2

1 t of coal produces = 2,86 t of CO2
5.796,05 t/year x 2,86 t = 16.576,70 t CO2 x 4,80 €/t = 79.568,16 €

Savings 1 + Savings 2 =**216.802,16 EUR**

Other savings (not calculated)

Costs of transporting slag to landfill
the reduction of corrosion damage
prevent damage made by heavy debris falling