ESTONIAN OIL SHALE AS POWER FUEL

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Sold fuels can be divided into two large groups to their formation: humus and sapropel fuels.

Mostly the formation oil shale as sapropel fuel took place in marine conditions, less often in lakes. The geotectonic structure of oil shale deposits is predominantly of the platform type.

Oil shale is sedimentary rock containing organic matter, kerogen.

Oil shale deposits have been discovered on all continents. The more than 600 oil shale basins are known.

Estonia has significant oil shale resources; they are estimated to be more than 7 Gt. Estonia is the only country in the world that uses oil shale fired power plants to supply most of its electricity to domestic customers and can export power to neighboring countries. In addition to thermal power plants, Estonia also has oil shale thermal processing plants for shale oil production. Power plants and processing factories in Estonia are supplied with oil shale from underground and opencast mines.

Oil shale differs from humus fuels by its high hydrogen and oxygen content of organic matter. The atomic ratio of hydrogen to carbon (H/C) is about 1.5, which is approximately the same value as crude oil, but for coals only about 0.3 to 0.4. The high hydrogen to carbon ratio is the main reason for the high yield of volatile matter and condensable oil during the thermal decomposition of oil shale organic matter.

Oil shale is also a material very rich in mineral matter. Estonian oil shale belongs to the carbonaceous class of fuels, which contains a complicated composition of mineral matter. It characterized as a fuel with a high content of sulfur, alkali metals, and chlorine. This composition creates numerous complicated and mutually related problems such as the intensive ash fouling and corrosive-erosive wear of boiler tubes, the cleaning of ash deposits from heat transfer surfaces, the behavior of boiler tube metal under the influence of ash deposits, the effect of ash deposits on heat exchange, and the behavior of oil shale components in the combustion process and its influence on the environment. Because of these concerns, the design of oil shale fuel boilers for power plants differs from that of standard solutions.

The important milestone in the history of the oil shale power industry was the switch to oil shale firing at the Tallinn Power Plant in 1924. At that time, a steam boiler with a grate-firing furnace was typical. After them was put into operation power units with pulverized oil shale boilers. At the beginning of 2004 circulating fluidized bed combustion boilers was introduced.