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Developing an improved solid heat carrier process – ENEFIT280

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A new, improved solid heat carrier process for shale oil mining based on oil shale fines - known as ENEFIT280 - was unveiled at the 2009 CSM Oil Shale Symposium. One year later, with the construction of the first plant underway in Narva, Estonia, we present an update on our progress in developing this process with discussion of the tools being used for process improvement. Extensive testing with oil shale and semicoke (spent shale) from the Enefit140, operating in Narva, has been performed in Outotec's Research and Development Center in Frankfurt, Germany. Testing began with chemical and physical analyses and continued with drying and combustion trials in fluidized bed pilot plants up to a throughput of 600 kg/h. Data collection and measurements of solid discharge, gas effluents and particle size distributions completed the test work. The data has been used for the design parameter optimization of the new commercial Enefit280 plant. The collected data and the basic flow sheet parameters were then fed into SolidSim, a particle mass balance flow-tracking tool recently developed at the University of Hamburg. The results allowed process engineers to develop a detailed understanding of fine dust circuits and how to avoid them. This will improve the quality of the oil generated, as less dust will be carried to the condensation step. CFD simulations were used to design the waste heat recovery unit and the flow to the electrostatic precipitator. For future testing of oil shale of different origins, the joint venture company, Enefit Outotec Technology, has built a test plant at the Outotec R&D Center in Frankfurt. The plant can be used to determine the oil quality achieved in the solid heat carrier process and will allow for the adjustment of process parameters for different types of oil shale.