UNDERGROUND COAL GASIFICATION

IN REPUBLIC OF UZBEKISTAN

Functioning in Angren since 1961 station «Podzemgas» (now JSC «Yerostigaz») is the most powerful industrial object of such kind, which doesn't have analogues in the world.

The main purpose of the enterprise is transforming brown coal into power generating gas with the it's following use in Angren thermal power station. The enterprise develops part of Angren brown coal deposit, which is not suitable for underground and open cut mining on account of technical and economical causes and mining and geological conditions.

More than 40 year experience of enterprise operation showed that method of Underground coal gasification allows to obtain power generating gas in large industrial scales and provide it's uninterrupted delivery to the consumer.

Prospecting projects on reconstruction of Angren and Novo-Angren thermal power stations, forming demand for such kind of production, can stimulate development of UCG

MOTIVATION OF TECHNOLOGY CHOICE

One of main sources of thermal and electric energy in many countries is coal whose share in the world reserves of hydrocarbon fuel exceeds 80 %.

The conventional methods of coal extraction require the presence of man at the stope. In addition, the non-combustible mass (about 50 %) extracted together with coal and consisting of ash and moisture causes pollution of the earth's surface and atmosphere in the same way as the coal dust does.

The most advanced and safe method of extraction is the mineless method of underground gasification. The idea of the possibility of such a process was expressed in 1888 by great Russian scientist D.I. Mendeleyev. In 1911 Ramsay, an Englishman, was the first to obtain gas from a generator hole.

The underground gasification has a number of advantages over coal extraction from pits and quarries :

— Capital investments in construction of underground coal gasification stations are less by 2.5 times as compared with those in construction of pits and quarries.
— The productivity of labour is the same as in open-cut mining and 4 times as high as in pits while the cost of final product being the same as in open-cut mining is 3 to 4 times as low as in extraction from pits.
— Hard and dangerous underground labour becomes unnecessary, working conditions are much better, and the extraction process can be completely mechanized and automatically controlled.
— Coal transportation, loading and unloading are excluded. No fuel is lost in transportation to the user and the atmosphere is not polluted with coal dust.
— There is no necessity for large areas for waste and ash dumps, and this allows conservation of fertile soil. The cost of land recultivation is five times as low as that with the conventional method of coal extraction. The mineless method of underground gasification allows exploitation of coal deposits with unfavourable mining conditions unsuitable for underground or open-cut mining. This allows more complete utilization of coal resources because non-conditioned and overbalance coal reserves can be used.
— Unlike coal combustion, the –underground gasification requires no fuel preparation, and consequently, no ash and slag disposal. No environmental pollution occurs because the gas combustion products are free of solid particles, carbon oxide, sulphur and nitrogen oxides.

THE STATION PROCESS FLOW

The power-generating gas is produced by the station „Podzemgaz" in underground air-blow gas generators. An underground gas generator is a system of air blow and gas outlet holes bored from the surface to a coal seam following a certain scheme.

The underground gas-generating process includes:

— preparation of the coal seam for gasification by air-filtration burning connection of holes and by boring inclined and horizontal holes forming a solid gasification front;
— subsequent gasification of the coal seam by air blow.

Air is forced into the coal seam through the air blow holes arranged in parallel rows along the gas generator gasification front. The gas at a temperature of 150 to 350 °C (at the heads) produced in the underground gas generators is passed through a system of gas conduits to the station area where it is cooled and dedusted in cooler scrubbers. The cooler scrubbers are provided with an independent water circulation system including cold and hot water pumps, settlers, and cooling towers. The scrubber cycle sewage is cleaned in a dephenolizing plant and then discharged into the sewerage system. The cooled and dedusted gas is fed to the Angren thermal power station through a gas conduit of 2 m in diameter.

The gas is forced to the power station under the excessive pressure at the gas outlet hole mouth.

GAS GENERATOR LIGHTING AND CONNECTION OF HOLES

The initial duct in coal between the holes is produced by hydraulic blasting, and then air is fed into the duct. After the coal duct is dried by the air flow, the hole is lighted up.

The coal seam is lighted up by throwing burning-hot coke into the hole through a sluice without any interruption of the air blow intended to maintain the coal seam burning.

After the gas generator is lighted up, air is forced for connection of the adjacent holes. Thus, the fire initiation site gradually moving from one hole to another interconnects all the holes and forms gasification ducts. A sharp drop in pressure and increase in air flow rate are indicative of the complete connection of holes.

BUILDINGS AND STRUCTURES OF THE STATION

The station „Podzemgaz" includes :

(a) underground gas generators with holes and service lines;
(b) air blower shop including three air turbo-blowers rated at 3 atm compressed air pressure, two turbo-compressors rated at up to 6 atm compressed air pressure, and six piston compressors rated at up to 40 atm compressed air pressure;
(c) scrubber department including eight stage-type scrubbers intended for gas cooling and dedusting;
(d) underground gas main of 2 m in diameter and 5 km in length laid from the station area to the electric power station;
(e) water circulation system including two scrubber-cycle cooling towers, a cooling tower for the conventionally clean water cycle, pumping plant, and settlers;
(f) dephenolizing plant for sewage treatment;
(g) machine shop, steam boiler house, garage, main office, management and service centre, canteen, and other auxiliary buildings;
(h) pumping plant intended to feed fresh water to the station area.

MAIN TECHNICAL DATE ON THE STATION

— Depth of coal seam occurrence, m — 130÷300
— Coal seam thickness, m — 0,2÷15
— Heat value of coal, kcal/kg — 2800÷3200
— Ash content of coal, % — 15÷21
— Moisture content of coal, % — 30÷35
— Hole diameter, mm — 150÷200
— Heat value of gas, kcal/m^3 — 800÷1000
— Chemical efficiency of gasification, % — 70÷85
— Underground loss of coal, % — 5÷15
— Gas yield per 1 kg coal, m^3 — 3,0÷3,4
— Air consumption per 1 m3 gas, m^3 — 0,8÷0,9
— Power efficiency of the station taking into account the auxiliary consumers, % — 80÷86

GAS COMPOSITION (vol.%)

CO_2 — 20÷22 CO_4 — 4,0÷7,0
O_2 — 0,5÷0,3 H_2 — 22,0÷22,4
CH_4 — 2,2÷3,0 CmHn — 0,2÷0,3
N_2 — 50,6÷44,4

Źródło: JSCYEROSTIGAZ - Uzbekistan

Uruchomiono pierwszą w Polsce japońską elektrownię wiatrową

Pierwszą w Polsce japońską elektrownię wiatrową oficjalnie uruchomiono 10 września w Łosinie k. Słupska (Pomorskie).

Obiekt zbudowany kosztem 74 mln euro przez spółkę Zajączkowo Windfarm, której głównymi udziałowcami są japońskie koncerny Mutsui i J-Power, to 24 turbiny o łącznej mocy 48 megawatów.

Elektrownia w Łosinie ma rocznie produkować 106-110 gigawatogodzin energii. Jak powiedział menadżer projektu Jan Michałowski, wystarczy to na pokrycie rocznego zapotrzebowania ok. 30-tysięcznego miasta.

Energię od farmy wiatrowej w Łosinie będzie odbierać spółka Energia - Obrót SA wchodząca w skład koncernu Energa SA.

Keiji Iguchi, prezes spółki Zajączkowo Windfarm, powiedział w środę, że japońskie firmy wybrały na inwestycję Polskę ze względu na dobre warunki wiatrowe i rządowy program wspierania energetyki wiatrowej.

Iguchi dodał, że inwestycja w Łosinie powinna zwrócić się w ciągu 8-10 lat.

— Cały projekt rozplanowany jest na 15-20 lat. Chcemy dalej rozwijać energetykę wiatrową w Polsce, przygotowujemy już kolejne inwestycje - powiedział Keiji Iguchi.

Według Leszka Kulińskiego, wójta gminy Kobylnica, na terenie której leży Łosino, kolejne japońskie inwestycje również będą realizowane w gminie.

Uczestniczący w uroczystości uruchomienia elektrowni ambasador Japonii Ryuichi Tanabe podkreślił w wygłoszonym po polsku krótkim wystąpieniu, że „Mitsui i J-Power zapoczątkowały nowe możliwości japońsko-polskiej współpracy w dziedzinie rozwijania odnawialnych źródeł energii, co ma tym ważniejszy wymiar, iż oba kraje stoją przed wielkim wyzwaniem, jakim jest redukcja globalnej emisji gazów cieplarnianych".

Ambasador dodał, że obecnie w Polsce działa 200 japońskich firm, z czego 60 to fabryki.

Budowa wiatrowej farmy w Łosinie rozpoczęła się wiosną 2007 r. Do sieci przesyłowej elektrownię podłączono w styczniu br. Testy techniczne dostarczonych przez duńską firmę Vestat turbin zakończono w maju. Eksploatacja elektrowni rozpoczęła się w sierpniu.

Źródło: PAP, Wirtualny Nowy Przemysł – Serwis Energrtyka