Metanov klatrat – nov energetski vir?

Iz Japonske poročajo, da so marca letos (2013) uspešno pridobili zemeljski plin iz metanovega klatrata z dna oceana. Metanov klatrat poznamo tudi pod imenom metanov led – metan je ujet v zamrznjenih kristalih vode. V svetovnem merilu se ocenjuje, da je zalog metanovega klatrata med 10.500 do 42.000 milijonov kubnih metrov, kar pomeni, da bi zadostilo potrebe po plinu, seveda glede na trenutno porabo, za 3.000 do 12.000 let. To pomeni, da so zaloge metanovega klatrata vsaj dvakrat tolikšne kot vse svetovne zaloge premoga, nafte in naravnega plina skupaj. Nahajališča ležijo pod vodo večinoma na mejah kontinentalnih plošč. V primeru ležišča na robu strmo padajočega roba kontinentalne plošče, bi lahko bilo nepremišljeno odstranjevanje metanovega klatrata nevarno. Sprožil bi se namreč lahko podvodni plaz peščenih plasti v večje globine, kar pa bi lahko na površini vode ustvarilo močne cunamije.

Japonska vrtalna ladja je v Nankajski udorini, južno od Tokia, testno načrpala 120.000 kubičnih metrov zemeljskega plina. Vrtina poteka skozi 1.000 m morske vode, ter skozi 270 m morskih usedlin (v glavnem so to peščene usedline). Pod temi usedlinami leži 60 m debela plast metanovega klatrata. Črpanje poteka tako, da se voda izčrpava iz plasti metanovega klatrata, s čimer se zniža tlak vode in omogoči odtajanje ledu, ki tako omogoča sproščanje metana v plinasti obliki. Vrtalno/transportna cev je dvoslojna, oz. kolobarjaste oblike. Notranja cev je uporabljena za črpanje vode, med zunanjim obodom notranje cevi in notranjim obodom zunanje cevi, pa se omogoča črpanje metana. Druga možnost sproščanja metana bi bila s segrevanjem plasti metanovega klatrata, kar pa bi bilo energetsko gledano precej bolj potratno.

Tehnološko gledano je potrebno črpanje in sam transport plina še izpopolniti. Pri črpanju se namreč pojavljajo problemi zamašitve črpalk, v katere zaide pesek. Pri transportu plina sta možni dve izvedbi, in sicer skladiščenje in utekočinjanje plina na plavajoči platformi ob samem črpališču, ali izgradnja plinovoda po ceveh, nameščenih po morskem dnu. Slednja je seveda precej dražja rešitev od prve; ima pa to prednost, da bi se lahko ploščad »selila« od nahajališča do nahajališča.

Ocena zalog v Nankajski udorini je dobrih sedem milijonov kubičnih metrov zemeljskega plina – metana, kar pomeni, da bi Japonska samo s tem virom lahko zadovoljila svoje potrebe po energentih za naslednjih 100 let. Podatki so povzeti po »Nov Vir Energije, Science Illustrated, november 2013«.

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Andrej PREDIN

Methane clathrate – a new energy source ?

In March 2013, it was reported that natural gas from methane clathrate had been successfully obtained from the bottom of the ocean near Japan. Methane clathrate (also known as ice methane) is methane trapped in crystals of frozen water. Globally, it is estimated that the world's sources of methane clathrate are between 10,500 to 42,000 million cubic meters, which means that it could cover the world's needs for gas (calculated according to current consumption) for 3,000 to 12,000 years. This means that the stock of methane clathrate is at least twice that of the world's combined coal, oil and natural gas stocks. Deposits lie under water, mostly at the limits of the continental plates. Pumping at the plate edge could be dangerous, possibly triggering underwater avalanches of sand layers at substantial depths, which could create powerful tsunamis on the water surface.

A Japanese drill ship in the Nankai depression, south of Tokyo, test extracted 120,000 cubic meters of natural gas, boring through 1,000 meters of sea water, and through 270 m of mostly sandy sediment. Under these deposits is a 60-m thick layer of methane clathrate. Pumping is carried out so that the water is depleted from the layer of methane clathrate, thereby reducing the water pressure and allowing the ice to defrost, thus allowing the release of methane in the gaseous form. The drilling/conveying pipe layer has an annular shape. The inner pipe is used for the pumping of water, while methane is extracted via the outer periphery of the inner tube and the inner circumference of the outer tube. Alternatively, the release of methane would be by heating the layer of methane clathrate, which would be much more wasteful with regard to energy usage.

Technologically speaking, there must be improved absorption and transport of gas itself. When pumping, some problems exist with the clogging of pumps with sand. When transporting gas, two possibilities exist: storage and liquefaction of gas on a floating platform next to the pumping station, or the construction of a pipeline installed on the seabed. The latter is, of course, a much more expensive solution than the former, but the former has the advantage that the platform can be moved from deposit to deposit.

It is estimated that the Nankai depression holds more than seven million cubic meters of natural gas (i.e. methane), which means that it is the only source capable of meeting Japan's energy demand for the next 100 years. This information is taken from the "New Source of Energy, Science Illustrated", November 2013.

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