

Digestasi anaerobik temperatur tinggi sebagai sumber bahan bakar alternatif di kamp pengungsi = High-temperature anaerobic digestion as an alternative source of fuel in refugee camps / Olav Kevin Sudja

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Abstrak

[Pada akhir tahun 2012 diperkirakan bahwa 3.3 juta pengungsi di dunia tinggal di kamp penampungan sementara. Persediaan bahan bakar masak kepada kamp-kamp sering kali mengalami kekurangan, sehingga pengungsi terpaksa untuk mendapatkan bahan bakar melalui penebangan liar pohon disekitar kamp. Tujuan dari penelitian ini adalah untuk men-design system digestasi anaerobik sebagai alternatif sumber bahan bakar. Digestasi anaerobic pada temperatur tinggi ($>50^{\circ}\text{C}$) mempunyai kecepatan reaksi lebih tinggi dengan memerlukan energi agitasi lebih kecil. Design yang di ajukan oleh penelitian ini adalah sistem digestasi anaerobik semi-batch yang dioperasikan pada temperature 55°C . Design yang diajukan di modelkan menggunakan model IWA Anaerobic Digestion Model No.1 (ADM1) pada temperatur operasi normal 35°C dan 55°C . Analisa Monte-Carlo juga dilakukan untuk menentukan kestabilan model terhadap perubahan feed masuk ke reaktor. Hasil model menunjukkan bahwa digester yang dioperasikan pada temperature tinggi (55°C) menghasilkan produksi biogas lebih tinggi dengan volume reactor lebih kecil. Penelitian ini jika diterapkan dengan benar dapat menyediakan alternatif sumber bahan bakar bagi pengungsi di berbagai belahan dunia.;It is estimated by year's end of 2012 that 3.3 million refugees across the world is living in planed/managed camp. Supply of cooking fuel by aid agencies to these camps has not always meet demands and has resulted in refugees resorting to dangerous practice of deforestation. The aim of the project is to design an alternative method of producing cooking fuel to these camps by using anaerobic digestion, anaerobic digestionconducted at elevated temperatures of ($>50^{\circ}\text{C}$) has been observed to have faster rate of fermentation while requiring less agitation. The design proposed by the project is a semi-batch anaerobic digester operated at a temperature of 55°C . The IWA Anaerobic Digestion Model No.1 (ADM1) was used to model the behaviour of the digesters operating at both 35°C and 55°C . While using a Monte-Carlo analysis approach, to observe the digester sensitivity to varying feed inputs. The proposed design was analysed to be cost appropriate while still producing a higher yield of biogas compared to digesters operated at lower temperatures of 35°C . If applied this design could be used to provide a healthier and more sustainable source of cooking fuel for refugee camps across the world., It is estimated by year's end of 2012 that 3.3 million refugees across the world is living in planed/managed camp. Supply of cooking fuel by aid agencies to these camps has not always meet demands and has resulted in refugees resorting to dangerous practice of deforestation. The aim of the project is to design an alternative method of producing cooking fuel to these camps by using anaerobic digestion, anaerobic digestionconducted at elevated temperatures of ($>50^{\circ}\text{C}$) has been observed to have faster rate of fermentation while requiring less agitation. The design proposed by the project is a semi-batch anaerobic digester operated at a temperature of 55°C . The IWA Anaerobic Digestion Model No.1 (ADM1) was used to model the behaviour of the digesters operating at both 35°C and 55°C . While using a Monte-Carlo analysis approach, to observe the digester sensitivity to varying feed inputs. The proposed design was analysed to be cost appropriate while still producing a higher yield of biogas compared to digesters operated at lower temperatures of 35°C . If applied this design could be used to provide a

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