Final report

1.1 Project details

Project title	REnescience full scale demonstration plant
Project identification (program abbrev. and file)	EUDP- 13-I 2013 Journal nr. 64013 - 0162
Name of the programme which has funded the project	Bio mass
Project managing company/institution (name and address)	DONG Energy Kraftværksvej 53 7000 Fredericia
Project partners	
CVR (central business register)	36 21 37 28
Date for submission	1 June 2017

1.2 Short description of project objective and results

The overall goal of the project was planning, design, construction and testing of a full-scale REnescience plant located in the "Triangle area", finally owned by the municipalities Vejle, Kolding, Fredericia and Middelfart. Due to juridical and political difficulties in clarifying ownership models, the final project objectives were focused to the three work packages:

- WP 2.1 "Content of phthalate in waste"
- WP 2.2 "Spreading digestate on farmland as fertilizer"
- WP 2.3 "Recycling of Inert material".

WP 2.1 "Content of phthalate in waste"
The content of phthalate in different waste fractions have been investigated though a desk study. According to studies from the Danish Environmental Protection Agency more than 80% of phthalate in the MSW is due to the content in clothes and shoes. Part of the phthalate must be expected to pass over to the bio liquid from the REnescience process.

From a 10 weeks performance test on the REnescience pilot plant, based on unsorted MSW, samples of bio liquid and digestate have been analysed to determine the content of phthalate. The analysis were compared with the threshold limiting value (LTV) from "Slambekendtgørelsen".

The majority of the samples showed a result below the LTV. Four (4) samples exceeded the LTV value.

WP 2.2 "Spreading digestate on farmland as fertilizer"
Phosphorus is a limited resource. Using digestate as fertilizer on farmland gives the possibility to recycle phosphorus from the MSW back to the crops.

During the discussion of the performed Risk Assessment with Danish Environmental Protection Agency, DONG Energy decided not to recommend to spread the dewatered Digestate on farmland. The recommendation was based a general precautionary principle. It is not possible to predict the content of heavy metals and xenobiotic in MSW and which content that

might occur in the bio liquid or the dewatered digestate, regardless of waste sorting method. Due to this uncertainty, DONG Energy cannot recommend spreading the dewatered digestate on farmland.

WP 2.3 "Recycling of Inert material"
Recycling of the inert fraction from the REnescience process will benefit the overall political goal of recycling of resources and hereby reduce the consumption of virgin material.

To clarify the possibility to use the inert fraction as filler material in asphalt production, a test has been performed together with NCC. At the present stage the content of organic material in the inert fraction is too high to be use as filler material. Incineration in a W_tE plant with recycling of the slag as road construction material seems to be the best way to recycle the inert fraction at present time.

1.2.2 Kort beskrivelse af projektmål og resultater.

Det overordnede mål i projektet var planlægning, design, konstruktion og test af et fuld skala REnescience anlæg placeret i Trekantområdet og efterfølgende ejet af kommunerne Vejle, Kolding, Fredericia og Middelfart. Grundet juridiske og politiske uklarheder omkring ejerskabsmodeller, endte projektet med at fokuser på følgende 3 arbejdspakker:

- WP 2.1 "Indhold af blødgøre i affaldet"
- WP 2.2 "Brug af digestat som gødning på landbrugsjord"
- WP 2.3 "Genanvendelse af den inerte fraktion"

WP 2.1 "Indhold af blødgøre i affaldet"
Indholdet af blødgøre i affaldet er blevet undersøgt gennem et litteraturstudie. Undersøgelser gennemført af Miljøstyrelsen har påvist at mere end 80% af blødgørerne i usorteret dagrenovation skyldes indholdet af tøj og sko. En del af blødgørende må forventes at komme over i biovæsken fra REnescience

Med udgangspunkt i en 10 ugers præstationstest på REnescience pilotanlæg på usorteret dagrenovation, er prøver på biovæske og digestat blevet analyseret og sammenlignet med grænseværdierne fra Slambekendtgørelse.

Hovedparten af resultaterne fra analyserne viste et indhold under grænseværdien. Fire (4) af analyserne viste et resultat over grænseværdien.

WP 2.2 "Brug af digestat som gødning på landbrugsjord"
Fosfor er en begrænset ressource. Anvendelse af digestat som gødning giver mulighed for at tilbageføre fosforen i dagrenovationen til afgrøderne.

I forbindelse med drøftelserne med Miljøstyrelsen omkring den gennemførte risikoanalyse, besluttede DONG Energy ikke at anbefale at anvende afvandet digestat på landbrugsjord. Anbefalingen var baseret på et general forsigtighedsprincip. Det er, uanset affaldssorteringsmetode, ikke muligt at forudsige indholdet af tungmetaller og miljøfremmede stoffer i dagrenovationen og dermed indholdet i biovæsken eller digestatet. Begrundet i dette forsigtighedsprincip, kan DONG Energy ikke anbefale anvendelsen af afvandet digestat på landbrugsjord.

WP 2.3 "Genanvendelse af den inerte fraktion"
Genanvendelse af den inerte fraktion fra REnescience processen vil medvirke til det overordnede politiske mål med genanvendelse af ressourcer, for hermed at mindske forbruget af nye ressourcer.

For at afklare muligheden for at bruge den inerte fraktion som tilsatsmateriale i asfalt produktion, blev der gennemført et forsøg sammen med NCC. På nuværende tidspunkt er ind-

holdet af organisk materiale i den inerte fraktion for højt til at blive anvendt som tilsatsmateriale. Forbrænding i et affaldsforbrændingsanlæg, med anvendelsen af slaggen som vejkonstruktionsmateriale, vurderes på nuværende tidspunkt som den bedste måde at genanvende den inerte fraktion.

1.3 Executive summary

See the attached final report of the project.

1.4 Project objectives

See the attached final report of the project.

1.5 Project results and dissemination of results

See the attached final report of the project.

1.6 Utilization of project results

See the attached final report of the project.

1.7 Project conclusion and perspective

See the attached final report of the project.

Annex

Final report of the project "REnescience full scale demonstration plant"