D T6.2 Informing the companies located nearby each other about the possibility for nutrient exchange

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Responsible organisation for this deliverable: John Nurminen Foundation

EUROPEAN UNION
European Regional Development Fund

Interreg
Central Baltic

NutriTrade
Nutrient Offsetting for the Baltic Sea

INTRODUCTION

In mapping of potential participants in Pilot Nutrient Exchange, 135 suppliers and 142 users of recycled nutrients were found (Deliverable D T6.1). At this stage,

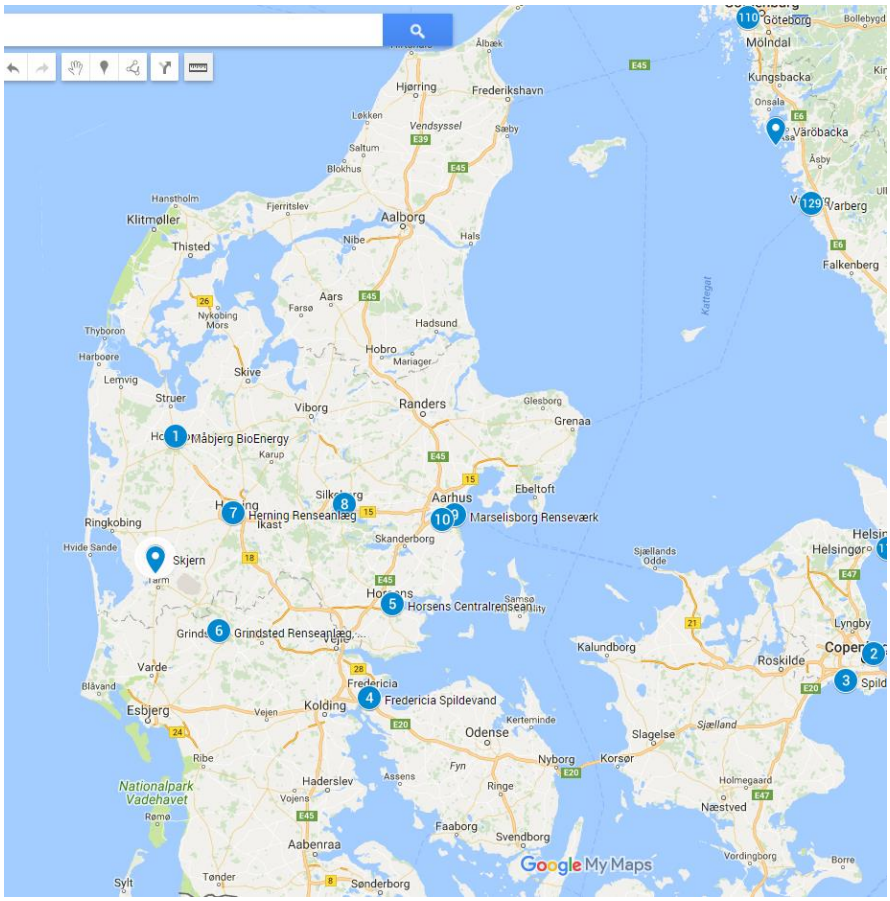
1. A closer look is taken at them with the aim of identifying companies that are located in the same municipalities. The dry matter content of the N-enriched liquid digestate/reject water of biogas plants is very low. In order to avoid the transportation of water, the transportation distance should be very limited or the digestate should be further treated for mass reduction (vaporisation or membrane separation techniques) or for extraction of nutrients.
2. A survey among the nearby-located companies is planned and realised to map the availability of digestate treatment technologies and the willingness of these companies to participate in nutrient exchange activities.

COMPANIES LOCATED NEARBY EACH OTHER

Denmark

The closest biogas plants to the small Skjern paper mill are #6 Grinsted Renseanlaeg, #7 Herning Renseanlaeg and #1 Måbjerg BioEnergy. The direct distance is, however, already quite high, i.e. 30-50 km.

Figure 1. Denmark



Estonia

The following plants are located within a 40 km radius:

- Pulp mill #2 Kunda (306 000 Adt/a, Heinzel, AS Estonian Cell) and biogas plants #15 Jaama 21, Kunda (AS Estonian Cell) and #14 Kohtla-Järve (Eastman Specialities OÜ)
- Pulp and paper mill #3 Kehra (110 000 Adt/a + 65 000 Adt/a, Tolaram Group, Horizon Pulp and Paper) and biogas plants #11 Tallinna Vesi AS and #16 Salutaguse Pärmitehas AS

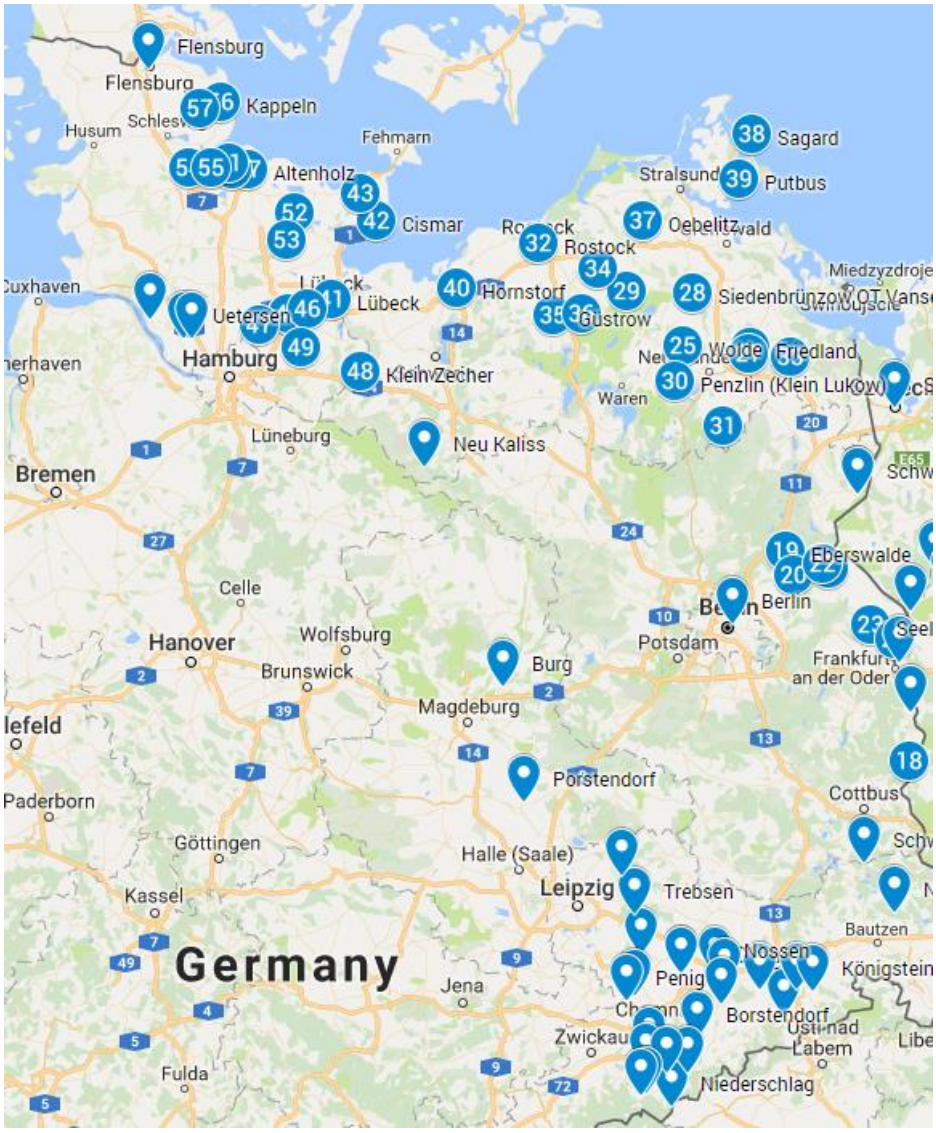
Figure 2. Estonia

Germany

In Germany, the biogas plants and pulp paper mills are in many cases located at least 30 km from each other. However, regulation permitting, there may be nutrient export opportunities across the Polish border. The most prominent cases include

- Polish paper mills Kostryn nad Odra (306 000 Adt/a) and Kostryn (185 000 Adt/a) and biogas plants #23 Seelow and #24 Podelzig
- Paper mill Eisenhuttenstadt (650 000 Adt/a) and biogas plant #18 Schenkendöbern
- Pulp and paper mill Schwedt (770 000 + 460 000 Adt/a) and biogas plants #19 Ebersvalde, 22 Bad Freienwalde, 21 Bad Freienwalde OT Altranft and 20 Heckelberg-Brunow
- Paper mills Uetersen (245 000 Adt/a) & Tornesch (70 000 Adt/a) and biogas plant #47 Bargfeld Stegen
- Paper mill Flensburg (35 000 Adt/a) and biogas plants #57 Süderbrarup and #56 Kappeln

Figure 3. Germany



Latvia

In Latvia, the direct distance to the nearest pulp and paper mill is almost 100 km. Therefore, it is considered that there is no potential for matchmaking.

Lithuania

A potential match was identified between Panevezys mill and biogas plant #62 Kurana and #64 UAB Psenergija. However, the Panevezys mill is so small-scale (paper and board capacity is only 2000 t/a), that the demand for additional nutrients is considered negligible.

From the other pulp and paper mills, the distance to potential suppliers is close to 100 kms at the minimum.

Figure 4. Lithuania

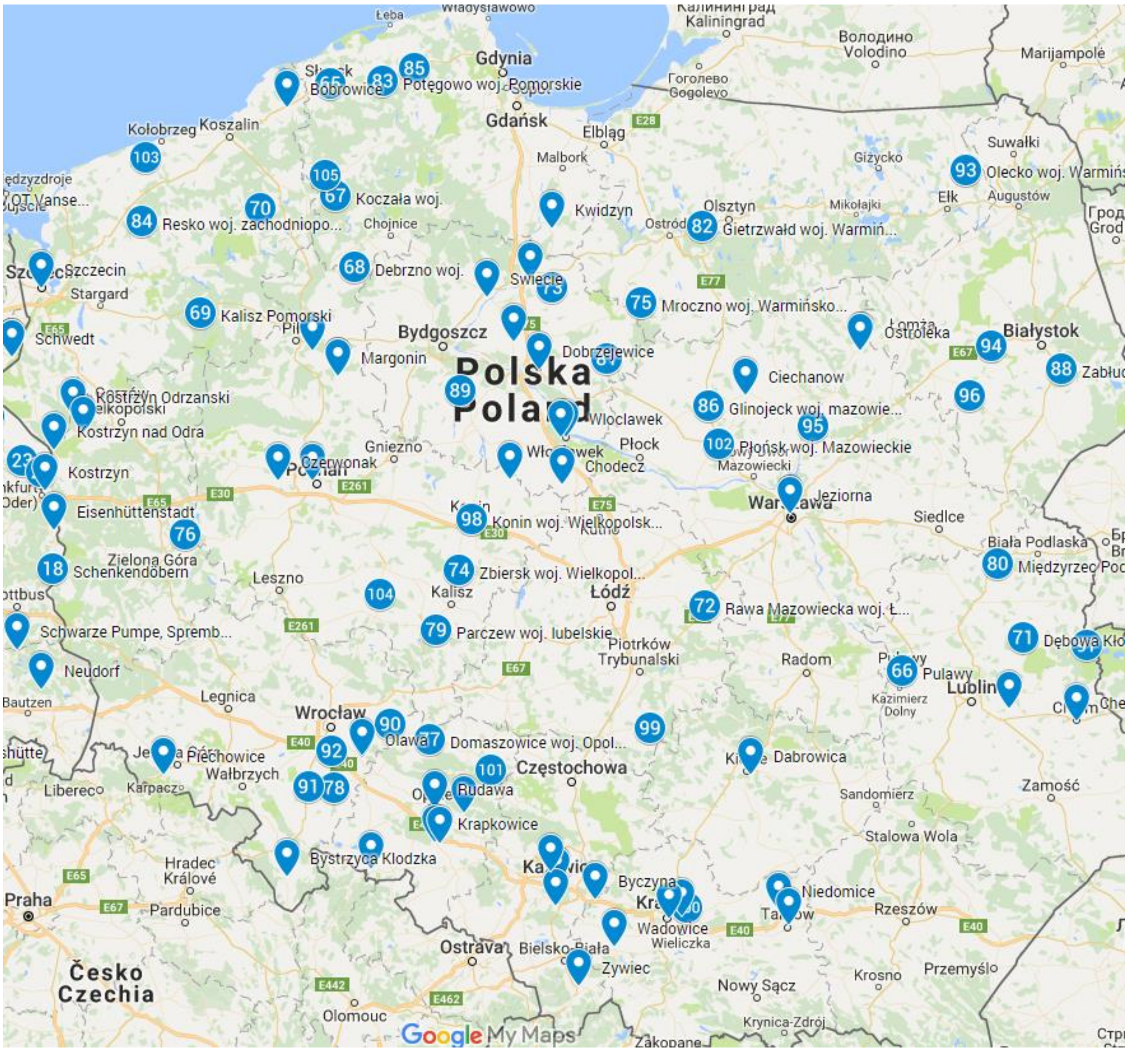
Poland

In Poland, the analysis suggest matchmaking between the following industries:

- Swiecie (1475 000 + 595 000) and Kwidzyn (770 000 + 555 000) paper and pulp mills and Grudziadz paper mill (120 000) and biogas plant #73 Mełno woj. Kujawsko-Pomorskie
- Stora Enso Narew Sp. z o.o. Ostroleka (455 000 + 0) and Stora Enso Poland S.A. Ostroleka (195 000+ 105 000) mills and biogas plant #95 Psary woj. Wielkopolskie
- Two Olawa paper mills (18 000 and 5 000) and biogas plants #78 Strzelin woj. Dolnośląskie, #92 Żórawina woj. Dolnośląskie and #90 Bierutów woj. Dolnośląskie

Together with the Polish mills mentioned in connection with German biogas plants, this list includes the seven largest paper mills and three largest pulp mills in Poland. In addition, there are very small paper mills in Bobrowice and in Krakown in the vicinity of biogas plants, but they have been excluded from a closer survey.

Figure 5. Poland



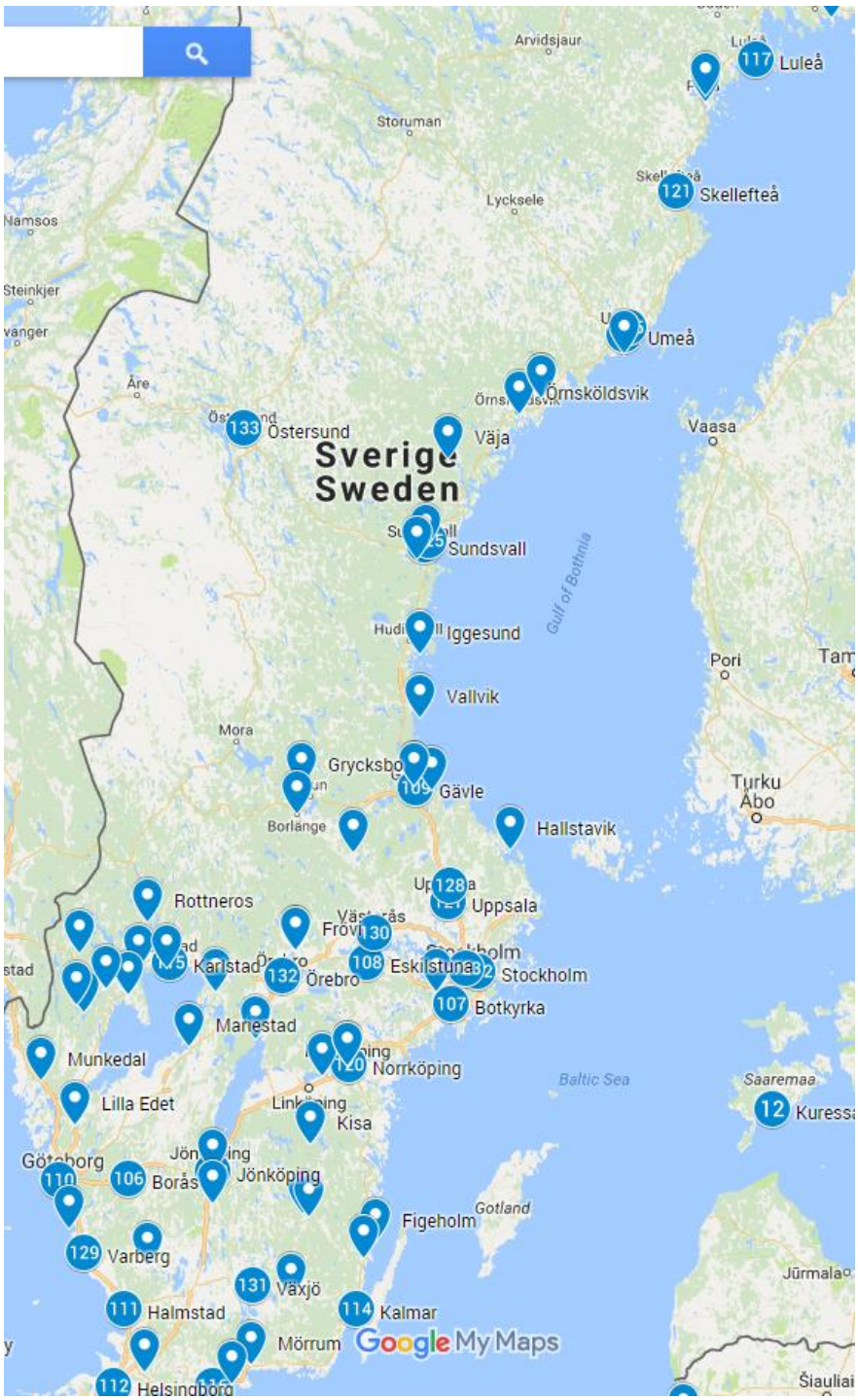
Sweden

In Sweden, large-scale biogas plants and pulp paper mills are situated in the same area in six municipalities: Umeå, Sundsvall, Gävle, Norrköping, Jönköping and Karlstad. A few other closely located sites were included, too (see also Figure 6 below):

- SCA Obbola AB (435 000 + 250 000) and #126 Umeå sewage treatment plant or #135 Norrmejerier industrial biogas plant
- Mills of SCA Graphic Sundsvall AB: Ortviken (765 000 + 895 000) or Östrand (0 + 520 000) and #124 and #125 sewage treatment plants of Sundsvall
- BillerudKorsnäs AB, Gävle (725 000 + 700 000), SwedPaper AB, Gävle (65 000 + 0) and Stora Enso Pulp AB, Skutskär (0 + 565 000) and #109 Gävle sewage treatment plant
- BillerudKorsnäs AB, Skärblacka (365 00 + 445 000), Fiskeby Board AB, Norrköping (170 000 + 0) and Holmen Paper AB, Norrköping (585 000 + 700 000) and #120 Norrköping sewage treatment plant
- Ahlstrom-Munksjö, Munksjö Paper AB, Jönköping (35 000 + 0) and #113 Jönköping sewage treatment plant

- Stora Enso Skoghall AB, Skoghall (780 000 + 715 000), Waggeryd Cell AB, Vaggeryd (0 + 155 000) and #115 Karlstad sewage treatment plant
- Stora Enso Nymölla AB, Nymölla (500 000 + 335 000) and #116 Kristianstad sewage treatment plant
- Södra Cell AB, Väröbacka (0 + 700 000) and #110 Varberg and #129 Göteborg sewage treatment plants

Figure 6. Sweden



SURVEY

An electronic survey was planned and realized in January-February 2018, informing the companies about the opportunities for nutrient exchange and inquiring their willingness to participate in such an activity.

The survey was translated into English, Swedish, Polish and German and sent to 63 recipients (31 pulp and paper mills and 32 biogas plants) in the Baltic Sea region. The English version is attached as Annex 1.

Based on 10 responses (response rate 16%), it can be concluded that

-Potential suppliers of recycled nutrients

- All responded biogas production plants at least partly separate liquid digestate or reject water and solid digestate. However, none of them currently sells the liquid digestate or the reject water to other actors.
- There is mixed interest in selling the liquid digestate / reject water: 20% is very interested, 40% moderately interested and 40% not interested.
    - "Liquid fraction is sent to wastewater treatment"
    - "Reject water is released to local river."
    - "We release reject water to the Gulf of Finland."
    - "Probably expensive to transport."

-Potential users of recycled nutrients

- 100% of responded pulp and paper mills operate a biological wastewater treatment plant and add nutrients in the process. These nutrients are currently industrially produced chemicals. In other words, none of the respondents currently use recycled nutrients in their processes.
- All respondents are interested in using recycled nutrients. According to their comments, cost and quality issues play an important role, however:
    - "We are interested depending on the cost of course."
    - "We have looked at different solutions, especially for nitrogen, to recycle from other industries. Unfortunately, the nitrogen content has been so high that it would risk our limit values."

CONCLUSIONS

There is potential for nutrient cycling from biogas to pulp and paper industry in Denmark, Estonia, Germany, Poland and Sweden. The main obstacles are the transportation cost involved and the limited interest of potential sellers' side.

There are some forerunners which are already putting nutrient exchange into practice:

- During the course of the project NutriTrade, UPM has committed to using recycled nutrients at its biological waste water treatment plants by 2030. This applies to all UPM 21 production plants in 13 countries as long as the mills have their own biological waste water treatment plants. In Finland, the target is expected to be achieved by 2020.
- Stora Enso Varkaus and Imatra mills treat the nutrient rich wastewaters of adjacent fish farms, thus reducing the need for adding nutrients at the activated sludge plant.

Based on responses and the UPM commitment, the order of magnitude of reduced P consumption due to nutrient exchange can be estimated at 425 t P/year by 2020.

In Latvia and Lithuania, no opportunities were identified due to long distances between the potential sellers and buyers of recycled nutrients.

Apart from pulp and paper industry, nutrient low wastewaters can in found in fruit and vegetable processing. An emerging opportunity is also carbon rich wastewaters, which can replace added methanol at wastewater treatment plants.

Cover letter

Subject: Survey of recycled nutrients

Dear Sir/Madam,

As the project manager of NutriTrade, I am writing to you to request your participation in a brief survey. Project NutriTrade aims at reducing phosphorus to the Baltic Sea by 50 tons/a. One of the means is to encourage the use of recycled nutrients (P, N). In order to estimate the interest in recycled nutrients, this questionnaire has been sent to 31 pulp and paper mills and 32 biogas plants in the Baltic Sea region.

The survey is very brief and will only take about 2 minutes to complete. Please click the link below to go to the survey Web site (or copy and paste the link into your Internet browser).

Survey link: http://www.surveymonkey.com/

Your participation in the survey is completely voluntary and all your responses will be kept confidential. No personally identifiable nor company information will be associated to any reports of these data. Should you have any comments or questions, please feel free to contact me at anna.saarentaus@jnfoundation.fi or +358 40 7190208.

Thank you very much for your time and cooperation. Improving the state of the Baltic Sea is very important to us.

Sincerely,

Anna Saarentaus

Project Manager, NutriTrade

Questionnaire on recycled nutrients

General 1

- Email address of respondent
- Name of organisation

Biogas plants & Wastewater treatment plants with biogas production

- In your biogas production process, do you separate the liquid and solid fractions of the digestate?
    - Yes
    - No

  Comment _____

- Do you currently provide liquid digestate / reject water to other actors?
    - Often
    - Sometimes
    - Seldom
    - Never

  Comment _____

- Are you interested in starting or increasing to provide liquid digestate / reject water?
    - Very interested
    - Moderately interested
    - Not interested

  Comment _____

Pulp and paper mills

- Are the wastewaters from your company treated in an aerobic biological process?
    - Yes, in a wastewater plant operated by us
    - Yes, in a wastewater plant operated by someone else
    - No

  Comment _____

- Are nutrients (nitrogen (N), phosphorus (P)) added there for the effective operation of an aerobic biological process?
    - Yes, both N and P are added
    - Yes, N is added
    - Yes, P is added
    - No

  Comment _____

- What is the origin of added N?
    - Ready-made industrial product
    - Recycled
    - Both ready-made industrial and recycled

  Comment _____

- What is the origin of added P?
    - Ready-made industrial product
    - Recycled
    - Both ready-made industrial and recycled

  Comment _____

- Are you interested in starting or increasing the use of recycled nutrients?
    - Yes, interested in both N and P
    - Yes, interested in N
    - Yes, interested in P
    - No

  Comment _____

- What is the reason for not starting or increasing the use of recycled nutrients?
    - Cost
    - Quality
    - Lack of information
    - Other, please specify _____

  Comment _____

General 2

- Any other comments on recycled nutrients?
- Do you want to join the project mailing list?
  Yes
  No

Thank you for your response!