The Forests Dialogue

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TFD's Company Questionnaire on the Development of Genetically Modified Trees

April 2014

Summary

This document represents the compilation of five global forest products companies' (Fibria, Stora Enso, International Paper, Meadwestvaco, Suzano) responses to a 1st questionnaire on issues related to the development of genetically modified trees (GMT). The questionnaire highlights some of the main questions some civil society organisations (CSO) and some indigenous peoples' organisations (IPO) have for the forest products industry regarding their support for and development of GMTs.

Process

At the recommendation of The Forests Dialogue's (TFD) Steering Committee, a first draft of the questionnaire was prepared in advance of a TFD meeting held in Gloucestershire, England in October 2013. To draft the questionnaire, TFD worked with two UK based NGOs (and Gloucestershire meeting hosts), the Forest Peoples Programme and FERN. This initial draft was then distributed to over 50 individuals that had participated in TFD's prior GMT's meetings for their comments, additions and revisions. A limited number of comments were received and incorporated into the draft. The revised draft was discussed at the Gloucestershire meeting. The meeting was attended by 15 persons from CSOs, IPOs, Intergovernmental Organisations (IGOs) and the forest products industry. Clarification of questions, suggestions for additional questions for a possible follow up and a discussion on how the companies could reply to the questions formed the basis of the meeting. To read a summary report from the TFD Gloucestershire meeting please go to:
http://www.theforestsdialogue.org/initiatives/GMT

The companies represented agreed to respond to all of the questions in a timely fashion. Although more questions were raised during the Gloucestershire meeting, which were seen as crucial for inclusion by some CSOs, it was accepted that the companies would answer the original draft questions first since they had already discussed the questions within their companies. The companies also offered to make their responses publicly available via this TFD publication. The full and complete company responses follow this introductory cover note. No agreement was reached regarding any specific further actions during the meeting.

Going Forward

Many participants expressed their appreciation of the meeting's open spirit and some commended the willingness of the participants to engage on these challenging and complex issues. However, it was noted that while some progress had been made in furthering the exchange of information, there still remained substantial areas of uncertainty and divergence of opinion and much more information needed to be shared. It was also noted that this questionnaire was crafted specifically for companies with interest in developing GMTs, and thus did not fully explore issues that may be better addressed by other stakeholders such as national government regulatory agencies. TFD agreed to continue to play a facilitating/coordinating role among the various stakeholders on the GMT issue as long as it was deemed useful. Several options for future action were suggested by the participants, including a next phase of information sharing. Decisions about any follow up actions will depend on how the company responses to the questionnaire are received and the willingness of the key stakeholders to continue to engage constructively. Sorting through and making decisions on those options will be the responsibility of the GMT Advisory Group steered by TFD.

TFD is eager to receive feedback on the questionnaire and the GMT Initiative. Please send any comments or questions to *info@theforestsdialogue.org*

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The Forests Dialogue

Questionnaire on "What NGOs want to know from industry about Genetically Modified Trees (GMT)" Version 1 (*Approved - 1 November 2013)*

COMPANY: FIBRIA CELULOSE SA **Date Completed:** 30 NOVEMBER 2013

1. Overall GMT development plans

Q 1.1 Is your company currently developing or planning to develop GMT?
Company Answer: Fibria has been carrying out research with Genetically Modified Eucalyptus since the late 1990s in controlled environments (both laboratory and greenhouse). Since 2011, with the new FSC interpretation on GMO Policy, Fibria has expanded field trial research in areas outside the scope of certification. Currently, Fibria has 92 hectares with GM Tree field trials (less than 0.01% of the company's total area), into 11 different field trials.
Company notes/assumptions/discussion points: Information related to Fibria's research on GMT is disclosed publicly, following the CTNBio (National Technical Biosafety Committee) requirements. To access this information, CTNBio requires a formal request from interested parties.

Q 1.2 Does your company have a written policy on GMT?
Company Answer: Yes. Fibria's GMT Policy is available online at the following address: http://www.fibria.com.br/web/en/institucional/tecnologia.htm It states: "Fibria believes that the society will benefit from the genetic engineering of forest species. Therefore the Company's decisions on the research of genetically modified eucalyptus trees are in accordance with current legislation, scientific knowledge and stakeholders' demands. It has been made through the continuous evaluation of economic, environmental and social gains and impacts resulting from the application of such technology and is in compliance with technical and scientific procedures to mitigate potential risks". Fibria recognizes that this policy must be updated in order to consider principles such as the need to take into account specific stakeholder's concerns. A revision of the GMT Policy is scheduled for 2014.
Company notes/assumptions/discussion points:

Q 1.3 Can you share the risk assessment methods you used - or plan to use-prior to developing GMT?
Company Answer: Current evaluations: - overall GM detection techniques; - natural range of the parental species of GMOs and wild relatives or ancestors; - history of cultivation and use of parental organism in terms of safety for the environment, human and animal consumption; - information about the possibility of introgressive hybridization with sexually compatible species and the possible selective advantage of the transgene; - propagation structures dispersal and reproduction of GMO; - information on pollen viability;

- potential pollinators and their geographical distribution in Brazil;
- GMOs usage history and countries where their commercialization and planting have been authorized or denied (in this case, monitoring data or post-commercial release, if any).

Future evaluations (for commercial release, during the process and if we get there):

- pattern of genetic inheritance of the inserted genes;
- degree of genotypic stability;
- whether genetic modifications included in the GMO may alter reproductive capacity, survival, dissemination or transfer of genes to other organisms;
- the possible effects on relevant organisms indicators (symbionts, predators, pollinators or parasites) in ecosystems where it intends to make its cultivation, compared with the parental organism of the GMO in a conventional production system;
- negative and positive impacts on target and non-target organisms that may occur with the release of GMOs;
- modifications of the plant's ability to add or remove substances from the soil, due to introduction of new features, describing possible physical and chemical changes in the soil and contamination of adjacent water bodies resulting from the interactions with the GMO compared to conventional systems;
- possible resistance to chemical agents conferred by feature introduced;
- changes in the survivability of the GMO in environments other than those occupied by parental caused by the new features introduced .

It is important to emphasize that future evaluations, if we select a potential event for commercial release, will be conducted for each GM event and will take additional 3 to 5 years of field evaluation, before a company's decision of moving forward (or not) with any commercial plantation.

Additionally, we must consider (in both the research phase or in commercial release), even if not required by law, other relevant evaluations, such as the impact on water resources, in the case of plants whose traits developed are for faster growth.

Company notes/assumptions/discussion points:

According to Brazilian Law, there are three phases, from field trials to commercially approved plantations:

1) PFTE (planned field trials to the environment), which is the phase of the research that we are currently in;

2) Application for Commercial Release;

The results of these two phases are prerequisites for the approval of any commercial release (valid for agricultural crops and trees).

3) Post-Release Commercial Monitoring.

The CTNBio RN05 Norm must be followed in full and regulates general risk evaluations, considering risks to human and animal health and to the environment.

Q 1.4 Can you share the findings from these risk assessments?

Company Answer:

As we answered in the previous questions, since 2011 we have installed 92 ha of field trials with GMTs and we are conducting several evaluations, related to economic, environmental and social assessments. Fibria is open to share risk assessment findings and we are willing to engage with any interested party in Brazil or abroad on this issue. However, our field trials are still very young (under 2 years old) and do not yet obtain relevant information to be shared, in terms of risk assessment.

However, some findings related to risk assessments in GM eucalyptus (GME) planted in Brazil are already public, through work developed at the CDA Project (Pasquali et. al., submitted for publication):

- GME do not alter the insect fauna of the soil;
- GME are not toxic to animals (rats and fish);
- GME do not alter the chemical properties of wood;
- GME do not require any new forest management techniques.

Studies conducted by the Institute on Forestry Research and Studies (IPEF / Brazil) on "Dispersion and Evaluation of Invasiveness of Eucalyptus" have also been published. They indicate the inability of eucalypts to adapt to conditions outside of their natural range and proved that, in Brazilian conditions, eucalyptus species cannot invade areas of native vegetation (http://www.ipef.br/publicacoes/ctecnica/nr203.pdf).

Company notes/assumptions/discussion points:

All information generated in our field trials has been disclosed publicly, following the CTNBio requirements, and new information will continue being shared.

Q 1.5 Can you tell us the tree species or polyploids you are currently developing or seeking to develop as GMT ?

Company Answer:

We are working exclusively with clones of the *Eucalyptus grandis* x *E. urophylla* hibrids (diploids).

Company notes/assumptions/discussion points:

Q 1.6 Do you expect to continue producing new, faster- growing, higher -yielding trees by means of GM into the coming decades?

Company Answer:

Everything will depend on the current and continuous evaluation of economic, environmental and social gains and impacts resulting from the application of such technology. At this moment we are conducting only field trials (research level) in order to answer these and questions. Specifically about future, Fibria believes that society will benefit from the development of GMTs alongside traditional routes, such as classical tree breeding.

Company notes/assumptions/discussion points:

Q 1.7 Could such advances be made with the most advanced (non-GM) breeding programmes?

Company Answer:

Classical Tree Breeding is Fibria's main focus of research, taking up most of our R&D resources. We strongly believe that genetic gains with non-GMTs will continue, adopting traditional routes, mainly due to the natural genetic variability of eucalyptus genus, which is large and still underexplored. However, for some specific objectives (e.g. lignin content; drought tolerance) we do not have enough natural genetic variability in the eucalyptus tropical species we have been working for over 40 years. Therefore, for some objectives, we believe that GM will become a key tool to increase and accelerate the gains expected from classical breeding programs, bringing benefits for the society (to produce more with less resources, such as land, water, nutrients, etc.).

Company notes/assumptions/discussion points:

Q 1.8 Is there any evidence that faster growing trees take pressure off forests?

Company Answer:

Yes. Consider the case of gains in wood productivity and quality already obtained in Brazil, for example: forest productivity has jumped from 20 to 45 m^3/ha/year and the wood specific consumption has been reduced from 4.5 to 3.4 m^3/adt, since 1970's. Just as an example, with these figures presently 100,000 ha of planted eucalyptus area are required to supply a 1.5 million ton/year mill, which is about half of the area that would be required without those gains (and also much lower than the area required in other countries). This is the result of serious R&D plus best practices in silviculture. In others words, genetic gains alongside better management and forest operation processes have resulted in significant productivity and ecoefficiency gains. So, in our case, we have been able to use less land for pulp production, which means more land available for other uses, such as food production and / or bioproducts in general.

This example related to pulp production in Brazil can also be applied to other wood uses in Brazil, such as charcoal production, solid wood products, etc.. In these businesses, faster growing trees have reduced the pressure on logging of native forests.

Company notes/assumptions/discussion points:

Q 1.8-1 If so, will you abstain from replanting land freed by faster growing trees?

Company Answer:

This is one of the company's Strategic Long-Term Targets. Our specific target is to reduce by one third the total area needed to produce our present pulp capacity, considering the improved clones planted after 2025. If we have any pulp capacity expansion, this also will result in the reduction of the land needed, due to better productivity of our new planted forests.

Company notes/assumptions/discussion points:

Q 1.9 Can you tell us for what purpose(s) you plan to develop GMT?

Company Answer:

The main objective of the research carried out by Fibria is to increase pulp production per unit of area (ton pulp/ha/year). We have different strategies to achieve this goal, where the main ones are:

- improvement of wood quality: lignin content and/or quality; cellulose content; wood density; fiber length;
- increasing volumetric growth.

Research with other focuses is also being developed, such as increased tolerance to hydric stress. Another objective is to support our developments applied to second generation biofuels.

Company notes/assumptions/discussion points:

Q 1.10 Can you tell us the exact sites or general locales (countries, states) to test or pilot GMT?
Company Answer: Fibria conducts field trials exclusively in Brazil, in the municipalities of Taquarivai (São Paulo state), Aracruz (Espírito Santo state) and Três Lagoas (Mato Grosso do Sul state).
Company notes/assumptions/discussion points:

Q 1.11 What plans do you have to develop GMT on an industrial scale?
Company Answer: At this moment Fibria is only conducting field trials (research level) in order to first evaluate potential benefits and risks, compared to conventional plantations. The decision regarding the scale up of GMTs will be taken only after current and future assessments are completed. Please see our answer to question 1.3.
Company notes/assumptions/discussion points: It is important to note that the commercial use of GM Eucalyptus is not allowed yet in Brazil.

Q 1.12 Can you tell us the exact sites or general locales (countries, states) where you are growing or plan to grow GMT on an industrial scale?
Company Answer: Fibria has not taken the decision regarding the growth of GMT on an industrial scale. For the time being, we are still in the research phase.
Company notes/assumptions/discussion points:

Q 1.13 What details can you share about these plans?
Company Answer: We currently do not have plans to grow GMT on an industrial scale, this will depend firstly on the legislation allowing for commercial plantations, and then on the results of the field trials (research and pre-commercial release phases).
Company notes/assumptions/discussion points:

2. Biosafety issues

2.1 Genetic issues

2.1.1 What details can you share about the genes you are planning to splice in or out of GMT?
Company Answer: Please see Q1.9 – Fibria's GMT purposes. Due to competitiveness factors, we cannot share specific information related to genes at this moment, since this is considered strategic and confidential information, taking in account that we are still doing research on this issue. However, based on Brazilian law, for the commercial approval (if that stage is reached by Fibria), this information will be public.
Company notes/assumptions/discussion points:

2.1.2 Will the resultant varieties be fertile?
Company Answer: Yes. In Brazil the use of GURT technology (Genetic Use Restriction Technology) - or similar - is prohibited by law.
Company notes/assumptions/discussion points:

2.1.3 How will they be propagated?
Company Answer: Eucalyptus propagation, either conventional or transgenic, is done by vegetative techniques, mainly micro-cuttings.
Company notes/assumptions/discussion points:

2.1.4 What precautions have you adopted to ensure that no cross-breeding occurs between GMT and related natural species?
Company Answer: The available scientific literature and practical observations do not indicate cases of a cross between eucalyptus (conventional or transgenic) with any plant of natural occurrence in Brazil (native species). Our research will continue analyzing the issue of cross-breeding between GMT and native Brazilian species.
Company notes/assumptions/discussion points:

2.1.5 How will you avoid escapes of the GMT, or the genetic modifications themselves, into natural ecosystems?
Company Answer: The level and ability of eucalyptus invasiveness in Brazil is already known to be at low levels. Nevertheless, new studies are being carried out by Academia (in Universities, as well as at Fibria and other companies), to assess the risks of GMT escape. What is currently being done in the field trials is to keep a track of 100 meters free of any spontaneous regeneration during the life-cycle field trials, plus 1 year. Based on studies already published, the risk of undesirable crossing is minimal, because the eucalyptus' ability to spread seeds reduces dramatically with increasing distance from the seed-producing tree. There is no evidence, according to data in the literature, that the pollen carried by wind or animals to longer distances will result in a cross and that any seeds produced are viable and able to establish itself.
Company notes/assumptions/discussion points:

2.1.6 What details can you share about how these precautions are made effective?
Company Answer: The inspection on spontaneous regeneration or escape of GMTs is done by official inspectors of the Ministry of Agriculture and all controls must be reported to CTNBio (public data). What is known so far is that there is no gene escape into natural ecosystems. More information is being generated to support this in a project led by IPEF - Institute of Forest Research and Studies, Piracicaba/SP, Brazil).
Company notes/assumptions/discussion points:

2.1.7 What precautions do companies developing GM trees hope to put in place to prevent what happened in China? GM trees were released in China about a decade ago. GM trees were on sale in tree nurseries and no records have been kept about where they have been planted. (Some nurseries also mislabelled non-GM trees as GM trees in order to sell them for more.) Do any of the companies have any further information about how many GM trees have been planted in China, and what the impacts of these GM trees has been?
Company Answer: The forest model in Brazil is very different of the Chinese's model. At first, major seedling production is under responsibility of companies themselves, for their own use and also for providing seedlings to small and medium farmers. In Brazil, there are two laws in place regarding to this matter: "Seeds and Seedlings Law" and "Plant Varieties Protection Law". Based on these laws, we have seedlings traceability and allocation. This legislation protects the developer (crop and tree breeders), but also ensures the right to use protected cultivars for own consumption, in case of small farmers and local communities. All nurseries in Brazil have to strictly follow these laws. This is already applied for non-GMT and should be still more strict when we have commercial plantations of GM Trees. Other important aspect needs to be emphasized, considering Fibria's business model: we do not sell seedlings. 100% of our seedling production is to our own use.
Company notes/assumptions/discussion points:

2.1.8 Are you pursuing effective transgene containment mechanisms which don't sacrifice the pollen, seed, fruit, flowers or cones of trees?
Company Answer: Brazilian law does not allow constraint propagation technologies (like GURT or Terminator). Fibria strictly follows the law and does not use any of these technologies in its studies. In the field trials, in order to ensure any possibility of contamination we are isolating the areas (temporal and physical isolation) and monitoring / eliminating any spontaneous regeneration, if it occurs.
Company notes/assumptions/discussion points:

2.1.9 Can you ensure sterility in the face of transgene silencing and stability issues?
Company Answer: ?
Company notes/assumptions/discussion points: Sorry, we did not understand this question. Could you please clarify it?

2.1.10 What kind of civil society participation do you anticipate in the development of these precautions?
Company Answer: Currently we release all information required by CTNBio and we encourage a transparent process. Prior to commercial approval, CTNBio requires a public hearing to debate results, risks and benefits of any GM crop. All interested parties can participate in such hearings. We are open to engaging with CSOs in order to discuss ways that may allow a further participation of civil society in the assessment of the evaluation findings and in the development of needed precautions.
Company notes/assumptions/discussion points:

2.2 Chemical and mechanical issues

2.2.1 Will the GMT you are developing require specialist chemical or other treatments?
Company Answer: We do not use any strategy that requires special treatment.
Company notes/assumptions/discussion points:

2.2.2 Do you **expect** to grow the GMT along with any special treatments or use of chemicals to enhance growth or protect from pests etc?
Company Answer: Special treatment is not expected in the routes in which Fibria has worked.
Company notes/assumptions/discussion points:

2.2.3 What precise details can you share about these chemical or other treatments? (i.e. names and descriptions of the chemicals or treatments to be used)
Company Answer: We do not use any strategy that requires special treatment.
Company notes/assumptions/discussion points:

2.2.4 Have you already tested for the positive and negative effects of such treatments?
Company Answer: We do not use any strategy that requires special treatment.
Company notes/assumptions/discussion points:

2.2.5 Can you share the results of such tests?
Company Answer: We do not use any strategy that requires special treatment.
Company notes/assumptions/discussion points:

2.2.6 What do you know about the possible effects of these treatments on the environment, on animal welfare and on human health?
Company Answer: We do not use any strategy that requires special treatment.
Company notes/assumptions/discussion points:

2.2.7 What measures and policies do you propose to nullify or mitigate any negative impacts?
Company Answer: Regarding special treatments: we do not use any strategy that requires special treatment. Regarding any other negative impact: a major objective of our research on GMTs is to evaluate potential risks and side effects. And depending on these, to also evaluate effective measures to mitigate or eliminate them. Due to that we strongly defend the importance of the research phase (current phase and future pre-commercial field evaluations), including field trials adopting an adequate scale. Our field trials are still young (under two years old) which does not allow us yet to reach final conclusions on negative impacts and/or side effects of this technology.
Company notes/assumptions/discussion points:

2.2.8 What details can you share about how these measures and policies are made effective?
Company Answer: Please see our answers to previous question (Q. 2.2.7).
Company notes/assumptions/discussion points:

2.2.9 What kind of civil society participation do you anticipate in the development of these measures and policies?
Company Answer: Fibria believes that engagement processes, such as The Forests Dialogue (TFD) and WWF's New Generation Plantations, are excellent ways to discuss how to strengthen an effective civil society participation. We intend to intensify our participation in those processes, encouraging transparency and openness in the discussion regarding the development of GMTs. Furthermore, we are willing to engage with any interested party in Brazil or abroad on this issue.
Company notes/assumptions/discussion points:

2.3 Biosafety issues - social, cultural

2.3.1 What public regulatory requirements cover your GMT developments and how is your compliance with these verified?
Company Answer: All issues related to genetically modified organisms in Brazil follow requirements of federal legislation and are subject to inspections by the Ministry of Agriculture. Fibria strictly follows all aspects of the legislation. To do so, the company created, with the research department, a dedicated Regulatory Affairs office, with responsibility and actions ranging from the performance of its Internal Biosafety Commission to the monitoring and inspection of all processes and studies related to GM Trees.
Company notes/assumptions/discussion points:

3. Social and cultural issues

3.1 Do you have any current policies which you think will prevent or mitigate the negative social impacts of GMT?
Company Answer: We do not have any policy related to this issue, but as we answered at question 1.2, we recognize that our corporate GMT Policy needs to be reviewed, in order to contemplate additional aspects, like this one. Fibria has already started a process to review its GMT Policy is willing to engage with representatives of civil society in order to get contributions to this. However, at this moment we do not expect negative social impacts of GMTs. This is mainly because we have developed a successful program, that has been ongoing for 18 years, with small and medium landowners, that are included in our production system (over 3,300 forest partner contracts – small and medium farmers). Based on this program, the farmers have access to our best available technology platform (exempted from development costs). Therefore all our gains in this area will be shared with them.
Company notes/assumptions/discussion points:

3.2 Do you have any specially tailored policies on indigenous peoples, local communities, poor people, women or society at large?

Company Answer:

The company has forged a wide range of relationships with diverse communities (indigenous or otherwise), which are primarily impacted by its forestry activities. As part of its social strategy and following an Engagement Manual, Fibria works with these communities either directly or through engagement with other players who can also contribute to finding solutions, such as the government, in its various echelons, NGOs and other companies. Some communities have received special attention from the company, which has been developing specific social inclusion projects, often with input from government agencies and independent socioenvironmental agencies. This is the case of communities known as quilombolas (descended from former runaway slaves) and Indigenous communities of the Tupiniquim and Guarani ethnicities. Members of the Landless Workers' Movement (MST) and families of local fishermen are yet other cases in point.

Currently, our engagement manual, and related relationship policies do not explicitly mention GMT. However, our plantations of GMO or otherwise, will only take place within forest partners' areas and within local communities only after following the principle of free, prior and informed consent.

Company notes/assumptions/discussion points:

3.2-1 If so, can you share copies of these policies?

Company Answer:

Yes, Fibria's engagement manual is available in Portuguese on the company's website:
http://www.fibria.com.br/shared/midia/publicacoes/manual-de-engajamento-fibria-13mai2013.pdf
Additionally, information on Fibria's relationship with local communities, such as policies, challenges and indicators, is disclosed annually in our Sustainability Report. Refer to, for instance, the company's 2012 Sustainability Report (in English):
http://www.fibria.com.br/rs2012/en/template?go=desempenho-social/modelo-de-relacionamento.html

Company notes/assumptions/discussion points:

3.3 Do you expect GMT to have positive benefits for indigenous peoples, local communities, poor people, women or society at large?

Company Answer:

We are not carrying out research on indigenous lands or traditional communities. The expectation is that, once the gains and risks are analyzed, and the balance is positive and attractive, the technology could be used by anyone. The principle of free, prior and informed consent (FPIC) will be observed and any future decision of the use GMT will be taken freely by each community, taking into consideration the technology's gains and the risks. In general, the model adopted by forestry companies in Brazil recommends that a significant part of the wood supply comes from small and medium-sized farmers, to which the best production technology is provided. In the case of proving benefits with any known and mitigated risks, the technology could be transferred (royalty-free nor with another mode of payment) to these farmers, as long as they do not pass the technology on to third parties.

Company notes/assumptions/discussion points:

3.4 What concrete plans do you have to make sure that GMT bring positive impacts?
Company Answer: Every trial being led aims to answer this question by mapping the potential benefits and risks. It does not make sense for Fibria to request approval of any commercial cultivar (in the future, if so) that does not bring positive impacts to Fibria, local communities, customers and end users.
Company notes/assumptions/discussion points:

3.5 Do you have a policy not to develop GMT where indigenous peoples or local communities withhold their Free, Prior and Informed Consent?
Company Answer: We do not have a policy related to that, but we shall not use GMT on indigenous peoples' or local communities' lands without their Free, Prior and Informed Consent. This statement will be part of the revision of our policy on GMT, that will happen in 2014.
Company notes/assumptions/discussion points:

3.6 Do you have a policy not to develop GMT in countries where there is widespread opposition from informed CSO groups?
Company Answer: No, we do not have a policy related to that - please see our answer to question 1.2. Important Note: the focus of Fibria's forest operations and pulp production is only in Brazil.
Company notes/assumptions/discussion points:

3.7 Will the GMT you are developing require specialist skills or treatments to grow or propagate them?
Company Answer: Special treatment in the routes where Fibria has worked in is not expected. Therefore, no special skills will be required other than the ones already needed in the use of traditional technology.
Company notes/assumptions/discussion points:

3.8 Will the GMT that you develop be proprietary varieties or freely shared with all?
Company Answer: Fibria's procedures related to our forest partners will be the same for GM and non-GM trees.
Company notes/assumptions/discussion points:

3.9 Will independent farmers or communities choosing to grow these trees be **able** to propagate them?
Company Answer: Yes, they will be **able** to propagate them (biologically speaking), because in Brazil the use of constraint propagation technologies (like GURT or Terminator) is prohibited. Additionally, eucalyptus propagation in Brazil, either conventional or transgenic, is done by vegetative techniques, mainly micro-cuttings.
Company notes/assumptions/discussion points:

3.10 Will they be **allowed** to propagate them?
Company Answer: This is a strategic decision, but likely not different from our current business model. Farmers, local communities and civil society that fall within our sustainability strategy and operations will have our permission to use our genetic materials available, developed by the company.
Company notes/assumptions/discussion points: The production and propagation of seedlings is a breeder's right and is regulated by the Seeds and Seedlings Law (Law No. 10711 of 2003).

3.11 Will they require a licence to propagate them?
Company Answer: This is a strategic decision, but should not have a model different from that currently adopted with conventional eucalyptus (presently, no fee is involved). But we need to emphasize that the production and propagation of seedlings is a breeder's right and is regulated by the Seeds and Seedlings Law (Law No. 10711 of 2003).
Company notes/assumptions/discussion points: The production and propagation of seedlings is a breeder's right and is regulated by the Seeds and Seedlings Law (Law No. 10711 of 2003).

3.12 Will they have to pay a fee to use or propagate them?
Company Answer: This is a strategic decision, but should not have a model different from that currently adopted with conventional eucalyptus (presently, no fee is involved). But we need to emphasize that the production and propagation of seedlings is a breeder's right and is regulated by the Seeds and Seedlings Law (Law No. 10711 of 2003).
Company notes/assumptions/discussion points:

The Forests Dialogue

Questionnaire on "What NGOs want to know from industry about Genetically Modified Trees (GMT)" Version 1 (*Approved - 1 November 2013)*

COMPANY: INTERNATIONAL PAPER **Date Completed: 13 DECEMBER 2013**

1. Overall GMT development plans

Q 1.1 Is your company currently developing or planning to develop GMT?
Company Answer: IP has not been directly involved with GMT development in the USA since 2000. At that time, IP became a partner in the formation of ArborGen into which we contributed our GMT R&D program. Our IP Brazil operations have been and are currently supporting small scale field trials in collaboration with ArborGen.
Company notes/assumptions/discussion points: IP has been investing in the strategic development of ArborGen.

Q 1.2 Does your company have a written policy on GMT?
Company Answer: Yes. The policy is available at: *http://www.internationalpaper.com/documents/EN/Sustainability/Procurement__Policy.pdf*
Company notes/assumptions/discussion points:

Q 1.3 Can you share the risk assessment methods you used - or plan to use -prior to developing GMT?
Company Answer: See 1.1. We would expect that all GMT development would follow all government regulations and strict procedures defined for laboratory and field testing. Information about regulations and requirements is available at www.aphis.usda.gov/biotechnology and www.ctnbio.gov.br.
Company notes/assumptions/discussion points:

Q 1.4 Can you share the findings from these risk assessments?
Company Answer: See 1.1 and 1.3. The permit process and status of GMT testing in the USA and Brazil are publicly available on the APHIS website (for US tests). See 1.3.
Company notes/assumptions/discussion points:

Q 1.5 Can you tell us the tree species or polyploids you are currently developing or seeking to develop as GMT ?
Company Answer: See 1.1. We are aware of testing with Eucalyptus, Pinus, Populus and Liquidambar.
Company notes/assumptions/discussion points:

Q 1.6 Do you expect to continue producing new, faster- growing, higher -yielding trees by means of GM into the coming decades?
Company Answer: See 1.1. If and when GMT testing demonstrates performance and safety, and commercial development proves to be viable and is permitted, IP would consider further investments in development of GMT. However, for the foreseeable future, tree improvement will be done with traditional, non-GMT, methods.
Company notes/assumptions/discussion points: IP strives for continuous improvement of all aspects of company operations.

Q 1.7 Could such advances be made with the most advanced (non-GM) breeding programmes?
Company Answer: It depends on the tree species and the trait of interest. Non-GM breeding programs constitute the majority of our tree improvement efforts.
Company notes/assumptions/discussion points:

Q 1.8 Is there any evidence that faster growing trees take pressure off forests?
Company Answer: A pulp mill is designed to a certain production capacity, which includes a certain volume of wood to meet that capacity. It stands to reason that if more wood can be grown per hectare or acre in the supply area of a mill, less land is required to meet the required wood volume. As more wood comes from working forests in the supply basin of a mill, less harvesting of natural forests is required. For example, a pulp mill in the boreal region requires significantly more hectares of natural forest to supply wood than does a mill of the same size in South America using 100% plantation grown trees. This means potentially less pressure on other forests in the same area to supply wood for industrial uses. Having said that, it is also fair to note that freed up forested land could be available for alternate uses. This principle applies whether or not improved trees are produced from GMT or non-GMT methods.
Company notes/assumptions/discussion points: An important consideration is the fact that the world's population is predicted to grow from 7 billion to 9 billion by 2050. This population will require fiber for paper and packaging, lumber for homes, and wood for fuel. We believe that sustainably managed working forests are the preferred way to meet this growing demand for wood. The alternative source of wood is native forests.

Q 1.8-1 If so, will you abstain from replanting land freed by faster growing trees?
Company Answer: In areas where IP operates, reforestation, including replanting, is a component of a well managed working forest system. How those specific areas are used over the course of the next growth cycle would likely change in the context of landscape management. It is probable that some areas may be removed from future harvests, or dedicated to alternate uses.
Company notes/assumptions/discussion points: Demand and capacity are the critical factors here. Having GMT available doesn't mean more demand for our products, so if the wood grows on fewer acres, the remaining acres are available for some other use (not necessarily forest).

Q 1.9 Can you tell us for what purpose(s) you plan to develop GMT?
Company Answer: See 1.1. If and when GMT are commercially available, IP's interest in GMT is to potentially improve productivity and quality of trees to support industrial uses of wood, such as to improve pulping, to reduce use of water, chemicals, and energy, while increasing yield of pulp per unit of wood. When high yielding working forests are developed closer to a mill, average transportation distance is reduced, and the fuel used for transport is reduced. In short, we see GMT as a potential tool to reduce IP's environmental footprint and potentially reduce costs.
Company notes/assumptions/discussion points:

Q 1.10 Can you tell us the exact sites or general locales (countries, states) to test or pilot GMT?
Company Answer: See 1.1. IP is not involved with the tests in the USA. Our operations in Brazil have small scale field tests registered to the company by CTNBio. All tests are government permitted, controlled and monitored. States and counties of plot location are in the public record in both countries (see 1.3 for website links). We have no plans to pilot GMT until appropriate testing and development is completed, and necessary permits for commercialization are issued.
Company notes/assumptions/discussion points:

Q 1.11 What plans do you have to develop GMT on an industrial scale?
Company Answer: See 1.1 and 1.10. IP has not planned for industrial scale development of GMT.
Company notes/assumptions/discussion points:

Q 1.12 Can you tell us the exact sites or general locales (countries, states) where you are growing or plan to grow GMT on an industrial scale?
Company Answer: See 1.11.
Company notes/assumptions/discussion points:

Q 1.13 What details can you share about these plans?
Company Answer: See 1.11.
Company notes/assumptions/discussion points:

2. Biosafety issues

2.1 Genetic issues

2.1.1 What details can you share about the genes you are planning to splice in or out of GMT?
Company Answer: See 1.1. We are aware that developers are testing selected genes to improve lignin structure, growth, and cold tolerance. Confidentiality is normally necessary when a gene or genes are licensed from 3rd parties. Also, costs are high to conduct GMT development and so for commercial reasons it is important to protect intellectual property rights to allow a developer to recoup these costs.
Company notes/assumptions/discussion points:

2.1.2 Will the resultant varieties be fertile?
Company Answer: This will likely depend on the species, purpose of use and regulatory requirements.
Company notes/assumptions/discussion points:

2.1.3 How will they be propagated?
Company Answer: It will likely depend on the species. Most will likely be propagated using well-established methods of cuttings or tissue culture.
Company notes/assumptions/discussion points:

2.1.4 What precautions have you adopted to ensure that no cross-breeding occurs between GMT and related natural species?
Company Answer: See 1.1. Strict regulatory controls address this precaution. In some cases, trees in tests are removed prior to flowering. In some cases, there are no related species in the natural forest with which to cross-breed. Additional information is available at websites listed in 1.3.
Company notes/assumptions/discussion points:

2.1.5 How will you avoid escapes of the GMT, or the genetic modifications themselves, into natural ecosystems?
Company Answer: This is an aspect of the government's assessment of risks and part of the testing requirements. Practical measures applied in tests include leaving isolation zones, removing flowers, and removing trees prior to flowering. Presumably, this would not be a risk in future commercial areas where there are no related species in the natural forest.
Company notes/assumptions/discussion points:

2.1.6 What details can you share about how these precautions are made effective?
Company Answer: The regulatory agencies have responsibility for monitoring compliance with permit requirements. The organization conducting the tests has an obligation to comply with these rules. We require Arborgen to have internal monitoring procedures to insure compliance with permit requirements, and that government inspectors conduct audits periodically to assess compliance.
Company notes/assumptions/discussion points:

2.1.7 What precautions do companies developing GM trees hope to put in place to prevent what happened in China? GM trees were released in China about a decade ago. GM trees were on sale in tree nurseries and no records have been kept about where they have been planted. (Some nurseries also mislabelled non-GM trees as GM trees in order to sell them for more.) Do any of the companies have any further information about how many GM trees have been planted in China, and what the impacts of these GM trees has been?
Company Answer: IP was not aware of this situation. If and when GM trees become commercially available, stewardship of the GMT is a responsibility of the developer and the grower. Responsible developers and customers of GMT should have systems in place to manage stewardship accordingly.
Company notes/assumptions/discussion points:

2.1.8 Are you pursuing effective transgene containment mechanisms which don't sacrifice the pollen, seed, fruit, flowers or cones of trees?
Company Answer: See 1.1. Based on general principles, this should be considered on a case by case basis. Flowering control may be beneficial in some situations, while having full flowering capability would be desirable in others.
Company notes/assumptions/discussion points:

2.1.9 Can you ensure sterility in the face of transgene silencing and stability issues?
Company Answer: See 2.1.8. As a practical matter, given the fundamental principles of evolution, genetic change is a basic characteristic of biological systems. At the scientific level, the question is very technical and should be addressed to the appropriate experts.
Company notes/assumptions/discussion points:

2.1.10 What kind of civil society participation do you anticipate in the development of these precautions?
Company Answer: Regulations governing GMT testing were developed by federal agencies considering scientific facts and unbiased professional oversight. Where applicable, based on the country's regulations, different steps of the permitting process are open for civil society comment. One source of information about the public input process is available at http://www.aphis.usda.gov/biotechnology/index.shtml.
Company notes/assumptions/discussion points:

2.2 Chemical and mechanical issues

2.2.1 Will the GMT you are developing require specialist chemical or other treatments?
Company Answer: See 1.1. If and when GMT becomes commercially available, we would expect the trees to be used in the same way as current tree stocks with no special treatment or special chemicals not already tested and approved for forest use.
Company notes/assumptions/discussion points:

2.2.2 Do you **expect** to grow the GMT along with any special treatments or use of chemicals to enhance growth or protect from pests etc?
Company Answer: See 1.11 and 2.2.1. We would expect GMT to require no special treatments, and potentially to require less chemical applications over the growth cycle.
Company notes/assumptions/discussion points:

2.2.3 What precise details can you share about these chemical or other treatments? (i.e. names and descriptions of the chemicals or treatments to be used)
Company Answer: See 2.2.1 and 2.2.2.
Company notes/assumptions/discussion points:

2.2.4 Have you already tested for the positive and negative effects of such treatments?
Company Answer: See 2.2.3.
Company notes/assumptions/discussion points:

2.2.5 Can you share the results of such tests?
Company Answer: See 2.2.4
Company notes/assumptions/discussion points:

2.2.6 What do you know about the possible effects of these treatments on the environment, on animal welfare and on human health?
Company Answer: Forestry chemicals in use now have been tested, approved and labeled for use under Regulatory requirements.
Company notes/assumptions/discussion points:

2.2.7 What measures and policies do you propose to nullify or mitigate any negative impacts?
Company Answer: Government approval for commercial use of certain chemicals takes into account risks. Product use restrictions are designed to address the risks.
Company notes/assumptions/discussion points:

2.2.8 What details can you share about how these measures and policies are made effective?
Company Answer: IP has strict policies regarding compliance with all laws and regulations. Our forest management prescriptions include compliance with label rates of chemicals. Practices are audited periodically. Forests under IP ownership are certified to FSC, SFI or PEFC standards.
Company notes/assumptions/discussion points: IP supports forest certification and currently more than 30% of our wood supply is 3rd-party certified. We are actively working to increase the supply of certified wood.

2.2.9 What kind of civil society participation do you anticipate in the development of these measures and policies?
Company Answer: See 2.2.8. The forest certification systems used by IP include civil society in development of the standards and 3rd party verification of compliance.
Company notes/assumptions/discussion points:

2.3 Bio safety issues - social, cultural

2.3.1 What public regulatory requirements cover your GMT developments and how is your compliance with these verified?
Company Answer: Federal regulatory agencies in USA and Brazil control the issuance of permits for any phase of testing, from laboratory to greenhouse to field plots. Applications for permits are reviewed closely, and inspections are conducted routinely to verify compliance with regulations.
Company notes/assumptions/discussion points:

3. Social and cultural issues

3.1 Do you have any current policies which you think will prevent or mitigate the negative social impacts of GMT ?
Company Answer: We are not aware of any documented negative social impacts of GMT. Company policies do address social impacts of operations when potential negative impacts are known.
Company notes/assumptions/discussion points: It would be useful to know what specific impacts are being referenced in this question.

3.2 Do you have any specially tailored policies on indigenous peoples, local communities, poor people, women or society at large?
Company Answer: We have corporate ethics, diversity and sustainability policies. These policies apply to all stakeholders in areas where IP operates. Additional information is available at: http://www.internationalpaper.com/US/EN/Company/Sustainability/PeopleFirst.html
Company notes/assumptions/discussion points:

3.2-1 If so, can you share copies of these policies?
Company Answer: Yes, the policies are available on IP's Corporate website www.internationalpaper.com
Company notes/assumptions/discussion points:

3.3 Do you expect GMT to have positive benefits for indigenous peoples, local communities, poor people, women or society at large?
Company Answer: GMT has the potential to provide positive benefits for stakeholders who rely on wood and trees for fuel, fiber, food and income to sustain daily life. On a case-by-case basis, GMT and non-GMT have the potential for indigenous people to earn an income and alternatively provide fuel and food.
Company notes/assumptions/discussion points:

3.4 What concrete plans do you have to make sure that GMT bring positive impacts?
Company Answer: Most GMT are in the testing phase of development. An important part of testing is to verify performance and safety. The expectation is that GMT would provide positive impacts as a basis for commercial deployment. If the impact was not positive, there would be no basis for commercialization.
Company notes/assumptions/discussion points:

3.5 Do you have a policy not to develop GMT where indigenous peoples or local communities withhold their Free, Prior and Informed Consent ?
Company Answer: In every aspect of our company operations we respect the rights of indigenous peoples and local communities. If and when GMT becomes commercially available, we would contemplate its use on land owned or controlled by IP. We would expect other landowners to make their own decisions freely regarding use of GMT based on decision criteria appropriate for their situation.
Company notes/assumptions/discussion points:

3.6 Do you have a policy not to develop GMT in countries where there is widespread opposition from informed CSO groups?
Company Answer: If and when GMT becomes commercially available, it will reasonably be used in countries that recognize and accept sustainable forestry practices, and support a viable and sustainable forest industry. Testing

and developing GMT is an expensive endeavor and not likely to occur in countries that oppose sustainable plantations and forest industry.
Company notes/assumptions/discussion points:

3.7 Will the GMT you are developing require specialist skills or treatments to grow or propagate them?
Company Answer: See 1.1, 2.1.3 and 2.2.2. If and when commercially available, we expect the same skills will be required to propagate and grow GMT as for non-GMT.
Company notes/assumptions/discussion points:

3.8 Will the GMT that you develop be proprietary varieties or freely shared with all?
Company Answer: See 1.1 Development of GMT varieties is an expensive process. It is reasonable for the developer to control stewardship of the plant material for commercial purposes.
Company notes/assumptions/discussion points:

3.9 Will independent farmers or communities choosing to grow these trees be **able** to propagate them?
Company Answer: This depends on the species in question, the propagation methods required and conditions of use imposed by the commercial GMT provider when available.
Company notes/assumptions/discussion points:

3.10 Will they be **allowed** to propagate them?
Company Answer: We expect this to be a term of negotiation with the GMT provider. The developer and seller of GMT, when approved, will likely maintain some control over the plant material for commercial and stewardship reasons (see several answers in Section 2.1)
Company notes/assumptions/discussion points:

3.11 Will they require a licence to propagate them?
Company Answer: Yes, we expect this to be a reasonable term of negotiation with the GMT provider for proprietary products.
Company notes/assumptions/discussion points:

3.12 Will they have to pay a fee to use or propagate them?
Company Answer: Yes, see 3.11.
Company notes/assumptions/discussion points:

The Forests Dialogue

Questionnaire on "What NGOs want to know from industry about Genetically Modified Trees (GMT)" Version 1 (*Approved - 1 November 2013)*

COMPANY: MEADWESTVACO **Date Completed:** 16 DECEMBER 2013

1. Overall GMT development plans

Q 1.1 Is your company currently developing or planning to develop GMT?
Company Answer: MWV is a part-owner of ArborGen. As such we are indirectly involved in the development of GM trees. For many of these questions, information from ArborGen would be required to formulate a complete and accurate answer. We recommend that ArborGen be included in future discussions so that their perspective can be heard.
Company notes/assumptions/discussion points:

Q 1.2 Does your company have a written policy on GMT?
Company Answer: MWV does, and will continue to, follow all government regulations regarding the deployment of GMTs and we view this technology as an extension of established tree improvement approaches. In addition, MWV is a contributor to the Institute for Forest Biotechnology (IFB) and has supported the development of the IFB's *Responsible Use: Biotech Tree Principles*.
Company notes/assumptions/discussion points:

Q 1.3 Can you share the risk assessment methods you used - or plan to use -prior to developing GMT?
Company Answer: MWV is not directly involved in the risk assessment process, however some of the specific risk assessments conducted by regulatory agencies are publicly available.
Company notes/assumptions/discussion points:

Q 1.4 Can you share the findings from these risk assessments?
Company Answer: See answer to 1.3.
Company notes/assumptions/discussion points:

Q 1.5 Can you tell us the tree species or polyploids you are currently developing or seeking to develop as GMT?
Company Answer: MWV is not currently developing GMT. We are aware that ArborGen is developing pine, Eucalyptus, poplars and sweetgum, and information on this is publicly available.
Company notes/assumptions/discussion points:

Q 1.6 Do you expect to continue producing new, faster- growing, higher -yielding trees by means of GM into the coming decades?
Company Answer: Refer to 1.5.
Company notes/assumptions/discussion points:

Q 1.7 Could such advances be made with the most advanced (non-GM) breeding programmes?
Company Answer: It is MWV's opinion that some traits will likely be developed with advanced breeding programs. Some traits could not be developed without GMT technology.
Company notes/assumptions/discussion points:

Q 1.8 Is there any evidence that faster growing trees take pressure off forests?
Company Answer: A recent World Wildlife Fund publication (Living Forests Report, Chapter 4) indicated that to meet rising demand, more natural forests will need to be managed for wood production, and more plantations will need to be established on areas not already dedicated to natural forest. The report also noted that, in theory, GMT biotechnology could improve plantation yields, and reduce the area of land that would need to be dedicated to wood production.
Company notes/assumptions/discussion points:

Q 1.8-1 If so, will you abstain from replanting land freed by faster growing trees?
Company Answer: MWV does not own significant acreages of commercial forestland in the U.S. In most, if not all cases, with which we are familiar, the deployment of faster growing trees is on forestland that is already intensively managed or on abandoned or surplus agricultural land.
Company notes/assumptions/discussion points:

Q 1.9 Can you tell us for what purpose(s) you plan to develop GMT?
Company Answer: MWV believes that GMT can play an important role in helping society to meet increasing demands for wood, fiber and energy and will find a commercial market in the future. The general purpose for MWV would be as raw material for mills in the US and southern Brazil.
Company notes/assumptions/discussion points:

Q 1.10 Can you tell us the exact sites or general locales (countries, states) to test or pilot GMT?
Company Answer: There are several ArborGen test sites on land MWV leases from private landowners in Texas. These sites are regulated and state and county information is available to the public.
Company notes/assumptions/discussion points:

Q 1.11 What plans do you have to develop GMT on an industrial scale?
Company Answer: MWV has no immediate plans to develop GMT on an industrial scale. We support the development of GMTs as we believe they can play an important role in helping to meet increasing demands for wood, fiber and energy.
Company notes/assumptions/discussion points:

Q 1.12 Can you tell us the exact sites or general locales (countries, states) where you are growing or plan to grow GMT on an industrial scale?
Company Answer: MWV has no plans to grow GMTs on an industrial scale in the near future. If approved, MWV would explore their use as a means to maximize fiber production.
Company notes/assumptions/discussion points:

Q 1.13 What details can you share about these plans?
Company Answer: As mentioned in Q1.11, we have no immediate plans for incorporating GMT technology, however, once GMT technology becomes commercially available we will utilize it where it is available and makes economic sense.
Company notes/assumptions/discussion points:

2. Biosafety issues

2.1 Genetic issues

2.1.1 What details can you share about the genes you are planning to splice in or out of GMT?
Company Answer: The traits that are of current interest are growth rate, wood density, wood quality, and chemical treatment reduction.
Company notes/assumptions/discussion points:

2.1.2 Will the resultant varieties be fertile ?
Company Answer: This question is best answered by ArborGen and we recommend that they be included in future discussions so that their perspective can be heard.
Company notes/assumptions/discussion points:

2.1.3 How will they be propagated?
Company Answer: See answer to 2.1.2.
Company notes/assumptions/discussion points:

2.1.4 What precautions have you adopted to ensure that no cross-breeding occurs between GMT and related natural species?
Company Answer: See answer to 2.1.2.
Company notes/assumptions/discussion points:

2.1.5 How will you avoid escapes of the GMT, or the genetic modifications themselves, into natural ecosystems?
Company Answer: See answer to 2.1.2.
Company notes/assumptions/discussion points:

2.1.6 What details can you share about how these precautions are made effective?
Company Answer: See answer to 2.1.2.
Company notes/assumptions/discussion points:

2.1.7 What precautions do companies developing GM trees hope to put in place to prevent what happened in China? GM trees were released in China about a decade ago. GM trees were on sale in tree nurseries and no records have been kept about where they have been planted. (Some nurseries also mislabelled non-GM trees as GM trees in order to sell them for more.) Do any of the companies have any further information about how many GM trees have been planted in China, and what the impacts of these GM trees has been?
Company Answer: There are a number of published reports on the impacts of GM tree plantations in China, in particular with respect to insect resistance and (lack of) potential for the trees to spread. As a potential customer who may deploy GMTs when they are commercially available, we plan to be in accordance with the Responsible Use: Biotech Tree Principles that cover obtaining, planting, growing, using and harvesting (transferring) biotech trees in an open environment. We will comply with any forest certification programs that address best practices that may be associated with the deployment of GMTs.
Company notes/assumptions/discussion points:

2.1.8 Are you pursuing effective transgene containment mechanisms which don't sacrifice the pollen, seed, fruit, flowers or cones of trees?
Company Answer: See answer to 2.1.2.
Company notes/assumptions/discussion points:

2.1.9 Can you ensure sterility in the face of transgene silencing and stability issues?
Company Answer: See answer to 2.1.2.
Company notes/assumptions/discussion points:

2.1.10 What kind of civil society participation do you anticipate in the development of these precautions?
Company Answer: See answer to 2.1.2.
Company notes/assumptions/discussion points:

2.2 Chemical and mechanical issues

2.2.1 Will the GMT you are developing require specialist chemical or other treatments?
Company Answer: No special new chemicals are envisioned or planned. For most GMTs, existing silvicultural practices will be used, or modified as appropriate. For GMT modified for herbicide tolerance, insect, or pest resistance, chemical use should be reduced.
Company notes/assumptions/discussion points:

2.2.2 Do you **expect** to grow the GMT along with any special treatments or use of chemicals to enhance growth or protect from pests, etc.?
Company Answer: See answer to 2.2.1
Company notes/assumptions/discussion points:

2.2.3 What precise details can you share about these chemical or other treatments? (i.e. names and descriptions of the chemicals or treatments to be used)
Company Answer: See answer to 2.2.1
Company notes/assumptions/discussion points:

2.2.4 Have you already tested for the positive and negative effects of such treatments?
Company Answer: As noted in 2.2.1 we anticipate these herbicide and other treatments will be very similar to the existing intensive silvicultural practices that have been used by the forest industry for many years.
Company notes/assumptions/discussion points:

2.2.5 Can you share the results of such tests?
Company Answer: See answer to 2.2.4
Company notes/assumptions/discussion points:

2.2.6 What do you know about the possible effects of these treatments on the environment, on animal welfare and on human health?
Company Answer: See answer to 2.2.4
Company notes/assumptions/discussion points:

2.2.7 What measures and policies do you propose to nullify or mitigate any negative impacts?
Company Answer: As a potential customer of GMT, MWV plans to be in accordance with the *Responsible Use: Biotech Tree Principles* that cover obtaining, planting, growing, using and harvesting (transferring) biotech trees in an open environment. We will comply with any state and federal best management practices as well as forest certification programs that address the use of GMTs.
Company notes/assumptions/discussion points:

2.2.8 What details can you share about how these measures and policies are made effective?
Company Answer: See answer to 2.2.7.
Company notes/assumptions/discussion points:

2.2.9 What kind of civil society participation do you anticipate in the development of these measures and policies?
Company Answer: The *Responsible Use: Biotech Tree Principles* were developed by a broad spectrum of stakeholders, including university researchers, conservation and environmental groups, and industry leaders. Certification programs and state and federal best management practices are also developed with input from many different stakeholders.
Company notes/assumptions/discussion points:

2.3 Bio safety issues - social, cultural

2.3.1 What public regulatory requirements cover your GMT developments and how is your compliance with these verified?
Company Answer: In both the US and Brazil federal regulatory agencies review any application for field plantings of GM plants. Field sites are routinely inspected by federal or state inspectors who verify compliance with regulatory requirements.
Company notes/assumptions/discussion points:

3. Social and cultural issues

3.1 Do you have any current policies which you think will prevent or mitigate the negative social impacts of GMT?
Company Answer: This question assumes that GMT will have negative social impacts. It would be helpful to get further clarification of the views on what are considered the negative social impacts of GMT.
Company notes/assumptions/discussion points:

3.2 Do you have any specially tailored policies on indigenous peoples, local communities, poor people, women or society at large?
Company Answer: Yes, we have a Social Law Compliance policy for our Forestry Sector. MWV is committed to complying with labor and social laws such as those covering civil rights, equal employment opportunities, antidiscrimination and anti-harassment measures, worker's compensation, workers' and communities' right to know, prevailing wages, workers' right to organize, and occupational health and safety.
Company notes/assumptions/discussion points:

3.2-1 If so, can you share copies of these policies?
Company Answer: Yes.
Company notes/assumptions/discussion points:

3.3 Do you expect GMT to have positive benefits for indigenous peoples, local communities, poor people, women or society at large?
Company Answer: We believe that there are significant potential benefits to society at large, both economic and environmental. These could include re-invigorating rural communities and potentially reducing pressure to harvest natural forests. GMT could also have a role in reducing pest and disease in important tree species for indigenous peoples and other segments of society.
Company notes/assumptions/discussion points:

3.4 What concrete plans do you have to make sure that GMT bring positive impacts?
Company Answer: While we believe that there will be positive impacts using GMT, the technology is not commercially available at this time. When the technology is available MWV will engage with the communities in which we operate and other stakeholders to determine whether plans are needed.
Company notes/assumptions/discussion points:

3.5 Do you have a policy not to develop GMT where indigenous peoples or local communities withhold their Free, Prior and Informed Consent?
Company Answer: Prior to the development of the FPIC concept, MWV has operated in concert with the communities in which we are located, both in the U.S. and Brazil. This collaborative model will continue wherever we operate.
Company notes/assumptions/discussion points:

3.6 Do you have a policy not to develop GMT in countries where there is widespread opposition from informed CSO groups?
Company Answer: See answer to 3.5.
Company notes/assumptions/discussion points:

3.7 Will the GMT you are developing require specialist skills or treatments to grow or propagate them?
Company Answer: MWV believes that GMT will be managed in very similar ways to current intensively managed forestry operations.
Company notes/assumptions/discussion points:

3.8 Will the GMT that you develop be proprietary varieties or freely shared with all?
Company Answer: This question is best answered by ArborGen and we recommend that they be included in future discussions so that their perspective can be heard.
Company notes/assumptions/discussion points:

3.9 Will independent farmers or communities choosing to grow these trees be **able** to propagate them?
Company Answer: See answer to 3.8.
Company notes/assumptions/discussion points:

3.10 Will they be **allowed** to propagate them?
Company Answer: See answer to 3.8.
Company notes/assumptions/discussion points:

3.11 Will they require a licence to propagate them?
Company Answer: See answer to 3.8.
Company notes/assumptions/discussion points:

3.12 Will they have to pay a fee to use or propagate them?
Company Answer: See answer to 3.8.
Company notes/assumptions/discussion points:

The Forests Dialogue

Questionnaire on "What NGOs want to know from industry about Genetically Modified Trees (GMT)" Version 1 (*Approved - 1 November 2013)*

COMPANY: STORA ENSO OYI **Date completed:** 29 NOVEMBER 2013

1. Overall GMT development plans

Q 1.1 Is your company currently developing or planning to develop GMT?
Company Answer: Yes
Company notes/assumptions/discussion points: As a part of our Eucalyptus tree breeding programme, we are currently doing research on, and evaluating the feasibility of, different technologies to enable the sustainable intensification of production in tree plantations. Genetic engineering is one such technology.

Q 1.2 Does your company have a written policy on GMT?
Company Answer: Yes we have.
Company notes/assumptions/discussion points: Please consult our Wood and Fibre Sourcing and Land Management Policy which is available on our website (http://www.storaenso.com/responsibility/our-approach/policies/Documents/Wood%20and%20Fibre%20Sourcing,%20and%20Land%20Management%20Policy%202012.pdf).

Q 1.3 Can you share the risk assessment methods you used - or plan to use -prior to developing GMT ?
Company Answer: At the moment, our research is at an exploratory phase. We will naturally comply with all the relevant risk assessments and regulations in the country or countries which would be involved.
Company notes/assumptions/discussion points:

Q 1.4 Can you share the findings from these risk assessments?
Company Answer: See above. However, we aim to be open and transparent with results from risk analysis
Company notes/assumptions/discussion points:

Q 1.5 Can you tell us the tree species or polyploids you are currently developing or seeking to develop as GMT?
Company Answer: We are doing research on the suitability of different Eucalyptus species and their hybrids.
Company notes/assumptions/discussion points:

Q 1.6 Do you expect to continue producing new, faster- growing, higher -yielding trees by means of GM into the coming decades?
Company Answer: See answer to first question above. It is too early to say as we are on an exploratory stage at the moment.
Company notes/assumptions/discussion points:

Q 1.7 Could such advances be made with the most advanced (non-GM) breeding programmes?
Company Answer: We rather think that genetic engineering may prove added value to other breeding approaches. Any genetic engineering technologies would best be applied on elite clones emerging from traditional breeding programmes.
Company notes/assumptions/discussion points:

Q 1.8 Is there any evidence that faster growing trees take pressure off forests?
Company Answer: We believe that fighting deforestation and forest degradation is more complicated than just introducing some high-yielding trees, though they can have also a role to play in reducing forest loss. Our view is that sustainable intensification of production of food, fibre and fuel is necessary to meet the needs of the growing world population. See also an enlightened discussion on the subject in WWF's Living Forests report, Chapters 1 and 4.
Company notes/assumptions/discussion points:

Q 1.8-1 If so, will you abstain from replanting land freed by faster growing trees?
Company Answer: This would not be an automatic response. Replanting or not replanting land will depend on an evaluation of what we would consider the best use for that land at that particular moment.
Company notes/assumptions/discussion points: We would like to bring an example of positive impact of land use intensification to native forest conservation in Bahia, Brazil, where the intensive wood production in tree plantations has stabilized land use and enabled restoration of native forests (see more at http://www.youtube.com/watch?v=iwrV_yQ46Q0&list=FL3WUNpTDWw42Yms2lemkaNA&index=3)

Q 1.9 Can you tell us for what purpose(s) you plan to develop GMT?
Company Answer: The objectives of genetic engineering would be the same as those of tree breeding with any other technologies – sustainable intensification of production. This may involve increased biomass, improved fibre quality, frost tolerance, and so forth.
Company notes/assumptions/discussion points:

Q 1.10 Can you tell us the exact sites or general locales (countries, states) to test or pilot GMT?
Company Answer: We expect to develop field trials in Brazil, but we do not yet know exact sites. If these will materialize, the information will be publicly available.
Company notes/assumptions/discussion points:

Q 1.11 What plans do you have to develop GMT on an industrial scale?
Company Answer: At the moment we have no concrete plans; we are evaluating the feasibility of the technology.
Company notes/assumptions/discussion points:

Q 1.12 Can you tell us the exact sites or general locales (countries, states) where you are growing or plan to grow GMT on an industrial scale?
Company Answer: See above.
Company notes/assumptions/discussion points:

Q 1.13 What details can you share about these plans?
Company Answer: See above.
Company notes/assumptions/discussion points:

2. Biosafety issues

2.1 Genetic issues

2.1.1 What details can you share about the genes you are planning to splice in or out of GMT?
Company Answer: As a general rule in our company we do not comment on the details of our individual research projects. This is not specific for GMT but relates to any research in the company.
Company notes/assumptions/discussion points: If we will use GMT for operational use any specific genes and/or gene promoter combinations used to enhance the breeding value will be patented. This information would be publicly available as per the relevant patenting regulations.

2.1.2 Will the resultant varieties be fertile?
Company Answer: Most likely they would be. We do not possess any technology to make the genetically engineered trees sterile.
Company notes/assumptions/discussion points:

2.1.3 How will they be propagated?
Company Answer: If we would get to that stage, they would be propagated in the same way as all our Eucalyptus clones through clonal propagation, or tissue culture.
Company notes/assumptions/discussion points:

2.1.4 What precautions have you adopted to ensure that no cross-breeding occurs between GMT and related natural species?
Company Answer: We do not foresee that we would plant GM trees on their natural range of occurrence, so we do not see any specific risk of out-crossing.
Company notes/assumptions/discussion points:

2.1.5 How will you avoid escapes of the GMT, or the genetic modifications themselves, into natural ecosystems?
Company Answer: Genetically engineered trees could spread, or not spread, just like any other improved plantation eucalyptus species or their hybrids emerging from breeding programs, or other plant species introduced to a new location. Whether the plantation eucalyptus spreading to neighbouring areas would survive or thrive there will depend on the competition they face, on the management regime of the land area in question, and so forth.
Company notes/assumptions/discussion points:

2.1.6 What details can you share about how these precautions are made effective?
Company Answer: As is the case with all exotic species or superior clones, GMTs' response to the site (climate, soil and other factors) has to be tested with proper field trials, importance of which cannot be over-emphasized. Precautions will include, among others, risk assessment and monitoring of the invasiveness during and after the testing phase.
Company notes/assumptions/discussion points:

2.1.7 What precautions do companies developing GM trees hope to put in place to prevent what happened in China? GM trees were released in China about a decade ago. GM trees were on sale in tree nurseries and no records have been kept about where they have been planted. (Some nurseries also mislabelled non-GM trees as GM trees in order to sell them for more.) Do any of the companies have any further information about how many GM trees have been planted in China, and what the impacts of these GM trees has been?
Company Answer: China has today a well-defined regulation around GM trees.If we would develop genetically engineered trees, we would protect them similarly as any other clonal material. Any commercial clone will be registered using DNA fingerprinting.There are published material about GM trees in China and ecological and risk analysis performed on these trees. For example: Jianjun Hu, Lijuan Wang, Donghui Yan, and Meng-Zhu Lu. Research and Application of Transgenic Poplar in China. In: T. Fenning (ed.). Challenges and Opportunities for the World's Forests in the 21st Century. Forestry Sciences 81. DOI 10.1007/978-94-007-7076-8_24. ©Springer Science+Business Media Dordrecht 2013.
Company notes/assumptions/discussion points:

2.1.8 Are you pursuing effective transgene containment mechanisms which don't sacrifice the pollen, seed, fruit, flowers or cones of trees?
Company Answer: We are not using technologies that affect flowering of trees.
Company notes/assumptions/discussion points:

2.1.9 Can you ensure sterility in the face of transgene silencing and stability issues?
Company Answer: See 2.1.8
Company notes/assumptions/discussion points:

2.1.10 What kind of civil society participation do you anticipate in the development of these precautions?
Company Answer: A number of governments have established, or are expected to establish, national precautions and/or are a party in relevant international agreements. Governments should facilitate civil society participation in these processes.
Company notes/assumptions/discussion points:

2.2 Chemical and mechanical issues

2.2.1 Will the GMT you are developing require specialist chemical or other treatments?
Company Answer: No
Company notes/assumptions/discussion points:

2.2.2 Do you **expect** to grow the GMT along with any special treatments or use of chemicals to enhance growth or protect from pests etc?
Company Answer: If we developed GMT for commercial use they will be grown with the same management principles as other clones emerging from our breeding program. For instance, the chemicals we use in our plantations are approved by the certification systems, such as FSC.
Company notes/assumptions/discussion points:

2.2.3 What precise details can you share about these chemical or other treatments? (i.e. names and descriptions of the chemicals or treatments to be used)
Company Answer: Not applicable specifically for GMT.
Company notes/assumptions/discussion points:

2.2.4 Have you already tested for the positive and negative effects of such treatments?
Company Answer: Not applicable specifically for GMT.
Company notes/assumptions/discussion points:

2.2.5 Can you share the results of such tests?
Company Answer: Not applicable specifically for GMT.
Company notes/assumptions/discussion points:

2.2.6 What do you know about the possible effects of these treatments on the environment, on animal welfare and on human health?
Company Answer: Not applicable specifically for GMT.
Company notes/assumptions/discussion points:

2.2.7 What measures and policies do you propose to nullify or mitigate any negative impacts?
Company Answer: Not applicable specifically for GMT.
Company notes/assumptions/discussion points:

2.2.8 What details can you share about how these measures and policies are made effective?
Company Answer: Not applicable specifically for GMT.
Company notes/assumptions/discussion points:

2.2.9 What kind of civil society participation do you anticipate in the development of these measures and policies?
Company Answer: See 2.1.10
Company notes/assumptions/discussion points:

2.3 Bio safety issues - social, cultural

2.3.1 What public regulatory requirements cover your GMT developments and how is your compliance with these verified?
Company Answer: If the research will proceed into a trial stage in Brazil, the Brazilian relevant regulations would be applied, with the related compliance mechanisms.
Company notes/assumptions/discussion points:

3. Social and cultural issues

3.1 Do you have any current policies which you think will prevent or mitigate the negative social impacts of GMT?
Company Answer: We do not see any social impacts, positive or negative, which could be attributed to genetic engineering technology *per se*. From a social point of view, we think that GM trees are no different than other plantation emerging from the breeding program.
Company notes/assumptions/discussion points:

3.2 Do you have any specially tailored policies on indigenous peoples, local communities, poor people, women or society at large?
Company Answer: Please consult the following statements available at Stora Enso's website (http://www.storaenso.com/responsibility/our-approach/policies/Pages/Policies%20and%20principles.aspx) : • Social responsibility policy • Social responsibility guidelines • Wood and fibre sourcing and land management policy • Human rights statement
Company notes/assumptions/discussion points:

3.2-1 If so, can you share copies of these policies?
Company Answer: See above
Company notes/assumptions/discussion points:

3.3 Do you expect GMT to have positive benefits for indigenous peoples, local communities, poor people, women or society at large?
Company Answer: We do not expect any specific benefits which could be attributed to genetic engineering technologies *per se*. Benefits to the society would depend on the general management of plantations, on the approach to shared value creation a company would have, and so forth.
Company notes/assumptions/discussion points:

3.4 What concrete plans do you have to make sure that GMT bring positive impacts?
Company Answer: See above. In general, we strive to benefit the society through implementing our Global Responsibility approach and not least through running a healthy and sustainable business. As to tree plantations, improved clones – GM or not – would benefit both the company and local people who would choose to participate in Stora Enso's outgrower programmes or other similar schemes.
Company notes/assumptions/discussion points:

3.5 Do you have a policy not to develop GMT where indigenous peoples or local communities withhold their Free, Prior and Informed Consent?
Company Answer: We have no such specific policy, see also 3.1 above. We recognise indigenous people's legitimate rights to their traditional lands and our approach is to carefully listen to the views of the local stakeholders. We recognise that widespread local consent and mutual cooperation is a necessary prerequisite for successful plantation operations.
Company notes/assumptions/discussion points:

3.6 Do you have a policy not to develop GMT in countries where there is widespread opposition from informed CSO groups?
Company Answer: See above.
Company notes/assumptions/discussion points:

3.7 Will the GMT you are developing require specialist skills or treatments to grow or propagate them?
Company Answer: No. In this sense they will not be different from other clones emerging from our breeding programs.
Company notes/assumptions/discussion points:

3.8 Will the GMT that you develop be proprietary varieties or freely shared with all?
Company Answer: We do not see any difference between possible GM trees or other clones which emerge from our breeding programme. They would not be freely available; they could either be licensed to other companies or then made available to local farmers who would choose to participate in an outgrower programme.

Company notes/assumptions/discussion points:

3.9 Will independent farmers or communities choosing to grow these trees be **able** to propagate them?
Company Answer: Yes, they would be able to do so. See 3.7 above.
Company notes/assumptions/discussion points:

3.10 Will they be **allowed** to propagate them?
Company Answer: Again, this would be no different to any other clone bred and registered by Stora Enso. Normally, we would expect to construct an agreement with farmers or communities which would be take some form of an outgrower scheme, and this would entail the right (but not necessary an obligation) to use specific clones.
Company notes/assumptions/discussion points:

3.11 Will they require a licence to propagate them?
Company Answer: See above
Company notes/assumptions/discussion points:

3.12 Will they have to pay a fee to use or propagate them?
Company Answer: See above.
Company notes/assumptions/discussion points:

The Forests Dialogue

Questionnaire on "What NGOs want to know from industry about Genetically Modified Trees (GMT)" Version 1 (*Approved - 1 November 2013)*

COMPANY: SUZANO **Date Completed: 6 DECEMBER 2014**

1. Overall GMT development plans

Q 1.1 Is your company currently developing or planning to develop GMT?
Company Answer: Yes
Company notes/assumptions/discussion points:

Q 1.2 Does your company have a written policy on GMT?
Company Answer: "Not currently. Suzano intends to elaborate policy on GMT from existing position statements, taking into consideration that any policy must conform with legal obligations of compliance with national legislation." The position of Suzano on GMT is: Genetic modification provides a specific means for enhancing agronomic traits in plant species. Suzano views genetic modification of trees as an extension of conventional breeding programs, affording the ability to enhance and protect yield and to modify wood properties in a sustainable manner. Suzano carries out extensive biosafety studies and strictly adheres to all legal requirements in its current development and planned deployment of GMTs. Suzano will cooperate with civil society to provide transparent information on its GMTs program, in order to develop a shared vision that genetic modification can be a significant tool in the sustainable management of tree plantations.
Company notes/assumptions/discussion points:

Q 1.3 Can you share the risk assessment methods you used - or plan to use -prior to developing GMT?
Company Answer: Yes. The risk assessment evaluation of our GM trees follows the requirements of Normative Resolution 5 (NR5), which was developed by CTNBio, the Brazilian National Biosafety Commission according to Brazilian Law 11105 of 24/5/2005. The principles of Normative 5 are based on the provisions of the Cartagena Protocol on Biosafety and the Codex Alimentarium and are freely available in the public domain.
Company notes/assumptions/discussion points: In Brazil, CTNBio is a multidisciplinary collegiate body, created by Law No. 11.105, of March 24, 2005, to provide technical advisory support and advice to the Federal Government in the formulation, implementation and updating of the National Biosafety Policy on GMOs. CTNBio is also mandated with

the establishment of technical safety standards and technical advice relating to the protection of human health, living organisms and the environment, for activities involving the construction, testing, cultivation, handling, transporting, marketing, consumption, storage, release and disposal of GMOs and their derivatives. In order to assure that civil society is represented in the decisions regarding commercial use of GMOs in Brazil, CTNBio´s composition as defined by the law is composed of: 3 specialists in human health, 3 specialists in animal health, 3 plant specialists, 3 environment specialists, 1 family agriculture specialist, 1 consumers rights specialist, 1 biotechnology specialist, 1 worker´s health specialist, 1 representative each from the Ministries of Science and Technology, Ministry of Agriculture, Ministry of Environment, Ministry of Health, Ministry of Agrarian Development, Ministry of Industry, Ministry of Justice, Ministry of Defence, Ministry of External Relations and the Ministry of Fisheries. All CTNBio members must have a doctorate degree or equivalent and they meet monthly, 10 times a year. All CTNBio meetings are recorded and the information is publicly available.

Q 1.4 Can you share the findings from these risk assessments?

Company Answer:

Yes. The detailed findings of our on-going risk assessment studies in Brazil that are not already in the public domain can be made available for consultation under appropriate confidentiality arrangements.

Company notes/assumptions/discussion points:

All documents related to GM field studies performed in Brazil under Biosafety Law 11105 are publicly available.

Q 1.5 Can you tell us the tree species or polyploids you are currently developing or seeking to develop as GMT?

Company Answer:

Eucalyptus and poplar.

Company notes/assumptions/discussion points:

We may in long term develop certain desert species as well for arid regions.

Q 1.6 Do you expect to continue producing new, faster- growing, higher -yielding trees by means of GM into the coming decades?

Company Answer:

Yes. The main focus of the FuturaGene/Suzano technology platform is on yield enhancement and yield protection (through providing resistance to pests and diseases), and this will continue through continued investment in R&D of different approaches towards this goal. Our GM program is an extension of the established conventional tree-breeding program established thirty years ago in Suzano.

Company notes/assumptions/discussion points:

Q 1.7 Could such advances be made with the most advanced (non-GM) breeding programmes?

Company Answer:

For yield enhancement, possibly, but even through the use of marker assisted selection procedures, this approach will be a long-term program and experience has shown only incremental improvement over time. However, the limiting factor in this approach is that it will be hard to continue to improve the yield above a certain level by classical breeding. Yield gains obtained through conventional breeding have plateaued in recent years due to biotic and abiotic pressures on commercial materials. Yield enhancement through gene modification is an opportunity to overcome these barriers. In the case of yield protection, it is much less likely that solutions for pest and disease control will be forthcoming without considering GM approaches based on our understanding of the germplasm available. The question of forest health can only realistically be approached through a transgenic approach, as alleles for disease and pest resistance may not be found within related species and thus cannot be introduced via conventional crosses.

Company notes/assumptions/discussion points:

Q 1.8 Is there any evidence that faster growing trees take pressure off forests?

Company Answer:

For conventionally bred varieties, yes. In Suzano, over the past 30 years, the focus of the conventional breeding programs has been to develop faster growing trees. It is now possible to produce far more pulp per unit land area than it was 30 years ago. Globally, although plantations only represent 7% of the total forested area, they supply around 50% of wood supply (WWF Living Forests Chapter 4 Ref 59). If these investments had not been made, this supply would come from natural and semi natural forests. In Guangxi Province in China, for example, of the total productive area, only 20% is conventional eucalyptus plantation, but this provides 80% of the wood needs.

Further intensification through the development of yield enhanced GM trees, capable of producing more wood from even less land represent an opportunity to significantly extend this model, contributing to more sustainable use of available resources.

Company notes/assumptions/discussion points:

Q 1.8-1 If so, will you abstain from replanting land freed by faster growing trees?

Company Answer:

Yes. Spared land can be made available to the local communities for crop production, or for the provision of ecological corridors, or any other land use of relevance to the local community. It should be noted that the majority of land on which the plantations are established is degraded agricultural land, therefore for this land to be made productive for crop production, inputs will be required for the local communities to make the most effective use of this land. In Brazil by law, companies are already required to set aside a percentage of land intended for plantations as legally protected reserves. With the improved GM varieties, it will be possible to produce pulp competitively with even greater land conservation.

Company notes/assumptions/discussion points:

Q 1.9 Can you tell us for what purpose(s) you plan to develop GMT?
Company Answer: GM trees will be developed in order to produce higher yield to meet demand whilst using less land and resources; resistance to pests and diseases to ensure plantation survival and to reduce chemical loads and; tolerance to abiotic stress to improve ecological services and promote the co-existence of environmental protection and socio-economic development.
Company notes/assumptions/discussion points:

Q 1.10 Can you tell us the exact sites or general locales (countries, states) to test or pilot GMT?
Company Answer: In Brazil, FuturaGene-Suzano has regulatory field trials planted in 4 different geographies in Brazil, which represent regions where eucalyptus is economically important and therefore where the field performance and possible environmental impact need to be evaluated. GM eucalyptus is planted in different regions of Brazil as a means to establish field performance criteria and allow the collection of biosafety data. There are two farms in two different regions of the state of São Paulo, in the southeast region of Brazil and three farms in the northeast region; one in Bahia state, one in Piauí state and one in Maranhão state.
Company notes/assumptions/discussion points:

Q 1.11 What plans do you have to develop GMT on an industrial scale?
Company Answer: We expect to be ready to deploy GM yield-enhanced eucalyptus commercially in the last quarter of 2014. There will then be a period in which scaling up and deployment in the different regions in which the company has commercial operations will progress towards full scale commercial production.
Company notes/assumptions/discussion points:

Q 1.12 Can you tell us the exact sites or general locales (countries, states) where you are growing or plan to grow GMT on an industrial scale?
Company Answer: In Brazil, GM trees will be deployed wherever the company has plantation operations, and where it makes commercial sense to plant them. In the future, in China, we aim to plant poplar and eucalyptus in appropriate regions various provinces.
Company notes/assumptions/discussion points:

Q 1.13 What details can you share about these plans?
Company Answer: The company needs to receive regulatory approval as a strict pre-condition to deployment. In line with our position statement that "*Suzano views genetic modification of trees as an extension of conventional breeding programs"* and with relevant policy we will develop as we move closer to regulatory approval, we will develop our deployment plans accordingly. At that time, we will be willing to share our policy on this issue.
Company notes/assumptions/discussion points:

2. Biosafety issues

2.1 Genetic issues

2.1.1 What details can you share about the genes you are planning to splice in or out of GMT?
Company Answer: The most advanced GM trees in our pipeline are transformed with the *cel1* gene from the plant *Arabidopsis that* encodes an endoglucanase. This gene is present in all plant species and its product is part of normal plant development processes; enabling relaxation of the crystalline matrix of the rigid plant cell wall during cell growth, and this flexibility enables faster growth. We are also researching the efficacy of gene insertions and DNA modifications that would improve the resistance of eucalyptus to a range of specific pests and diseases. In collaboration with EMBRAPA, we will be analysing the effects of gene insertion on plant aluminium tolerance, and with Arcadia Biosciences, we will be looking into ways to enhance water and nitrogen use efficiency. All of this information is contained in scientific publications, press releases or other statements to be found on our website.
Company notes/assumptions/discussion points:

2.1.2 Will the resultant varieties be fertile?
Company Answer: Yes
Company notes/assumptions/discussion points:

2.1.3 How will they be propagated?
Company Answer: During the laboratory phase, plant material is propagated through tissue culture and then transferred to soil for greenhouse and field propagation. Once selected trees from this experimental phase have been researched, they will go into the conventional clonal propagation process employed in our nurseries.
Company notes/assumptions/discussion points: The nursery propagation of GM trees follows exactly the same procedures as conventional trees.

2.1.4 What precautions have you adopted to ensure that no cross-breeding occurs between GMT and related natural species?
Company Answer: FuturaGene in Brazil works with eucalyptus, which is an exotic species in in the country, and therefore the potential for crosses with related, natural species is limited or impossible. For poplar field trials, two different approaches would be used; either physical separation, or removal of trees before flowering – using procedures developed according to the local regulatory requirements. We will evaluate various technologies as we move towards the development of varieties for commercial deployment.
Company notes/assumptions/discussion points:

2.1.5 How will you avoid escapes of the GMT, or the genetic modifications themselves, into natural ecosystems?

Company Answer:

As explained above, there is no potential for crosses of GM eucalyptus with related natural species in Brazil. There is no evidence for the ability of a "genetic modification" to escape into unrelated species without a sexual crossing. In Brazil, the eucalyptus clones used by Suzano are interspecific hybrids that are not invasive because they cannot compete in natural ecosystems. Indeed they have to be actively managed, free from competition in plantations. As part of the biosafety procedures for the evaluation of our yield-enhanced event, in collaboration with academic partners, we have undertaken a detailed study of the ability of seeds to establish "escape" populations. The results of these studies published (Da Silva, P.H.M., et al., (2011). Can Eucalyptus invade native forest fragments close to commercial stands? Forest Ecology and Management, 261: 2075-2080). The ability of a GM tree to escape and spread is the same as its non-GM parent. Current plantation management practices are sufficient to control the spread of the commercial varieties deployed. It should be noted, that after 30 years of intensive breeding for faster growing trees, Suzano has still not encountered a tree variety from this program that has become invasive, despite the fact that in many cases, the crossings made involved extensive genetic combinations and rearrangements.

Company notes/assumptions/discussion points:

2.1.6 What details can you share about how these precautions are made effective?

Company Answer:

We have performed gene flow studies with our GM eucalyptus field trials in Brazil and the results of these trials can be shared according to the procedures described in Q 1.3 and 1.4. As stated in 2.1.5, the eucalyptus clones used, and those that have been genetically modified are interspecific hybrids that cannot compete in the wild. This is probably the most effective form of containment possible.

Company notes/assumptions/discussion points:

2.1.7 What precautions do companies developing GM trees hope to put in place to prevent what happened in China? GM trees were released in China about a decade ago. GM trees were on sale in tree nurseries and no records have been kept about where they have been planted. (Some nurseries also mislabelled non-GM trees as GM trees in order to sell them for more.) Do any of the companies have any further information about how many GM trees have been planted in China, and what the impacts of these GM trees has been?

Company Answer:

With respect to deployment of its own GM tree varieties in Brazil, Suzano plans to plant these only in its own or controlled plantations. The company may also consider working with out- growers as it does today. The company already monitors its planting of conventional clones in all its plantation areas and will continue to do this in the future with GM clones, as well as adhering strictly to any additional stewardship requirements that are stipulated under Brazilian Law 11105 of 24/5/2005. Post-authorization monitoring may also be made by the Ministry of Agriculture in Brazil (see answer 2.3.1), and this could enable procedures to prevent illegal sale of material.

Today in China, practical and clear regulatory requirements to guide the companies now exist through the State Forest Administration. A detailed biosafety assessment of GM poplar in China has been published, that contains information on the impacts of GM trees planted in China: (Hu, J., Yang, M. and

Lu, M. (2010). Advances in biosafety studies on transgenic insect-resistant poplars in China. Biodiversity Science, 18 (4): 336-345).
Company notes/assumptions/discussion points:

2.1.8 Are you pursuing effective transgene containment mechanisms which don't sacrifice the pollen, seed, fruit, flowers or cones of trees?
Company Answer: With respect to all our activities in the pre-regulatory stages, we comply with all relevant national and local biosafety regulations, which include strict protocols for tissue culture, greenhouse and field tests. The labs are certified in GLP for PCR analysis and the company intends to increase the scope of this certification – despite the fact that law in Brazil does not require it. Our laboratory is registered in the "Conselho Regional de Quimica" (Regional Chemistry Council), the entity responsible for overseeing our operations as required by Brazilian law. The company will deploy in accordance with the relevant approvals it receives. As explained above, given the exotic status of eucalyptus in Brazil, the company believes that it will not need to employ containment methods that sacrifice the pollen, seed, fruit, flowers or cones of trees. Indeed, under Brazilian law, mechanisms such as genetic use restriction technologies (GURT) are not allowed.
Company notes/assumptions/discussion points

2.1.9 Can you ensure sterility in the face of transgene silencing and stability issues?
Company Answer: We are currently not inducing sterility in our trees, as per Brazilian legal requirements.
Company notes/assumptions/discussion points:

2.1.10 What kind of civil society participation do you anticipate in the development of these precautions?
Company Answer: At one level, national regulations and/or relevant international agreements should facilitate civil society participation in these processes. At the same time, in Brazil, where these processes are already established, we are actively engaging with civil society groups as part of our own initiatives to enhance the understanding of our technologies and processes, their biosafety and their potential contribution to sustainability.
Company notes/assumptions/discussion points:

2.2 Chemical and mechanical issues

2.2.1 Will the GMT you are developing require specialist chemical or other treatments?
Company Answer: No, they will be grown in the same way as their essentially equivalent non-transgenic counterparts
Company notes/assumptions/discussion points:

2.2.2 Do you **expect** to grow the GMT along with any special treatments or use of chemicals to enhance growth or protect from pests etc?
Company Answer: Phytosanitary treatments applied in the plantations will be the same as for conventional varieties.
Company notes/assumptions/discussion points:

2.2.3 What precise details can you share about these chemical or other treatments? (i.e. names and descriptions of the chemicals or treatments to be used)
Company Answer: NA
Company notes/assumptions/discussion points:

2.2.4 Have you already tested for the positive and negative effects of such treatments?
Company Answer: The efficacy and safety profiles of all conventional phytosanitary treatments used in the Suzano plantations are already well known, and meet with the standards for compliance with FSC certification and national regulations.
Company notes/assumptions/discussion points:

2.2.5 Can you share the results of such tests?
Company Answer: Yes. These results are revealed during FSC audit and are part of the Suzano corporate sustainability disclosures.
Company notes/assumptions/discussion points:

2.2.6 What do you know about the possible effects of these treatments on the environment, on animal welfare and on human health?
Company Answer: The efficacy and safety profiles of all phytosanitary treatments used in the Suzano plantations are already well known and are subject to national regulations, and meet with the standards for compliance with FSC certification. All of the information is in the public domain.
Company notes/assumptions/discussion points:

2.2.7 What measures and policies do you propose to nullify or mitigate any negative impacts?
Company Answer: Standard plantation management practices and any other measures requested by national authorities or under certification compliance procedures.
Company notes/assumptions/discussion points:

2.2.8 What details can you share about how these measures and policies are made effective?
Company Answer: All phytosanitary treatments applied in our field operations comply with local and national legislation and the standards of certification bodies. Monitoring of compliance is annual.
Company notes/assumptions/discussion points:

2.2.9 What kind of civil society participation do you anticipate in the development of these measures and policies?
Company Answer: The policies and measures employed are already in force under national legislation, and have been developed through established procedures and are in accordance with the standards of certification bodies that benefit from ongoing stakeholder scrutiny and verification.
Company notes/assumptions/discussion points:

2.3. Bio safety issues - social, cultural

2.3.1 What public regulatory requirements cover your GMT developments and how is your compliance with these verified?
Company Answer: The GMT are developed are under national biosafety regulations, and compliance with these is covered by official audit by statutory bodies. In addition, during FSC audit, the presence of GM material is assessed. In the case of Brazil, all field releases are regulated and regularly inspected by the Ministry of Agriculture (MA). In the case of planted forests the inspection of each specific experiment is made on a yearly basis. MA also inspects commercial plantings of crops (including trees) that have been the subject of experimental field releases authorized by CTNBio and collects samples of these materials at random, to check that there is no illegal and unauthorized commercial planting of GM events.
Company notes/assumptions/discussion points:

3. Social and cultural issues

3.1 Do you have any current policies which you think will prevent or mitigate the negative social impacts of GMT?
Company Answer: We do not, however, we have policies and also obligations under certification schemes related to the social impacts of our forest operations. We need to distinguish here between risks associated with the transgene (addressed during biosafety evaluation) and the potential social impacts of the plantations. GM scientific awareness training for the general public and other interested stakeholders led by related government agencies and public research institutes and universities would be of great value. At our research centre in Brazil, FuturaGene is already conducting awareness tours to interested parties. Additionally, Suzano, like many other forest companies in Brazil participates in several forums to dialogue and address concerns over possible negative social impacts of plantations in general. Examples of these are the Brazilian chapter of the Forest Dialogue, the Certification Program of the IPEF/USP university and the FSC and PEFC audits, which also verify high standards of social performance, including compliance with and application of instruments such as FPIC, shared benefit schemes, schemes for mitigation and/or compensation of negative impacts of forest operations.

Company notes/assumptions/discussion points:

3.2 Do you have any specially tailored policies on indigenous peoples, local communities, poor people, women or society at large?

Company Answer:

Yes, we have specific written procedures for this within our social responsibility policies and guidelines. As mentioned previously, Suzano works closely with local communities, including poor and, depending on the region, indigenous peoples whether directly as out growers, or not. We will examine the social engagement policies of Suzano, and consider whether formulation of policies relevant to the deployment of GM trees needs to be specifically considered.

Company notes/assumptions/discussion points:

3.2-1 If so, can you share copies of these policies?

Company Answer:

Yes. Materials and policies relating to social projects are available upon request.

Company notes/assumptions/discussion points:

3.3 Do you expect GMT to have positive benefits for indigenous peoples, local communities, poor people, women or society at large?

Company Answer:

We envisage that the use of GM trees can bring substantial benefits in the regions where we operate. We have over 1,000 forest outgrowers, 80% of them are smallholders, which currently access our genetic materials (clones) to produce eucalyptus wood. These producers will benefit from the GM technology by:

- Increasing productivity per hectare;
- Potentially freeing some of the forest production land for other land uses, such as food production for local markets.
- Decrease use of inputs. We believe we can use GM technology to reduce the amount of resources needed to produce the same amount of wood – such as chemical pesticides and fertilizers.
- Increase natural areas. Is very common that small farms in Brazil have little or no compliance with the Brazilian forest code. By increasing productivity, we can help these areas to free some of their production stands (non-forest) and turn them into natural areas for legal compliance with the forest law.
- Other benefits will arise from:
    - Protection against pests and diseases,
    - Less pressure on natural forests – less pressure on forest communities, traditional

practices;
- Higher profitability of out-growers;
- Development of a bioeconomy model with diversified offtakes of higher value, and lower volume requiring less trees, thus providing higher potential income and more available land for other uses.

Company notes/assumptions/discussion points:

3.4 What concrete plans do you have to make sure that GMT bring positive impacts?

Company Answer:

We intend to revise our current landscape model, in order to reduce the amount of land used for production and to reduce the radius in which we transport wood and wood products – and yield enhanced trees will allow just that. High yield, better resistance to pests and diseases and higher resistance to stress should bring better economic, environmental and social benefits to people involved. The details of appropriate benefit sharing schemes would be established up-front during the consultation process with the communities in which the plantations will be deployed, as they are currently when new, better performing varieties are introduced into a community. Suzano operates in a competitive environment, and has to work hard to attract local communities to work alongside it. The company has competitors who compete for the same skills from the same communities in all of the regions in which it operates – and this serves as an additional stimulus to maintain attention on community relations.

Company notes/assumptions/discussion points:

3.5 Do you have a policy not to develop GMT where indigenous peoples or local communities withhold their Free, Prior and Informed Consent?

Company Answer:

To develop GMT needs approval from the local authority and there will be no development if there is no consent. Suzano is already following certification rules regarding the FPIC and it will continue to do so. Suzano sees positive interaction with communities as an imperative to the sustainability of its business and will continue to engage with all relevant stakeholder groups to understand and if possible, address their concerns regarding the use of GMTs.

Company notes/assumptions/discussion points:

3.6 Do you have a policy not to develop GMT in countries where there is widespread opposition from informed CSO groups?

Company Answer:

GM trees will be developed in those countries where legislation allows their research, development and deployment. Suzano operates in Brazil, where there are groups against and in favor of the use of GM technology. We intend to continue to engage with all relevant stakeholder groups in order address concerns regarding the use of GMTs and to educate about the contribution of technology to

sustainability. To operate under a social license is a key factor in business sustainability
Company notes/assumptions/discussion points:

3.7 Will the GMT you are developing require specialist skills or treatments to grow or propagate them?
Company Answer: The skills required in the nurseries will be exactly the same as those used for conventional varieties – they are in fact "essentially equivalent". In the plantations, the planting, management and harvest procedures will be identical. The only specialized skills required are in the biotechnology laboratories where there is a need for highly qualified staff. In the field, the silviculture practices are the same as for non-GM trees.
Company notes/assumptions/discussion points:

3.8 Will the GMT that you develop be proprietary varieties or freely shared with all?
Company Answer: The genes inserted into the varieties developed will be patent protected, and the tree varieties themselves will have plant variety protection (PVP) according to national legislation. Conventionally bred varieties also have similar PVP. Approximately 31% of Suzano pulp is derived from out-growers representing over 1,000 farmers. The GM trees under development would be made available for planting in the company's own plantations and to the out-growers. This will be done under similar arrangements as for existing proprietary non-GM varieties. Thus our out-growers will have access to our novel materials, as they currently do to other clones developed by Suzano.
Company notes/assumptions/discussion points:

3.9 Will independent farmers or communities choosing to grow these trees be **able** to propagate them?
Company Answer: If they are part of our production chain certainly, if not, there will be a case-by-case discussion. Independent farmers would in principle be able to propagate them, but it is more likely that they would obtain seedlings of the relevant clones from the company nurseries. Clonal propagation of eucalyptus requires a certain amount of specialist knowledge, and the company produces 80-100 million cuttings from around 40 different clones per annum for planting in its plantations or to out-growers. It is standard practice that at the end of the 7 year rotation period, there is a preference by the farmers to plant new, improved clones which bring better yield or other agronomic characteristics and that maintain a high degree of crop diversity, thus helping to prevent environmental problems.
Company notes/assumptions/discussion points: We understand the question as meaning – "will farmers be able to save seed from the material and replant it. Whilst farmers would be free to do so, they would most probably not, because of the reason described in the answer.

3.10 Will they be **allowed** to propagate them?
Company Answer: Yes, but as above: if they are in our production chain yes, and if not we will discuss on a case-by-case basis. However, in practice, and our experience over the last 25 years is that out-growers prefer to use the improved varieties on offer at each planting cycle.

Company notes/assumptions/discussion points:

3.11 Will they require a licence to propagate them?
Company Answer: The terms and conditions under which seedlings are supplied to out-growers will be similar to the existing arrangements.
Company notes/assumptions/discussion points:

3.12 Will they have to pay a fee to use or propagate them?
Company Answer: The terms and conditions under which seedlings are supplied to out-growers will be similar to the existing arrangements.
Company notes/assumptions/discussion points: