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Foreword

Welcome to the first Progress Report of the Independent Peat Expert Working Group (IPEWG), established to help APRIL fulfil the peatland commitments set out in its Sustainable Forest Management Policy (SFMP 2.0).

This report summarises the work of the Working Group over the last two years as we have developed and begun to implement our Peatland Roadmap and Workplan. It covers both the progress and challenges of this first phase and sets out priorities to be implemented as part of Phase 2. Through this report, our aim is to provide stakeholders with a meaningful insight into the work of IPEWG so that they stay informed and engaged in its progress. We would welcome any feedback or comments.

The first phase of our work, as the report highlights, has had a strong focus on building a robust understanding of peatland science, and particularly working with APRIL to analyse and review the very extensive data they have been collecting on their own plantation activities. It has been encouraging to discover how much the company has invested over the last decade in monitoring its operations, resulting in some of the best data sets available for tropical peat management.

Analysing this data has not come without its challenges. Ensuring the independence of our scientific analyses and research work while at the same time establishing a close and positive working relationship with APRIL – as well as its stakeholder advisory platforms - has been critical. This has been a journey in trust building as all parties have sought to understand and meet each other's expectations, but one where good progress has been made.

However, as we move into Phase 2 where the focus is strongly on implementation, the challenges become much greater. Success will depend on integrating the science with legal requirements, stakeholder demands and development imperatives. We will need to find the best role for IPEWG in this process, and ensure we support government initiatives as we work effectively with all the relevant stakeholders in the identification and implementation of the most appropriate pathways to better peatland management.

Our thanks go to APRIL's leadership and field staff for their ongoing collaboration, in spite of our frequent challenges and scrutiny on sensitive subject matter. Thanks must also go to my IPEWG colleagues, some of the world's foremost peatland scientists, who have invested considerable time and effort in this endeavour. Hard work has brought results and we're pleased with the considerable progress that has been achieved over the last two years while fully aware of how much remains to be done.

Ruth Nussbaum

Coordinator IPEWG

Background

The IPEWG is one of three external advisory bodies established by APRIL. In 2014, APRIL formed a Stakeholder Advisory Committee (SAC), a group of independent social and forestry experts with a remit to oversee the implementation of APRIL's Sustainable Forest Management Policy (SFMP). The year before, in 2013, an Advisory Board, including Indonesian and international experts, was set up to provide guidance for the Riau Ecosystem Restoration conservation program.

Following the launch of the reinforced version of the policy (SFMP 2.0), IPEWG was established in 2015 with a mandate to help APRIL fulfil the commitments related to its peatland operations set out in its SFMP 2.0. It brings together national and international peat experts to advise and provide science based recommendations to APRIL on a variety of strategic and operational issues related to responsible peatland management.

The IPEWG meets on a quarterly basis and was officially established for an initial period of two years, 2016-2017. The work of IPEWG and the SAC is closely integrated.



Professor Christopher (Chris) Evans is a group leader at the UK Natural Environment Research Council's Centre for Ecology, in Bangor. His research encompasses interactions between land-use, climate,

soil processes, greenhouse gas (GHG) emissions and water quality. He currently holds a visiting position at the Swedish Agricultural University, Uppsala, as King Carl XVI Gustaf's 20th Visiting Professor in Environmental Sciences. He has published over 125 papers, including four in Nature, which have been cited over 5300 times.



Professor Vincent Gauci is Chair in Global Change Ecology in the School of Environment, Earth and Ecosystem Sciences, The Open University. He directs the UK Natural Environment Research Council

(NERC) Methane Network 'MethaneNet'. His interests include the role of trees in mediating methane emissions from wetlands, the effects of fires and disturbance on fluvial carbon fluxes from forested tropical peat-swamps in South-East Asia and the effects of restoration on lowland peatland processes.



Professor Ari Lauren works as an Associate Professor of Ecosystem Modelling in the University of Eastern Finland. His expertise is environmental impacts of forestry, catchment modelling, forest soil

science. He has published more than 75 articles in Scientific Journals. Dr. Lauren has worked for several years in pulpwood plantations in Indonesia, and has developed advanced simulation methods allowing linking of water and plantation management with peat subsidence, and carbon and nutrient balance, and growth and yield of plantations.



Dr. Ruth Nussbaum (Coordinator) is co-director of Proforest, a nonprofit organisation that supports the implementation of responsible sourcing and production of natural resources. Ruth has

been working with responsible production and sourcing of natural resources for more than two decades. Her experience includes advising private sector, governments and NGOs on practical implementation of responsible practices, developing international and national policies, standards and safeguards, running a global forest certification programme and writing a variety of practical guides and books.



Professor Susan Page holds a personal chair in the School of Geography, Geology and the Environment. Between 2011 and 2015, she was the Head of Department. For the last 20 years Professor Page's research

has focused on the ecology and carbon dynamics of tropical peatlands, with a main focus on Southeast Asia. Her research has examined peat-vegetation relationships, carbon storage, impacts of drainage and fire, and opportunities for ecosystem restoration and livelihoods. She has published more than 100 papers, chapters and reports, and has awards from the Royal Geographical Society and Society for Ecological Restoration.



Professor Supiandi Sabiham is a senior staff member at the Department of Soil Science and Land Resource, Faculty of Agriculture, Bogor Agricultural University, Indonesia. He has also conducted research on sustainable

peatland management supported by national and international research funds. He has published more than 50 scientific papers in national and international journals, either written alone or with other scholars. As of his 2016, he is serving a second term as President of the Peat Society of Indonesia (HGI).

Phase 1 Outcomes – Review of Activities 2015-2017

Over the last two years, IPEWG's primary focus has been the development and implementation of a Peatland Roadmap and Workplan. Both documents were agreed in 2016 and workplan implementation has made good progress.

Peatland Roadmap

Developed by the IPEWG in discussion and agreement with APRIL management, the Roadmap and Workplan provide an overarching framework for IPEWG's activities with the end objective of developing a long-term, science based, peatland management strategy for APRIL and its suppliers.

The Roadmap consists of three elements:

Component 1: Building science-based understanding and minimising impacts:

This component is focussed on building a robust scientific understanding to underpin the further development of APRIL's approach to responsible peatland management. This includes minimising the negative impacts of production on peat, protecting remaining forest areas and preventing fire within the landscape.

Component 2: Responsible peatland operations:

Component two is focussed on the implementation of the evolving APRIL approach to responsible peatland operations, designed to minimise fires, optimise yields, improve community livelihoods and minimise APRIL's carbon footprint, while working with other stakeholders on a long-term vision for peat landscape management.

Component 3: Developing a vision for peatland landscapes:

The goal is the full implementation of a vision for peatland landscapes in collaboration with other stakeholders, to deliver a balance between production, protection and social development without further loss or degradation of peat.

Over the last eighteen months, considerable progress has been made across all three components.

Component 1 Building science-based understanding and minimising impacts

During phase 1, the main focus of IPEWG has been to understand, analyse and review data to provide the scientific basis for understanding APRIL's peatland landscape and activities, as well as the options for, and implications of, alternative strategies for responsible peatland management.

1. Analysis of subsidence and greenhouse gas data and preparation of publications;

One of the key challenges in managing plantations on peat where drainage is used to lower the water table is the oxidation of the unsaturated peat. This results in subsidence and the release of CO_2 , a greenhouse gas. Understanding and minimising oxidation and subsidence is therefore a critical part of responsible peatland management. IPEWG's work has consequently focussed on the analysis of existing subsidence data at APRIL in partnership with the University of Indonesia in order to improve understanding around current operational outcomes and to inform alternative management approaches. This has been made possible due to APRIL's significant investment in collecting peatland subsidence data over the last ten years.

• **Phase 1 progress:** IPEWG member Professor Chris Evans and The University of Indonesia analysed APRIL's subsidence data using two different statistical methods. Results from these analyses are now being prepared for publication in two research papers, the first reporting average rates of subsidence on APRIL plantations, including spatial variation, while the second will examine temporal variations in subsidence in more detail. We expect these papers to contribute significantly to the scientific understanding of peat subsidence.

Preliminary data trends for APRIL's three Eddy Co-variance flux towers were also reviewed in phase 1. Flux towers are essential as they enable the measurement of greenhouse gas CO_2 and CH_4 emissions versus sequestration rates of mixed natural and production forest as well as the vegetation cover in mixed landscapes. APRIL has installed three of these – a unique investment for any company – whilst IPEWG have supported in getting them operational. The preliminary data are proving interesting and APRIL has committed to a collaborative data analysis.

• Phase 2 priorities: As data become available from the flux towers, the priority will be to support APRIL to share early results through the publication of short papers and external presentations, while building a comprehensive data set to support responsible peatland management.



A view from the top of one of the flux towers in the Kampar Peninsula, Riau, Sumatra.

2. Modeling relationships between water table and other factors influencing plantation production and establishment of high water table trials

Regulated drainage-based peatland management lowers and manages the water table so that species which cannot tolerate permanently saturated roots can be grown. Understanding the implications of different water table depths on crop growth and survival, peat subsidence and moisture content, nutrient availability and fire occurrence is very important. Furthermore, peatland formations have a complex hydrology which can extend over large areas in the landscape. IPEWG's focus has been to understand options for, and impacts of, managing water tables as well as the impact of water tables on tree water use, tree and peat surface emissions of trace greenhouse gases and tree growth rates, for both plantation and natural forests.

- Phase 1 progress: Although there is some data on the relationship between water table depth and other factors, IPEWG and APRIL have agreed that to underpin the potential significant changes to management envisaged over the coming years it is important to have a controlled water table trial in a peatland plantation area. This is a major undertaking as the trial will last for a full rotation (five years) and three water table levels will be adopted for testing. The trial site was agreed in 2017 with the project expected to begin in mid-2018. A Lysimeter trial will also be undertaken in parallel, at the trial site.
- Phase 2 priorities: Building a better understanding of how to manage plantations with a higher water table is essential in light of Indonesian regulations which require water tables to be at 40 cm.

3. Building a better overview of natural forest condition

Maintaining natural peat swamp forest is critical for the protection of biodiversity and peat carbon stores, and preventing fire. APRIL is committed to a 1:1 ratio of protection to production forest, and has exceeded this commitment for peatlands through a combination of two large conservation programmes: (i) Riau Ecosystem Restoration (RER) on the Kampar Peninsula and Pulau Padang and (ii) the setting aside of many smaller conservation areas within the wider landscape. However, maintaining the overall health and function of protected peatlands, particularly smaller forested fragments, is challenging and so it is crucial to have systematic management, monitoring and review of the areas to evolve approaches which are effective.

- Phase 1 progress: Based on advice from both the SAC and IPEWG, APRIL has developed a comprehensive monitoring and management programme for smaller conservation areas and has hired a new Landscape Manager to implement it. The conservation management framework, which will work with local field staff in each area to engage them in supporting conservation, will be rolled out within APRIL concessions over the next six months. The initiative will then be applied to APRIL suppliers.
- Phase 2 priorities: Monitoring the effectiveness of the programme and building in improvements where needed.



4. Accelerating understanding of alternative native species for high water table plantations

Maintaining the plantation water table at a higher level reduces oxidation and subsidence, but can impact the growth and survival of plantation species like Acacia. Finding traits within either existing plantation families or new species which can grow well on wet peat is important in improving plantation productivity while maintaining higher water tables.

- Phase 1 progress: IPEWG and APRIL reviewed all the existing data on alternate species trials. Based on this, a large R&D program on water-tolerant species, focusing on native tree species, has commenced. Referred to as The Alternate Species Project, the objective is to determine alternative species to Acacia that are most adaptable for good growth in peatland conditions and to develop appropriate propagation and silviculture techniques.
- Phase 2 priorities: Developing best practice for growing commercial species on wetter peat, and for rehabilitating and restoring natural vegetation is crucial for the future of both APRIL and Indonesia's peatlands more widely. APRIL can play a central role in supporting the Indonesian government's goal of dramatically improving peatland management by continuing and sharing its work on alternate species, while mitigating potential for increased emission of methane and N₂O.

5. Examining data on the most important factors in fire prevention

Forest fires and haze have been one of the biggest environmental issues in Southeast Asia over the last decade. Indonesian government policy is now strongly focused on addressing this problem. APRIL has a programme to manage fire within its own and supply partners' concession areas which to-date is proving successful. IPEWG has focused its efforts on understanding the correlation between fire indicators and water tables across APRIL concessions, and has evaluated this information in relation to other factors such as response times, as a means to help inform strategies for addressing fire in the wider landscape.

- **Phase 1 progress:** IPEWG and APRIL conducted a review of existing data related to water tables and fire hotspots. This analysis concluded that there does not appear to be a strong correlation between water table depth and fire ignation sources. Limited evidence suggested the main correlation is with soil moisture and the presence of people on the landscape rather than simple water table depth, and that rapid response to fire is an equally important factor.
- Phase 2 priorities: Continued work on understanding how fire can best be prevented and controlled. It will also be important to understand better the sources of fire through analysis of available data, particularly that which relates to the activities of communities (locals and newcomers) around the concessions, as the evidence to date suggests that it is the presence of people in the landscape, along with low moisture levels, that is critical for fire occurrence.



6. LiDAR strategy

APRIL's production, ecosystem restoration and conservation concession areas cover around 1 million hectares, located within a landscape that is many times larger and full of complexity. A good understanding of this resource provides the foundation for all other work. Currently, technologies to map and analyse landscapes are evolving very fast.

IPEWG has focused on working with APRIL to consider the best combination of technologies, techniques and data analysis, including collection and analysis of LiDAR data as well as satellite data, aerial photography and ground surveys to build a comprehensive understanding of their fiber supply base and the landscape in which it is located.

- Phase 1 progress: IPEWG has worked with APRIL staff to review both the data acquisition strategy and the results of different techniques. Much progress has been made by the APRIL team on both conventional LIDAR and use of UAVs.
- Phase 2 priorities: Sharing APRIL's growing expertise and learning on LiDAR and its application and value, in conjunction with other data with Indonesian practitioners.

7. Review and feedback to APRIL on key peatland-related reports

One of IPEWG's roles has been to provide feedback and review to APRIL on reports and papers about peatland management in general, and APRIL's activities more specifically.



IPEWG members Dr. Ruth Nussabaum, Professor Ari Lauren and Professor Chris Evans pictured recently in Sumatra on a field trip, as part of their work with APRIL.

Component 2 Responsible Peatland Operations

During Phase 1, IPEWG began working with APRIL field staff to further develop best management practices for existing operations on peatland which address both the plantations themselves and the effects of operations on the wider landscape. IPEWG's role has focused particularly on building a better understanding of the implications of different management approaches through modelling, while also encouraging APRIL to share practical experience and learning with practitioners such as Wetlands International.

Key activities in Phase 1:

1. Modelling plantations and landscapes

Testing out new management approaches in plantations is a big undertaking, requiring many years of work (one rotation is at least 4-5 years) and incurring significant costs. Building models which allow reasonable predictions to be made of the likely impact of a new approach such as raising the water table, changing the fertiliser regime or altering the rotation length is crucial in providing managers with some guidance to allow them to choose only the most promising options to test.

- Phase 1 progress: IPEWG and APRIL have developed a plantation model which is providing reasonable predictions of impacts of different management regimes at the scale of individual plantation blocks. APRIL has also invested in a commercial model which allows planning and scenario analysis at landscape level.
- Phase 2 priorities: Develop a series of scenario analyses by considering reduced water table depth and greenhouse gases emissions levels, while calculating the potential management costs and benefits of doing so.
 Collaborate with APRIL on the hydrological modelling project it has initiated which aims to provide a thorough understanding of landscape-scale hydrology for resource management.

2. Field discussions on improved peatland management

IPEWG are not practical field operations experts, so need to work closely with APRIL field staff and other experts to consider how operations can be improved based on the science.

- Phase 1 progress: Ongoing discussion of operational procedures between IPEWG and APRIL staff. In April 2017, APRIL held a two day relationship-building and knowledge sharing workshop with Wetlands International, a global environmental NGO dedicated to the protection and conservation of wetland areas. Points of common interest were explored and a number of recommendations were made by Wetlands International.
- Phase 2 priorities: Continued work on operational improvements based on science, legal requirements and practical expertise, to support enhanced plantation and peatland management.

Component 3 Developing a vision for peatland landscapes

The Peatland Roadmap agreed with APRIL sets out an objective for the development of a Peatland Vision that aims to optimize the management of peatland by APRIL over the long term. Understanding the views and aspirations of different local, national and international stakeholders with respect to peatland management will be integral to the development of the Peatland Vision. This is not something IPEWG can lead on, so close collaboration with APRIL will be essential.

- Phase 1 progress: APRIL has committed to developing and implementing a long term vision for peatlands with inputs from IPEWG and other stakeholders.
- Phase 2 priorities: APRIL develops, with the input of stakeholders, a long-term vision for peatland management.



Blackwater river in the Kampar peat forest.

Talking to stakeholders

IPEWG has had dialogue with external stakeholders over the last two years in order to gather perspectives related to its work and to encourage greater external engagement with APRIL on peatland issues. Such engagement will be critical in the development of a Peatland Vision for the company – a priority for phase 2 of IPEWG's work. Discussions have been held with the Peatland Restoration Agency (Badan Restorasi Gambut – BRG), The Nature Conservancy (TNC), Wetlands International, and Rainforest Alliance (RA), Fauna & Flora International (FFI), and Winrock International, among others.



Q&A with Professor Susan Page

Q. What is your area of expertise?

I am a wetland ecologist with a specific interest in peatland systems – both in the tropics and the UK. My expertise is in 1) peat swamp forest biodiversity and carbon dynamics, 2) understanding the impacts that land use change (deforestation, drainage) has on the peatland carbon cycle, e.g. in terms of greenhouse gas emissions and fire risk, and 3) exploring opportunities for mitigation of carbon loss and greenhouse gas emissions from drained peatlands, including reforestation.

Q. Why did you join IPEWG?

I joined IPEWG having previously been involved with APRIL in an earlier sciencebased management support project which ended without the opportunity to develop and implement project recommendations. I was reluctant to invest further time in an advisory role unless there was significant appetite for independent, scientific advice. At the end of the first phase of IPEWG, I think we have developed a sufficient level of mutual trust between IPEWG and APRIL. Encouragingly this is starting to result in practical management actions that could provide a basis for reducing the environmental impact of plantation operations.

Q. As a world recognized expert on on peat and peatlands,

how significant is the IPEWG body of work in your view?

Deforestation and drainage of SE Asian peatlands have had a massive environmental impact over the last two decades at both regional and global scales (e.g. in terms of biodiversity loss, greenhouse gas emissions and fire-related health problems). Advisory groups such as the IPEWG can play a critical role in communicating scientific knowledge to industry partners, as well as providing the impetus for developing and sharing ideas on best practice. During Phase 1, I have been encouraged to see that APRIL are strongly invested in developing their peatland science programme. IPEWG are very supportive of this and can perform a critical peer-review function for internally developed research.

Q. What has been the most significant learning for IPEWG/ APRIL during phase 1?

Developing sufficient levels of trust on the part of both IPEWG and APRIL has been a key element of Phase 1.

Q. How has APRIL responded to IPEWG's work?

Overall, reasonably positively – but we are still at an early stage in the work of the IPEWG and I look forward to more affirmative, practical actions during Phase 2 which will further demonstrate APRIL's commitment to its Sustainable Forest Management Policy.



Q&A with Professor Dr. Supiandi Sabiham

Q: What is your area of expertise?

I am Professor of Soil Science in the Faculty of Agriculture at Bogor Agricultural University, Indonesia, and my focus is on peat chemistry, with a specific interest in peat. This led me to an interest in responsible peatland management, to better understand how we balance the socio-economic-conservation equation.

Q: Why did you join IPEWG?

There were three principal reasons. First, because of the merging of interests, and what I saw as the value of an Indonesian perspective. Second, because our focus converged in developing best practice peatland methodologies that merge the interests of industrial tree plantation, communities and the environment. And third, because I would be working with peat scientists from around the world.

Q: What do you see as the biggest challenges facing

Indonesia's peatlands?

There are several. First, maintaining productivity but with low environmental impact. Second, finding a water management system that enables productivity alongside peat stability. Third, community development around concessions. Fourth, sourcing tree varieties that can adapt to wet conditions. And fifth, all this in the context of recent government regulations prohibiting plantation on peatland greater than 3m deep and with groundwater levels of >40cm.

Q: What contribution will IPEWG make to scientific

understanding around Indonesia's peatlands?

This relates primarily to subsidence, greenhouse gases emissions, groundwater levels, and fire. While the search for water resistant species has been helpful, there has been important work on solving the subsidence issue by understanding the conditions of 'moist peat' lying above the >40cm ground water level. This layer supports both peat stability and crop productivity and it is critical to understand its porosity levels in relation to lower lying peat.

Q: From an Indonesian perspective, what are the most significant outcomes from phase 1 of IPEWG's work?

I believe our work is delivering valuable new insights into peat based plantation systems especially in the areas of subsidence and carbon emissions, fire minimisation, resource mapping, modelling, and above all delivering a new vision for managing peat landscapes. This work will benefit the wider social, business and political community across Indonesia.

Looking Ahead - 2018-2020

Phase 1 of IPEWG's work has seen solid progress, both in the development of the Roadmap and in the implementation of the work plan that underpins that Roadmap. There is now a much stronger understanding of the scientific elements that inform APRIL's decision-making and IPEWG has made a series of recommendations on how these can be further advanced in Phase 2.

Whilst IPEWG will continue to support and encourage good science, it is clear that the science must inform operational changes on the ground at APRIL. Initial progress to develop, test and refine models that can be used by APRIL to inform decision-making has been made, but this work needs to be accelerated in Phase 2.

The rapid developments in the Indonesian regulatory framework over the last years mean there is also a lot of work to do in responding to these. For this reason, IPEWG have recommended that as part of Phase 2 APRIL implement operational practices that support the regulations and provide a balance between environmental, social and economic objectives.

IPEWG can assist APRIL in this implementation, but it is clear that delivering the Government of Indonesia's vision for peatland protection and management on the ground, while maintaining a viable long-term future for APRIL, will require an integrated, multi-stakeholder driven process.



IPEWG members meet with members of the local community who are engaged in APRIL's Fire Free Village Program

Vincent Gauci, Professor of Global Change Ecology at the Open University, UK

APRIL has shown a serious commitment to engaging in primary research in order to understand the effects of tropical peatland management and land use on the carbon balance of natural forest ecosystems and plantations. This commitment extends to the deployment of 3 fully operational eddy covariance flux towers which quantify the exchange of carbon dioxide and methane at the ecosystem scale. Their commitment further extends to the establishment of new, wellinstrumented large scale water table manipulation experiments and an alternative species research programme is about to begin both of which, when operational, will provide better information on how to responsibly manage peatlands under a higher water table. The commitment to making data from these activities publicly available in publications following peer review is to be welcomed.



Response from APRIL Leadership

Two years ago, APRIL brought together a group of internationally renowned peatland experts to advise the company on how to shape and fulfil its peatland commitments as set out in its Sustainable Forest Management Policy 2.0. This decision marked a commitment by APRIL to continually improve, to evolve its peatland approach and practices in line with the latest scientific thinking, and to map a path forward to responsible peatland management for the future.

We are confident that the delivery by IPEWG of the Peatland Roadmap is a strong step in the right direction. The collaboration has already led to peatland management improvements on the ground and IPEWG will continue to be valuable in informing management and operational decisions during this period of rapid and significant change.

Our aim is to achieve biodiverse, flourishing, and resilient peatland landscapes which provide livelihoods and support the well-being of local communities, as well as a secure fibre supply for APRIL. This is in line with our production-protection model where conservation, restoration and social inclusion are integral to our approach.

Our commitment to the activities of IPEWG is critical to us ultimately achieving our aim and is reflected in the extension of IPEWG's remit for a further two years. I express my gratitude, on behalf of APRIL, for the work undertaken by the IPEWG members and in anticipation of their continued focus and work over the next term.

Praveen Singhavi

President, APRIL Group