

PROCEEDINGS

**FAO Advisory Committee
on Paper and Wood
Products**

Forty-sixth Session

Vancouver, Canada, 31 May 2005

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

All rights reserved. Reproduction and dissemination of material in this information product for educational or other non-commercial purposes are authorized without any prior written permission from the copyright holders provided the source is fully acknowledged. Reproduction of material in this information product for resale or other commercial purposes is prohibited without written permission of the copyright holders. Applications for such permission should be addressed to the Chief, Publishing Management Service, Information Division, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy or by e-mail to copyright@fao.org

© FAO 2005

Foreword

The Advisory Committee on Paper and Wood Products (ACPWP) is one of the technical statutory bodies of the Food and Agriculture Organization of the United Nations (FAO). It was originally established in 1959 as the Committee on Pulp and Paper, and later on, in 1996, merged with the FAO Advisory Committee on Wood-based Panels.

The Committee is FAO's main contact with the private forest industry. Its mandate is to advise the FAO Director-General on activities industries consider could usefully be undertaken by the Organization in the forestry sector. Furthermore the Committee provides a privileged avenue of communication between FAO and the private sector, ensuring both that activities undertaken are relevant to the current issues faced by industry and that the information presented is accurate and useful.

The Committee is composed of a maximum of twenty-five members, appointed by the FAO Director-General based on their experience and knowledge of the industry. Typically senior executives of companies or associations, the members come from all regions of the world and currently represent over ninety percent of the world production of pulp and paper. FAO acknowledges the contribution made by Committee members who so generously donate their time and their organizations' resources in support of FAO's work.

This year's Session took place in Vancouver, Canada, and FAO expresses its gratitude to the Government of Canada and to the Forest Products Association of Canada for their most generous invitation and their help in ensuring the success of the meeting.



Wulf Killmann
Director

Forest Products and Economics Division

Table of contents

Foreword	iii
Table of contents	v
Acronyms and Abbreviations	vii
REPORT	3
Annex 1 - List of Participants	11
Annex 2 - Agenda	17
PAPERS PRESENTED	19
ITEM 3: Review of Actions taken by FAO on the Recommendations made at the 45 th Session of the Committee	21
ITEM 5 - Code of Best Practices for Planted Forests	23
ITEM 6 - Emissions Trading	27
ITEM 7 – Future Fibre Supply	41

Acronyms and Abbreviations

%	percent
AF&PA	American Forests and Paper Association
BRACELPA	Brazilian Association for Pulp and Paper
CO ₂	carbon dioxide
CDM	Clean Development Mechanism
CEPI	Confederation of European Paper Industries
CIFOR	Center for International Forestry Research
COFO	Committee on Forestry
COPACEL	Confederation of the Paper, Cardboard and Cellulose Industries
CSR	Corporate Social Responsibilities
NGO	environmental non-governmental organization
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FPAC	Forest Products Association of Canada
FSC	Forest Stewardship Council
ha	hectare
ICFPA	International Council of Forest and Paper Associations
ITTO	International Tropical Timber Organization
IUCN	World Conservation Union
IUFRO	International Union of Forest Research Organizations
m	metre
NGO	non-governmental organization
PEFC	Pan European Forest Certification
SFM	sustainable forest management
UNEP	United Nations Environment Programme
UNFF	United Nations Forum on Forests
WBCSD	World Business Council on Sustainable Development

**REPORT OF THE 46TH SESSION OF THE ADVISORY
COMMITTEE ON PAPER AND WOOD PRODUCTS**

Report

The FAO Advisory Committee on Paper and Wood Products held its Forty-sixth Session in Vancouver, Canada on 31 May 2005. The meeting was attended by 37 participants from 20 countries, including 14 members (see Annex 1, list of participants) and it was chaired by Mr Saeki Yoshihiko, President of the Japan Paper Association. This report summarizes the main results of the discussions.

Item 1. Opening of the Session and welcome addresses by representatives from the Government of Canada and FAO

Mr Saeki Yoshihiko, vice-chairman of the Advisory Committee, opened the forty-sixth Session and Mr Brian Emmett, Assistant Deputy Minister, Canadian Forest Service, welcomed the participants on behalf of the Canadian government and expressed the hope that, despite the very busy week of activities and meetings, everybody would find some time to enjoy the city of Vancouver and the natural beauty that surrounds it. He noted that, not incidentally, this is also one of the most productive forest regions in the world. The forest sector has played a fundamental role in Canada's economic and social development. Canada has become the nation that it is today, in part because of the influence of forestry. It is genuinely part of Canada's heritage. A healthy forest and a strong forest sector have helped produce considerable prosperity for Canadians in cities and towns across the country.

Canada is familiar with the role that forests and the forest sector can play in economic and social development around the world. Sustainable forest management can play a key role in achieving and supporting the Millennium Development Goals with respect to combating extreme poverty and hunger, provision of safe drinking water, universal primary education, gender equality in education, and prevention of maternal and child mortality and HIV aids. Mr Emmet stressed that one of his personal missions is to persuade the Canadian Development Agency to place forestry even higher on their agenda. Action has been taken in order to meet international commitments with respect to poorer countries; in the most recent budget, the Government of Canada confirmed its commitment to double international assistance by 2010.

Canada has taken a leadership role by virtually eliminating bilateral debt of the highly indebted poor countries and by committing to multilateral debt relief. In addition, over two years ago, Canada extended virtually unrestricted access for imports from least developed countries.

Canada also supports the development of an international arrangement on forests. Canada's forest resources amount to 10 percent of the world's forests and are a tremendous gift of nature to the country, which recognizes that with this gift comes a corresponding responsibility. Mr Emmet emphasized that Canada is, and will continue to be, a more than responsible steward of its forest resources. The world has a right to expect this of Canada and, in turn, Canada has the right to expect that other nations will not take advantage of this good behaviour by failing to meet their own responsibilities.

It is understood that Canadian forest practices matter to the rest of the world in an important way and vice-versa.

About 15 years ago, Canada and other nations began to work hard in developing and implementing an international agreement on forests. It is Canada's view that a strong, legally binding commitment is the best way to facilitate the necessary political commitment to advance the profile of forest issues, increase finances, achieve higher priority on the agenda of development agencies and that of the Government, internalise global forest goals, and accelerate on-the-ground action in support of sustainable forest management. There is a reality here that needs to be recognized, which is that a consensus on a legally-binding initiative has yet to be established and Canada supports non-binding options such as quantitative goals, a code of conduct, certification and the possible role of voluntary peer reviews.

For corporations, there are also opportunities for social and economic development through policies and practices that are socially responsible. Forest practices in Canada and around the world have changed tremendously over the past generation or so. A Canadian company, TEMBAC, provides a good example of socially responsible practice. This company recently received an award from the Conference Board of Canada for having created regional advisory committees that give community representatives a voice to influence the company's future and help to find a better balance between the needs of communities and those of the company. These committees are composed of representative of first nations and there are also regional people, NGOs, unions, companies and members of the business community. The role consists of advising and making recommendations on a wide range of issues and also management of the company's environmental, community and scholarship funds. An aboriginal relations unit was also created in the forest management group to support employees in developing good relationships with aboriginal communities in TEMBAC's areas of operation. This has made it possible to build sound business relationships to support aboriginal communities, which is an important priority of the Government of Canada.

There are other ways that well-managed forests can support economic and social development. As the market for CO₂ emissions trading develops, states and companies can invest in upgrades for industries facilities, both domestically and internationally, that would reduce carbon emissions and implement afforestation projects that would produce carbon credits. The local community benefits from efficient technology while the investor can benefit from selling carbon credits. This is a great example of Dr Bruntman's exhortation to think globally and act locally.

These ideas and possibilities can lead to better conditions in an economic and social sense as well as a better management of forests. It is a win-win situation. To conclude, Mr Emmet pointed out that gatherings such as the present meeting provide a forum for the continuing advancement of forestry communities' common goals. He encouraged all participants to make the most of this opportunity.

Mr Avrim Lazar, President and CEO of the Forest Products Association of Canada and Chair of the International Council of Forest Products Associations (ICFPA), welcomed the participants and thanked the Government of Canada and the Canadian Forest Service, for having made it possible for the Committee to meet in Vancouver and for welcoming the Food and Agriculture Organization of the United Nations (FAO) into Canada. Mr Lazar also expressed appreciation to FAO for seeking the input of the private sector and for ensuring that these consultations are not simply a formality but a genuine exchange of views. Mr Lazar then recalled that on 30 May a full day of International Council of Forest Products Associations Annual Meeting had been held. One of the things evidenced was how much the industry's priorities overlap with those of the UN, especially FAO's. Discussions were held about best practices in plantations, best practices in sustainable forest management, promoting certification and best practices to developing countries and the role of the forest sector in alleviating poverty. Importantly, discussions focussed on how to combat, and not merely address, illegal logging. It is not surprising that the private sector has such productive relations with FAO because so many of the

concerns of the private sector also are the concerns of FAO. Mr Lazar concluded by wishing participants an informal and productive session for the rest of the day.

Subsequently, Mr Wulf Killmann, Director, Forest Products and Economics Division, FAO, welcomed the participants on behalf of Mr Jacques Diouf, Director-General of FAO. He expressed FAO's gratitude to the hosts, the Government of Canada and the Forest Products Association of Canada, who so kindly invited the Committee to hold this Forty-Sixth Session in this beautiful city of Vancouver. He also thanked Mr Avrim Lazar, President and CEO of FPAC, and his team, for the excellent organization of the meeting, and, last but not least, expressed his gratitude to the participants, for serving on the ACPWP and advising FAO.

Mr Killmann mentioned that 2005 was a year which had seen increased activity in the forestry sector. In February, the Kyoto Protocol and its Clean Development Mechanism finally entered into force, and in late November/early December the first Meeting of Parties, the so-called COP- MOP, would be convened in Montreal. In March, FAO had hosted in Rome a Ministerial Meeting on Forestry Issues and the 17th Session of the Committee on Forestry. The discussions for a new International Tropical Timber Agreement are ongoing. During the preceding two weeks, delegates had attended the 5th Session, which concluded the United Nations Forum on Forests, and in August IUFRO would hold its World Conference in Brisbane.

In his recent report: "Towards Larger Freedom", UN Secretary-General Kofi Annan deplored the fact that, despite substantial progress in the formulation and implementation of national forest policies, deforestation and forest degradation continue at an alarming rate. He stressed the critical role of forests in achieving the Millennium Development Goals, noting that nearly 1.6 billion people depend, to varying degrees, on forests for their livelihoods

In September 2005, the UN General Assembly would review progress made during the past five years towards achieving the eight Millennium Development Goals. Whilst the important environmental contributions offered by forests are generally recognised, their social and economic role is often overlooked. The sustainable management and use of forests not only contributes directly to attaining MDG 7 (conservation of natural resources), but also to goal 1 (poverty reduction, food security) and, indirectly, to most of the others. The increasing acceptance of the social and economic role of forests also became the *Leitmotiv* for the latest issue of the State of the World's Forests, which was published just three months previously.

The private sector too was looking afresh at the link between the social and economic aspects of its work. An example of this was the inclusion of corporate social responsibility as an Agenda item for the forthcoming International Forest Products Summit and the CEO- Roundtable.

In the past, discussions in these international fora were, to a great extent, led by government employees. However, as we all know, civil society and the private sector are major actors in the drive for more sustainable management of the world's forests.

Therefore the private sector is increasing its participation and visibility in these international forestry fora, as was seen at the recent COFO and UNFF sessions. Earlier in 2005, FAO's Forestry Department sought advice on its work from two different panels. Representatives from the private sector participated in both panels, reflecting the importance FAO attaches to this collaboration.

Mr Killmann recalled that the meeting agenda provided for special discussions on the Code of Planted Forests, the Code of Corporate Responsibility, Emissions Trading, and Future Fibre Supply.

All these issues involve and directly affect the private sector. Some of them provide opportunities for governments, non-governmental organizations and the private sector to develop partnerships and joint activities. FAO was looking forward to acting as a forum for discussion and as a neutral facilitator to promote this collaboration.

For the benefit of participants unfamiliar with the work of the Committee, Mr Killmann reminded the participants that the Committee's role is to provide advice to FAO on its programme in the fields of forest industries and paper. The annual sessions are thus especially important since the recommendations presented by Committee members help us to direct our work for the year to come.

Though sessions of the Committee are not open to the public, experts in the sector are welcomed and FAO looks forward to their comments and suggestions.

In two inter-sessional meetings during past year, discussion had taken place on how to further strengthen the mutual relationship and increase the benefits generated by debate, for both the private sector and FAO. It was agreed to sharpen the focus, reduce lecturing and allow more space for discussions. Mr Killmann called on the participants to experiment this new approach at the present meeting.

Mr Killmann concluded by encouraging the participants to express their ideas and suggestions in a frank and open manner so as to contribute to the recommendations which will be put forward, and to take full advantage of the opportunity offered by this session to meet and exchange ideas with colleagues from other regions of the world.

Item 2. Adoption of the provisional agenda

The Agenda was adopted (Annex 2), with the proposal to move items 4 and 5 to 13:30, item 6 to 10:30 and item 8 to 14:00 hrs.

Item 3. Review of actions taken by FAO on the recommendations made at the 45th Session of the Committee

Mr Killmann presented the progress made by FAO in implementing the recommendations of the ACPWP at its 45th Session (page 21).

Mr Armando Cafiero, Managing Director of ASSOCARTA, reported on the main results of the side event jointly organized by ICFPA, WBCSD and FAO during the 17th Session of the Committee on Forestry – COFO, held in Rome from 15 to 19 March 2005. Over 40 experts from around the world participated in the meeting, representing Governments, international organisations such as the World Bank and the UNFF and many industry colleagues. The objectives of the meeting were to inform on certification status and key challenges, to raise awareness of the private sector's contribution, to share some experiences being developed around the world and to discuss the private sector in the phased approach to certification. To achieve these objectives, four outstanding presentations were made: a leading paper presented by Markku Simula, followed by a presentation by Mr Paul-Emmanuel Huet, Secretary General of ATIBT on the Pan-African certification initiative. Mr Tham, Director of the Malaysian Timber Council's London office, then presented the Malaysian initiative to promote SFM and certification. Finally, Mr Boris Tabacof, ACPWP Chairman, presented the experience, progress and results from South America, in particular Brazil. Mr Cafiero recalled that forest certification has increased greatly around the world in recent years. In 2004, more than 220 million hectares were certified, but this still represents only 6% of the total forested area in the world. Out of 220 million ha certified, 95% is in North America and Europe and, over the years since

certification began, it is clear that the other continents still do not account for more than 10% of the total certified area. Against this background, the presentations showed that the main challenges faced in advancing certification in developing countries would appear to be the shortage of qualified human resources, the inadequate regulatory and political framework, including instability and poor governance, and the lack of natural certification and accreditation services. The message shared with the audience on behalf of ICFPA is the same as the one presented at COFO during ICFPA's intervention, which is that the private sector is definitely part of the solution for SFM, that good governance and law enforcement and capacity building are necessary to ensure sustainable forest management, that a diversity of approaches to SFM exist and all certification schemes aim to improve practices and therefore should be supported, and that a basic approach and similar concepts have to be accepted and promoted. Mr Cafiero recalled the need to re-assess the sustainability impact of public procurement policies.

Mr Killmann reminded the meeting that this had been the first time that the private sector had been given the floor at a Committee on Forestry (COFO) Session and expressed the hope that this practice could continue in future. He also mentioned that in 2006 – as always, in alternation with COFO – the Regional Forestry Commission meetings will be held. He proposed that, if this proves possible, representatives of the private sector should participate and take the floor at all the Regional Forestry Commission sessions, to ensure that more private sector concerns and ideas are brought into the discussions. There is certainly still space to increase the communication between the private sector and FAO and, at the end of the day, in many countries it is the private sector that manages the forests and the processing of the products. Mr Lazar requested the list of the Commissions and dates and indicated that ICFPA would prepare messages and identify representatives to attend each meeting. It was therefore agreed that the dates and venues of next year's sessions would be distributed.

Mr Killmann then referred to other FAO activities not directly addressed through the recommendations process:

- Forest Resources Assessment Process. Every 10 years, FAO produces an assessment of the forest resources of the world, based upon reports through national correspondence from the countries. The last was done in 2000, so the next would be ready by the end of 2005;
- Forest Products Yearbook is produced annually. In 2005, it was intended to produce also a graphics-only glossy summary;
- Forestry and forest products country information available on FAO website;
- Forest Sector Outlook studies for Europe and Latin America. The Outlook Study for West and Central Asia was under preparation;
- Logging code of best practices: one has been developed for Central and West Africa, another would be undertaken for tropical forests of South America;
- Economics of sustainable forest management;
- Start-up of a major project in the Congo Basin countries, Democratic Republic of the Congo, the Republic of the Congo, Cameroon, Gabon, Equatorial Guinea and Central African Republic, looking into the role of non-wood forest products (NWFP) in the food security situation of these countries. This activity will proceed for several years;
- Training sessions on climate change issues for foresters in Latin America, Africa and Asia. Support is also provided to the Intergovernmental Panel on Climate Change and the Secretariat of UNFCCC on technical issues.

Finally, FAO hosts a number of Secretariats. The Collaborative Partnership on Forests (CPF) is part of the international arrangement on forests (UNFF) and FAO chairs and hosts the Secretariat. FAO also hosts the National Forest Programme Facility, a funding mechanism which is an information initiative created in response to recent intergovernmental dialogue on

forests and which recognizes the essential role of national forest programmes in addressing forest sector issues.

Item 4. Code on corporate social responsibilities

Mr Lazar informed the Committee that ICFPA will address the issue of corporate social responsibilities.

Item 5. Code of best practices for planted forests

Mr Luis Leal, Director General of the Portuguese Pulp and Paper Association, presented a progress report on the development of the code and future activities planned for its completion.

He explained that the objective is to introduce a Code of Best Practices for Planted Forests to provide the framework to balance the economic, cultural, social and environmental dimensions of planted forests in supply of wood, fibre, non-wood products and services, whilst contributing positively to sustainable forest management, integrated land-use and livelihoods.

The *Code of Best Practices for Planted Forests* as proposed will complement and supplement, without detracting from, the different forest certification schemes in existence.

It is important to note that certification of planted forests has occurred generally in industrialized (developed) countries. However, 80% of planted forests globally are in developing countries or those with economies in transition, which often have difficulty in achieving standards or do not have the resources to obtain certification. Rapid expansion of area and impact of planted forests & plantations, industrial or non-industrial, amounts to approximately 4.5 million hectares per year. There is a need to learn from both negative and positive experiences in planted forests, so as to make a greater contribution to planted forests in the cultural, social, environmental, economic and technical areas.

It is important to demonstrate greater accountability and improve international reputations. Other issues are: the need to demonstrate compliance with best practices in planted forest management for market access – certification, as well as alienation from traditional lands & uses of natural resources, land-use conflicts, traditional, tribal, customary land and cultural attachment, and First Nations which are often marginalized from main plantation development. Furthermore, First Nations' land & land-use rights should be properly recognized & respected, and they should be increasingly involved in participatory planning, implementation & investment.

It was recalled that planted forests are a source of rural employment and that they can complement and support agriculture, livelihoods and sustainable land-use. On the one hand, planted forests can be developed for high productivity of wood, fuelwood, fibre and non-wood forest products in monocultures, and, on the other hand, there could be flexible and diverse species approaches of smallholder, trees outside the forests and agroforestry.

Smallholder, social, community, farm forestry, and agroforestry mechanisms are important for growing planted forests and trees – in accordance with people's needs. Plantation forest management is as much about people and livelihoods as it is about management of trees and forest products.

There is a strong trend globally for the private sector (corporate and smallholder) to invest in planted forests. Corporate knowledge of germplasm, silviculture, markets, trade, funds, etc, is superior, whilst smallholders have land and labour but lack this knowledge.

Greater covenants are needed for improved social and environmental responsibility – whilst corporate boards and shareholders pressure for greater profitability. Large scale planted forests can face complex social issues – they can alienate local communities from land that has traditionally provided goods and services.

Mr Leal concluded by briefing the Committee about the next steps to follow in the development of the Code. A task group, consisting of collaborating partners/planted forest specialists, will continue its work. Following the roundtable exercise to evaluate needs, detail objectives, identify target beneficiaries and elaborate on the scope, contents and process in preparation of the *Code of Best Practices for Planted Forests*, which was held on 20 January 2005, a concept note based on a scoping meeting and co-opting additional partners will be reviewed. In addition, a draft outline of the Code would be prepared, taking into account existing processes and documentation. A second collaborating partner meeting would be organized, including co-opted members, with the aim of reviewing the advanced outline, would be held in mid June 2005. Based on this, the draft *Code of Best Practices for Planted Forests* would be prepared and shared with collaborating partners for feedback.

A second draft of the Code would be developed and an International Stakeholder Workshop would be held, in order to introduce and review the Code, prior to its presentation to the FAO Regional Forestry Commissions in 2006.

Item 6. Emissions trading

Mr Peter Vis from the European Commission presented the challenges and opportunities of emissions trading. Mr March Stuart from Eco-Securities presented the process and examples of forestry projects under the Clean Development Mechanism, and Mr Dirk Brinkman, from Brinkman & Associates Reforestation Ltd talked about the carbon trade in the forestry sector.

Item 7. Future fibre supply

Dr Gary Bull from the Faculty of Forestry, University of British Columbia and Professor Sten Nilsson, Deputy Director and Forestry Program Leader at the International Institute for Applied System Analysis, presented a global wood supply analysis describing the need to improve information on availability of fibre supply.

Item 8. Recommendations of the Committee to FAO for 2005-2006

The Committee proposed the following recommendations to FAO:

- (a) The Committee recommended that FAO further enhance its assistance to developing countries in implementing forest certification, inter alia through FAO and ICFPA representations to other relevant UN organizations in support of developing countries' implementation of certification;
- (b) The Committee urged FAO to continue and enhance its efforts to promote inclusion of the ICFPA in international processes discussing sustainable forest management, including but not limited to WB/WWF and UNFF.
- (c) The Committee further recommended that FAO continue to help clarify the role that the private sector can play in combating illegal logging and to assist in finding an appropriate definition for it;
- (d) The Committee also recommended that FAO continue its work on the code of best practices for planted forests, with strong input from the private industry sector.

- (e) The Committee recommended that FAO help to co-host with ICFPA a global seminar on energy dynamics and its impact within the paper and forest sector;
- (f) The Committee further recommended that FAO work with ICFPA to seek opportunities to document the social and economic contributions made by the industry;
- (g) The Committee agreed to hold its 47th Session in Rome, on 28 April 2006.

Item 9: Date and place of next session

The Committee proposed to hold its 47th Session in Rome, on 28 April 2006. [Subsequently, it was agreed to push the date of the meeting back to 6 June 2006.]

Item 12. Closing remarks

Mr Killmann thanked all participants and the Forest Products Association of Canada for having hosted this meeting and declared the 46th Session of the ACPWP closed.

Annex 1 - List of Participants

Prof. Eduard Akim
Professor, Head of Department
St.-Petersburg State Technological University of
Plant Polymers
47, Stachek pr.
St. Petersburg 198097
Russian Federation
Fax: +7 (812) 186 5809
Tel: +7 (812) 186 5323/+7(812)905 7189
Email: akim@ed.spb.su/inna@home.su

Ms Marie S. Arwidson
Managing Director
Swedish Forest Industries Federation
Box 16006,
Stockholm SE-103 21
Sweden
Fax: +46 8 611 71 22
Tel: +46 8 762 72 60
Email: marie.arwidson@forestindustries.se

Mr Dirk Brinkman
CEO
Brinkman & Associates Reforestation Ltd.
520 Sharpe St. New Westminster
V3M 4R2
Canada
Fax: 604 520 1968
Tel: 604 520 2800
Email: dirk_brinkman@brinkman.ca

Dr Gary Bull
Assistant Professor, Dept. of Forest
Resources Management
University of British Columbia
2022-2024 Main Mall
Vancouver, B.C. V6T 1Z4
Canada
Fax: 1 604 8229106
Tel: 1 604 8221553
Email: gary.bull@ubc.ca

Mr Armando Cafiero
Managing Director
Associazione italiana degli industriali della
carta, cartoni e pasta per carta (ASSOCARTA)
Viale Pasteur 10
Rome 00144
Italy
Fax: +39 (06) 591 0876
Tel: +39 (06) 591 9131/40
Email: armando.cafiero@assocarta.it

Mr Somboon Chuchawal
President
The Thai Pulp and Paper Industries
Association
1 Siam Cement Road
Bangsue, Bangkok 10800
Thailand
Fax: +66 (2) 587 2209/586 2999
Tel: +66 (2) 586 4645/6
Email: somboonc@cementthai.co.th

Mr Bernard de Galembert
Forest Director
Confederation of European Paper Industries
(CEPI)
Avenue Louise 250
Brussels B-1050
Belgium
Fax: +32 (2) 646 8137
Tel: +32 (2) 627 4927
Email: b.degalembert@cepi.org

Mr Michael Edwards
Executive Director
Forestry South Africa
P O Box 1553
Rivonia, Sandton 2128
South Africa
Fax: +27 (11) 803 6708
Tel: +27 (11) 803 3403
Email: trees@global.co.za

Mr Brian Emmett
Assistant Deputy Minister
Government of Canada, NRCAN
580 Booth St.
Ottawa K1A 0E4
Canada
Fax:
Tel: +1 613 947 7400
Email: bemmett@nrcan.gc.ca

Mr Jean-Paul Franiatte
Délégué Général
Confédération française de l'industrie des
papiers, cartons et celluloses (COPACEL)
154, boulevard Haussmann
Paris F-75008
France
Fax: +33 (1) 5389 2401
Tel: +33 (1) 5389 2400
Email: jean-paul.franiatte@copacel.fr

Mr Thomas Hammond
Senior Programme Advisor
The World Conservation Union (IUCN)
555, René-Lévesque Blvd West, Suite 500
Montréal, Québec H2Z 1B1
Canada
Fax: ++1 (514) 287 9687
Tel: ++1 (514) 287 9704 Ext 361
Email: tom.hammond@iucn.org

Mr Anders Hildeman
Environment Director
SCA PACKAGING
Culliganlaan 1D
Diegem BE-1831
Belgium
Fax: +32 (2) 715 4815
Tel: +32 (2) 718 3711
Email: anders.hildeman@sca.com

Mr John Hunt
Executive Director
Paper Manufacturers' Association of South Africa
(PAMSA)
P.O. Box 1553
Rivonia, Johannesburg 2128
South Africa
Fax: +27 (11) 807 6720
Tel: +27 (11) 803 5063
Email: john_hunt@pamsa.co.za

Ms Esa Hyvärinen
Environment Director
Confederation of European Paper Industries
(CEPI)
Avenue Louise 250, Box 80
Brussels B-1050
Belgium
Fax: 32 2 646 8137
Tel: 32 2 6274928
Email: e.hyvarinen@cepi.org

Mr Gerrit Jan Koopman
Director
Royal Netherland's Paper and Board Association
Kruisweg 761
Hoofddorp 2132NE
Netherlands
Fax: +31 (0) 20 6543064
Tel: +31 20 6543055
Email: g.koopman@vap-online.nl

Mr Avrim D. Lazar
President and CEO
Forest Products Association of Canada
(FPAC)
99 Bank, Suite 410
Ottawa, Ontario K1P 6B9
Canada
Fax: +1 (613) 563 4720
Tel: +1 (613) 563 1441
Email: alazar@fpac.ca

Mr Luis Costa Leal
Director General
Portuguese Pulp and Paper Association (CELPA)
Rua Marqués Sá da Bendeira, 74 2Dt
Lisbon1069-076
Portugal
Fax: +351 217611529
Tel: +351 217611510
Email: luis.leal@celpa.pt

Mr Mario H. Leonel
Executive Director
Associação Brasileira de Celulose e Papel
(Bracelpa)
Rua Afonso de Freitas, 499
São Paulo, SP04006-900
Brazil
Fax: +55 (11) 3887 7541
Tel: +55 (11) 3889 9021
Email: mleonel@bracelpa.org.br

Dr Irene W. Meister
Principal
Irene Meister & Associates
239 East 79th Street, Suite 12B
New York NY 10021
United States of America
Fax: +1 (212) 744 5196
Tel: +1 (212) 628 8165
Email: iwmeist@meadwestvaco.com

Mr W. Henson Moore
President and Chief Executive Officer
American Forest and Paper Association
(AF&PA)
1111, 19th Street, NW - Suite 800
Washington, D.C.20036
United States of America
Fax: +1 (202) 463 2024
Tel: +1 (202) 463 5151
Email: whm@afandpa.org

Mr Hiraku Nihei
Managing Director
Japan Paper Association
3-9-11 Ginza Chou-ku
Tokyo104-8139
Japan
Fax: +81 (0)3 3248 4826
Tel: +81(0)3 3248 4802
Email: nihei@jpa.gr.jp

Prof. Sten Nilsson
Deputy Director and
Leader, Forest Resources Project
International Inst. for Applied Systems
Analysis
Schlossplatz 1
A-2361 LaxenburgA-2361
Austria
Fax: 43 2236 807599
Tel: 43 2236 807229
Email: nilsson@iiasa.ac.at

Mr Alfonso Ocampo
President
Propal S.A.
Carretera Antigua Cali-Yumbo, Km 17
Apartado Aéreo 4412
Cali
Colombia
Fax: +57 (2) 651 2444
Tel: +57 (2) 651 2215
Email: aocampo@propal.com.co

Ms Teresa Presas
Managing Director
Confederation of European Paper Industries
(CEPI)
Avenue Louise 250, Box 80
BrusselsB-1050
Belgium
Fax: (322) 627 49 32
Tel: (322) 627 49 14
Email: t.presas@cepi.org

Mr Carlos Sacal
Chairman of the Board
Smurfit Cartón y Papel de México, S.A. de C.V.
1000 Sawgrass Corporate Parkway-Suite 120
Sunrise. FL33323
Mexico
Fax: +52 55 3067 5213
Tel: +52 55 5729 2403
Email: carlos.sacal@mx.smurfitgroup.com

Mr Nilkanth Sadawarte
Chairman and Managing Director
APTECH Consultants Pvt. Ltd.
1922, Sadashiv Peth
Pune411030
India
Fax:
Tel: +91 20 30910179 / +91 0 9371014751
Email: n_sadawarte@rediffmail.com

Mr Yoshihiko Saeki
President
Japan Paper Association
3-9-11 Ginza Chou-ku
Tokyo104
Japan
Fax: +81 (3) 3248 4826
Tel: +81 (3) 3248 4802
Email: saeki-y@jpa.gr.jp and cc:
masaotaniguchi@jpa.gr.jp

Mr Roberto Silva Salamanca
President
Smurfit Cartón de Colombia S.A.
Apartado Aéreo 219
Cali
Colombia
Fax: +57 (2) 691 4199
Tel: +7 (2) 691 4115
Email: roberto.silva@co.smurfitgroup.com

Mr Denis Sokolov
Chief Executive Officer
Confederation of Forestry Complex of the NW
PB 687
Saint-Petersburg197046
Russian Federation
Fax: +7 812 303 9281
Tel: +7 812 303 9282
Email: denis.s@woodexpert.ru

Mr Richard Stanton
Manager-Policy
A3P Australian Plantation Products and
Paper Industry Council
Level 3, 40 Blackall St
Barton Act2600
Australia
Fax: +61 2 62738011
Tel: +61 2 62738111
Email: richard.stanton@a3p.asn.au

Mr Marc Stuart
Director
EcoSecurities Ltd.
206 West Bonita Avenue
ClaremontCA 91711
United States of America
Fax: (909) 621 7438
Tel: (909) 621 1358
Email: marc@ecosecurities.com

Mr Eladio Susaeta Saenz
Ingeniero
Ingenieros y Economistas Consultores Ltda
(INECON)
Villavicencio No. 361, Of. 105
Santiago
Chile
Fax: +56 (2) 369 1930
Tel: +56 (2) 369 1900
Email: inecon@inecon.cl

Mr Peter Vis
Environment Directorate-General
European Commission
18 Avenue des Becasses
Waterloo B1410
Belgium
Fax:
Tel: +32 2 351 1532
Email: Peter.Vis@proximus.be

Mr Klaus Windhagen
Director General
Verband Deutscher Papierfabriken e.V.
(German Pulp and Paper Association)
Postfach 2841
Bonn 53018
Germany
Fax: +49 (228) 267 0518
Tel: +49 (228) 267 0513
Email: k.windhagen@vdp-online.de

Ms Ann Wroblewski
Vice President- International
American Forest and Paper Association
1111 19th Street, N.W., Suite 800
Washington D.C. 20036
United States of America
Fax: +1 202 463 2772
Tel: +1 202 463 2451
Email: ann_wroblewski@afandpa.org

Food and Agriculture Organization of the United Nations

Mr Wulf Killmann
Director
Forest Products and Economics Division
Forestry Department
FAO
Rome, Italy
Tel: +39 06 570 53221
Fax: +39 06 570 55137
Email: Wulf.Killmann@fao.org

Mr Olman Serrano
Senior Forestry Officer
Forestry Policy and Information Division
Forestry Department
FAO
Rome, Italy
Tel: +39 06 57054056
Fax: +39 06 57055137
Email: Olman.Serrano@fao.org

Ms. Carla Tomalino
ACPWP Secretariat
Forest Products and Economics Division
Forestry Department
FAO
Rome, Italy
Tel: +39 06 57052071
Fax: +39 06 57053137
Email: Carla.Tomalino@fao.org

Annex 2 - Agenda

1. Opening of the Session and welcome addresses by representatives from the Government of Canada and FAO
2. Adoption of the provisional agenda
3. Review of actions taken by FAO on the recommendations made at the 45th Session of the Committee
4. Code on corporate social responsibilities
5. Code on corporate social responsibilities
6. Emissions trading
7. Future fibre supply
8. Recommendations of the Committee to FAO for 2005-2006
9. Date and place of next session
10. Any other business
11. Closing remarks

PAPERS PRESENTED

ITEM 3: Review of Actions taken by FAO on the Recommendations made at the 45th Session of the Committee

At its 45th Session, the Committee made a number of recommendations to FAO, which are listed below.

1. Illegal Logging

FAO was recommended to assist the process of harmonization of illegal logging related definitions. It was suggested that an expert consultation should be organized with the participation of forest industries and non-governmental organizations (NGOs).

Implementation:

- In November 2004, FAO conducted jointly with ITTO a meeting in Rome on best practices for improving law compliance in the forestry sector. At this meeting, the issue of definitions was also addressed. Many ICFPA members participated.
- A draft working document was prepared.

2. Forest Plantations

FAO was recommended to develop, in close collaboration with ICFPA, a draft code of best practices for plantation forestry.

Implementation:

- The Third Expert Meeting on Harmonizing Forest-related Definitions, held in Rome from 17-19 January 2005, addressed definitions for the terms “forest plantations”, “plantation forest” and “planted forest”.
- On 20 January 2005, a scoping meeting for the “Code of Best Practices for Planted Forests” was held in Rome, with five representatives of the private sector, two from NGOs as well as some from Governments, ITTO, CIFOR and FAO. The concept and general roadmap were agreed upon. Colleagues from WB, the Woodworkers’ Union and others were co-opted to the core group. FAO staff were entrusted with information collection and selection. The next meeting is scheduled for 23 June 2005.

3. Corporate Social Responsibility (CSR)

FAO was recommended to develop, in close collaboration with ICFPA, a framework for best practices for Corporate Social Responsibility (CSR) with emphasis on social aspects, including poverty alleviation.

Implementation:

- FAO drafted a first approach to a concept note which was discussed at the informal meeting on 7 October 2004 in Rome. It was then decided that ICFPA members would develop a further draft and discuss it at a meeting during the FPAC Paper Week in February 2005.
- FAO participated in that discussion.
- An enhanced paper will be presented at the CEO Forum in May 2005 for feedback.

4. Interaction between ACPWP and ICFPA

FAO was recommended to continue its efforts to improve the exchange of information and interactions between ACPWP and ICFPA, recognizing the different functions of each forum and strengthening the work of existing working groups in both bodies.

Implementation

- FAO facilitated an intervention of ICFPA in the 17th Session of COFO (15-19 March 2005);
- FAO provided the opportunity for, and joined ICFPA and WBCSD in the conduct of, a special event during COFO;
- FAO invited the private sector to participate in its High Level Advisory Panel;
- FAO invited the Chair of the ACPWP to participate in a Civil Society Meeting advising FAO on the direction of its work;
- FAO increased the provision of information on meetings and documents to ACPWP members.

ITEM 5 - Code of Best Practices for Planted Forests

Concept Note Code of Best practices for Planted¹ Forests

Background and Rationale

In 2000, plantation forests accounted for 187 million hectares (< 5% of global forest cover and a little over 1% of land-use) but provide 35% percent of global, industrial roundwood supply (increase anticipated to 44% by 2020). In addition, large forest areas consist of stands of native species that are planted for commercial purposes. There is wide recognition that forests play a critical and positive role in sustainable forest management and in wood and fibre supply; planted forests provide economic, social, cultural and environmental services and benefits. The fundamental enabling factors that are necessary to support planted forest development with consistent and clear policies, legal, regulatory and institutional frameworks based upon sound principles, standards and ethics. The planning, implementation and monitoring of planted forest development needs support by the application of appropriate knowledge and technology from propagation to maturity, including harvesting. Critical issues that commonly require special attention include land and crop tenurial rights; engagement of key stakeholders with ethnic minority groups and local populations; the role of incentives in planted forest development; competition between forestry and agricultural lands; and competition for land between natural and planted forests.

Recognizing these issues, Governments and stakeholders have requested FAO, with collaborating partners to prepare a *Code of Best Practices* to detail the recommendations and ethics for planted forests to ensure that cultural, social, environmental and economic dimensions are considered and incorporated in a balanced manner in any planted forest development. The application of the proposed *Code of Best Practices* will be on a voluntary and non-binding or non-mandatory basis that could be adopted by Governments and investors (public and private sector), policy makers, planners and other stakeholders without a formal acceptance procedure.

Objective

Introduce a Code of Best Practices for Planted Forests to provide the framework to balance the economic, cultural, social and environmental dimensions of planted forests in supply of wood, fibre, non-wood products and services, whilst contributing positively to sustainable forest management, integrated land-use and livelihoods.

¹ Third Expert Meeting on Harmonizing Forest Related Definitions, 17-19 January, 2005 defined:

Planted Forest – “forest stands in which trees have predominantly been established by planting, deliberate seeding or coppicing, where the coppicing is of previously planted trees. This includes all stands established by planting, or seeding of both native and introduced species”

Plantation Forest (a subset of planted forests) – “forest stands in which trees have been established by planting or/and deliberate seeding or coppicing (where the coppicing is of previously planted trees) with either native species or non-native species that meet all the following criteria: i) 1-2, or few species; ii) even-aged; iii) regular spacing”.

Scope

The Code of Best Practices for Planted Forests will build upon the foundation work established in the UNFF Inter-sessional Experts Meetings on Maximising the Role of Planted Forests in Sustainable Forest Management, Chile (1999) and New Zealand (2003) where stakeholders expressed a need for a reference Framework – a “Code of Conduct” or “Code of Best Practices”. The Code of Best Practices for Planted Forests as proposed will complement and supplement, without detracting from the different forest certification schemes in existence. The Code of Best Practices for Planted Forests will also complement/contribute to The Forest Dialogue process which aims to improve the dialogue, consensus and cooperation between major stakeholders in “intensive forest management”, including planted forests. The Code of Best Practices for Planted Forests will provide the overarching framework of principles, standards and ethics for planted forest development to service:

- Certification schemes, with a neutral, balanced reference foundation for all planted forest development globally, regardless of purpose or ownership.
- Governments, to strengthen governance for an improved enabling environment for planted forest development, particularly in developing countries and those with economies in transition. *Note: Certification of planted forests has occurred generally in industrialized (developed) countries however, 80% of planted forests globally are in developing countries or those with economies in transition, which often have difficulty to achieve standards or do not have the resources to obtain certification.*
- Public and private sector (corporate and smallholder) investors in planted forests. *Note: The certification focus has been primarily on the corporate private sector, however 80% of planted forests are owned by the public sector (55%) or smallholders (25%), which often have difficulty to achieve standards or do not have the resources to obtain certification..*
- Planted forests of all purposes - production (wood and fibre for industrial uses) and protection and conservation (non-industrial uses). *Note: The certification focus has been primarily on large scale industrial planted forests, whilst more than half of planted forests are managed for non-industrial purposes for landscape restoration, rehabilitation of degraded lands, combating desertification and protection of soil and water.*

A global inventory of *Operational Guidelines* will also be undertaken to gather and analyse any significant gaps and evaluate the necessity to update these in accordance with new scientific knowledge and identify future actions. Where significant gaps exist, *Operational Guidelines might be developed*, that will reflect the unique conditions pertaining to specific ecological zones, purposes, ownership, species groups and silvicultural management. Any new *Operational Guidelines* will be linked to the *Code of Best Practices for Planted Forests*.

Elements of the *Code of Best Practices for Planted Forests* may include the framework, guiding principles and standards to:

- take into account all relevant biological, technological, ethical, economic, social, cultural and environmental dimensions of planted forests, in accordance with the relevant rules and agreed proposals for action of international laws, conventions and processes;
- elaborate and support formulation of national policies for planted forest management and development;
- improve the legal, regulatory and institutional framework required for planted forest management and development;
- be included in the formulation and implementation of international agreements, legal instruments, both binding and voluntary;
- consider sound technical and financial inputs to planted forest management and development;

- link planted forest management and development to food security, poverty alleviation and sustainable livelihoods and other social and cultural aspects;
- link planted forest management and development to major environmental and integrated land-use issues, including but not limited to, rehabilitation of degraded lands, landscape restoration, combating desertification, sequestering carbon, protecting soil and water values;
- be included in research, education and training in planted forest management and development; and
- be included in Code of conduct and ethics for all persons involved in planted forest management and development.

Major Outputs

- A *Code of Best Practices* – the framework for planning and management of reproductive material, production, establishment, silviculture, protection and harvesting (if appropriate) of planted forests; and
- Assessment of existing *Operational Guidelines* for activities in planted forest development – the specific, individual planning and technical practices pertaining to different ecological zones, purposes, ownerships, species groups and silvicultural management.

Main Activities and Process

- Engage a task group of collaborating partners/planted forest specialists in a roundtable exercise to evaluate the needs, detail the objectives, identify the target beneficiaries and elaborate on the scope, contents and process in preparation of the *Code of Best Practices for Planted Forests* (held 20 January, 2005);
- Review concept note based on scoping meeting and co-opt additional partners
- Prepare a draft outline of the *Code of Best Practices for Planted Forests* taking into account existing processes and documentation;
- Conduct a second collaborating partner meeting, including co-opted members, to review the advanced outline (estimated June 2005);
- Recruit a specialist to prepare a draft *Code of Best Practices for Planted Forests* taking into account existing processes and documentation;
- Share the first draft *Code of Best Practices for Planted Forests* with collaborating partners for feedback
- FAO and specialist, prepare second draft of *Code of Best Practices for Planted Forests*
- Conduct an International Stakeholder Workshop to introduce and review the *Code of Best Practices for Planted Forests*;
- Engage collaborating partners and specialist in review and edit of the final draft of the *Code of Best Practices for Planted Forests*;
- Agreement by collaborating partners to the *Code of Best Practices for Planted Forests*
- Conduct regional training workshops with policy makers and decision makers;
- Publish and disseminate through hard copy, CD and worldwide web; and
- Undertake a complementary process to review and collate existing *Operational Guidelines* to identify gaps and commonalities and to ascertain future actions, if needed.

The process of formal approval through Regional Forestry Commissions (2006) and the Committee on Forestry (COFO, 2007) requires further consideration.

References

The *Code of Best Practices for Planted Forests* for planted forests will build upon the existing reference documentation including, but not limited to:

- Code of Conduct for Responsible Fisheries (FAO)
- Code of Harvesting Practice – Global and Regional (FAO)
- Ethics Series (FAO)
- Linking Criteria & Indicators of SFM to a Code of Practice for Industrial Tropical Tree Plantations (CIFOR);
- Fastwood Forestry: Myths and Realities (CIFOR);
- Typology of planted forests (CIFOR)
- Sustainable Forestry Initiative (SFI) Standard, (SFI)
- Code for the Establishment and Sustainable Management of Planted Tropical Forests (ITTO);
- National Forest Certification Schemes; and
- International Forest Certification Schemes (FSC, PEFC etc)

FAO and its collaborating partners, the International Council of Forest and Paper Associations (ICFPA), CIFOR, ITTO, WWF, IUCN are committed to the process. Further co-opted partners from multi-lateral banks, developing countries, smallholders, international labour unions, climate change conventions and investment funds are to be confirmed.

Beneficiaries

The primary beneficiaries will be policy/legal/regulatory and planning decision makers in Governments and investors in planted forest development (public and private sectors). There will be benefits which flow on to managers and other stakeholders as secondary beneficiaries

Mutual Benefits

The *Code of Best Practices for Planted Forests* will set out the framework, guiding principles and international standards and ethics to balance the cultural, social, environmental and economic dimensions in planning and management of planted forests.

Duration

One year, coordination by FAO, HQ Rome, with collaborating partners.

Planned Inputs:

- Two roundtable meetings of 10-15 partners in design, preparation and review processes;
- Recruitment of international consultants under FAO supervision to prepare drafts of the *Code of Best Practices for Planted Forests* and assessment of *Operational Guidelines* for planted forests;
- Hosting of International Stakeholder Workshop and Regional Training Workshops
- Publication (English, Spanish and French) in hard copy, CD and worldwide web

Collaborating partners will provide their inputs on an “in kind” basis, with FAO undertaking the overall coordination and recruitment of specialists. Extra-budgetary funds will be necessary to conduct the International Stakeholder Workshop and Regional Training Meetings.

ITEM 6 - Emissions Trading

The creation of scarcity: an overview of emissions trading² By Peter Vis³

1. What is emissions trading?

Trading the right to pollute is a concept that still engenders much misunderstanding, even downright hostility, in Europe. And yet in spite of that, the European Union is the first region of the world to have introduced a greenhouse gas emissions trading scheme across a multi-country area. A new common currency has been “invented” that extends not just to the 12 countries of the Euro-zone, but to all 25 EU Member States, and, in all probability, even beyond the EU within a matter of months⁴. The EU’s emissions trading scheme was adopted in record time for such an ambitious project. As one of the firsthand witnesses to this process over the last 7 or 8 years, I am often asked what was it that made it happen so quickly? The answer is rather simple. Essentially, emissions trading is a good idea whose time had come. Europe, and some other major industrialised economies, had signed up to ambitious international commitments on climate change. The question was no longer “whether”, but “how”, and in this context emissions trading stood out as being the instrument of choice.

To summarise, emissions trading basically requires that polluters hold an entitlement to emit a given quantity of pollution. Entitlements, or “quota” as they are aptly referred to in the French language, are then limited, and there are penalties for those who emit without having a corresponding entitlement. At the heart of emissions trading, therefore, is the ending of an unlimited entitlement to pollute. Similar things have happened other areas of life. When all open land had been fenced off and appropriated by someone, the free acquisition of land ended, and land became scarce. Land was henceforth transferred against payment. Unlike land, however, emissions entitlements are not tangible assets. The markets created by emissions trading are an invention of man. For emissions trading to work, there are certain pre-requisites that need to be fulfilled. This article endeavours to review what these are, and have a look at practical examples of these new emerging markets.

1.1 Five components of emissions trading

Emissions trading is an instrument that centres on five elements: a commitment, an option to trade entitlements to emit, a monitoring of performance, a compliance exercise underpinned by sanctions, and scarcity. When asked to describe emissions trading, there is much interest in the mechanics of how the entitlements to emit are awarded, and then transferred from one participant to another. A whole service industry is emerging, of traders, brokers, exchanges, and specialist commentators. While such service providers are necessary and are to be welcomed, the heart of emissions trading in environmental terms *is about setting an environmental goal, and ensuring that it is met.*

² The views expressed in this paper are those of the author writing in his private capacity, and in no circumstances should be interpreted as representing the official position of the European Commission. Copyright belongs to the author, who reserves the right to publish this article elsewhere in either its present form or amended as appropriate.

³ Principal Administrator
Climate Change & Energy Unit, Environment DG, European Commission, Brussels

⁴ Discussions are now taking place between the European Union and Norway on the possible linking of their respective emissions trading schemes, thereby mutually recognising each other’s allowances.

1.1.1 *The commitment*

The commitment is fundamental. There are four essential elements.

- First, a commitment should result in environmental improvement. If no environmental improvement is achieved, the instrument is failing. The commitment must, therefore, impose some effort beyond what would, in the absence of the commitment, be the normal need, or the “business-as-usual” scenario.
- Second, a commitment should be clear and determined at the outset of a trading period: companies, regulators and the public should understand what the objective is. Ultimately, the participants will be held to account, but they can only be made accountable if it is clear from the beginning what they should achieve.
- Third, the commitment must be fixed: nothing will be more detrimental to the instrument than if the goals keep changing, or if entitlements, once allocated, are taken back. What makes emissions trading cost-efficient is that, having set the goal or commitment, participants are left to decide for themselves how to reach the goal. The decisions what to do will only be “right” if the rules do not change in unpredictable ways.
- Fourth, an ideal commitment should be long-term. Investments are invariably long-term, and for participants to make rational informed decisions, they should ideally know what to expect in terms of future levels of ambition.

In the European Union’s greenhouse gas emissions trading scheme, as in other instances of emissions trading such as the sulphur dioxide emissions trading scheme in the United States, the commitment is determined by the allocation of entitlements at the outset of a trading period. This is also what the Kyoto Protocol has done in fixing commitments for industrialised countries for the period 2008-2012. Determination of such future commitments has one obvious disadvantage, and that is, like all expectations about the future, they are liable to be “wrong”.

1.1.2 *Transfer of entitlements*

This is where the market mechanism of emissions trading becomes so interesting. The most notable feature of the instrument of emissions trading is the ability to transfer entitlements between different participants in the market. What this means in practice is that participants in a trading scheme can “adjust” their entitlement to emit by buying parts of the entitlement of others or by selling parts of their own entitlement. These parts of entitlement are referred to as “allowances” in the European Union’s scheme. They are denominated in metric tonnes of CO₂ equivalent. The word “allowance” conveys well that the holder is allowed, or entitled, under the scheme to emit an equivalent amount of greenhouse gas into the atmosphere⁵. Generally speaking, emissions trading schemes should not proscribe how the transfers of entitlements are agreed or priced between the various participants. Given the existence of sufficiently liquidity, market forces should determine the price at which entitlements are transferred, and modern free market economies are sufficiently developed to be left to find their own ways of bringing potential buyers and sellers together.

When a programme is being made for television or radio, it is often this ability to transfer entitlement, and how this is undertaken, that attracts the most attention. While trades are not done by open outcry, as was once the method for transacting certain financial instruments and

⁵ It should be noted that the word “right” was not chosen by the European Union, no doubt for the reason that no legal or moral person is deemed to have a God-given “right” to pollute without regard to the effects of that pollution.

assets, there is a picturesque image of traders shouting and making frenetic hand signals at one another, and, the audience might suppose, making or losing large amounts of money. This image sits in stark contrast to that of a pure and unspoilt environment and the idealism often associated with environmental movements. It is a sign of the times, however, that in North America, Europe and many other parts of the world, environmental NGOs are increasingly embracing the concept of emissions trading as a worthwhile means to an end. By reducing costs, emissions trading maintains the willingness to act to protect the environment.

While at first sight, the transfer of entitlements might look like an adjustment of the level of the commitment, thereby contravening the principle of the commitment being fixed, one must realise the level at which an outcome is being fixed. In any emissions trading scheme, the aggregate quantity of emissions allowed will always equal the aggregate number of entitlements issued. *It is this aggregate commitment that determines the environmental outcome.* Below the aggregate level, there may be individual emitters that emit more, and others than emit less, and entitlements will be transferred – against payment – from one to the other. Overall, the reductions made by one actor are cancelled out by the extra emissions of another. The regulator of the scheme must concentrate not on individual outcomes, but rather on fulfilment of the overall environmental objective set at the outset. Given the need that commitments should be fixed, the regulator must accept that once fixed, the aggregate commitment cannot be changed, even if emissions allowed by this level of commitment prove later to be too high, or too low.

1.1.3 Monitoring

If there is a commitment, then clearly there must a monitoring of whether the commitment is fulfilled or not. Like the commitment itself, proper monitoring is one of the fundamental building-blocks without which the environmental outcomes will not be attained.

For too long, emitters “did not measure what did not matter”. Once emissions trading is in place, what is being monitored above all is actual performance as compared with the commitment. Good monitoring, to pre-determined standards, is as important to the environmental integrity of an emissions trading scheme as the level of ambition of the commitments themselves. What use an over-ambitious target if the monitoring of compliance is lax? Through weak monitoring, the environmental outcome can be compromised, accountability and certainty are weakened, scarcity is reduced and the proper functioning of emissions trading will be impaired. If an emitter can understate emissions so as to need less entitlement, then recourse does not have to be made to the market to buy additional entitlement. Similarly, it would be just as detrimental to the success of the scheme if an emitter were to sell part of his own entitlements and then understate his own emissions.

There are two ways to have “enough” entitlements: either to acquire more entitlement, possibly for free in the initial allocation, or to report fewer emissions. If an emissions trading scheme intends to impose a scarcity equivalent to 10% below expected needs; the intended objective would clearly not be reached if actual emissions were understated by 10% as well. While this seems perfectly obvious, *the point is that emissions trading is as much about monitoring as it is about the determination of commitments.* Furthermore, what is equally important to the perceived fairness of a scheme is that all participants in the scheme monitor their emissions on a comparable basis. Just as differentiated allocations can give rise to perceived unfairness, so can monitoring to different standards of stringency.

1.1.4 Compliance and sanctions

Having fixed the level of commitment and having monitored the outcome, there needs to be a comparison between what was intended and what actually occurred. Underlying this comparison is the premise that there ought to be an acceptance, whether voluntary or

mandatory, that actual emissions should be matched an equivalent quantity of entitlements. This comparison is generally referred to as the moment of “compliance” or “reconciliation”.

While the four “golden rules” of a commitment mentioned in section 1.2 above may be desirable, there is a necessary counterpart that, in the case the commitment is not met, there is a sanction or penalty applied. At first sight this may seem unduly harsh on companies that are engaged in emissions trading. But behind this is a simple fact. There is no incentive to buy allowances to make up a shortfall, if no sanctions are incurred for not doing so. The sanction – in combination with the commitment - is what ultimately underpins the market. The type of sanction depends on the type of scheme. A mandatory scheme is likely to have a more severe sanction than a voluntary scheme, which in its mildest form might be a “name and shame” sanction. But there should be no doubt that emissions trading without any sanction will not work. The more severe the sanction, the more likely it is that a pre-determined environmental outcome will be reached.

What is so powerful about emissions trading is that it “translates” into financial terms the need to address a particular environmental objective. In companies, this means that taking the environment into account extends beyond the remit of the Environment, Health and Safety Manager, to the Financial Director, and even into the Boardroom itself, where the deployment of capital is tested also against the financial consequences of environmental constraints. Entitlements to emit have a value, reflecting that there are limits on what the environment can bear in terms of pollution without serious adverse consequences, that themselves impose financial costs. The historical fact that unlimited amounts of pollution could be emitted for free was a blatant case of mispricing, with the result that companies – acting in economically rational ways – disregarded the value of what they were lawfully being allowed to do because there was no price signal. The scarce common resource of a clean environment has a value, and this value must be made apparent.

1.1.5 Scarcity

Emission trading is a market instrument, and free markets are based upon the notion of scarcity. Before something has a value, there must be demand for it. A clean environment that allows sustainable development is increasingly recognised as something of immense value. This value goes far beyond “amenity value” but extends to quality of life, health and biodiversity. If only a certain amount of pollution is acceptable, or deemed appropriate, the entitlement to emit this pollution is a scarce entitlement. It is logical that such an entitlement has a value. As entitlement is no longer free, additional emissions imply additional cost, through having to buy additional entitlement, and reductions of emissions imply value, through having less need for entitlements.

As a market instrument, emissions trading will only work properly, indeed will only work at all, if there are fewer entitlements than there is demand for these entitlements. The quantity of entitlement must, of course, reflect the level of ambition of the commitment. Not only will too many entitlements result in too much pollution, but if there are more entitlements issued than there is need by those who pollute, then, like any market which is over-supplied, the value of the entitlements will reduce to zero, and the incentive effect of the scheme will be lost. It is essential, therefore, that the commitment implies a scarcity of the entitlement to emit. So, for participants to complain that they have not received as much entitlement as they need would be to miss the whole point.

1.2 Alternative policy instruments

While “command and control” policies may have been used to address environmental problems in the past, and while they may still have their place in the armoury of environmental policy tools in future, it is striking to see how prominent emissions trading is becoming, in spite of it

not being the only economic instrument that might be applied. So what are its advantages over these other instruments?

The economic instruments with which emissions trading is most often compared are taxes and voluntary agreements. Emissions trading offers something extra to both of these. Taxes and emissions trading are generally compared in the following terms: while both require monitoring, taxes fix the price of emissions but leave the environmental outcome uncertain, whereas emissions trading determines the environmental outcome but leaves the price of compliance uncertain. The only way to reduce the tax burden is by limiting emissions. Taxes can never be seen as an “opportunity”, or as a potential additional revenue stream. Taxes always accrue to Governments, so cannot but be a burden on competitiveness. On the other hand, emissions trading can be designed in such a way that companies can sell entitlements and use the revenues from these sales to offset the cost of investments, or even as an additional return on investment to shareholders. Furthermore, on the macro-economic level, the money exchanged for the transfer of entitlements from one emitter to another does not accrue to Governments, but is transferred from one industry actor to another. Overall, the impacts are revenue neutral. Governments are not “enriched” by emissions trading unless they decide to allocate entitlement for payment (most commonly referred to as “auctioning”).

Voluntary agreements, while they do centre on targets and require monitoring, give no incentive for individual installations to over-achieve. Companies have no incentive to beat the target. Furthermore, if the target proves to be too ambitious, then recourse cannot be made to buy entitlements from others who may have been able to reduce their emissions at lower cost. Finally, there is no transparent mechanism for compensating good performance as compared to bad. The dilemma appears whereby it is not in any company’s individual interest to act for the common good if others (sometimes competing companies) do not act likewise but still share the benefits. Emissions trading provides a compensation mechanism whereby the “good” performers are compensated by the “bad”.

2. What kind of emissions trading?

Emissions trading is an instrument that can be implemented in different ways, while each of these ways will incorporate the key characteristics outlined above. The different ways are closely linked to different types of commitment.

2.1 Cap and trade

The first way, which is the most common, is for what is generally known as a “cap and trade” method. Such a method involves an allocation of entitlement taking place before the trading period begins. This *ex ante* allocation may be done a number of ways, but essentially an allocation is made based on informed choices, and that once made this determination of entitlement is fixed for the duration of the trading period. The European Union’s greenhouse gas emissions trading scheme is done in this way, with the first trading period extending from 2005 to 2007, and the second period from 2008 to 2012. Each period is preceded by an allocation of entitlements. The US sulphur dioxide trading scheme is also done in this way, allocating entitlements for a period extending for as long as 30 years. Finally, the Kyoto Protocol’s emissions trading, as referred to in Article 17 of the Protocol, is based upon an initial allocation of entitlement to industrialised countries⁶ for the 5-year period 2008 to 2012.

⁶ These entitlements are determined for industrial countries listed in listed in Annex B to the Protocol on the basis of their emissions in a reference year, which in most cases is 1990.

The advantage with this way of doing it is that once the initial allocation of entitlements is over, it is simpler to administer. That in itself is a big advantage. However, another powerful argument in favour of this method is that it ensures with greater certainty a given environmental outcome. The environmental result is set at the outset, and the price of entitlements will adjust in order that this outcome is reached. The total quantity of entitlement to be issued is known at the outset, and the market can develop with greater certainty.

2.2 Baseline and credit

Another way of doing emissions trading is referred to as the “baseline and credit” approach. Participating sources are set a goal regarding what their emissions ought to be in a future period. When such a method is discussed, it is often in the expectation of rising future emissions levels, although this does not necessarily need to be the case. It is also important to emphasise that the baseline can be set a number of ways, and that establishing a baseline can be just as controversial as determining what quantity of entitlement to issue under a cap and trade programme. The pre-determined baseline, however, represents the level of commitment.

Under the baseline and credit approach, over-performance in relation to the baseline gives rise to credits, which can be issued and traded. As time progresses, actual performance either over-achieves or under-achieves in relation to the baseline, giving a corresponding obligation or opportunity to adjust entitlement by the buying and selling of credits. These credits can be transferred between and used by all the participating sources as entitlements that adjust individual targets, or “baselines”, at the moment of reconciliation.

Practical examples of limited baseline and credit trading regimes include the project mechanisms of the Kyoto Protocol that are known as “Joint Implementation”⁷ and the “Clean Development Mechanism”⁸. While the Kyoto Protocol’s project mechanisms pre-suppose baselines determined by project, any participant can use the credits that are generated for compliance with obligations under the Protocol. Given that the international emissions trading regime foreseen by Article 17 of the Protocol is a cap and trade scheme, this demonstrates that the baseline and credit method and cap and trade method of emissions trading are not incompatible. New Zealand is also developing a project baseline and credit system that it would like to link with other schemes, including the EU’s emissions trading scheme⁹.

Advocates of the baseline and credit approach often do so in the belief that it can more easily integrate targets that allow for a continued growth of emissions in absolute terms. Opponents of this method believe that it is more complex, and more bureaucratic to administer. The comparability of baselines is also an issue of concern to some, but in fairness, the same issue of comparability can arise with a cap and trade programme that allocates according to individual circumstances rather than by using a common method for all sources.

2.3 Ex-post verification

“*Ex-post* verification trading” is a variation of the baseline and credit approach. It allows trading only after the end of a given period and after the actual performance of the emitter has been reported, verified and compared to the pre-determined baseline. The trading of credits is permitted for a limited period only prior to the final moment of compliance, and it is at this stage that participants with a surplus of credits can sell to participants whose emissions have exceeded their entitlement. The trading still allows entitlements to be adjusted, but by the time the trading takes place, it is too late to change actual emissions.

⁷ See Article 6 of the Kyoto Protocol.

⁸ See Article 12 of the Kyoto Protocol.

⁹ Other than public statements to this effect made by New Zealand’s Environment Minister, talks with the European Union have not yet developed beyond exploratory contacts at a technical level.

This method was discussed in earnest during the negotiations on the implementing provisions of the Kyoto Protocol, as it was felt by some that the Kyoto Protocol's compliance provisions were not sufficiently robust. This method is considered to provide much greater certainty in terms of compliance, and thereby in reaching the commitment. The major disadvantage is that such a method seriously limits the extent of trading¹⁰, and by so doing, limits the flexibility that reduces the costs of achieving a predetermined environmental outcome.

The purpose of mentioning this method is to show how different the ways are of doing emissions trading. But there are other fundamental differences too that should be looked at briefly.

2.4 Type of target

A major component of any emissions trading scheme is the *type* of commitment that it sets. The simplest to understand, and the most common, are "absolute targets". Absolute targets are used in the context of "cap and trade" type schemes. These commitments are expressed as an aggregate number of tonnes of pollution that cannot be exceeded. Within this overall "cap", entitlements are distributed among the participants. However much trading subsequently follows, the amount of pollution permitted will never exceed the aggregate total authorised.

Another possibility are "relative", or output-based targets, that are also sometimes referred to as "specific" targets. These commitments are expressed as a given number of tonnes of pollution per unit of output produced. Such targets are usually envisaged in the context of baseline and credit trading schemes and they do not limit the amount of pollution in an absolute way, but rather limit emissions per unit of output. Output can be defined as tonnes of steel or cement, megawatt hours of electricity produced, and can be further refined by technology or type of primary fuel used.

Such commitments are intrinsically more complex, but are favoured by some because precisely because they do not fixed an absolute limit on the amount of pollution. The setting and monitoring of such commitments require two parameters, emissions and output, rather than just emissions. The decision how the output-based targets should look is in itself a sensitive decision, as depending on how commitments are fixed, the distributional impacts can be considerable. Whether to have targets that take into account the primary fuel used, or whether to consider steel or lime as a homogenous product or a collection of specific products are difficult choices.

So while the distribution of entitlements under an absolute target is difficult, it would be a mistake to think that the use of output based targets is any easier. On the contrary, the need to determine more parameters is a source of additional complexity. If production is higher than forecast, more emissions can also be allowed. While this may indeed seem appealing for businesses that fear a "cap on growth", there are disadvantages too. The environmental outcome is uncertain. In the case that production is lower than expected, then such commitments may actually be more constraining than an absolute target would have been and produce a better environmental outcome. However, as the total number of entitlements is uncertain – depending as it would upon levels of output – the market does not know until the end of the trading period exactly how much "supply" of entitlement there is, which is an extra uncertainty that may imply a loss of efficiency and liquidity. Finally, in some cases, the disclosure of production data can entail the sharing of commercially sensitive information, which can add a further complicating factor, even if this can be overcome.

¹⁰ Even in the case that forward trades are allowed.

It is possible to envisage even more sophisticated output based targets, where the higher the output, the more stringent becomes the commitment expressed in emissions per unit of output. Such a self-tightening cap may go some way to answering the concerns of environmentalists, but such targets would be significantly more complex, and the loss of transparency would undermine confidence in compliance.

Still on the subject of the type of target, distinction needs to be made between commitments set by law, commitments that come with advantages of some kind, such as tax rebates or subsidies, collective voluntary commitments and self-imposed individual voluntary commitments. Examples of each of these can be found within the European Union. The EU greenhouse emissions trading scheme is a mandatory scheme embodied in law. In the UK, the national greenhouse gas emissions trading scheme – that for the moment is *not* connected to the EU scheme – involves the granting of subsidies to participating entities that would be lost in the case of non-fulfilment of the commitments. The European Car Manufacturers Association has a collective voluntary commitment that comprises of ensuring that the average fuel efficiency of new cars sold into the European market perform to an emissions standard of 140 grams of CO₂ per kilometre driven by 2008¹¹. The Commission has not been notified¹² whether, within the context of this agreement, emissions-trading-like mechanisms are used to compensate manufacturers that over-achieve this target in relation to manufacturers that under-achieve. The fact is, however, that such compensation mechanisms would be compatible, and, as already referred to above, would discourage “free-riders” who shelter within a voluntary agreement but who individually contribute little or nothing to meeting the collective commitment.

Finally, the European Union has had examples of self-imposed individual agreements encompassing emissions trading. The two most notable examples were company-wide emissions trading schemes introduced by the major oil companies BP and Shell. Mention must also be made of a North American initiative organised by the Chicago Climate Exchange that is a voluntary programme where participants from a variety of sectors set themselves commitments, and subsequently trade entitlements with other participants. While a voluntary scheme will always operate differently from a mandatory scheme, it is worth emphasising that many of the lessons being learnt from both voluntary and mandatory schemes are reinforcing and surprisingly consistent. Such lessons include the fact that commitments are always limited to what is considered acceptable by the companies concerned and their political representatives, taking into account also other imperatives, such as the security of energy supply or employment. The theory of “low hanging fruit” being harvested when the attention of plant managers is focussed on emissions is also confirmed. In spite of the ambitious commitment undertaken by BP to reduce emissions in absolute terms by 10% between 1990 and 2010, the company achieved its target 8 years early and recovered *all the costs and more* of putting in place its own emissions trading scheme just because of the efficiency improvements that were secured as a result.

Further variations that should be mentioned include whether commitments take account of emissions only, of whether avoided emissions or sequestrations can be taken into account. The EU’s emissions trading scheme looks at “emissions”, these being defined as “the release of greenhouse gases into the atmosphere from sources in an installation”. No account is allowed to be taken for sequestration or avoidance, except insofar as such “carbon capture” is made within the boundaries of the installation, and the release into the atmosphere is avoided.

¹¹ Similar agreements have been agreed also with the Associations of Japanese and Korean car manufacturers respectively for new cars sold into the European market, with a target set for 2009

¹² No such notification is required.

2.5 Direct or indirect emissions

The other major decision to make at the outset of an emissions trading scheme is whether only the “direct” emissions of the participants are to be taken into account or whether “indirect” emissions should also be taken into account. The easiest way to understand what is meant by “direct” emissions is to consider them as the emissions coming out of a particular installation’s or country’s chimney stacks, whereas “indirect” emissions are the emissions adjusted to take into account emissions attributable to electricity consumed by an installation or country. By way of example, the UK’s national greenhouse gas emissions trading scheme takes an indirect emissions approach, whereas the EU’s greenhouse gas emissions trading scheme and the Kyoto Protocol both take a direct emissions approach. Under Kyoto, even if Denmark produces emissions by generating electricity that it then exported to its neighbouring countries, as often happens, no adjustment is made for the emissions of the exported electricity. The assumption is that the exported electricity will have to be a little more expensive in order to factor-in the additional costs implied by being accountable for emissions in Denmark.

The UK’s national scheme takes its different approach essentially because UK electricity generators are not covered by the domestic trading scheme. This choice was made for political reasons, in particular the wish to maintain an indigenous coal industry. There is no doubt, however, that an indirect emissions approach is considerably more burdensome due to the greater complexities of monitoring emissions. Indeed, in the context of an increasingly liberalised electricity market in Europe, the tracking of electricity’s originating country – so as to apply that country’s specific emissions factor – is unduly burdensome in a context of an European internal market that for 15 years or more has been striving for the removal of internal frontiers between the Member States, and the abolition of the notion of “imports” and “exports” between Member States of the Union.

The supporters of indirect emissions measurement believe that such an approach creates more incentive to improve energy efficiency at the point of energy consumption, which is indeed an admirable goal. There is also the fear that on-site Combined Heat and Power (CHP) units will no longer be built if the direct emissions from a particular installation rise as a result. As, generally speaking, Europe wants to see more good quality CHP, some fear that the direct emissions approach can act counter to such an objective. However, there are two basic responses that can be made to such criticism. First, as new capacity, new CHP may in practice be allocated free of charge from reserves put aside for new entrants. It is notable that all the EU Member States have chosen to have reserves for new entrants even though the EU Directive does not require this. Second, electricity generated from good-quality CHP should be cheaper than electricity generated from conventional fossil fuel power stations, assuming that the conventional generators will have to price electricity in accordance with the cost of emissions caused from the fuels used for generation.

The most powerful argument in favour of the direct emissions approach is its relative simplicity, and many feel that emissions trading is already complicated enough. If an indirect emissions approach was carried through to its logical conclusion, the transfer of many kinds of goods, from electricity, to steel, to concrete and glass, would give rise to adjustments in the emissions of the “exporting” and “importing” companies and countries. This would be excessively complicated, and, like “life-cycle” monitoring of emissions, will engender far too much bureaucracy and approximation.

3. The Kyoto Protocol

Many references have been made already to the Kyoto Protocol. Whatever its faults, or “flaws”, it remains a unique multilateral environmental agreement, with regard to its wide-ranging

relevance, its compliance provisions and in particular its flexibility (multiple gases, multi-annual targets, the netting of emissions with capture, the combination of different flexible mechanisms (emissions trading in various guises)). The former Executive Secretary of the United Nations Framework Climate Change Convention Secretariat, Ambassador Michael Zammit Cutajar has said: "The essence of the Kyoto Protocol – its genius – is that it encourages recourse to the market to achieve environmental objectives at least economic cost. ... It is not an exaggeration to brand the mechanisms of the Kyoto Protocol as « Made in the USA »".

One of the disappointments about the United States not having ratified the Kyoto Protocol is that they are not now showing the rest of the world how well emissions trading can be done. The US is still far ahead of any other nation or group of nations in using the instrument. The European Union has learnt a great deal about the instrument of emissions trading from the United States, and whenever in the future the US engages again in multilateral efforts to address climate change, flexible instruments like emissions trading will surely be at the very heart of the process. Meanwhile, the European Union, and other parts of the world will have gained invaluable expertise in the operation of such instruments.

There is in Europe still a misunderstanding about the costs of the greenhouse gas emissions trading scheme. There are costs, of course. If there were not there would be little incentive for any change in behaviour. However, some people fail to see that the cost of complying with Kyoto without the EU's emissions trading scheme at the level of individual companies would be higher – notwithstanding the ingenuity of the Protocol's use of market mechanisms and other flexibilities. There is a false belief that if a European steel producer, for example, were not covered by emissions trading the costs borne by the steel produced would be lower. This belief is mistaken. First, if emissions trading is not to be used in order to comply with Kyoto, then other more costly instruments may be applied to energy-intensive industry. If, however, for a moment we imagined that energy-intensive industry would not be subject to any alternative measures, then clearly that would mean that other sectors of the economy, such as households, transport, the tertiary sector and light industry would have to bear the brunt of fulfilling the Kyoto commitments. All available economic analysis suggests that the measures applied to these other sectors would be more costly than emissions trading in the energy-intensive industry sectors. More costly measures for these sectors means that the higher costs for them will feed their way through into higher costs for energy-intensive industry too. Higher costs for transport will impact on energy-intensive industry too, higher costs for households will feed through into higher wage demands, higher costs on the tertiary sector will raise prices and thereby inflation. Higher costs for the economy as a whole spell a less competitive economy, and energy-intensive industry is as much part of this European economy as any other sector. It makes no sense for Europe to comply with Kyoto without making use of the most cost-effective instruments at its disposal. This is why we will always come back to economic instruments, and, in particular, emissions trading.

The economic analysis carried out by the European Commission suggests that the cost of fulfilling our international commitments would be at least a third higher if every Member State had its own domestic emissions trading scheme but that such domestic schemes were not linked to each other. The fact that 25 countries are working together, and that allowances can be issued by one Member State and used for compliance in another, reduces the costs of complying with the Kyoto Protocol by 1.3 billion €¹³. If the more realistic assumption were made that every Member State would not have introduced a domestic emissions trading scheme of its own, the cost savings become significantly greater. It is notable, also, that the schemes of the two EU Member States that did have pre-existing domestic emissions trading schemes, the UK and Denmark, developed such different schemes that the two could not feasibly be linked.

¹³ This figure rests on several assumptions that are explained more fully in the impact assessment form attached to the Commission's proposal COM (2001)581 final of 23.10.2001 for the emissions trading scheme. Among these assumptions is that of there being 15 Member States, whereas the number has since increased to 25.

4. The European Union's scheme: the EU as pioneer

Recital 5 of the preamble to the European Union's emissions trading Directive reads: "This Directive aims to contribute to fulfilling the commitments of the European Community and its Member States more effectively, through an efficient European market in greenhouse gas emission allowances, and with the least possible diminution of economic development and employment"¹⁴. The EU understood the good sense of doing emissions trading together. For such a diverse range of countries, with a multitude of industries and energy mixes, and a so-called "internal market", a common instrument that was flexible enough to suit the specific circumstances of each Member State and yet which could attain economies of scale was in the interest of all. It is a remarkable fact that, although the Directive only needed a qualified majority of Member States to vote in favour for it to become law, it secured the unanimous agreement of all the Member States¹⁵ and a resounding endorsement of the directly elected European Parliament¹⁶.

The EU's greenhouse gas emissions trading scheme has been in operation since 1 January 2005. It covers approximately 12 000 installations across the 25 Member States of the European Union, and the installations emit approximately a third of the EU's emissions of greenhouse gases, and approximately 45% of Union's emissions of carbon dioxide. The scheme is built around trading periods. The first trading period goes from 2005 until 2007, and from then on there are 5-year periods from 2008 to 2012, from 2013 to 2018, and so on. Each period is preceded by an entitlement allocation round. In effect, it is these allocations that determine the level of commitment that the Member States wish to see achieved. For the moment, the reference is the levels of commitment that Member States have assumed under the Kyoto Protocol. In the future, the levels of commitment will reflect the degree of ambition that Member States choose to assume in the context of the next steps beyond the commitment period of the Kyoto Protocol.

In addressing the largest emitters, the scheme focuses on energy-intensive industry. The sectors covered are the power generation sector, which alone represents four-fifths of the covered emissions, mineral oil refineries, steel, building materials such as cement, lime, glass, ceramics, and finally the pulp and paper sector. While the direct emissions of the chemical sector are not covered at this stage, the energy units of chemical plants are covered as power-generation units (whether supplying electricity, heat or steam). In the first 3-year period, which is sometimes described as the "learning-by-doing phase", only carbon dioxide emissions are covered, but from 2008, Member States are allowed to extend the scheme to other greenhouse gases and other activities than those covered initially. As of the start of the scheme, most CDM credits that are issued within the context of the Kyoto Protocol can be used, irrespective of the greenhouse gas being addressed. The notable exclusions are CDM credits from nuclear and "sinks" projects. For the first time under EU law, there is a harmonised penalty rate (applied per tonne emitted in the absence of a corresponding entitlement) of € 40 in the first period and € 100 a tonne from 2008.

The Member States have to decide how much to allocate to installations on their territory. In doing this, they are required to follow criteria laid down in the European Directive, and the European Commission has to either approve these plans or require that amendments are made prior to the Member States being able to proceed. So far, the national allocation plans of 23 out of the 25 Member States have been approved, that – after adjustment in some cases at the

¹⁴ Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowances trading within the Community and amending Council Directive 96/61/EC (O.J. L 275 of 25.10.2003, pages 32-46).

¹⁵ At the time of adoption, on 13 October 2003, the EU comprised of 15 Member States.

¹⁶ Only 4 votes were cast against the scheme in the Directive's second (and final) reading in the European Parliament on 2 July 2003.

insistence of the European Commission – foresee the issuance of 5.65 billion tonnes of entitlement from January 2005 until December 2007. At present, each allowances, or entitlement to emit a tonne of CO₂, is being traded in the market at approximately 16 € each. Just to multiply the number of tonnes so far approved by the market price suggests that the value of this market will be in excess of € 90 billion, which is a huge market to have been created in such a timescale¹⁷.

The last piece of the EU's emissions trading jigsaw to fall into place is the building of the registries by Member States¹⁸. Registries are electronic accounts in which the allowances, or entitlements, are held. When there is trading, there will be a corresponding transfer of allowances from one account to another, which represents the transfer of entitlement. The registries are no more than a sophisticated tracking tool, and they do not provide settlement facilities, there is no price disclosure required, and nor does the registry in any way organise the market. Market organisation is a matter than is left to the private sector to work out. All the evidence suggests that this is being done very effectively, and that there are competing exchanges and market-intermediaries offering their services. The level of trading at the moment is in the region of 3 to 4 million tonnes of entitlement per week, but this figure is still growing exponentially, and is expected to continue doing so for many months.

5. Relevant issues for the forestry products industry

The purpose of this paper is not to go into the implications of emissions trading for the forestry products industry in Europe. Suffice it to flag a few of the key issues that are of relevance. Most obviously the Directive specifically covers the pulp, paper and board sector. The power generation activities of pulp and paper manufactures will in all likelihood be covered – as it is assumed that many of these power units will exceed the size threshold set down by the Directive. However, much of the power generated by such power unit comes from biomass, which is treated as having zero emissions by the Directive. This is important both in terms of the actual emissions that the pulp and paper industry has to account for, but also because there may be increased demand for biomass, and the paper industry is the owner of considerable forest assets in Europe as elsewhere.

There are also indirect effects of the EU's emissions trading scheme for the forestry products industry, in particular the impact of the scheme on electricity prices. This has been, and remains, a major concern of large consumers of electricity in Europe. There has been extensive debate about the « windfall » profits accruing to the power sector. Some of this debate is linked more with the functioning of electricity markets, where it is the marginal cost of producing the last MWh that sets the market price. Such concerns have been rather over-played in recent months. Electricity prices are still being driven much more by the costs of primary energy, such as natural gas and coal prices, and by weather, than by the scarcity of entitlements to emit carbon dioxide. If there were such big profits accruing the power generators, it would be better for companies consuming electricity to own their own generation assets, so as to avoid price rises and share these profits. In the medium term, higher profits will attract new investment, and unsustainable profits will be squeezed down.

The European Commission is having a study carried out by McKinsey & Co on the impacts on competitiveness of the EU emissions trading scheme. The preliminary conclusions are that the impact on the pulp and paper industry will be modest, and unlikely to have a significant impact

¹⁷ The total amount approved for issuance will further increase when the Commission completes its assessment of the national allocation plans of Italy and Greece, and the market price is obviously expected to vary.

¹⁸ At the time of writing, 7 May 2005, 5 Member States have registries that are fully up and running. Several other Member States are in the process of the final testing of their registries.

on the competitiveness of the European pulp and paper industry. However, the consultants will disclose more details in June, and industry will be invited to respond to these hypotheses.

It is understandable that, with its considerable forestry assets, the forestry products industry would wish to see credit being allowed under the EU emissions trading scheme for carbon sequestered. As mentioned above, the European legislation specifically excludes the use of CDM credits from “sinks” projects by companies covered by the scheme¹⁹. However, the Member State governments themselves, as Parties to the Kyoto Protocol, may use sinks credits to comply with their commitments under the Kyoto Protocol in accordance with the Protocol’s implementing rules. It would not be true to say, therefore, that Europeans will not be buyers of “sinks” credits. The reason why CDM credits from sinks projects have not been admitted into the EU’s trading scheme is basically due to concerns about the permanence of carbon sequestered by forests. Everyone can understand that a tree represents a depository of carbon during its life, but that trees do not last forever. Trees are also sometimes blown or burnt down, in which case the carbon is no longer captured. There are methodological challenges too, in monitoring the amount of carbon sequestered. However, there is also in Europe a fear in some quarters that CDM should not encourage monocultures of alien tree species, which are not as good as indigenous tree varieties in preserving biodiversity and local eco-systems. A careful reading of the European legislation reveals traces of each of these concerns.

Rome was not built in a day. Before anyone needs to buy carbon credits, there must be an obligation somewhere that can be honoured by such credits. The EU’s emissions trading scheme is a novel instrument in Europe. Having it at all represents a considerable achievement. It sets the scene by creating new obligations upon energy-intensive industry in Europe. We are embarking on an era where carbon emissions carry a cost, where emissions reductions have a value. It would appear to be only a matter of time before carbon sequestered has a value that is linked to the obligations that have been created by the scheme. Consider what we have now as a first step. There will be subsequent steps. There is already increasing talk about carbon sequestration. You, the owners of forestry assets, can be confident that it is not going to be very many years before well-managed forests that you own will produce a further revenue stream from the carbon sequestered²⁰. Unquestionably, the entry into force of the Kyoto Protocol in February this year represents the beginning of this process. Furthermore, forestry credits are gaining ground anyway, with credits having been sold in conjunction with some makes of new car in Belgium, or voluntary commitments already recognising such value.

6. Future issues

Emissions trading as an instrument does not of itself reduce emissions. Emissions trading is a tool that, by allowing greater flexibility to participants in a commitment, allows for lower costs. What results in environmental improvement is the stringency of the commitments that are incorporated into a scheme. These commitments will logically reflect the level of ambition of companies or Governments. Given that, in Europe at least, there is an acceptance that climate change targets will have to be more ambitious over time, then it is logical to expect the stringency of the commitments under the EU’s emissions trading scheme to increase overtime. A company that relies only upon the current market price for carbon when considering the economic viability of a new investment that would last 20 or 30 years would be very unwise. Companies should already see that carbon constraint is here to stay, and is likely to increase in the future.

¹⁹ Article 11a (3)(b) as amended by Directive 2004/101/EC (O.J. L 338 of 13.11.2004, pages 18-23).

²⁰ Even if you will also need insurance to cover carbon liabilities in the case of forest fires, for example.

The process of designing the future begins now. There will be a review of the operation of the EU's greenhouse gas emissions trading scheme completed in 2006. This review will be informed by stakeholders and specialised consultants. The review will set the scene for the future amendment of the scheme, and no one has ever dared claim that it cannot be significantly improved. The acceptance of CDM credits from sinks projects is just one of the many items that the review is specifically mandated to look at²¹. The review process is one to watch, and to be involved in, because it is about shaping the instrument for the future – with all the points of relevance there are for the forestry products industry.

7. Conclusion

Emissions trading is a remarkable instrument that is now being used to address climate change. Emissions trading is an instrument that has been successfully applied to environmental protection and fisheries management in several parts of the world, but in particular by the United States. The European Union is now embracing this instrument wholeheartedly, and has done so in particular by putting in place a permanent scheme relating to emissions of greenhouse gases that will continue beyond the end of the Kyoto Protocol's first commitment period in 2012. It is an open scheme that can develop linkages with other schemes elsewhere in the world. It is, therefore, both an instrument of the present and an instrument of the future. As the stringency of environmental commitments increase, it makes ever more sense to use the instrument of emissions trading to reduce the costs of meeting those commitments.

It will have to become an article of faith for businesses in free market economies to know their emissions and the costs of reducing these emissions. There will be a comparative advantage for businesses that emit less than their competitors. The use of low-emissions technologies will be encouraged. Businesses that are proactive will have an advantage over those who reluctantly follow. Investment strategies will be developed in conjunction with carbon strategies.

The world is changing, and we must change with it.

²¹Article 30(2)(o) of Directive 2003/87/EC as amended by Directive 2004/101/EC.

ITEM 7 – Future Fibre Supply

Global Wood Supply Analysis

Sten Nilsson²² and Gary Bull²³

Background

From the mid 1990s to the end of 1990s around 15 global wood supply studies were carried out by international organizations, academia and consultant companies (Bazett, 2000; Bull *et al.*, 1998). The studies used different methodologies but all heavily relied on FAO data. Among the studies, the following can be mentioned, e.g., Simons (1994), Apsey and Reed (1995), Jaakko Pöyry (1995), Sedjo and Lyon (1995), Brooks *et al.* (1996), Nilsson (1996), Zhang and Buongiorno (1996), FAO (1997), Bull *et al.* (1998), and WRI (1999).

The conventional wisdom resulting from most of these studies is that the global timber harvest has increased over time and will continue to increase in the future, albeit at a lower rate. Most studies concluded that the supply of industrial roundwood will be sufficient up to 2050. Plantations were seen as a secure source of supply for industrial needs.

Some predicted that by 2030, the plantations would be responsible for approximately 45% of the global industrial supply (Whiteman and Brown, 1999). Another assessment concluded that the consumption of fuelwood and charcoal per capita has peaked and that most of the developing countries would change from fuelwood and charcoal to commercial energy—mainly fossil fuel (Arnold *et al.*, 2003). Combining these findings meant that there would be no major competition between industrial roundwood and fuelwood uses. However, in contrast to the conventional wisdom, two of the studies flagged different possible futures. Nilsson (1996) argued that if all of the demands on the services of the forest ecosystems are going to be fulfilled, this will result in substantial competition on the forest resources and may lead to a future deficit of industrial roundwood. The WRI (1999) study stressed that a tight supply/demand balance for coniferous roundwood is foreseen in a number of key regions in the world already around 2010.

Overall, most studies were concluding that there was no industrial roundwood supply problem given the increase in plantation area and the slackening of demand by fuelwood users. As a result, most studies concluded that there was no forecasted real price increase for forest fibers.

Changed Conditions

Nearly 10 years have passed since many of the studies were carried out and some fundamental market and non-market conditions have changed. Among these changed conditions are: booming consumption in emerging economies; increased illegal logging; over harvesting of existing forest capital in important supply countries; over enthusiasm for plantation supply; a downward trend in available supply (in some regions referred to as the annual allowable cut (AAC) or the imposition of a logging ban) in important supply regions; changing demands on

²² Deputy Director and Forestry Program Leader, IIASA, Laxenburg, Austria

²³ Faculty of Forestry, University of British Columbia, Vancouver, Canada

the forest where environmental concerns are a significant factor in many wood supply regions; increasing fuelwood consumption in many developing countries; increasing competition for wood fibers between the energy industry and the traditional forest industry; increasing rate of natural disturbances that is reducing the forest capital; rapid technological and biotechnological developments; increased use of recovered paper; improved policies; increased substitution; more efficient industrial processes; etc. Shifts in the number and composition of populations, migration to cities, greater mobility, increased communication and trade, higher consumption and expectations, changes in climate, new technologies, different energy conditions, etc., will create a global landscape that will be much different from today (Poore, 2003). These changed conditions are affecting future wood supply possibilities substantially and these changed conditions will be discussed in some more detail in the following paragraphs.

The objective of this paper is not to carry out any wood supply/demand analysis but rather to flag the changed conditions in the supply/demand equation as a platform for a discussion about the possible need for a revised wood supply/demand analysis.

Booming Consumption in Emerging Economies

The rapid rise in consumption in countries such as China is dramatic and India may well be set to follow. Smaller countries, such as Vietnam, see the manufacturing of wood products as vital to their economic development strategy and wood consumption is also rising dramatically.

China's forest market has become one of the largest in the world in terms of production, consumption and imports of wood products. The total consumption of industrial roundwood in China is currently around 270 million m³ (Bull and Nilsson, 2004). During the last five years the import of logs has increased from 5 million to 25 million m³. The total import of forest products, expressed in roundwood equivalents (RWE), has skyrocketed from 40 million m³ in 1997 to 120 million m³ in 2004 (Sun *et al.*, 2004). Chunquan *et al.* (2004) predicted that the RWE deficit in 2010 could be 125 million m³. Since China should be able to sustain an annual economic growth of 7–8 percent for at least another decade (Economist, 2004), the consumption of forest products is bound to increase in the future. We also know that China is already over harvesting substantially—currently some 120 million m³/year (Bull and Nilsson, 2004)—we can conclude that China will be strongly dependent on imports.

Around 2020, the Indian population will be about 1.25 billion people, of which nearly 70% will be in the age range of 16–65 years—this means the world's largest working and consuming population. The outlook on economic growth is in the range of 6.5–7%/year. Combining these forecasts with the predicted continued rise in income per person in India and the growth of the middle class, we expect to see significant increases in global consumption. Looking 15–20 years ahead, India will probably overtake China in growth status because its population is younger and is growing faster, so its work force will continue to expand when China's ageing population will start to slow down (Economist, 2004).

Muthoo (2004) estimated that the total industrial log consumption is currently 50 million m³ and could grow to 90–120 million m³ in 2020. Given the available information on the domestic wood supply, which is admittedly very uncertain, there could be a deficit of 20–70 million m³ by 2020. In Latin America, the earlier region of concern for economic sustainability, there is currently a stable phase of economic growth. The near-term outlook on economic growth is 4–5% for the region. The driving force for economic growth is the demand on raw material and increasing domestic consumption. Contrary to earlier, the inflation is low and the trade balance for the region is positive. Brazil, together with China and India, is among the fastest growing emerging economies. Foreign industrial investments are growing substantially. Goldman Sachs (2005) assesses that Brazil may have a larger economic growth status than Germany in 25–30 years.

The consumption of industrial roundwood in the region of Latin America was about 120 million m³ in 1990 and is predicted to increase to 200 million m³ in 2020. But with the current economic conditions in the region and a maintained and sustainable growth over time, this is probably an under estimate. The production of industrial roundwood was similarly assessed to be around 220 million m³ in 2020.

The difficulty with analysis of the emerging economies is the lack of transparent information and a lot of contradictory information at hand.

Increased Illegal Logging

With booming consumption in emerging economies, we can also see an increase of illegal logging in important supply regions. The World Bank (2002) assess that global illegal logging robs producer countries of at least 15 billion US\$ per year. Sheingauz (2004) assesses illegal logging in the Russian Far East and Southeastern Siberia to be 35–40% of all logging. Although illegal logging in Russia is mainly linked to domestic economic, institutional and social ills, Sheingauz (2004) concludes that areas with larger export have a high extent of illegal logging.

For the Russian Federation as a whole, the illegal logging is assessed to be between 20–36% (Greenpeace, 2000; Brukhanov et al., 2003; Lopina et al., 2003). In many of the former Eastern European countries the illegal logging is assessed to be 10–20% (Ivanov, 2004; WWF Latvia, 2003; WWF, 2004). Ottitsch et al. (2005) conclude that illegal logging is an issue of concern in the Baltics, Balkans, Russia and in Central Eastern European countries.

Currey et al. (2001) state that illegal logging is common in all tropical timber producing countries and that 70% of the log production in Indonesia is illegal (50 million m³), 80% in the Brazilian Amazonas and 50% of the harvest in Cameroon are illegally logged. Contreras-Hermosilla (2002) states that 15% of global timber trade is connected with illegalities. A study commissioned by AFPA (2004) suggests that illegal forest activities represent between 5–10% of the global industrial roundwood production. EIA (2005) assess that China's import of forest products, stemming from illegally logged timber and expressed in RWE, was over 18 million m³ in 2004. Bull and Nilsson (2004) estimate that nearly two-thirds of the reported industrial wood supply harvested in China is illegal. Brack (2005) points out that illegal logging distorts global markets, undermines incentives for sustainable forest management and reduces the long-term sustainable wood supply. The scale and speed of the illegal logging seem to be crucial with respect to the impacts on the wood supply in short and medium terms. Illegal logging has contributed to leave tropical forests in a state where useful commercial operations are just not economical in the short and medium term (Poore, 2003).

Over Harvesting

There is a substantial over harvesting of forest (natural) capital taking place in some supply regions. Bull and Nilsson (2004), for example, illustrate that a serious over harvesting is taking place in China. Serious over harvesting has taken place and continues to take place in countries like Cambodia, PNG, Indonesia, Laos, Myanmar and in several countries in tropical Africa (Pulkki, 1997; Bull *et al.*, 1998). As illustrated by Pulkki (1997) this will seriously hamper the future sustainable supply of industrial roundwood in these countries. Wardle *et al.* (2003) point out that the degradation and deforestation of the forests in the South seems to be difficult to stop. Poore (2003) points out that nearly all of expected population growth will take place in tropical areas and this will inevitably lead to the transformation of forests. He also points out that many kinds of sustainable forest management have been shown to be technically possible in the tropics but has rarely been implemented due to the fact that it is rarely profitable to do so. Arrow *et al.* (2004) find that several nations of the globe have been failing in meeting a

sustainable criterion and that their investments are not sufficient to offset the depletion of the natural capital.

Environmental Constraints

The implementation of new policies with respect to the protection of environmental services is bringing significant constraints on the supply situation. For example, during a 10-year period the Russian AAC has been reduced by some 100 million m³ mainly due to environmental constraints.

Nabuurs *et al.* (2003a) have made a wide literature review showing a Europe-wide change in forest management regimes towards nature-oriented management. This new management includes a variety of regimes generally aiming at enhanced nature conservation values and differs from traditional economic optimization in forest management and is less directed towards wood production. The authors (Nabuurs *et al.*, 2003a) claim that this is a long-term trend and have summarized the changed management regimes in terms as longer rotation periods, species change towards more natural/indigenous species, and set aside more forests. They also claim that this trend is promoted in international policies like the Ministerial Conference on Protection of Forests in Europe and by forest owners. This conclusion is supported by Rametsteiner and Kraxner (2003), who investigated the European's attitudes to forest management. They conclude that the European public disapproves of forest management concepts that disregard natural dynamics and regard forests just as production units for raw material. This trend is expected to continue and will affect the future wood supply in the region.

Poore (2003) pointed out that the overall trend in forestry of the South is an increased polarization of land-use towards intensive agriculture and plantation forests on the one hand and protection on the other hand.

The UNECE (2005) has recently tried to assess what this would mean for wood supply in Europe in the future. The baseline scenario for 2020 is assessing a sustainable wood supply of 430 million m³/year at an annual increment of some 700 million m³/year but, taking into account the increased conservation demands, the supply would be only 380 million m³. Thus, there is a difference of some 10–15%.

In many regions of Canada the managing for biodiversity, aesthetics, First Nations Cultural issues, and soil and water conservation could reduce the harvest in several areas by as much as 50%. In many tropical forest countries, the adoption of reduced impact logging will reduce the harvest levels in the first cutting cycle (Pulkki, 1997).

If the climate change issue requires the consideration of carbon management in the forests, there will also be a further constrained future on wood supply. Boettcher (2005) and Bull *et al.* (2004) have demonstrated that a conservation management regime creates the largest short-term carbon sink and highest carbon stocks in forests. It is also a generally held view that there will be additional other environmental constraints in the future on the traditional wood supply.

Changed Harvesting Behavior by Forest Owners

Trömborg and Solberg (1998) show that there is a huge variation of opinions between the European forest owners and that they have very different goals with respect to the management of forests. Other studies show that the general tendency for non-industrial private forest owners and state owners in Europe is that they have become less price-elastic (Lönnstedt, 1989; Bolkesjø and Baardsen, 2002). The changed values and preferences of forest owners in Europe affect the forest management decisions, harvesting and investment behavior and hence determine the long-term supply responses (Nabuurs *et al.*, 2003b). To reflect this development,

Nabuurs *et al.* (2003a) have in their wood supply analysis for Europe extended the rotation periods for certain owner categories. The changed behavior by owners to a more conservative forest management is expected to follow in other parts of the world. In many important supply countries the assessed future increased supply is assumed to come from non-industrial private forest owners, e.g., USA (Haynes, 2003).

Revised AAC Possibilities

Illegal logging, over harvest, environmental constraints and connected restrictive policies are all leading to reduced AAC possibilities. In North America, we have seen a reduction of the AAC in the British Columbia (BC) Coast and there is clearly going to be downward revisions in the BC Interior AAC after harvesting the beetle kill wood. Quebec has also just reduced its AAC by 20% and Ontario is currently analyzing the wood supply situation.

It should also be noted that the AAC in virtually all countries where it is used, is a biophysical calculation and does not represent the economic wood supply to the industry. For example, in Russia they have currently set the AAC at approximately 510 million m³/year but the long-term economic harvesting level seems to be around 250 million m³/year (Nilsson, 2004a).

Many of the most recent supply analysis just make a comparison with the AAC or the annual growth and the actual harvest and conclude that there is lots of room for expanded harvest (e.g., Häggblom, 2004; Roberts *et al.*, 2005). However, a temporary short-term overcut of the AAC in a country will probably not have any impacts on the long-term sustainable wood supply.

Natural Disturbances

The natural disturbances of the forest resources have increased significantly during the last 5–10 years. In the boreal zone, this seems to be linked to a warmer and drier climate in combination with human activities. For example, the forest fires in Russia during 1970–1985 were on average 3–4 million ha/year, but for 1997–2003 the average was 9–10 million ha/year. The outbreaks of insects in Russia show a similar development with affected areas of about 12 million ha/year during the most recent years (Shvidenko *et al.*, 2005). Similar developments of insect outbreaks have been observed in Canada. The foreseen long-term climate change impact is assumed to increase the numbers and intensities of storms, hurricanes, droughts, etc. All of this will affect the capital of forest resources in a negative direction. Recent reports (e.g., Stokstad, 2005) hint that severe droughts will cause a grim future for the rain forests. At a global scale, WRI (1999) predicted for 2030 that the area of productive, closed, non-reserved forest is expected, for different reasons, to decline in the world by at most 325 million ha or about 11% of the industrial wood supply forests.

Fuelwood and Charcoal

Currently, the world uses about 1.8 billion m³ of fuelwood and charcoal (FAO, 2005) and, as stated earlier, the common view (FAO, 2001a) is that the developing regions have industrialized, resulting in people switching from fuelwood and charcoal to fossil fuels. But FAO (2005) also assess that the used wood fuel in 1997 was 53% of the total roundwood production and points out that the most important source of energy for more than two billion people is wood fuel and that wood energy is also likely to gain in use in developed countries during the next 20 years. Arnold *et al.* (2003) conclude that the overall fuelwood demand will probably decrease in the future. The same authors claim that the existing fuelwood gap has not become a factor for deforestation and is not threatening the industrial wood supply due to the fact that part of the fuelwood consumption is stemming from coppicing shrubs and branches and not from whole trees.

With respect to charcoal, the situation is somewhat different. The consumption of charcoal has doubled from 1975 to 2000 and is expected to continue to grow (Girard, 2002). Charcoal consumption is causing increased pressure on wood supply because it is produced from solid wood.

It should be pointed out that FAO (Whiteman et al., 2004) has recently revised its consumption figures for fuelwood and charcoal substantially upwards. The earlier statistics were regarded as weak and were supplemented with new data and model analysis.

However, the above information is contrasted by other statistics. In India (ITTO, 2003), the current fuelwood consumption of some 280 million m³ is estimated to be 400 million m³ in 2020. Muthoo (2004) points out that the predominant use of the roundwood harvested in India is for wood fuel use. The current fuelwood consumption in Africa of some 600 million m³ is assessed to be 820 million m³ in 2020. The current fuelwood consumption in Latin America of some 250 million m³ is assessed to be 320 million m³ in 2020. Wardle et al. (2003) conclude that 66% of the roundwood consumption in Latin America is wood fuel and there is no sign of a rapid substitution of wood fuel by other sorts of energy. Fuelwood accounts for about 50% of the total fuel consumption in rural India (Pandey, 2002). The fuelwood consumption varies with relative availability and is high in forested areas. In urban areas during the last 20 years, there has been a substantial switch in the energy consumption. The use of so-called traditional fuels has halved in relative terms and been replaced by commercial energy sources.

Leiwen and O'Neill (2003) concluded that 70–75% of the rural households in China rely on biomass for energy use and that the consumption of biomass for energy will continue to grow. The future consumption of charcoal shows an even stronger increase than fuelwood consumption, since charcoal consumption seems to increase with increased urbanization (Whiteman et al., 2004).

Pandey (2002) has done detailed studies on fuelwood consumption in India, admittedly based on weak statistics. He concluded that the fuel consumption pattern has not changed much during 20 years in the rural areas with biomass and dung still accounting for about 90% of the energy consumption. The most plausible explanation of the contrasting views on fuelwood use is that due to the high prices for commercial energy there is less transition to commercial energy sources. Leiwen and O'Neill (2003) conclude that incomes have to rise substantially in order to see a reduction in biomass use for energy. For India, Pandey (2002) concludes that about 55% of India's households belong to the low income group and cannot spend much money on energy. If the price of commercial energy is high the consumer will keep using traditional fuels and given the expected increase in real prices for commercial energy (IEA, 2004), there is no reason to expect any dramatic energy switch in rural developing countries.

Given the expected relative future high prices on commercial energy there seems to be a reason to revisit the issue of competition between fuelwood and industrial wood in the mid-term.

Commercial Wood for Energy

The IEA (2004) suggests a rapid growth in energy demand from 2000 to 2020. The world's energy use will increase by nearly 60% to 14.4 billion TOE in 2020. Oil will remain the single largest fuel in the global primary energy mix. Fossil fuels will constitute some 85% of the increased demand. The IEA (2004) is of the opinion that the world's energy resources are adequate to meet the energy demand in 2020—natural gas and coal will be abundant, the physical potential for renewable energy will be very large and there is no lack of uranium. But, oil resources need to be made accessible in order to meet the increased oil demand. About US\$ 3 trillion will be needed to be invested in the oil sector up to 2020. First, it will be a challenge to find the financial resources for these investments. Second, needed investments of this

magnitude will have a strong impact on the price mechanism of energy. However, there is a core of informed analysts challenging IEA's view on a stable future energy balance. These analysts (e.g., ASPO, 2004) assess an irreversible decline in oil production by around 2010. If the latter are right, the development of renewable solutions will be requested. However, whichever of the two scenarios will be materialized the effect will be the same—substantially increased energy prices. This is of concern for the traditional forest industry—there will be strong competition between the energy sector and the traditional forest industry with respect to the raw material.

A study by Nabuurs et al. (2003a), commissioned by CEPI, addresses the conflict between energy policies under discussion in Europe and the traditional forest industry. The study identifies a shortfall of wood raw material for the traditional forest industry of some 50 million m³/year in 2020 due to more nature oriented forest management, changed ownership behavior with respect to harvesting regimes and mainly due to increased demand on wood for energy with current EU policy. Another study trying to assess the impacts of the EU policy that renewable energies should reach 12% of the total energy consumption by 2010 is carried out by CEI-Bois et al. (2000). This study concludes that to reach this goal the contribution of wood and wood residues would be equivalent to 163 million m³ of wood, which would have a serious impact on the supply of wood to the forest industry. A sharp penciled economic analysis, although theoretical, by Lundmark (2003) with respect to the allocation of wood to the energy sector versus the traditional forest industry shows that, based on the economic conditions in 2002, about 10 million m³ of the yearly pulp log harvest in Sweden should be allocated to the energy sector. If the energy prices increase by 25% compared to the price level in 2002 the volume will increase to 16 million m³.

The climate change issue may also drive to a changed allocation of wood raw material between the energy and forest industry sectors. Some people see bioenergy as the only realistic way to tackle the climate issue in the short/medium term, e.g., the Head of UNEP, Klaus Töpfer (Die Presse, 2005). If this will be materialized it may not only influence the price of wood for energy but also lead to a priori policy-settings with respect to the allocation of wood fibers.

With increased real energy prices the competition between these two sectors with respect to raw material will increase substantially.

Plantations

The conventional wisdom is, as stated above, that the plantations will play a more important role in the global wood supply in the future. The forest plantations reported in 2000 is 187 million ha, although all of these plantations are not directed towards the production of industrial roundwood. According to FAO (2001b) the plantations were only about 5% of the global forest cover but they provided some 35% of the global roundwood in 2000. This latter number is assessed to reach some 45% by 2020 (FAO, 2001b) or by 2030 (WRI, 1999). It is also assumed that the plantation growth rates and qualities are going to improve by each rotation due to improved biotechnology and management. With this development there will be a substantial transition of the center of gravity of the industrial wood production from the North to the South.

But there is also another side of the coin. Enters and Durst (2004) have analyzed the forest plantation development in the Asia-Pacific region. For Australia, the annual planting rate has decreased from about 137500 ha per year in 2000 to 42300 ha in 2003. In Australia, there is now a major concern with respect to the water issue and this has put a cap on the 2020 plantation vision (Australian Senate, 2004). For China, recent statistics show that the plantation rate has picked up pace. The latest forest inventory (released in January 2005) reports 53 million ha of plantations, but the fast growing plantations are only reported to be 3.7 million ha.

This is a reduction of earlier reported inventory numbers for the fast growing plantations, which were 6.5–8 million ha (Nilsson, 2005).

Enters and Durst (2004) report that the annual planting rate has dropped slightly in India since the 1990s; in Indonesia the planting rate has dropped from 230000 ha in 1997 to the current 78000 ha; in New Zealand plantings peaked in 1995 when nearly 100000 ha were planted and is now 14900 ha; in the Philippines most of the plantations were planted in 1980s and early 1990s and there has hardly been any planting since 1997; in Sabah the plantations averaged 10000 ha/year in the 1990s and is currently about 2000; in Thailand there was a short-lived plantation period between 1986 and 1997, which has now faded away.

WRI (2003) has studied the development of softwood plantations in Chile and Brazil. It is concluded that the majority of pine plantations were established during 1974–1994, when the government offered fiscal incentives. The annual rate of plantations was 66000 ha/year during 1978–1988 and has declined to less than 19000 ha during the last 10 year period. The majority of the pine plantations in Brazil were planted between 1966 and 1986 when the government had a tax incentive program.

One can also conclude that the productivity of the plantations in many cases are not in line with what is expected. Bull and Nilsson (2004) illustrate this with respect to China, where the official estimates for the fast growing plantations is 8–18 m³/ha/year (depending on species and sites) but the real average productivity is reported to be 3–3.5 m³/ha/year for the fast growing plantations.

In a similar way, the quality of the wood produced in the plantations is not as expected. This can be illustrated by a current industrial case for India. A company was offered access to substantial plantations of eucalyptus but found after investigations that only 3–5 m³/ha could be used for industrial purposes. Similar evidence is reported for China where significant areas of plantations are of low quality (Bull and Nilsson, 2004).

In addition to environmental, productivity and quality issues there are other challenges ahead for the forest plantation industry. The establishment of plantations has taken substantial subsidies as illustrated above, in one form or another and the question is whether these subsidies will continue and whether plantations will be established to a larger extent without any subsidies (Bull et al., 2005). In addition, serious land-use conflicts are foreseen by a substantially increased global plantation program (Anon, 2003; Poore, 2003) and that stimulated rates of plantations have sometimes led to inappropriate land-use (Cossalter and Pye-Smith, 2003).

Even if these negative trends could be dismissed, the FAO (2001c) concludes that the present plantation development is not sufficient to offset growing consumption, deforestation and declining harvest from natural forests.

But it is not all doom and gloom. There are a number of very significant success stories with respect to plantations, which have been developed using required expertise, good science, efficient management and hard work. Häggblom (2004) assesses that 88 million ha of successful fast growing plantations of Brazilian type (mean annual increment 20–25 m³/ha/year) would take care of the total supply for the global consumption of industrial hard wood in 2015.

Supply-Side Benefits

The above discussed changed conditions may be seen by some as alarmist views. There are of course also a number of developments, which may influence the future supply in a positive direction. One of the most dramatic possible changes is the rapid development of

biotechnology. Bio-engineered forests may offer many opportunities for forestry. It will probably result in increased forest productivity, lower production costs, improved wood characteristics, higher yield in the industrial process, etc. All of this will affect the supply side in a positive direction. But the ecological risks with bioengineered forests are complex. The addition of genes from distant species and alternatives to native or homologous genes, respectively, produce novel properties that can have significant social or ecological consequences (Strauss and Bradshaw, 2004).

Over time there will be investments in and learning effects, as discussed above, in all steps of the management of plantations. This will result in higher productivity, better quality and lower costs that will positively contribute to the future wood supply situation.

There is also a large potential in increased specialized forest management in general for increased future supply.

The forest sectors of the world can develop substantially by sufficient investments, implementation of efficient policies and establishment of adequate institutions in a broad sense (Nilsson, 2004c). Auty (2003) points out that the policies required for sustainable economic development are known but difficulties surround their implementation. This deficit causes over mining of renewable resources and depletion of natural resources. All of these measures have the potential to substantially increase the future wood supply.

Structural Change in Demand

To understand the implications of a possibly changing supply of fibers there is also a need to understand the development of the future demand. Maybe this is the most difficult component of the supply/demand equation. Earlier studies, discussed above, seem to have over estimated the future demand on industrial fibers substantially. Instead of growth in the consumption of industrial wood fibers the global consumption has been rather stable during the last 5–10 years. This can be explained, among other factors, by the collapse of the former USSR, as well as by an increased forest product substitution by metals and plastics (e.g., Zhang et al. 1997). This product substitution is expected to continue in the future (e.g., Haynes, 2003) unless the sector is investing substantially in innovations for the development in transformational products—products with brand new functions.

As stated earlier, technological development is going fast. This will influence the industrial production with more efficient processes with less input of raw material per produced unit. These developments will decrease the use of fibers. The technological development has also made it possible to develop attractive products for the market of so-called agri-products (e.g., bamboo, rubber plants, etc.). This trend can be expected to grow in the future. Most studies see a substantial increase in the use of recovered paper in the future (e.g., UNECE, 2005). This will affect the future use of wood fiber substantially. But, as pointed out earlier, high energy prices are expected and high energy prices will have a dampening effect on the use of recovered paper.

Some are also concerned on how the future recovered paper market will clear in the future—will the supply satisfy the demand? (e.g., Roberts, 2004; Häggblom, 2004). For example, Haynes (2003) assumes that the recovery rate of paper will only grow gradually to 50% by 2010 in the USA and stay at this level through the period to 2050. There are substantial signs that other structural changes are also taking place in the markets. In a forthcoming study on the impacts of Information and Communication Technologies (ICT) on the forest sector (Hetemäki and Nilsson, 2005), it can be concluded that the growth in electronic media is already shaking the traditional paper, especially communication paper grades, sector in high ICT, high GDP countries. Ince et al. (in Hetemäki and Nilsson, 2005) are making the conclusion that the same development will probably happen with respect to paperboard. Between 1995 and 2003

newspaper circulation fell by 5% in America, 3% in Europe and 2% in Japan (Economist, 2005). Meyer (2004) predicts that if this trend continues the last newspaper will be recycled in 2040. Rupert Murdoch (Financial Times, 2005) stated recently: “I hoped that this thing called the digital revolution would just limp along. Well, it hasn’t... it won’t... and it’s a fast-developing reality we have to grasp”. These developments will influence the future demand on fibre.

The development of new technologies (in addition to ICT), like material technologies, nanotechnologies and biotechnologies, is going rapidly and will develop exponentially in the future and will have a major impact on the production of future forest products and the future use of wood (Nilsson, 2004b).

Back of the Envelope

We have done a ‘back of the envelope’ outlook on the wood supply analysis based on current knowledge (Nilsson, 2004b). We divided the world into 14 regions. We used all of the available information we could obtain, not only official data because in many cases those data do not reflect realities with respect to harvest, forest capital, consumption, and harvest potentials. We tried to assess the harvesting potentials taking these data into account as well as the current forest management policies and the economic accessibility. The assessment (or guesswork) was carried out for 2000, 2010 and 2020. These numbers were compared with the assessed industrial consumption in the individual regions for the same time period. The result of the back of the envelope calculation shows a rather grim picture, and the picture is the same for 2010 as well as 2020 although even more so in the latter case. There are 5 out of the 14 regions showing a surplus with respect to the industrial wood supply. These regions are Latin America, Africa, Russia, Australia and New Zealand. All of the other regions are deficit regions. And the deficit in 2020 is about three times higher than the surplus in the surplus regions.

This development will, of course, not happen because if a deficit situation occurs investments will be made in order to increase the supply. And this latter dynamic was not taken into account in our simple ‘back of the envelope’ assessment.

Consistent Data

The picture of the changed conditions in the wood supply/demand equation is confused due to lack of consistent and transparent data on the development of the factors discussed above. Wardle et al. (2003) conclude that “FAO has the mandate to coordinate and compile global forest assessments. Methodological advances have taken place in this work but the validity and reliability of the stock and change data on world forests are still inadequate”. Thus, in order to make advances in the global wood supply/demand equation improved data on many components of the global forest sector is required.

Conclusion

So, does this preliminary discussion indicate that there will be imbalance in the global wood supply/demand balance? We have discussed that there are negative and positive structural changes taking place. Crucial questions are the development over time of the negative versus positive structural changes with respect to the wood balance and whether the positive trends are balancing the negative trends, respectively. Our current assessment is that the structural changes of some components of the supply/demand equation move rapidly and with business-as-usual policies there is a risk that there will be imbalances in the global wood balance.

Recommendation: A Revised Wood Supply/Demand Analysis

Based on the discussion above we would argue that the time is right to make a revision of the global industrial wood/supply demand conditions over time. As outlined above (and we have far from discussed all of the factors influencing the future global wood balance), the future landscape of the global wood balance is complex. We would argue that the future is a complex animal, which is impossible to predict. So the purpose of thinking about the future wood balance would not be to predict it but to prepare for it. One should specifically look for places in the wood balance system where drivers might combine to make change faster and where the drivers conflict with each other and hence slow down or halt change. In these spaces the largest risks and opportunities are to be found (Curry, 2005). Thus, we do not think that approaches/models that only extrapolate existing trends are sufficient.

The revision should have a broad approach taking into account demographic, water, transportation, energy, technological, economic, social, etc., developments. The revision should not be limited to just employing 'official' data; rather, the best data available should be applied to generate consistent analysis. The analysis should prepare for an uncertain future by building pictures of possible futures based on best available knowledge in scenario form. These scenarios should not just use different economic growth rates as the driving force, which has been the case in many of the earlier outlook studies; rather, they should build pictures of possible futures that may be very different in character, much in line with the approach used by companies such as Royal Dutch/Shell (Shell, 2003). There may be a need to broaden current existing forest economic models rooted in yield management systems and neo-classical economic frameworks to multiple equilibria, a consumer choice theory that incorporate heterogenous agents, etc. (e.g., Kant, 2003). The analysis should also be undertaken in a collaborative fashion with the international community working alongside industry, government and possibly even a select group of science-based environmental non-governmental organizations (ENGOs).

We think the key questions that need to be addressed are:

- What will the future fiber demand look like?
- Where is the wood fiber raw material going to come from in the medium and long term?
- Which policy actions should be taken to foster sustainable wood supply?
- What should be the role of the international community in addressing wood supply issues?

The wood balance issue should probably be addressed in a broader framework discussing how many forests we need, what kinds of forests there should be, where they should be located, what they should deliver and how they should be managed as earlier proposed by Nilsson (1996) and Poore (2003).

References

- AFPA (2004). "Illegal" Logging and Global Wood Markets: The Competitive Impacts on the U.S. Wood Products Industry. Paper prepared for the American Forest and Paper Association (AFPA) by Seneca Creek Associates and Wood Resources International, Washington DC, USA.
- Anon (2003). The Role of Planted Forests in Sustainable Forest Management. Report of the UNFF Inter-sessional Experts Meeting, 25–27 March, Wellington, New Zealand.
- Apsey, M. and L. Reed (1995). World Timber Resources Outlook, Current Perceptions: A Discussion Paper. Council of Forest Industries, Vancouver, Canada.

- Arnold, M., G. Köhlin, R. Persson and G. Shephard (2003). Fuelwood Revisited: What Has Changed in the Last Decade. Occasional Paper No. 39, Center for International Forestry Research (CIFOR), Bogor, Indonesia.
- Arrow, K., P. Dasgupta, L. Goulder, G. Daily, P. Ehrlich, G. Heal, S. Levin, K.-G. Mäler, S. Schneider, D. Starrett and B. Walker (2004). Are we Consuming Too Much? *Journal of Economic Perspectives* **18**, 3: 147–172.
- ASPO (2004). ASPO Newsletter. The Association for the Study of Peak Oil and Gas (ASPO). Available at: <http://www.asponews.org>.
- Australian Senate (2004). Australian Forest Plantations. Australian Senate Committee Report, Canberra, Australia.
- Auty, R.M. (2003). Natural Resources, Development Models and Sustainable Development. Discussion paper 03-01. International Institute for Environment and Development, London, UK.
- Bazett, M. (2000). Long-Term Changes in the Location and Structure of Forest Industries. Global Vision 2050 for Forestry. World Bank/WWF Project. Washington, DC, USA.
- Boettcher, H. (2005). Modeling the Management Impact on Forest Carbon Dynamics. Seminar presentation, 26 April, International Institute for Applied Systems Analysis, Laxenburg, Austria.
- Bolkesjø, T.F. and S. Baardsen (2002). Roundwood Supply in Norway: Micro-level Analysis of Self Employed Forest Owners. *Forest Policy and Economics* **4**, 55–64.
- Brack, D. (2005). Illegal Logging. Briefing paper, Sustainable Development Program, 25 March, Chatham House, London, UK.
- Brooks, D., H. Pajnoja, T.J. Peck, B. Solberg and P.A. Wardle (1996). Long-term Trends and Prospects in World Supply and Demand for Wood. Research Report No. 6, European Forest Institute, Joensuu, Finland.
- Brukhanov, A., A. Ptichnikov, A. Kotlobay and A. Voropayev (2003). The Russian-Danish Trade in Wood Products and Illegal Logging in Russia. WWF Russia. Available at: http://www.wwf.dk/db/files/wwf_russian_danish_trade_in_wood_.pdf.
- Bull, G.Q. and S. Nilsson (2004). An Assessment of China's Forest Resources. *International Forestry Review* **6**, 3–4: 210–220.
- Bull, G.Q., W. Mabee and R. Scharpenberg (1998). Global Fiber Supply Model. United Nations Food and Agriculture Organization (FAO), Rome, Italy.
- Bull, G.Q., Z. Harkin and A. Wong (2004). Carbon Accounting: Institutional Framework, Models and Economics. In: D.L. Peterson and J.L. Innes, *Climatic Change, Carbon, and Forestry in Northwestern North America*. USDA Forest Service PNW-GTR-614. Pacific Northwest Research Station, Portland, Oregon, USA, 61–78.
- Bull, G.Q., M. Bazett, O. Schwab, S. Nilsson, A. White and S. Maginnis (2005). Industrial Forest Plantations' Subsidies: Impacts and Implications. *Forest Policy and Economics* (forthcoming).
- CEI-Bois, CEPI, D.G. Enterprise of the European Commission (2000). EU Energy Policy Impacts on the Forest-based Industry. Brussels, Belgium.
- Chunquan, Z., R. Taylor and F. Guoqiang (2004). *China's Wood Market, Trade and the Environment*. WWF International, Science Press, Monmouth Junction, NJ, USA.
- Contreras-Hermosilla, A. (2002). Law Compliance in the Forestry Sector: An Overview. WBI Working Paper. The World Bank, Washington DC, USA.

- Cossalter, C. and C. Pye-Smith (2003). *Fast-Wood Forestry—Myths and Realities*. Earthscan, London, UK.
- Currey, D., F. Doherty, S. Lawson, J. Newman and A. Ruwindrijarto (2001). *Timber Trafficking: Illegal Logging in Indonesia, South East Asia and International Consumption of Illegally Sourced Timber*. Environmental Investigation Agency (EIA), London, UK and Telepak, Bogor, Indonesia.
- Curry, A. (2005). *Learning from the Future*. Henley Centre, London, UK.
- Die Presse (2005). Töpfer: Biomasse muss High-Tech werden. Die Presse, 12 May.
- Economist (2004). The Dragon and the Eagle. *The Economist*, 2 October, London, UK.
- Economist (2005). Yesterday's Papers. *The Economist*, 23 April, London, UK.
- EIA (2005). The Last Frontier. Illegal Logging in Papua and China's Massive Timber Theft. The Environmental Investigation Agency (EIA) and Telepak (Indonesia), London, UK.
- Enters, T. and P.B. Durst (2004). What Does It Take? The Role of Incentives in Forest Plantation Development in Asia and the Pacific. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand.
- FAO (1997). *FAO Provisional Outlook for Global Forest Products Consumption, Production and Trade to 2010*. United Nations Food and Agriculture Organization (FAO), Rome, Italy.
- FAO (2001a). *Past Trends and Future Prospects for the Utilization of Wood for Energy. Global Forest Products Outlook Study*. United Nations Food and Agriculture Organization (FAO), Rome, Italy.
- FAO (2001b). *Global Forest Resource Assessment 2000*. Forestry Paper 140, United Nations Food and Agriculture Organization (FAO), Rome, Italy.
- FAO (2001c). *Role of Forest Plantations as Substitutes for Natural Forests in Wood Supply—Lessons Learned from the Asia-Pacific Region*. Forest Plantations Thematic Paper Series, United Nations Food and Agriculture Organization (FAO), Rome, Italy.
- FAO (2005). *State of the World's Forests*. United Nations Food and Agriculture Organization (FAO), Rome, Italy.
- Financial Times (2005). Murdoch Says Newspapers Must Embrace the Internet. *The Financial Times*, 14 April.
- Girard, P. (2002). Charcoal Production and Use in Africa. *Unasylva* **53** (211).
- Goldman Sachs (2005). *Brazilien auf dem Weg zur Wirtschaftsmacht. Wachstum prosperiert Mehr Direkt investitionen*. Handelsblatt, 17 März (in German).
- Greenpeace (2000). *Illegal Logging in Russia — Summary of the Report "Forest Felling Activities in Russia"*. Available at: <http://archive.greenpeace.org/forests/resources/forestRussia-july00.htm>.
- Häggbloom, R. (2004). *Global Forest Trends. Presentation at FINPRO, World Bank: Business Opportunities in Forestry Sector*, 7 May 2004, Helsinki, Finland. Jaakko Pöyry Consulting, Vantaa, Finland.
- Haynes, R. (ed.) (2003). *An Analysis of the Timber Situation in the United States, 1952 to 2050*. USDA, Forest Service Pacific Northwest Research Station, Portland, Oregon, USA.
- Hetemäki, L. and S. Nilsson (eds.) (2005). *ICT and the Forest Sector*. IUFRO Task Force, International Union of Forestry Research Organizations (IUFRO), Vienna, Austria (forthcoming).

- IEA (2004). *World Energy Outlook*. International Energy Agency (IEA), Paris, France.
- ITTO (2003). Review of the Indian Timber Market. PPP 49/02, International Tropical Timber Organization (ITTO), Yokohama, Japan.
- Ivanov, M. (2004). Illegal Logging and Illegally-derived Timber in the Republic of Bulgaria. Paper presented at the UNECE/FAO Workshop on “Illegal Logging and Trade of Illegally-derived Wood Products in the UNECE Region, 16–17 September 2004, Geneva, Switzerland. United Nations Economic Commission for Europe (UNECE), Geneva, Switzerland.
- Jaakko Pöyry (1995). Global Fiber Resources Situation: The Challenges for the 1990s. The Jaakko Pöyry Group, Tarrytown, NY, USA.
- Kant, S. (2003). Extending the Boundaries of Forest Economics. *Forest Policy and Economics* 5, 39–56.
- Leiwen, J. and B. O’Neill (2003). The Energy Transition in Rural China. Interim Report IR-03-070, International Institute for Applied Systems Analysis, Laxenburg, Austria.
- Lönnstedt, L. (1989). Goals and Cutting Decisions of Private Small Forest Owners. *Scandinavian Journal of Forest Research* 4, 259–265.
- Lopina, O., A. Ptichnikov and A. Voropayev (2003). Illegal Logging in North Western Russia and Export of Russian Forest Products to Sweden. WWF Russia. Available at: http://www.wwf.ru/pic/docdb/publ/Russian_Swedish_Timber_Trade_eng.pdf.
- Lundmark, R. (2003). The Supply of Forest-based Biomass for the Energy Sector: The Case of Sweden. Interim Report IR-03-059, International Institute for Applied Systems Analysis, Laxenburg, Austria.
- Meyer, P. (2004). *The Vanishing Newspaper. Saving Journalism in the Information Age*. University of Missouri Press, Missouri, USA.
- Muthoo, M.J. (2004). Review of the Indian Timber Market. PPD 49/02, International Tropical Timber Organization (ITTO), Yokohama, Japan.
- Nabuurs, G.-J., M.-J. Schelhaas, A. Ouweland, A. Pussinen, J. van Brusselen, E. Pesonen, A. Schuck, M.F.F.W. Jans and L. Kuiper (2003a). Future Wood Supply from European Forests. Implications for the Pulp and Paper Industry. Alterra, Wageningen, Netherlands.
- Nabuurs, G.-J., R. Päivinen, A. Pussinen and M.-J. Schelhaas (2003b). Development of European Forests Until 2050. Brill, Leiden, Netherlands.
- Nilsson, S. (1996). Do We Have Enough Forests? Occasional Paper No. 5, International Union of Forestry Research Organizations (IUFRO), Vienna, Austria.
- Nilsson, S. (2004a). How Will the World Timber Market Develop? Paper presented at the “Forest Strategy Meeting”, 25–26 March, Nødebo, Denmark. International Institute for Applied Systems Analysis, Laxenburg, Austria.
- Nilsson, S. (2004b). Signposts for Tomorrow’s Pulp and Paper Industry. Keynote at Confederation of European Paper Industries (CEPI) Annual Meeting, 2 December, Brussels, Belgium. Available at: <http://www.iiasa.ac.at/Research/FOR/index.html>.
- Nilsson, S. (2004c). Experiences of Policy Reforms of the Forest Sector in Transition and Other Countries. *Forest Policy and Economics* [doi:10.1016/j.forpol.2004.04.001].
- Nilsson, S. (2005). What Wood Supply Can We Expect From China? Paper presented at the International Seminar “A Future Perspective on the Wood Sector in China”, 12–13

- April, The Wood Academy, Stockholm, Sweden. International Institute for Applied Systems Analysis, Laxenburg, Austria.
- Ottitsch, A., K. Kaczmarek and L. Kazusa (2005). Study on the Issues of Illegal Logging and Related Trade of Timber and Other Forest Products in Europe. Report for the Ministerial Conference on the Protection of Forests in Europe (MCPFE) Liaison Unit Warsaw. European Forest Institute, Joensuu, Finland.
- Pandey, D. (2002). Fuelwood Studies in India. Myth and Reality. The Center for International Forestry Research (CIFOR), Bogor, Indonesia.
- Poore, D. (2003). *Changing Landscapes*. Earthscan, London, UK.
- Pulkki, R.E. (1997). Modeling Future Availability of Non-coniferous Veneer Logs and Sawlogs in Tropical Forests. Working Paper GFSS/WP/05, Global Fiber Supply Study Working Paper Series, United Nations Food and Agriculture Organization (FAO), Rome, Italy.
- Rametsteiner, E. and F. Kraxner (2003). Europeans and Their Forests. What Do European Think About Forests and Sustainable Management? Ministerial Conference on the Protection of Forests in Europe (MCPFE), Liaison Unit, Vienna, Austria.
- Roberts, D. (2004). China and the global paper and Forest products Industry: A Focus on Fiber. Paper presented at the CSCA Investors Forum, 13–17 September, Hong Kong, China.
- Roberts, D., H. Carreau and J. Lethbridge (2005). Changes in the Global Forest Products Industry. Defining the Environment for British Columbia. CIBC World Markets, 14 March, CIBC World Markets Inc., Toronto, Canada.
- Sedjo, R. and K. Lyon (1995). A Global Pulpwood Supply Model and Some Implications. Resources for the Future, Washington DC, USA.
- Sheingauz, A. (2004). Overview of the Forest Sector in the Russian Far East. Production, Industry and Illegal Logging. Asia Pacific Partners Working Paper No. 2, Forest Trends, Washington DC, USA.
- Shell (2003). *People and Connections—Global Scenarios to 2020*. Shell, London, UK.
- Shvidenko, A., S. Nilsson, I. McCallum, C. Schmillius, S. Quegan, T. LeTuan, A. Bartsch, R.A. Kidd, W. Wagner, M. Santoro, H. Balzer and A. Luckman (2005). Regional Certified Full Carbon Account: Fusion of Remotely Sensed Data, On-ground Information and Ecological Modeling. Paper presented at the EGU05 General Assembly of the European Geosciences Union, 22–27 April, Vienna, Austria (Session BG 1.07, CD-ROM).
- Simons (1994). Global Timber Supply and Demand to 2020. Simons Consulting Group, Vancouver, Canada.
- Stokstad, E. (2005). Experimental Drought Predicts Grim Future for Rain Forests. *Science* **308**, 346–347.
- Strauss, S.H. and H.D. Bradshaw (eds.) (2004). The Bioengineered Forest. Challenges for Science and Society. RFF Press Book, Resources for the Future (RFF), Washington DC, USA.
- Sun, X., E. Katsigris and A. White (2004). Meeting China's Demand for Forest Products: An Overview of Import Trends, Ports of Entry, and Supplying Countries, with an Emphasis on the Asia-Pacific Region. *International Forestry Review* **6**, 3–4: 227–236.
- Trömborg, E. and B. Solberg (1998). A Comparative Analysis of Structures in European Roundwood and Forest products Markets. In: B. Solberg and A. Moiseev (eds.), *Analyzing Structural Changes in Roundwood and Forest Products Markets in Europe*, EFI proceedings 26, European Forest Institute (EFI) Joensuu, Finland.

- UNECE (2005). *European Forest Sector Outlook Study*. Main Report UNECE/FAO, United Nations, Geneva, Switzerland.
- Wardle, P. L. Jansky, G. Mery, M. Palo, J. Uusivuori and H. Vanhanen (2003). *World Forests, Society and Environment*. Executive Summary. The United Nations University, Tokyo, Japan.
- Whiteman, A. and C. Brown (1999). The Potential Role of Forest Plantations in Meeting Future Demands for Industrial Wood Products. *International Forestry Review* 1, 3: 143–152.
- Whiteman, A., J. Broadhead and J. Bahdon (2004). The Revision of Wood Fuel Estimates in FAOSTAT, *Unasylva* 211, 53: 41–45.
- World Bank (2002). *A Revised Forest Strategy for the World Bank Group*. The World Bank, Washington DC, USA.
- WRI (1999). *The Global Timber Supply/Demand Balance to 2030: Has the Equation Changed?* Wood Resources International (WRI), Reston, Virginia, USA.
- WRI (2003). *Brazil and Chile's Fiber Resources and Forestry Industry Development*. Wood Resources International (WRI), Seattle, Washington, USA.
- WWF (2004). *Quick Overview Facts on Illegal Logging in Accession and Candidate Countries*. Available at: [http://www.panda.org/about-wwf/where - we-work/europe/problems/illegal-logging/Downloads/ ILLEGAL%20LOGGING%20EASTERN%20EUROPE.pdf](http://www.panda.org/about-wwf/where-we-work/europe/problems/illegal-logging/Downloads/ILLEGAL%20LOGGING%20EASTERN%20EUROPE.pdf).
- WWF Latvia (2003). *The Features of Illegal Logging and Related Trade in the Baltic Sea Region*. Discussion paper. Forest Sector Meeting, Nordic Council of Ministers Adjacent Areas Programme and the Baltic 21 Process, 19–22 October 2003, Latvia. Available at: <http://www.sus.dk/internet/edited71.pdf>.
- Zhang, D. and J. Buongiorno (1996). *Trends and Outlook for Forest Products Consumption, Production and Trade in the Asia-Pacific Region*. Asia Pacific Forest Sector Outlook Study, United Nations Food and Agriculture Organization (FAO), Rome, Italy.
- Zhang, D., J. Buongiorno and S. Zhu (1997). *Trends and Outlook for Forest Products Consumption, Production and Trade in the Asia-Pacific Region*. Working paper APFSOS/WP/12. Forestry and Planning Division, United Nations Food and Agriculture Organization (FAO), Rome, Italy.