



Trends in World Bleached Chemical Pulp Production: 1990-1999

January 2000

Summary

Elemental Chlorine-Free (ECF) pulp, bleached with chlorine dioxide, continues to dominate the world bleached chemical pulp market. By the end of 1999, ECF production will be 48.5 million tonnes, totaling more than 62% of the world market share. Market data show an ever-widening gap between ECF and TCF (Totally Chlorine-Free) production. Over the last five years, ECF grew at an annual rate approaching 15% per year, with an additional 6.5 million tonnes entering the market in 1999. Over the same period, TCF remained steady at 6% of world bleached chemical pulp production.

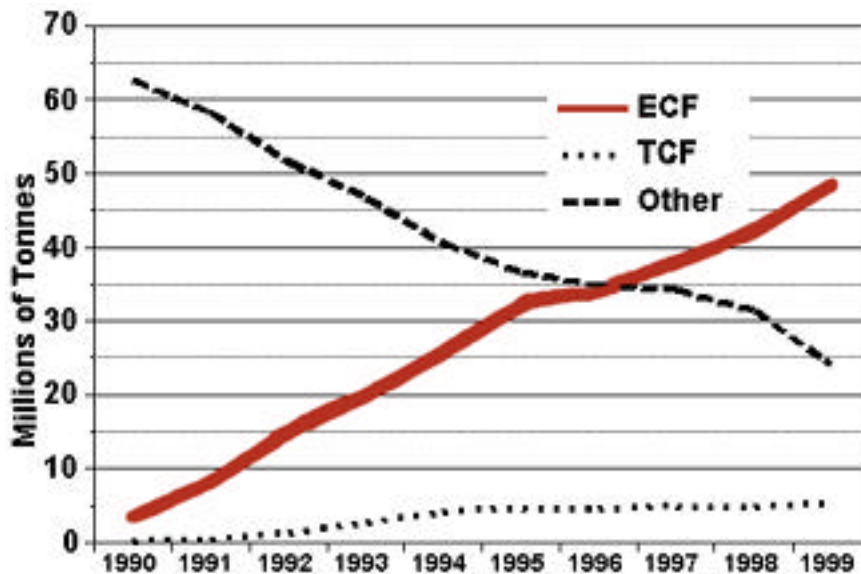
As the international scientific community increasingly recognizes and documents ECF's record, and producers acknowledge ECF's superior product quality, and life-cycle impact assessments document ECF's overall environmental integrity - end users are spurring its growth.

World Bleached Chemical Pulp Production Profile

In 1999, ECF commands the highest worldwide market share at greater than 62%, totaling more than 48.5 million tonnes. This marks a 15% production increase from 1998. ECF market share continues to grow in most pulp producing regions.

"ECF remains the process of choice in most pulp producing regions, commanding 62% of the world market."

World BCP Production: 1990 - 1999





North America

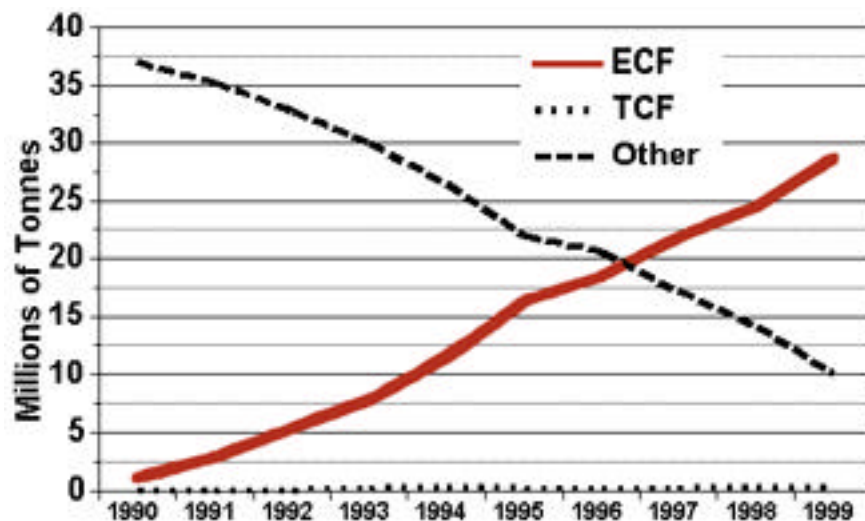
In North America, ECF production will increase in 1999 by 17% to represent over 70% of bleached chemical pulp production. In contrast, there is no growth in TCF production.

Separately, in 1999, Canadian BCP production of ECF grew by 18% to 10.7 million tonnes, holding more than 90% of the market, while TCF production remained at less than 10,000 tonnes.

In the United States, ECF continues to grow rapidly, with another 2.5 million tonnes entering the market in 1999. ECF production grew by 16% to more than 18 million tonnes, or 66% of U.S. bleached chemical pulp production.

The marketplace and the recently promulgated United States Environmental Protection Agency (EPA) Cluster Rule for the pulp and paper industry are driving the rapid conversion to ECF. The Cluster Rule is based in part on ECF as the Best Available Technology (BAT) for bleached paper grade kraft and soda mills [1].

North American BCP Production: 1990 - 1999



Japan

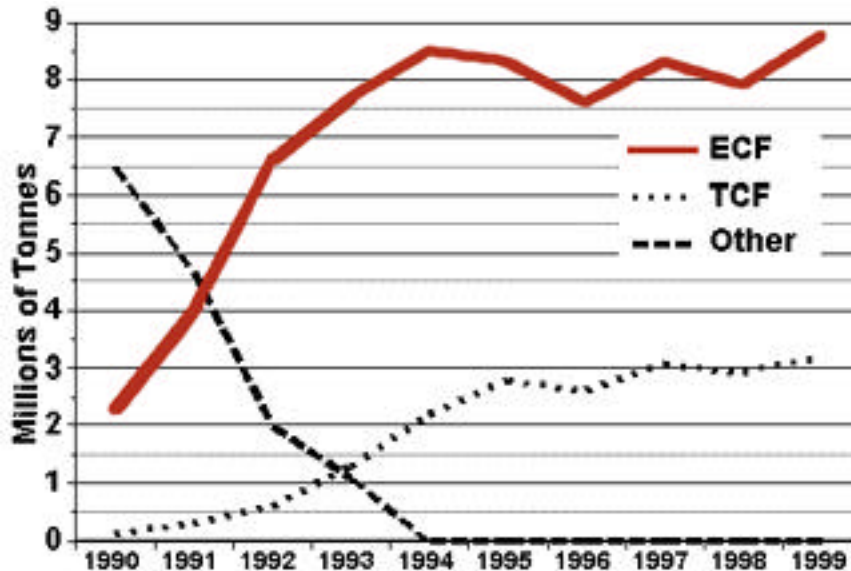
Japan produces approximately 8 million tonnes of bleached chemical pulp. No TCF is produced in Japan and while ECF production is low, it is beginning to grow. All major bleached pulp producers in Japan have recently announced their intentions to eliminate chlorine and in most cases, convert to ECF [3,4].



Scandinavia

In Scandinavia, ECF demand remains strong, accounting for ~75% of bleached chemical pulp production—triple that of TCF. ECF production will continue to grow, with two new ECF fibreines announced for startup in 2001 [2].

Scandinavian BCP Production: 1990 - 1999



Looking Ahead

ECF's steady growth is an acknowledgment of its environmental performance, cost-competitiveness, and high quality. For example a recent life cycle assessment of a consumer magazine produced from lightweight coated (LWC) and super-calendared (SC) papers made from either ECF or TCF pulp concluded [2]:

"for these products, there is no environmental difference between ECF and TCF pulps"

However, the same study reported quality differences noting that [5]:

"TCF products had inferior reinforcing properties (~ 10%)" which "required an additional 10% soft - wood kraft pulp when running TCF."

Manufacturers of TCF recently confirmed these quality and cost-competitive advantages of ECF when they stated the following [6]:

"We acknowledge the drawbacks with TCF — they have been discussed often enough — such as slightly lower strength" - Roland Lövlblad, Södra Cell AB

" it costs us around \$10 per tonne more to make softwood TCF pulp than it does our ECF grades." - Roland Lövlblad, Södra Cell AB



Life cycle assessments are increasingly being used as a basis for decisions in the marketplace. For example, the US EPA recently released its "Final Guidance on Environmentally Preferable Purchasing (EPP)". Rather than base decisions on a single manufacturing attribute, the guidance suggests factors such as product safety, price, performance and availability play a role. This approach is consistent with manufacturers of both ECF and TCF who have stated [6]:

"We are trying to move away from the outdated TCF versus ECF discussion and sell on the basis of a good performing pulp." - Roland Lövblad, Södra Cell AB

Sources

The Alliance for Environmental Technology, "Trends in World Bleached Chemical Pulp Production: 1990-1998," October 1998.

1999 AET International Survey

Pryke, D.C., Kanters, C. and Tam, T., "Analysis of ECF Bleaching Practices in Canada." Bleaching Committee, Pulp and Paper Technical Association of Canada (Paptac). May, 1999.

References

1. Federal Register, Vol. 63, No. 72. April 15, 1998.
2. Press Release, Stora Enso Oy, May 1999. (www.storaenso.com)
3. "Nippon Paper to Stop Using Chlorine by 2005". Dow Jones News Service, New York, NY. June, 1999.
4. "Four Japan Paper Mills Phasing Out Chlorine". Chemical News & Intelligence. October 1999.
5. Bradley, M.J., "Why Would Pulp and Paper Makers Consider Integrating Life Cycle Assessment into Their Businesses." Proceedings, 85th Annual Meeting, Pulp and Paper Technical Association of Canada (Paptac). Montreal, Quebec, January 1999.
6. Marcus, A. "TCF is Alive and Well and Living in Scandinavia." Papermaker, No. 21. April, 1999.



APPENDIX (ALL DATA IN MILLIONS OF TONNES*)

WORLD

	ECF	TCF	OTHER
1990	3.5	0.1	62.7
1991	8.2	0.4	58.2
1992	14.9	1.2	51.8
1993	20.0	2.6	46.8
1994	25.7	4.1	40.8
1995	31.2	4.7	36.8
1996	34.0	4.5	35.0
1997	38.4	5.0	34.4
1998	42.2	4.8	31.4
1999	48.5	5.1	24.1

SCANDINAVIA

	ECF	TCF	OTHER
1990	2.3	0.1	6.5
1991	4.0	0.3	4.7
1992	6.6	0.6	2.0
1993	7.7	1.3	1.1
1994	8.5	2.2	0.0
1995	8.3	2.8	0.0
1996	7.6	2.6	0.0
1997	8.3	3.1	0.0
1998	7.9	2.9	0.0
1999	8.8	3.2	0.0

UNITED STATES

	ECF	TCF	OTHER
1990	0.5	0.0	26.8
1991	1.6	0.0	25.6
1992	2.8	0.0	24.4
1993	4.0	0.2	23.0
1994	6.0	0.2	21.0
1995	9.1	0.3	17.9
1996	10.4	0.2	16.6
1997	13.3	0.2	13.8
1998	15.5	0.2	11.4
1999	18.1	0.2	8.9



CANADA

	ECF	TCF	OTHER
1990	0.7	0.0	10.3
1991	1.3	0.0	9.7
1992	2.6	0.0	8.4
1993	3.9	0.1	7.0
1994	5.5	0.1	5.5
1995	7.3	0.0	4.2
1996	8.1	0.0	4.0
1997	8.7	0.0	3.4
1998	9.1	0.0	2.8
1999	10.7	0.0	1.3

Rest of World

(Includes Western Europe, Chile, Brazil, South East Asia, Africa, Australia, New Zealand, and Japan)

	ECF	TCF	OTHER
1990	0.1	0.0	19.1
1991	1.3	0.1	18.2
1992	2.9	0.6	17.0
1993	4.4	1.1	15.7
1994	5.8	1.6	14.3
1995	6.5	1.6	14.7
1996	7.9	1.8	14.4
1997	8.2	1.8	17.2
1998	9.7	1.7	17.2
1999	11.0	1.7	14.0

*All data has been rounded to the nearest tenth

The Alliance for Environmental Technology (AET) is an international association of chemical manufacturers and forest products companies dedicated to improving the environmental performance of the pulp and paper industry. AET was created to establish a clearinghouse of educational and technical resources relating to chlorine dioxide and its use in chemical pulp bleaching.

For more information, call AET at 1-(800)-999-PULP.