MAINE
INDUSTRIES OF THE FUTURE

Maine *Industries of the Future*

A Vision and Pathway For Maine's

Forest Products Industry
Pulp & Paper Industry
Secondary Wood Products

Metals Industry

In Cooperation with the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy- State Partnership Program

January 8, 2003

Managed by the Maine Manufacturing Extension Partnership
Coordinated by the Environment & Energy Center
an affiliate of the Maine State Chamber of Commerce

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Executive Summary

The Maine Industries of the Future (IOF) is sponsored by the U. S. Department of Energy, office of Energy Efficiency and Renewable Energy (EERE) State Partnership Program and supported by industries doing business in Maine, the state University System, public sector agencies and non-profit organizations. Maine IOF is managed by the Maine Manufacturing Extension Partnership and coordinated through the Environment & Energy Center (E2 Center). Maine IOF is a catalyst for projects, partnerships, and programs that increase energy efficiency, reduce and utilize waste materials and improve industrial productivity.

This report provides the results of industry roadmaps for the future for each of the three industry sectors (Secondary Wood Products, Pulp & Paper, and Metal Products Industry) developed in 2001-2002. Considering roadmapping as an opportunity to:

- identify new critical technologies to meet future demands in the market
- help focus on near-term needs and beyond
- provide a base for long-term development planning
- identify industry strengths and weaknesses and
- influence public policy

the resulting visions are Maine industry specific goals and objectives for the future, based on the successful national IOF program.

This report is intended to be a working document and is the basis from which industry visions and action plans will be implemented. As a working document, it can and will be modified and changed as required by the needs and focus of Maine's industries.

An Overview - Cross Cutting Issues

Key issues unique to Maine and of equal concern to the multiple industry sectors participating in this exercise are evident. Primary concerns cutting across all three of Maine largest industries are the need for:

- improved R&D
- a resource clearinghouse
- more technology development/deployment
- secondary market development for waste streams
- improved energy & process efficiencies
- reduction in energy costs and alternative energy sources.

Implementation Scheduled for 2002-2003

The Maine IOF Program is committed to working with each industry's roadmapping committees to help implement the action plans stemming from their respective roadmapping sessions.

In the fall of 2002, Maine IOF will begin implementing actions to fulfill the above issues cutting across the three industry sectors.

The Maine IOF Program will:

- organize an ***annual Maine IOF R&D Forum*** to identify, promote and showcase public/private R&D partnerships in energy efficiency and conservation that support Maine IOF industries' technology requirements

- develop a resource clearinghouse that will include virtual and non virtual opportunities to help companies learn about new technologies and energy efficient opportunities, communicate with experts and within Maine industry

- facilitate the delivery of training programs for state and university energy auditors and for manufacturers to ensure continuous improvement in skill sets promoting and resulting in energy and process efficiencies

- leverage existing DOE IOF training tools and modify existing tools to address current requirements

- promote state and federal programs leading to R&D&D opportunities

The R&D Forum will serve as an important venue for bringing together University of Maine and Southern Maine researchers and students with Maine IOF industries to develop strategies on how best to

- address the industries' technology requirements and
- leverage existing federal (i.e. DOE IOF) and state (i.e., Maine Technology Institute) funding

As this Forum achieves success, it is anticipated that it will expand to include other topical R&D opportunities beyond energy and environment.

An executive committee comprised of representatives from the Maine IOF industries will oversee the Maine IOF R&D Forum. This committee will have primary responsibility for ensuring that topical areas selected for federal and/or state support are consistent with the IOF industries' technology requirements outlined in the roadmaps. Subcommittees may be established to oversee implementation of topical areas.

The overall objective of the energy efficiency training programs is to prepare small to medium sized industries, especially the metals and wood products industries to adopt continuous improvements in energy efficiency through a training program that gives them the knowledge to:

- know how their manufacturing systems use energy
- develop energy management systems specific to their operations
- perform a step by step energy self-audit at their facility and
- factor cost benefits/RIO

This project will develop and deliver a system and training program for small to medium sized manufacturers at five locations in Maine.

1. Background

The Energy Policy Act of 1992 provided the Department of Energy (DOE) with a mandate to work with the largest energy users in the industrial sector to create a "Meaningful, five year research program" for the purpose of encouraging those industries to adopt more energy-efficient practices and technologies, thereby reducing the nation's utilization of fossil energy and its green house gases emissions.

In 1994, a formal Compact was signed creating a partnership between the DOE and the Forest Products Industry to develop a 20-year vision and roadmap for the industry's future that would:

- advance global competitiveness of the industry
- improve the sustained management of the forest resource
- meet environmental requirements without increasing capital expenditures
- continue progress in building energy self-sufficiency that increases economic viability and
- increase the use of recycled wood and paper materials in the manufacturing process.

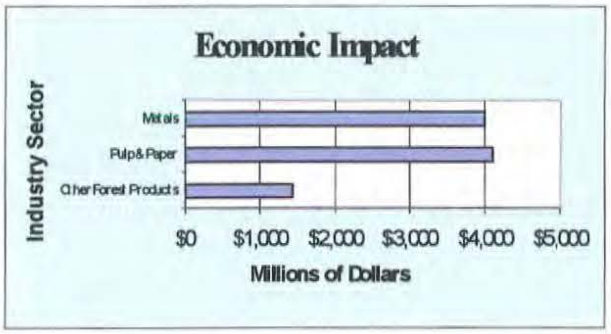
Since 1994, an additional eight industry sectors became partners in the DOE's Office of Industrial Technologies (OIT), Industries of the Future (IOF) program. These include: Agriculture, Metal Casting, Aluminum, Mining, Chemicals, Petroleum, Steel and Glass.

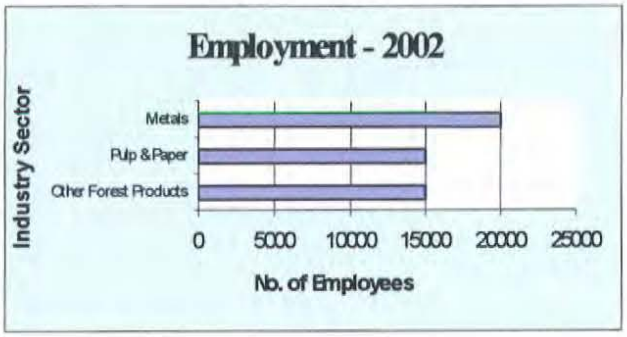
Since 1996, the OIT has provided over $9 million in funding toward State Energy Programs Special Projects grants to help state agencies implement the IOF strategy for improving industrial energy efficiency and competitiveness. State IOF programs expand and develop state specific programs rather than merely recreate the national efforts

and they reach out to a larger number of partners, smaller business and manufacturers not initially involved in the national IOF effort.

In 2001, Maine's Governor Angus King joined Denise Swink, Deputy Assistant Secretary of Energy for the U.S. Department of Energy (DOE) and leaders in the Pulp & Paper, Secondary Wood Products Industry and Metals Industry in signing a Memorandum of Understanding, creating a ***Maine Industries of the Future***. This new public-private partnership between Maine as a state partner and the DOE as a federal partner is intended to help Maine's energy-intensive industries compete and thrive in the 21st Century. The Maine IOF, modeled on the national program is industry driven – Maine industries joining together, leading the way to develop and share common solutions to common problems.

The goal in establishing a ***Maine IOF***, is to facilitate the development of a state





specific vision and a roadmap unique to Maine's forest products industry and to the metals industry. The Forest Products Industries include secondary wood products, saw mills, and pulp & paper companies. These industries employ 30,000 workers in Maine and generate several billion dollars in gross sales. The Pulp & Paper Industry alone employs more than 13,000 and thousands more are indirectly financially benefited by the industry which contributes 4.1 billion dollars to the Maine economy. The metals industry (precision manufacturing) includes metal casting, fabrication and machining and it is Maine's 4th largest employer with over 20,000 employees industry-wide. There are approximately 600 metal manufacturers throughout the state. The industry's average annual sales are nearly $4 billion, making the industry a primary factor in Maine's economy.

On April 23, 2001, approximately fifty representatives of the metals and forest products industries attended a workshop following the Compact signing with Governor King and DOE Deputy Assistant Secretary Swink. The workshop provided an opportunity for leading representatives of each of the industries to discuss issues around which to focus a Maine IOF program by:

- developing industry goals and objectives
- creating a set of "next steps" for moving forward to implement these goals and objectives with a time line for their completion and
- measurable guidelines to determine their success.

Following introductory presentations by Denise Swink and Del Raymond, Weyerhauser Corporation, and mentor to the Maine IOF program, the group divided into their industry sectors and participated in facilitated sessions.

In December 2001, industry leaders met once again to further map industry specific goals on energy, technology, transportation, environment, and workforce issues. Working groups from each industry sector were established. Each group reviewed potential roadblocks, solutions and the necessary tools to achieve identified goals. The goal of this process was to in the end create action plans from practical, short term, doable outcomes to long term strategies in areas of new products and process development and on technological innovations- thereby translating the industry vision into an agreed upon strategic and measurable agenda. Secondary market development for waste streams, improved efficiencies, reduced costs and alternative energy sources, improved R&D, technology development-deployment and a resource clearinghouse emerged as primary concerns cutting across all three of Maine's largest industries. A series of meetings and discussions with each sector followed to further develop action plans for each individual sector.

Maine Industries of the Future Partners

Environment & Energy Center (E2 Center) an affiliate of the Maine State Chamber of Commerce
Maine Manufacturers Extension Partnership (MEP)
Maine Metal Products Association
Maine Pulp & Paper Association
Maine Wood Products Association
Maine Department of Environmental Protection
Maine Department of Economic & Community Development
Maine State Chamber of Commerce
Maine State Planning Office
Maine Technology Institute
Northeast-Midwest Institute
University of Maine
University Of Southern Maine
US DOE – Boston Regional Office

Maine IOF Advisory Team

Michael Barden
Maine Pulp & Paper Association
Shirley Bartlett
Maine Department of Economic & Community Development
Greg Bazinet
University of Southern Maine
Julie Hashem
Maine State Planning Office
Scott Dunning
University of Maine
Anne Gould
SAPPI – NA Fine Paper
Jon Ford
Maine Wood Products Association
Scot Hutchins
U.S. DOE, Boston Regional Office
Lisa Martin
Maine Metal Products Association
Joseph Migliaccio
Maine Technology Institute
Paul Morrissey
Maine Department of Economic & Community Development
Joan Saxe
E2 Center
Terry Shehata
Maine MEP
Craig TenBroeck
Maine DEP
Bruce Tisdale
Mountain Machine Works
Suzanne Watson
Northeast Midwest Institute
John Wright
University of Southern Maine
Stephe Shaler
University of Maine

The ***Maine IOF*** program promotes best practices for immediate results and research partnerships with federal labs and universities for more long-term solutions. The long-term efforts provide a framework for identifying and pursuing joint research, development, demonstrations and outreach among the three industry sectors and the Maine University System for tomorrow. This provides the ideal three way combined efforts of private sector, university and research resources, and government.

The promotion of such best practices has occurred through Energy Expos held in the fall of both 2001 and 2002, where best practice workshops were provided, along with information on many new technologies and energy related issues.

The Maine IOF is managed by the Maine Manufacturing Extension Partnership and coordinated by the Maine Environment and Energy
Center (E2 Center) an affiliate of the Maine State Chamber. Partners in the initiative include the Maine Wood Products Association, Maine Metal Products Association, the Maine Pulp & Paper Association, Department of Environmental Protection, Maine Department of Economic and Community Development, Maine Technology Institute, Maine State Planning Office, the University of Maine System, University of Southern Maine, Maine State Chamber of Commerce, and key industries.

2. BEYOND 2002 - A Vision for the Maine Industries of the Future

2.1. Maine's Metal Products Industry

2.1.1. Overview

2.1.1.1. Executive Summary

The metal and precision manufacturing industry in Maine directly employs approximately 25,000 workers and exports $4.1 Billion gross products per year. The metal industry is a stable force in Maine's economy and is a leading industry in energy use in Maine. In 2001-2002, the Maine Metal Trades Association joined the Industries of the Future (IOF) to address some industry issues that prevent our industry from acquiring industry growth and prosperity.

Between April 2001 and April 2002, representatives of businesses working in the metal industry in Maine met to discuss ideas and options for strengthening the metal and precision manufacturing products sector in the state. They identified six issue areas, and based on these areas the industry made a series of recommendations.

2.1.1.2. Vision

By the year 2020, the metal industry in Maine will have the knowledge and tools to continuously use effective methods for addressing areas of development and productivity.

2.1.1.3. Historical Background

The metal industry has a long history in Maine. Possibly, the earliest commercial operation in Maine was the mining of bog iron in Newfield, a small-scale operation that continued for many years. A mining boom swept Maine from 1879 to 1882. Iron, silver, copper, lead, and zinc were mined, milled, concentrated, and smelted. Sporadic activity continued until 1918 when production of base metals in Maine ceased for almost 50 years.

During World War II, the US and Maine governments launched an intensive exploration program for manganese, an element on the War Department's "strategic list," that had been discovered in Aroostook County in the mid-1800's. Much attention was focused on Maine's coastal volcanic belt. From these efforts, part of an ore body estimated at 4.5 million tons was worked near Blue Hill in 1964-65. No metals have been mined in Maine since 1977. WW2 brought ship building capacity to Maine, although Maine is

renowned for building wooden and recreational boats. The industry has grown to include (but not limited to): metal fabrication, machine tool, tool & die, machinery manufacturing, foundry work, boat marine services finishing, testing and machinery repair.

Twenty-six percent (26%) of MMPA members have annual sales over $5 million, 45% average between $1-$4 million in annual sales and 29% have less than $1million in annual sales.

2.1.2. Action Plan Implementation

Based on meetings and conversations, this report identifies six areas where action is most needed if the metal industry is to grow and succeed in the future. For each of the areas, several goals are identified, along with Challenges and possible solutions.

Since the wood and metals industries have many similar issues, the two industry associations collaborated on the data analysis and the reports. As a result, readers of both reports will note similarities in language. These are intentional and provide additional emphasis for implementing this action plan. If the action plan is to be successful, a partnership with federal, state, and local entities, including government, industry, and academia is needed.

Implementation of the action plan to date has been overseen by the Maine Metal Products Association, with assistance from the Energy & Environment Center, the Maine Technology Institute, and the Maine Department of Economic and Community Development. Other partners in the initiative include the University of Maine System, the University of Southern Maine/Applied Science, Engineering and Technology (ASET), Maine Manufacturing Extension Partnership (MMEP) and several related trade associations.

2.1.2.1. Action

The action plans for the metal industry were developed with input and guidance from industry members. The following action steps will bring the metal industry closer to being a fully developed industry with growth, capacity and potential.

Technology	Waste/ Environment	Transportation	Energy/ Environment	Marketing
a Expand access and use of new equipment technologies in industry b Support industry specific R&D /technology c Leverage public/private funding for R&D d Link metal industry small business with computer technology resources (MESDA)	a Increase waste audits in metals industry businesses b Increase manufacturing improvements and efficiency c Encourage industry recycling d Improve waste and reduction recovery	a Explore transportation issues in industry b Create benchmarks for transportation issues and costs c Build relationships and collaborate on resources and aggregation concept d Grow in-state customer base	a Reduce energy use per unit of output b Collaborate on aggregation options with other trade associations c Develop Energy Management Systems d Research alternative energy opportunities	a Effectively market jobs in the metal industry to potential workers (students-dislocated workers-adults in transition-parents) b Change the image of manufacturing to attract workers c Sustainable funding sources for job force marketing d Workforce issues e Offer dependable career paths f Maintain a supply of qualified, well-educated workforce with Maine ethics g Safe, clean, environmentally friendly workplaces h Reclassify job categories for clarity

2.1.2.2. Participants

A group of leaders in Maine's metal industry and product manufacturing met over a period of two days to reassess these issues and trends affecting the status and the future for Maine's metal industry. As the industry association representing many of the constituents in the metal and manufacturing sector, the Maine Metal Products Association agreed to work with the metal products business community on further defining the vision and the action plan.

Participants – Metal Industry

Name	Organization
Duane Gushe	D&G Machine, Westbrook, ME
Bruce Tisdale	Mountain Machine Works, Auburn, Maine
Robert King	Steele & Marshall Thomaston, ME
Carl Gushee	Portland Machine Tool Services Gorham, ME
Bonita Pothier	I. Zaitlin & Sons, (subsidiary of Casella, Inc.) Biddeford, ME
Alan and Karen Lerman	E. Perry Iron & Metal Portland, ME
Lisa G. Martin	Maine Metal Products Assn.

The Table above lists those who have contributed and participated with the IOF process and will continue to provide input and guidance.

2.1.2.3. Immediate Next Steps

The industry recognizes that action and planning steps needed to be addressed within the next year by the metal manufacturing industry:

1. Organize a business forum with the Department of Energy's national laboratory's representatives and the Maine Metal Products Association members.

2. Strengthen relationships between industry associations, the university & college system, workforce and economic development providers and small manufacturing businesses to align services to small businesses.

3. Strengthen the industry cluster – by aligning the industry cluster's services and technologies for business-to-business (B2B) networking within the state.

4. Work with pioneering businesses to assist with new technologies that are available for manufacturing. These firms will be more efficient with materials use, energy efficiency and labor costs.

5. Actively promote the manufacturing sector to job applicants and Maine's youth as a way to attract and maintain qualified and skilled workers. Industry needs qualified employees who can operate the advanced equipment and support the needs of the customers.

6. Co-locate with related trade associations to develop business strategies in regards to the six (6) areas needed to grow and expand our industries. The trade association group will share resources, staff and statewide strategies to move ahead with our IOF agenda. This office will be located in the Greater Portland area, which is the economic center of the state.

7. Provide technical assistance to firms that produce energy or are interested in energy utilization and opportunities for combined heat & power. As noted earlier, the metal industry is a major recipient of energy resources in Maine.

2.1.2.4. Intermediate & Long Range Steps

To be successful in the medium term and in the long term, the metal industry needs to address several roadblocks. Some of the challenges relate directly to the work of this IOF initiative – improving industrial productivity, energy conservation, and waste reduction in the industry, increasing knowledge of best

practices, tools and initiatives, increasing efficiency in manufacturing and maximizing the revenues from solid waste products and shavings.

The metal industry sector wants to address issues that may be beyond the current IOF program.

- Change the public perception of manufacturing and jobs within manufacturing
- Educate the state's political leaders on major issues within our industry
- Challenge health care and workers compensation costs
- Find solutions to the demographic trends in Maine which show an aging
- population and out-migration of young people
- maintain a technically capable workforce through attracting, recruiting, and training young people to work in manufacturing.

2.1.2.5. Results Realized

For the metal industry sector, the IOF initiative is providing a forum to address common concerns and identify some of the immediate key issues for now and in the future. The IOF has showed that the metal industry is doing a fairly good job in the waste and environmental arena and needs more resources and guidance in the technology, energy and with workforce/marketing issues.

The IOF consortium is helping the leaders in the metal industry identify the issues and begin to address them. The metal industry is committed to work together with individual businesses, trade associations, educational institutions, service providers, political leaders and the public to make Maine a better place to live and work. On behalf of the metal industry association, our members and partners, we look forward to our future, together.

2.1.3. Issue Summaries

Workforce

Develop and keep a quality workforce

Challenges

- Flat, aging population
- Out-migration
- Not enough post-secondary education
- Cost sensitivity
- Distinction between new/vs. obsolete technologies
- Insufficient emphasis on technical education
- High credit hour costs
- In general low aspirations of students
- Not a resource problem
- Attitudes/marketing

- Communications problem not infrastructure
- Mother Power – heavy influence on career path choices
- Metals message fractionalized

Solutions

- Offer dependable career path
- Develop pride in work performed. **"I built that!"**
- Maintain a supply of qualified well-educated workforce with Maine work ethic
- Effective Marketing to potential workforce (students/parents/ guidance councilors/ displaced workers
- Sustainable fund sources for job force marketing
- Safe, clean environmental friendly workplaces
- Collaborative relationship in the industry
- Industry needs to reclassify by categories for clarity

Technology

Expand use and access to new manufacturing technology.

Challenges

- Lack of Best Practices being used
- Basic technological literacy and connectivity
- Infrastructure implications
- Major R& D initiatives
- Tools & equipment
- Manufacturing techniques
- Cumbersome infrastructure
  there is no "One Stop Shop" for business issues beyond entry-level problems

Solutions

- Clearing house issues
- Short term priority
- Leverage public/private funding
- Manufacture oriented bonds
- Cluster grants
- Tech transfer via associations
- Share tech resources among trade associations (perhaps a suite of trade assoc. offices. Pineland??)
- Use of best practices
- Become more informed with DECD Business Answers and connect with statewide Business Development Specialists

Energy

Costs must become competitive with rest of east coast, national, and international

Challenges

- Inability to import cheap power
- Untapped alternative resources
- Sense of little to no control over energy expenditures
- High in-state distribution costs
- Take Control of aggregated buying
- Alternatives
- Assess to natural gas
- Self generation -Cogeneration (combined heat and power)
- Biomass
- Wind/solar
- Hydro
- Fuel cells
- Nuke/fusion

Solutions

- Energy Conservation Division Energy Assessments
- Best Practices
- Energy management software

Transportation

Improved Transportation Systems

Challenges

- Lack of Efficiency, flexibility
- Heavy dependency on trucking, lack of understanding of
- intermodal transport systems
- Cost, reliability- (costs can be higher than [electrical] energy costs)
- Large out-of-state customer base
- Issues exacerbated by J-I-T expectations
- High People moving costs
- Supply chain implications

Solutions

- Industry pressure on transportation committee
- Investigate Intermodal freight shipment for cost and efficiency improvements
- Benchmark transportation costs
- Inbound material
- Outbound product
- People Moving - Short term – competitive air fares to and from Maine
- Aggregate resources/brokerage
- Grow in-state customer base

Waste/Environment

Long term waste sustainability
Reduce, re-use recycle

Clean waste stream

Challenges

- COST
- Correct image that metals shops are dirty
- Lack of secondary markets for "wastes"
- supply chain implications

Solutions

- Reduce waste
- In short term - waste audits
- Mid-range - continuous improvement toward sustainability
- Improved productivity
- Improve throughput
- Reduce costs

2.2. Maine's Secondary Wood Products Industry

2.2.1. Overview

2.2.1.1. Executive Summary

The solid wood industry in Maine directly employs around 12,000 people at facilities ranging in size from 1-450 employees. These facilities process about one-third half of the wood harvested in Maine, or around 1.5 billion board feet of wood per year. The logging and processing also yields over one million tons of chips which are used primarily as fuel in wood-to-energy facilities, producing 20-25% of Maine's electricity.

Between April 2001 and April 2002, representatives of businesses working in the wood industry in Maine met to discuss ideas and options for strengthening the wood and forest products sector in the state. They identified six issue areas, and based on these areas the industry made a series of recommendations.

2.2.1.2. Vision Statement

By the year 2020 the firms in Maine will be a market leader in the wood industry through continuous innovation and the deployment of diverse products, processes and services, all based on the use of Maine's wood resource and on the needs of our customers.

2.2.1.3. Background

Wood has been a part of the local economy since the British first came here over 300 years ago and claimed the tallest trees, which were needed as masts for their navy and

trading vessels. Today, the landowners in Maine earn about $240 million per year for the wood that is harvested off of their lands.

That wood is processed into many different products, and the value-added during that processing is more than $5 billion. According to the North East State Foresters Association, the value of shipments from Maine's forest products industry was over $5.6 billion in 1999.

The 1990's was a period of growth for the forest products industry. For businesses classified under SIC 25 for Lumber and wood products (primarily sawmills), shipments increased by 20% between 1992 and 1997. The value of shipments for furniture and fixtures (SIC 26) increased by two-thirds during this time period. Payroll also increased – up by one-quarter for lumber and wood products, and nearly three-quarters for furniture and fixtures, or three times the national average for SIC 26.

On April 23, 2001, the Governor, representatives from the Federal DOE and various state agencies and organizations, and leaders in the business community signed a compact in support of improved industrial productivity, energy conservation, and waste reduction in the forest products industry. An initial meeting was held that day to discuss issues and next steps.

In December 2001, a group consisting of a dozen or so leaders in Maine's wood processing and product manufacturing met over a two day period to reassess these issues and trends affecting the status and the future for Maine's wood industry. As the industry association representing many of the constituents in the wood manufacturing sector, the Maine Wood Products Association agreed to work with the business community on further defining the vision and the action plan.

2.2.2. Action Plan Implementation

Based on meetings and conversations, this report identifies six areas where action is most needed if the industry is to grow and succeed in the future. For each of the areas, several goals are identified, along with Challenges and possible solutions.

Since the wood and metals industries have many similar issues, the two industry associations collaborated on the data analysis and the reports. As a result, readers of both reports will note similarities in language. These are intentional and provide additional emphasis for implementing this action plan. If the action plan is to be successful, a partnership with federal, state, and local entities, including government, industry, and academia is needed.

Implementation of the action plan to date has been overseen by the Maine Wood Products Association, with assistance from the Energy & Environment Center, the Maine Technology Institute, and the Maine Department of Economic and Community Development. Other partners in the initiative include the University of Maine System, the Maine Forest Service, the Maine Forest Products Council, and several related trade associations.

2.2.2.1. Action

Each of the areas identified below are described more fully in an attachment, with a listing of selected challenges and solutions that relate to each group. This information was then used to make the recommended action items.

Technology	Waste/ Environment	Workforce Issues	Transportation	Energy/ Environment	Marketing
a R&D leading toward new products, processes & services b Incremental process improvements as well as "leaps forward" c Lean manufacturing & energy auditing d Coordinate DOE's Best Practices training and IAC assessments where appropriate and useful	a Improve utilization of by-products b Increase manufacturing efficiency c Increase use of environmentally benign/friendly chemicals d Maximize wood utilization	a Targeted training on manufacturing, marketing and management b Peer learning and pilot programs c Affordable health & workers compensation insurance	a Improve rail, highway & inter-modal shipping b Improvements in packaging and shipping methods	a Reduce energy use per unit of output (now at 3-5% of product cost) b Stabilize existing biomass facilities c Research on small, efficient systems to burn wood waste d New products/ services from "waste" energy e Coordinate DOE's Best Practices training and IAC assessments where appropriate and useful	a Product diversification & new products/product lines b Promote Maine-made wood products & services c Focus on value-added products & needs of our customers

2.2.2.2. Participants

This review process was overseen by representatives from Maine's diverse wood and forest products manufacturing industry. The Table to the right includes a partial listing of the people (and their firms) who were involved in the process.

Participants – Forest Products

Name	Organization
Mark Awalt	JSI Store Fixtures
Bruce Bornstein	Isaacson Lumber
Leon Favreau	Bethel Furniture Stock
Eric Howard	Maine Wood Products Association
Roger Johndro	Solon Manufacturing
Thom Labrie	Auburn Machinery
Wil Lamarre	C.F. Wells, Inc.
Peter Lammert	The Maine Forest Service's Marketing and Utilization Program
Tim McIntyre	Thos. Moser Cabinetmakers
John Oliver	Brown Wood
Jimmy Robbins	Robbins Lumber
James Taylor	James M. Taylor & Co.
John Wentworth	Moosehead Manufacturing

2.2.2.3. Immediate Next Steps

The group recognized that certain steps needed to be taken in the next twelve months to facilitate action by the wood manufacturing industry.

1. Strengthen relationships between industry associations, the university & college system, service providers, and small manufacturing businesses so that the small firms have access to the best available technologies and management systems.
2. Strengthen the industry cluster – the manufacturing firms and suppliers that form a web through their business ties, yielding manufacturing firms that have a competitive advantage over firms elsewhere in the world.
3. Actively work with the most innovative firms and help them adapt new technologies that are available for manufacturing. This is needed so that the firms can be more efficient in their manufacturing in terms of materials use, energy efficiency and labor costs.
4. Work with smaller firms on strengthening their relations with their customers for the purpose of developing new products and selling existing products. Firms must realize that they are part of the global market, and
5. must set their prices based on the world market, not the local demand. A related issue is better utilization of the "Made in Maine" brand.
6. Actively promote the manufacturing sector to job applicants and Maine's youth as a way to attract and maintain qualified and skilled workers. This is needed because the industry needs qualified employees who can operate the advanced equipment and support the needs of the customers.
7. Co-locate with like-minded trade associations so that the associations and their members can benefit from a broader pool of knowledge. This office will be in the Portland area, which is the economic center of the state.
8. Provide technical assistance to firms that produce energy or are interested in energy utilization and opportunities for combined heat & power. As noted earlier, a significant share of Maine's energy comes from wood-powered plants.

2.2.2.4. Intermediate & Long Range Steps

To be successful in the medium term and in the long term, the wood manufacturing industry needs to address several roadblocks. Some of the challenges relate directly to the work of this IOF initiative – improved industrial productivity, energy conservation, and waste reduction in the forest products industry.

1. Increasing knowledge of best practices, tools and initiatives
2. Maintaining a technically capable workforce and recruiting young people to work in manufacturing.
3. Increasing efficiency in manufacturing and maximizing the revenues from solid products, shavings, chips, bark, sawdust, etc.
4. Finding ways to direct individual trees to certain production lines, and thereby get the most from each tree in terms of adding value.

The wood manufacturing sector has several issues which may fall outside of the current purview of the IOF program.

1. Changing the public perception that cutting trees is bad
2. Educating political leaders on major issues within our community
3. Finding solutions to health care costs and the demographic trends in Maine which show an aging population
4. Recruiting talented people to live and work in rural communities.

2.2.2.5. Results Realized

For the wood manufacturing sector, the IOF initiative provided a means for businesses to come together to discuss issues of common concern and identify some of key issues for the coming years. The initiative demonstrated that different components of the forest products industry are highly interconnected – lumber, pulp & paper, and secondary manufacturing. There is a high degree of both horizontal and vertical relations within the industry, and because of those connections, we need to work together.

The IOF leadership helped the leaders in the wood industry identify the issues described in this and begin to address them. The wood manufacturing industry is committed to work together with individual businesses, trade associations, educational institutions, service providers, political leaders and the public to make Maine a better place to live and work. We look forward to taking the necessary steps.

2.2.3. Issues Summaries

Technology
R&D leading toward new products, processes & services
Incremental process improvements as well as "leaps forward"
Lean manufacturing & energy auditing

Challenges
- Lack of basic technological literacy
- Lack of information on best practices
- Lack of investment capital – firms not investing in new technology
- Many small firms were created to sell one product – that is their focus
- Energy costs are not a significant part of the firm's operations
- Most new technology comes from out of state
- Local staff unable to service and repair advanced equipment

Solutions
- Information exchange via industry associations
- Promote best practices
- Better promote existing assistance programs
- Maine Technology Institute Cluster enhancement awards
- Training center that addresses new technology as well as basic familiarization with existing technologies

- Support and promote smaller firms who can service others (e.g. one small nimble firm does CNC work for other firms).

Workforce Issues

Targeted training on manufacturing, marketing and management
Peer learning & pilot programs
Affordable health & workers compensation insurance

Challenges

- Flat, aging population
- Out-migration of youth
- Population is dispersed – no population centers for offering training
- Perceived lack of strong work ethic in younger workers
- Insufficient emphasis on technical education in schools & higher ed.
- Industry not marketing itself well to youth
- No private sector champions
- State-supported training often focus on new hires
- Diversity of companies have different training needs
- Workers have technical knowledge, but no management knowledge
- Few women in management

Solutions

- Career awareness – familiarize people with the opportunities
- Offer dependable career paths
- Develop pride in work performed
- Get industry leaders involved in the schools – Maine TREE program
- Effective marketing to potential workforce – students & parents
- Collaborative relationships among businesses
- Identify industry leaders and promote their actions
- Apprenticeships

Waste/Environment

Increase manufacturing efficiency
Improve utilization of by-products
Increase use of environmentally benign/friendly chemicals
Maximize wood utilization

Challenges

- Firms not investing in lean manufacturing
- Valuable wood is chipped – an easy activity, but with little added value
- Availability of quality wood resource in the future
- Narrow-minded firms focus on a limited number of products, so trees don't always go to the highest and best use
- Resources are wasted because of a lack of innovation in terms of new processes, products and markets

Solutions

- Quality control
- Increase worker productivity
- Support small manufacturers and artisans who can use by-products from larger firms
- Support technology innovations to improve wood utilization
- Product diversification & new products/product lines
- Promote Maine-made wood products & services
- Focus on value-added products & needs of our customers

Transportation

Improved rail, highway & inter-modal shipping
Improvements in packaging and shipping methods

Challenges

- Maine is at the end of the line
- Companies poorly served by shipping firms
- Products are easily damaged during shipment
- Rural roads are in poor shape
- Lack of opportunities to back-ship (paper companies ship product away, but there is nothing to bring to Maine in the empty containers)

Solutions

- Share information on shipping success stories
- Support existing shipping cooperatives
- Use our location a competitive advantage – for marketing, for trade with Canada, for trade with Europe.

Energy / Environment

Reduce energy use per unit of output (now at 3-5% of product cost)
Stabilize existing biomass facilities
Research on small, efficient systems to burn wood waste
New products/services from "waste" energy

Challenges

- Energy is not a significant part of the cost of doing business
- Firms do not explore options for new products/services
- Developments outside of Maine have a large impact in the state
- Biomass option is influenced by regional electricity costs

Solutions

- Technical assistance
- Wood-to-energy pilot programs at smaller mills

Marketing

Product diversification & new products/product lines

Promote Maine-made wood products & services
Focus on value-added products & needs of our customers

Challenges

- Our products are expensive – high cost of doing business
- Foreign competition – low wages, subsidized raw materials
- Unbranded products
- Little state funding for promotion
- Many firms not innovating
- Firms sell to brokers – not end user
- Low-quality and low-valued added products are common
- Competition from steel, plastics, and others
- Most sales within State or NE region.

Solutions

- Dedicated funding for market promotion
- Increase education & skills of workforce & owners
- Management training - entrepreneurship
- Lower the cost of the product – better utilization of people & materials
- Better and more use of the "Maine" brand and other niche brands
- Better customer service

2.3. The Pulp & Paper Industry

2.3.1. Overview

2.3.1.1. Executive Summary

The pulp & paper industry in Maine directly employs nearly 15,000 workers and comprises approximately 4.5% or $1.45 billion of Maine's Gross State Product. The total direct and indirect economic impact attributed to the industry was over $ 1 billion dollars in 2001. There are approximately thirteen pulp & paper mills in the state. Many of these mills are owned by large international firms that are already participating in the Federal DOE Industries of the Future Program.

Maine's pulp and paper industry produces some of the finest paper in the world. Its broad range of products include: high quality writing paper, business papers, technical and specialty papers, tissue products, coated papers for publishing commercial printing papers uncoated groundwood papers coated groundwood papers, paperboard, coated woodfree paper, newspaper, label facing papers, packaging and more.

Between April 2001 and July 2002, representatives of businesses working in the pulp & paper industry in Maine met to discuss ideas, options and a vision for the industry. Further, mill managers and plant energy mangers were interviewed to review and critique the working groups report.

2.3.1.2. Vision

In the year 2020 the Maine Pulp & Paper Industry will be a global market leader through continuous innovation/deployment of diverse products and processes, with sustainable use of natural resources, working in partnership with government, industry and academia.

2.3.1.3. Historical Background

In 1886 wood pulp was first produced beginning the development of the paper industry in Maine with the establishment of such companies as SD Warren, The Great Northern Paper Co. and International Paper.

Today, Maine's Pulp & Paper companies face a variety of challenges if the industry is to remain competitive in Maine; among them are increasing competition form imports, regulatory and tax burdens, rising energy costs and internal competition for capital expenditures.

The superior competitive position enjoyed by U.S. paper producers for many years has gradually eroded due to a number of factors, including the growth of imports and the strong U.S. dollar. For example, Coated free sheet imports have tripled since the mid-90s, routinely running 75,000-95,000 tons per month. Exports of coated free sheet over this same time period have remained flat. The relatively strong dollar makes these imports less expensive and more attractive. In addition, for the last several years, the industry in the U.S. has not earned its cost of capital, and with management under pressure to produce financial returns, new capital investment in coated free sheet has trailed that of Europe and Asia. The result of this phenomenon is that the U.S. is at a competitive disadvantage as our machines, on average, are smaller and slower. Further, the economic recession and drop in consumer confidence leads to a drop off in advertising spending, making magazines and catalogs thinner and reducing demand for coated paper.

Despite these and other factors, most analysts predict sustained recovery for the U.S. economy and the paper industry through 2003-2004. Demand is expected to rebound and the dollar is expected to continue to weaken against other currencies, giving U.S. paper producers a competitive advantage.

However, the industry has seen major consolidation over the past 5 years. There will be a continuation of that consolidation with fewer mills, both in North American and globally, owned by fewer companies.

2.3.2. Action Plan Implementation

2.3.2.1. Action

Based on meeting and interviews five issue areas were identified, goals, action plans and recommendations were then made. Each of the identified areas has selected challenges and solution that relate to each group listed at the end of this section. That information was used to make the recommended action items.

Technology	Workforce/ Environment	Energy	Transportation	Waste/ Environment
a Expand use and access (Information Clearinghouse) b Advance R&D and Deployment of new R&D/technology c Develop new/different raw materials d Diversify Products/Proces ses e Leverage public/ private funding for R&D f Utilize Best Practices	a Incorporate Smart Production/ Sustainability throughout Industry Research b Current models of Smart Production/Sustain ability c Educate industry/workers d Sustain livable wages	a Produce, export and sell energy b Influence public policy regarding energy cost structure/transmissi on research c Alternative energy opportunities	a Improved rail, highway & inter-modal shipping systems b Research current status and needs c Educate public/politicians about the need	a Promote Industrial Recycling b Promote R&D and pilot projects using waste/by-products c Research secondary markets for waste/by-products d Continuous improvement toward sustainability

2.3.2.2. Participants

Representatives from Maine's Pulp & Paper Industry oversaw this review process. The Table to the right includes a partial listing of the people (and their firms) who were involved in the process.

Participants – Pulp & Paper Industry

Name	Organization
Richard Arnold	Fraser Paper Co.
Michael Barden	Maine Pulp & Paper Association
Roy Barry	Madison Paper Industries
Douglas Daniels	SAPPI NA – Somerset Mill
Lou DeRose	Eastern Fine paper, Inc.
Scott Dunning	University of Maine, Maine IOF Team Member
Anne Gould	SAPPI NA – Somerset Mill
Tom Howard	DOMTAR – Formerly Georgia Pacific
Rosaire Pelletier	Fraser paper Co.
Glen Poole	International Paper Co.
Wendy Porter	Interface Fabrics, Inc.
Del Raymond	Weyerhaeuser Co.
Craig TenBroeck	Maine DEP
Richard Tracy	SAPPI NA - Somerset Mill
Suzanne Watson	Northeast Midwest Institute
Ralph Webber	Georgia Pacific
John Williams	Maine Pulp & Paper Association

2.3.2.3. Immediate Next Steps

The industry recognizes that action and planning steps need to be addressed within the next year. Identifying issues that cut across all three-industry sectors and acting upon those would be the most appropriate plan.

1. Develop an information clearinghouse to allow companies to share (where appropriate and non-propriety) information and ideas about process and energy efficiency and environmental pollution prevention technologies.
2. Promote and provide Best Practices training opportunities within the industry. Encouraging efficient systems that not only saves electricity and money but those which can afford better process control.
3. Promote R&D within the university system and leveraging of federal funding for R&D.

2.3.2.4. Intermediate & Long Range Steps

To be successful in the medium term and in the long term, there are steps the industry can take to improve efficiency. Most of the steps relate directly to the work of this IOF initiative – continual and improved relationships with the University R&D resources and help to create a Center for Excellence at U Maine for all Maine companies and the industry nation wide, bring DOE resources to the industry – Best Practices tools and seminar, plant assessments and potential funding opportunities for new R&D and technologies to Maine, encourage continued and increased participation from the Pulp and Paper industry in Maine IOF, develop & increase networking opportunities, work within the Maine IOF to identify transportation efficiencies that could help all sectors of industry and collectively maintain a larger voice for industry needs in the state.

2.3.2.5. Results Realized

For the Pulp & Paper industry, the IOF initiative provided a forum to discuss important issues unique to the mills in Maine, appreciate available opportunities and resources and have a better understanding of a state based IOF program.

2.3.3. Issues Summaries

Technology
Advance R&D and deployment for new R&D.

Challenges
- Lack of money
- Lack of knowledge of potential resources
- Lack of "idea Clearinghouse

Solutions

- Double investment
- Private/public partnerships
- Industry wide effort
- More money provided by government

Workforce/Environment Issues

Incorporate Industrial Ecology into the Industry

Challenges

- Integrating into core value of the business
- Initial cost for training and implementation
- New equipment costs

Solutions

- Offer dependable career path
- Develop pride in work performed- "I built that"
- Effective marketing to potential workforce – students & parents/guidance councilors/displaced workers)
- Industry needs to reclassify by categories for clarity

Waste/Environment

Develop Product waste streams (By-Products)

Challenges

- Public Acceptance
- Government regulations
- Public relations nightmare

Solutions

- Promote Industrial Recycling – fly ash-use for odor cont4rol or alternative use
- Sludge alternative
- Use pilot projects to point out success stories in future

Transportation

Improved transportation Systems

Challenges

- Lack of money
- Public opinion
- Environmental concerns
- Lack of rail access
- Politics

Solutions

- Money
- Political message
- Get accurate information, prioritize it and educate the public

Energy / Environment

Become a net exporter of energy – sell it

Challenges

- Lack of Fuel efficiency technologies
- Expensive fuel sources incl. alternatives

Solutions

- Alternative fuels/renewables
- Change policies concerning energy cost structure/transmission

3. Cross Cutting Issues

Key needs and cross cutting issues unique to Maine and of equal concern to the multiple industry sectors participating in this exercise are evident.

Research and Development Needs

- R&D/Technology Development/Deployment is important to all 3 sectors. To accomplish this we need:
  - Public/private partnerships
  - Leveraging grant/bond money
- Support for industry specific R&D/technology
  - R&D leading toward diversification of Products/Processes & services
  - Higher-yielding, low-cost process technology
  - Incremental process improvements as well as "leaps forward"
- Secondary market development and R/ D for waste streams
  - One's By-product =someone's raw material –
  - Sludge reuse/recycling high importance
- Access to federal labs
- Develop new/different raw materials

Energy/Environment Issues

- Alternative – fuel/energy sources
- Closed cycle manufacturing

- Energy – reduce costs
- Improved efficiencies
- Use of alternatives
- Secondary market development for waste streams
- New products/services from "waste" energy

Resource Clearinghouse

- Tech transfer
- Access to alternative transportation
- Energy aggregation
- Business to business resource sharing
- Innovations & Inventions
- Mentoring
- GAP identification
- Industry success and failures

Workforce Issues

- Improve the Image of manufacturing
- Attracting people into
- Education/employment system
- Career paths
- Targeted training on manufacturing, marketing and management
- Peer learning & pilot programs

Partnership Development

- Public/private
  - Education
  - R&D
  - Inter-industry/ intra industry
- Marketing
- Resource leveraging
- Public/private partnerships–
  - Leveraging grant/bond money

Marketing Issues

- State wide marketing efforts
- Good & products
  - Promote Maine-made products & services
- Industry/citizens
- Waste stream By-product
- Secondary markets

4. Next Steps

The Maine Industries of the Future (OIF) program has successfully implemented the visioning/roadmapping process. This success has led the coalescence of a model state

IOF program that is now regarded as an important program in the state's overall energy and economic development strategies. The Maine IOF program is now prepared to take the IOF initiative to next level by achieving the following objectives:

- Assist the IOF industries in implementing their roadmaps
- Facilitate the identification and pursuit of IOF research and development activities taking special consideration to cross cutting opportunities
- Continue promoting DOE OIT products and services

The Maine Manufacturing Extension Partnership (MEP) will continue to provide strategic and management support for the Maine IOF Program which operates as a true collaborative in which all private and public sector partners have joint ownership in the program and its direction. No single organization or firm owns the program, but they all own the principles of the federal IOF and its market focus on helping the state's energy intensive industries access technologies and other resources that will result in energy conservation, pollution prevention and productivity enhancement.