**Scope**

This report includes environmental indicators for facilities owned or solely operated by the Pechiney Group. It also captures the information of certain other facilities based on the percentage of equity interest owned by Pechiney (e.g. Tomago Aluminium Company, Aluminerie de Bécancour Inc., Queensland Alumina Ltd., etc.). However, the Pechiney Nederland facility, in which Pechiney has an 85% interest, is included for 100%. Thresholds are established for each indicator. If the threshold is not attained, the facility is excluded (the thresholds are determined so as to avoid any significant impact on the representative character of the indicators). These are presented in the appendix.

Certain indicators are expressed per metric ton of aluminum. They only concern the production of alumina and primary aluminum. Emissions at the alumina stage are accounted for assuming that all the alumina consumed (1.92 metric tons per metric ton of aluminum) is produced at Pechiney plants.

Health and safety indicators concern facilities solely operated by the Pechiney Group or in which it has a majority interest.

In particular, for the year 2002, the indicators include Eurofoil (aluminum conversion) and Soplaril (plastic packaging), which became part of the Group in 2001. The Tomago smelter is accounted for on the basis of the Group’s 51.55% equity interest. The indicators should be considered in terms of changes in the Group’s consolidation.

In addition, it should be noted that in compliance with international protocols on greenhouse gases, changes in the Group’s consolidation may result in retroactive adjustments in greenhouse gas emission values.

**Preamble**

This document is not a sustainable development report, although Pechiney subscribes to this approach and is involved in specific projects. Certain accomplishments presented in this report reflect the Group’s commitment to sustainable development.

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1. Message from the Chairman
2. Pechiney in 2002
4. General policy, organization and resources
8. Ensuring safety, protecting health
14. Reducing the impact of our activities on the environment
22. Contributing to sustainable development through our technologies and products
Several incidents at a small number of smelters unfortunately resulted in a rise in greenhouse gas emissions in 2002, but we are confident that we can attain our objectives. Two major projects will help – the modernization of our facility in the Netherlands, which will reduce emissions by 60% while increasing capacity by 25%, and the project to build the first smelter using AP50 technology, in which emissions per metric ton of aluminum produced will be some of the lowest in the world.

We have also made progress in certain other areas, primarily air, water and waste management. We lowered fluorine emissions by 5% and our consumption of freshwater by 9%. We have made a major step forward in recycling, together with our partners, by introducing specific equipment to recycle aluminum conversion machining scrap and plastic packaging waste, for example, and by finding industrial uses for recovered bauxite and cathode residue in primary aluminum.

Our objective for 2003 is to continue to advance by pursuing implementation of the Pechiney Continuous Improvement System with commitment and determination. The results achieved in safety demonstrate its efficiency. Safety and health in the workplace and the protection of the environment are everyone’s business in the Group. I know I can count on the mobilization and spirit of responsibility of our teams to develop activities in a dynamic of sustainable development, to the benefit of all Pechiney stakeholders.

On behalf of Pechiney’s Board of Directors, I would like to thank the Group’s employees for their commitment.

Every industrial activity involves risks. It is up to us to measure, prevent and reduce them by mobilizing scientific and technical capabilities, developing our ability to innovate, improving our production systems and organizations, and promoting a safety-conscious culture of vigilant behavior in all our teams. It is also up to us to convince our customers and partners of the opportunities offered by our technology, products and services.

The year 2002 presented many difficult challenges, but it also provided us with a major motive for satisfaction in a field that is at the top of our list of priorities: safety in the workplace. Pechiney’s lost-time rate, per million hours worked (TF1) was reduced by 30%. Measuring the total incidence rate, per million hours (TF2), the Group reported progress in safety of more than 10% in the Aluminum sector and of more than 40% in the Packaging sector. This performance shows how committed our teams are. Fifty-eight facilities have reached the Group’s medium-term objective of a TF2 of less than 7.

In the fields of occupational health and public health, we have continued to improve risk control through initiatives launched by Pechiney professionals, including accurate measurements of exposure, strict risk management procedures and elimination of the most hazardous substances whenever possible. In addition, the remarks and recommendations of the Group’s independent medical and toxicological council make a major contribution to the scientific watch Pechiney organizes in these fields.

With regard to the environment, we pursued our ISO 14001 certification program, and seven additional facilities were certified for a total of 25 plants. This brings the percentage of insured assets covered by this designation to 38%, in line with objectives.

In France, we announced a new voluntary commitment to reduce direct greenhouse gas emissions, a primary objective of our environmental policy. This goal targets a reduction of 23% in emissions from 1990 levels for 2003-2004 and of 33% for the period 2005-2007. This initiative boosts our efforts to achieve a 15% reduction in global emissions by 2012, as we promised when we joined the Partnership for Climate Action.

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Jean-Pierre Rodier
Chairman and Chief Executive Officer
Pechiney in 2002

- **Work force**: 34,000
- **Industrial investments**: 580 million euros
- **Net sales**: 11.9 billion euros
- **Research and development**: 90 million euros

### Primary Aluminum

- **16% of the Group’s net sales**
- **Work force**: 8,650

**Products**
- Bauxite, metallurgical and technical alumina
- Primary aluminum: ingots, billets, slabs, machine wire, foundry alloys and specialty products
- Secondary aluminum
- Silicon, ferrosilicon, calcium silicide, inoculants, nodularizers
- Electrofused products (white and brown corundum)
- Sale of technology and equipment

**Main markets**
- Aluminum production and conversion industries, ground, aerospace and sea transport, construction, packaging chemicals (silicones), light alloys, foundry, steelmaking, abrasives and refractories

**Countries**
- Australia, Cameroon, Canada, France, Germany, Greece, Mozambique, Netherlands, South Africa

### Aluminum Conversion

- **22% of the Group’s net sales**
- **Work force**: 8,000

**Products**
- Can stock and sheet for automobiles, standard sheet products, foil and thin foil
- Technical rolled products: heavy, medium and thin sheet for aerospace and industry
- Bars, sections, finished and unfinished soft aluminum alloy extrusions, bottles, tubes and hollow bodies
- Specialty products: circles, precoated sheets, bright sheets, Rubanox refrigeration panels, etched and anodized foil for capacitors, continuous cast wire rod
- Secondary aluminum casting alloys
- Sale of technology: continuous casting and foundry equipment

**Main markets**
- Cans, automotive, aerospace, ground and sea transport, construction, mechanical engineering, boilermaking, electronics, home appliances, cookware

**Countries**
- Belgium, France, Germany, Luxembourg, United Kingdom, United States

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**Breakdown of net sales in 2002**

- **by business**
  - 16% Primary Aluminum
  - 22% Aluminum Conversion
  - 20% Specialty Packaging
  - 42% International Trade

- **by geographic region**
  - 42% France
  - 15% Other Europe
  - 30% North America
  - 13% Other regions

**Breakdown of work force in 2002**

- **by business**
  - 25% Primary Aluminum
  - 25% Aluminum Conversion
  - 48% Specialty Packaging
  - 2% International Trade
  - 1% Holding

- **by geographic region**
  - 50% France
  - 19% Other Europe
  - 20% North America
  - 11% Other regions
Specialty Packaging

20% of the Group’s net sales  
Work force 16,150

Products

- Flexible plastic packaging: single- and multi-layer plain and printed plastic films, laminations, pouches, bags, lidstock and thermoformed trays, multi-layer plastic bottles
- Caps and overcaps for wines and spirits
- Collapsible plastic, laminated and aluminum tubes, service caps
- Seamless aluminum aerosol and spray cans, aluminum bottles
- Compacts, cases for powder and creams, jars, caps, dispensers, applicators, mascara cases, lipstick, eye-liners, bottles, trim parts for bottles and dispensers, samples and accessories for perfumes and cosmetics

Main markets

- Food, beauty, personal care and healthcare

Countries

- Argentina, Brazil, Canada, China, Czech Republic, France, Germany, Indonesia, Italy, Mexico, Morocco, New Zealand, Poland, Portugal, Spain, United Kingdom, United States

International Trade

42% of the Group’s net sales  
Work force 770

Activities

- Trading of bauxite, alumina, aluminum, copper, non-ferrous concentrates and metals
- Network of agencies selling the Group’s products and the products of other principals
- Distribution of semi-finished aluminum and stainless steel products

Countries

- A network of 40 agencies serving 65 countries

North America

- 6,700 employees
- Canada, Mexico, United States

Europe

- 23,500 employees
- Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Hungary, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Spain, Sweden, Switzerland, Turkey, United Kingdom

Other regions

- 3,800 employees
- Argentina, Brazil, Chile, Peru, Venezuela

- Algeria, Cameroon, Central African Republic, Congo, Egypt, Gabon, Morocco, Mozambique, South Africa, United Arab Emirates
- Australia, China, Indonesia, Japan, Mongolia, New Zealand, Philippines, Singapore, South Korea, Taiwan, Thailand
General policy,

organization and resources

Pechiney puts health, safety and environmental protection at the heart of its strategy and at the top of its list of priorities. The development of its Environment, Health and Safety (EHS) Policy is part of the Pechiney Continuous Improvement System, one of the Group’s drivers.

Pechiney is committed to applying and implementing eight main guidelines throughout the Group (see page 5). To honor this commitment, Pechiney works with all its stakeholders. The Group promotes employee involvement at all levels and is introducing a risk management system for environmental protection, safety and health at its principal facilities. This system makes it possible to organize progress planning, achievement and continuous improvement; define each employee’s responsibilities; train the work force; and inform suppliers of the requirements of the Group’s business units. The Company also measures progress on a regular basis, conducts periodic audits to detect and correct deviations, and facilitates the sharing of best practices.

A dedicated organization

Operating under the authority of Pechiney’s Executive Committee, the Environment and Industrial Safety division is responsible for defining Group policies in terms of environmental protection, health, and personal and industrial safety. It agrees general methods, objectives and programs to promote the development of these policies.

The Environment and Industrial Safety division:
- determines and helps implement fundamental requirements and processes common to the Group in risk management and performance measurement;
- monitors compliance through a network of correspondents and Group audit programs;
- ensures the Group’s industrial safety, provides financing, and monitors and manages technological risks through programs set up with the Company’s insurers;
- organizes the work of the Group’s Scientific and Medical Council, composed of outside experts;
- assists the Group and its operating sectors in acquisitions, divestitures and management of former production sites.

The Group’s operating sectors are responsible for defining and implementing corporate policy while taking into account the specific characteristics of the activities they oversee.

The sectors have introduced structures to manage their environmental, health and safety policies in a coordinated manner through a dedicated division or an EHS steering committee. Each facility adopts an organization that is adapted to its operations and size.

EHS days are organized by the Environment and Industrial Safety division every two years. They bring together EHS network coordinators and Group managers to share best practices, learn more about current subjects and work together on priority topics. Outside experts are invited. These days also provide the opportunity to highlight progress initiatives and the contribution of the best EHS professionals.
1. **Ensure** transparency in issues concerning environmental protection, health and safety, in particular by evaluating and publishing achievements and performances measured by selected indicators applicable to the Group’s activities.

2. **Guarantee** regulatory compliance of operations and facilities, as well as compliance with the internal standards the Group has developed to align its practices.

3. **Promote** continuous improvement of employees’ health and safety conditions and those of Group subcontractors.

4. **Reduce** any negative environmental impact of the Group’s past, current or future activities as well as of its products, by limiting emissions and waste, optimizing processes, managing the risk of accidents, remediating any damage, and developing partnerships with customers and suppliers.

5. **Develop** products that are more environmentally friendly by analyzing their life cycles, from design to recycling.

6. **Implement** the best available and most economically viable technology in new investments and the best environmental practices throughout the Group.

7. **Manage** industrial risks through efficient identification and ranking procedures, as well as by the implementation of appropriate prevention and protection measures, and their ongoing adaptation.

8. **Organize** a scientific health watch activity to detect and control new risks.

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**Pechiney, a partner in organizations and recognized programs**

Pechiney participates in several initiatives and programs created to address global warming and, more generally, promote sustainable development.

- Pechiney is a member of the French association Entreprises pour l’Environnement (EPE). Created in 1992, EPE promotes its members’ initiatives for sustainable development, and particularly in the environmental field. Pechiney’s Chairman and Chief Executive Officer, Jean-Pierre Rodier, was named EPE’s President in 2002.

- Pechiney participates in the Aluminum for Future Generations (AFFG) program launched in 1998 under the aegis of the European Aluminium Association (EAA). Through this program, the Group works to keep channels of communication open with all interested parties to enhance the environmental performance of the aluminum industry and its products.

- Pechiney is a member of the Global Compact initiative launched by the United Nations. This group federates corporations, UN entities, labor organizations and representatives of the civil society around nine universal principles related to human rights, labor practices and environmental standards.

- Pechiney participates in the Global Aluminium Sustainable Development Initiative launched in 2002 under the aegis of the International Aluminium Institute (IAI). This program was created to define and publicize a set of common indicators for the aluminum industry and to commit to concrete objectives.

- Pechiney is a member of the Partnership for Climate Action (PCA) created in 2001 under the aegis of the Environmental Defense association. Within this framework, the Group has made a commitment to reduce its greenhouse gas emissions worldwide.

- Pechiney is a member of the Association Française pour la Réduction de l’Effet de Serre (AERES). Created in 2002 with the support of public authorities, AERES coordinates and validates its member-companies’ voluntary and quantified commitments to reduce greenhouse gas emissions. AERES has the power to sanction members that do not respect their commitments.
Workplace safety
An absolute priority, safety is a criterion by which to evaluate management at all levels in the Group. The Pechiney Continuous Improvement System is a key factor in bettering results in this area. Pechiney implements an active prevention policy with regard to industrial risks based on a visible commitment by management, employee mobilization, and clear principles of organization. Annual and multi-year action plans are developed, implemented and updated by safety committees at the level of the operating divisions and of each facility.

Two types of tools make a decisive contribution to improvements in safety:
- standards which determine minimal requirements for a business or a specific risk;
- audits on the safety system, standards and workplace practices.
The group of safety coordinators in the operating sectors assists in applying these tools and sharing experiences. Results with the most impact are rewarded.

Health in the workplace
Action programs to ensure healthy working conditions are coordinated by a network of physicians. A risk evaluation system, codified in a guide on occupational health risks, has been in effect since 1997.

Periodic evaluations make it possible to set priority objectives and develop multi-year improvement plans at the sector level and then in the facilities. The sectors have defined health standards in certain areas, some of which are common to the whole Group, including asbestos and refractory ceramic fibers, noise, chemical products, polycyclic aromatic hydrocarbons (HAP) and Legionnaires’ disease.

Public health and scientific watch
An independent medical and toxicological council comprised of 12 qualified scientists and doctors advises the Group on work and public health issues related to manufacturing activities and products. Cooperation agreements have been signed with organizations such as INSERM (French National Institute of Health and Medical Research) and INRS (French National Institute of Research and Safety). In addition, Pechiney participates in the scientific health watch launched by the Health Committee of the International Aluminium Institute (IAI), in liaison with the Institute for Basic Research of New York, Yale University and certain inspection firms.

Public health issues that concern specific industrial facilities are addressed locally. Evaluations of the impact of emissions on the health of local populations are the subject of specific studies by health and environmental authorities using standardized methods.

Prevention of industrial property risks
Pechiney advocates an advanced, standardized policy for the prevention of industrial property risks. The policy is based on the evaluation and ranking of risks, the identification and implementation of safety and surveillance measures required to guarantee workplace safety, the organization of rapid response in the event of an emergency and employee training through a program of regular exercises.

With regard to the risk of damage to equipment and facilities (fire, explosions, natural catastrophes), the Highly Protected Risks program meets the highest standards in terms of safety. This classification is granted by insurance companies, which evaluate the measures taken at industrial facilities. Regular inspections by insurance company engineers ensure a constant level of risk prevention and protection.

Seven Group facilities, five of them smelters, are subject to European Seveso 2 regulations, and their compliance contributes to the prevention of technological risks. Seven Pechiney facilities, five of them smelters, are concerned by these regulations. Most of these have also been certified ISO 14001, thereby facilitating the integration of new recommendations.

Environmental protection
A network of environmental experts assists Group facilities to introduce efficient and long-lasting management systems. Selected and developed by each unit through multi-year plans, the principal action programs help to reduce greenhouse gas emissions, preserve air quality and, more generally, all natural environments; prevent accidental pollution; increase energy efficiency; conserve water and raw materials; reduce and recycle effluents and waste; and remediate former production sites.
ISO 14001 environmental management

Since 1996, Pechiney has implemented an ISO 14001 certification program that involves a major effort to train employees. At the end of 2002, 25 facilities had been certified. Environmental protection management systems based on ISO 14001 standards are implemented in smaller plants. This is the case for 30 American facilities in the packaging sector since 1992. All of the Group’s American packaging activities now meet Maximum Achievable Control Technology (MACT) standards, which prescribe closer monitoring if Hazardous Air Pollutants (HAP) are utilized.

Fight against greenhouse gas emissions

Through the Partnership for Climate Action, Pechiney committed itself to reduce its direct emissions of greenhouse gases by 15% worldwide between 1990 and 2012. In France, pledges made by Group subsidiaries are part of this general commitment.


Eco-design and recycling

Environmental protection, reduced consumption of energy and raw materials, and product recycling are objectives from the design stage, and the Group makes an active contribution to product recovery after use.

Pechiney develops solutions directly and in partnership with customers to contribute to sustainable development – reduced environmental impact of aluminum production by using technologies proposed by the Group, increased energy efficiency and safety in automobiles and aircraft, longer protection and greater effectiveness of medicine, cosmetics and food thanks to oxygen-barrier packaging.

Investing in the environment: 21.1 million euros in 2002

The investment expenses discussed in this report concern those dedicated to environmental protection. They include funds earmarked to promote reduced consumption of energy and raw materials and the prevention of major risks, but exclude research and development costs. These capital expenditures totaled 21.1 million euros in 2002. The main investments targeted PNL’s new anode furnace (energy), a cell regulation system at Saint-Jean-de-Maurienne (reduction of PFC), the Compiègne smelter (reduced energy and dioxins), processing of silica fumes at Pietersburg in South Africa, reduction of odors, recovery of runoff water at QAL in Australia, and the modernization of a filter at Neuf-Brisach.

In 2003, Pechiney’s sectors plan to invest an equivalent sum.

Environmental provisions totaled 77 million euros as of December 31, 2002. They concern the expense of remediating the environmental impact of past and present activities. This figure incorporates a new provision for the elimination of equipment containing PCB (polychlorobiphenyl).

For all the sites identified where the Group could incur liability, Pechiney quantifies as accurately as possible the costs associated with potential remediation. Provisions are recorded as soon as costs become probable and reasonably estimable, for example, when competent authorities issue an order to perform remedial work.

The Group believes it has covered all the expenses relating to environmental remediation that were probable as of December 31, 2002. These provisions nevertheless depend on changes in legislation and regulations, which may lead to adjustments.
Priorities

- **Occupational safety and health** – Pechiney’s first priority
  Stringent standards and strong employee commitment at all levels for ambitious objectives

- **Public health and scientific watch** – the backing of an independent scientific council and constant monitoring of health conditions in the environment

- **Industrial safety** – an active prevention policy, Highly Protected Risks, and a strict management system for facilities at risk

Accomplishments in 2002

- Significant improvement in safety performance, particularly in the Packaging sector

- Introduction of a chemical products standard to enhance management of such risks throughout the Group

- Completion of the program to eliminate glycol ethers classified as potentially toxic for reproduction

- Partnership agreement with the government of Cameroon to help fight AIDS
Workplace safety

A daily priority

Human safety, which contributes significantly to the Group’s economic success, is considered an indicator on the same level as financial results. Pechiney has set ambitious medium-term objectives – to reduce the lost-time rate to 2 (TF1*) and the total incidence rate to 7 (TF2*). The ability to improve safety and react rapidly if a workplace accident occurs is a decisive factor in evaluating a manager’s performance.

Significant improvement

Throughout the Group, TF1* improved by 30% between 2001 and 2002, and TF2* by 24%. In 2002, no fatal accident was reported. The number of accidents resulting in lost time totaled 441, representing 7,114 work days lost, versus 9,601 days lost in 2001. In 2002, 73 facilities achieved a lost-time rate (TF1) of zero, and 45 attained Pechiney’s medium-term target (TF1 < 2 and TF2 < 7), 18 of which were manufacturing plants. The Tubes Europe division reported the best collective result with a lost-time rate (TF1) of 2.8 and a total incidence rate (TF2) of 7.8.

In the Primary Aluminum and Aluminum Conversion sectors, standardized tools have been introduced. Accident declaration and analysis procedures, standards for the prevention of major risks, safety training for managers, and each activity’s visible workplace standards (equipment and behavior) may be checked during shop inspections or plant audits and corrected immediately. In 2002, safety visits by management doubled, and five new standards were adopted, in addition to the four already audited regularly. The “safe professional gestures” method successfully developed by ADG has become a benchmark, both in and outside of the Group.

In the Packaging sector, the safety management system implemented since 2001 produced positive results in 2002. A steering committee was created at the sector level to develop standards, create networks of health and safety correspondents, and facilitate sharing best practices. Almost 6,000 internal audits were conducted using the sector’s new standards.

Ambitious objectives were set, in addition to the decision to freeze investments at facilities with a lost-time rate (TF1) of more than 20. Nine facilities were in this situation in 2001, but the measures taken have allowed them to reduce accident frequency drastically and to recover their investment funding.

* TF (taux de fréquence) are Pechiney indicators of safety performance that represent lost-time accidents (TF1) and total accidents (TF2) per million hours worked. In the United States, rates are calculated based on 200,000 hours worked.

** including temporary employment
"Passport for life" inspires safe behavior

Daily behavior patterns are a major factor in safety. To heighten employee awareness, the Issoire, France, plant, which manufactures heavy plate for aerospace applications, developed an innovative half-day program that involves:
- a collective analysis of accident situations based on video interviews of former accident victims; and
- a self-diagnosis tool to measure the safety behavior of each team and its manager.

The program leads to an action plan comprised of individual or team commitments that are posted in the workshops as a collective reminder. Several divisions have adopted a similar approach, including Aluminum Metal, Cebal Tubes Europe, Cebal Aerosols and Pechiney Capsules.

Inspired by the same dynamic, a French accident-avoidance program aims to promote best practices when it is a question of moving, driving and handling equipment.

Neuf-Brisach optimizes the presence of management at the plant

Having reported unsatisfactory safety results in 2001, i.e. a lost-time rate (TF1) of 14.3 and a total incidence rate (TF2) of 31.8, the Neuf-Brisach, France, facility launched a demanding action plan in 2002. Every manager, from the plant’s general manager to supervisors, dedicates an hour to safety per day or per shift, conducting audits or inspections to make sure tools are put away and clean-up done. These audits provide the opportunity to meet with operators in the workshops, heighten safety awareness, recognize best practices, and check to make sure recommendations and operating procedures are followed. Two time slots are reserved for safety, during which these managers cannot participate in other meetings.

The results are a lost-time rate (TF1) of 8.6 and a total incidence rate (TF2) of 19.4 by the end of 2001 and further improvement in 2002 with a lost-time rate (TF1) of 5.5 and a total incidence rate (TF2) of 15.9.

Mobilization at Techpack: accident frequency reduced by two-thirds in a year

Specialized in deluxe cosmetics packaging, Techpack reduced its lost-time accident rate from 20 to 7. This improvement came as a result of a plan launched in 2001 that did not compromise on safety and required management to set an example.

In the business, each meeting starts with a safety review. At plant level, managers systematically discuss safety issues with operators, and immediate action is encouraged. Every month, eight thematic inspections help detect risk situations and find solutions. Indicators posted in each workshop inform teams directly and rapidly of safety results and objectives.
PPP and safety:

a more systematic approach

In 2002, all Pechiney Plastic Packaging activities in North America introduced a new EHS management system. A steering committee was set up and standards established in four areas: safe professional gestures and practices, accident analysis, safety inspections, and safety audits. Business unit management participated in one of the training days dedicated to the new system. Results improved during the first year with a reduction of more than 50% in lost work days because of an accident and a decrease of more than 10% in the total number of accidents.

Golden Glove for Safety:

a Pechiney Soplaril Flexible Europe initiative

PSFE recognizes the achievements of one of its facilities every three months by awarding a Golden Glove for Safety, a trophy that represents the fact that the most frequent accidents in packaging involve hands. Five criteria are evaluated: improvement in behavior, level of safety results, progress, quality of teamwork, and assistance provided to other facilities.

Road safety CRV

For their work, CRV research and development employees based in Voreppe, France, travel throughout the world, and because CRV is located in the French Alps, transportation in and out of the region is usually by car. CRV’s management introduced a travel standard which aims to limit road risk by ensuring that employees prepare properly for the road trip and respect all traffic regulations.

In 2001, the 150 people who travel the most were trained in day-long sessions during which the main road safety issues were discussed, including driving rules, speed, safe distance, vehicle condition, seat belts, fatigue, stress, drinking and driving, and courtesy. In 2002, the work force was trained in four half-days. Finally, a dozen staff members participated in a practical program to demonstrate how difficult it is to control a vehicle on a slick surface and therefore how important it is to limit speed. Eighty percent of CRV’s work force attended these sessions.
In this way, Pechiney anticipated a new French regulation which makes it mandatory to monitor and report structures made of fibrocement and non-friable asbestos in buildings before December 31, 2005.

In France, the Group also organized thoracic CAT scans for employees exposed to asbestos in the past on the basis of the procedures proposed in 1999 by the national Consensus Conference. Almost 250 CAT scans had been conducted by the end of 2002. Within the framework of its general policy to evaluate risks linked to solvents, Pechiney eliminated the eight glycol ethers classified toxic for human reproduction.

**Exposure surveillance**

The electrolysis of alumina involves electric currents of an intensity of more than 300,000 amperes. Operators’ exposure to electromagnetic fields (EMF) is evaluated by mapping and accurately measuring doses. The indicators are much lower than the limits recommended by the International Commission for Non-Ionizing Radiation Protection (ICNIRP). In addition, blood tests done on certain operators did not show any change in the parameters evaluated. The work force is regularly informed of new data on exposure to electromagnetic fields and of current uncertainty about its effects, as well as of the results of inspections and analyses.

Certain operators may also be exposed to polycyclic aromatic hydrocarbons (HAP). Atmospheric samplings and urine tests are conducted regularly, and Pechiney continues to collaborate on research with the French National Institute of Research and Safety (INRS) in order to identify the best monitoring parameters. Pechiney also launched a study with INRS to monitor employee exposure to aluminum on the basis of work locations. The first phase of the study concerned almost 200 people at Saint-Jean-de-Maurienne, France, and it will be conducted at the Neuf-Brisach, France, facility as well.

In 2002, the Packaging sector pursued its assessment of chemical risks. Programs to evaluate and improve occupational ergonomics were launched at the Aviatube Carquefou, France, plant and several Cebal Americas facilities to manage the risk of musculoskeletal disorders. This initiative will be extended to all sectors in 2003, and practical ergonomic assessment guides will be published.
Alucam in the forefront of the fight against AIDS

Since 1995, Alucam-Socatral has conducted a proactive program targeting the prevention, testing and treatment of AIDS in Cameroon. “Relay-people” visit villages, high schools, sports stadiums and neighborhoods to inform the local population about the disease and promote prevention. Created by Alucam in 1994, the regional medical center, Centre Médical des Entreprises de la Sanaga (CMES), provides healthcare services equivalent to those available in European countries, and enables employees and their families to benefit from tri-therapy treatments. These health services are also open to people who are not members of the Alucam-Socatral community. CMES has a staff of 30 people, a medical laboratory, 53 beds and a large pharmacy. It gives more than 35,000 consultations per year. In May 2002, Alucam-Socatral and Cameroon’s Minister of Health signed a partnership agreement for the fight against AIDS, which has been declared a national priority.

Packaging promotes hearing protection devices

Making it general practice to wear hearing protection devices has been a priority in the Packaging sector for two years. For example, mobilization is high at the Kolin tube plant in the Czech Republic, where noise levels exceed 90 decibels in certain areas. Meeting in small groups with managers and the plant doctor, the work force was made aware of the risks involved. Since these meetings, regular audits show that almost 100% of the work force wears hearing protection devices.

Industrial safety

A risk-aware culture with a stronger base and more resources for prevention

As of January 1, 2003, 55% of physical assets in production units insured by the Group (assets plus annual gross margin) were designated Highly Protected Risks (HPR), compared with 68% as of January 1, 2002. The decrease was due to the consolidation of new non-HPR assets and the loss of this rating by six facilities, including Aluminium Dunkerque, after prevention audits.

In 2003, action plans will be implemented at these facilities to enable them to regain their HPR rating. In addition, different improvement points have been identified, in particular fire protection upgrades, which should make it possible to have at least 70% of the Group’s physical assets designated Highly Protected Risks by the end of 2003.

In 2002, storms in northern Europe damaged the PNL plant’s electrical substation in the Netherlands. The damage to the electrolysis cells is estimated at more than 25 million euros.

The Group operates seven facilities concerned by the Seveso 2 directive: – five smelters (Dunkerque, Lannemezan, Auzat and Saint-Jean-de-Maurienne in France, and Vlissingen in the Netherlands), which use cryolite; – two facilities in France with stocks of chlorine and acids (Pechiney Rhenalu at Neuf-Brisach) and butane (Pechiney Rhenalu at Rugles). Pechiney has complied with the latest regulations – comprehensive studies of potential hazards, introduction of auditable safety management systems, and enhanced response plans in the event of emergency situations.

PNL’s facilities, Lannemezan, Dunkerque and Saint-Jean-de-Maurienne integrated these requirements in their ISO 14001 environmental management systems. Studies of potential hazards conducted at these plants led to increased prevention and enhanced response to the greatest risks, especially foundry explosions and chlorine leaks. Other accidents, especially those linked to the presence of cryolite, like the interruption of fluoridated gas processing, are not listed as risks for the general public at the levels of fluorine concentration that would be observed in the atmosphere. The foundries at Issoire and Saint-Jean-de-Maurienne have installed a new system to detect and deal with chlorine leaks.

After an accidental explosion at the Kaiser Group plant in Gramercy, risk studies were conducted and action plans upgraded at the Gardanne, France, and Aluminium de Grèce (ADG) alumina smelters. These initiatives were launched in cooperation with FM Global specialists who commented on how pertinent and efficient they were.

Moreover, during the summer, ADG reviewed its studies of potential hazards and its emergency plans. In 2003, this facility will complete protection studies for the project to install a cogeneration unit and protection studies related to seismic risks.

Several units have developed their programs to inform and increase the awareness of local residents, and pursued emergency warning drills.
Accomplishments in 2002

- Seven additional plants certified ISO 14001
- A new commitment to reduce greenhouse gas emissions in France as of 2003, but world emissions increased in 2002
- Lower emissions of fluorine but increased VOC emissions
- Decrease in freshwater consumption
- Strong growth in recycling plastic packaging scrap
- Major progress in recycling bauxite residue
- Compliance with environmental standards achieved at three facilities

Priorities

- An environmental management system based on ISO 14001
- A policy of voluntary commitment to reduce greenhouse gases since 1995
- Active programs to reduce significant atmospheric emissions and recycle residue and waste
- A strict policy of ensuring compliance or remediation of polluted sites and landfills

Reducing the impact of our activities
on the environment

Main environmental issues

In Aluminum Production
- Reduce greenhouse gas emissions, in particular PFC
- Reduce or control emissions of fluorine, particulate materials, SO₂ and NOₓ
- Recycle bauxite residues and used cell cathodes

In Aluminum Conversion and Packaging
- Reduce emissions of volatile organic compounds (VOC)
- Limit consumption of raw materials
- Reduce waste and scrap during production

Products
- Bauxite
- Sodium hydroxide
- Lime
- Vapor energy
- Fuels

- Alumina
- Aluminum fluoride
- Coke & pitch
- Electric energy
- Fuels

- Aluminum
- Other metals
- Energy
- Water
- Inert gases, chlorine

- Aluminum and alloys
  - Energy
  - Water
  - Lubricant

- Recovered aluminum
  - Energy
  - Water
  - Additives
  - Chlorine

Processes
- Production of Alumina
- Electrolysis
- Smelting
- Conversion
- Foundry

Emissions/waste
- Gases: CO₂, PFC, Fluorine, SO₂, CO, HAP
- Particulate materials
- Aqueous waste discharges: fluorine, HAP, SS, metals
- Used cathodes, refractories, miscellaneous slag

- Gases: CO₂, Cl, SO₂, HAP
- Particulate materials, metals
- Aqueous waste discharges
- Scum
- Refractories

- Gases: volatile organic compounds
- Miscellaneous waste

- Gases: CO₂, chlorine, chlorides
  - Particulate materials, dioxins
  - Salt slag, scum, filters
  - Refractory materials
  - Miscellaneous waste

Treatment
- Cogeneration
- Optimization of processes
- Processing of emissions
- Recycling, controlled scrap

- Optimization of processes and raw materials
- Processing of emissions
- Clean sites
- Decantation
- Recycling, reuse
- Controlled landfills

- Optimization of processes and fuels
- Closed circuit water
- Recycling
- Controlled landfills

- Optimization of processes
- Incinerators
- Controlled landfills

- Pre-treatment of materials
- Optimization of processes
- Filtration
- Recycling
- Closed circuit water
- Controlled landfills
Fighting against global warming

A voluntary endeavor

Pechiney prefers voluntary commitments when it is a question of reducing greenhouse gas emissions.

In France, the Group attained the objectives it had set in 1995 with the Ministry of the Environment to reduce emissions at its aluminum production facilities. Altogether, Pechiney reduced its direct annual emissions in France by 670,000 metric tons (down 17%) between 1990 and 2000, while increasing aluminum production by 35%.

In 2000, Pechiney committed to reduce its direct emissions of greenhouse gases worldwide by 15% before 2012 compared with 1990, while continuing to grow. This commitment was made within the framework of the Partnership for Climate Action, an organization created under the aegis of the NGO Environmental Defense. In addition to Pechiney, Alcan, BP, DuPont, Entergy, Ontario Power Generation, Shell and Suncor have joined this partnership. In 2002, the partners tested tools such as the exchange of emission credits and clean development assistance mechanisms. The reduction Pechiney has already achieved stood at 11% in 2001-2002 compared with 1990. However, since emissions of PFC increased at certain smelters, in 2002 greenhouse gas emissions rose 240,000 metric tons of CO₂ equivalent compared with 2001.

In 2002, Pechiney drew up an Emission Inventory Protocol on the model of international protocols in force, such as that of the International Aluminium Institute (IAI). On this basis, emission inventories for 1990, 2000 and 2002 and their verification by an independent organization will be completed at the beginning of 2003. Pechiney also conducted campaigns to measure PFC in several plants in order to improve emission calculation protocols for these gases.

In France, Pechiney was involved in the creation of Association Francaise pour la Reduction de l’Effet de Serre (AERES), which regroups some 20 French corporations among those reporting the most emissions of greenhouse gases. AERES is responsible for coordinating and validating the voluntary, quantified commitments to control greenhouse gas emissions each member company makes. Compared with 1990, the new commitment presented by Pechiney for its activities in France involves a reduction of 23% for the period 2003-2004 and of 33% for the period 2005-2007.
Preserving air quality

A targeted policy

The Group concentrates its reduction efforts on the principal emissions of each activity: particulate materials (alumina and ferroalloys), fluorine (electrolysis), dioxins (finishing), and VOC (aluminum conversion and packaging).

Emissions of particulate materials, which are presented for the first time for the whole Group, are stable. There is room for improvement at alumina plants and PNL.

Emissions of fluorine occur during electrolysis. In 2002, they decreased by 5% and by 8% per metric ton of aluminum produced, with marked progress reported at ADG and PNL units. Benzo (a) Pyrene (BaP) is an HAP used to measure emissions in anode production units. PNL’s modernization is a factor in its progress.

Emissions of SO₂, which have been stable over the last four years, are the result of the presence of sulfur in furnace coke and fuels, particularly heavy fuels. To control them, the Group opts for materials with a lower sulfur content and, when economically possible, for the use of natural gas. The natural gas cogeneration project being studied for ADG offers an opportunity for significant reductions.

VOCs are mainly the product of the evaporation of solvents, lacquer and varnish. At Neuf-Brisach, remote control equipment in the distillation and Airpur washing unit will make it possible to achieve a 60% reduction in rolling fluid.

Emissions of NOₓ, which have been stable over the last four years, are the result of the presence of sulfur in furnace coke and fuels.

The Compiègne finishing facility (recycling of aluminum waste) is one of the 17 French metallurgical facilities which have been required since 1998 to make regular assessments of dioxin emissions and their impact on the environment. The reduction initiatives already launched and those planned in the framework of the 2003 furnace modernization program will lead to a reduction of more than 50% in emissions, in line with the new limits that have been set.

New equipment has also been installed to capture emissions at flexible packaging facilities in Froges, Arras, Moreuil and Barcelona. The increase in the volume of emissions in 2002 was linked to developments in plastic packaging in the United States.
Reduction of Volatile Organic Compounds

The lacquer workshop at the PSFE plant in Froges, France, produces 2.4 million liters of varnish every year. To reduce risks, 43 solvent concentration points have been eliminated through the installation of fume hoods and automated feeding systems for the mixers. At the Dijon workshops, the solvents are captured by fume hoods over all the lines and incinerated to return clean air to the atmosphere. Since 1979, 46 million euros have been invested.

PNL increases capacity by 25% and improves environmental performance

PNL’s smelter in the Netherlands has just finished upgrading the system it uses to supply alumina to electrolysis cells with the best available technology – point feeding cell conversion – and has acquired a new anode furnace. The result is an increase in production capacity of approximately 25% (56,000 metric tons) and a marked improvement in environmental performance. Completed in 2002, impact studies point up a 60% reduction in greenhouse gas emissions compared with 1990, a stabilization of fluorine emissions at the optimum level (0.5 kilogram/metric ton), a decrease of 62% in emissions of particulate materials and of 44% of water effluents.

This modernization project also enabled PNL to sign the Benchmarking Covenant proposed by Dutch authorities, by which PNL commits itself to attain the highest energy efficiency levels in the period 2002-2012.

Reduced fluorine emissions at ADG: a threefold benefit for environment/health/safety

At ADG, the cells are still covered by single-piece panels that were left in place when the plant was modernized. To remedy this handicap, the length of time the panels are open must be carefully controlled. The objective to reduce fluorine emissions from 2.8 kilograms/metric ton to 2 kilograms/metric ton was achieved in 2002 by working on this parameter. The installation of a small door in the panel to conduct operations such as taking samples provided an efficient technical solution, which was complemented by two Continuous Improvement projects: one to reduce the time the hoods are open, and the other to increase the hood condition index. Two initiatives were likewise launched at the captured gas processing center, which made it possible to increase gas purification output. This project also improved safety conditions (less risk of stepping in the cells) and working conditions (less exposure to fluorine and particulate materials, and reduced noise from fume fans).
Saving energy and water

Energy accounts for 20% to 30% of production costs in primary aluminum and ferroalloys, providing a constant incentive to improve the energy efficiency of the processes. In this regard, the Group’s electrolysis technologies have maintained their competitive edge. The modernization of PNL will generate significant energy savings.

Three years ago, Pechiney began to use the vapor produced by one of France’s most powerful cogeneration units for a significant portion of its needs. This unit can supply the national grid with 88 Megawatts of electricity. A major cogeneration project is also being studied at ADG. In the United States, the Ravenswood aluminum conversion facility has set up a task force to reduce its energy consumption.

Water is principally used for cooling and, in alumina plants, to transport bauxite residue. In 2002, the Group reduced its freshwater consumption by 9%. The QAL, Australia, and La Bathie, France, plants introduced reduction measures, and the discontinuation of production at Marignac, France, had a considerable effect.

Saving raw materials

Within the framework of the Pechiney Continuous Improvement System, the sources of scrap are systematically analyzed and action plans are devised to reduce the quantity. In aluminum conversion, production scrap from the Group and from partner-customers is reintegrated into the production chain. In plastic packaging, for four years, the Group has conducted an ambitious scrap reduction program aimed at limiting the volume of crushed and recycled plastic that is of lesser quality than the original material. Better control of casting during molding-wheel stoppages and production jams made it possible to reduce scrap by 10% to 15% at several units. Many Continuous Improvement projects have been launched throughout the Packaging sector to enhance the fluidity of the production process and eliminate scrap at the different manufacturing stages.
Reducing and recycling effluents and waste

Regular progress is made in sorting techniques and in the search for the best processing and recycling methods. In the production of alumina, the main effluent is non-solubilized bauxite (iron oxide, titanium oxide and silica) in the usual proportion of a metric ton of residue per metric ton of alumina produced. In 2002, Pechiney generated 1.49 million metric tons of bauxite residue at Gardanne (France), Saint-Nicolas (Greece) and QAL (Australia), representing a decrease of 40,000 metric tons, for a production of 2.05 metric tons.

At Gardanne and Saint-Nicolas, the residue is deposited on the sea bed. In its most recent annual report, the scientific committee confirms the absence of any chemical impact or ecotoxicity. Pechiney nevertheless has committed to stop sea deposits by 2015 at the latest for Gardanne and by 2020 for ADG. Research on possible reuses of this residue has taken concrete form in the development of Bauxaline®, which holds promise as a material to cover landfills, serve as a road bed, fill cavities, reinforce cement, make roofing tiles, and provide a coloring additive. In 2002, 35,000 metric tons of Bauxaline® were recycled in these different applications, including 5,500 metric tons at ADG, which has launched a program for reuse in cement.

In the production of primary aluminum, used cathodes from electrolysis cells, made of refractory and carbonized materials, are recycled, in particular, in the production of cement and electricity-powered steelmills. Since 1994, Pechiney has implemented a program to pair each smelter with the closest recycling units. In 2002, almost all of the spent cell linings from the Group’s European facilities, i.e. 28,000 metric tons, were processed. Industrial tests on recycling the carbonized residue were conducted at a cement plant near Dunkerque, France.

In Ferroalloys, 56,000 metric tons of micro-silica from the production of silicon were sold to the construction sector in 2002 for use as a component of high-performance concrete and as a substitute for asbestos in fibrocement.

In Packaging, Pechiney Plastic Packaging’s manufacturing units in the United States more than doubled the percentage of recycled production scrap, which increased from 22% in 1999 to 52% in 2002. In the same period, landfill costs were reduced by 600,000 U.S. dollars, while revenues from the sale of recycled scrap rose 1.5 million U.S. dollars. This success was bolstered by the introduction of compactors and by specialized training in sorting adapted to meet the needs of recyclers. The plants in Newark, California, and Neenah, Wisconsin, reported the best scores, with a 75% reduction in landfill material.

The three plants in eastern France ship their scrap and defective tubes to a protected workshop. Scrap is crushed and then resold to a specialist who transforms it into pellets for use by manufacturers of plastic angles, swimming pool walls and garbage bags.

Residue used as backfill

For the first time in 2002, backfill composed of Bauxaline® and Sopraline®, a bonding agent made from coal ash with properties close to those of cement, was used in France to build a road. This accomplishment was the result of several years of tests, which made it possible to demonstrate the new material’s resilience and environmental qualities.

The Ussel foundry recycles its sand

An installation called Eureka Sand Cast 2748 entered its industrial phase in 2002. This innovative process makes it possible to extract large cast parts from their mold without affecting quality, to recycle significant quantities of sand and to discharge only clean effluents.

The sand is processed in a fluidized bed to give it the erosion properties required to destroy the mold and remove the phenolic binder. This is done through a stripping operation. Sand previously disposed of in landfill (4,500 metric tons per year) is now completely recycled, and effluents are processed before discharge.
Remediating sites and landfills

Pechiney has initiated a program to close or ensure the compliance of internal landfills and to remediate former manufacturing sites and landfills.

In 2002, an impermeable extension was added to the landfill at Lannemezan, in conformity with current regulations. New recycling solutions were also developed for 1,000 metric tons per year and strict management guidelines were applied with regard to access procedures and acceptance criteria.

At Alucam, Cameroon, the site of the new landfill has been chosen and detailed studies conducted according to current international standards. Operations are scheduled to begin in 2004.

At the same time, in France, Pechiney completed the remediation of the sites at Castelsarrasin and Pierrefitte, where an impermeable cover using the capillary barrier technique has been installed. The Group also launched remediation of the Marignac landfill.

In 2003, Pechiney plans to complete the remediation of the French sites of Noguères, Venthon and Gerzat, and to undertake works at eight other landfill sites.

Reforestation in Greece

Since 1972, the Group has rehabilitated landscapes altered by bauxite mining in the districts of Boeotia and Phocaea. The program involves filling excavations reusing sterile materials from the mining operations, then replanting trees according to the recommendations of specialized agricultural experts. The rehabilitation concerns 2.3 square kilometers, of which 1.6 square kilometers were completed at the end of 2002.

Altogether, 400,000 trees and bushes will be planted, and a 200-kilometer watering system will be installed. A 40-kilometer fence will protect the area. In 2002, 85,500 trees and bushes were planted, 60 kilometers of the watering system were installed, and 6 kilometers of fence were built. The Group supervises growth until the rehabilitation is considered to have taken hold. The land is then returned to the Greek water and forestry services.
Priorities

- Offer customers solutions that combine competitiveness, safety, health and limited impact on the environment
- Aluminum production: maintain a global technological edge, including in environmental issues
- Research with partners to promote sustainable development in new projects
- Transport: advanced solutions to enhance lightweighting, safety and recycling for manufacturers
- Packaging: ongoing improvement in conservation techniques so that products are increasingly natural

Accomplishments in 2002

- Aluminum production: environmental impact study on the planned AP50 smelter in South Africa and administrative authorization
- Aluminum conversion: startup of a major recycling installation for scrap from aerospace heavy plate operations
- Packaging: innovations leading to products offering consumers greater safety and traceability with minimum impact on the environment

Contributing to sustainable development
Aluminum production: clean development technologies

4.2 million metric tons of aluminum, representing 16% of world production, are produced using Pechiney AP18 and AP30 technologies (180,000 amperes and 320,000 amperes of electrical current). The economic and environmental performance indicators are better than those of other available technologies: 1.9 metric tons CO₂ equivalent per metric ton of aluminum (world smelter average: 3.8, according to IAI).

Pechiney has developed innovative systems to boost the efficiency of its electrolysis cells, including automatic feeding systems, the Hyper Dense Phase System (HDPS), an electrolysis cell regulation system, and the Electricity Measurements Automation system (EMA).

The combination of these different systems significantly limits the environmental impact of anodes and thus emissions of PFC, while optimizing energy consumption and output.

In 2002, Pechiney won three major contracts for additions to existing smelters in Quebec (Canada), Bahrain and South Africa. Altogether they represent an increase in production capacity of 412,000 metric tons of aluminum. The Group is also modernizing an anode furnace in Australia. Finally, Pechiney is helping upgrade a large alumina production complex in Venezuela and ensure environmental compliance.

AP50 promotes sustainable development

Pechiney’s new generation AP50 smelter (500,000 amperes of electrical current) makes it possible to achieve critical size while respecting the environment and meeting strict economic criteria. This technology generates emissions of 1.7 metric tons CO₂ equivalent per metric ton of aluminum, a further improvement on AP30. A first project has been launched. Construction of an AP50 smelter with an annual capacity of 460,000 metric tons is scheduled for 2004, and the plant will reach full capacity in 2006. The location has been decided – Coega near Port Elizabeth in South Africa. To promote sustainable development, South African legislation requires a comprehensive impact study and sets guidelines for all parties. The impact study launched at the beginning of 2002 was structured in terms of environmental, social and economic issues. The general public was consulted at each stage in the process.

In a major step forward, South African authorities granted administrative approval on December 20, 2002. In building this first plant of a new generation, the objective is to integrate the basic priorities from the construction phase, including architectural integrity, emissions, waste, noise, traffic, the safety and health of employees and the local population, the protection of plant life and the sea, and socio-economic development.

This is the most extensive industrial project in South Africa since 1994.
Aluminum: an ideal solution in the transportation sector

Three times lighter than steel, aluminum is the basic metal in aerospace applications. It allows a significant reduction in the weight of ground transportation vehicles, their fuel consumption and their impact on the environment.

Resistant to oxidation, aluminum is frequently used in shipbuilding and construction. Its high level of prefabrication makes it possible to keep the number of hazardous operations at work sites down to a minimum.

Through partnerships with customers, Pechiney steps up its research in resistance and lightweighting, and develops new recycling processes for used metal.

Aerospace: partners in innovation

For commercial aircraft wings and fuselages, Pechiney supplies 50% of the aluminum heavy plate used in Airbus planes and 25% in Boeing aircraft.

Innovations provide solutions to five major requirements - weight reduction, mechanical resistance, resistance to the spread of fissures, resistance to corrosion and ease of use.

In the last three years, Pechiney has developed seven new alloys at Issoire, France, for wings and fuselages on jumbo jets. They have been approved for Airbus’s A340-600 and its jumbo A380. The most recent alloys are characterized by how easily they can be extruded, shaped or machined, and the consequent gains in costs and production time of approximately 30%.

Successful co-development with PSA Peugeot Citroën

In 2000, Pechiney signed a strategic ten-year partnership agreement with PSA Peugeot Citroën. The objective is to develop innovative aluminum solutions to make vehicles lighter, increase the recovery and recycling of aluminum in manufacturing and end-of-life vehicles, and reduce production costs for large-run parts.

This partnership has led to the development of many economical large-run aluminum applications. For example, the rear axle of the Citroën C5, which combines an aluminum section central part and cast aluminum ends, reduced weight by 9.4 kilograms compared with steel, representing a gain of 45%. Equipping almost 3,000 vehicles/day, the hood of the Peugeot 307 is now the most successful large-run application in the car body segment.
Commitment of European automobile manufacturers to reduce CO₂ emissions

<table>
<thead>
<tr>
<th>2001 Objectives 2008</th>
<th>Objectives 2012</th>
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<tbody>
<tr>
<td>(ACEA agreement)</td>
<td>(EU orientation)</td>
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<tr>
<td>Fuel consumption (l/100 km)</td>
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<td>CO₂ emissions (g/km)</td>
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European directive on the recycling of end-of-life automobiles

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<th>2000 Objectives 2006</th>
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<td>Recycling rate</td>
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European directive on packaging and packaging waste
New objectives

<table>
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<tr>
<th>2001</th>
<th>Objectives 2006</th>
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<tbody>
<tr>
<td>Total recovery rate</td>
<td>50-65%</td>
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<tr>
<td>Total recycling rate</td>
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<tr>
<td>Recycling of metals</td>
<td>15%</td>
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<tr>
<td>Recycling of plastic*</td>
<td>15%</td>
</tr>
</tbody>
</table>

* Only mechanical and chemical recycling

Automobile: helping manufacturers achieve their goals

European manufacturers have committed to reduce vehicle greenhouse gas emissions from 186 grams of CO₂ per kilometer in 1995 to 140 grams in 2008. For 2012, the European Union has proposed a threshold of 120 grams. Manufacturers have also targeted boosting the vehicle-recycling rate to 85% in 2006 and to 95% in 2015. Aluminum is an ideal material to help carmakers reach these goals, and the quantity of aluminum per car, which stood at 100 kilograms in 2002, is expected to rise to 130 kilograms in 2005.

With the improvement in engine efficiency, lightweighting vehicles is the best way to reduce polluting emissions, and this axiom concerns almost all automotive components - car bodies and structural parts, wheels and suspension systems, mechanical parts and equipment. The generalization of the use of aluminum can reduce a car’s weight by 300 kilograms, and cut fuel consumption by 2 liters per 100 kilometers. In this way, over the life of a car, each kilogram of aluminum used reduces CO₂ emissions by an average of 20 kilograms (source IAI). This figure includes all the emissions during the life cycle of the aluminum used.

In addition, aluminum resists corrosion and enhances active and passive safety, because its light weight cuts braking distance and aluminum sections absorb great quantities of energy in the event of a collision.

Aluminum is also an efficient way to increase the automobile recycling rate and reduce related costs. It already represents 50% of the value of a vehicle at the end of its life, and 90% of the aluminum contained in automobiles is currently recycled.

Pechiney offers carmakers and automotive parts manufacturers aluminum solutions that make it possible to reduce the weight of many components by 40% to 50%, while providing the same levels of performance, comfort and safety. Pechiney has developed new alloys to optimize resistance and lightweighting, including the DR (Dent Resistant) sheet alloy, the HF (High Formability) section alloy, and the Calypso 85R alloy, which has been optimized for cylinder heads. Already a major supplier of casting alloys and brazed products, Pechiney has rapidly developed a range of car body sheet and sections. The Group reported growth of 50% per year in these two markets between 2000 and 2002. It now has a share of almost 25% of the European automobile body market and, in 2002, supplied the aluminum sheet to produce 1.3 vehicle hoods, which now equip a great variety of models, including Peugeot’s 307 and 607; Citroën’s C5; Renault’s Laguna, Vel Satis and Espace; as well as the new Mercedes Class E. The Group contributed to other components on recent models, such as the suspension system on Peugeot’s 307 and 206 SW, seat components for Peugeot’s 807 and Renault’s Vel Satis, and sections for the structure of the new Audi A8.

The new Renault Espace is 90% recyclable
Packaging: lighter, safer, more resistant

Pechiney manufactures specialty packaging primarily used in the food, beauty and healthcare markets. It is principally made of plastic or aluminum.

Aluminum is totally neutral from a chemical point of view, and a very effective “barrier”, which makes it ideal for packaging food, pharmaceuticals and cosmetics. A 6-micron thin sheet of aluminum foil is sufficient to protect perishable products from spoilage. Aluminum packaging developed by Pechiney guarantees the integrity and properties of packaged products with solutions that are increasingly cost-effective in terms of raw materials.

Plastic packaging also makes economical use of raw materials. Its light weight helps reduce energy consumption during transport and makes waste less heavy. Co-extrusion also endows it with excellent barrier properties.

Many manufacturers want to eliminate secondary packaging. Jars, tubes and pouches become direct advertising vehicles. The packaging solutions developed by the Group and its expertise in printing meet our customers’ graphics and marketing requirements. Cebal Tubes Europe offers several tamper-evident systems that eliminate secondary packaging, including bands for tube tops equipped with screw-on caps, heat-shrinkable sleeves for service-caps, tear-off tops that are part of basic packaging on single-use tubes and tubes that contain food products. For crackers and cookies, printed plastic packaging serves as both primary and secondary packaging.

Extrusion, co-extrusion and complexing techniques also enable plastic packaging to offer barrier qualities that protect products from ultraviolet rays, gas and humidity and extend their shelf life. Flexible plastic packaging has made major inroads at large supermarkets.

Doypack® standup pouches developed by PSFE provide sterilizable flexible packaging for the first time that adapts to a wide range of products. The Doypack® standup pouch helps to preserve flavor and texture perfectly since sterilization time is reduced and high-barrier films are used. Its reduced weight (3 to 5 times lighter than a box for the same content) limits raw materials consumption and waste.

Cosmetics or personal care product formulas increasingly use molecules that are extremely effective but, because they are very fragile, need protection from oxygen. This is the reason Pechiney has made a major investment in research to prevent air from entering the tube when the pressure is released. Cebal has developed and patented an Airbackless tube which provides added protection and limits the need to use preservatives. At LuxePack 2002, Cebal Tubes Europe exhibited its first industrial production for an Italian dermatology-cosmetics laboratory.

Examples of innovative packaging developed by Pechiney

- Flexible packaging presents a multiple advantage – flavor lasts longer because the thin packaging means faster sterilization, lower energy consumption, lighter weight and less waste.

- The double-compartment tube holds two active formulas separately, which are only mixed when needed.

- A new lettuce packaging bag with an aerated laminated structure regulates gas/oxygen exchanges to ensure both product longevity and freshness.

- The Airbackless tube provides added protection for the molecules of the product it contains.
Cleanliness, an essential requirement

The Cebal aluminum tubes plant in Saumur has a Class 100,000 Clean Room with fewer than 100,000 particulate elements bigger than 5 microns per cubic foot of air. This room can produce 100 million tubes per year, primarily for the pharmaceuticals market. Specialized in packaging for cheese, meat products and seafood, the PSFE plant in Arras, France, was completely renovated to track down the smallest particle of dust. Its cleanliness is audited every month. Any malfunction is analyzed from the point of view of the risks it might cause and any declaration is systematically accompanied by a solution.

Kwikbreathe™ bags facilitate surgery

Developed for the Kenpack® brand in the United States to package surgical instruments, these innovative bags enable central hospital services to save both time and money. The posing of a heat-sealed strip against a pealable film reduces materials costs by 10%. The special pouches increase gaseous exchanges with the environment, making it possible to sterilize surgical instruments four to ten times faster. Lastly, the seal on Kwikbreathe™ bags is very sure.

Parafilm M® film fights infections

Hospitals have used Parafilm M® film for 70 years to seal beakers, test tubes and petri dishes. Now, it is successfully being used for other applications, including protecting bone marrow transplant patients from infection by keeping the patient’s central venous catheter dry during bathing. The result is a 50% reduction in infections, and associated cost savings of more than 50% as well.
Recycling products

Aluminum: infinitely recyclable

Aluminum may be reused indefinitely without altering its qualities, and such recycling requires only 5% of the energy needed to produce primary aluminum. The value added of secondary aluminum thus far exceeds the cost of recycling. The transport and construction sectors are the main sources of aluminum recovered from end-of-life products. Eighty-five percent of aluminum used in construction is recycled and this rate rises to 95% in transport applications.

Pechiney, which is already a major producer of secondary aluminum with 62,000 metric tons produced in 2002 at its Compiègne plant, promotes cooperation with manufacturer-customers in the automotive and aerospace sectors. The Group offers to recycle their cutting and machining scrap in the production of the same alloys. Already a regular practice in the recycling of waste from extrusions and beverage cans, this initiative is beneficial from a technical, environmental and economic point of view. It is a good example of an initiative that is profitable for both the customer and the supplier.

Packaging: contributing to the search for solutions

Pechiney contributes to the development of structures and solutions to recycle post-consumer packaging in France, Germany, Italy, Portugal, Spain, the United Kingdom and the United States.

A co-founder of France Aluminium Recyclage and of Deutsche Aluminium Verpackung to promote the recycling of aluminum packaging, Pechiney is also a member of the non-profit organizations ASSURE and ACRE created to recycle aluminum beverage cans. Committed to the European Packalu project with other manufacturers, the Group helps promote the economic and environmental advantages of aluminum to meet European regulatory requirements.

Group research has led to the development of economical and efficient sorting machines that make it possible to recover 90% of the aluminum in flexible and rigid packaging. These machines (Foucault current; detection-ejection) are in use in many sorting centers in France. Pechiney monitors the improvement of their performance, the first developments of a technique of delamination of complexes using physical means (as opposed to pyrolysis), and works to extract non-ferrous fines from bottom ash.

Aluminum: recycling for customers

In the automotive sector, the Neuf-Brisach facility reuses all the production scrap from Peugeot Citroën, Renault and Daimler Chrysler Mercedes to make metal for similar applications. Such recycling represented almost 8,000 metric tons in 2002.

In aerospace, the Issoire plant introduced a system in 2002 to recycle high value-added heavy plate machining scrap. Almost 4 million euros have been invested in this installation, which enable the plant to process 11,000 metric tons of aluminum per year, 8,000 metric tons of which are recovered from aerospace manufacturer-customers and their subcontractors.

Before re-smelting the metal in an induction furnace, a drying furnace removes the oil from the scrap, volatile organic compounds are burned, and the heat from combustion is recovered to assist in the drying. An innovative process is being developed to eliminate the problematic presence of zirconium in the scrap.

Designing packaging that is easy to recycle

Packaging made of a single material makes recycling easier. If this solution is not always possible for technical, commercial or economic reasons, the Group nevertheless advocates such an approach. Among single-material products recently developed are the plastic stand-up tube which sits on a wide cap on a store shelf and needs no additional packaging, and completely recyclable seamless aluminum aerosol cans for makers of perfumes.

In addition, the PolyPlus™ polypropylene plastic bottle offers improved contact clarity similar to glass, while it eliminates the coating of varnish that was used to make the container shine.
### Appendix: Environment indicators

For each indicator: Unit, threshold per facility accounted for in the inventory. Total Pechiney, by sector (Ferroalloys in Primary Aluminum except for CO₂) and facilities with the most emissions.

#### LEVEL OF ACTIVITY

<table>
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<tr>
<th>Indicator</th>
<th>Unit</th>
<th>1990</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
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<td>Aluminum (primary and secondary)</td>
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<td>Rolled products</td>
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<td>248,626</td>
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<td>235,066</td>
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<tr>
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<td>706,547</td>
<td>817,126</td>
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<tr>
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<td>1,796,000</td>
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#### GREENHOUSE GASES

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<th>2000</th>
<th>2001</th>
<th>2002</th>
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</thead>
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#### ATMOSPHERIC EMISSIONS

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<th>2000</th>
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<th>2002</th>
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#### PARTICULATE MATERIALS

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<th>2001</th>
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## Appendix: Environment Indicators

### Consumption

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<th>Year 2001</th>
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<td>28,513</td>
<td>29,672</td>
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<td>26,484</td>
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<td>18,762</td>
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<tr>
<td>Aluminum Conversion</td>
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<td>28,513</td>
<td>29,672</td>
<td>25,490</td>
<td>26,484</td>
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</tr>
<tr>
<td>Pechiney Electricity</td>
<td>18,604,205</td>
<td>19,884,682</td>
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<td>Primary Aluminum</td>
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<td>2,202,264</td>
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<td>2,554,316</td>
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<td>Dunkerque</td>
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<td>1,095,610</td>
<td>1,095,610</td>
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<td>Pechiney Thermal energy</td>
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<tr>
<td>Ravenswood</td>
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<td>–</td>
<td>–</td>
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| SODI AND LIQUID EMISSIONS

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<th>Year 1999</th>
<th>Year 2000</th>
<th>Year 2001</th>
<th>Year 2002</th>
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<tbody>
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<td>Bauxite residue</td>
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Glossary

ABI  Aluminerie de Bécancour, Inc.
ADG  Aluminium de Grèce
AERES  Association des Entreprises pour la Réduction de l'Effet de Serre
       (Organization of companies to reduce greenhouse gas emissions)
BaP  Benzo (a) Pyrene (HAP)
CH₄  Methane (greenhouse gas)
CO₂  Carbon dioxide (greenhouse gas)
COD  Chemical oxygen demand
EAA  European Aluminium Association
EHS  Environment, Health, Safety
EMF  ElectroMagnetic Fields
EMS  Environmental Management System
EPE  Association française des Entreprises pour l'Environnement
       (French organization of companies for the environment)

Greenhouse gases  Gases which induce global warming; the Kyoto Protocol singles out CO₂, CH₄, N₂O, HFC, PFC, SF₆
HAP  Hazardous Air Pollutants (polycyclic aromatic hydrocarbons)
HFC  Hydro fluorocarbons (greenhouse gas)
HPR  Highly Protected Risks
IAI  International Aluminium Institute
INRS  French National Institute of Research and Safety
INSERM  French National Institute of Health and Medical Research
ISO 14001  International environmental management standard
MSD  Musculoskeletal Disorders
NOₓ  Nitrogen oxides (monoxide and dioxide) - sour gas
OHSAS 18001  Occupational Health and Safety Assessment Series
PCA  Partnership for Climate Action
PCB  Polychlorobiphenyl
PNL  Pechiney Nederland
PFC  Per fluorocarbons: CF₆, C₂F₆, etc. (greenhouse gases)
PSFE  Pechiney Soplaril Flexible Europe
QAL  Queensland Alumina Ltd.
RCF  Refractory Ceramic Fibers
Seveso  European directive on industrial safety at certain facilities presenting major risks
SF₆  Sulfur hexafluoride (greenhouse gas)
SO₂  Sulfur dioxide - sour gas
SS  Suspended Solid
TF1  Lost-time accident rate, per million hours worked
TF2  Total accident incidence rate, per million hours worked
TG  Number of days lost per thousand hours worked
VOC  Volatile Organic Compounds

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