What is the proposed aluminium smelter project about?

Who?
Aluminium Pechiney, a French company, is investigating the feasibility of constructing and operating an aluminium smelter, in the Coega Industrial Development Zone (IDZ) - north east of Port Elizabeth, South Africa. The smelter, if constructed, would be located in the area identified as the metallurgical cluster.

Why?
Aluminium Pechiney conducted a market analysis, which indicated an anticipated rise in demand for aluminium of 2.5% per annum, up to the year 2010. In order to meet this growing demand Aluminium Pechiney identified the Coega IDZ, serviced by commercially available electricity and port facilities, as a possible site to establish an aluminium smelter.

What?
The aluminium smelter, operating with new smelting technology - AP50, would cover an area of approximately 80 hectares (the size of approximately 160 rugby fields) in order to produce about 485 000 tonnes of aluminium per year with an approximate export value of US$750 million. The project will involve importing alumina and processing this in the smelter to produce aluminium ingots which will mainly be exported to international markets. The proposed port facility at Coega will be the main entry and exit point for alumina, other raw materials and the aluminium ingots.

When?
If a decision to invest at Coega is made, Aluminium Pechiney proposes to commence construction in early 2003. It is planned that construction will take 26 months leading to the first metal production in early 2005 and full metal capacity production 8 months later.

What is the role of the public in the planning of a new project?

In the planning of a new project, input from all interested and affected parties/persons (I&APs) and/or organisations is required as part of the Environmental Impact Assessment (EIA) process. One of the key objectives of the Public Participation process during the EIA is to provide opportunities for participation as well as assist stakeholders to identify issues and concerns and comment on the findings of the EIA. If you are interested and/or affected by the proposed Pechiney Aluminium Smelter project, then you have an important role to play in the planning process.

Who is Aluminium Pechiney?

Aluminium Pechiney is a French company within The Pechiney Group which has been in operation since 1898. Aluminium Pechiney focuses on the production of primary aluminium and aluminium products. It is the fourth largest primary aluminium producer in the world, and the world leader in...
design and supply of aluminium production technology. The company conducts bauxite mining, alumina refining and aluminium smelting operations in five countries. Other core business of the Pechiney Group includes the production of packaging materials, production of ferroalloys and international trade.

How was the Coega Industrial Development Zone (IDZ) identified as a possible site?

Aluminium Pechiney undertook an initial international site selection study for an aluminium smelter at 11 potential sites. The Coega IDZ was identified as one of three potential sites warranting further investigation. Australia has been identified as the second possible location for the aluminium smelter. Assessment of a third site in Argentina has been shelved due to the current economic instability of the country. Following are some of the criteria that were used to assess the feasibility of the potential sites:

- **Energy Supply** (one of the main criteria)
  - Source, (hydraulic, gas or other)
  - Size of the energy resources and availability of the supply (security and length of supply contract)

- **Site**
  - Topography, geotechnics, climate
  - Port and road infrastructure.

- **Environment**
  - Flora and fauna impact
  - Impact on employment
  - Social impact.

- **Tax conditions**
  - Corporate tax, metal sale tax
  - Depreciation rules.

- **Raw materials and metal logistics**
  - Transportation cost and market location

- **Risks inherent to the country**
  - Political stability
  - Safety of people and goods.

Aluminium Pechiney are involved in ongoing negotiations and investigations to enable them to select a preferred site. The Environmental Impact Assessment (EIA) process forms part of this investigation. At present, engineering, planning and environmental studies are underway at the South African and Australian sites.

What is aluminium?

Aluminium is the third most abundant element in the Earth’s crust and is found in most rocks, clay, soil and vegetation combined with oxygen and other elements. In nature, however, it only exists in very stable combinations with other materials (particularly as silicates and oxides) and aluminium never occurs naturally in metallic form. A viable production process to “unlock” the aluminium metal from its ore has only been developed over the last 100 years.

Aluminium ore, most commonly bauxite, is plentiful and occurs mainly in tropical and sub-tropical areas: Africa, West Indies, South America and Australia. There are also some deposits in Europe.
the aluminium production process bauxite is first refined into aluminium oxide trihydrate (alumina) and then electrolytically reduced into metallic aluminium.

What are the uses of aluminium?

Aluminium in its end form is relatively lightweight (about 1/3 the mass of an equivalent volume of steel or copper) but with alloying (mixing with other metals) can become very strong. It is also highly corrosion resistant, an excellent thermal conductor, non-magnetic, non-toxic and highly workable being able to be transformed into almost any shape. Today more aluminium is produced each year than all other non-ferrous metals (such as copper, tin and lead) combined. The following are some of the end uses of aluminium:

**Building and Construction Industry**
- Doors and window frames
- Roofing and awnings

**Manufacture of Electrical Products**
- High tension power lines, wires, cables
- Components for television, radios, refrigerators and air conditioners

**Packaging and Containers**
- Cooldrink cans, bottle tops
- Aluminium foil, semi-rigid foil containers

**Cooking Utensils**
- Kettles and saucepans

**Aeronautical, Aviation and Automotive Industries**
- Propellers
- Aeroplanes and vehicle body sheet, gearboxes and motor parts

**Leisure Goods**
- Tennis Racquets
- Indoor and outdoor furniture

What are the advantages of aluminium?

Aluminium is recyclable:

- **Aluminium has unique recycling qualities**: the quality of aluminium is not impaired by recycling - it can be repeatedly recycled.

- **Aluminium recycling saves energy**: remelting used aluminium saves up to 95% of the energy needed to produce the primary product.

- **Aluminium recycling is economical**: it uses less energy and recycling is self-supported because of the high value of used aluminium.

Aluminium is light. Therefore cars and aeroplanes built using aluminium are lighter and use less fuel. They then emit less greenhouse gases.
What does the aluminium production process involve?

The major raw materials in aluminium production are fresh alumina, petroleum coke, aluminium fluoride and liquid coal tar pitch, which will be imported to Coega and transported from the harbour via a conveyor belt to holding silos on the Aluminium Pechiney site. The smelter has three major process components; a potline, carbon and rodding shop and a cast house (Figure 1).

**Figure 1: The Aluminium Production Process**

**The Potline**
In the potline alumina is reduced to aluminium by electrolysis. The potline will consist of two elongated potrooms measuring 1200m x 30m. Each room will house 168 pots aligned sequentially in two groups of 84 pots, electrically connected. There will be 336 pots in total in the AP50 potline.

**The Carbon and Rodding Shop**
Carbon anodes are used to conduct electricity into the smelting pots. The expected life of an anode is approximately 640 to 770 hours, so they are regularly replaced. The anodes will be manufactured on site in a carbon plant. They are then connected to an electrical conducting stem in the Rodding Shop prior to use in the potlines.

**The Casthouse**
Molten aluminium is extracted from the pots and transported to the casthouse. Before being cast into ingots, various alloying metals may be added to the metal to attain specific qualities and strengths for
customer requirements. The final product will be stacked and trucked to the port from the smelter, loaded onto ships and exported.

**Key environmental control systems integrated with the processes are as follows:**

**Gas Treatment Centres (GTC’s)**
Associated with the Aluminium Pechiney potline will be two Gas Treatment Centres (GTC’s) that will be positioned between the potrooms to receive emissions from the pots. The GTC’s have the primary role of recycling the fluoride and dust captured from the pots. The emissions are treated in the GTC, to extract the fluoride, using alumina as a scrubbing agent. The ‘fluorinated alumina’ is then directed into the pots.

**Fume Treatment Centre (FTC)**
Associated with the anode-baking furnace is a fume treatment centre (FTC) to extract and recycle fluoride, tars and dust from emissions created by the anode baking process. This is a dry scrubbing unit, also utilising raw alumina as the scrubbing agent with the resultant ‘enriched alumina’ being recycled into the pots.

**Pitch Fume Treatment Centre (PFTC)**
There is also a pitch fume treatment centre (PFTC) associated with the paste plant. This is a dry scrubbing unit that treats tar and dust emissions from the paste plant, using particulate coke as the scrubbing agent. This ‘enriched coke’ is recycled into the paste plant.

**What is alumina?**

Alumina is the name given to the raw material, aluminium oxide, which is used in the smelting process to produce aluminium. It is a white powdery oxide produced through refining of bauxite.

**What is petroleum coke?**

Petroleum coke is the main carbon source for the anode blocks. It is imported from overseas and is made from oil derivatives, which are regarded as a waste product, by oil refineries.

**What is liquid coal tar pitch?**

Pitch is a heavy, sticky, tar-like by-product derived from the coking of coal. It is used as a binding agent for the petroleum coke in the anode blocks, prior to baking.

**What is an anode?**

An anode is the name given to a positive electrode in a reduction cell. The anode used in the aluminium industry provides the positive electrical contact as well as the carbon for the reduction process.

**What are the potential environmental impacts of an aluminium smelter?**

Potential environmental impacts (including biophysical, social and economic impacts) of the construction and operation of an aluminium smelter may include: a reduction in air quality (including secondary effects of emissions on plants and agriculture); the increased generation of waste; changes
in water quality; water discharges to the marine environment; changes to existing patterns of traffic
and transportation; increasing noise levels; visual impacts; and socio-economic and macro-economic
effects on employment, GDP and national balance of payments.

**How will the potential environmental impacts of an aluminium smelter be addressed?**

The EIA has commissioned specialist studies to assess the significance of these potential impacts
taking into account the nature of the impact, extent, duration, intensity and probability of occurrence.
Potential impacts will be evaluated for the full-lifecycle of the proposed development, including
construction, operation and decommissioning. The impact evaluation should take into consideration
the cumulative effects associated with this and other facilities, which are either developed, or in the
process of being developed in the region.

Where potential negative impacts are identified, specialists will set mitigation objectives (i.e. ways of
reducing negative impacts), and recommend attainable mitigation actions. Where no mitigation is
feasible, this will be stated and the reasons given. Where positive impacts are identified actions to
enhance the benefit will also be recommended.

**What will be the main wastes produced by the plant?**

Wastes (excluding gaseous emissions) include spent potlinings, domestic waste, process waste
water, site stormwater runoff, miscellaneous industrial waste (wood, metals, etc) and laboratory
wastes. The specialist studies commissioned by the EIA will propose measures for mitigating the
impacts of these wastes.

**What are the main emissions that come from the aluminium smelting process?**

The major emissions that can be expected and which will be contained, treated and monitored are:

- **Solid Particulates**
  These include carbon, alumina (aluminium oxide), fluoride compounds and condensed
  hydrocarbons.

- **Carbon Dioxide**
  Carbon dioxide ($CO_2$) is generated during the electrolysis process as the carbon in the anode
  reacts with oxygen in the molten electrolyte, and from fuel used in the baking furnace and
  casthouse. As a result of the tremendous world-wide consumption of such fossil fuels, the
  amount of $CO_2$ in the atmosphere has increased over the past century, now rising at a rate of
  about 1 ppm per year. Major changes in global climate could result from a continued increase
  in $CO_2$ concentration.

- **Gaseous Fluorides**
  The use of molten cryolite (sodium aluminium fluoride) in the electrolysis process is the source
  of fluoride emissions. In certain circumstances, fluorides in the air can damage vegetation.
  Some types of plants are more susceptible than others. Fluoride is also present in significant
  concentrations in some foods (e.g. tea and sardines)

- **Sulphur Dioxide**
  Sulphur dioxide ($SO_2$) is formed from sulphur contained in petroleum coke, pitch and fuel oil. It
  is released in the anode baking process and as the anode is consumed in the pot. $SO_2$ is an
  irritant gas and can combine with water to form so-called acid-rain. $SO_2$ also occurs as a
  natural substance and is released in vast quantities during volcanic eruptions. Levels of
  sulphur dioxide are controlled by the specifications of raw materials used in the smelter.
What are the potential social and economic benefits?

It is expected that the workforce will peak at approximately 6,000 people for a period of 12 months during the construction phase. Operation of the smelter will require approximately 750 full-time, permanent employees. About 550 of these positions will be waged employees, most of which will be organised in shift-work. There will be about 200 technical and management positions required for operation of the smelter. An additional 200 to 300 subcontractors will be employed for smelter operations. The workforce will be sourced locally where possible.

The EIA for the Aluminium Pechiney aluminium smelter has initiated a socio-economic and macro-economic study which will identify the positive and negative impacts of the proposed smelter on South Africa’s economy. This will include addressing issues such as job creation potential, the contribution to GDP and the balance of payments. The evaluation will consider both the proposed development and upstream and downstream opportunities associated with the proposed expansion.

The Environmental Impact Assessment (EIA) Process

The environmental studies will follow a two-phased approach to run concurrently with the Public Participation Process.

Phase 1: Issues Based Environmental Scoping Study (ESS) - April to July 2002
The ESS is undertaken in order to identify environmental issues associated with the proposed project and determine which issues require further investigation during the EIA phase. Issues raised are captured in a Draft Scoping Report that is made available for public review. Comments on the report are encouraged to ensure all potential impacts are considered within the EIA process.

Phase 2: Environmental Impact Report (EIR) - April to December 2002
Specialist studies are undertaken to investigate issues of concern identified during Scoping. The following specialist studies have been identified for investigation:

- Air Quality (including effects of emissions on human health, plants and agriculture)
- Materials Handling and Waste Management
- Water Discharges to the Marine Environment
- Socio-Economic Effects
- Traffic and Transportation,
- Macro-Economics
- Water Quality (including surface water and stormwater)
- Noise
- Visual Assessment.

The specialist studies will be initiated in parallel with the Scoping process. This will enable the specialists to analyse baseline information and set-up model studies that will assist the EIA team in understanding the issues raised during the Scoping phase. The findings of the Scoping process will inform the specialist studies, which will only be completed after the Scoping process is finalised.

The Public Participation Process?

To ensure effective public participation in both the Scoping Phase and Environmental Impact Assessment Phase of the project the following process will be implemented in stages:
Stage 1: Identify and Consult I&APs
The Identification of I&APs and consultation with stakeholder groups to identify issues and concerns for inclusion in the Draft Scoping Report. Networking meetings and a Public Meeting are to be held.

Stage 2: Draft Scoping Report for Public Review
During this stage I&APs will be provided with 21 days to make comments on the Draft Scoping Report and identify any additional issues. Stakeholder meetings, Public Meetings and Open Days are to be held.

Stage 3: Draft EIR for I&AP Comment
The Draft EIR will be released for a 28 day period of Public Comment. Public Meetings and Open Days are to be held.

Stage 4: Focus Group Meetings
The purpose of these meetings will be to facilitate feedback from I&APs on the Draft EIR.

Stage 5: Final Report
The Final EIR and public participation report will be submitted to the Provincial Department of Economic Affairs, Environment and Tourism for their decision-making.

The entire public participation process will be supported by regular communication with I&APs in the form of Public meetings, Open Days, Networking Meetings, written as well as telephonic communication, newspaper advertisements, the distribution of information documents, a question and answer book and Draft Reports for comment. Documentation will also be made available from an EIA website hosted by the CSIR - smelter.csir.co.za

What is your role as an I&AP?
If you consider yourself an I&AP in terms of the proposed project we urge you to make use of the opportunities created by the Public Participation Process to raise issues and concerns which affect and/or interest you and about which you would like more information. Your input forms a key element of the EIA process.

Should you not yet be registered as an I&AP on the Coega Public Participation database we urge you to submit your contact details (name, address, phone numbers) to the public participation consultants indicated at the end of this document. Registering your interest will ensure that you receive regular information on the project, are invited to attend meetings and are informed of the availability of Draft Reports for review and comment.

How can you get involved?

1. By responding to our invitation for your involvement which will be advertised in local newspapers.
2. By mailing or faxing a comment form to the public participation consultant indicated below.
3. By attending the meetings/open days to be held.
4. By telephonically contacting the public participation consultant if you have a query, comment, or require further project information.
5. By reviewing the Environmental Scoping Study report within the 21-day period in mid-May to mid-June 2002.
6. By attending the public feedback meetings which will be held during this review period. Should you be registered as an I&AP you will be invited to attend these meetings and the meeting dates will be advertised in local newspapers.
7. By reviewing the Draft Environmental Impact Assessment that will be released in about mid-September to mid-October 2002 for a 28 day comment period. You will also be invited to attend public meetings/open days during this period. The meeting dates will be advertised in local newspapers.

WHO SHOULD YOU CONTACT?

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EIA process information is available on the following website: smelter.csir.co.za