

Corporate Perspective Norsk Hydro (Magnesium)

**SF₆ and the Environment:
Emission Reduction Strategies
San Diego, CA, November 2002**



Changing Strategy to Meet the Greenhouse Gas Challenge



**News – November 20, 2002:
The 30-year energy forecast prepared
by the International Energy Agency
(IEA) gives little reason for optimism.
...K. Oren, Director ECCP, WBCSD**

Changing Strategy to Meet the Greenhouse Gas Challenge

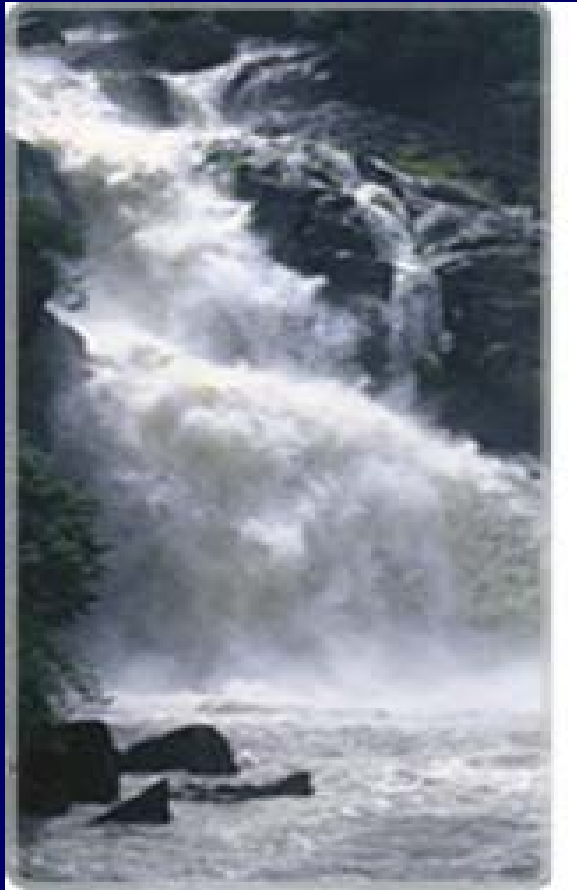


Overall consumption may increase more than 60% Renewable share of total energy mix will increase to 4% (from 2%) Dependence on hydrocarbons remains

- 1. Kyoto cannot work without Russia**
- 2. Industry must prove the business case and provide greater awareness to consumers**
- 3. Exploration of emissions trading is underway**
- 4. Beyond 2012 is unclear**



Norsk Hydro ASA - Global Responsibility



- More than 400 operations globally
- Country locations
 - 28 in Europe
 - 12 in Africa
 - 12 in Latin America
 - 14 in Asia-Australia
 - All of North America
- Third largest light metals manufacturer globally
- World's largest magnesium producer



Norsk Hydro ASA – Primary Environmental Goal

- **Create efficient management of natural resources, as well as reducing waste and emissions, while taking great care to insure that Hydro operations are as kind to humans as they are to the environment**





Environmental Principles



- **Established in 1993**
- **Main issues:**
 - **Mission**
 - **Impact of products**
 - **Impact of production**
 - **Relevant R&D**
 - **Relevant organization**



Norsk Hydro in Partnership Programs

- **World Business Council for Sustainable Development – charter member**
- **World Bank’s Prototype Carbon Fund**
- **The Sustainable Mobility Project**
- **Greenhouse Gas Protocol**
- **The CO₂ Capture Project**
- **Member – European Climate Change Programme 6, Working Group 5-Fluorinated Gases**



Global Partnerships: Working Together



- **Hydro is engaged in the global debate**
 - **Sustainability**
 - **Corporate social responsibility**
 - **Maximize the positive impact on communities and the natural environment**



Sustainable Development

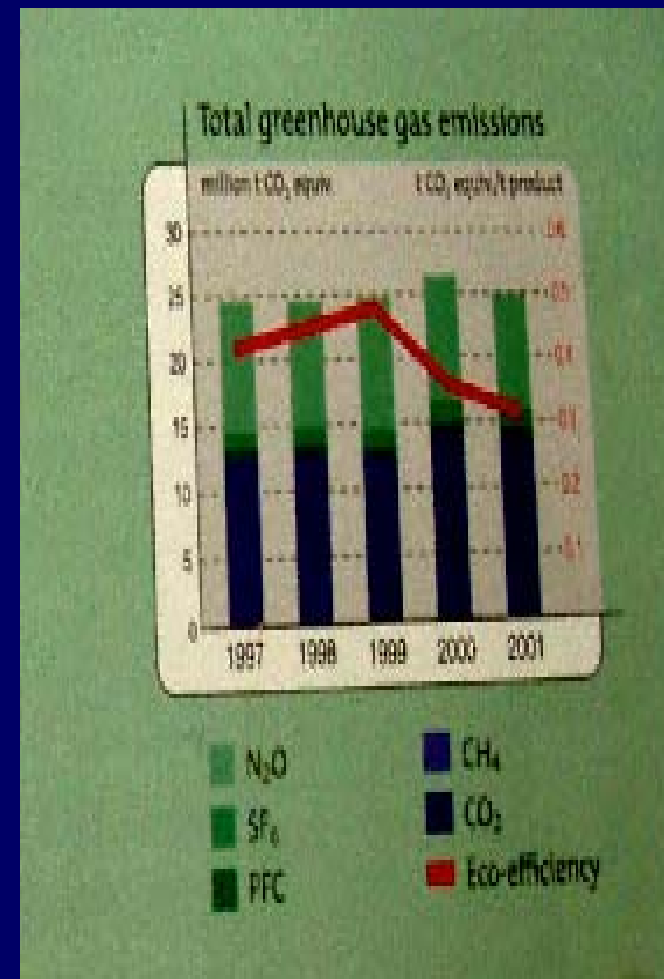
- Focus must be on cradle to grave
- Product life cycle analyses
- Material flow analyses
- Cooperation with industrial and public partners





Norsk Hydro ASA

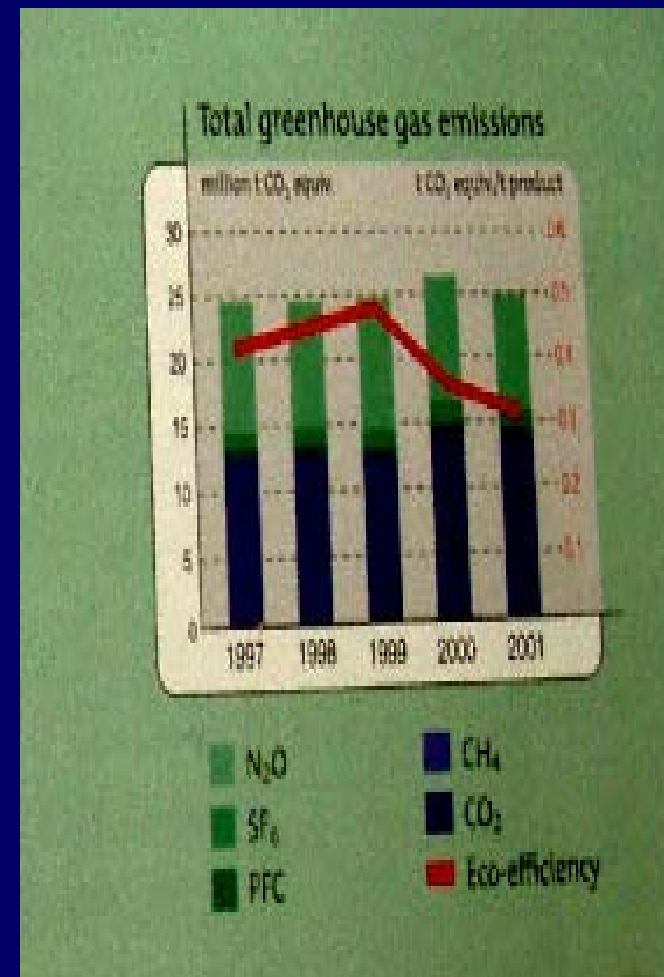
- **Greenhouse gases 2001**
 - **69% Agri, 16% Light Metals, 14% Energy**
 - **Multiple approaches to reduction, e.g., new technology to lower N₂O formation during the production of HNO₃**





Norsk Hydro ASA

- **Eco-efficiency**
 - **Developed by WBCSD**
 - **Merges essential parts of economic and ecological progress**
 - **Reported on basis of product volume**





Hydro Magnesium – Current Situation

- **SF₆ – dry air mixture in use**
 - **Becancour primary production plant**
 - **Porsgrunn remelting facility**
- **SO₂ – dry air mixture in use**
 - **Bottrop remelting facility**
 - **Xi'an remelting facility**
 - **Porsgrunn Research foundry**



Environmental Commitment

Bécancour, Oct. 29, 2001

■ **NORSK HYDRO'S
ENVIRONMENTAL
PERFORMANCE AGAIN
COVERED IN HONOURS**

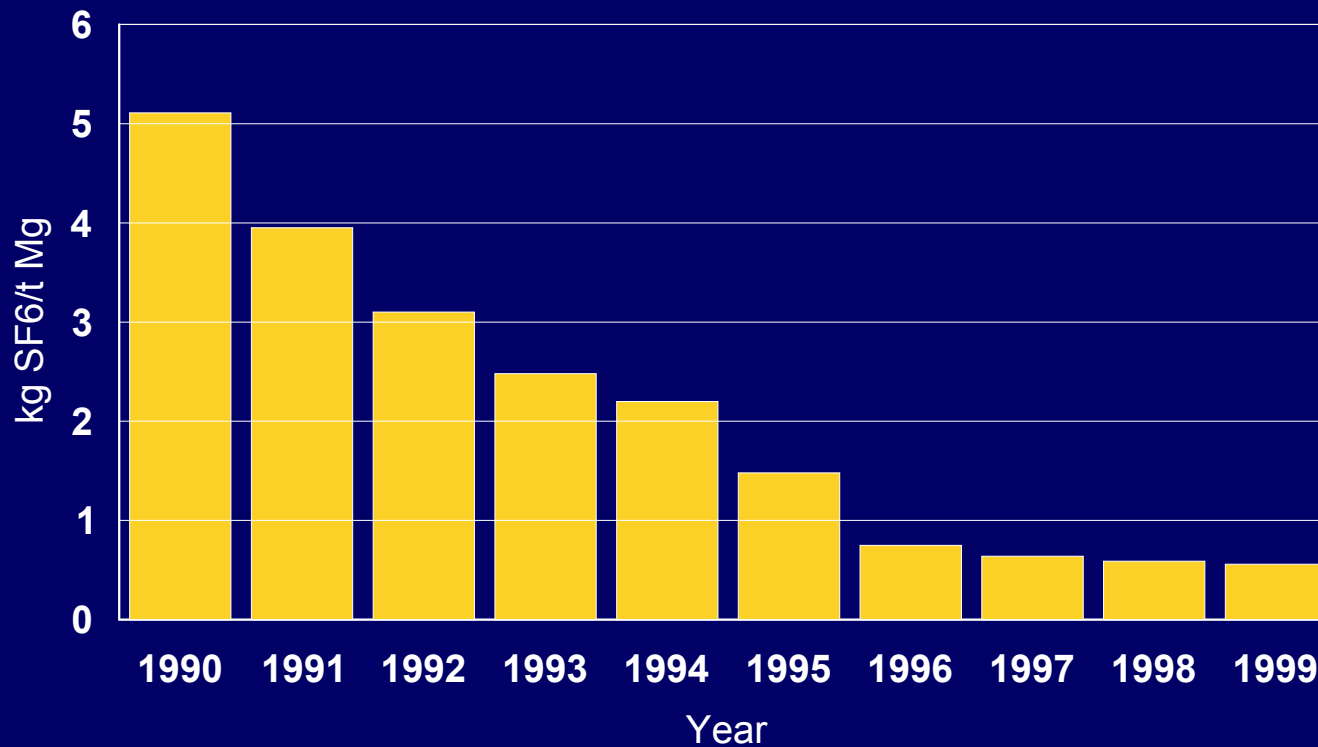


- Norsk Hydro Canada keeps earning recognition for its performance in Environment. The Bécancour plant has received the **EcoGESTe Award**.



Becancour Protective Gas Usage

Consumption of SF6 : 1990 - 1999



0.7 kg/MT in 2002. The plant now generates <15% of the emissions in 1990.



Becancour – The EcoGESte Award



- The EcoGESte Award is given for a program that monitors organizations who voluntarily commit to reduce their emission of greenhouse gases.
- For the first time ever, the Government of Québec has given the Award to recognize the best achievements over the last decade.



Leading the Magnesium Industry





Ongoing Environmental Commitment

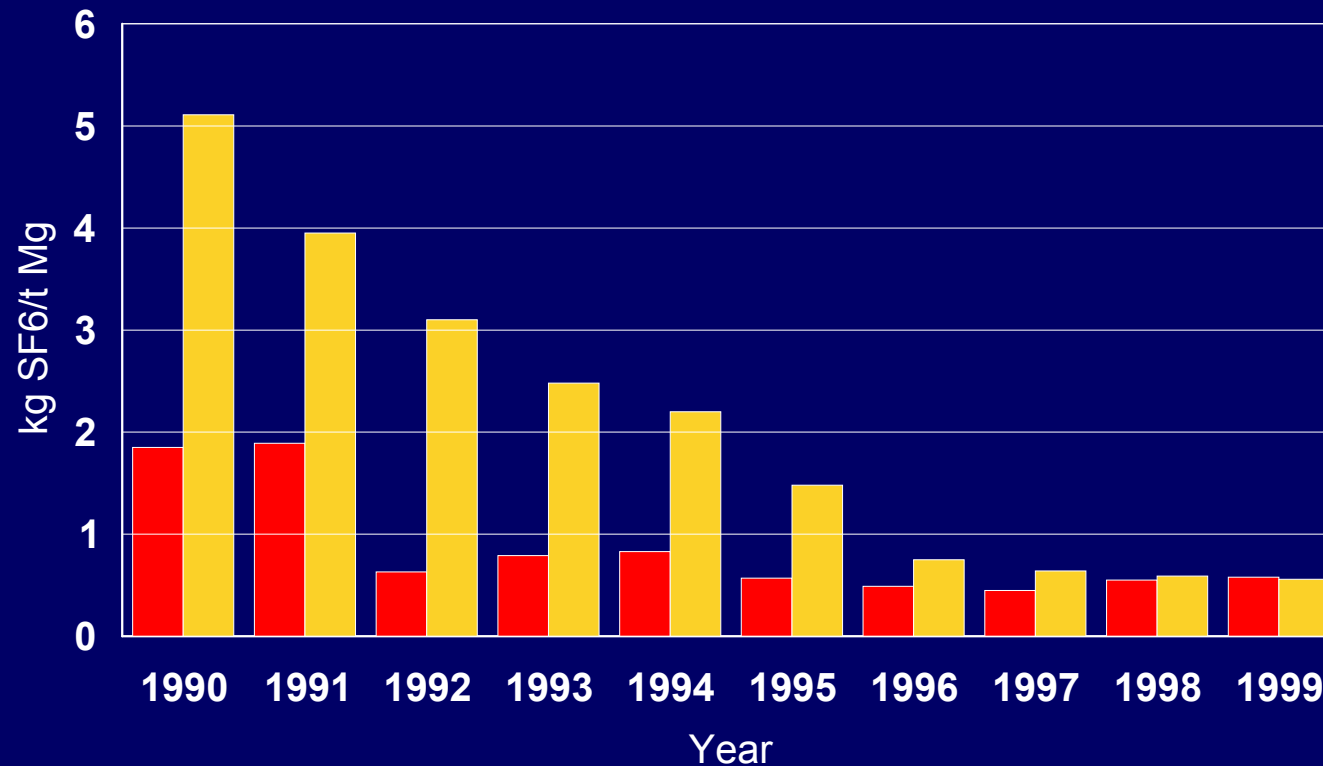
- Porsgrunn entered Mg production in 1951
- Consumption of SF₆ dropped below 0.6 kg/MT in 1995 and has remained there
- Use of SF₆ was 0.55 kg/MT in 2001
- Acceptable alternative today would be SO₂





NHM Combined Plant Gas Reduction

Consumption of SF6 : 1990 - 1999





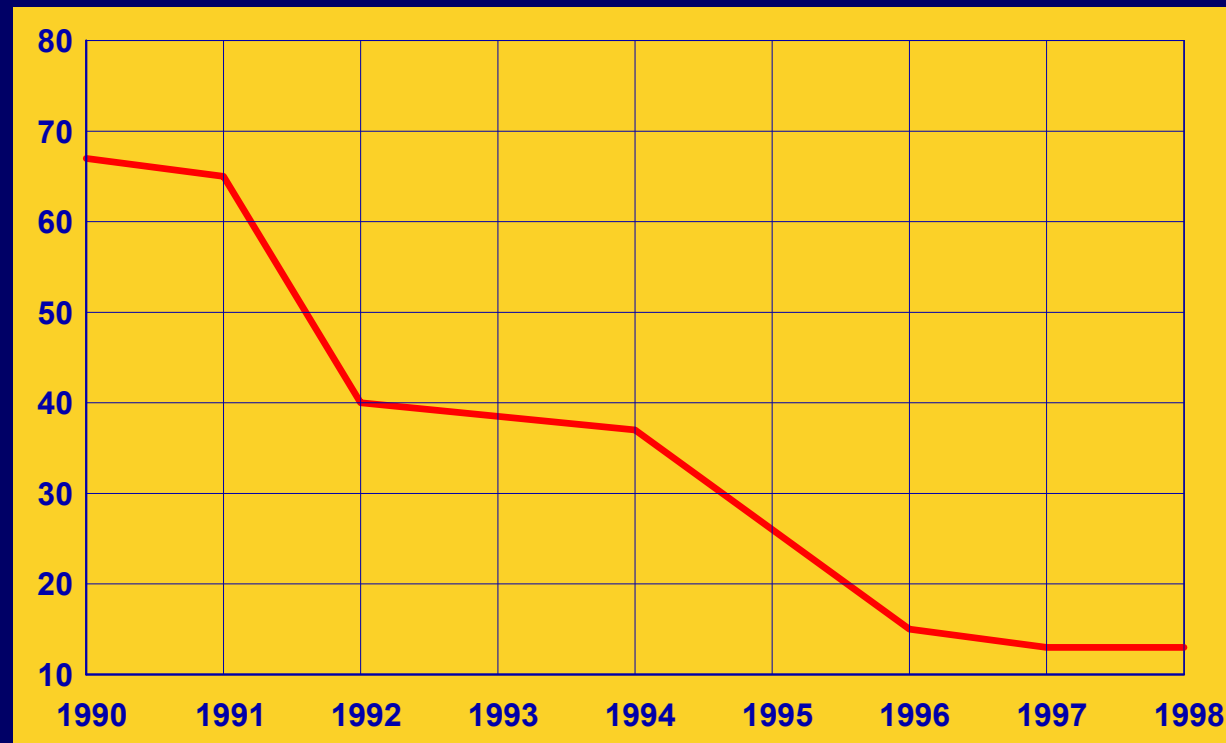
Hydro Magnesium Gesellschaft

- **Located in Bottrop, Germany**
- **Meets all HES standards**
- **Products**
 - **Remelted ASTM alloys**
 - **Custom alloys**
 - **Specialty anodes**
- **Global business perspective**



NHM Systematic Reduction of GHG

CO₂-eq. [kg/kg Mg]





Hydro Magnesium Xi'an

- Design basis same as HMG (Germany)
- Safety, quality, health and environmental standards are same as at other NHM plants
- Melt protection based on SO₂/dry air
- Does not employ people from the migrant work force
- Suppliers must show HES improvements



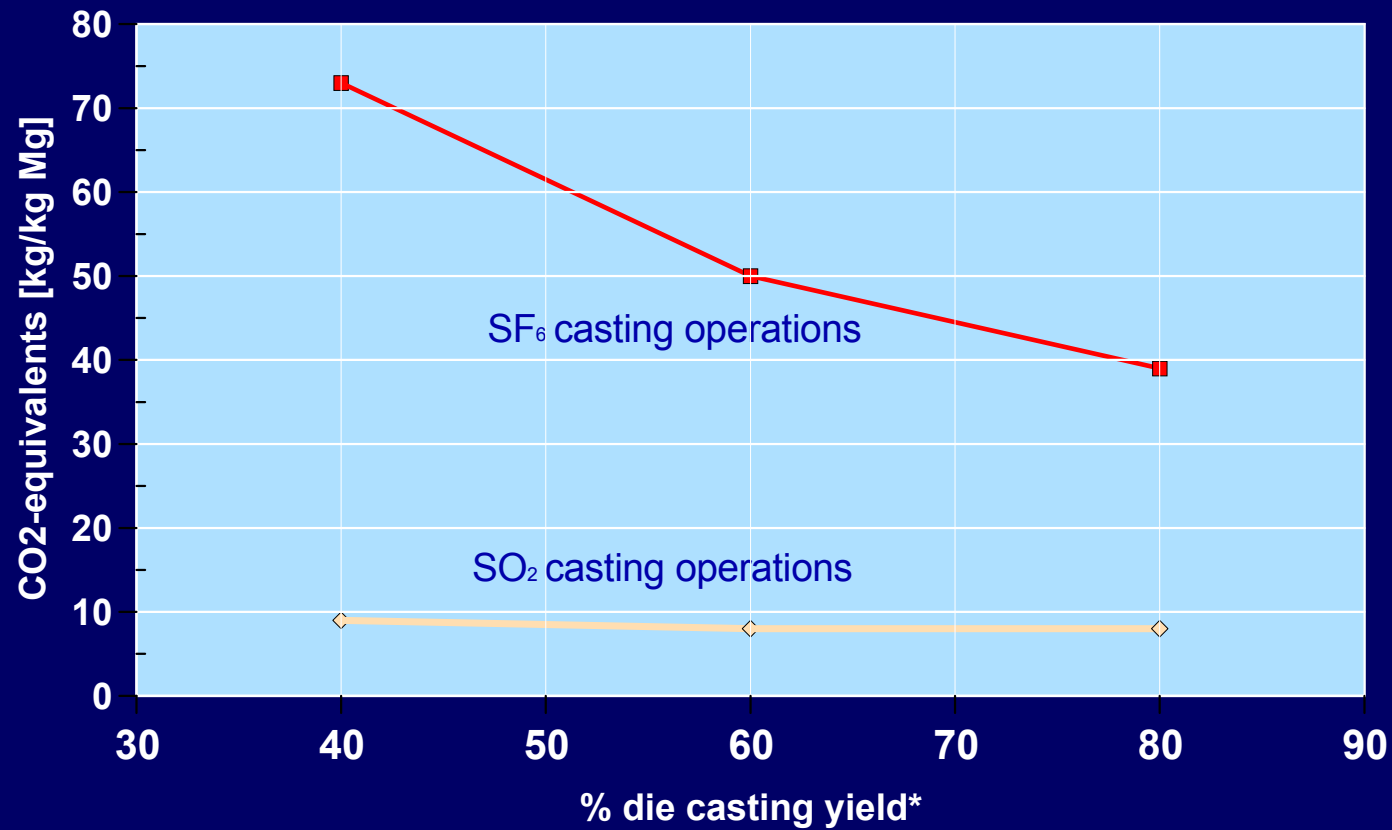


NHM Protective Gas Trials

- Research foundry recently served as test site for IMA – SINTEF project
- Becancour conducted an extensive SO₂ trial in 2001
 - Mixing, distribution and protection properties were all excellent
 - Ingot surface and interior quality were excellent
 - Emissions were very low and amenable to capture via ventilation and gas cleaning processes
- SO₂ trials at die casters



Environmental Impact in Die Casting



(*component weight/shot weight)



Hydro Magnesium - Outlook

- **Elimination of SF₆ from all plants before the end of 2005**
- **SO₂ is an acceptable alternative**
 - **Disadvantages**
 - **Safety risks**
 - **Non-ideal working environment**
- **Novec 612 trial is planned for Becancour in early 2003**
- **Prepared to implement the best available technology in our plants**