

Sourcing Anodes as a Production Option

A Viable and Economic Alternative with Proven Success



Presented by *MANNWEILER-CONSULTING*
in cooperation with *AMINCO RESOURCES, LLC*
at the 15th World Aluminium Conference in
Oslo, June 21 - 23 2010



Agenda

- ❑ Aluminum growth and its impact on the demand for carbon
- ❑ The merchant anode market
- ❑ China's changing role as an anode supplier
- ❑ How will third party anode demand be covered: A look ahead
- ❑ Conclusion



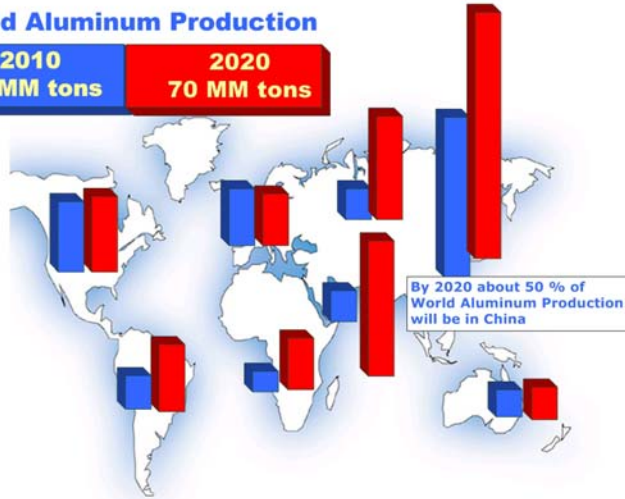
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World Aluminum Production

World Aluminum Production

2010
40 MM tons

2020
70 MM tons

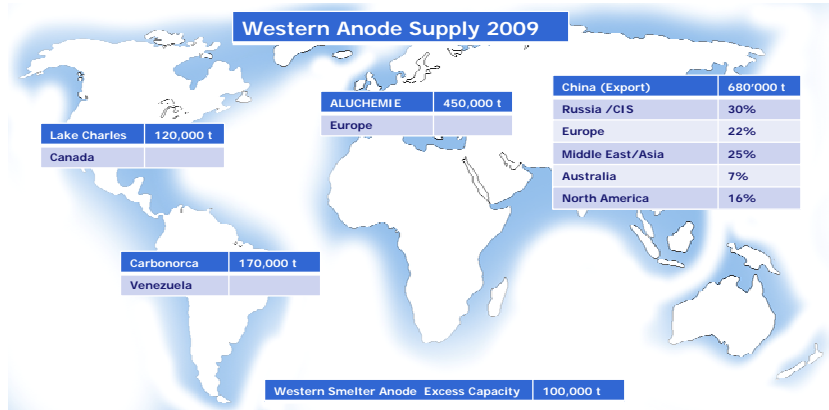


Global Anode Requirement

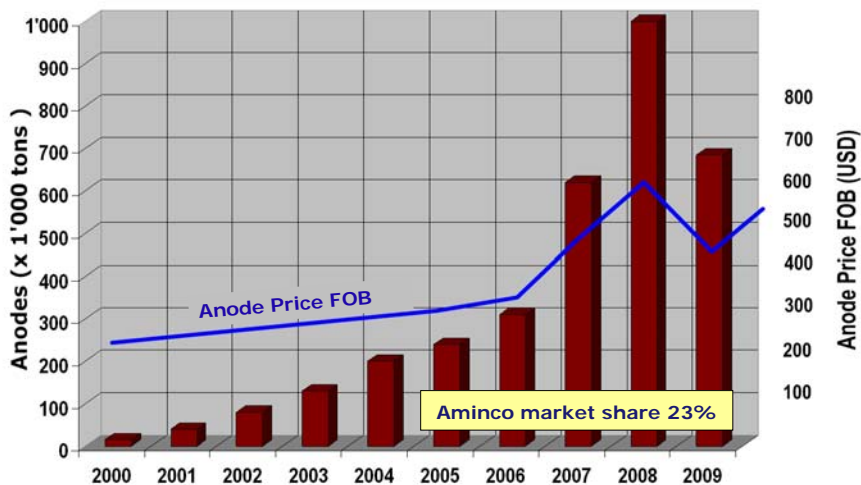
| | 2010 | | |
|------------------------|------------|-----------------------|----------|
| | Total | World excluding China | China |
| Aluminum | 40 | 26 | 14 |
| Anodes total | 22 | 14 | 8 |
| Merchant anodes | 5.5 | 1.5 | 4 |



Suppliers to the Western Market



Chinese Merchant Supply Meets 45% of Western Anode Demand





Global Anode Requirement: A Second Look

| | 2010 | | | 2015 | | |
|------------------------|------------|-----------------|----------|----------|-----------------|----------|
| | Total | World w/o China | China | Total | World w/o China | China |
| Aluminum | 40 | 26 | 14 | 56 | 32 | 24 |
| Anodes total | 22 | 14 | 8 | 31 | 18 | 13 |
| Merchant anodes | 5.5 | 1.5 | 4 | 9 | 3 | 6 |



Continuous Growth of Merchant Anode Demand

- ❑ By 2015, 3 MM tons of merchant anodes will be required in the West of which 1/3 will be supplied from China
- ❑ Growth will come from
 - New smelters without anode plants due to environmental restrictions: (Iceland, Greenland)
 - Conversion of Söderberg to prebake (North America, Europe)
 - Aluminum capacity creep (Global)
 - More smelters = more bake furnace rebuilds
 - CHINA: The more Al capacity built, the larger the demand for merchant anodes in China – this trend will continue



China's Changing Role

- ❑ With continuous Chinese smelter expansion: domestic customers have priority
 - Quality requirements less stringent
 - Payment condition is more attractive for the carbon plant than for export
- ❑ *Wei Ren Min Fu Wu* (For the good of the people)
 - Growing/supporting domestic business is now **priority**
 - Micro anode plant (< 50'000 t) will disappear
 - Consolidated and large anode producers will dominate



China's Changing Role (cont)

- ❑ Chinese anode prices will be similar or higher than western anode prices
 - High energy and raw material cost
 - Decreasing anode quality due to pet coke quality deterioration (more sour crude imports!)
 - Increasing transportation cost
 - Consolidated market
 - ***With the stronger RMB the RMB/USD ratio will play a major factor in price of Chinese anodes***



Supply to Western Merchant Market

- ❑ Who, therefore, will supply the 3 MM Tons which will be required in the West?
 - Existing anode plants (e.g. ALUCHEMIE) with marginal expansion possible
 - Quality anodes from China – but with a smaller share and pricing on par or higher with western anodes
 - Aminco/RDC “Swiss quality made in China” - anodes
 - New highly efficient anode plant. Projects are planned, e.g.

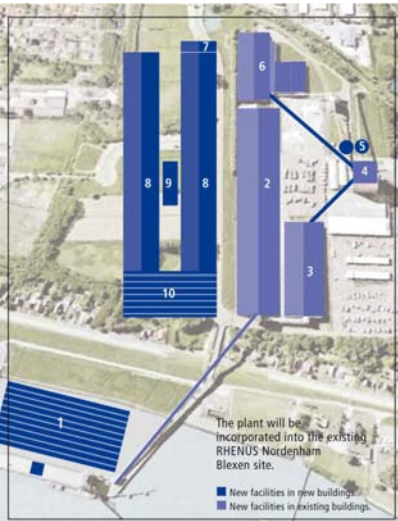
“Nordenham Anode Production Company”



Nordenham Anode Production Company

1,000,000 tons
of high quality
anodes to be
manufactured
by the
**NORDENHAM
ANODE
PRODUCTION
COMPANY**

- 1 Harbor and Container Terminal
- 2 Coke Storage
- 3 Storage and Processing Plant for Recycled Materials
- 4 Paste Plant
- 5 Pitch Tanks
- 6 Green and Baked Anode Storage
- 7 Refractory Maintenance
- 8 Bake Furnaces 1 and 2
- 9 Waste Gas Cleaning
- 10 Anode Cleaning, Slotting and Handling





Nordenham Anode Production Company



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RHENUS Logistics an Ideal Partner



- With its own shipping companies and seaport terminals RHENUS will be the active partner for all logistic solution
- It will provide the harbor, land, infrastructure and worldwide logistics network
- Nordenham is an ideal location with connections to close-by cities and ports



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Proven Technology Partners

Conceptional Design
Paste Plant/Recycled Processing
Fines Circuit
Paste Mixer
Bake Furnaces
Waste Gas Cleaning (RTO)

R&D
Carbon Ltd.

Outotec

CP
CLAUDIUS PETERS

BUSS
excellence in compounding

RIEDHAMMER

CTP
AIR POLLUTION CONTROL

Reference Plant **EMAL** **500'000 tpa**

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Smelters benefit to buy from Nordenham

- ❑ Long anode supply contracts at competitive price
- ❑ High anode quality with consistent properties guaranteed (technology, R&D Carbon support)
- ❑ Utilization of European raw materials (coke, pitch)
- ❑ Just in time delivery possible i.e. reduction of stocks, low cost for transportation
- ❑ Credit for returned butts
- ❑ Modern, efficient anode plant operated by skilled people, built in a political stable environment, that fulfills the stringent ecological conditions

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Time Schedule

2010

- ❑ Concept and determination of investment/production cost
- ❑ Preliminary negotiations with raw material suppliers
- ❑ Determination of anode sales price and long term supply conditions
- ❑ Definition of environmental impact and preliminary negotiation with local, state and federal authorities

2011

- ❑ If negotiation of long-term anode sales contract with potential customers successful start of next phase (10 MM € needed)
- ❑ Banking feasibility
- ❑ Negotiations with potential investors and decision of "go or no go"

2012 – 2015

- ❑ Construction first phase: 500'000 tpa anode plant

2020

- ❑ Depending on market requirements, construction of second phase for 1 million tons of anodes



Conclusion

- ❑ With the growing aluminum industry, the demand for merchant anodes will grow continuously
- ❑ An anode is no longer a cheap commodity but a valuable product. Anodes are no more part of smelters core business
- ❑ Outsourcing anodes is economically viable as "full cost" is lower than in house production cost
- ❑ In the West merchant anodes will be supplied from existing and new high efficient anode plants and from China, **but**
- ❑ With increasing raw material, energy and transportation cost Chinese anodes will have similar or higher anode prices particularly as Euro weakens and RMB strengthens
- ❑ Therefore, new efficient capacities are urgently required. The **Nordenham Anode Production Company** is the answer

Thank you



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