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IKI International Climate Initiative

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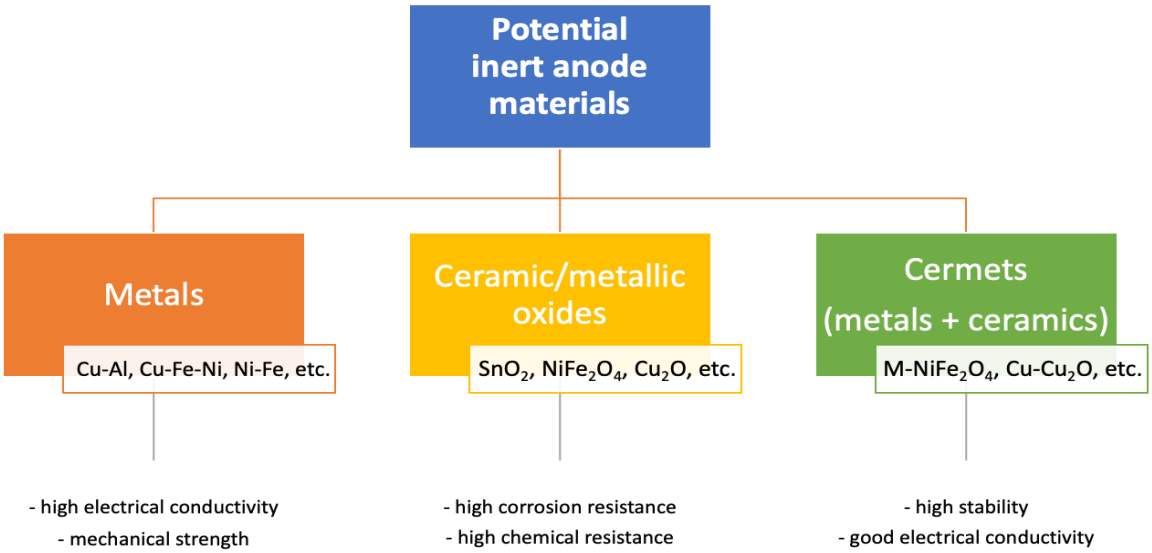
Alu

Aluminium Smelter with inert anodes (HaHe-IA)

Description | In today's aluminium smelters, carbon-containing anodes are used and consumed as a reducing agent. The combustion of these anodes is the main source of direct emissions in the aluminium smelting process. One option for reducing these GHG emissions is the use of innovative Inert anode (IA) materials that do not react chemically or electrochemically during electrolysis, and thus avoid process emissions from aluminium smelting, including both: CO_2 emissions and PFC's[1].



Process inputs and outputs per t of aluminium

	Unit	Value
Electricity demand	GJ	52.2
Heat demand	GJ	29.9
Bauxite ore	t	4.84
GHG emissions (scope-1)[2]	t CO_2	0.0
GHG emissions (scope-2)*	t CO_2	7.28
CO_2 captured	t CO_2	-

*Assumed emission intensity of electricity: 516 g CO_2/ kWh_{el}

Key characteristics:[3]

- Eliminates process related Greenhouse Gas (GHG) emissions, including both CO_2 and PFC emission
- Reduction of GHG emissions compared to conventional aluminium smelting: 100% (scope-1)
- Not proven on industrial scale, yet

Key requirements:

- New cell design may be required

Applicability to the Kazakh context:

- The Kazakh context does not play a decisive role for the applicability of this technology to Kazakh aluminium smelting

[1] PFC (perfluorocarbons) emissions are mainly CF_4 and C_2F_6, whose global warming potentials (GWP) are a multi-fold of that of CO_2

[2] of the aluminium smelter (HaHe process) including PFC emissions in CO_2-eq, excluding alumina refinery

[3] More information and assumptions are provided in the final report of the *DeKaMe* project (https://epub.wupperinst.org/frontdoor/index/index/docId/8779)

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