

Mapping industries and emissions in the northern territories

BAT: Economic and social benefits of introduction of clean production technologies

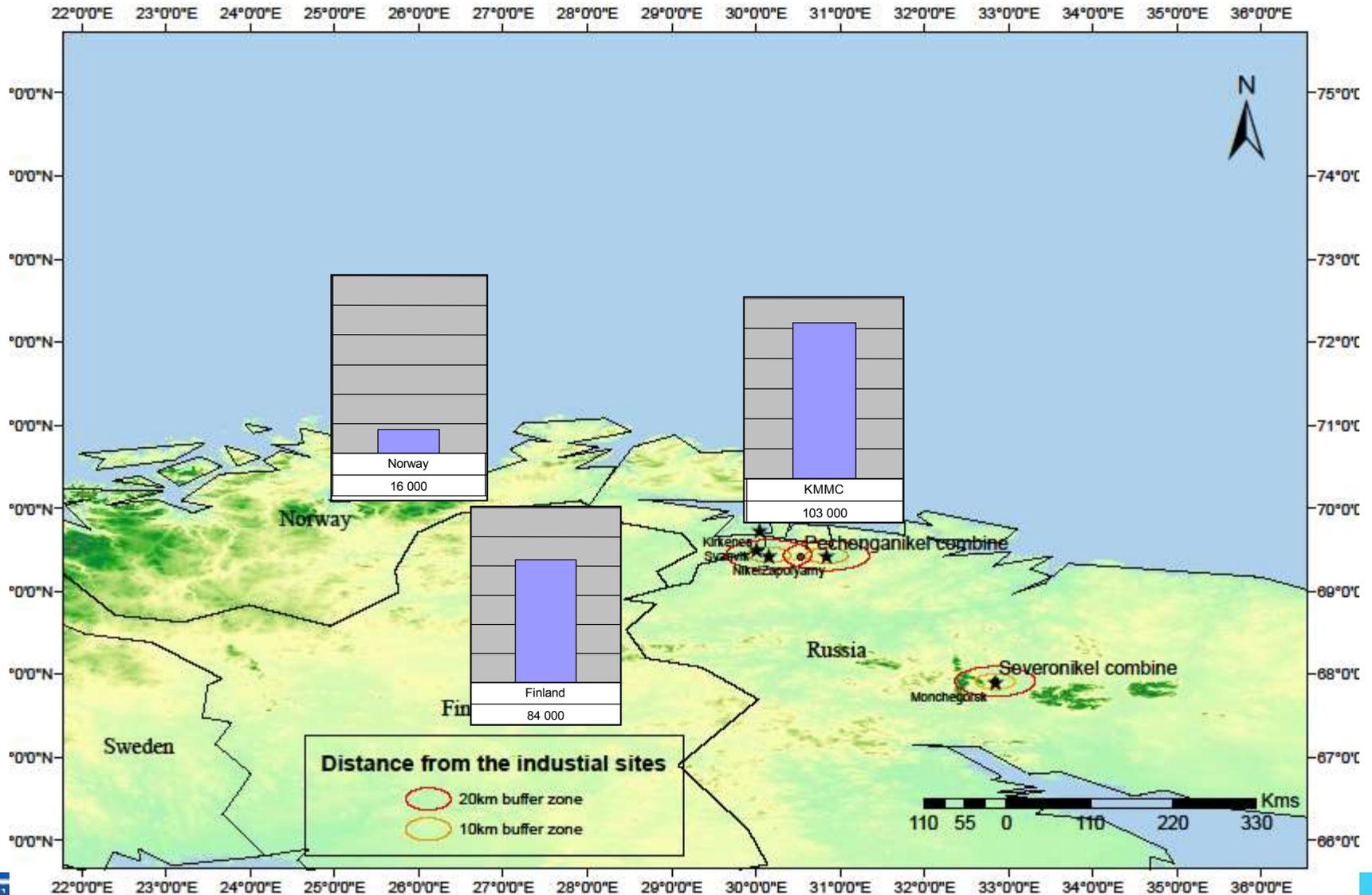
Norwegian-Russian seminar

Interaction between governmental structures, business, academia and civil society
– an instrument for improving environmental safety in the region

Zapolyarny 26. october 2011

Karl Kristensen
Advisor, Bellona

SO₂ (tonnes) emissions from KMMC compared to total national emissions of Norway and Finland



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MMC Norilsk Nickel begins to review bids from participants of international tender for sulfur recovery

Moscow, October 18, 2011 – OJSC MMC Norilsk Nickel (hereinafter – MMC Norilsk Nickel or the Company) begins to review bids coming from Russian and international companies which took part in international tender for implementation of state-of-the-art sulfur dioxide recovery at Copper Plant and Nadezhda Metallurgical Plant (CP and NMP).

The tender was posted in February 2011, and bid submitting deadlines were postponed twice following requests of the participants. Initially, around 15 Russian and international companies applied for participation in the tender. By October 17, the final deadline, technical and commercial offers were submitted by 5 participants comprising both Russian and international companies. The offers include recovery of at least 95% of sulfur dioxide from metallurgical off-gases at CP and NMP. Together with the currently implemented project aimed at increase of NMP capacity and shut down of agglomeration and smelting areas at Nickel Plant, this should lead to considerable decrease of sulfur dioxide emission into atmosphere.

It is expected that the chosen contractor shall provide the following:

- Installation of NMP flash furnaces and CP Vanyukov furnaces off-gases dust fine cleaning systems;
- Construction NMP flash furnaces and CP Vanyukov furnaces off-gases sulfur dioxide concentration units;
- Reconstruction of NMP and CP sulfur recovery lines securing the treatment of all concentrated sulfur dioxide and production of elementary sulfur;
- Construction of converter off-gases sulfur dioxide cooling, dust cleaning, and concentration systems with subsequent treatment (to elementary sulfur) at CP sulfur recovery lines.

The annual production volume of commercial sulfur in the Company's Polar Division shall exceed 900 thousand tons. Furthermore, off-gases shall be used as the raw material for production of sulfuric acid for copper and nickel electrolysis ships, and for production of sulfuric reagent for concentration purposes. Off-gases dust fine cleaning systems shall provide for considerable decrease of nonferrous metal particles emission into atmosphere.

Expert team that includes representatives of Polar Division, Gipronickel Institute, and Head Office of the Company, has begun to review the technical and commercial offers. It is expected that the contractor shall be chosen by December 15, 2011, at the latest.

18.10.2011



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Negative effects of KMMC operations today

Health effects caused by emissions from Nickel producing industry

- Respiratory illnesses
- Increase in oncological diseases
- Increase in number of infections caused by weakened immune system
- Damage to reproductive system
- Increase in childrens diseases
- Reduced life expectancy

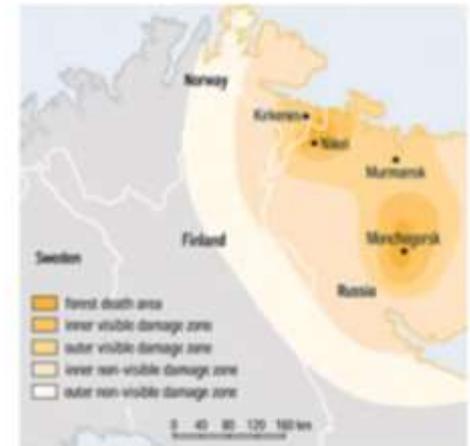
Environmental damage caused by emissions from KMMC

- Death of trees and other vegetation
- Destruction of mosses and lichens
- Reduced fisheries and wildlife
- Poisoned water systems and soil
- Reduced biological diversity and productivity

Picture 1. Birch tree leaves damaged by sulfur dioxide
(photo by D. Aamild)¹⁷⁷



- Forest death area
- Inner visible damage zone
- Outer visible damage zone
- Inner non-visible damage zone
- Outer non-visible damage zone



(Институт исследования леса Финляндии (METLA))

Almost all emissions from KMMC can be recycled as feedstock for extra production if captured

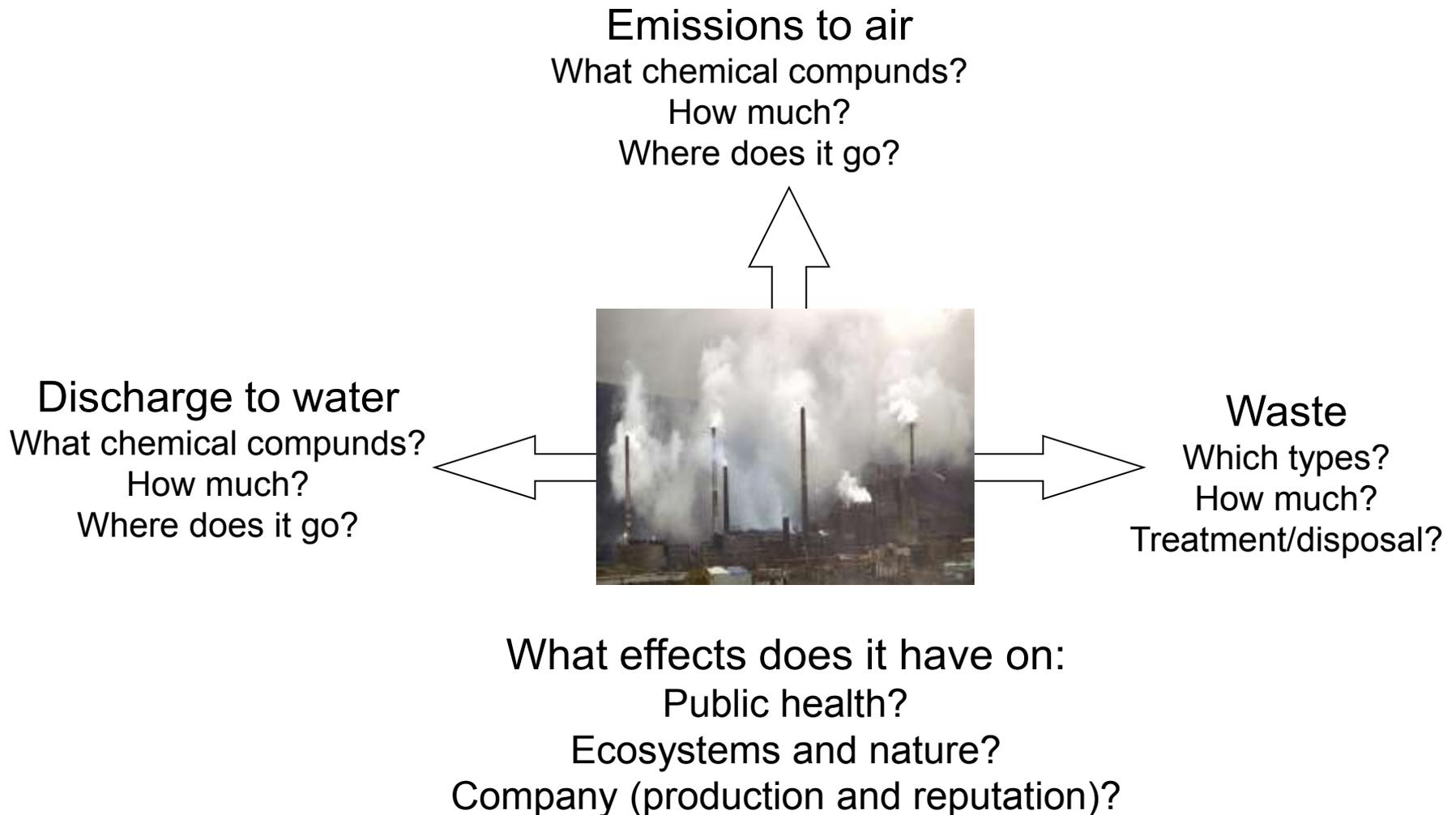
- Local pollution in surroundings of some nickel production plants in Russia have reached levels that is almost profitable to mine
- Heavy metal dust that is collected can easily be recycled back into the production process
- Almost all SO₂ emissions can be captured and processed to H₂SO₄ (or liquid SO₂) that is the world largest chemical commodity
- (Extra thermic energy may be sold or provided to local community)

The reputation of Norilsk nickel company is damaged by today's environmental practice

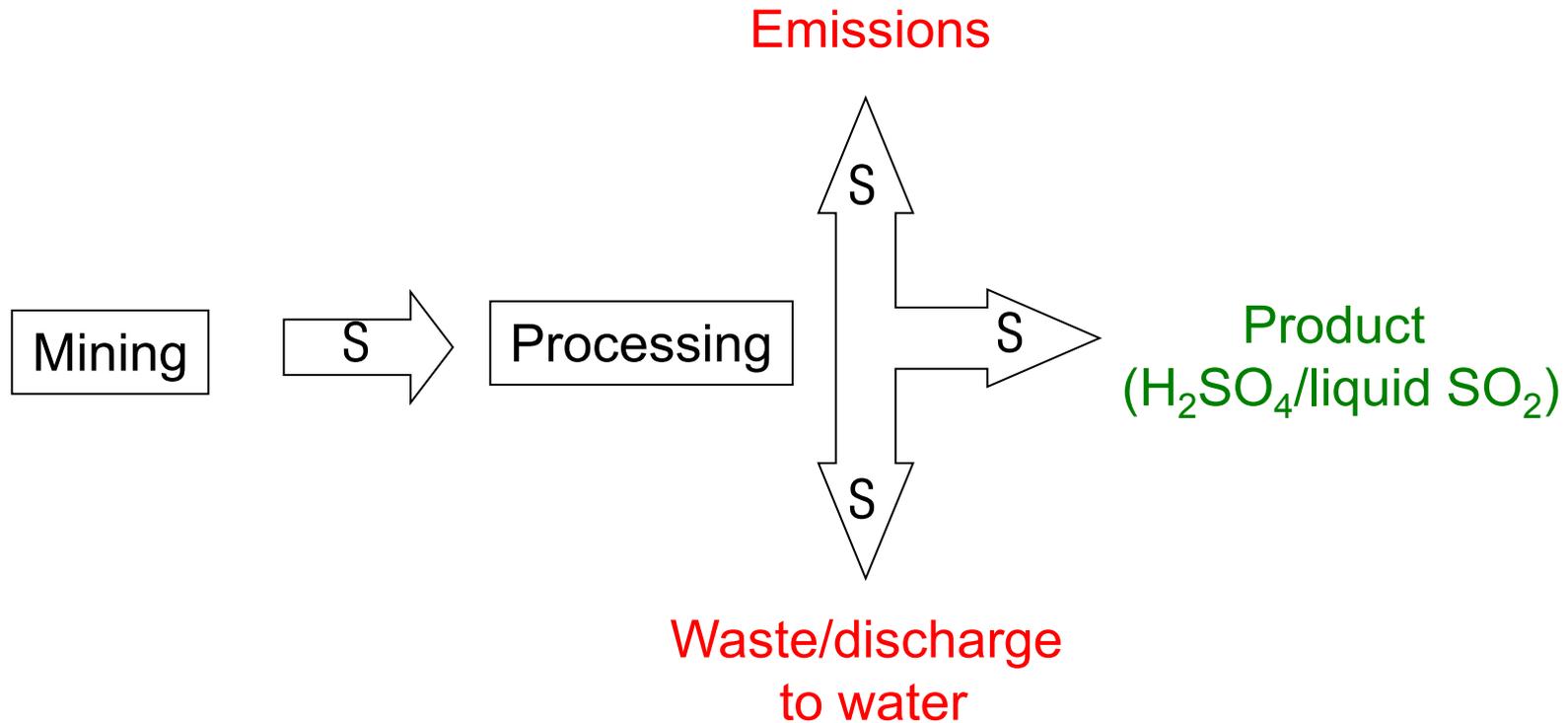
- The practice of Norilsk Nickel company today is unacceptable to many foreign governments, financial institutions, market players and general public
- In order to be taken seriously, Norilsk needs to apply to international standards for environmental performance.
- Damage to reputation of Norilsk may reduce the motivation for competent personnel to work at their facilities

What should KMMC do?

How can we work towards improving our environmental performance, if we don't know our current status?



Massbalance: What goes in must come out, nothing disappears



Relevant parameters to monitor

Acidic oxides

- SO₂
- NO_x
- HCl

Heavy metals

- Ni
- Cu
- Co
- Pb
- Hg
- Cd
- Cr (VI)
- Zn

Organic toxins

- Phenols
- Formaldehyde
- Benzopyrene
- PAH
- Dioxins
- PCB

Climate gasses

- CO₂
- Methane
- CFK/Freon

How to map environmental performance: performance indicators

Total	Relative	Effects in surroundings
SO ₂ emissions 103.000 tonne	SO ₂ emissions/production 0,63 tonne/per tonne product	pH in water 3,5

KMMC needs to set and public announce goals for its environmental performance that meets international standards

- How much reduction in emissions in SO₂, heavy metals and organic compound?
- When shall this be achieved?
- What action will be taken to achieve these goals?

What change should KMMC make in its environmental management practice

- Commit beyond doubt to reducing negative environmental impact from its operations
- Attain transparency in all efforts, and publish results of environmental performance
- Verify quality of documentation of environmental performance by independent 3. party
- Base evaluation of environmental performance on mass balanced analysis

KMMC should have a program for

- Monitoring and capture of SO₂, heavy metals and other relevant pollutants
- Minimization of waste and eco efficient disposal
- Remediation of contaminated areas
- Conservation of biological diversity proportional to disturbances caused by Norilsk operations

What steps should KMMC take to reduce its polluting emissions

- General upgrade to ecoefficient production systems
- Commit to a massive upgrade of pollution monitor- and capture systems
- Better maintainance of process equipment
- Improve energy efficiency
- Consider installation of steam dryer for feed preparation

What steps should KMMC take to reduce its polluting emissions

Emissions to air

- Build or upgrade sulphur processing plant to capture 95% of SO₂ emissions
- Install/upgrade electrostatic precipitation (ESP) and bag filters to capture 90 % of all metal dust and recycle it back into the production process
- Consider upgrading waste heat boilers to increase energy efficiency and dust capture
- Install forced ventilation to reduce spreading of dust
- Focus on better sealing of equipment

Discharge to water

- Recycle process water where ever possible
- Install/upgrade water treatment plants to capture heavy metals more efficient



Waste

- Safe disposal of hazardous waste
- Recycle back in process

Conclusion

- Local human health, ecosystems and the reputation of KMMC and Norilsk NC will benefit tremendously from a systematic effort from Norilsk to improve its environmental performance
- Norilsk already have the technology and money to do this... we hope you also have the will
- Bellona is prepared to assist Norilsk in this process in any way we can

Thank you for your attention!

