



ARCTIC CONTAMINANTS  
ACTION PROGRAM

# MURMANSK BUS COMPANY

## RETROFIT PROJECT



ARCTIC COUNCIL



[acap.arctic-council.org](http://acap.arctic-council.org)



@ACAP\_Arctic

### Summary

Thanks in large measure to U.S. technical support, Murmanskavtotrans, the largest bus company in the Russian region of Murmansk, was able to upgrade its bus fleet in 2013. The company bought 29 new buses (Euro V) and retired 28 obsolete models (Euro 0). All the new buses came with efficient diesel engines that emit less than 5% of the black carbon emitted by the older buses. Replacing the Euro 0 buses with Euro V models allowed Murmanskavtotrans to cut its black carbon emissions by 90 percent.

### Background

Air pollution creates serious health, environmental, and economic problems for urban, suburban, and rural inhabitants. Buses, trucks, and other vehicles powered by combustion engines are a major source of air pollution. In June 2012, the World Health Organization (WHO) reclassified diesel engine exhaust emissions as carcinogenic to humans, and linked them to more than 74 million healthy life years (HLY) lost annually, and more than 3 million cases of premature death, including more than 100,000 in Arctic countries.

Diesel-powered vehicles are one of the largest sources of particulate matter and black carbon emissions. Particulate matter refers to the mixture of solid particles and liquid droplets found in the air. Most notable are those particles less than 2.5 micrometers in diameter (PM<sub>2.5</sub>), which can be inhaled deep into the lungs and lead to stunted lung development in children, harmful effects on the cardiovascular system, and even premature death. When it comes to PM<sub>2.5</sub>, there is no safe level of exposure, or a threshold below which adverse health effects can be avoided. Black carbon comprises roughly half of PM<sub>2.5</sub> emissions from diesel engines.

## Why black carbon matters in the Arctic

While black carbon is harmful anywhere, it is even more problematic in the Arctic. When deposited onto ice and snow, black carbon increases melting due to the absorption of solar energy. These effects make the Arctic an exceptionally vulnerable region for black carbon emissions, and the Arctic is warming considerably faster than other regions of the world. The Arctic Council's Arctic Contaminants Action Program (ACAP) selected this project to demonstrate how other Arctic communities can take tangible steps to address both public health and environmental concerns.

*"People in Murmansk remember how dirty the old Ikarus buses were. Those who lived close to the bus stops 'Ledovoe' and 'Morskaya' should remember the smog every morning. I remember, too, when the engines started in the maintenance facility, it was impossible to stay in – your eyes were full of tears. We could not breathe and had to open the door (in the winter!) to get fresh air. Now, we have a completely different situation. One can stand close to the bus and smell no exhaust."*

Vladimir Klimov  
Director of the Maintenance Service of Depot No.3  
OJSC Electrotransport

Emissions reductions by Murmanskavtotrans resulting from the bus fleet upgrade							
	Vehicle class	Number of buses	Emission factors (PM2.5, g/km)	Distance traveled, km/year	PM2.5 emissions per year, kg	Speciation factor, BC/PM2.5	BC emissions, kg/year
Old buses	Euro 0	28	1.14	70,000	2,234	0.50	1,117
New buses	Euro V	29	0.04	70,000	81	0.75	61

## Results

The bus fleet upgrade reduced black carbon emissions and improved the market position of the company in the Murmansk region due to the increased reliability and comfort of the service. Additionally, the company benefited from reduced fuel consumption and lower operations and maintenance costs. Because fuel prices keep rising, improved fuel efficiency helps further reduce costs.

This upgrade was such a success that a competing bus company – Elektrotransport – decided to undertake the same measures. In 2014, they purchased 37 new Euro IV buses, and they plan to buy four new buses in 2016.

Check the links below for more information on the project.

<https://oaarchive.arctic-council.org/handle/11374/389>

<https://www.epa.gov/international-cooperation/black-carbon-diesel-initiative-russian-arctic>

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## Contacts

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