

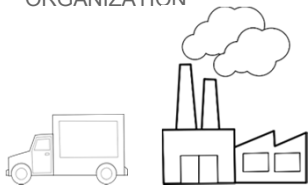




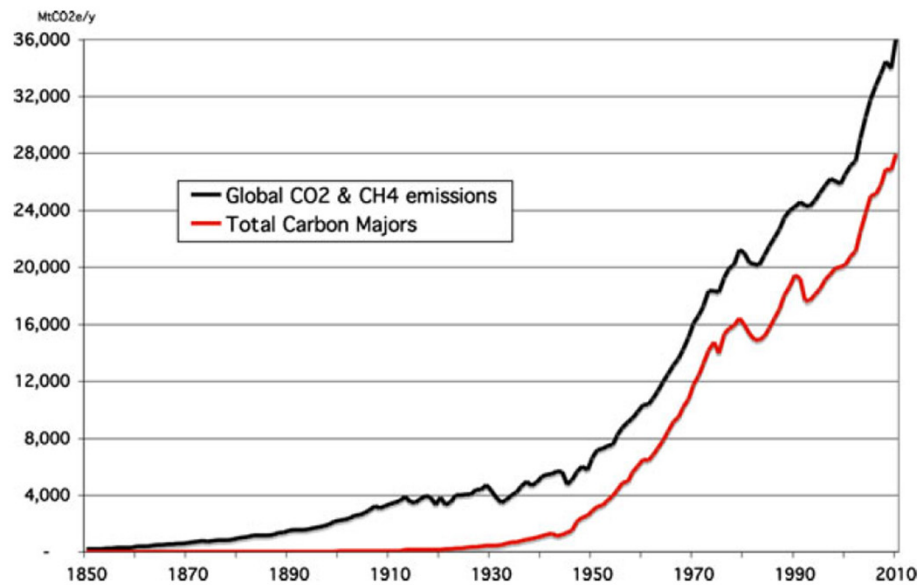
Organisations shaping Arctic future: Studying organisational decisions to produce applied predictions

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Levels of attribution of anthropogenic emissions and climate effects

<p>STATE</p> 	<p>States are main subjects to international agreements and conventions on mitigating environmental impacts (e.g. Kyoto protocol, UNFCCC). Producing aggregated national inventories and reports.</p>
<p>SECTOR</p> 	<p>Sectoral data is accumulated in Systems of National Accounts (SNA), sectoral expert organisations (e.g. IEA, GFFR, OGP, IMO) and administrative records.</p>
<p>ORGANIZATION</p> 	<p>Monitoring operations, navigating environmental policies, submitting reports to administrative records and statistical surveys.</p>

Attributing historic emissions to major fossil fuel and cement producers



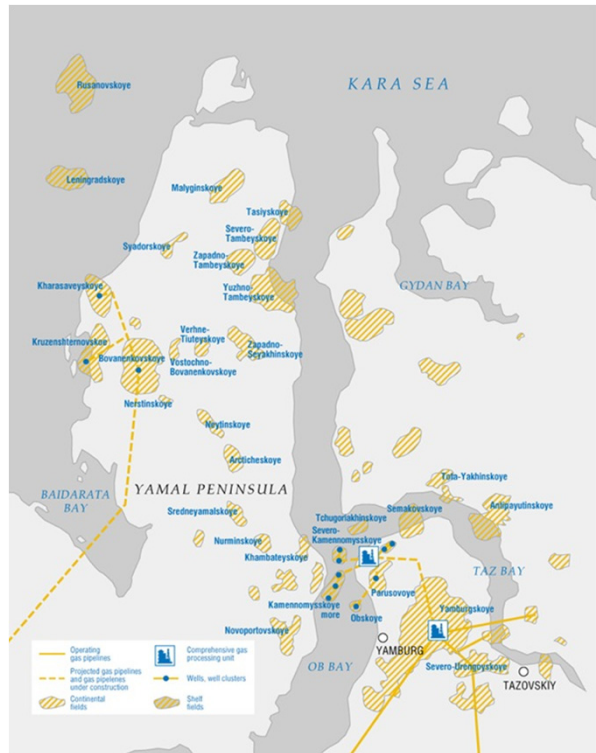
Global and Carbon major entities'* CO2 and CH4 emissions 1845-2010 (Hede 2014)

* 90 investor- and state-owned organisations

	Entities #	Total emissions GtCO ₂ e	Percent of Carbon Majors
Combustion			
Oil & NGLs	55	365.73	40.00 %
Natural gas	56	120.11	13.14 %
Coal	36	329.60	36.05 %
Flaring	56	6.04	0.66 %
Own fuel use	56	7.12	0.78 %
Cement	7	13.21	1.45 %
Vented CO ₂	54	4.83	0.53 %
Fugitive methane	83	67.62	7.40 %
Total	90	914.25	100.0 %
CDIAC global emissions 1751–2010		1,450.33	
Carbon Majors of global emissions		63.04 %	

Carbon majors' cumulative emissions 1845-2010, by source category (Hede 2014)

YAMAL MEGAPROJECT: GAZPROM



Geography: Yamalo-Nenets Autonomous Okrug, Russia
Projected output of YMP: 310-360 bcm (year 2030)
Total output of gas industry (YNAO): 389.7 bcm (2010)
Proportion of Petroleum Industry revenue in RGDP: 47.9%
Total output of gas industry (Russia): 640 bcm (2010)

“Being most explored and ready for development, Yamal is located near the existing gas transportation infrastructure, has significant reserves and favorable production opportunities. It is impossible anywhere in Russia to create such an oil and gas production complex within two decades only. This is the reason why the development of Yamal will play a pivotal role in the national gas industry development in the 21st century.”

gazprom.com

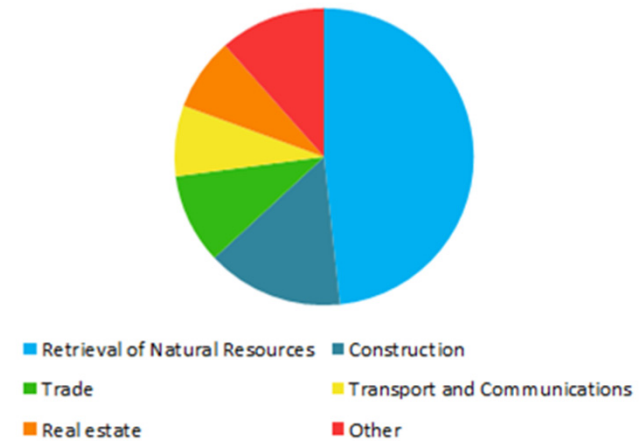
Field Pre-Development Scheme for the Ob & Taz Bays and the Yamal Peninsula (retrieved from gazprom.com).

Gazprom in Yamalo-Nenetskiy Autonomous Okrug

Gazprom's shares in Sector D

GAS	332 Bcm (85%)
Condensate	6 Mtoe (65%)
Crude oil	11.5 Mt (62%)

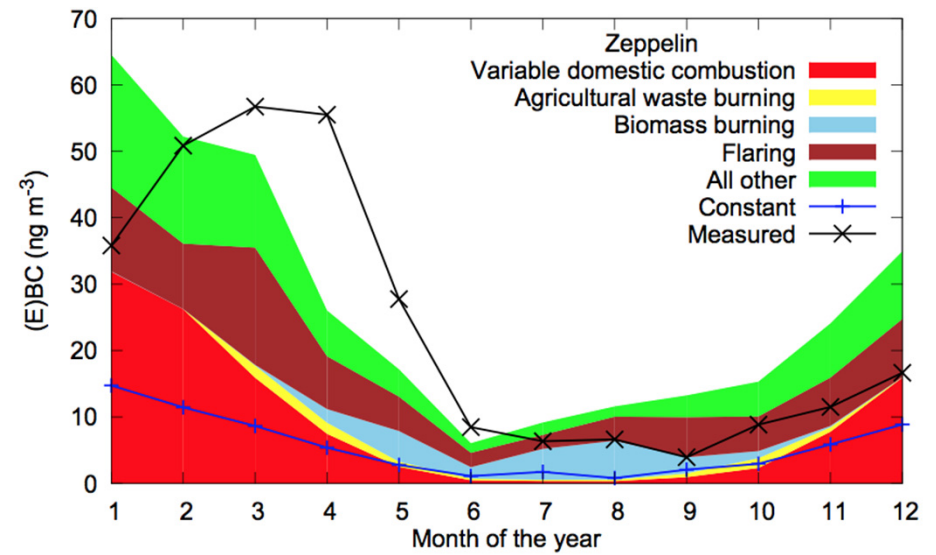
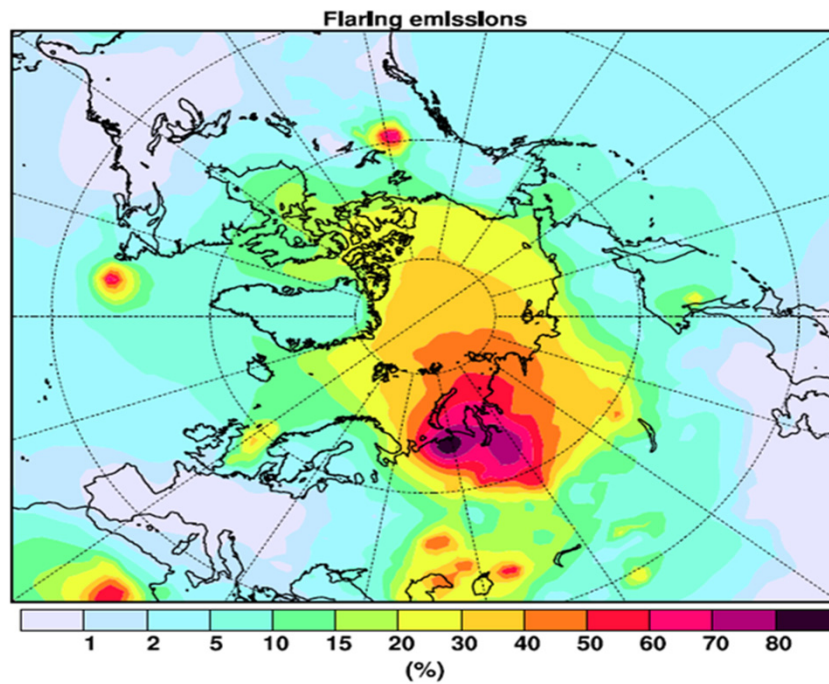
Structure of RGDP 2010



Data retrieved from Federal State Statistic Service of Russia.

ASSOCIATED EMISSIONS

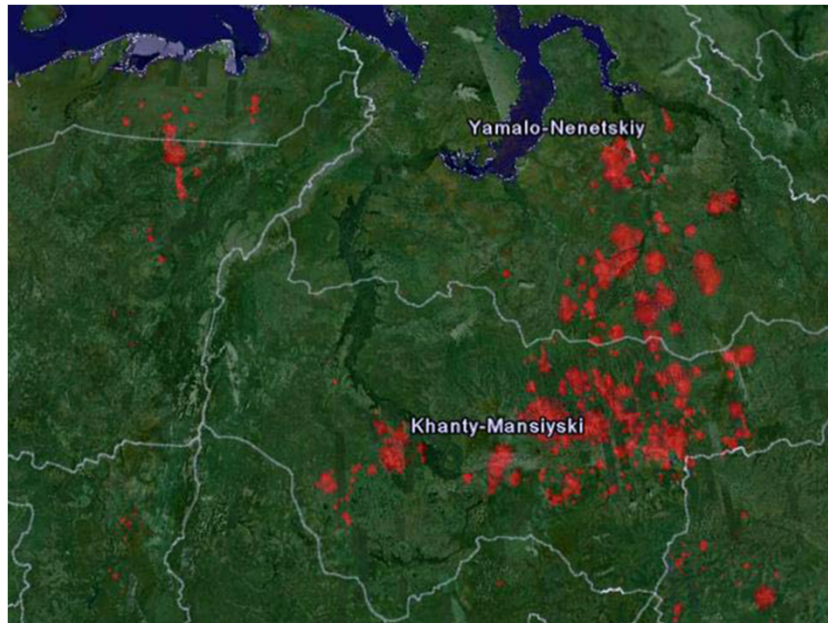
Simulated relative contributions to BC emissions from flaring and other activity categories



Source Stohl et al. (2013). GAINS model, IIASA.

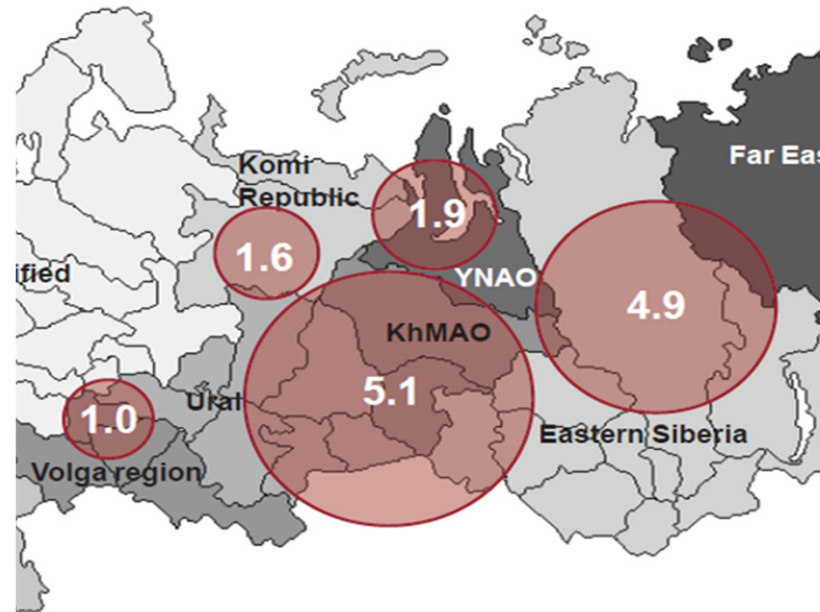
ASSOCIATED EMISSIONS

Satellite image of the domain's gas flares



Source: PFC Energy (2007).

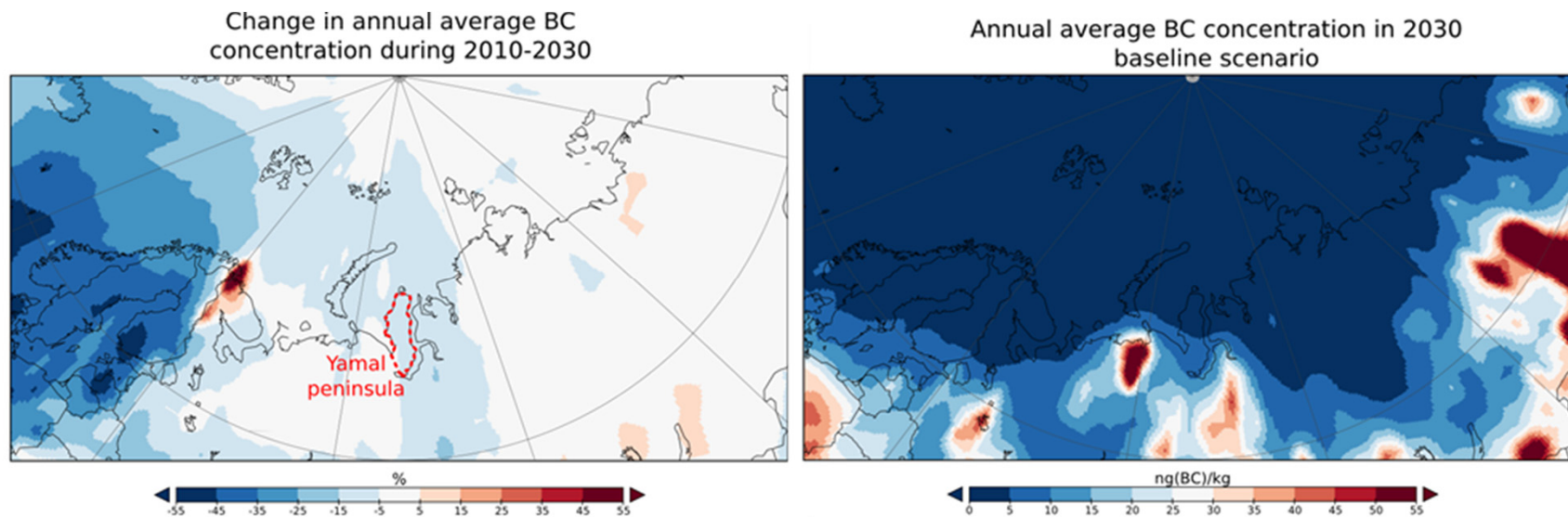
Geographic distribution of main APG flaring volumes in Russia (bcm)



Source: WWF-Russia and KMPG (2011).

CLIMATE EFFECTS

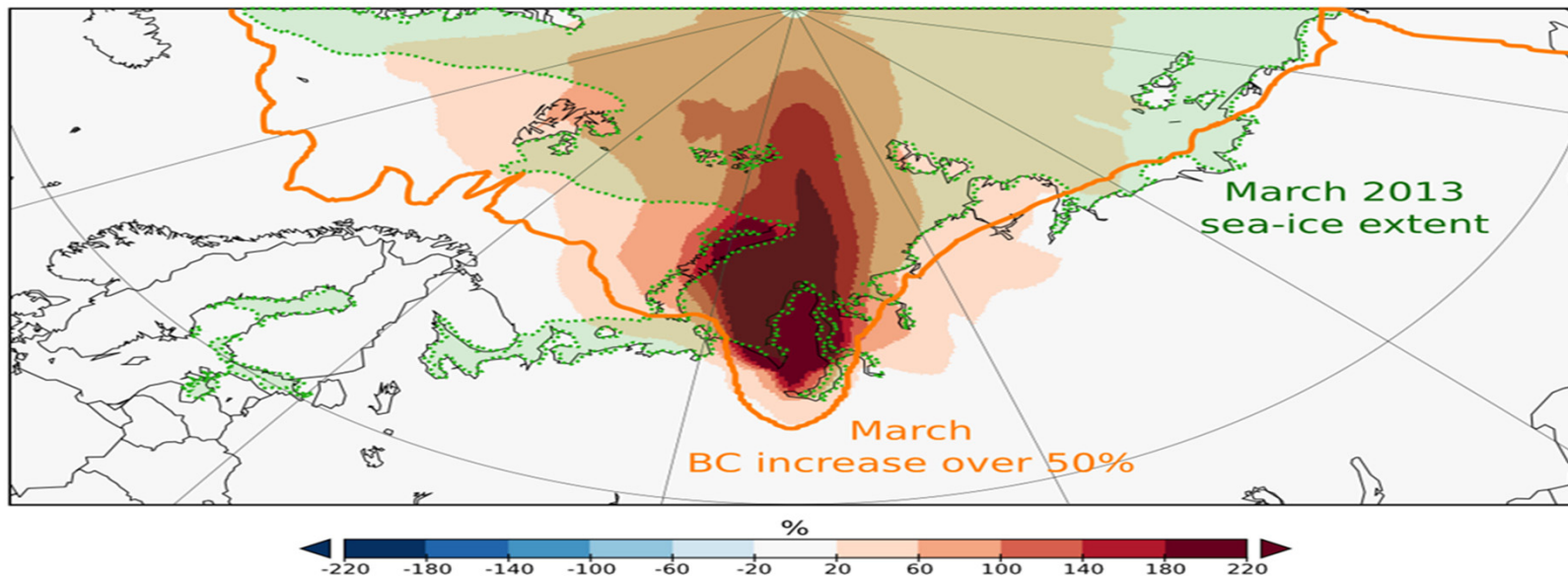
GAINS 2010-2030 baseline scenario implemented in ECHAM5.5-HAM2



Change in simulated black carbon concentration between years 2010 and 2030 (left panel) and simulated black carbon concentration in year 2030 baseline scenario (right panel).

CLIMATE EFFECTS

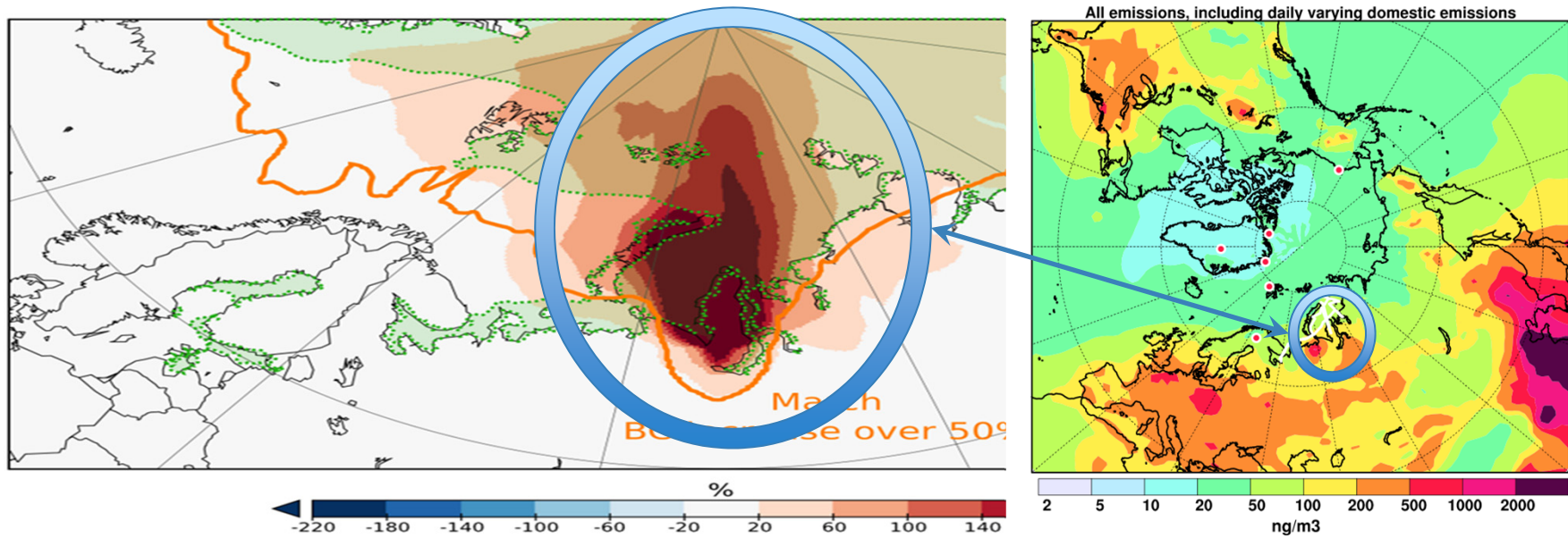
Additional emissions of BC implemented in ECHAM5.5-HAM2.



Relative annual-average increase of BC concentration in 2030 due to additional anthropogenic activities in Yamal (color shading), sea-ice extent in March 2013 (green line and shading) and simulated 50% BC concentration increase isoline for March.

CLIMATE EFFECTS

Additional emissions of BC implemented in ECHAM5.5-HAM2.



Relative annual-average increase of BC concentration in 2030 due to additional anthropogenic activities in Yamal (color shading), sea-ice extent in March 2013 (green line and shading) and simulated 50% BC concentration increase isoline for March.

Thank you!

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