The Navigation on the Northern Sea Route
Today & in the Future
Atomic Icebreaking Fleet of Russia

Atomic icebreakers of “Arktika” type:
Propulsion Capacity – 54 MW;
Water displacement – 23000 t;
i/b “Rossia” – 21.12.1985
i/b “Yamal” – 28.10.1992
i/b “50 Let Pobedy” – 23.03.2007

Atomic Icebreakers of “Taimyr” type:
Propulsion Capacity – 35 MW;
Water displacement 21000 t;
i/b “Taimyr” – 30.06.1989
i/b “Yaygach” – 25.07.1990
Increase in navigation period in the western area of Russian Arctic in 1920-2009 related to rise of icebreaking capacity.

- **Atomic Icebreakers**
  - Peak power: 75,000 N h.p.
  - 1980

- **Diesel Electric Icebreakers**
  - Peak power: 26,000 N h.p.
  - 1980

- **Steam-Powered Icebreakers**
  - Peak power: 10,500 N h.p.
  - 1950

Power levels:
- 5,000 N h.p. (1920)
- 8,000 N h.p. (1930)
- 10,500 N h.p. (1940, 1950)
- 75,000 N h.p. (1980)
The Gulf of Finland

2011
i/b Vaygach
Freight period: 19.02 – 16.04.2011
Total vessels piloted: 258

2012
i/b 50 Let Pobedy 27.01 – 09.03.2012
i/b Rossiya 09.03 – 18.04.2012
White Sea
(Vitino Port Operations)
Ice Conditions by Periods:

<table>
<thead>
<tr>
<th>Period</th>
<th>Ice Concentration 1-6 points</th>
<th>Ice Concentration 7-10 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-26.06.12</td>
<td>Extra Young Ice</td>
<td>Fast Ice</td>
</tr>
<tr>
<td>12-14.08.12</td>
<td>Young Ice (0-30 cm)</td>
<td>Clear</td>
</tr>
<tr>
<td>08-10.07.12</td>
<td>One-Year Ice (30-200 cm)</td>
<td></td>
</tr>
<tr>
<td>02-04.09.12</td>
<td>Ice Area Border according to TV/IR/microwave</td>
<td></td>
</tr>
</tbody>
</table>
### Oil and Gas from Murmansk

<table>
<thead>
<tr>
<th>State</th>
<th>through Suez Canal</th>
<th>through NSR</th>
<th>+/- days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan (p. Kobe)</td>
<td>12291 miles 37,1 days</td>
<td>6010 miles 18,1 days</td>
<td>-19</td>
</tr>
<tr>
<td>Korea (p. Busan)</td>
<td>12266 miles 37 days</td>
<td>6097 miles 18,4 days</td>
<td>-18,6</td>
</tr>
<tr>
<td>China (p. Ningbo)</td>
<td>11848 miles 35,8 days</td>
<td>6577 miles 19,9 days</td>
<td>-15,9</td>
</tr>
</tbody>
</table>

### From Rotterdam to the Asian markets

<table>
<thead>
<tr>
<th>State</th>
<th>through Suez Canal</th>
<th>through NSR</th>
<th>+/- days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan (p. Kobe)</td>
<td>10969 miles 33,1 days</td>
<td>7610 miles 23 days</td>
<td>-10,1</td>
</tr>
<tr>
<td>Korea (p. Busan)</td>
<td>10754 miles 32,5 days</td>
<td>7697 miles 23,2 days</td>
<td>-9,3</td>
</tr>
<tr>
<td>China (p. Ningbo)</td>
<td>10336 miles 31,2 days</td>
<td>8177 miles 24,7 days</td>
<td>-6,5</td>
</tr>
</tbody>
</table>
Transit Voyages 2010

SCF Baltica:
NSR period: 16.08 – 27.08.2010
(10,5 days)
Tanker deadweight: 117000 tons
Cargo: 70000 tons of gas condensate

Nordic Barents:
NSR period: 8 days
Bulker deadweight: 43372 tons
Cargo: 41000 tons of iron concentrate

4 transit voyages were done in 2010
Total amount of transit cargo: 111 000 tons
In ballast: 2 voyages
The voyage by Swedish supply icebreaker Tor Viking II piloted by atomic icebreaker Rossiya was done a month after the official completion of summer-to-autumn navigation on the NSR. This successful transit voyage done in late December proved that it is possible to increase the period of Arctic navigation on the NSR in winter months.
Pilotage of mt Perseverance on the NSR

Eastbound Voyage:
Tanker deadweight: 75000 tons
Cargo: 61000 tons gas condensate
NSR navigation period: 30.06 – 15.07.2011 (14,9 days)
Average speed: 7,6 knots

Return Voyage:
Tanker deadweight: 75000 tons
Cargo: 64000 tons jet fuel
NSR navigation period: 09.09 – 16.09.2011 (8 days)
Average speed: 13,7 knots
Pilotage of mt STI Heritage on the NSR

Tanker deadweight: 75000 tons
Cargo: 61000 tons gas condensate of JSC NOVATEK
NSR navigation period: 21.07 – 29.07.2011 (8 days)
Average speed: 14.0 knots
Pilotage of mt Vladimir Tikhonov on the NSR

Tanker deadweight: 160 000 tons (Suezmax)
Cargo: 120 000 tons gas condensate of JSC NOVATEK
NSR navigation period: 23.08 – 30.08.2011
Average speed: 14,0 knots
Pilotage of mv Sankō Odyssey on the NSR

Bulker deadweight: 75 000 tons (Panamax)
Cargo: 66 500 tons of iron ore by JSC EUROCHEM
NSR navigation period: 03.09.2011 – 10.09.2011
Average speed: - 13,7 knots
Pilotage of Refrigerator Vessels on the NSR

Refrigerators with the cargo of red fish sail westbound along the Northern Sea Route.
NSR Caravan Piloting
July 2012

Mv Nordic Odyssey, mt Marilee, ttb Vengeri ice-piloted by ib Yamal and Vaygach July 12 – 22, 2012
## NSR Transit Voyages in 2011

<table>
<thead>
<tr>
<th>Cargo Type</th>
<th>Total Volume, t</th>
<th>Vessels Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Cargo</td>
<td>682 170</td>
<td>Singapore, Marshall Islands, Norway, Liberia, Finland</td>
</tr>
<tr>
<td>Bulk Cargo</td>
<td>110 000</td>
<td>Russia, Liberia</td>
</tr>
<tr>
<td>Frozen Fish</td>
<td>27 535</td>
<td>Russia, Panama</td>
</tr>
<tr>
<td>In Ballast</td>
<td>10 Vessels</td>
<td>Russia, Liberia, Panama</td>
</tr>
</tbody>
</table>
### Total of Transit Voyages in 2010-2012

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Volume of Transit Cargo, t</td>
<td><strong>111 000</strong></td>
<td><strong>820 789</strong></td>
<td><strong>836 815</strong></td>
</tr>
<tr>
<td>Total Number of Transit Voyages</td>
<td>4 (2 of them in ballast)</td>
<td>34 (10 of them in ballast)</td>
<td>31 (9 of them in ballast)</td>
</tr>
</tbody>
</table>

*2012 Transit Season number are actual for 27.09.2012*
Federal Service for Hydrometeorology and Environment
Science and Research Centre for Space Hydrometeorology “Planet”

Change of Multi-Year Ice Area in the Western Arctic

December 1983 – December 2011

Area of multi-year ice in December in the Western Arctic
Universal Atomic Icebreaker
<table>
<thead>
<tr>
<th>Principal Dimensions</th>
<th>Project 1052</th>
<th>Project 10580</th>
<th>Project 22220</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic area of operations</td>
<td>Arctic</td>
<td>Yenisei River and shallow Arctic waters</td>
<td>Permanently – Western Arctic incl. Barents, Pechora and Kara Sea, shallow waters of the Yenisei River (up to port of Dudinka) and the Gulf of Ob. Eastern Arctic – in summer-autumn period</td>
</tr>
<tr>
<td>Length overall, m</td>
<td>148,0</td>
<td>150,0</td>
<td>173,3</td>
</tr>
<tr>
<td>Beam, m</td>
<td>30,0</td>
<td>29,2</td>
<td>34,0</td>
</tr>
<tr>
<td>Board height, m</td>
<td>17,2</td>
<td>15,2</td>
<td>15,2</td>
</tr>
<tr>
<td>Draught, m</td>
<td>11,00</td>
<td>8,1</td>
<td>10,5</td>
</tr>
<tr>
<td>Minimal</td>
<td>-</td>
<td>-</td>
<td>8,55</td>
</tr>
<tr>
<td>Water displacement, t</td>
<td>23 460</td>
<td>19 600</td>
<td>33 530</td>
</tr>
<tr>
<td>Minimal</td>
<td>-</td>
<td>-</td>
<td>25 540</td>
</tr>
<tr>
<td>Quantity and power of turbines, kW</td>
<td>2 * 27 580</td>
<td>2 * 18 400</td>
<td>2 * 33 500</td>
</tr>
<tr>
<td>Propulsion, hp</td>
<td>75 000</td>
<td>50 000</td>
<td>91 000</td>
</tr>
<tr>
<td>Ice-free water speed, knots</td>
<td>20,8</td>
<td>20,2</td>
<td>~ 22</td>
</tr>
<tr>
<td>Ice passability, m</td>
<td>2,25</td>
<td>1,95</td>
<td>2,8 – 2,9</td>
</tr>
<tr>
<td>Shaft power to water displacement</td>
<td>2,09</td>
<td>1,66</td>
<td>1,79</td>
</tr>
<tr>
<td>Crew quantity</td>
<td>107</td>
<td>91</td>
<td>75</td>
</tr>
</tbody>
</table>
Thank you for your attention!