

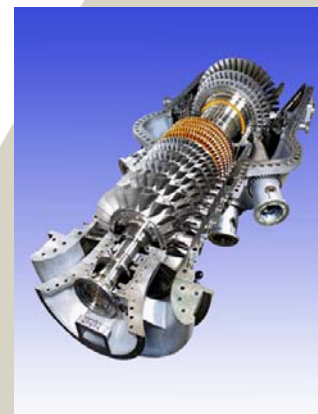


Kawasaki Gas Turbine

Cutting Edge Technology

& its Deployment in Russia

Start of research in Sakha Republic



8th Japan-Russia Energy and Environment
Dialogue in Niigata

Nov. 4th, 2015 Niigata, Japan

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On-site Cogeneration by small & medium sized Gas Turbine Generator

- **About 80%, high total efficiency**
- **Lower transmission loss (Electric power & Heat)**
- **Higher reliability = Stable energy supply**
- **Clean exhaust gas, lower emission**



- **Fuel saving and cost reduction**
- **Competitive industries**
- **Environmental friendly development**

Kawasaki - World Leading small & medium sized

Gas Turbine Generator Maker

FEATURES

- Own original technology
 - Development & production experience over 40 years
- Higher Energy Efficiency
- Lower Emission (cleaner exhaust gas)
- Easy Maintenance (Horizontal Sprit Casing, etc.)
- Long Maintenance Intervals
- High reliability
 - Delivery over 10,000 units



Gas Turbine Generator – Line up

Model	Electricity (ISO Baseload)	Heat (Estimated)
GPB15D	1,490 kWe	2.9 Gcal/h
GPB17D	1,690 kWe	2.9 GCal/h
GPB70D	6,740 kWe	9.4 GCal/h
GPB80D	7,810 kWe	9.8 GCal/h
GPB180D	18,420 kWe	23.0 GCal/h
GPB300D	30,120 kWe	26.9 GCal/h

5 units of GPB17D will be installed at Gas Pipeline Compressor Stations in Russia



7 units of GPB70D are installed in Russky island for Vladivostok APEC 2012



1 unit of GPB80D has delivered to Moscow Power Engineering Institute for education and in-house heat & power supply



Moscow Power Engineering Institute

Kawasaki has shipped out GPB80D

7.4 MW gas turbine generator this JULY to
Moscow (MEI)

for educational use
besides supply of
Heat & Electricity
to MEI

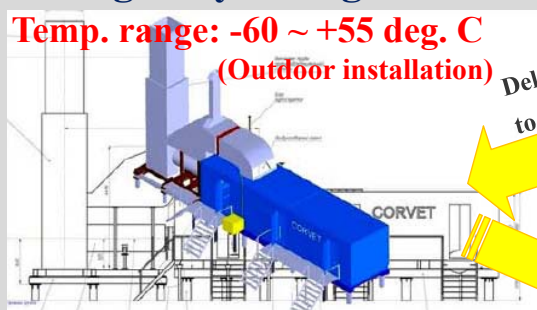


Local packaging of Kawasaki Gas Turbine

Local packaging of generator with our Gas Turbine was selected as
“Program of Science & Technology Cooperation 2012-2014”
by Gazprom and Agency for Natural Resources and Energy, Japan.

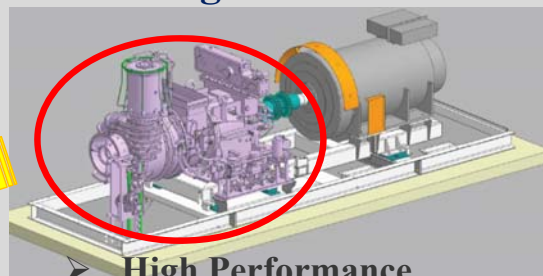
Packaged by Energotechnika

Temp. range: -60 ~ +55 deg. C
(Outdoor installation)



Delivered
to Russia

1700KW gas turbine



- High Performance
- Long maintenance interval

Supply to Gazprom

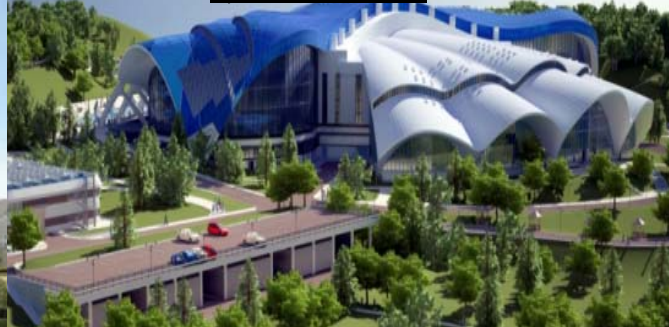
- Apply for gas pipeline booster stations of Gazprom
- Site operation test for 1700kW pilot plant is on going
- Local packaging of 7400kW class for Gazprom is under discussion.
- “Program of Science & Technology Cooperation 2015-2017” will be signed soon.

Thanks to **APEC Summit 2012 at Vladivostok**

Main Central Site
7,000kW x 5



Oceanarium
7,000kW x 2

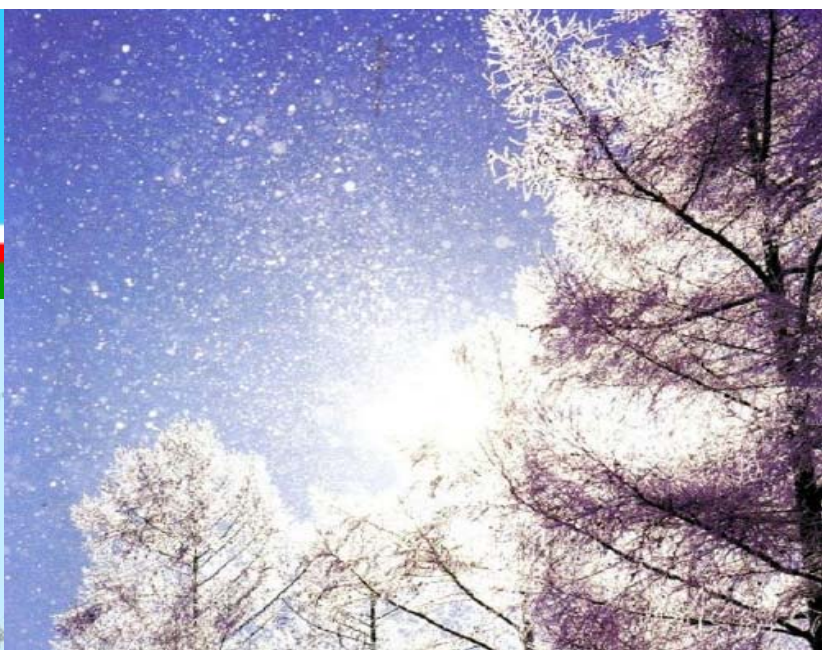


**Cooperation Agreement
in Energy Sector with
RAO-Energy System Vostok
has signed on September, 2015**



Start of Research in Sakha Republic

under Ernst & Young Advisory Co., Ltd.
aiming to promote energy efficiency improvement

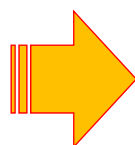
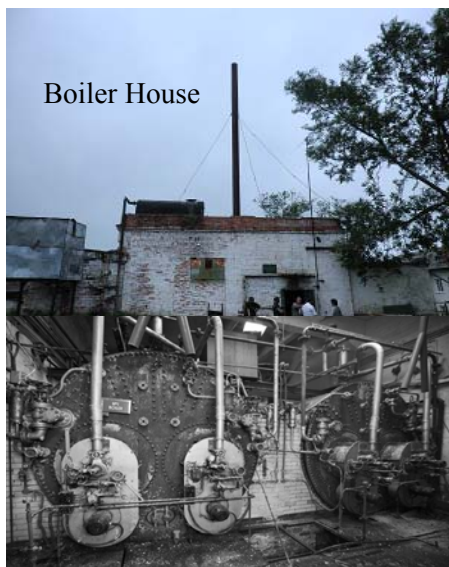


Replacement of Old Boiler House to COGEN

High Efficiency Heat & Power Cogeneration

Suitable to YAKUTSK

where natural gas is available locally
with 290 days' heating season



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Base Load & Buffer for load fluctuation

Kawasaki M1 (1700kW) Gas Turbine can endure

instant load change 0% ~ 100%

Suitable to load fluctuation buffer



For reference:

Heat recovery boiler can keep
its heat supply volume by
gas burner.

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ASEZ Kangalassy Yakutsk



**ASEZ
KANGALASSY
Industrial Park**
SAKHA REPUBLIC (YAKUTIA)

- Site
- Infrastructure
- Rates
- Residents

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ASEZ Kangalassy Yakutsk

Kangalassy Page 5



Price for main resources 2015	RUB	USD
Electric power, kWh	6.21	0.1
Heat, GCal	1,732.39	28.87
Gas, cbm	3.91	0.07

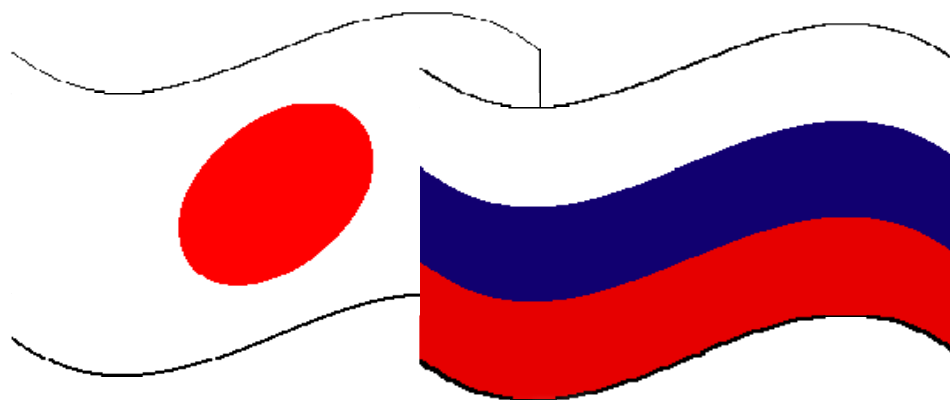
Natural Gas Application

7200 hours (300 days) Operation	GPB17D	RUB	USD
Electric power	1,630 kWh	72,880,560	1,173,600
Heat	2.9 Gcal	36,172,303	602,805
Fuel consumption	683 cbm	Δ19,227,816	Δ344,232
Balance		89,825,047	1,432,173
Operation & Maintenance	Reference only	Δ30,000,000	Δ500,000
Total (Reference only)		59,825,047	932,173

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**Hoping we can contribute to Russia
by our cutting-edge technology!**



Thank you for your attention!