



JSC «RAO ENERGY SYSTEMS OF EAST»

**PERSPECTIVE PROJECTS OF JSC «RAO ENERGY SYSTEMS OF EAST» COOPERATION WITH JAPANESE COMPANIES IN RUSSIA'S FAR EAST**

OCT. 2014



RAO ENERGY SYSTEMS OF THE EAST | 2

**GENERAL INFORMATION ABOUT THE FAR EAST:**

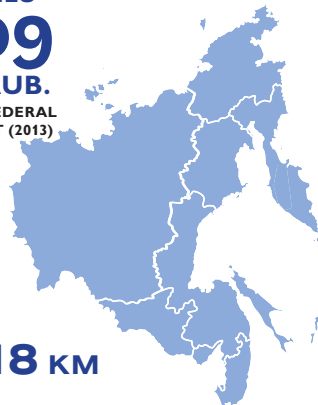
TERRITORY OF THE FAR EAST  
**>1/3**  
OF RUSSIA TERRITORY

POPULATION  
**~6,2**  
MILLION PEOPLE

ELECTRICITY DEMAND  
**~5%**  
OF TOTAL RUSSIA DEMAND

RUSSIA GRP  
**~5,5%**  
OF TOTAL RUSSIA GRP

SUBSIDIES  
**~109**  
BLN. RUB.  
FROM FEDERAL BUDGET (2013)



JSC «RAO ENERGY SYSTEMS OF EAST» IS THE LARGEST SUPPLIER OF HEAT AND ELECTRICITY IN THE FAR EAST.

Installed power capacity  
**9071 MW**

Installed heat capacity  
**17919 GCAL/H**

Electricity grids length  
**102118 KM**

## PERSPECTIVES OF ENERGY SECTOR DEVELOPMENT IN RUSSIA'S FAR EAST



IN THE PROGRAM OF PERSPECTIVE DEVELOPMENT OF ENERGY SECTOR ON THE TERRITORY OF THE FAR EAST IN THE AREA OF RESPONSIBILITY OF JSC "RAO ENERGY SYSTEMS OF EAST" FOR THE PERIOD OF UP TO 2025 IT IS PLANNED TO:



4,4GW

IMPLEMENT NEW POWER GENERATION FACILITIES WITH TOTAL CAPACITY OF



576 km

DEVELOP THERMAL NETWORKS, INCLUDING REPLACEMENT OF WORN-OUT NETWORKS



2249 km

DEVELOP ELECTRICITY DISTRIBUTION GRIDS



120 MW

DEVELOP RENEWABLE ENERGY SOURCES



## DRIVERS OF COOPERATION BETWEEN RUSSIA AND JAPAN IN ENERGY SECTOR IN RUSSIA'S FAR EAST



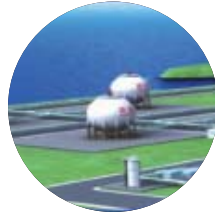
- 1 EXISTING PLANS FOR DEVELOPMENT OF THE ENERGY SECTOR OF THE FAR EAST.
- 2 CREATION OF AREAS OF ADVANCED DEVELOPMENT (AADs).
- 3 JAPANESE COMPANIES' EXPERIENCE AND COMPETENCIES IN THE PRODUCTION OF HIGHEFFICIENCY ENERGY EQUIPMENT.
- 4 POSSIBLE SYNERGISTIC EFFECT FROM THE ACCOMMODATION OF VARIOUS INDUSTRIES ON THE TERRITORY OF THE FAR EAST FOR FURTHER DISTRIBUTION OF THE MANUFACTURED GOODS TO THE CONSUMERS IN JAPAN.



## MAIN DIRECTIONS OF COOPERATION



ENERGY BRIDGE



PRODUCTION OF LIQUEFIED HYDROGEN

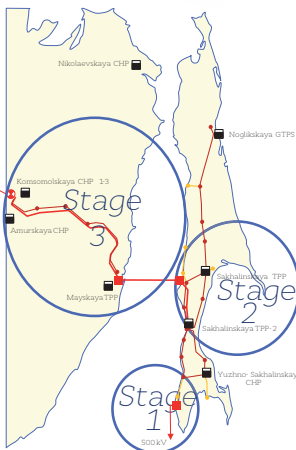


IMPLEMENTATION OF COGENERATION TECHNOLOGY



DEVELOPMENT OF RENEWABLE ENERGY SOURCES

## CONSTRUCTION OF THE ENERGY BRIDGE TO JAPAN



### STAGES OF THE PROJECT

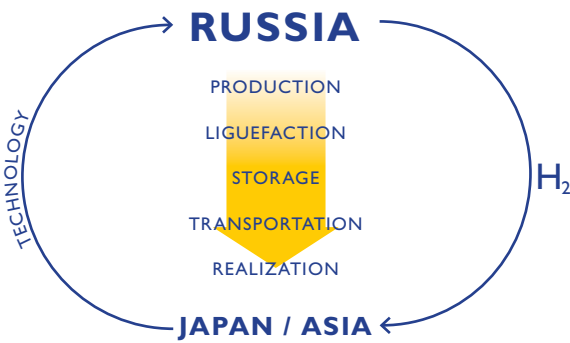
- 1 · CONSTRUCTION OF A SUBMARINE CABLE TO JAPAN AT LA PEROUSE STRAIT  
· CONSTRUCTION OF ENERGY TRANSMISSION DEVICES ON HOKKAIDO ISLAND
- 2 · CONSTRUCTION OF AN EXPORT ORIENTED POWER PLANT WITH INSTALLED CAPACITY OF UP TO 1000 MW  
· CONSTRUCTION OF AN ADDITIONAL 500 KV TRANSMISSION LINE TO THE SOUTH OF SAKHALIN ISLAND
- 3 · CONSTRUCTION OF TWO 500 KV SUBMARINE CABLE LINES "CONTINENT - SAKHALIN ISLAND" TO EXPORT MORE POWER FROM UES OF EAST

VOLUME OF EXPORT MAY AMOUNT TO 2 – 4 GW.  
PRELIMINARY FEASIBILITY STUDY OF THE PROJECT IS UNDER DEVELOPMENT. EXPECTED COMPLETION DATE – END OF 2014.

## PRODUCTION OF LIQUEFIED HYDROGEN



JSC “RAO ENERGY SYSTEMS OF EAST” TOGETHER WITH KAWASAKI HEAVY INDUSTRIES IS IMPLEMENTING A PROJECT ON THE INDUSTRIAL PRODUCTION OF LIQUEFIED HYDROGEN IN RUSSIA’S FAR EAST



### CONSUMERS



• Industrial use (chemical industry, metallurgy, etc.)



• Electric Utilities (gas-fired engines, gas turbines, CCGT)



• Cars running on hydrogen

STAGE OF THE PROJECT	COMMISSIONING	PRODUCTION CAPACITY	ELECTRICITY CONSUMPTION
Pilot Plant	2019	12 t/day	42,7 MW
Industrial Plant	2026	200 t/day	510 MW

## IMPLEMENTATION OF COGENERATION TECHNOLOGY



IN THE AREA OF SMALL AND MID-SCALE COGENERATION MAIN PARTNERS OF JSC “RAO ENERGY SYSTEMS OF EAST” ARE KAWASAKI HEAVY INDUSTRIES AND SOJITZ CORPORATION



### CONSTRUCTION OF MINI-CHP IN ZMEINKA DISTRICT VLADIVOSTOK CITY

- Stage 1 - load switching of existing inefficient boiler houses. Project’s installed electric capacity - 22 MW and thermal power capacity - 28 Gcal/h
- Stage 2 – covering of future demand. Increase of installed electric capacity of up to 44 MW and heat capacity up to 56 Gcal/h.



### CONSTRUCTION OF MINI-CHP IN SINAYA SOPKA DISTRICT ARTEM CITY

- Stage 1 - load switching of existing inefficient boiler houses. Project’s installed electric capacity - 22 MW and thermal power capacity - 28 Gcal/h
- Stage 2 – covering of future demand. Increase of installed electric capacity of up to 59 MW and heat capacity up to 75 Gcal/h.

FEASIBILITY STUDY AND PROJECT DOCUMENTATION FOR THE PROJECTS IS UNDER DEVELOPMENT

## DEVELOPMENT OF RENEWABLE ENERGY SOURCES



JSC “RAO ENERGY SYSTEMS OF EAST” IS IMPLEMENTING A NUMBER OF PROJECTS OF RENEWABLE ENERGY SOURCES WITH MITSUI, KOMAI AND NEW ENERGY AND INDUSTRIAL TECHNOLOGY DEVELOPMENT ORGANIZATION (NEDO).

Wind measurement complex was installed in Novikovo village (Sakhalin region). Based on the results received from the complex a business-plan for the construction of hybrid wind-diesel power plant is being prepared.

### CONSTRUCTION OF A WIND FARM IN UST-KAMCHATSK (KAMCHATKA REGION) WITH INSTALLED CAPACITY OF 3 MW:

- STAGE 1 (FINISHED) – CONSTRUCTION OF WIND TURBINE WITH INSTALLED CAPACITY OF 275 kW
- STAGE 2 (PLAN) – CONSTRUCTION OF 3 WIND TURBINE (WITH TOTAL INSTALLED CAPACITY OF 1000 kW) PRODUCED BY MITSUI IN ARCTIC DESIGN
- STAGE 3 – CONSTRUCTION OF WIND POWER PLANT WITH TOTAL INSTALLED CAPACITY OF 2 MW (TECHNICAL SOLUTION WILL BE DETERMINED AFTER STAGE 2)



**THANK YOU FOR YOUR ATTENTION!**