

8th Japan-Russia Energy and Environment Dialogue in Niigata

«Prospects of producing and usage of fuel from wood waste in the Far East of Russia»

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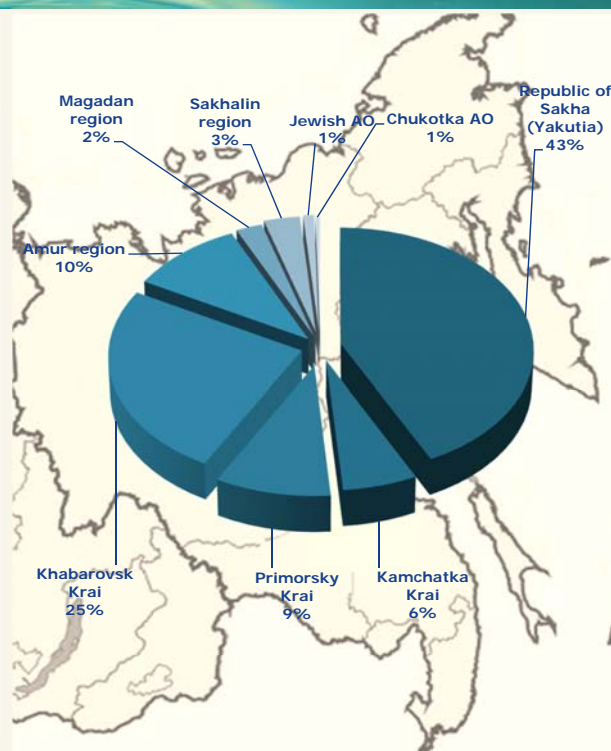
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Forest resources of Far Eastern District of Russia

Wood reserves of the Far East federal district, million m³

Republic of Sakha (Yakutia)	8 764,2
Kamchatka Krai	1 223,2
Primorsky Krai	1 897,8
Khabarovsk Krai	5 154,0
Amur region	2 061,5
Magadan region	475,3
Sakhalin region	653,9
Jewish AO	199,9
Chukotka AO	84,4
Total	20 514,2 млн.м ³



Source of Rosstat

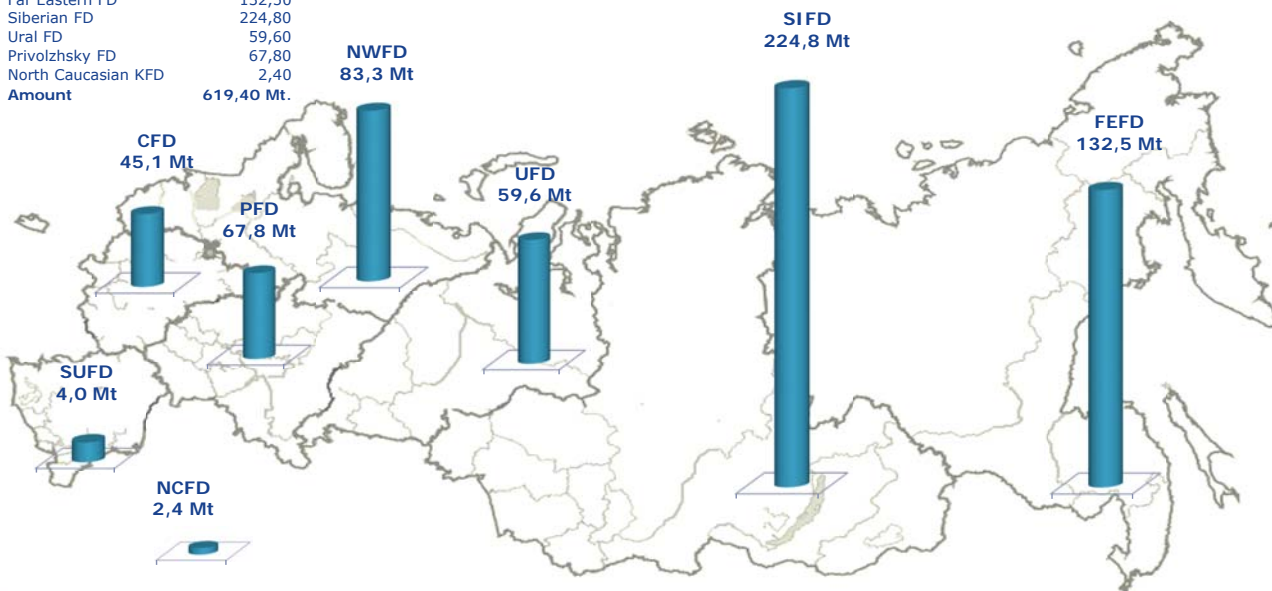
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Growth of woods resource of Far Eastern District of Russia

Federal districts Wood source growth, Mt.

Central FD	45,10
South FD	4,00
North Western FD	83,30
Far Eastern FD	132,50
Siberian FD	224,80
Ural FD	59,60
Privolzhsky FD	67,80
North Caucasian KFD	2,40
Amount	619,40 Mt.

The annual increase in potential of woods



Source of Rosstat, Energy of biomass, UFU, calculations of the author

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Wood waste resources of Far Eastern District of Russia

Waste of Russian timber processing industry (TPI)

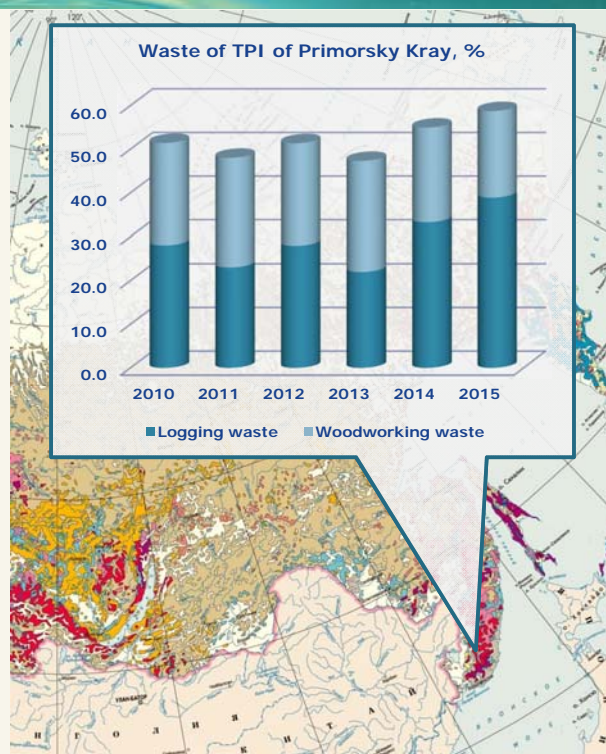
- ❖ The total amount of logging in 2014 was more than 202,77 million m³

Quantity of logging waste, million m ³		
Boughs and tops	42,6	21,0%
Sawing up waste	15,2	7,5%
Roots and stubs	34,5	17,0%
Bark (cortex)	14,2	7,0%
Total of logging waste	106,5	52,5%

- ❖ The total amount of waste is estimated at 106,45 million m³ formed in cutting areas

Quantity of woodworking waste, million m ³		
Volume of a saw log raw materials	96,3	47,5%
Total of a woodworking waste	31,0	15,3%

- ❖ Total amount of wood processing waste is approximately 31,00 million m³
- ❖ Total amount of waste: approximately 137,5 million m³ (67,8%)
- ❖ Waste of TPI of Primorsky Krai : about 1 million m³



Source of Rosstat, Roslesinform, calculations of the author

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Alternative resources of Far Eastern District of Russia

The areas of reservoirs of the operating hydroelectric power stations (HPS) of the Far East federal district, sq.km

1	Zeyskaya HPS	●	~ 1100
2	Bureyskaya HPS	●	~ 2200
Flooded territory			~ 3300

The areas of reservoirs of the designed hydroelectric power stations of the Far East federal district, sq.km

3	Lower Bureyskaya HPS	▲	~ 200
4	Gilyuyskaya HPS	▲	~ 700
6	Lower Zeyskaya HPS	▲	~ 900
7	Selemendzhinskaya HPS	▲	~ 1200
11	Ekimchanskaya HPS	▲	~ 150
12	Upper Nimanskaya HPS	▲	~ 130
15	Urgalskaya HPS	▲	~ 500
Flooded territory			~ 3780



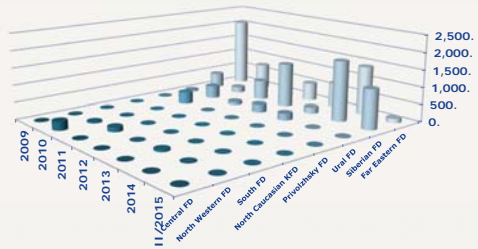
❖ By estimates of specialists of JSC RusHydro the amount of the flooded wood which is subject to the utilization is 1,5 - 2 million m³ and is suitable for production of 500-700 thousand tons pellets or briquettes

Sources of JSC RusHydro, Thematic community on problems of big dams <http://solex-un.ru>

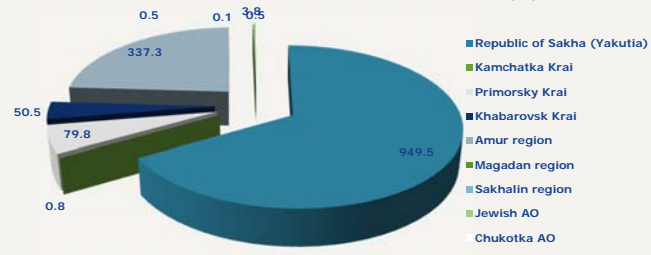
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Forest fires in Russia

Area of forest fires by years and districts in Russia, thousand hectares (ha)



Total area of forest fires fires in 2014 in FEFD was 1 423 thousand hectares (ha)



❖ In case of creeping fire up to 30% of usable wood is burned down, vegetation survives;

❖ In case of crown fire all vegetation and 42,5 - 83% of wood are burned down;

❖ Remaining 17-57,5% (up to 19,86 mil. t) can be used to produce up to 5,3 mil. t of charcoal;

Source Satellite fires monitor FEFD <http://fires-dv.kosmosnimki.ru>, accounts of the author

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Types of forest fires

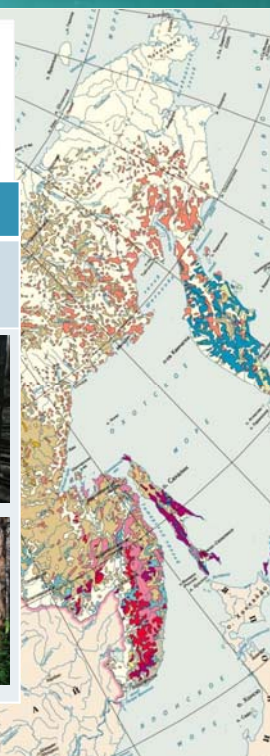
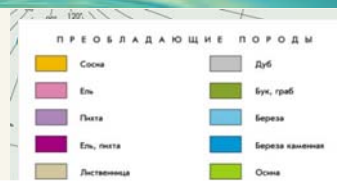
Creeping fires

- ❖ The underbrush is destroyed, the death of a forest stand makes to 30%



Crown and general fires

- ❖ The vegetation and almost all wood is destroyed (from 42 to 83%)



Source Federal Forestry Agency

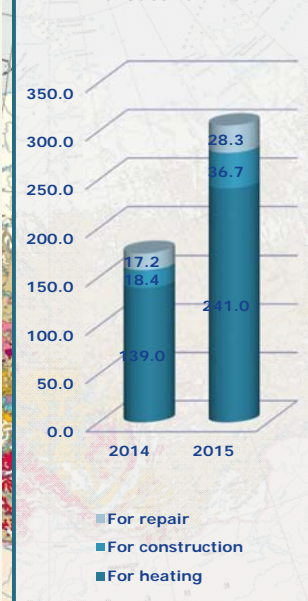
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Forest resources of Far Eastern District of Russia

Consumption of wood fuel by the population of Primorsky Krai, thousand m³

- ❖ The total amount of logging in Primorsky Krai recorded by the system of registration of volume of cuttings "Decrement" with the duplicated space shooting of the woods: 2000
- ❖ Prepared for domestic needs of the population, according to the Program of Administration of Primorsky Krai: 300
- ❖ Pent-up demand in preparation of wood fuel: ~
- ❖ The volume of wood fuel released by implementation of the Program of gasification of Primorsky Krai according to the current consumption level: 240

Logging for domestic needs in the Primorsky krai 2014-2015, thousand m³



Source official site of Administration of Primorsky krai

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Forest resources of Far Eastern District of Russia

Use of wood of implementation of the MOAKS (WWF®) project

The annual volume of cutting of the main and intermediate use in territories of restoration of biological diversity

Parameter of the modelled site	Zanadvorovskoye	Slavyanskoye	Kraskinskoye	Nadezhdinskoye	Total amount
Total area, hectare	6 004	8 370	4 026	5 357	
Logging area, hectare	394	417	236	237	1284
Construction wood, thousand m ³	5,9	5	1,9	4,1	16,9
Firewood, thousand m ³	11,4	10	2,6	7,1	31,1
Logging waste, thousand m ³	4	3,2	2,7	1,9	11,8
Raw materials for wooden fuel, thousand m ³					42,9

Source WWF http://www.wwf.ru/about/where_we_work/dvo/forests/moaks



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Pellet energy of Japan

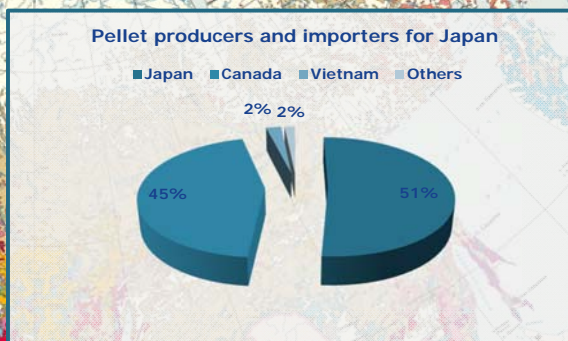
Pellet energy of Japan

Pellet consumption	160 kt/year
Pellet produce	80 kt/year
Pellet import	80 kt/year

The largest pellet producers in Japan

Okinawa prefecture	15 kt/year
Okayama prefecture	13 kt/year
Miyazaki prefecture	7 kt/year
Hokkaido prefecture	5 kt/year
Iwate, Niigata, Aomori, Gifu, Oita, Gifu, Miyagi, Akita, Kochi prefectures	3 kt/year
Others 34 prefectures	below 2 kt/year
Total	80 kt/year

Sources <http://www.asiabiomass.jp>, <http://www.industcards.com>



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Pellet energy of South Korea

Pellet energy of South Korea

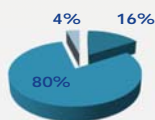
Pellet consumption	500 kt/year
Pellet produce	20 kt/year
Pellet import	480 kt/year

The largest pellet producers in South Korea

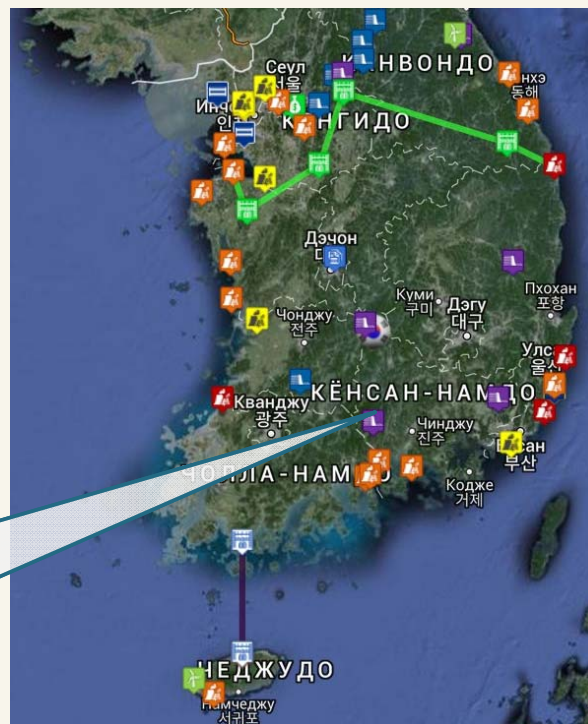
Distribution center of forest production of Federation of cooperatives of the forest industry	18 kt/year
Others	2 kt/year
Total	20 kt/year

Pellet producer and importers of South Korea

■ Russia ■ Others ■ South Korea



Sources Electrical power complex of South Korea <http://www.eeseaec.org> <http://www.ved55.ru>



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Charcoal

Use of charcoal

- ❖ In Russia charcoal has been used as fuel for long time, but in the FEFD it found application only in metallurgy and blacksmithing
- ❖ Now production of charcoal in Russia is generally concentrated in the central and western regions and only recently extended to the eastern part of the country generally in sector of recreational goods (for rest and camping)
- ❖ Waste of wood processing and specially prepared wood are applied to processing of charcoal (generally birch, oak, poplar)
- ❖ In Asia-Pacific countries charcoal is used for heating of dwellings, metallurgy, cooking and ceremonial actions
- ❖ The scope determines quantity of kinds of coal: Binchutan (shiro-dzumi lat, white from Quercus phillyraeoides wood. – umabe oak), Ikedadzumi (kuro-dzumi lat, black from Quercus acutissima wood. - a kunuga oak), Takutan (from Phyllostachys edulis wood of armor. - a bamboo a mushroom), Ogatan (a coal briquette made of the pressed biomass)
- ❖ The Russian production can offer only black coal and coal briquettes



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Improvement of methods

Possibilities of improvement of methods of work with raw materials

- ❖ Transferring of technological phase of crushing and consolidation of raw materials to cutting areas;
- ❖ Attraction of the population of the Far East to processing of raw materials on the standardized conditions (the standard price of acceptance of the crushed wood);
- ❖ Development and use of means of transportation of the condensed raw materials with the greatest extent of automatization;
- ❖ Usage of torrefacting and carbonizing furnaces with advanced gas and secondary heat recuperation system; combination of processes of a torrefaction and carbonization;
- ❖ The organization of wood fuel production based on the existing enterprise of TPI of the FEFD, with use of established system of transportation of raw materials;
- ❖ Registration of the producer of wood fuel as resident of special economic zone;
- ❖ Usage of Vladivostok free port as the logistic center;



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In conclusion

Conclusions

- ❖ Use of wood fuel is a convenient and most environmentally friendly transitional form of power generation;
- ❖ The traditional resource base expanded with existence of nonconventional sources of raw materials covers not only needs of the FEFD, but also makes export of wood fuels possible;
- ❖ Expansion of a source of raw materials creates new workplaces;
- ❖ Torrefied pellets are a product with stable energy potential, assuming production from different sorts of wood;
- ❖ Charcoal is a product with a stable energy potential and pressed in briquettes becomes the ideal fuel consisting almost completely of elementary carbon;
- ❖ Complex use of economic conditions of the Far East makes the produced wood fuel competitive;



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Thank you for attention!