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THE CURRENT STATE OF RENEWABLE ENERGY IN RUSSIA

A BIT OF HISTORY

Since the early nineties	Interest in Renewables
November 2007	Introduction of a legal basis for the promotion of renewable energy sources in the Federal Electricity Law by a “premium scheme”, including the obligation for the Government to adopt a national renewable energy target.
Jan 2009	Resolution 1-R: Russia sets a target of 4.5 % renewables by 2020
May 2013	Decree 449: Adoption of the Capacity Payment Support Scheme on the Wholesale Electricity Market in the pricing zones
September 2013	First tender organized under D 449
January 2015	Decree 47: Support for renewable energy on the retail market adopted
July 2015	Resolution 1-R amended: target of 4.5 % postponed till 2024
June 2016	Closure of the IFC Russia Renewable Energy Program
January 2017	Founding of the Russia Renewable Energy Development Association : www.rreda.org info@rreda.org

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THE ISSUES …

- Cost of State Support
- Safe Operation of the national electricity grid
- Concern for sharp electricity price increases for the end-users
- Abundant resources that lie dormant
- Russia suffers from the Dutch Disease
- Substantial Support for fossil fuel generation
- Vested Interest
- Lack of needed infrastructure
- Lack of appropriate information

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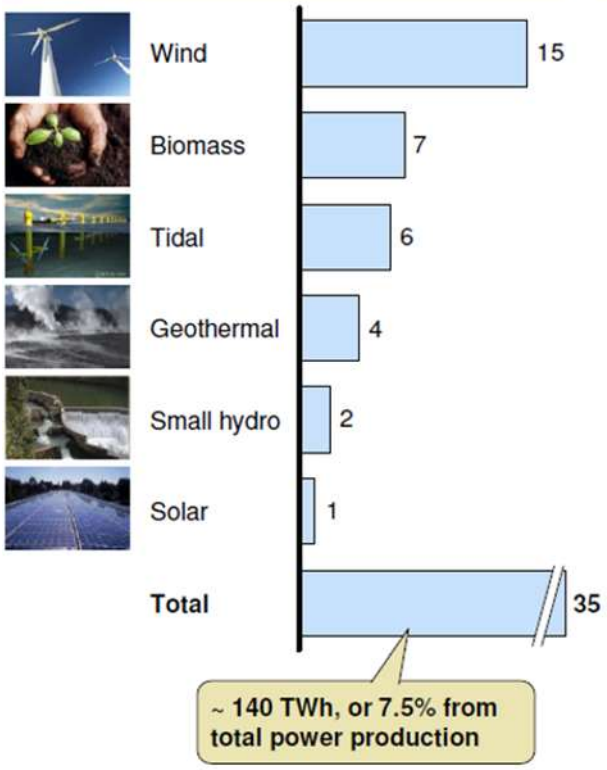
Opportunities abound

Installed capacity, 2030
GW



Main regions implementation

South: Volgograd, Krasnodar
North-West: Karelia, Murmansk, Kaliningrad
Siberia: Omsk, Novosibirsk
Far East: Khabarovsk, Kamchatka

South, Volga and North-West regions account for ~80% of potential

Three projects in **White**, **Barentsevo** and **Okhotskoe** sea

Main potential in **South** and **Far-East** regions

Siberia, **Far-East** and **South** account for ~85% of small hydro potential

South

- Maximum feasible potential to tap until 2030 considering realistic locations which are close to potential demand or existing power grids
- Derived from in-depth interview with a key Russian' expert on renewables (Head deputy of Institute for Energy strategy)

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WHOLESALE ELECTRICITY MARKET SUPPORT

Type of document	**Government Decree #449**
Date of adoption:	May 28, 2013
Scope of regulation:	RES plants on wholesale electricity market (>5 MW)
Technology:	Wind – Solar – Small Hydro (<25 MW)
Who will benefit:	Winner of the yearly competitive tender of investment projects Only new projects (not commissioned)
Basis of payment:	Capacity (MW) not electricity production
Terms of payment:	15 years / monthly basis (RUB / kW)
Limits on final payment:	CapEx (incl. grid connection) within limits OpEx is capped and must be the same for all
Adjustment coefficients for the final payment:	- Local content requirement - Capacity factor requirement - Self needs / auxiliary power - Currency coefficient

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PROJECTS UNDER D449 TO BE TENDERED BY YEAR

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
PV	**35,2**	**140**	**199**	**250**	**270**	**270**	**270**	**162**	**163**			**1759**
2013	35	115	149	100								
2014		25	40	155	285							
2015			10			270						
2016												
Local content req.	**50%**	**50%**	**50%**	**70%**	**70%**	**70%**	**70%**	**70%**	**70%**	**70%**	**70%**	
CAPEX (rub/kWt)	**116451**	**114122**	**111839**	**109602**	**107410**	**105262**	**103157**					
Remaining capacity (MW)	0	0	0	-5	-15	0	270	162	163	0	0	555
WIND	**0**	**51**	**50**	**200**	**400**	**500**	**500**	**500**	**500**	**500**	**150**	**3351**
2013			15	90								
2014		51										
2015			35									
2016					150	200	260					
Local content req.			**25%**	**40%**	**55%**	**65%**	**65%**	**65%**	**65%**	**65%**	**65%**	
CAPEX (rub/kWt)	**65762**	**110000**	**109890**	**109780**	**109670**	**109561**	**109451**	**109342**	**109232**	**109123**	**109014**	
Remaining capacity (MW)	0	0	0	110	250	300	240	500	500	500	150	2550
SHPP				**124**	**0**	**50**	**109**	**35,6**	**35,6**	**35,6**	**35,6**	**425,4**
2013												
2014						50						
2015												
2016												
Local content req.	**20%**	**20%**	**45%**	**45%**	**65%**	**65%**	**65%**	**65%**	**65%**	**65%**	**65%**	
CAPEX (rub/kWt)	**146000**	**146000**	**146000**	**146000**	**146000**	**146000**	**146000**					
Remaining capacity (MW)	0	0	0	124	0	0	109	35,6	35,6	35,6	35,6	376
Remaining capacity TOTAL	**0**	**0**	**0**	**234**	**250**	**300**	**619**	**698**	**698**	**536**	**186**	**3521**
TOTAL TENDERED (MW)	35	191	249	345	435	520	260	0	0	0	0	2035

The base rate of the currency basket used for indexation 43,262 rub

Actual rate $=60 rub

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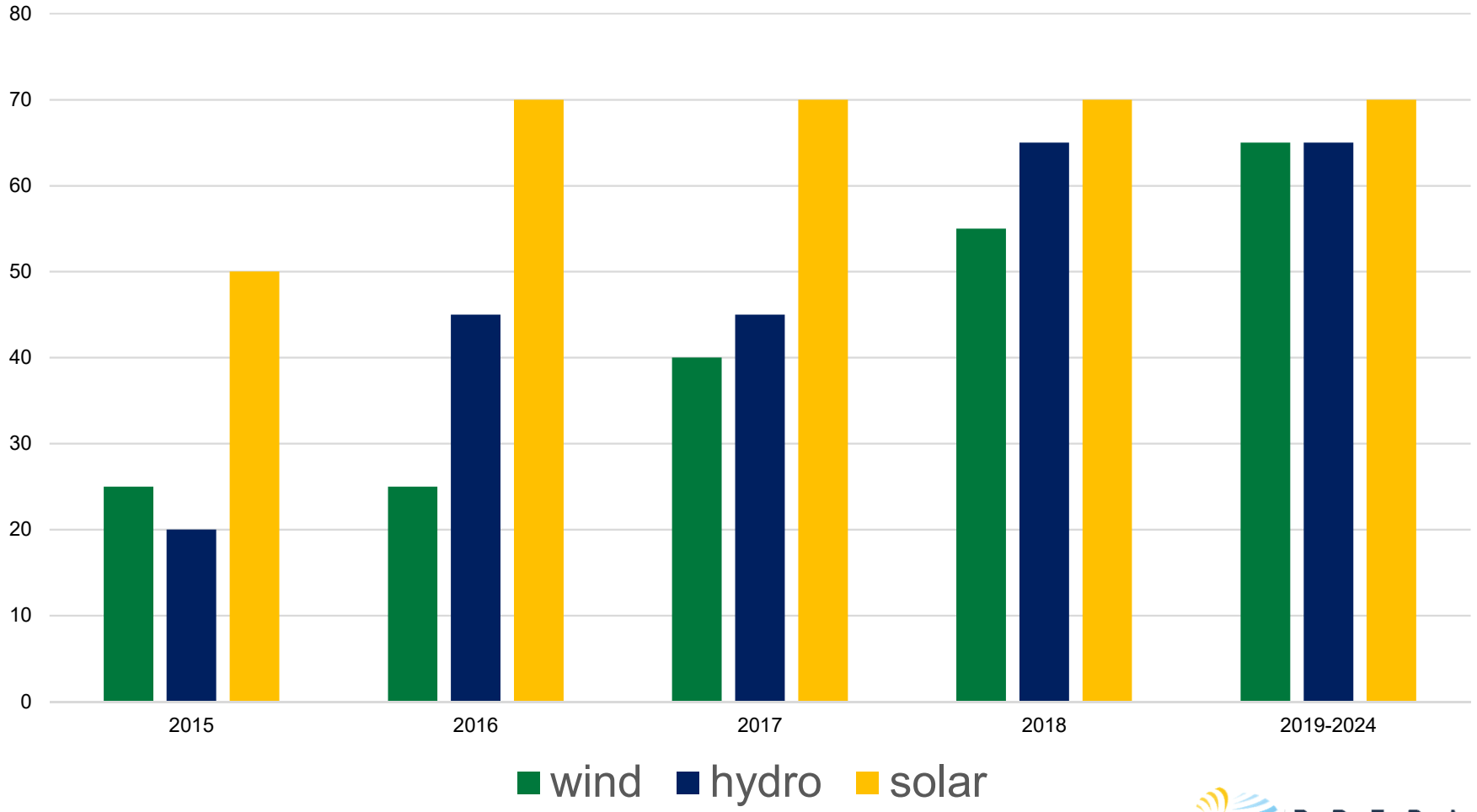
LOCAL CONTENT CONSIDERATIONS

Local content requirements under the regulation.



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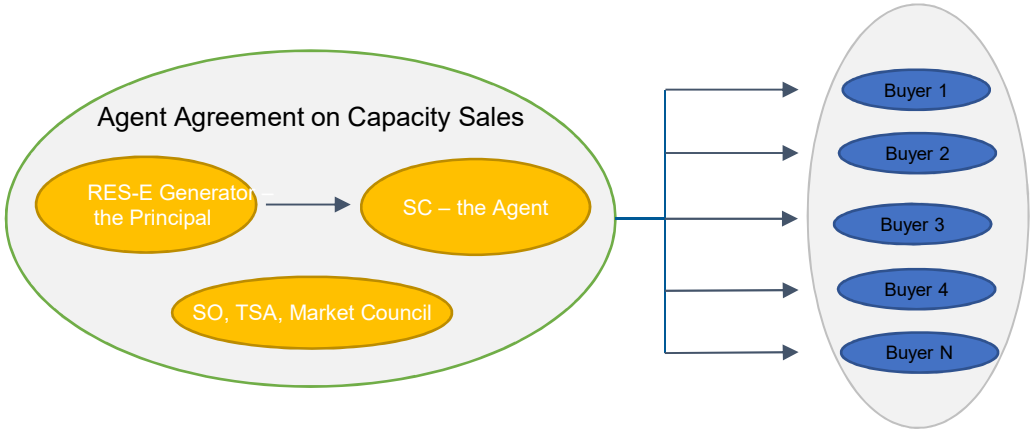
LEGAL FRAMEWORK: WHO PAYS?



- RES-E generator signs an agent's type of agreement with the Financial Settlement Center (SC - part of the market infrastructure);
- SC on behalf of the Generator signs Capacity Supply Contracts with all the buyers in the WECM;
- The other parties of the Contracts are: System Operator, Trading System Administrator, Market Council.

- The volume of the capacity delivered is calculated by the TSA and is spread among all consumers
- Decreasing coefficients: as set by the agreement, incl. late delivery (over 12 months), non-delivery (total or a part of), non-compliance with the LC requirement, etc.
- RES generator also delivers electricity to DAM and BM and receives certain revenue from the market
- WACC:

14% till Dec 2015,

12% from Jan 2016

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CAPACITY PAYMENT

P = (NGR - Ie) / N installed * CF * C internal * C seasonality

Internal Energy Consumption Coeffecie	✓ Reflects capacity purchase for own and commercial needs ✓ Equals 1.005 for all technologies
Capacity factor coefficient	✓ Reflects the performance of the capacity factor specified in Decree 449 ✓ CF = 1.0 *if* project capacity factor / capacity factor specified in Decree 449 > 0.75 ✓ CF = 0.8 *if* 0.75 ≥ project capacity factor / capacity factor specified in Decree 449 > 0.5 ✓ CF = 0.0 *if* project capacity factor / capacity factor specified in Decree 449 < 0.5

***

P - Payment under Renewable Energy capacity supply contract
NGP – Necessary Gross Revenue
Ie – Income from electricity
N installed - Installed capacity
CF – Capacity factor coefficient (basic) – PV-0,14; WPP-0,27; SHPP-0,38
C internal – Internal Energy Consumption Coefficient
C seasonality – Seasonality Coefficient

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RETAIL ELECTRICITY MARKET SUPPORT

Document	Government Decree #47
Date:	Jan. 23, 2015 - adopted Feb. 05, 2015 - enacted
Sphere of regulation:	RES facilities on retail electricity markets (<25 MW)
Technology:	Wind – Solar – Small Hydro – Biomass – Biogas – Landfill gas
Who will benefit:	Winner(s) of the annual competitive tenders of RE investment projects to be included into the regional electricity master plans
Basis of payment:	Electricity production (kWh)
Terms of payment:	Tariff for electricity produced (RUB/kWh). Methodology will be adopted within 4 months.
Limits of final payment:	CapEx – OpEx – Capacity Factor – Local content – Qualification - Certification – 5% of network losses Principles for competitive selection for regional master plan
Payback period:	15 years

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5% OF NETWORK LOSSES! HOW MUCH IN MW?

Total network losses for Russian grids in 2014

96 bln. kWh (9,1% of electricity output)

96 bln. kWh X 5% = 4,8 bln. kWh

4000 MW - PV

2000 MW - WPS

1500 MW - SHPP

**in the event that all projects being developed are covered entirely by one technology*

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PROJECT PIPELINE ON THE RETAIL MARKET

- Projects are tendered on the regional level (regional master plan)

- Regional authorities must adopt master plans before May 1 on an annual basis.

- General principles for the competitive selection:
  - ✓ End user tariff growth reduction
  - ✓ Volume of RE electricity produced is below 5% of network losses
  - ✓ Minimization of environmental damage
  - ✓ Solving of social problems in the region
  - ✓ Public disclosure and transparency

- Restrictions:
  - ✓ CapEx – not higher than the limit set by Decree 47
  - ✓ From January 1, 2017 the facility must meet local content requirements.

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RENEWABLE SUPPORT IN ISOLATED ZONES

Differences in government support:

- ✓ No limitation to 5% of losses
- ✓ No limitation in CapEx and OpEx
- ✓ No local content requirements
- ✓ The RE electricity is purchased by the last resort supplier

OPPORTUNITIES FOR UNIQUE CONDITIONS IN RUSSIA

RE Generation in Isolated Areas:

Russia's vastness makes transmission of energy difficult and inefficient. Distributed renewable energy production from wind can reduce grid losses and blackouts and save diesel fuel in isolated communities.

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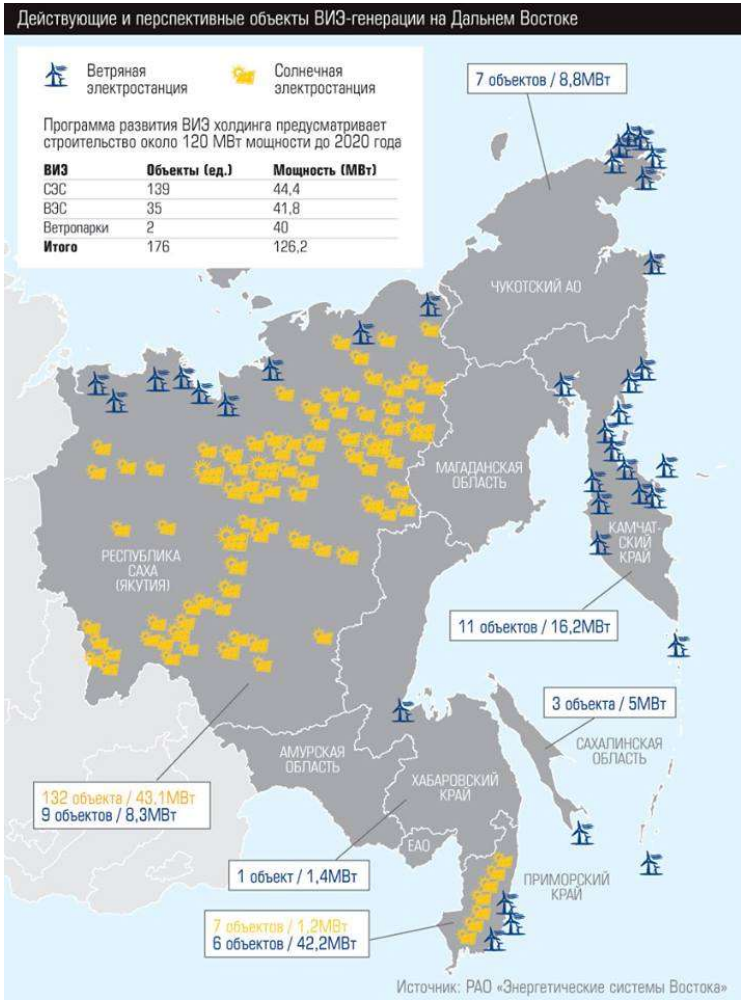
RUSSIA'S ISOLATED REGIONS SHOW MODEST POTENTIAL

Potential wind and solar projects
in the Russian Far East



Russia's energy isolated regions have been at the forefront of the development of renewable energy installations.

This is driven by need to lower diesel usage and improve reliability and access.

Source: RAO ES of East

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THANK YOU

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