Prospective Development of the RES-E Generation In the Russian Energy System

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1. Development of RES generation in the Russian energy system
2. RES-E microgeneration development in Russia

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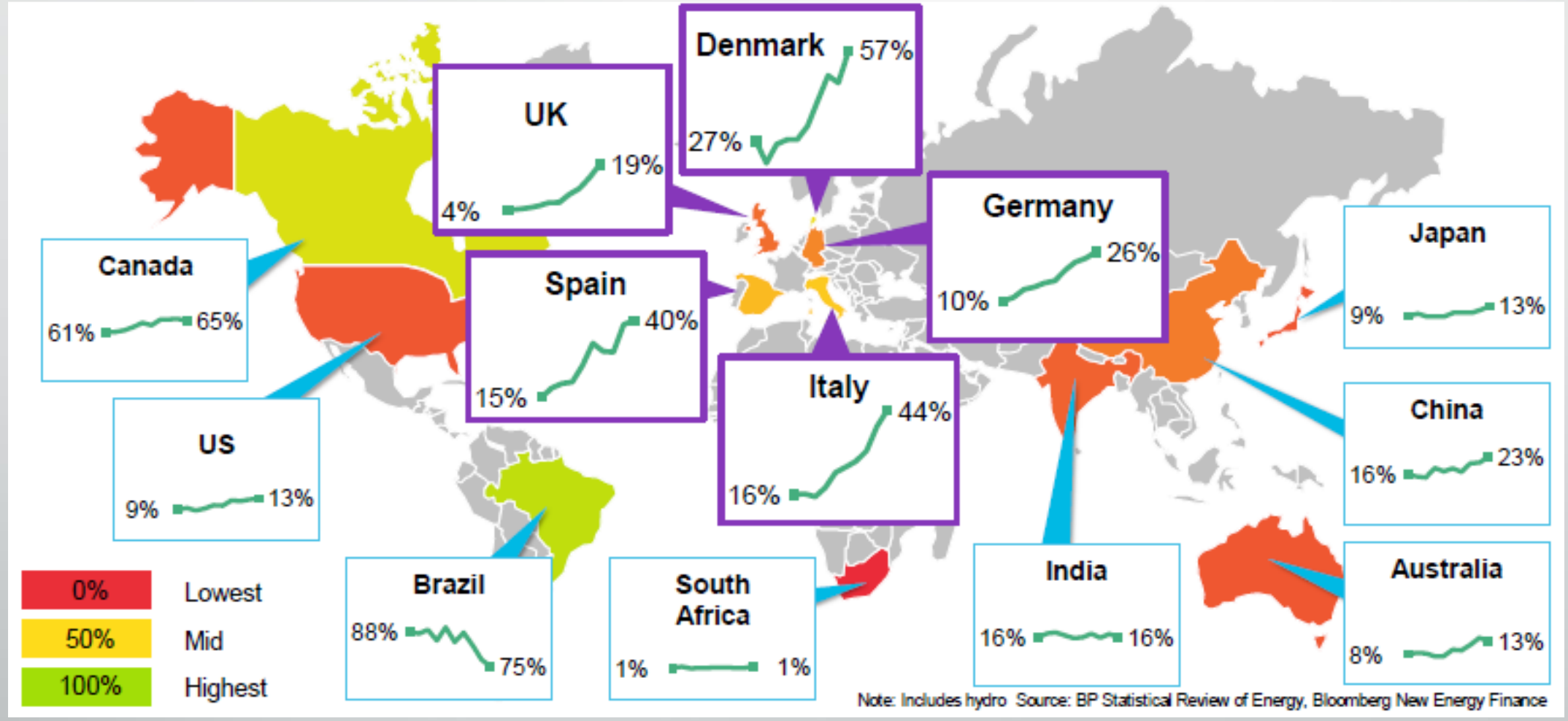
RES-e share in national energy balances 2004-14



Russia: ~17% ~17%

Factors of RES-e Development in Russia

- For the development:
  - enormous RES resource potential
  - necessity to upgrade and re-tool Russian energy system as well as to provide a transfer to the new technology platform in the industry
  - principal political decision on the support
  - start-up of the support system at the wholesale energy market
- Against the development:
  - low start position of the new RES generation technologies in the country
  - powerful anti-RES lobby in the country
  - excessive generation capacity in the country
  - Difficult economic and political situation in the country at the moment of the RES development ignition.

RES Development Scenarios in Russia 2008-13

- Russia has enormous RES potential of all types of resources
- Scenario-2008 1 – Government Decree, dated Jan. 8, 2009, № 1-p
  - till 2015 г. - 2,5%, 26-30,5 mlrd kWh
  - till 2020 г. - 4,5%, 59-68 mlrd kWh
- Scenario-2010 within the draft of the RES support Government Decree in 2009-11

Type	Целевой показатель (млрд кВт·ч)				
	Scenar. 1	Scenar. 2	Scenar. 3	Scenar. 4	Scenar. 5
SHPP	32,88	7,0	7,7	204,5	204,0
Onshore wind	3,59	17,25	50,20	23,2	23,2
Offshore wind	0,32	0	0	1,57	1,53
Sol, PV	0,11	2,8	3,0	0	0,11
Biomass	22,94	8,0	8,0	106,4	102,79
Biogas	4,17	2,0	2,0	1,08	4,2
Geothermal	0	2,1	2,1	0	0
Tidal	0	0,024	0,024	0	0
Total:	**64,00**	**39,07**	**73,12**	**336,75**	**335,83**

Scenario -2013, v1

Type	2013	2014	2015	2016	2017	2018	2019	2020	Всего
Wind	0	150	200	600	700	1000	1500	2000	**6150**
SHPP	0	30	50	150	200	300	400	820	**1950**
Biomass	0	20	50	60	80	90	120	180	**600**
Biogas	0	10	15	25	40	50	70	90	**300**
Sol, PV	0	100	170	220	250	330	420	510	**2000**
Total:	**0**	**310**	**485**	**1055**	**1270**	**1770**	**2510**	**3600**	**11000**

Scenario -2013, v2 act. – Govern. Decree №861-p (2013)

Type	2013		2014		2015		2016		2017		2018		2019		2020		Всего	
	МВт	ГВтч	МВт	ГВтч	МВт	ГВтч	МВт	ГВтч	МВт	ГВтч	МВт	ГВтч	МВт	ГВтч	МВт	ГВтч	МВт	ГВтч
Wind	0	0	100	219	250	547,5	250	547,5	500	1095	750	1642,5	750	1642,5	1 000	2190	3 600	7884
Sol, PV	0	0	120	136,7	140	159,4	200	227,8	250	284,7	270	307,5	270	307,5	270	307,5	1520	1731
SHPP	0	0	18	46,4	26	69,6	124	324,6	124	324,6	141	371	159	417,4	159	417,4	751	1971
Total:	**0**	**0**	**238**	**402**	**416**	**776,5**	**574**	**1100**	**874**	**1704**	**1161**	**2321**	**1179**	**2367**	**1429**	**2915**	**5871**	**11586**

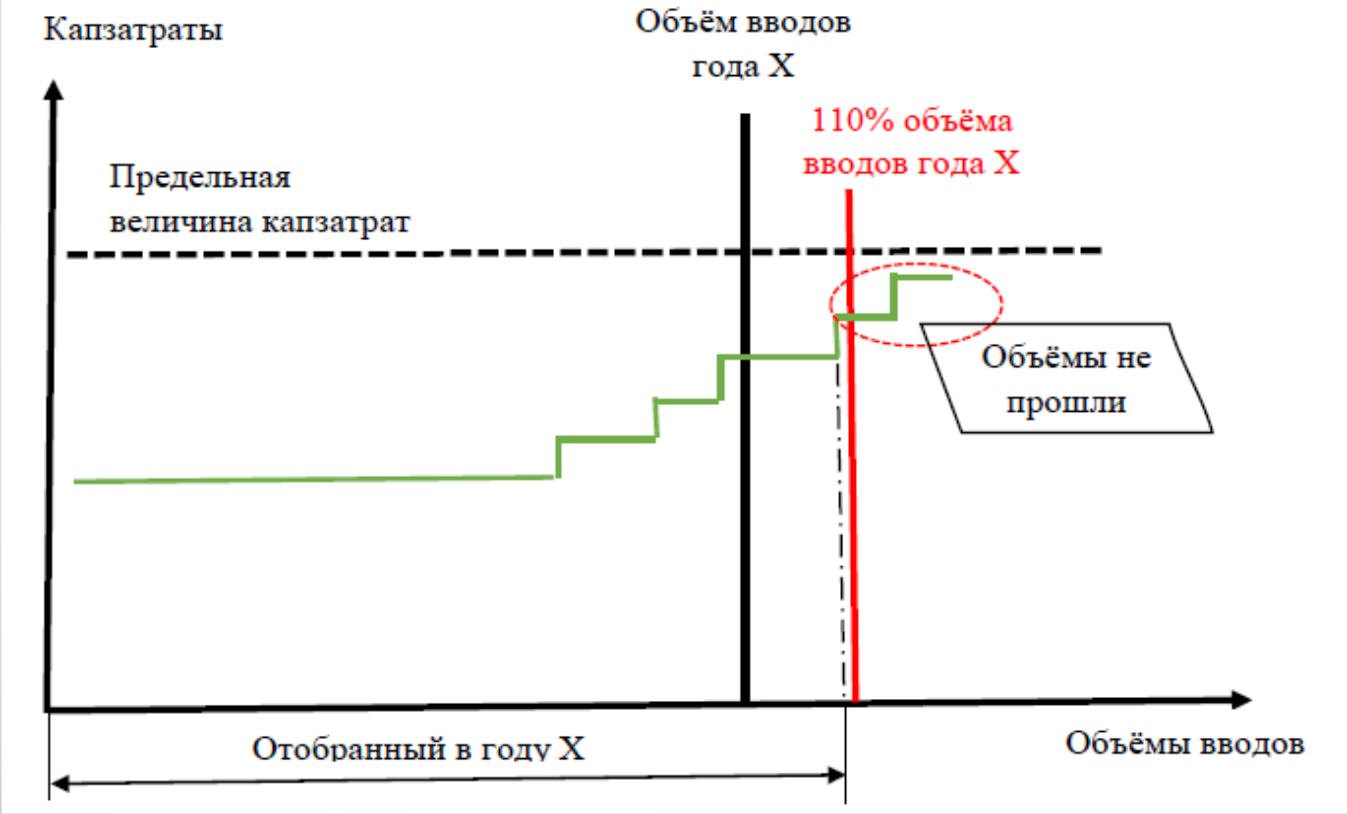
New Technology Platform in Electrical Energy

- On-going shift in energy balance structure in favor of growing share of carbon-free technologies (nuclear and RES), dawn of the coal-firing generation in the developed countries
- Two-times faster growth of energy consumption in households compares to business
- Very quick demand growth for DC current in households and offices
- Slowing growth, in OECD countries – decrease or freeze of energy consumption levels
- Change in generation structure in favor of micro and small-size generation, so-called distributed generation, and a consequent growth of the prosumers independence
- Shift to adaptive, smart-grid networks facilities as an answer to all mentioned changes in energy generation and consumption structures
- Development of the accumulating electrical energy technologies:
    - prosumers independence growth
    - demand side management
    - peak capacity elimination.

RES Support Policy in Russia

- Russian RES support system is quite unique in the market instruments used but very modern and up-to-date regarding selected targets and methodology:
  - RES generation is obliged to sell energy in the energy market at the market prices
  - competitive selection of the RES projects, entitled for support from the market
  - capacity commissioning control: per technology and per year within the frame of support program
  - RES cost control and public results monitoring
  - growing yearly requirements for local content in the power plants equipment commissioned
  - financial guaranties system introduced at the wholesale energy market
  - Revenue flow of RES generators includes variable part (energy sale) and fixed – capacity payment
  - capacity payment is adapted to market realities and economic changes in the country
  - Late commissioning – penalty, under-generation - penalty
- The existing RES support system covers practically all the energy system with possibly only exceptions for RES microgeneration and heat supply.

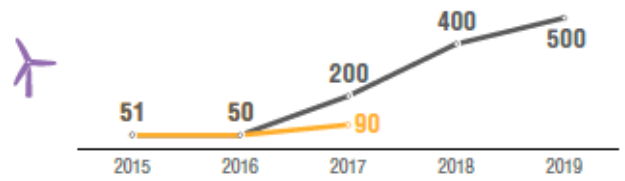
Competitive Selection Of the RES Projects At the WECM



Results of the RES Projects Competitive Selection at WECM in 2013-15 гг.

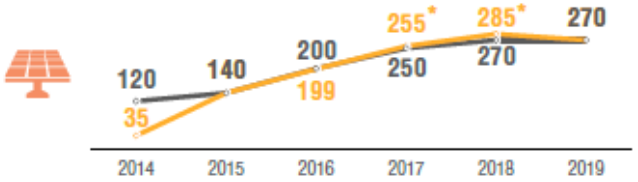
Итоги отбора проектов за 2013-2015 гг., МВт

Ветряные электростанции



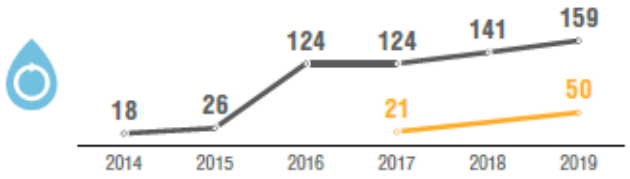
Итого:
квоты 1 201 МВт
отобрано 191 МВт

Солнечные электростанции



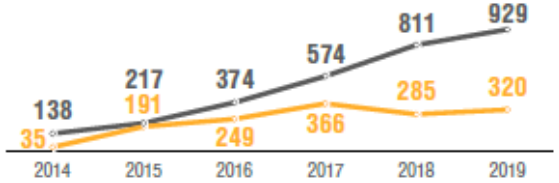
Итого:
квоты 1 250 МВт
отобрано 1 184.2 МВт

Малые ГЭС



Итого:
квоты 592 МВт
отобрано 70.44 МВт

Итого ВИЭ



Итого:
квоты 3 043 МВт
отобрано 1 445.64 МВт

Объем привлеченных инвестиций

Вид ВИЭ	Совокупная установленная мощность	Капитальные затраты	Объем инвестиций
ВЭС	191 МВт	76869 — 110000 руб./кВт	19.45 млрд руб.
СЭС	1184.2 МВт	60 000 — 112 000 руб./кВт	155 млрд руб.
МГЭС	70.44 МВт	174 014 — 188 700 руб./кВт	12.6 млрд руб.
Итого	**1 445.64 МВт**	**60 000 — 188 700 руб./кВт**	**187.05 млрд руб.**

RES Support at the Retail Energy Market

- This part of RES-e energy has mostly a regional aspect of development
- Financial base of the support – regulated energy tariffs
- Decisions on RES-e projects implementation at the retail market has to be made in the regions
- Energy generation at retail is not the main task in some cases in the regions
- Each project has to be included into the regional program of prospective energy development
- Regulated energy tariffs will be approved by regional tariff departments on a case by case basis, but considering technology based caps for capital and operational cost indicators
- RES generator has to obtain qualification status same as at WECM
- Energy will be sold to regional grid organizations for their grid loss compensation There are Local Content Requirements same as at WECM

Further Development of the RES Policies in Russia

- A set of RES-e technologies under support has to be expanded in Russia, which are not still developed enough with exception of large HPPs and are not sufficient for a transition to a new technology platform or decreasing carbon footprint in the energy sector
- The existing support system at WECM needs some adjustment regarding wind and small HPPs
- Support measures are to be expanded to municipal waste, mining gas, high and low temperature geothermal, tidal and probably wave energy
- The existing support system at retail energy market also needs adjustment
- There is a need to provide support to a RES heat supply, especially from biomass as waste and specifically grew up wooden mass
- Russia should actively participate in a developing global system for carbon trade
- RES-e microgeneration, including household individual facilities producing energy mostly for consumption and dumping excessive energy into the grid.

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Regulation of RES-e microgeneration development in Russia

- Normative frame for microgeneration in Russia is very weak and for RES-e microgeneration there is no support measures at all
- With this a task to develop a support system for this type of generation is split in two separate: normative frame and formal status for microgeneration facilities and support system for RES-e microgeneration
- It is important for Russia to use other countries experience (e.g. Germany) in order to leap-frog in this aspect
- RES-e microgeneration pilot projects are extremely important for its development
- Implementation of such real RES projects will rise a level of public acceptance for RES as a prospective technology for national system development

Thank you for your attention!

Копылов Анатолий Евгеньевич, к.э.н., Генеральный директор и Управляющий партнёр компании Акта Консалт

Автор книги **«Экономика ВИЭ»**. Начал работать в качестве консультанта по управлению и производству ещё в 80-е годы. Основные опыт и экспертные знания А.Е.Копылова лежат в сфере экономики, энергетики, нормативного регулирования энергорынков, механизмов поддержки ВИЭ, повышение эффективности деятельности энергокомпаний, оценка эффективности инвестпроектов в энергетике. Работал в качестве консультанта и руководителя проектов не только в России, но также в Казахстане, Киргизии, Молдавии, Узбекистане, часто выполняя задачи по развитию нормативного регулирования отрасли энергетики в этих странах, вопросы стратегического развития отрасли, построение систем поддержки ВИЭ и др. Заказчиками многих таких проектов были международные финансовые институты: ADB, World Bank, EBRD, SIDA, IFC, а также правительства этих стран как бенефициары выполненных работ. Среди клиентов А.Е.Копылова были: РАО ЕЭС, РусГидро, НП «Совет рынка» и АТС, КЭС (Т-плюс), Лукойл, группа РУСАЛ, Хевел, Авелар, Норд гидро, Роснано, НП ГП и ЭСК, ТНС Энерго, Vireo Energy (группа Kinevik), ХК «Композит», др.

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