

**RENEWABLE ENERGY SOURCES**

**8.2. Wind power plants (WPPs)**

**8.2.3. Hybrid WPPs**

*V.A. Vasilyev, B.V. Tarnizhevskiy, OJSC "ENIN"*

For larger autonomous consumers it is reasonable to apply power complexes, including WEIs and, for example, a diesel power installation. A block-diagram of autonomous power complex with WEI and diesel-generator is shown in fig.8.8.

The most urgent task is creation and application of such autonomous power complexes, including WEIs.

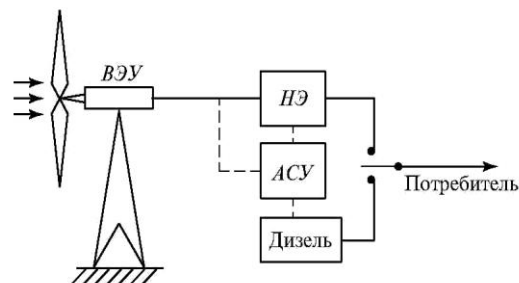
Development of such optimized autonomous power complexes is realized by Scientific and Technical Centre of Small Energy and NIIES.

Characteristics of home-produced WEIs are shown in table 8.4.

WEIs, mentioned in table 8.4, have a wide range of capacities and can be used in autonomous power complexes.

Use of WEIs for autonomous power supply of consumers, as the key application of wind-power, does not exclude creation of large network WPPs, where it is economically profitable. Anadyrskaya WPP in Chukot Autonomous Area, which works in parallel with the local power network, can

serve as an example of that.



**Fig. 8.8. A block-diagram of autonomous power complex with WEI and diesel generator:**

*ВЭУ=WEI— power installation; АСУ=ACS — autonomous control system; НЭ=PA — power accumulator, дизель - diesel, потребитель - consumer*

**Table 8.4. Characteristics of home-produced WEIs**

Name	Type of wind-power installation					
	Manufacturer					
	USW 56-100 CJSC "Vetroenergetika"	AVE-250SM SUE SPE "Vetroen"	Radiga-016 SUE "Raduga"	WEI-1 OJSC "Invest-profit"	Vetrotok-30 Factory "Vpered"	Breeze-5000 CJSC "Elektrosphera"
Nominal capacity, $N_{WEI\ inst.}, kW$	107,5	250	16	30	30	5
Generator type	asynchronous	synchronous	synchronous	synchronous	synchronous	permanent magnet
Current type	3 ph., 380 V	3 ph., 380 V	3 ph., 380 V	3 ph., 380 V	3 ph., 380 V	1 ph., 220 V
Estimated operating wind speed at nominal capacity, $v_{p\ inst.}, m/s$	13	13	10	11	10,4	10
Minimal operating speed of wind, $v_{p\ min}, m/s$	5	5	3,5	3	4	3
Maximal operating speed of wind, $v_{p\ max}, m/s$	22	30	25	25	25	50
Diameter of wind-roller, $D_{w.r.}, m$	17	25	10	11,5	12	5
Height of wind-roller axis, $H, m$	20	18...30	9,5	18	12	13,5...18
Tower type	latticed	conic	conic	Tubular with tensions	Hard form	Tubular with tensions
Regulator	Mechanic	Mechanic	Mechanic	Centrifugal-spring, inverter	Centrifugal-spring	Inverter
Mechanism of orientation	Hunting	Tail-vane	Drive	Weathercock	Tail-vane	Weathercock
Conditions of production	Series	Series	Adjustment of series	Prototype	Adjustment of series	series