Energy saving measures in heating, ventilation and air conditioning systems

Some energy saving measures in heating systems with expert assessments of energy saving potential are given in the table:

№	The content of the event	Assessment of energy saving potential
1	Organization of accounting and control over the use of **thermal energy**	Up to 7... 30% of **thermal energy** when installing apartment **heat meters**
2	Reconstruction of the **hot water treatment system**	Saves up to 6% of **fuel consumption**
3	Presence of **systems of automatic regulation** of temperature of the heat carrier depending on external temperature	Increase of temperature of air indoors over norm increases a **heat expense** by 4 ÷ 6%
4	Elimination of drip leakage of water from shut-off valves	Leakage per year is 10 ÷ 35 m3 / year
5	Presence of uninsulated shut-off valves	**Losses** equivalent to 1 m of uninsulated pipeline
6	Installation of the **regulator of heating on time**	Saves up to 40% of **heat consumption** of the building
7	Lowering the temperature in residential buildings at night	saves up to 2% of the building's **heat consumption**
8	The presence of triple glazing windows.	Gives **savings** of up to 3 ÷ 4%
9	The presence of vestibules and their partitioning at the entrances to the room and springs on the door	**Saves** up to 3 ÷ 4%
10	The correct choice of color of heating devices	- coloring of the heating device with zinc paints increases heat transfer by up to 15%; - oil painting reduces heat transfer by up to 8.5% (for cast iron radiator - reduces even more, up to 13%); - covering of the heating device with decorative

			plates, curtains - reduces heat transfer by up tp 10 ÷ 12%
11	Installation of radiator thermostats		Gives **heat savings** of up to 6 ÷ 7%
12	Installation of **heat carrier** temperature **regulators** for heating		The estimated **savings** will be about 15%.
13	Presence of block individual automated heating point		Reduces **heat consumption** by 37% in industrial and administrative buildings and by 12% in residential buildings
14	Adjustment of **heating** and sealing **systems** of elevators and regulators in position according to debugging cards		The **economic effect** makes up to 15 ÷ 35%, and payback period - 1 ÷ 2 years
15		Creating an infrared heating system	The use of radiant (infrared) heating in industrial buildings **saves** up to 25%
16		Installation of converters with mechanical heat removal	Gives savings of up to 7%
17		Installation of air heating systems	**Saves** up to 10 ÷ 15%
18		The use of glazed loggias.	Gives **savings** of 7 ÷ 40%
19		Elimination of cold bridges in places of connection of window covers with a wall	Gives **economy** of 2%
20		Sealing of cracks and leaks of window and door openings	**Heat consumption** after sealing of cracks and leaks is reduced by up to 10 ÷ 20%. 1 m. unsealed window porch is equal to the **loss** of 50 kWh for 228 days
21		Installation of windows with high thermal protection characteristics. Best: 1) triple glazing in wooden weaves	Heat saving 23%
		2) the same with argon between the glass	34% compared to conventional double glazing

22		Installation of double-glazed windows: with heat-reflecting covering, or with two heat-reflecting coverings	Use of the thermal screen allows to reduce **heat losses** through windows from up to 22% in comparison with usual double glazing
23		The maximum possible savings of thermal energy with thermal insulation: exterior walls cold floors coating	The implementation of measures will reduce the total heat loss 42% 4% 8%
24		Replacement of tubular heat exchangers with plate ones	**Saves** about 15% of **heat**
25		Installation of a heat reflector, which is a heat-insulating gasket with a reflective layer, between the heater and the wall	**Saves** 2 ÷ 3% of the total energy consumption
26		Restoration of thermal insulation on pipelines of heating and hot water systems	Allows to reduce **heat losses** by 3 ÷ 9% of total consumption
27		Transfer of the **heating system** from the heat carrier "steam" to the heat carrier "hot water"	**Savings** of 20 ÷ 30% of heat
28		The presence of infiltration of cold air in heated rooms	Additional consumption of 10 ÷ 15 kcal per cubic meter of cold air
29		Introduction of the energy-saving mode of heat supply for heating from boiler-houses or CTP taking into account household heat emissions	Annual **heat savings** make up to 4 ÷ 17%
30		Introduction of **facade regulation of heat supply** taking into account meteorological factors (wind speed and solar radiation) effect of wind speed and solar radiation in the facade regulation, the annual	Overconsumption of thermal energy per year without meteorological factors (without facade regulation) in the range of wind speed change from 0 to the estimated is 6 ÷ 12%. Taking into account the combined

		savings can be 9 ÷ 18%	effect of wind speed and solar radiation in the facade regulation, the annual **savings** can be 9 ÷ 18%
31		Introduction of the economic schedule of supply of the heat carrier taking into account the type of **heating system** and the type of **heating devices**	Savings make from 5% (depending on type of heating and heating devices) of thermal loading at regulation of heat release according to the operating schedules
32		Insulation of uninsulated pipelines of **heat consumption systems** located in basements and unheated rooms	Annual heat **savings** when insulating 1 m. A bare pipeline with an average diameter of 25 mm is 0.22 Gcal / m.

Energy saving measures in ventilation and air conditioning systems

Some **energy saving measures** in ventilation and air conditioning systems are given in the table. The list of these measures is significantly smaller than the list of **energy saving measures** in heating systems.

Energy saving in ventilation and air conditioning systems is represented by two parts: **savings of heat and electricity**. The **consumption of thermal energy** by these systems is almost an order of magnitude higher than the **consumption of electricity**. For industrial consumers, **heat and electricity consumption** are often correlated as 10: 1. However, given the high **cost** of air movement in ventilation and air conditioning systems, speaking of energy savings in these systems, we can not neglect the cost of electricity to create air flows.

It should also be borne in mind that the **savings in thermal energy** from the implementation of some of the above measures can be obtained by calculation.

№	Content of the event	Assessment of energy saving potential
1	Application of recirculation in ventilation and air conditioning systems	Savings depend on the degree of recirculation of exhaust air.
2	Application of air recovery on exhaust systems of ventilation and air conditioning	Gives savings of 20 - 70%. The savings depend on the efficiency of the recuperative heat exchanger-utilizer of exhaust air heat.
3	Application of recuperators with moisture transfer between exhaust and supply air	Increases economy in comparison with the utilizer of only obvious heat in addition to 30%
4	Application of air regeneration on exhaust ventilation and air	Savings depend on the efficiency of the regenerative heat

	conditioning systems	exchanger-utilizer of exhaust air heat.
5	Application of two recuperative air heat exchangers on supply and exhaust systems of ventilation and air conditioning	**Savings** depend on efficiency of system from two heat exchangers of utilizers of heat of exhaust air
6	Presence of automatic **regulators** on supply systems of ventilation	Gives up to 10% of **economy of heat** and 25… 30% of the **electric power**
7	Thermal insulation of air ducts in places of laying with the lowered air temperature	Possible economy of heat and cold at high-quality execution of thermal insulation reaches 10… 15%
8	Application of frequency-regulated electric drive of fans for the purpose of regulation of an air expense	New optimum ways of quantitative regulation allow to reduce an expense of the on air movement in exhaust systems by 6 - 26% and in supply systems by 3 - 12% of size of consumption by the fan in the calculated mode
9	Joint use of general exchange and local ventilation in the form of local exhausts, air curtains, etc.	**Savings** are determined by calculation.
10	Localization of inflow and extraction (device of air oases, suppression, localization of inflow)	Reduction of air exchange at work of UPC by 25 - 50%
11	Elimination of suction and air leaks due to leaks in air ducts	**Reduction of costs** for air movement of fans by 9 - 10% (electricity)
12	Reduction of aerodynamic losses during air movement in air ducts	Increase of refrigeration load of UPC by approximately 10 - 16% for every 1000 Pa of friction **losses**