Save energy by cutting down waste. For details, see the inner page.

Energy-saving Effect Tops 30%

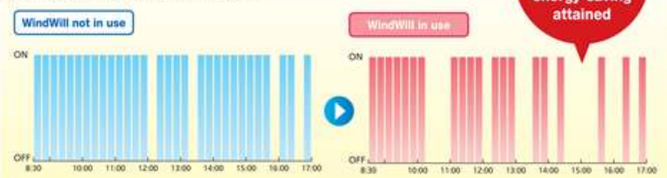
WindWills cut down the Air-conditioner's Operating Hours by 2 hours 45 minutes.

In heating operation at the WarmBiz setting, too, WindWills effectively improve the air-conditioning efficiency and lessen the load to the air-conditioner, resulting in shortened compressor operating hours and incidental increase in energy-saving effect.

Air-conditioner (Compressor) Operating Hours

(Results of tests conducted by Miyagi Technical Junior College)

36.9% energy-saving attained

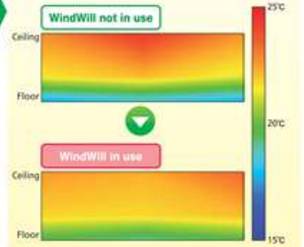


Test conditions: Temperature setting/ 20℃ Wind volume/ 840m³/h x 2 units
Floor area/ approx. 40m² (430 sq.ft.) Number of WindWill installed/ 4 units

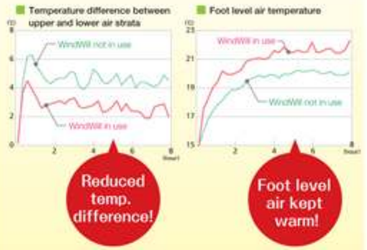
Improved Comfortableness despite Shortened Operating Hours

Changes in Room Temperatures

WindWill's air-stirring performance lets warm air quickly flow downward to warm up air around people's feet, preventing it from collecting and hanging overhead near the ceiling at the same time.



WindWill reduces temperature differences between the upper and lower air strata and quickly warms up air near the floor and keeps it comfortably warm at all times.



WindWill

The brand name **WindWill** represents our strong desire and will to combine improved comfortableness and energy-saving by making effective use of the wind power inherent in all air-conditioning equipment. The name combines "Wind" of "windmill" and our strong "Will."

This product was developed under the guidance of:

Associate Prof. Hideyuki Aoki, Tohoku University Graduate School Technology Graduate Course Assistant Prof. Yousuke Matsushita; Prof. Yasuo Utsumi, Dept. of Architecture, Miyagi Technical Junior College; D. Eng. Kazuo Ogino, part-time instructor at School (Department) of Technology (Engineering),Chuubu University; Industrial Technology Institute, Miyagi Prefectural Government; City of Sendai; and Sendai City Industrial Development Promotion Foundation.

air opt. Air Opt Co.,Ltd.

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E-mail info@airopt.jp

ver.1 2009.February

An Air-stream Stirrer that runs on the wind power of conditioned air, without electricity. WindWill

WindWill®

materializes better indoor space by using,
without wasting, the power of conditioned warm or cool air flow

Power Rates and CO_2 Cut down by More than 30% & Environment-friendly Comfortable space

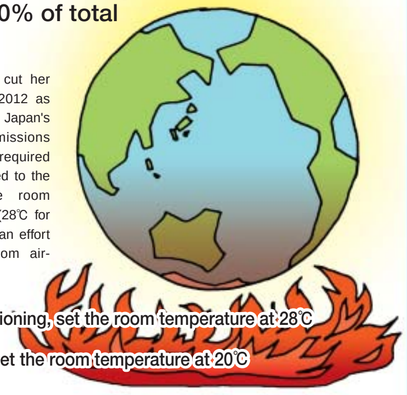
Comfort and Energy-saving by Wind Power

Patent No.4071258
Method of air stirring and air stirrer.

Serious Global Warming

In office buildings, air-conditioning accounts for roughly 50% of total power consumption.

The Kyoto Protocol requires Japan to cut her greenhouse gas emissions by 6% by 2012 as compared with 1990. However, in 2005, Japan's energy-derived carbon dioxide emissions increased by 13.6% contrary to the required target, and the Government has appealed to the public, among others, to set the room temperatures at "energy-saving modes (28℃ for summertime and 20℃ for wintertime) in an effort to reduce power consumption for room air-conditioning.



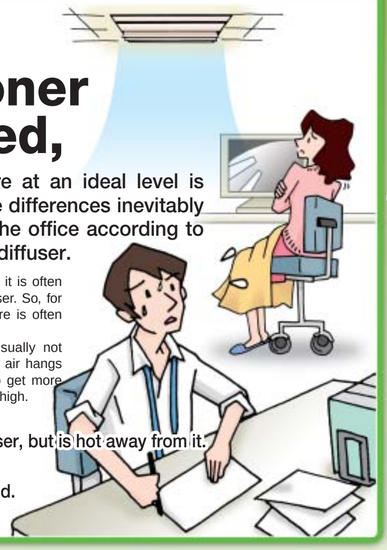
COOLBIZ For air-conditioning, set the room temperature at 28℃

WARMBIZ For heating, set the room temperature at 20℃

Where an air-conditioner alone is used,

keeping the room temperature at an ideal level is hard to realize, as temperature differences inevitably occur from place to place in the office according to the relative locations from the diffuser.

In summer, though it is cool near the diffuser, it is often too warm at other places away from the diffuser. So, for better comfort in those places, the temperature is often set too low.
Conversely in winter, moderate heating is usually not enough to keep the feet warm, as the heated air hangs near the ceiling and does not come down. To get more heat, the room temperature tends to be set too high.



Summer It is cold near the diffuser, but is hot away from it.

Winter Head feels hot, feet cold.

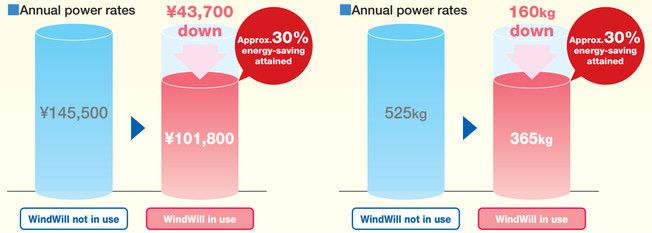
WindWill used as a means to save energy:

WindWill used as a means to narrow down the temperature differences

30% energy-saving attained by the use of WindWill in air-conditioning systems resulted in reduced power cost and CO_2 emissions, as illustrated below:

Energy-saving results by floor space in Tokyo

A case of an office with a floor space of 40m² (or 430 sqft.)



VRV (Variable Refrigerant Volume)

Area: Tokyo **Building use:** Office **Duration of Use:** Air-conditioning/ April 16 – November 6 Heating/ December 14 – March 23
Number of Days used: Six days weekly **Hours used:** 08:00 – 20:00
(Source: Japan Refrigeration and Air Conditioning Industry Association)

■Power rates and CO_2 emissions by floor space

Floor space		27-34m² (290-374 sqft)	49-60m² (527-646 sqft)	61-89m² (657-958 sqft)	90-103m² (969-1109 sqft)
Air-conditioner capacity		2.5 hp	4.0 hp	5.0 hp	6.0 hp
WindWill not in use	Annual power cost (¥)	121,250	194,000	242,500	291,000
	CO_2 emissions (kg)	440	700	875	1,000
WindWill in use	Annual power cost (¥)	84,850	135,800	169,700	203,700
	CO_2 emissions (kg)	310	490	615	680

Due to differences in temperature and other factors between Tokyo and other areas, power consumption varies according to the respective areas. The following estimated correction r ates shall apply to calculation of power consumption in the respective areas concerned:

Nagoya	1.3 to 1.4 times
Osaka, Hiroshima, Takamatsu	1.2 to 1.3 times
Fukuoka	1.0 to 1.1 times
Sendai	1.6 to 1.9 times
Niigata, Toyama	1.5 to 1.8 times

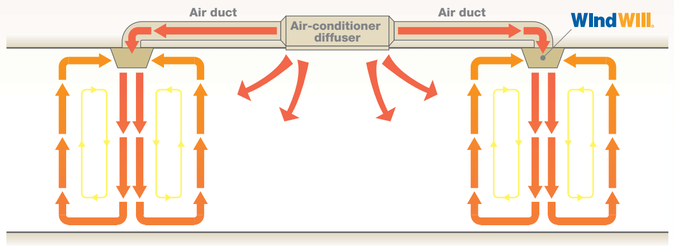
(Source: Japan Refrigeration and Air Conditioning Industry Association)

Power cost calculation formula: hp x 0.736kw/hx12 hrs x 250 days xpower rate(¥22/kwh)
CO_2 reduction calculation formula: hp x 0.736kw/hx12 hrs x 250 days x CO_2 emissions per 1 kw (0.08kg/kw)

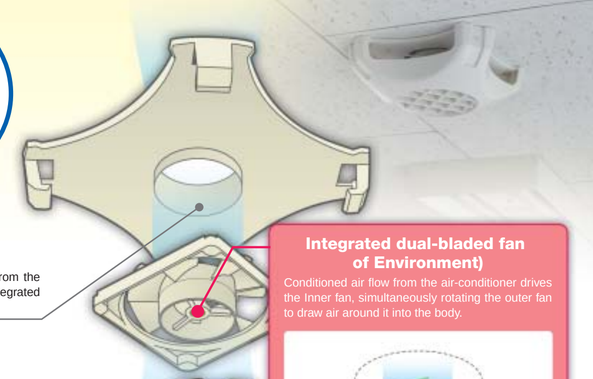
Note: Numerical values shown for energy-saving were calculated from the results of experiments conducted by our company and may vary according to environmental conditions such as the outdoor temperature.

Imaginary illustration of WindWills stirring indoor air:

WindWills mix air around them with conditioned warm or cool air from the air-conditioner diffuser and diffuse mixed warm or cool air into larger areas, reducing temperature differences in the room.



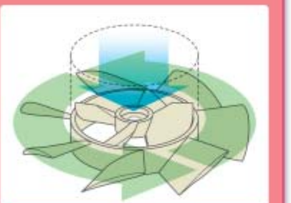
WindWill Internal Construction



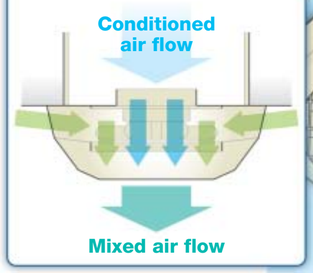
Warm or cool conditioned air from the air-conditioner flows to the integrated dual fan.

Integrated dual-bladed fan of Environment)

Conditioned air flow from the air-conditioner drives the Inner fan, simultaneously rotating the outer fan to draw air around it into the body.



Cross section



Mixture of conditioned air and air drawn from around WindWill is diffused into the room.

WindWill is also Environment-Friendly

CO_2 emissions reduced annually in an office with a floor space of 40 square meters (430 sqft) equipped with WindWills amounts roughly to 160kg. To purify this amount of carbon dioxide back to oxygen, a large number of trees are needed. In terms of Keyaki (a Japanese tree of the genus Zelkova), as many as 146 trees are required.

A Keyaki is capable of purifying 1.1kg of CO_2 annually.

(Based on Data from the Ministry of Environment)