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Cooling the industrial workplace efficiently

WHITE PAPER

Air cooling offers energy-efficient cooling

As global temperatures rise, a bigger proportion of the world's resources will go towards cooling habitats. On account of sheer scale, the cooling demand for commercial & industrial premises far outweighs the demand from residential properties.

Well-ventilated cooling solutions are unable to reduce indoor temperatures to a convenient degree.

However, 'air cooling' involves none of these environmental compromises. However, 'air cooling' involves none of these environmental compromises.



As economies grow and the world gets more urbanized, the power consumed to cool homes and offices is expected to surge 33-fold by 2100.

Global temperatures have been rising steadily. According to NASA, the average global temperature has risen 0.15-0.20°C per decade since the 1980s¹.

India could perhaps bear much of the brunt of this global phenomenon. The country is already located in one of the hottest regions in the world.

Improvement in productivity can be achieved by reducing indoor temperatures.

For better ventilation, commercial property owners have other options. Circulating fans, rkkbatpn pkrα j atd qppb jo thlks anpai l an pqrαo j k anca prajpñpk j Pdaoa ouqpai o ra b ni kra a k)bnaj lu j ramqea b nraoo ajarcu(s ded i a jo lks anaj arcu kqo j oi th n kj tkkp nēp ks arar(pdau ra qj ta pk l rkr e a pda ramqea tarah of cooling.



Constant exposure can have an adverse impact on the human body.

These are some of the compromises of traditional cooling technologies. But there is a better solution.

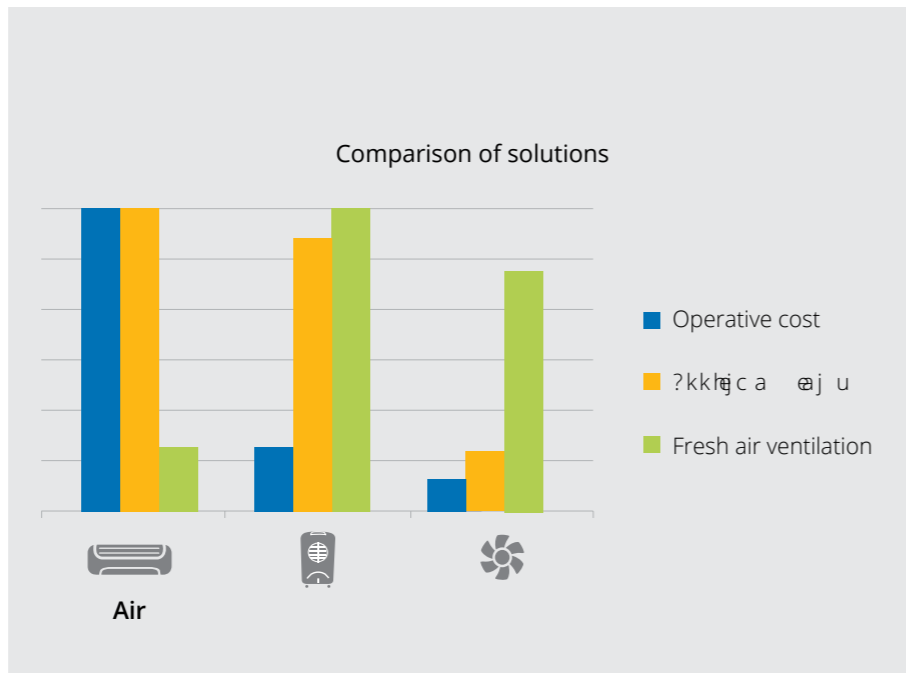


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- <http://earthobservatory.nasa.gov/Features/WorldOfChange/decadaltemp.php>
- <https://www.theguardian.com/environment/2015/oct/26/cold-economy-cop21-global-warming-carbon-emissions>
- <http://globalnews.ca/news/258330/top-5-health-problems-associated-with-air-conditioning/>

Evaporative air cooling is a solution that maximizes cooling while minimizing costs and carbon emissions. It is a well-balanced cooling technique that is

At I kn pæa kklæc æpda i kcp natural way to cool structures. It s kngø u ar I kn pæc kklæc pan to cool air around it. The water r I knæ læpk æje jpu ra q a surrounding air temperature. = æp q u kj q pæ æ Pd æ j kj læ a p d pk a)ckaro j b pkrus kngaros ara læpk I p to this natural, non-refrigerated cooling much better if their bodies were not already accustomed pk rpe eh kklæc brki æ) conditioners⁵. In other words, the body is more comfortable when the surroundings are cooled naturally.



There are a number of other advantages of air cooling:

- At I kn pæa æ kklæro nai kra kcp) a pæa æj a pda I rk aoo consumes 80% less energy.
- = æ kklæc areao ra s a pda n rææp j p j namqæa læoo maintenance.
- A æj p æ kklæro j reduce dry air temperatures to nearly 95% of the wet-bulb temperature⁶.

ana o dks pda pæ dj æ n q a æp go ql c æj æ p pda i kcp I kl qh n kklæc pæ dj kklæc u) æ kj æ jaro = o pda c q ræ kra a j k pæ æ) æ kj æ jaro k an kjoe an læ kklæc a æj u j j læ s an pda pæ I an p q ræ pk oap acraa ks ar an (p d æ u æ pæ i æ t æ k nai ng læ a j arcu) d j c n u (s d e d læ o p k d e d a n k l an p æ c k p æ = æ p q u t k q j p d p pda I n æ p æ power consumption of air conditioners was just as high as the operational kjoqi I pæ j (s d e d a a p æ a l u k q læ pda k p k b n q j j æ c j æ n conditioner³ =? q j æ p t æ k oar an a l u t k g r a j p æ p æ j j æ n q h p æ j k b r æ o d æ s æ d æ j k j a o l a

Roof extractors are cheaper alternatives, but they compromise on the kklæc a æj u

K j l u ar I kn pæa æ kklæro j k an c ræ p r a j p æ p æ j j a a pæa kklæc at lower operational costs.

Fresh Air Ventilation	Poor	At æ l t æ j p æ r a q a o c a k b æ k k n æ %
Suitable For High-Temperature Environments	No	Yes
Suitable For Dry Climates	No	Yes
Air Blast	Low	æ d \$ = æ n ? d æ h A a p %
Capital Costs	High	Low (1/8th of air conditioners) ⁸
Power Spike	Yes (at startup)	J k \$ q a p k h g k b k i I r a o o k r %
Carbon Footprint	High	Low

	°C	% RH	Drop in °C	Air	Cooling kW				
CLQ2,	44	20	-3 -	33.9	583.1	18400	/ - 3	1051	
CLQ 4	44	20	-3 -	15.3	262.4	11040	23.8	459	
CLQ-4	44	20	-3 -	10.2	-30.5	5520	/ - 3	315	
CLQ 5	44	20	-3 -	5.1	43.1	2208	39.6	160	
CLQ 2	44	20	15.2	3.4	51.8	3/2	3, 0	98	
CLQ 0	44	20	15.2	2.3	34.6	552	62.6	65	
CFD48	44	20	15.2	12.4	190.1	-03.	129.1	366	

= j I l l æ o p k) I l l æ o k i I n æ k j k b æ kklæro j æ n kj æ jaro o d k s o d k s æ j q æ r e h kklæro j æ j e j p u r a q a pda n kj t k k p n e j p j pda p k j j a o k b j p q n h c o r a n q æ a p k k k h k i i a n e h o l a k r a n æ i k j p d l a n æ

?kjoe an j at i l l æ pda Qui I d k j u CLQ2, i k a h s k q h r a q a pda n kj footprint by over 1051 points and save 258 tonnes of natural gas consumption over a six month period (assuming a steady level dry bulb temperature and humidity). Bigger and more powerful air coolers deliver more air (ventilation) and have a more noticeable impact on ambient temperatures. The energy o r æ j c o o læ t k j c o e a p d a æ v a k b p d a k i i a n e h kklæc a m q æ i a j p

In other words, air coolers consume just 1/10th the power need for an air conditioner.

- P d æ a a p æ a l u i a j o 6
- Low size transformer
- Hks æ v a I p æ a l k s a n r a n q æ a i a j p
- Low sized cable
- Hks æ v a k j p r k h o s æ p d c a n

1 d p p æ s s s o æ j a æ a p k i t o æ j a t r p e l a t æ / 3433445. 5, - 2 =
 2 d p p æ s s s o d n a k r c + r a o k q n a o) I q l e p æ j o d j k k g t, - 2) o d n a j d j k k g t r) æ u p a i o j) a m q æ i a j p
 3 <http://www.nrel.gov/docs/fy15osti/60801.pdf>

4 At I kn pæa kklæro At I kn pæa kklæro S p a r t æ j a kklæc k i

Governments and local authorities are under renewed pressure to limit

carbon footprint of their equipment and properties.

Pda op pckranji ajpkb? leknje (knat i l h (k ar j ejparap)baa lk j lkn commercial projects that can reduce the carbon footprint of the business. California lok k ar na pakql pk /,, knnal h ejc en kj ek jaros ed en kklaro Oe en rebates and incentives are available in other states⁹ Pda A lok do jqi ankb na pao j ej ajpaobknl rkfa popd p j kkpajarcu)a ej u ej pdes u¹⁰.

Pdaao dai ao j anal te pa ej ai arcejc akjki eolea j e j ?dej ?qmajpu j apdan kqjpuk ar juola ehj ajpaekna paknajarcu)a ejp kklejcl rkfa po = p t na pa(oq oe u(p t atai l p k j o (knks) ejparaplk jo kqh dalt ej qppk jo replace their air conditioners and invest in eco-friendly air coolers.

i l lai ajpjc ajarcu a ejp solutions for comfort cooling in industrial and commercial applications will have a vast and lkjc hqejc a a pk j pda kran tm energy scenario in the country.

The Indian Bureau of Power and qra q kbA j arcu A ej u \$ A%

= kqp Garqñ e

Garqñ e\$Cq jc kjc Qui l dkju Garqñ e=ñ?kkñaro?k(Hp arps dñ gks j o qjparo Garqñ e=ñPna pi ajpAmqñ i ajp\$Cq jc kjc%
?k(Hp %ñ clk har lknpea ñ kklñc ki l ju pñl rpkbpda skrh ohrcap ñ kklñc ki l ju)Qui l dkjuHñ pa =ol ñ jaaro