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Research Article

A NEW METHOD OF STORING AND RETRIEVING ELECTRICAL ENERGY IN THE FORM OF COMPRESSED AIR

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ABSTRACT

Electrical supply is greater than demand at some part of time in a day. Electrical supply is less than demand at some other part of time in a day. When Electrical supply is greater than demand energy needs to be stored and when supply is less than demand electrical energy needs to be retrieved from stored energy. In this paper a new method of storing the electrical energy in the form of compressed air is proposed and it was found that the system efficiency is 56.3%.

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INTRODUCTION



Figure1 All India Daily Load Curve

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From the figure1 it is evident that the daily load curve is not constant with time.

Table1 Power Supply Position in March 2014 and March 2015 in India

Region	Energy (MU)				Deficit (%)	
	Requirement		Availability			
	March.14	March.15	March.14	March.15	March.14	March.15
Northern	23526	22426	22444	21484	-4.6	-4.2
Western	25063	25481	24786	25404	-1.1	-0.3
Southern	25961	25972	24389	25388	-6.1	-2.2
Eastern	9593	8523	9504	8411	-0.9	-1.3
North Eastern	1027	1170	952	1097	7.3	6.2
All India	85170	83572	82075	81784	-3.6	-2.1

Power deficit in MARCH 2015 in INDIA=2403 MW.

Table2 Peak Demand-PEAK MET in MARCH 2014 and March 2015 in India.

Region	Power (MW)				Deficit (%)	
	PEAK Demand		Peak Met			
	March.14	March.15	March.14	March.15	March.14	March.15
Northern	38813	38338	35,829	35945	-7.7	-6.2
Western	40375	43580	39768	43145	-1.5	-1.0
Southern	38464	38241	36048	37047	-6.3	-3.1
Eastern	15888	16376	15598	16264	-1.8	-0.7
North Eastern	2110	2403	1995	2131	-5.5	-11.3
All India	135650	138938	129238	134532	-4.7	-3.2

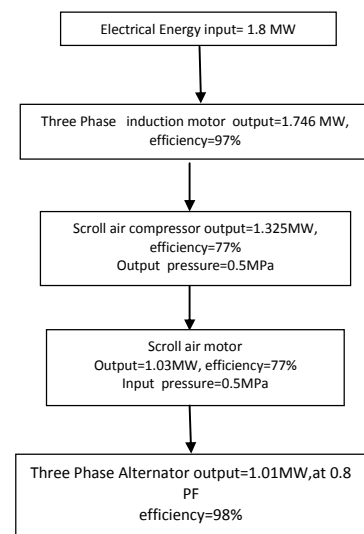
Peak Power deficit in March 2015 in India=4406 MW.

The national average Plant Load Factor (PLF) of Coal / Lignite based power generating stations during last three years i.e. 2011-12, 2012-13 and 2013-14 is 73.32%, 69.93% and 65.55% respectively.

All India Thermal installed capacity coal based =164635 MW. Plant load factor remaining(100-66)=34%. Assuming 17% of remaining PLF for maintenance purpose. Remaining 17% =27987 MW

Assuming 50% efficiency of the compressed air system, 13993 MW can e recovered from the system.

METHODOLOGY



Scroll compressor has efficiency of 77% operating pressure of 0.5 Mpa.

Electrical energy is input to the scroll compressor when supply is greater than demand.

Scroll type air motor is run when electrical supply is less than demand.

The output of Scroll type air motor is mechanically coupled to the rotor of alternator.

Cost of Producing 1mw of Electrical Energy Through Compressed AIR

Cost of 2MW induction motor=RS2,04,94,635.

Cost of 1.746 MW Scroll compressor=RS 9,03,98,058

Cost of 1.02 MW scroll air motor= RS 5,29,09,598

COST OF 1.25 MVA ALTERNATOR=RS1,09,12,731

TOTAL COST = RS17,47,15,022.

Software at National load dispatch centre need to be modified to include compressed air energy storage.

CONCLUSION

A new method of storing air through scroll compressor is presented in this paper. When load is greater than generation then stored electrical energy is retrieved from scroll type air motor coupled to alternator.

References

1. Li Yang¹, Jihong Wang², Stephen Mangan³, James W Derby³, Nan Lu¹ "Mathematical Model and Energy Efficiency Analysis of a Scroll-type Air Motor" IAENG *International Journal of Applied Mathematics*, 38:1, IJAM_38_1_03.
2. Government of India, Executive Summary Power Sector March-15, Ministry of Power, Central Electricity Authority New Delhi.
3. Grid Integration of Renewables K.V.S. Baba General Manager National Load Despatch Centre.
4. Press Information Bureau, Government of India, Ministry of Power, 18-December-2014 16:13 IST, PLF in Thermal Power Sector

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