Opportunities and Challenges of T&D in Energy Sector of India: A Review

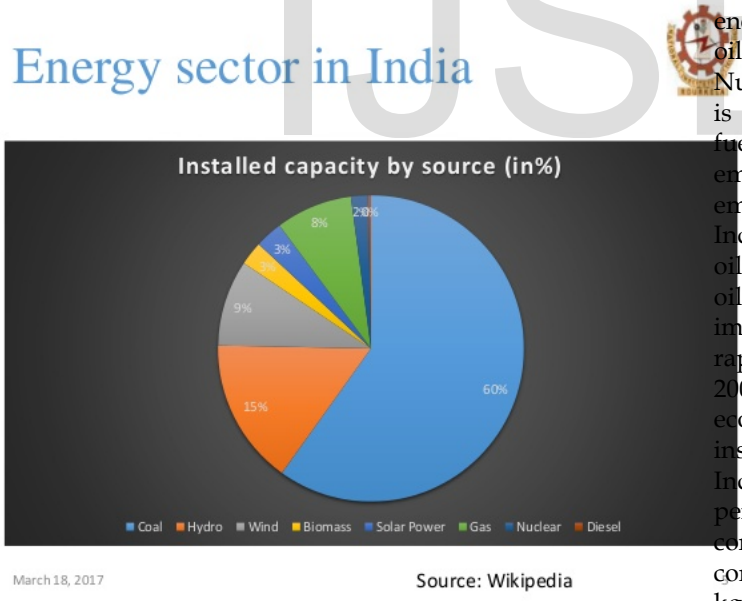
Mr. Swapnil Thorat, Dr. Anthony Rose

Abstract: Energy is an essential input for economic development and improving the quality of life. It is assessed that, earth is blessed with enormous energy, classified as conventional and non-conventional sources, for electricity generation and its use. Conventional energy sources are fast depleting and scarcity is prioritized at World level, whereas harnessing renewable energy seems to be one of the sustainable ways to meet the increasing global electricity demands. In order to consider these issues, investments are being made to address the challenges; availability of skilled manpower is becoming a major constraint. While large scale investments have been planned and a large number of projects are being launched, the lack of high quality human resources is becoming a key constraint. Keeping in account the requirement of skilled manpower, present study reviews the available literature on opportunities and challenges of training and development in energy sector of India.

Keywords: Training and development, human resources, conventional and nonconventional energy, skilled manpower.

INTRODUCTION

India's commercial energy consumption has been growing fast in recent years keeping pace with high economic growth rate. India depends heavily on coal and oil for meeting its energy demand.



The shares of different sources in primary conventional energy consumption as on March 18, 2017 were: coal – 60%; oil – 15%; natural gas – 8%; hydroelectricity – 15%; and Nuclear energy –2.0%. This pattern of energy consumption is highly problematic for the country. Coal is a polluting fuel and is the biggest source of national greenhouse gas emissions; its use needs to be curtailed for reducing emissions of both greenhouse gases and local air pollutants. India depends heavily on imports for meeting its domestic oil requirements; imports accounted for 72% of India's total oil consumption in 2004–2005. As a result of growing import, India's oil import bill has also been growing rapidly; the bill was INR 1717 billion (US$ 39 billion) in 2006. Growing oil import would imply even greater economic burden in the future and greater energy insecurity. The above obviously shows the need to reduce India's dependence on both coal and oil. Currently, India's per capita energy consumption is very low; in 2003 the consumption was 439 kgoe (Kg of oil equivalent) per capita compared with 1090 kgoe per capita in case of China, 4052 kgoe per capita for Japan and 1688 kgoe per capita for the world Energy consumption of India is therefore expected to continue growing significantly in the future. The only practical options for enhancing energy security and reducing coal consumption as well as oil import bill would be improving efficiency of energy use and promoting renewable energy.

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CHALLENGES FOR GROWTH OF THE POWER SECTOR

- Development of conventional fuel resources both in India and purchase of global assets to ensure continued supply
- Induction and development of skilled manpower for handling the capacity addition and subsequent operations and maintenance
- Building heavy equipment manufacturing capacities in order to prevent delay in equipment supplies
- Ensuring low carbon intensive development to address the current global climate change concerns
- Developing alternative energy resources as cost effective and reliable resources

TRAINING AND DEVELOPMENT

National Training Institutes in India

- Northern Region
- NPTI Corporate Office Faridabad
- NPTI (Northern Region) Badarpur
- NPTI (Hydro Power Training Centre) Nangal
- Southern Region
- NPTI (Power System Training Institute) Bangalore
- NPTI (Hot Line Training Centre) Bangalore
- NPTI (Southern Region) Neyveli
- Eastern & North Eastern Region
- NPTI (Eastern Region) Durgapur
- NPTI (North Eastern Region) Guwahati
- Western Region
- NPTI (Western Region) Nagpur

LITERATURE REVIEW…..

THE TRAINING AND DEVELOPMENT INFRASTRUCTURE IN THE POWER SECTOR IN INDIA INCLUDES THE FOLLOWING:

- Sixty eight training institutes recognized by CEA for imparting statutory induction training in Thermal, Hydro, T&D and Power Management.
- Lineman Training Institutes operated by most distribution utilities
- Training facilities outside power sector offering refresher and management programs

OBJECTIVES

- This study on review of literature on opportunities and challenges of T&D in energy sector of India undertakes the following objectives:
- To find out the various research works that have been done in the area of training and development in energy sector of India.
- To highlight the various challenges faced during training and development of human resources in energy sector of India.
- To explore opportunities in training and development of human resources in energy sector of India in order to meet skilled manpower requirement.

METHODOLOGY

The study is descriptive in nature and only secondary data has been used in it. The secondary data consist of the books, various research journals, government manuals and notifications, yearly review of energy sector, etc.

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Year	Source	Title	Contents	Author	Relevance
Jan 2009	International association for energy economics	Strategic Developments In Renewable Energy In Nigeria	Biomass energy- fuel wood, wind energy, solar power, agriculture waste, etc	Abubakar Sambo	The factors affecting developments in the renewable energy sector
Aug 2014	Renewable and Sustainable Energy Reviews	Evolution of solar energy in India: A review	Solar potential in India, national five year plans, government initiative to promote solar energy, socio-economic challenges to solar energy.	Karan Kapoor, Krishan K. Pandey, A.K. Jain, Ashish Nandan	This study helps decision makers and various stakeholders to understand the current status, barriers and challenges for better planning and management in the field of solar energy.
April 2009	International Energy Initiative	Renewable energy in India: Historical developments and prospects	Renewable energy Biomass Solar energy Wind energy India Renewable energy prospects Renewable energy potential	S. C. Bhattacharya , Chinmoy Jana	Solar thermal and Photovoltaic systems are technically well established in India. However, their installation has been rather low in comparison with certain other countries, regions and world as a whole.
Oct 2011	Renewable and Sustainable Energy Reviews	Solar energy: Markets, economics and policies	study analyzes the technical, economic and policy aspects of solar energy development and deployment	Govinda R.Timilsina, Lado Kurdgelashvili, Patrick A.	Barriers to the development and deployment of solar energy technologies are discussed
June 2009	Energy: International Journal	SWOT analyses of the national energy sector for sustainable energy development	(SWOTs) of the energy sector is utilized as baseline to diagnose the current state and to sketch future action lines towards sustainable energy development	N. Markovska*, V. Taseska, J. Pop-Jordanov	The most important problems the national energy sector faces are scarce domestic resources and unfavorable energy mix, low electricity prices, a high degree of inefficiency in energy production and use, as well as insufficient institutional and human capacities

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Feb 2011	Renewable and Sustainable Energy Reviews	Energy poverty: A special focus on energy poverty in India and renewable energy technologies	The focus of this article is to bring to light the problems faced in India in terms of energy consumption as well as the hindrances faced by renewable-based electrification networks	Anjali Bhide, Carlos Rodríguez Monroy	The research reveals that the Government of India has been unable to meet some of its unrealistic development goals. The Government will have to be more aggressive in the promotion of renewable Energy technologies in order to achieve sustainable development in India.
July 2013	Renewable and Sustainable Energy Reviews	Analysis of barriers to implement solar power installations in India using interpretive structural modeling technique	This study develops a structural model of the barriers in implementing solar power installations in India	Md. Fahim Ansari, Ravinder Kumar Kharb, Sunil Luthra, S.L. Shimmi, S. Chatterji	Major barriers in implementing solar power installations in India are as follows; Lack of trained people and training Institutes, High initial capital cost, high payback period, less efficiency, need for backup or storage device, unavailability of solar radiation data and lack of R&D work, Lack of consumer awareness to technology, lack of financing mechanism, lack of sufficient market base, lack of local infrastructure, lack of political commitment and lack of adequate government policies
April 2011	Renewable and Sustainable Energy Reviews	Hotspots of solar potential in India	The study evaluates the progress made in solar power generation in the country	T.V. Ramachandra, RishabhJain, Gautham Krishnadas	A major thrust for R&D in solar technologies is essential to lower the generation cost and enable a competition with the conventional fossil fuel based options. Solar hotspots in India have the potential to offset a huge volume of GHG emissions as demonstrated and help realize a low carbon economy at a faster rate. It will create numerous employment opportunities especially in the village level.
April 2012	Renewable and Sustainable	Determinants of success for promoting	Renewable energy- Solar power- Thar desert	Shreemat Pandeya, Vijai Shanker	This study presents a practitioner perspective and reviews the initiatives responsible for

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	Energy Reviews	solar energy in Rajasthan, India	Solar Policy-Governance Rajasthan, India	Singhb, Naresh Pal Gangwarc, M.M. Vijayvergiad, Chandra Prakashe, Deep Narayan Pandeyf	accelerated development of solar energy in Rajasthan. Understanding early ground-level efforts for solar energy development in Thar desert of Rajasthan may prove valuable for other regions in India and elsewhere.
April 2013	Renewable and Sustainable Energy Reviews	Potential application of renewable energy for rural electrification in Malaysia	. In this study, the potential for applying renewable sources (solar, wind and hydropower) for rural electrification is investigated with respect to social, economical and institutional issues.	H. Borhanazad a, S. Mekhilef a , R. Saidur b , G. Boroumandja zi	**Social :-** Ownership **Institutional:-** Regular maintenance and monitoring, Designing the system according to need **Economic:-** Innovative financing and smart subsidies
October 2007	International Conference on Small Hydropower - Hydro Sri Lanka	Employment Generation Through Small Hydro Projects in the Himalayan States	An unemployment problem in Himalyan states can be tackled by adopting small hydro development approach (rural electrification and decentralized management of distribution of power)	S K Sharma Vinod Bhardwaj	SHP approach would provide gainful employment to a large number of the existing unemployed labour force,
2012	Workforce Sciences and Employee Research www.mercer.com	Strategic Management of Human Capital in The Energy Sector	Challenges : Aging Workforce, failed to recruit and retain sufficient human capital. Evidence based approach	By Haig R. Nalbantian and Philip M. Tenenbaum	An evidence-based approach to strategic workforce management and planning: Anticipate future workforce requirements Measure, understand and manage the dynamics of the current and future workforce supply Prudently invest in building the capabilities they require Quickly adjust internal deployment of employees to minimize unproductive situations of excess supply and/or excess

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					demand
	Institute of Energy Management and Research Interim Report	Human Capital Challenges in the Indian Power Sector	This report addresses some of the key human resource challenges in the power sector today and lays out strategies for attracting fresh talent, retaining existing manpower and creating the necessary infrastructure for sustained training and development.	IEMR Interim Report	For the strategies to be successful and for development of the Indian Power sector, it is important for all the stakeholders to recognise the importance of developing human capital and invest in it. a) Mandatory training b) Orientation programs for key decision makers. c) Creating awareness about energy efficiency among all stakeholders.
2015	Journal of Public Administration and Governance	The Importance of Training for Human Resource Development in Organization	This study examines Training Need Analysis (TNA), performance problem, new system technology and actual training needs as a priority.	Astuty Mulang	• Training focuses more on capability improvement for current specific purposes. • Development focuses more on knowledge improvement for future job. • Training needs analysis at workplace help the organization for optimum utilization of their resources (fund, time, etc.)
2012	IOSR Journal of Business and Management	(Re) Evolution in HR Strategies - Power Sector	The study focuses on identification of skill sets and skill gaps required in vibrant and expanding powerful sector	Y. P. Chawla,	The Power Sector conventionally revolves around Power Generation, Transmission and Distribution. The Manufacturing (or Sourcing from Manufacturers) and Project Development is as much important from the developers' perspective. Each of these activities requires specialized skill sets.
2014	Ecoforum	The role of human resources in	This paper analysed some indicators for pointing out the role of human resources in energy sector, the	Sorin P. ANGHELUȚĂ, Oleg MARGINA, Alina	There is need for educational reform to recognize both human role in economy and the importance of the energy sector.

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		sustainable development of the energy sector	influence of the energy sector on the social dimension, the influence of human resources on know-how, technologies and innovation in the energy field	ZAHARIA, Gabriela ARIONESEI	
Nov 2012		Human Resource Development in New Nuclear Energy States: Case Studies from the Middle East John Banks	This study assesses human resource development (HRD) in the United Arab Emirates (UAE), Jordan, and Turkey	Kevin Massy Charles Ebinger,	With widely varying economic, political, and social contexts, each of the three countries under review has different HRD requirements and objectives. According to a standardized set of metrics, each country has unique challenges related to its individual circumstances and leading HRD practices.
	(http://powermin.nic.in/en/content/training)	Training, Ministry of Power, GoI	The researcher evaluates this data in order to understand the National Training Policy for the Power Sector and its salient features.	Government of India, Ministry of Power	National training policy emphasizes the idea that money spent on training is an investment. It also highlights the need for planning for training as an integrated HRD activity with commitment to impart training for all in the power sector at entry level as well as in service.
	(http://www.hindustanpetroleum.com/HR-Training-and-Development)	Training and Development, HPCL	The study analyzes the information on this document in order to understand the firm's efforts to harness the full potential of all employees for becoming a World Class Energy Company.	HPCL	HPCL provides training in different ways such as; • In-Company Programs • Customized Programs • Training Plans: External Seminars/ Conferences • Foreign Training • E-Learning • Learning Centers • Education Refund Plan (ERP) • Study leave policy
	(http://www.ongcindia.co	Human Resource	Various measures pertaining to	ONGCL	Sincere efforts are made to meet the aspirations by adopting best in

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	m/wps/wcm/connect/ongcindia/Home/Career/HR_Policies/)	Policy, ONGC	compensation and welfare of employees are undertaken and the same are revised / modified periodically according to changing circumstances and requirements. The researcher evaluates all these efforts and subsequently corroborates them with empirical study		class HR practices. Various benchmarks studies pertaining to employee satisfaction, motivation, organizational culture and climate are periodically conducted by in-house expertise as well as by external agencies in order to introspect and understand the pulse of the employees and take corrective measures.
2013	https://core.ac.uk/download/pdf/38098025.pdf	Effects of Training on Employee Performance	The purpose of appraising this research work is to evaluate the effects of training on employee performance.	Aidah Nassazi	Equipping available employees (unique assets) through effective training becomes imperative in order to maximize the job performance and position them to take on the challenges of the today's competitive business climate.
2014	https://opendocs.ids.ac.uk/opendocs/bitstream/handle/123456789/4540	Human Resource Development Practices and Challenges in Public Sector	This study shows that the employees have good awareness towards HRD concepts and they were able to relate those concepts with HRD.	Simachew Amare	The results proved the sector bureaus were not in a good track in practicing training and development, career development, organizational development and performance appraisal.
2012	https://shodhganga.inflibnet.ac.in/bitstream/10603/21947/1/final%20thesis.pdf	A Critical Study of Human Resource Development Practices in Durgapur Steel Plant	Better HRD climate, in turn, enthuse motivation, willingness, commitment, belongingness among the Human Resources that coupled with effective and efficient training and development pedagogy, an unbiased and progressive performance management system,	Amar Kumar Mishra	The ultimate effect of better HRD is on the productivity that harbingers production, profit, reduced labor turnover, reduced loss time, more congruence between plan and actuality.

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			proactive growth policy, career planning and potential appraisal improves the ability and skill.		

1. CONCLUSION

Skilled manpower is highest requirement in energy sector of India. They are the assets which can make or break an organization. NTPI emphasizes on the need of training and development as an integrated HRD activity, whereas firms fail to adopt NTPI policies. This research paper explores importance of training need analysis and resource constraints required for effective training and development. Previous literature focused on effect of human resource development practices on productivity but there is no tracking of effect of training and development on performance of employees in energy sector. Although the research paper tried its level best to reveal the research done and the contributions made by various researchers in the area of training and development of human resources in energy sector of India, there is much scope to explore challenges faced by organizations during training of employees and opportunities of training and development programs in energy sector.

2. REFERENCES

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