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Energy Consumption and Industrial Growth in Gujarat: A Trend Analysis

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Abstratct – Energy assumes an essential job in the economic development. Energy being rare, it turns into a vital factor underway. In the event that we take a gander at Gujarat from the earliest starting point of industrialization it has been a noteworthy benefactor in the industrial yield. Starting at now it has 11% of Indian industries, utilizes 21% of aggregate material accessible in India, expends around 15% of the energy and adds to over 18% in the aggregate value included of India's industrial GDP. There appears to be high relationship between's energy consumption and industrial yield. This investigation is an endeavor to comprehend the pattern on energy consumption and industrial yield for the period 1999-2015 utilizing straightforward relationship and relapse work.

Keywords: Industrial Energy Consumption, Energy Efficiency and Industrial GDP

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INTRODUCTION

India is the fifth biggest energy buyer in the World (US. Branch of Energy). This talks off the information that in India the generally speaking economic action, for example, industrialization, electrification, quick growth of framework and human development are coming to fruition. Presumably that nation is wealthy in coal and other sustainable power source assets. Anyway it has numerous imperatives that it can't take care of the demand for energy. Along these lines still India is compelled to import more than 25% of energy requirements. The significant energy necessity has been distinguished in the Industrial division (IEA 2008a). The Indian industrial division's commitment to nation's GDP is around 29% and more than couple of industries are simply energy subordinate. Among which the Micro, Small and Medium Enterprises (MSME) represent 80% of industry (in wording units), among them a couple of substantial/overwhelming small scale industries alone expend over 60% of the energy (ASI). Along these lines it is basic to inspect the energy consumption incline and industrial yield drift the requirement for this is to enhance the productivity levels as expense of energizing, shortage of energy and energy related pollutions expanding. Enhancing effectiveness level relies upon diminishing energy force or lessening energy consumption per unit of yield.

Energy as a vital factor of generation and its shortage was felt just since second multiyear plan with fast industrialization arrangement. Today on the off chance that we take a gander at energy consumption shareof industries alone records around 43.6 for each penny of energy accessibility as Indian industrial segment winding up increasingly skilled on the planet economy (Energy balance Statistics 2012). This is somewhat because of steady increment in the interest in essential and energy-concentrated industries, following the accentuation laid on accomplishing confidence in the past development plans.(TERI, 2015). Consistent increment in Energy consumption was one of the significant effects on GHG, including CO2. In India, substantial industries, for example, iron and steel, aluminum, cement, fertilizer, refining, and pulp and paper are more energy escalated (Bhattacharya and Copper 2010). The industries, for example, nourishment preparing, materials, wood items, printing and distributing, and metal handling represent a lesser last energy consumption. The previous and later said industries make a commitment of 29% to the GDP at Current price. The energy utilize per rupee GDP earned said to have expanded quickly and this can be ascribed to more energy escalated industries. In the meantime there is a need to enhance the proficiency to have significantly more lessened forces. India made a promise to lessen energy power of its GDP by 25 % inside the time of 2005 to 2020 (arranging commission 2011). In this setting it turns out to be more basic to break down

the energy consumption drift in the industrial segment, its force on industrial yield.

Not superseding the reality, from the earliest starting point of Industrialization there are few states, for example, Maharashtra, Gujarat, Tamil Nadu, Karnataka, Uttar Pradesh, Andhra Pradesh and Uttarakhand who have overleaped in industrial sector.Among them Gujarat is the text style sprinter of Industrial development (ASI 2015). As of now Gujarat State with around 10.17% of industrial facilities in the nation positioning third, contributes over 17.40% to add up to net value included positioning second for the year 2014-15. Gujarat State's commitment to the All India value of gross yield was 18.45% ranking1st and framing Fixed Capital of 17.69%, catching in front of the rest of the competition in India (ASI 2017). To accomplish this situation in the National guide of Industrial segment, Gujarat brought different arrangement activities as the decade progressed. There are few arrangement activities worth illustration the consideration. One such activity was taken in 2000 for the most part to center around fortifying the manufacturing area, advancing fare, improving R&D, setting up industrial stop, and overhauling the foundation. Of later in the new Industrial arrangement 2009 prime accentuation was given in effective energy consumption and Pollution control without bringing down the industrial yield. This clears an approach to watch the pattern in energy consumption and industrial yield.

LITERATURE REVIEWS:

Until the 1973-74 and 1978-79 oil emergency the essentialness of energy as a contribution for economic growth has been less figured it out. From that point forward the oil emergency drove numerous investigates in the region of energy consumption and economic growth. One of the main investigations was Pindyck (1979), he utilized pooled time arrangement and cross-sectional information, for manufacturing industries and turned out with results that energy prices assuming imperative job in the energy consumption. He additionally found that energy and capital might be substitutes over the long haul in numerous industries, as opposed to supplements, as for the most part accepted.

Dargay et al. (1983) made an endeavor to discover the interest for energy in Swedish Manufacturing utilized a translog cost work for 12 manufacturing sub-segments from 1952-1976. The significant factors utilized in the examination incorporate energy consumption, capital, work and halfway products. The outcomes anticipated that relative changes in energy prices effectsly affect energy consumption. All in all, the discoveries propose that rising energy prices can to some degree, be consumed by substitution far from energy. The examination reasoned that the prevalence of energy-capital correspondingly is conceivable

Greening et al. (1998), attempted to contrast six disintegration techniques and connected with total energy power for manufacturing in 10 OECD nations, including Denmark, Finland, France, Germany, Japan, Italy, Norway, Sweden, United Kingdom and the United States from 1970 to 1992. The factors utilized in their examination are add up to energy consumption, energy consumption by various segments, add up to industrial generation, creation of various divisions, and creation share per area, energy yield proportion, and energy force. The energy power changes in the examination demonstrate that the potential job of the expense of energy and cost of different variables of creation are identified with the changing example of total energy force.

Christopher and Rodney (2005) have concentrated on energy preservation arrangements and have utilized a large scale economic model-constructed investigation with respect to different model estimation to comprehend the causality between energy consumption and economic growth. A reliant causation between energy consumption and GDP was found in the examination.

Santosh Kumar Sahu and Krishnan Narayanan (2011) made an endeavor to break down the determinants of energy power of Indian manufacturing firms for the period 2000-2008, they detailed cross segment information and utilized an econometric methodology. Their examination distinguished variety in energy force. The consequence of their investigation demonstrated a modified U shape connection between energy force and firm size. The investigation additionally found that remote possessed firms show larger amount of specialized productivity and subsequently less energy concentrated than household. Further, the aftereffects of the examination uncover that R&D exercises are essential donors in diminishing firm level energy force. The examination additionally recognized that there is a sizable contrast in energy power between higher energy serious and less energy escalated firms.

Jakovac (2013) analyzed the connection between economic growth and aggregate energy consumption in Croatia utilizing the yearly information for the period 1952– 2010. He distinguished a bidirectional short-run causality and a unidirectional long-run causality running from aggregate energy consumption to economic growth proposing that energy consumption comes as a main factor of the economy.

FalihKaranfil and Yuanjing Li (2014) inspected the long and short-elements between power utilize and economic exercises, utilizing board information of per capita power consumption and per capita GDP of 160 nations for the time of 1980-2010 bookkeeping, for the level of power reliance and the level of urbanization, they examined the chose

variable with board unit root, co-reconciliation and causality tests. Their investigation found that there is a long-run co-reconciliation connection between power consumption and economic growth.

Renjish and Vimala (2016) broke down the consumption of energy in various divisions of the economy and concentrated its immediate effect on the economic growth of India, other than analyzing the impact of different types of energy consumption growth on growth of private consumption and private venture as various segments of GDP growth. The investigation recommended, lessening oil and gaseous petrol consumption particularly in the consumption areas of the economy, accordingly moderating energy and diminish its necessities by interest side administration and by receiving more energy productive advances in all divisions.

K. Sreelatha Reddy, JyothiMehra (2017) broke down the connection between energy consumption and economic growth in India for the time of 2006-2013. They utilized various relapse models to comprehend energy consumption design in Indian Industries, for example, transport, private and business and its effect on GDP. Result of their investigation proposed that there is an earnest need to utilize energy in a more proficient way in the vehicle segment when contrasted with that of industry, private and commercial sector.

From the writing did both in the national and universal level it has been seen that a large portion of the examinations are managing the connection between energy consumption and economic growth. A few investigations recognized direct connection between factors some other on non-straight connection between factors. Barely any different investigations found a U-molded connection between energy productivity and per capita salary, and presume that energy effectiveness would ascend alongside economic growth. Furthermore, some different examinations have tried for the edge level of energy power and consumption on economic growth. Dominant part of the examinations has concentrated chiefly on energy consumption and growth. A Very couple of studies have limited to examine the between connection between fuel consumption and yield growth in industrial part. This sets an approach to ponder Gujarat industrial part and its energy consumption, as it is a main industrial player in India having right around 11% of Indian industries, devouring on a normal fuel and material 14% and 18%, and creating around 17 % of gross value included industrial yield.

In light of the over coming up next are the goals for the investigation proposed.

OBJECTIVE:

1) To analyze the energy consumption trend in Gujarat Industrial Sector.

2) To understand the industrial output trend as result of energy input in Gujarat.

3) To understand energy importance in the industrial sector.

METHODOLOGY:

To catch the reliance of energy power on industrial yield, information on value of fuel consumption in rate and value of industrial yield in rate is taken for the time of 1999 to 2015. Also, basic regression and correlation function are utilized to comprehend the effect of energy use on industrial yield and the information for which is taken from ASI (Annual Survey of Industries).

Table: 01

India's Industrial Expenditure trend on wage to workers, fuel consumption, material consumed as % percentage of total input

Year	WAGES TO WORKERS %	FUELS (Energy) CONSUMED%	MATERIAL CONSUMED%	Others%	VALUE OF OUTPUT growth in %
1981-82	7.72	9.21	76.46	6.61	
1982-83	7.67	9.69	75.14	7.50	8.52
1983-84	8.46	11.21	79.03	1.31	22.04
1984-85	8.38	11.39	79.62	0.60	7.07
1985-86	7.67	11.88	80.48	-0.03	5.43
1986-87	7.63	11.72	78.86	1.78	2.94
1987-88	7.48	12.00	78.69	1.83	28.88
1988-89	7.22	9.95	80.63	2.21	5.67
1989-90	6.60	10.01	80.62	2.77	32.78
1990-91	6.31	10.00	79.88	3.80	20.46
1991-92	5.83	10.32	79.56	4.28	26.01
1992-93	5.95	10.98	79.06	4.01	17.74
1993-94	5.48	10.51	79.42	4.58	-24.47
1994-95	5.63	10.34	79.75	4.28	118.64
1995-96	5.51	9.56	80.86	4.07	16.12
1996-97	4.77	9.81	73.30	12.12	15.65
1997-98	4.67	9.49	71.84	14.00	-9.59
1998-99	4.07	7.58	72.86	15.49	-4.43
1999-2000	3.71	7.78	74.03	14.48	-29.52
2000-01	3.70	7.88	75.00	13.42	-3.70
2001-02	3.52	7.66	75.45	13.36	49.64
2002-03	3.24	7.27	76.49	13.00	-32.35
2003-04	2.93	8.85	74.55	13.67	21.24
2004-05	2.47	6.30	75.16	16.08	30.79
2005-06	2.44	6.26	78.01	13.29	67.54
2006-07	2.27	6.16	77.59	13.97	14.47
2007-08	2.30	5.83	78.85	13.02	23.19
2008-09	2.25	5.72	77.63	14.41	27.09
2009-10	2.27	5.32	79.35	13.05	18.74
2010-11	2.22	5.07	78.43	14.27	5.72
2011-12	2.08	5.05	77.98	14.89	21.21
2012-13	2.21	5.33	78.30	14.16	3.99

Source: ASI (Annual Survey Of Industries India from 1981-2015)
*Others: Total Emoluments, Provident and other funds and Workmen & Staff welfare Expense

The above table demonstrates the offer of consumption drift throughout the years on number of industries' wages to the laborers, fuel expended, add up to material devoured, as level of aggregate contributions, in India's industrial part. The offer of wages to specialists in the aggregate information continued diminishing from 7.72% out of 1981 to 3.70% out of 2000-01 and to 2.21 % in 2012-13 this appears to demonstrate that there has been more funding to work proportion utilized during the time spent industrialization. Though the offer of fills devoured as a level of aggregate contribution to 1981 was around 9.21% however begun to increment as the Gross industrial yield expanded from 8.52% of every 1982 to 22.04% out of 1984. From that point forward the normal offer of fuel in the aggregate yield balanced out around 10% in

the aggregate info. Anyway in the later long stretches of 1995-96 it began to decay in spite of the fact that yield had soundness. This appears to show that there has been decrease in the energy power level. In this manner after 2000-01 there has been a steady fall in the offer of fills in all out data sources. In 2000-01 it was 7.88% declined to 5.33% out of 2012-13. It demonstrates either effectiveness in energy utilize or great measure of R&D in the utilization of energy as a factor of generation.

Gujarat Industrial energy consumption and Industrial GDP:

Gujarat State with around 10.17% of industrial facilities in the nation positioning third, contributes over 17.40% to add up to net value included ranking2nd for the year 2014-15. Gujarat State's commitment to the All India value of gross yield was 18.45% ranking1st and shaping Fixed Capital of 17.69%,capturing ahead of everyone else in India (ASI 2017).

Table: 02

Gujarat' position at all India level

Year	Total no of Industries as % of Indian Industries	Total workers wages as % of Indian worker' wages	Total amount of material used as % of total material use in India	Total fuel used as % of total fuel used at all India level	Total input as % of total input used at all India level	Gross value of output as % of total Gross value of output at all India level
1999-2000	11.18	9.58	13.12	15.19	13.13	13.20
2000-2001	10.73	8.86	14.51	15.16	14.03	13.81
2001-2002	10.85	8.68	16.86	14.90	15.78	15.33
2002-2003	10.30	8.66	17.82	14.75	16.54	16.16
2003-2004	9.91	9.15	18.21	10.94	16.39	16.10
2004-2005	9.98	9.66	17.62	14.44	15.86	15.59
2005-2006	10.03	9.75	16.93	14.16	16.21	16.14
2006-2007	9.90	10.05	16.77	14.26	16.01	15.47
2007-2008	10.32	10.36	17.66	14.73	16.78	16.15
2008-2009	9.57	9.93	17.34	15.97	16.28	15.52
2009-2010	9.80	9.86	18.93	14.18	17.60	17.22
2010-2011	10.05	9.99	19.78	13.23	18.10	17.25
2011-2012	10.21	10.34	20.11	14.72	18.50	17.29
2012-2013	10.17	10.21	21.20	14.17	19.32	18.53
2013-2014	10.14	10.19	21.14	14.15	19.30	18.13
2014-2015	10.18	10.20	20.19	14.60	19.37	18.47

Source: ASI (Annual Survey of Industries India 1999-2015)

Gujarat manufacturing sector's fuel consumption has been in an expanding pattern, the above table demonstrates that during the time the level of fuel use in the manufacturing segment has been on a normal 15%. Such outcomes portray that our industries are utilizing still a greater amount of rare asset like energy. The crude information taken from Annual Survey of industries demonstrate that the fuel consumption in the cement business has expanded to 1988.27 Gw in 2012-13 from 711.59kw out of 2003-04, and that of synthetic industry fuel consumption has expanded to 8105.40GW out of 2012-13 from 4778.16KW out of 2003-04, and that of fertilizer industry fuel consumption has expanded to 1088.52GW of every 2012-13 from 993.76 KW in 2003-04 and that of Iron and Steel control consumption expanded to 2934.5GW of every 2012-13 from2053.73KW in 2003-04, and the mineral oil Petroleum fuel consumption expanded to 8503.23GW from 3281.99KW out of 2003-04, and of Textile fuel consumption rose to 1019.70GW from 1231.26KW of every 2003-04, while Paper industry fuel consumption rose to 388.66GW from 342.02KW out of 2003-04.

ANALYSIS:

In this examination a straightforward econometric and factual investigation of energy consumption and industrial yield for the year 1999 to 2015 has been completed, with a perspective of finding the noteworthy offer of fuel in industrial yield. This information given here was dissected utilizing factual technique. Techniques, for example, connection and relapse were utilized to consider the bury connection between energy consumption and industrial yield. The investigation delineates that in the previous 18 years the energy consumption and industrial GDP are unequivocally associated. The dissected outcomes uncover R2= 0.975 which implies there is huge connection between's fuel consumption and Gujarat Industrial GDP.

CONCLUSION:

On one hand as industrial yield is exceedingly related with energy consumption and then again energy being rare info. It would be suggested that states like Gujarat, having exceedingly energy escalated industries; it ought to receive new substitutable innovation to energy, or utilize energy in a more productive way. This won't just diminish energy empowered pollution yet in addition spare energy for future necessities.

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