Plugging into the Future: An Exploration of Electricity Consumption Patterns

MINI PROJECT ON

PLUGGING INTO THE FUTURE:

AN EXPLORATION OF ELECTRICITY CONSUMPTION PATTERNS

BACHELOR OF SCIENCE

IN

MATHEMATICS

BY

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AFFILIATED TO MADURAI KAMARAJ UNIVERSITY

REACCREDITED B++ BY NAAC (CGPA2.93) IN III CYCLE

RAJAPALAYAM

1. INTRODUCTION:

1.1 Overview:

India is the world's third-largest producer and third-largest consumer of electricity. The national electric grid in India has an installed capacity of 370.106 GW as of 31 March 2020. Renewable power plants, which also include large hydroelectric plants, constitute 35.86% of India's total installed capacity. During the fiscal year (FY) 2019–20, the total electricity generation in the country was 1,598 TWh, of which 1,383.5 TWh generated by utilities. The gross electricity consumption per capita in FY2019 was 1,208 kWh. In 2015-16, electric energy consumption in agriculture was recorded as being the highest (17.89%) worldwide. The per capita electricity consumption is low compared to most other countries despite India having a low electricity tariff. In light of the recent COVID-19 situation, when everyone has been under lockdown for the months of March to June the impacts of the lockdown on economic activities have been faced by every sector in a positive or a negative way. The dataset is exhaustive in its demonstration of energy consumption state wise. Analysing Electricity Consumption in India from January 2019 till 5th December 2020. This dataset contains a record of Electricity consumption in each states of India, here we are going to analyse State wise, Region wise and Overall Electricity consumption in India.

1.2 PURPOSE:

In this project we are trying to analysis the data of electricity consumption patterns and able to extract some insights from the data Using Business Intelligence tools.

2. PROBLEM DEFINITION & DESIGN THINKING:

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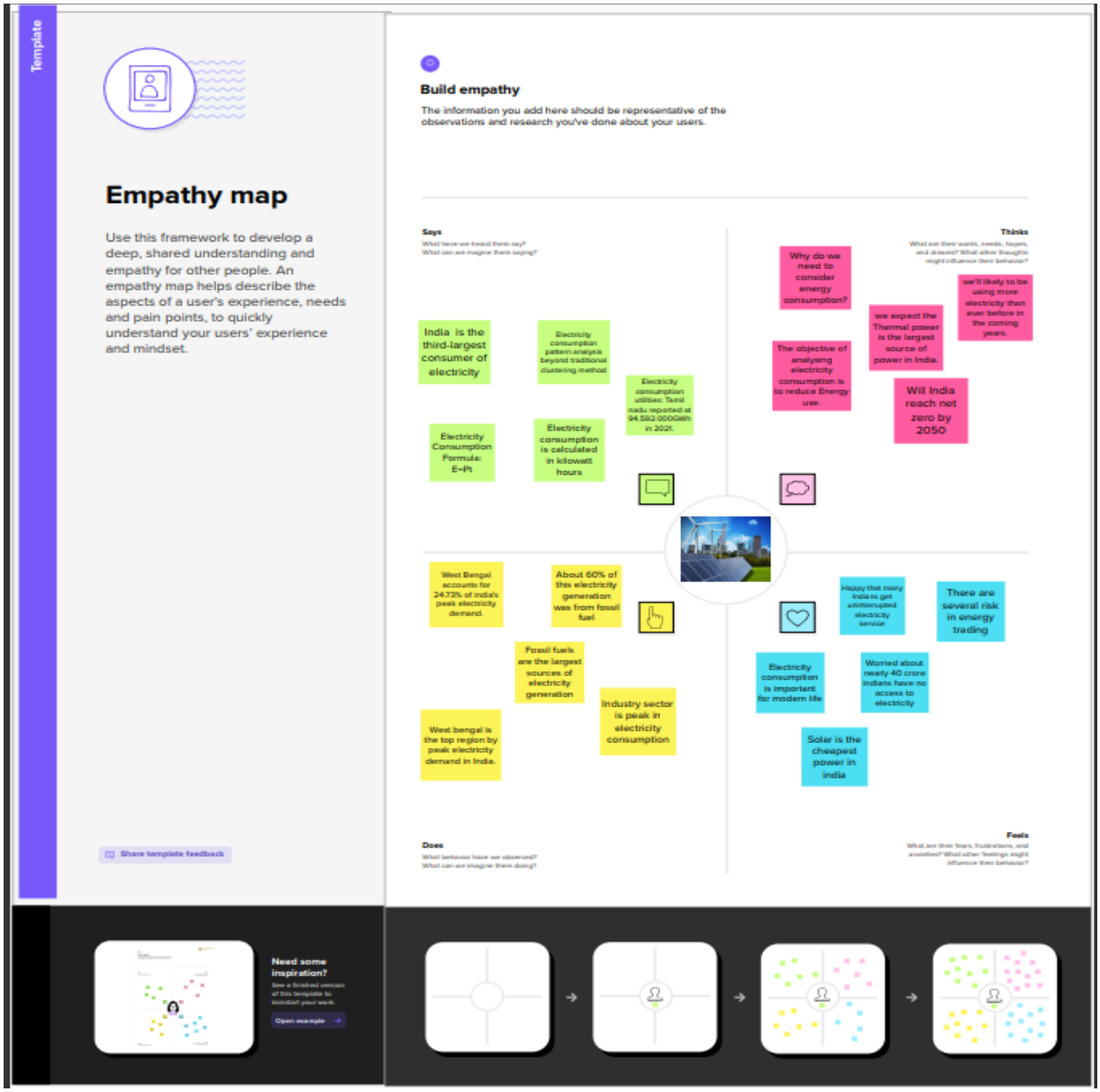
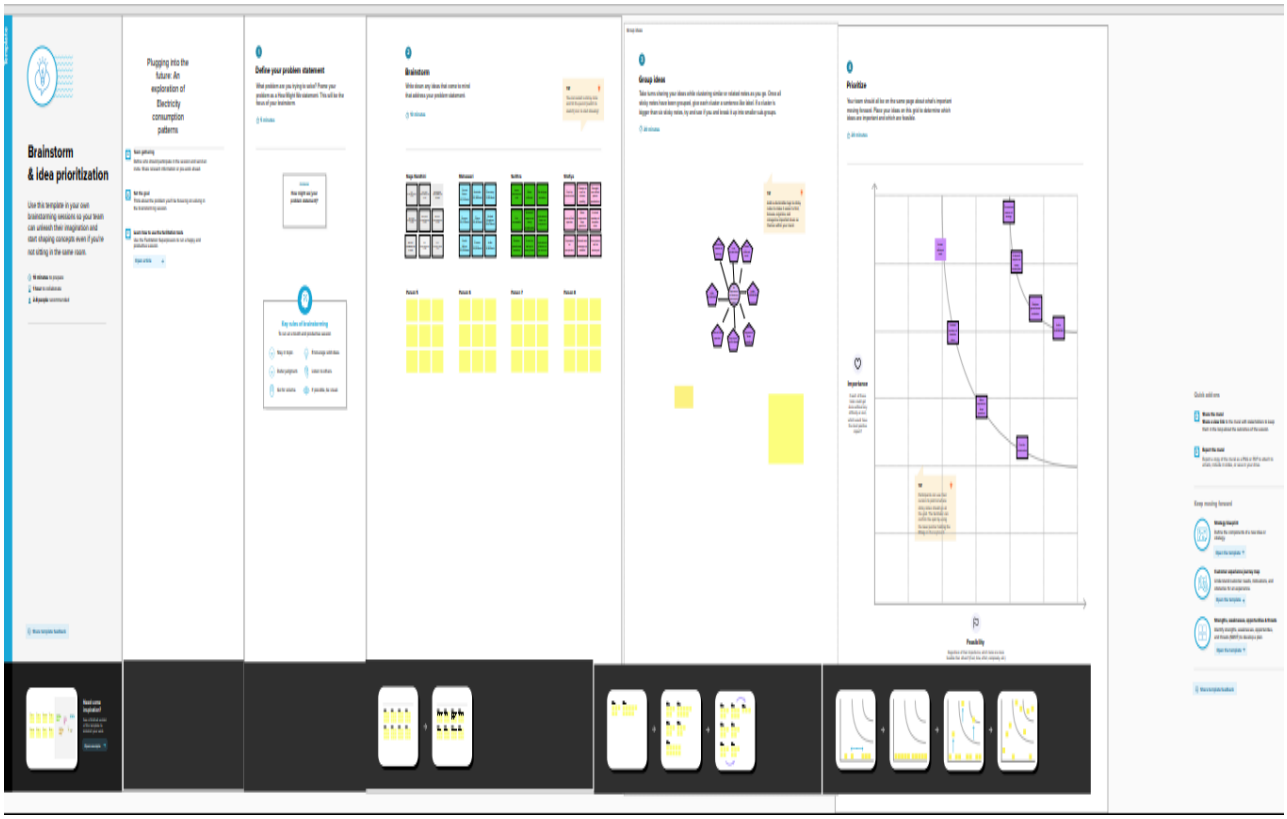


2.2 IDEATION & BRAINSTORMING MAP:



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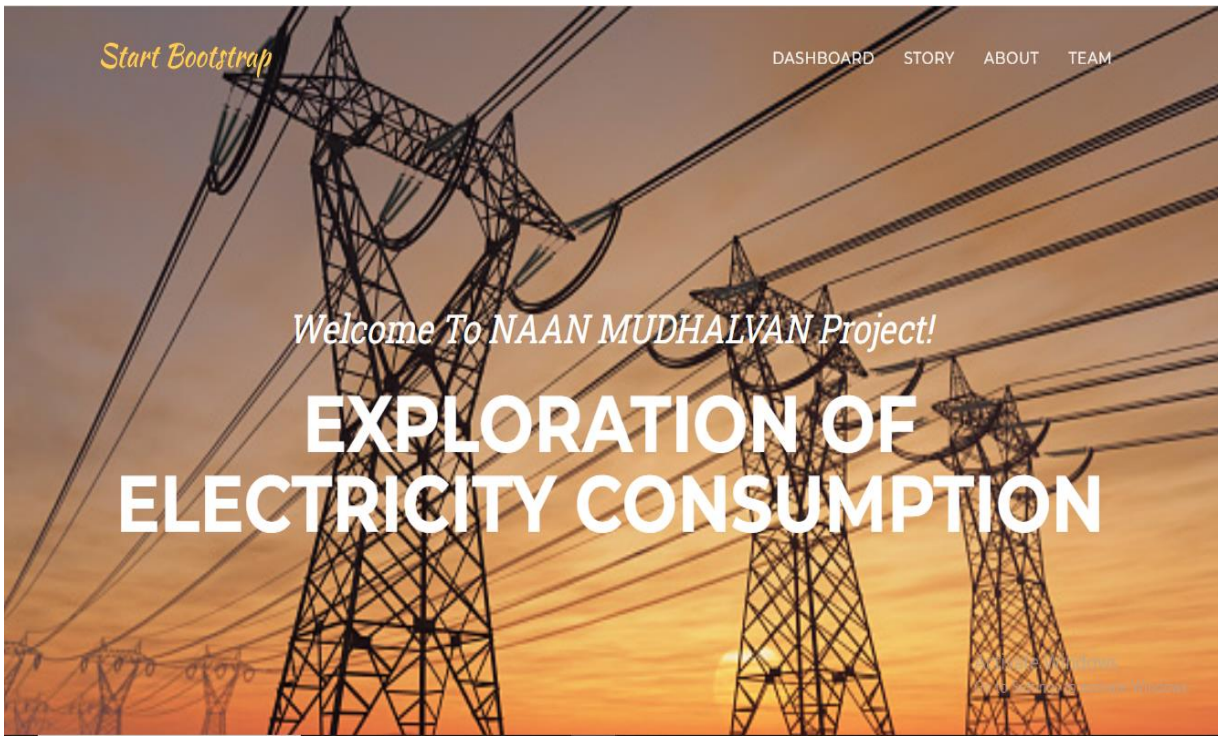
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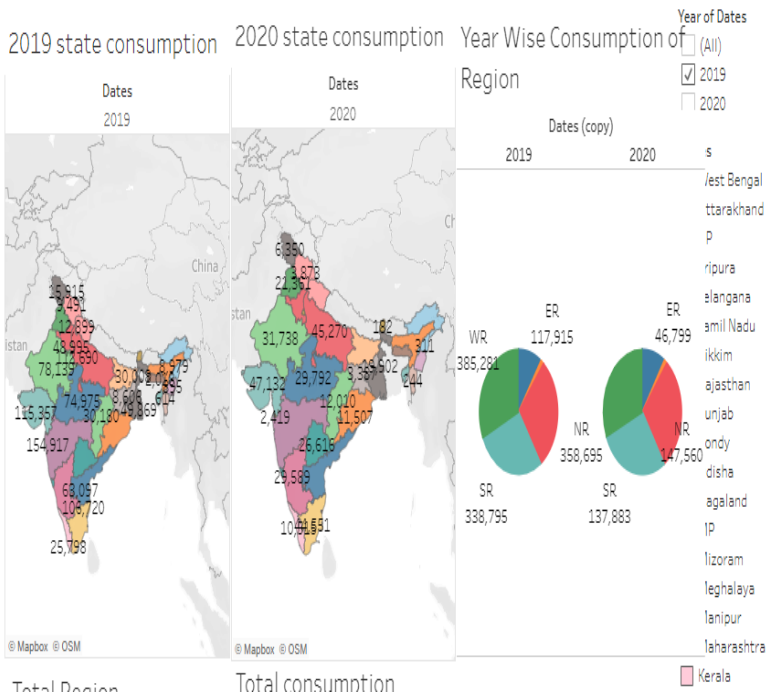

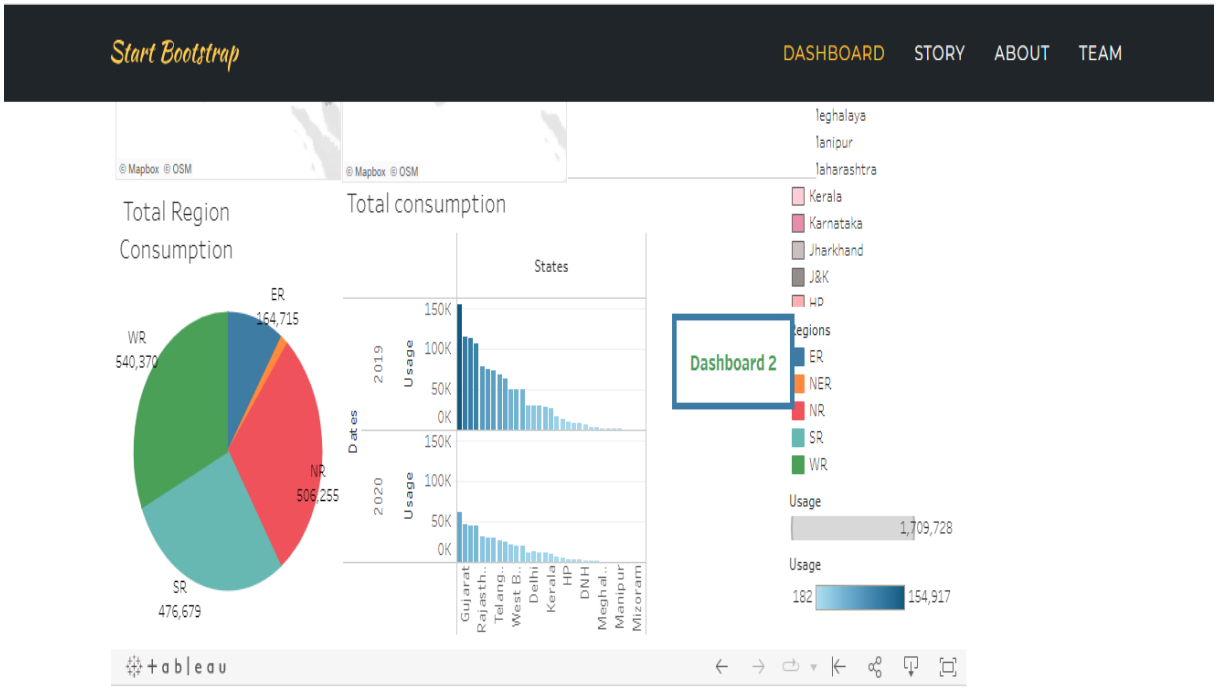

STORY

Story Board

SALES IN EU-NA-JP REGION: This graph compares the video

GENRE WITH RANK: This graph displays the types of genre of

TOTAL SALES: This Line graph shows the global sales of the

TOP 5 PUBLISHERS: This pie chart tells the top 5 publishers world

BEST 10 SELLING GENRE ON PLATFORMS: It

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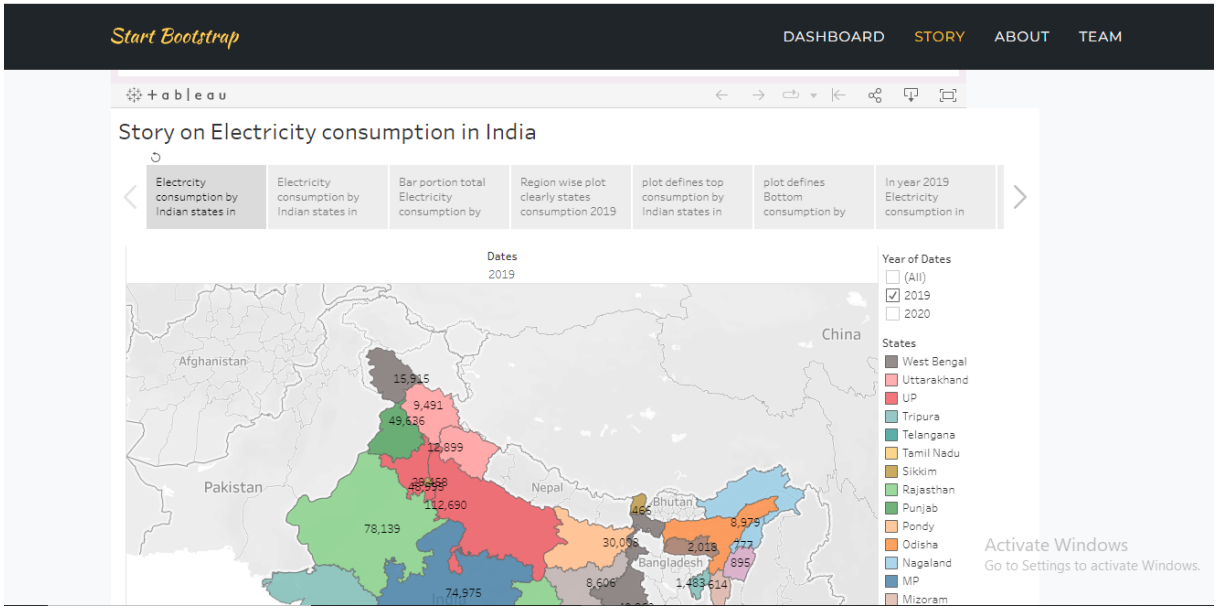
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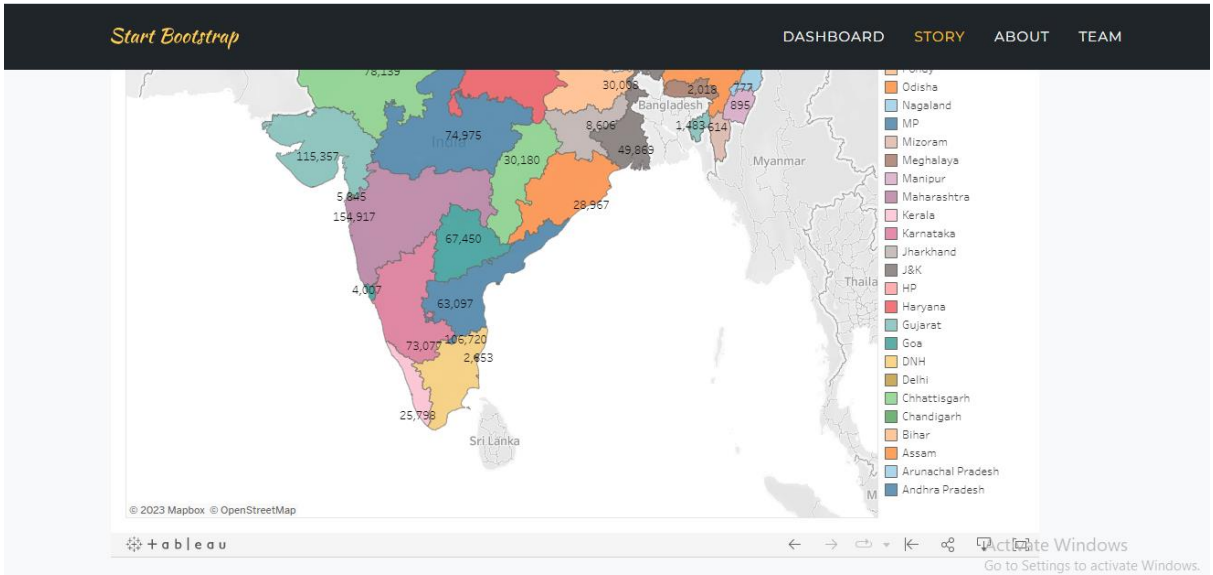
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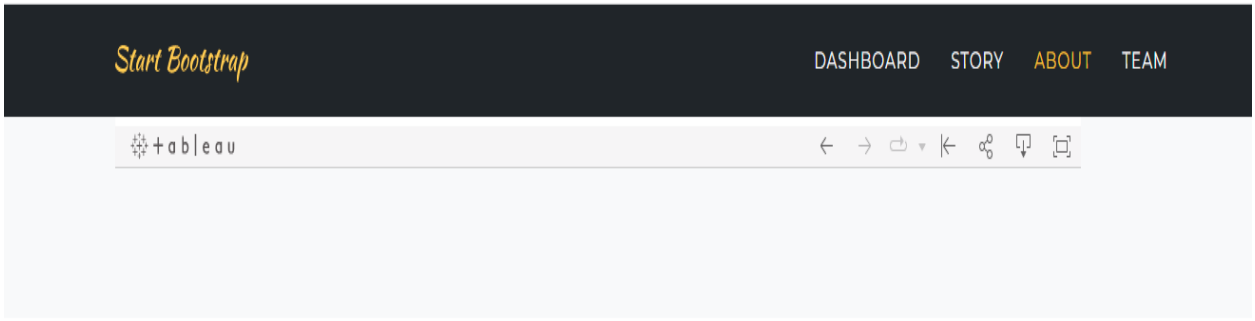
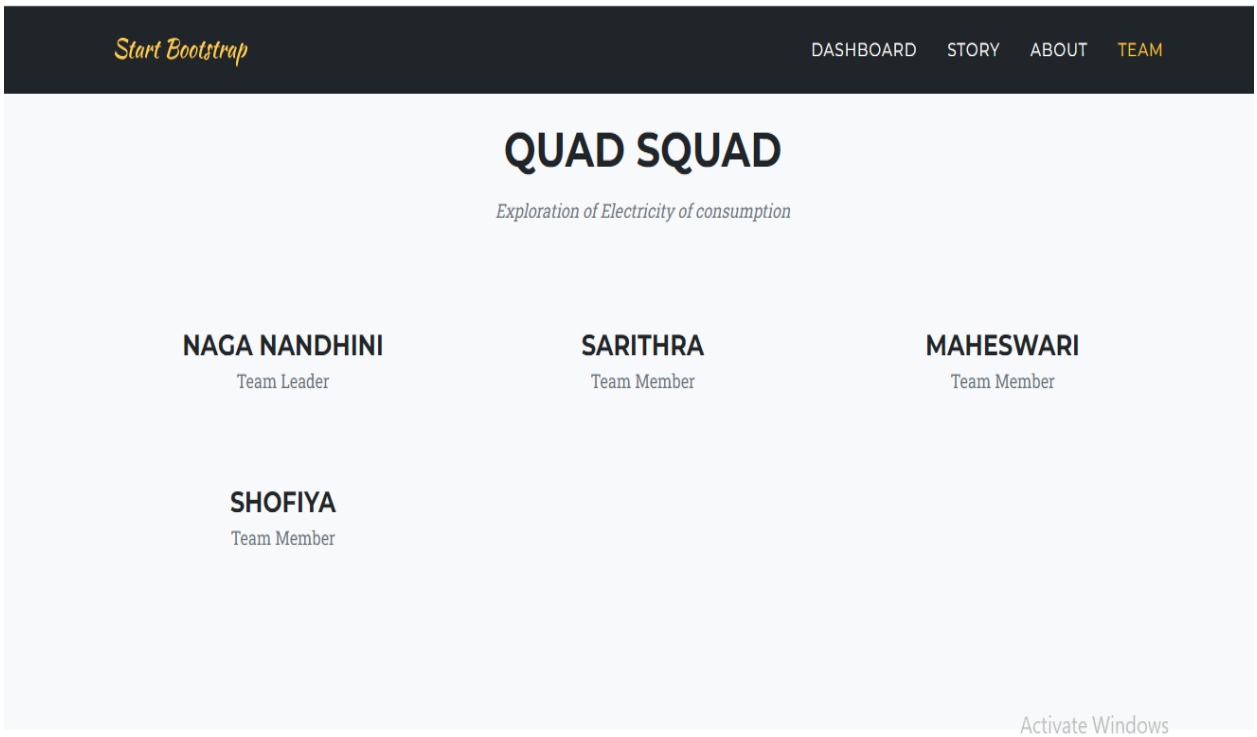


ABOUT

Electricity consumption ; India is the third largest consumer of electricity, The objective of analysing comsumption is to reduce energy use. we expect that the thermal power is the largest source of power in India. The electricity consumption is important nfor modern life. solar is the cheapest power in India. There are several energy trading. westbengal is the top region by peak electricity in India. Electricity is lower efficient cost and more expensive than gasoline. An Electric vehicle is not completely emission free.



4. ADVANTAGES & DISADVANTAGES:

Trading:

Bulk power purchasers can buy electricity on a daily basis for short, medium, and long-term durations from a reverse e-auction facility. The electricity prices transacted by the reverse e-auction facility are far less than the prices agreed under bilateral agreements. The commodity derivative exchange has sought permission to offer electricity futures markets in India. The union government of India is also planning reverse procurement process in which generators and discoms with surplus power can seek e-bids for power supply for up to a one-year period, to put an end to bilateral contracts and determine the market-based price for electricity.

Energy saving certificates (PAT), various renewable purchase obligations (RPO), and renewable energy certificates (REC) are also traded on the power exchanges regularly.

Funding of power infrastructure:

India's Ministry of Power administers the rural electrification corporation limited and the power finance corporation Limited. These central-government-owned public sector enterprises provide loans and guarantees for public and private electricity sector infrastructure projects in India. Excessive plant construction loans at 75% of overestimated costs on overrated plant capacities have led to standard assests of US$40 to 60 billion. The central and state-owned power generators escaped this crisis as they had entered PPAs with state-owned monopolistic discoms on a cost-plus basis at higher than prevailing market power tariffs, without undergoing competitive bidding process. Many direct and indirect subsidies are given to various sectors.

DISADVANTAGES:

Inadequate last mile connectivity:

The country already has adequate generation and transmission capacity to meet the full consumer demand, both temporally and spatially. However, due to the lack of last-mile link-up between all electricity consumers and a reliable power supply (to exceed 99%), many consumers depend on diesel generators. Nearly 80 billion kWh of electricity is generated annually in India by diesel generator sets that consume nearly 15 million tons of diesel oil. Over 10 million households use battery storage UPS as back-ups in case of load shedding India imports nearly US$2 billion worth of battery storage UPS every year. As overhead lines cause distribution problems during rain and wind storms, there is a plan to lay buried cables from low voltage substations to supply cheaper emergency power in cities and towns and thus reduce diesel oil consumption by diesel generator sets and the installation of UPS systems

Demand build up measures:

Electricity-intensive industries consume the cheaper electricity (average price Rs 2.5 per kwr) available from the grid instead of running their own coal/gas/oil fired captive power plants. The captive power generation capacity by such plants is

nearly 53,000 MW, and they are mainly established in steel, fertilizer, aluminium, cement, etc. industries. These plants can draw cheaper electricity from the grid on short term open access (STOA) basis, avoiding their own higher cost of electricity generation and diverting power from other consumers. Some of these idling captive power plants can be used for anciallary services or grid reserve services and earn extra revenue.

Unequal electricity distribution:

Almost all households have access to electricity. However, most households find the electricity supply intermittent and unreliable. At the same time, many power stations are idling for lack of electricity demand and the idling generation capacity is sufficient to supply the needs of households lacking electricity three times over.

5. APPLICATIONS:

India's net import of liquefied petroleum gas (LPG) is 16.607 million tons and the domestic consumption is 25.502 million tons which is 90% of total consumption in 2021–22. The LPG import content is nearly 57% of total consumption in 2021-22. The affordable electricity retail tariff (860 Kcal/kWh at 74% heating efficiency) to replace LPG (net calorific value 11,000 Kcal/Kg at 40% heating efficiency) in domestic cooking is up to 10.2 ₹/kWh when the retail price of LPG cylinder is ₹1000 (without subsidy) with 14.2 kg LPG content. Replacing LPG consumption with electricity would reduce imports substantially.

India's piped natural gas (PNG) for domestic cooking needs was 12,175 million standard cubic meters (mmscm) which is nearly 19% of total natural gas consumption in 2021–22. Natural gas/ LNG import content is nearly 56% of total consumption in 2021-22. The affordable electricity retail tariff (860 Kcal/kWh at 74% heating efficiency) to replace PNG (net calorific value 8,500 Kcal/scm at 40% heating efficiency) in domestic cooking is up to 9 ₹/kWh when the retail price of PNG is ₹47.59 per scm. Replacing PNG consumption with electricity would reduce costly LNG imports substantially.

The domestic consumption of kerosene is 1.291 million tons out of 1.493 million tons total consumption in 2021–22. The subsidized retail price of kerosene is 15₹/liter whereas the export/import price is 79₹/liter. The affordable electricity retail tariff (860 Kcal/kWh at 74% heating efficiency) to replace kerosene (net

calorific value 8240 Kcal/liter at 40% heating efficiency) in domestic cooking is up to 15.22 ₹/kWh when the kerosene retail price is 79 ₹/liter.

In 2021–22, the plant load factor (PLF) of coal-fired thermal power stations (nearly 210 GW) was only 58.86%. These stations can run above 85% PLF if there is adequate electricity demand. The possible additional net electricity generation at 85% PLF is nearly 450 billion kWh which is enough to replace all the LPG, PNG, and kerosene consumption in the domestic sector. The incremental cost of generating additional electricity is only the coal fuel cost, less than 3₹/kWh. Enhancing the PLF of coal-fired stations and encouraging domestic electricity consumers to substitute electricity in place of LPG, PNG, and kerosene in household cooking would reduce government subsidies. It has been proposed that domestic consumers who are willing to surrender subsidized LPG/kerosene permits should be given a free electricity connection and a subsidized electricity tariff. To avoid the possibility of fatal electric shocks, power is supplied to the electric cook stove through a residual-current circuit breaker.

Substantial scope is also present in micro, small, and medium enterprises (MSME) to switch over to electricity from fossil fuels to reduce the cost of production provided uninterrupted power supply is ensured. Since 2017, IPPs have been offering to sell solar and wind power below 3.00₹/kWh to feed into the high voltage grid. After considering distribution costs and losses, solar power appears to be a viable economic option for replacing the LPG, PNG, kerosene, etc used in the domestic and MSME sectors.

6. CONCLUSION:

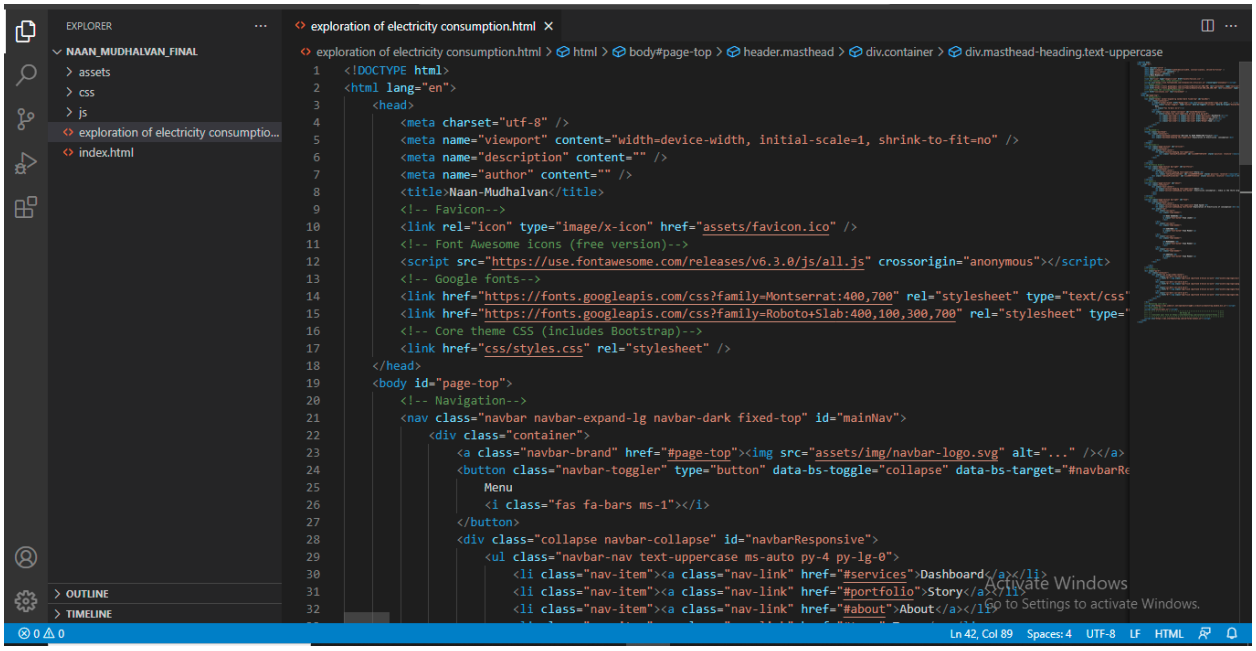
Here we analyses the financial performance of banks by empathy map, brainstorming, data preparation, data visualization, dashboard, story.

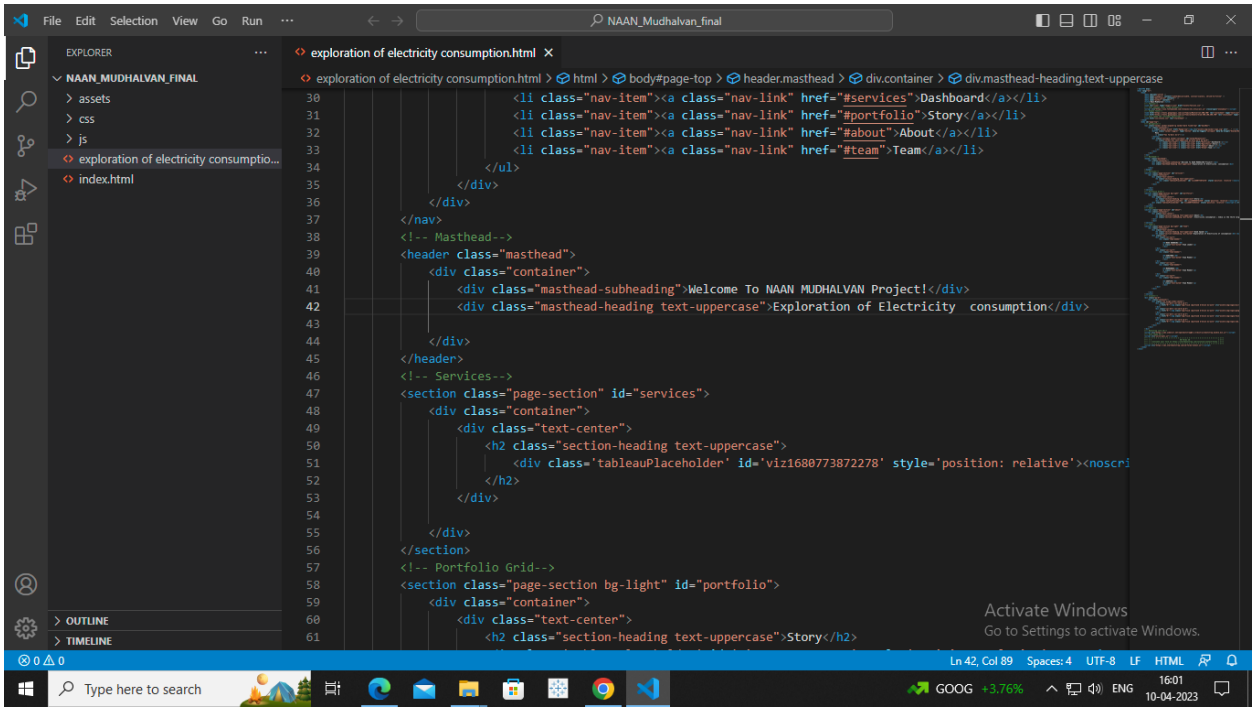
7. FUTURE SCOPE:

During the fiscal year 2019–20, the utility energy availability was 1,284.44 billion KWh, a shortfall relative to requirements by 6.5 billion KWh (−0.5%). Peak load met was 182,533 MW, 1,229 MW (−0.6%) below requirements. In the 2020 Load Generation Balance report, India's Central Electricity Authority anticipated energy surplus and peak surplus to be 2.7% and 9.1%, respectively, for the 2020–

21 fiscal year Power would be made available to few states expected to face shortages from states with a surplus, through regional transmission links. From the calendar year 2015 onwards, power generation in India has been less of a problem than power distribution.

8. APPENDIX:

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<li class="nav-item">About
<li class="nav-item">Team

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Welcome To NAAN MUDHALVAN Project!
Exploration of Electricity consumption

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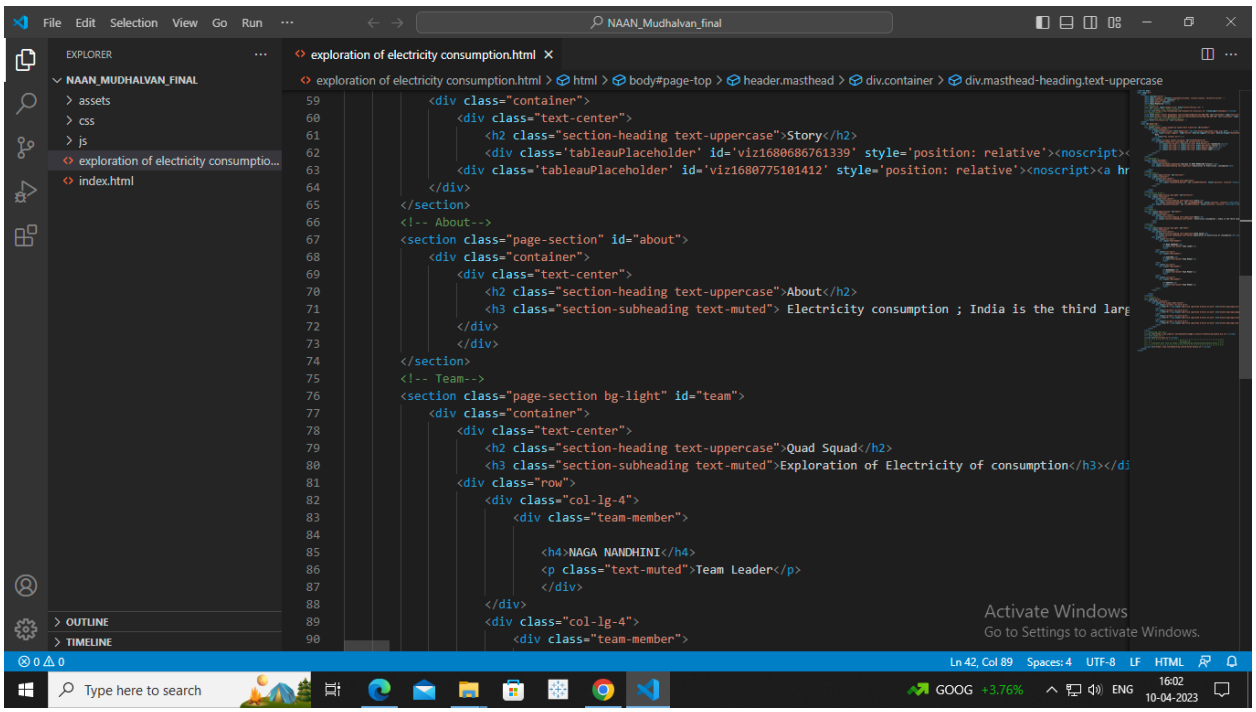
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<h4>NAGA NANDHINI</h4>
Team Leader

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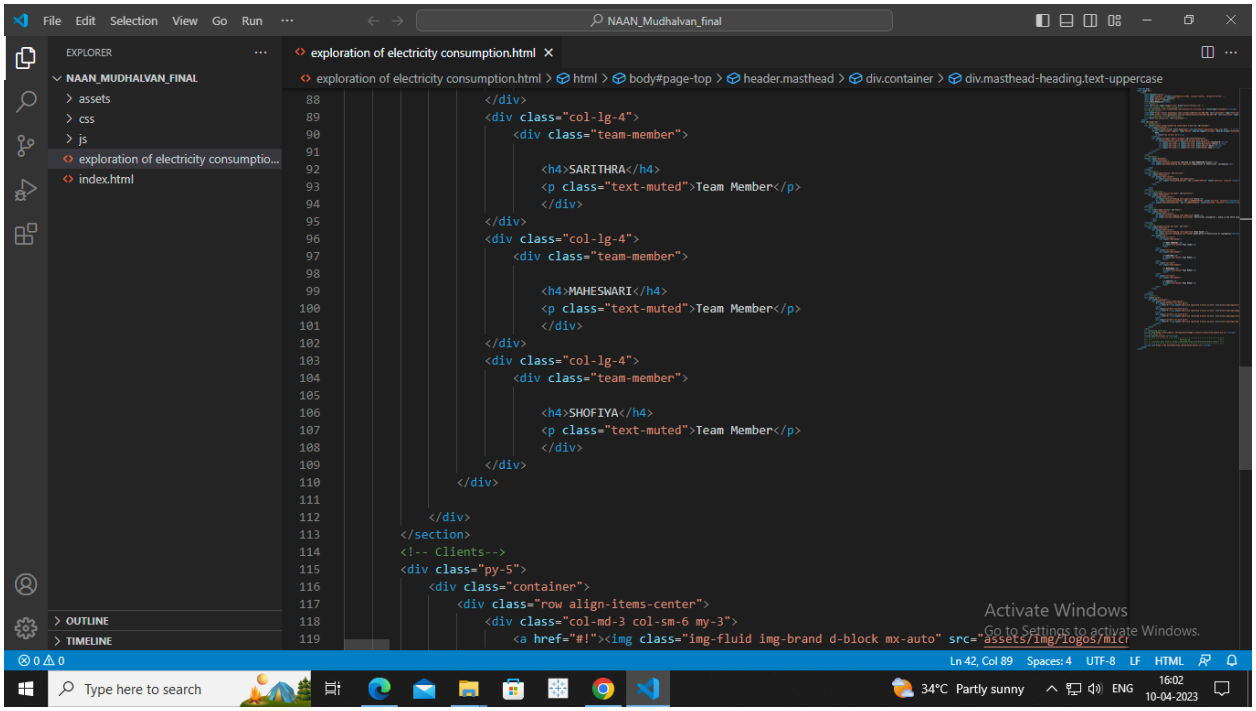
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<h4>SARITHRA</h4>
Team Member

<h4>MAHESWARI</h4>
Team Member

<h4>SHOFIYA</h4>
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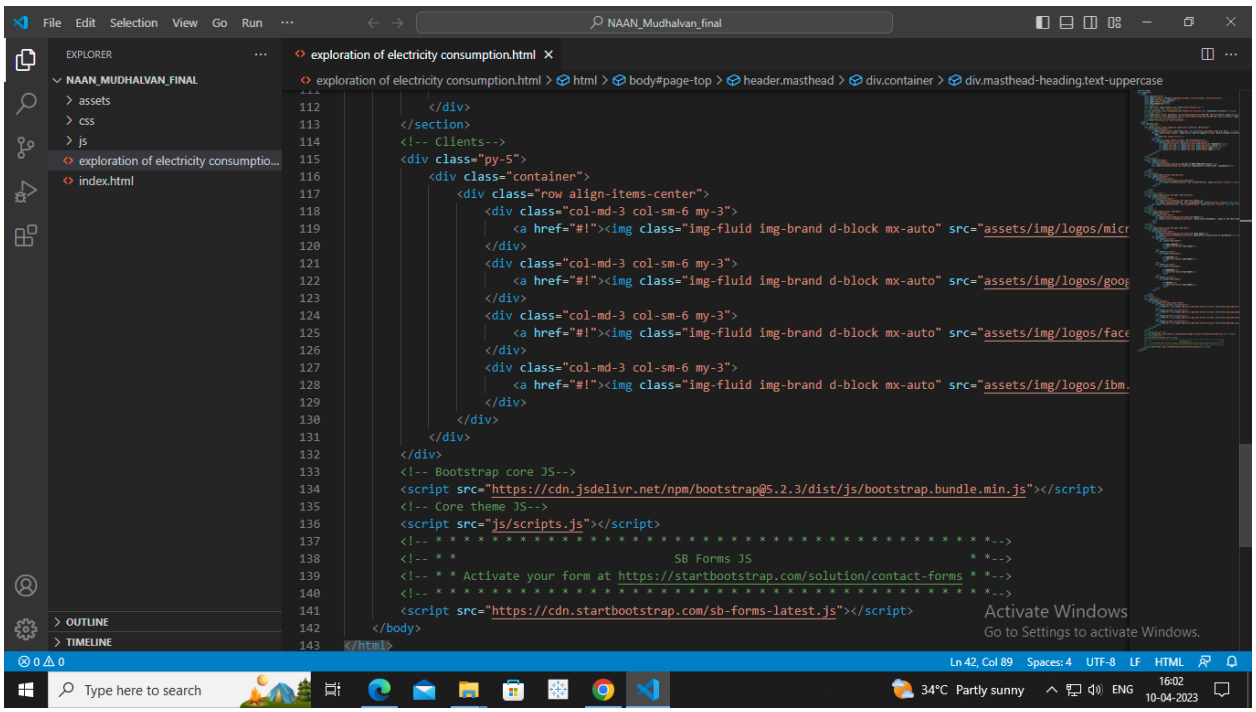
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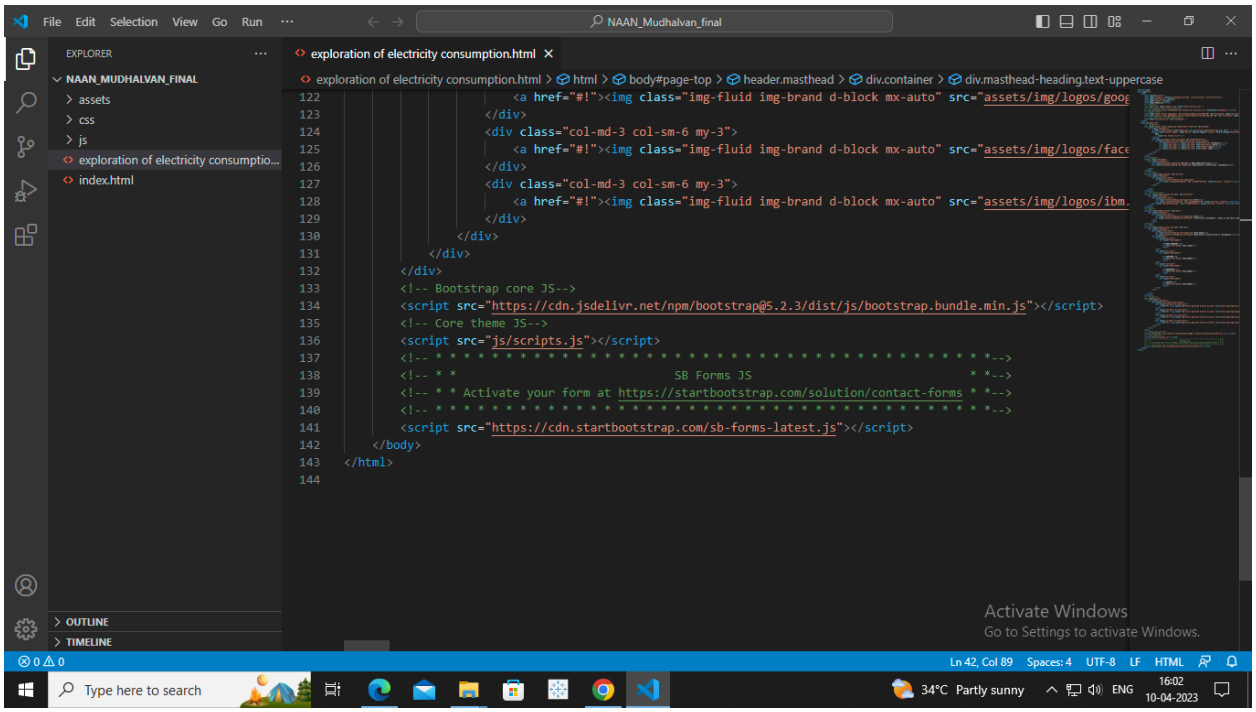
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Thank You