PROJECT REPORT

Date	17 February 2026
Team ID	LTVIP2026TMIDS55781
Project Name	Plugging into the Future: An Exploration of Electricity Consumption Patterns Using Tableau
Maximum Marks	

Plugging into the Future: An Exploration of Electricity Consumption Patterns Using Tableau

1. INTRODUCTION

1.1 Background

Electricity consumption is a critical indicator of economic development, industrial activity, and societal growth. With rising urbanization, industrial expansion, and increasing household demand, monitoring electricity usage patterns has become essential for sustainable energy planning.

Government agencies, utility providers, and policymakers require accurate insights into consumption trends to ensure efficient power distribution, demand forecasting, and infrastructure planning. However, electricity data is often dispersed across reports and spreadsheets, making analysis complex.

Data visualization tools such as Tableau transform raw electricity datasets into interactive visual insights, enabling stakeholders to understand trends, identify peak demand periods, and support energy conservation strategies.

1.2 Project Overview

Plugging into the Future is a Tableau-based data visualization project designed to analyze and present electricity consumption patterns across regions and time periods.

This project focuses on:
  o State-wise electricity consumption distribution
  o Regional consumption comparisons
  o Monthly and quarterly usage trends
  o Identification of peak demand periods
  o Year-over-year comparison (2019 vs 2020)
  o Interactive storytelling using Tableau Story

The dashboard converts raw CSV datasets into interactive visuals that support informed decision-making for energy planners and policymakers.

1.3 Objectives

The main objectives of this project are:
• To design an interactive electricity analytics dashboard
• To analyze consumption trends across regions and seasons
• To identify peak demand periods
• To compare electricity usage between 2019 and 2020
• To present insights using story-based visualization
• To publish dashboards for web accessibility

2. IDEATION PHASE

2.1 Problem Statement

Energy authorities and utility providers often lack a centralized, interactive platform to analyze electricity consumption patterns. Data stored in static reports limits the ability to identify trends, forecast demand, and support data-driven planning.

2.2 Target Users

The primary users of this dashboard include:

- Government energy departments
- Electricity distribution companies
- Policy makers and planners
- Sustainability and energy analysts
- Academic researchers

2.3 Empathy Map

THINK & FEEL

- Concerned about meeting rising electricity demand
- Worried about power shortages and grid failures
- Wants accurate forecasts for planning
- Feels pressure to ensure reliable supply
- Aspires to improve efficiency and reduce losses

HEAR

- Government pushing for energy efficiency & sustainability
- Consumers complaining about outages & high bills
- Industry leaders discussing smart grids & renewable integration
- Media highlighting energy shortages and demand spikes

SEE

- Increasing urbanization and industrial power consumption
- Seasonal demand spikes (summer cooling, winter heating)
- Regional disparities in electricity usage
- Growing adoption of renewable energy sources

SAY & DO

- Discusses load management strategies in meetings
- Reviews consumption reports and dashboards
- Coordinates with grid operators & regional offices

   o Advocates for data-driven planning and smart infrastructure

PAIN (Fears & Frictions)

   o Inaccurate demand forecasting

   o Power outages during peak load periods

   o Scattered and hard-to-interpret data

   o Inefficient energy distribution & transmission losses

   o Difficulty identifying high-consumption zones

GAIN (Needs & Success Measures)

   o Clear visualization of consumption trends

   o Ability to compare regions & time periods (2019 vs 2020)

   o Insights to optimize load distribution

   o Improved reliability and reduced outages

   o Data-driven decision making for future planning

3. REQUIREMENT ANALYSIS

3.1 Functional Requirements

   o Interactive filters (State, Region, Year, Quarter)

   o State-wise consumption map

   o Monthly & quarterly trend charts

   o Year comparison visuals

   o Story-based dashboard navigation

   o KPI summary indicators

3.2 Non-Functional Requirements

- Dashboard loading time under 5 seconds
- Responsive layout for presentations
- Accurate KPI calculations
- Secure publishing via Tableau Public
- Scalability for additional datasets

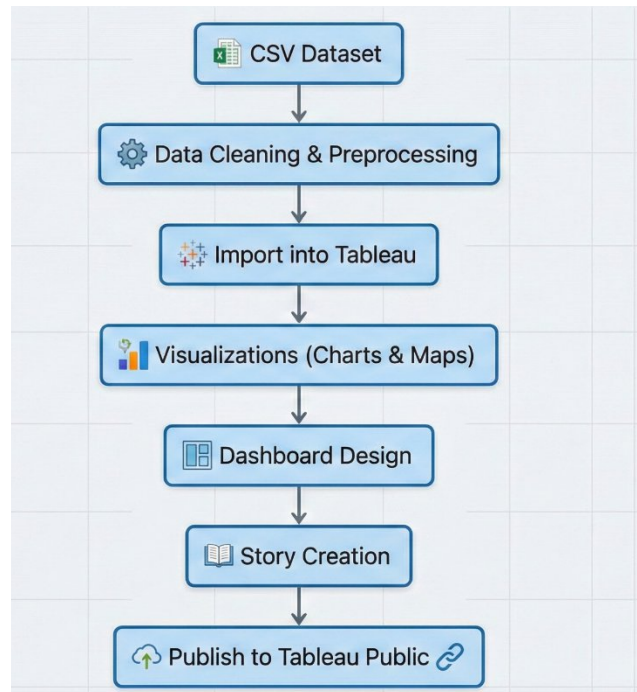## 3.3 Data Requirements

The dashboard uses electricity consumption datasets containing:

• State

• Region

• Monthly consumption

• Quarterly totals

• Year (2019 & 2020)

Total Records: 1000+ entries

4. SYSTEM DESIGN

4.1 Data Flow Diagram

4.2 Solution Architecture

User Interface Layer:
- Tableau Dashboard (Web-based)
- Interactive filters and KPI cards

Application Layer:
- Tableau Calculated Fields
- Data filtering and aggregation logic

Data Layer:
- CSV datasets
- Optional cloud storage

Deployment Layer:
- Tableau Public
- Embedded via HTML iframe

5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning Table

Phase	Task	Time (Days)
Phase -1	Data Collection	1
Phase -2	Data Cleaning & Preprocessing	2
Phase -3	Visualizations	2
Phase -4	Dashboard & Stories	2
Phase - 5	Performance Testing	1
Phase-6	Web Integration & Publishing	1
Phase - 7	Report & documentation	3

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing
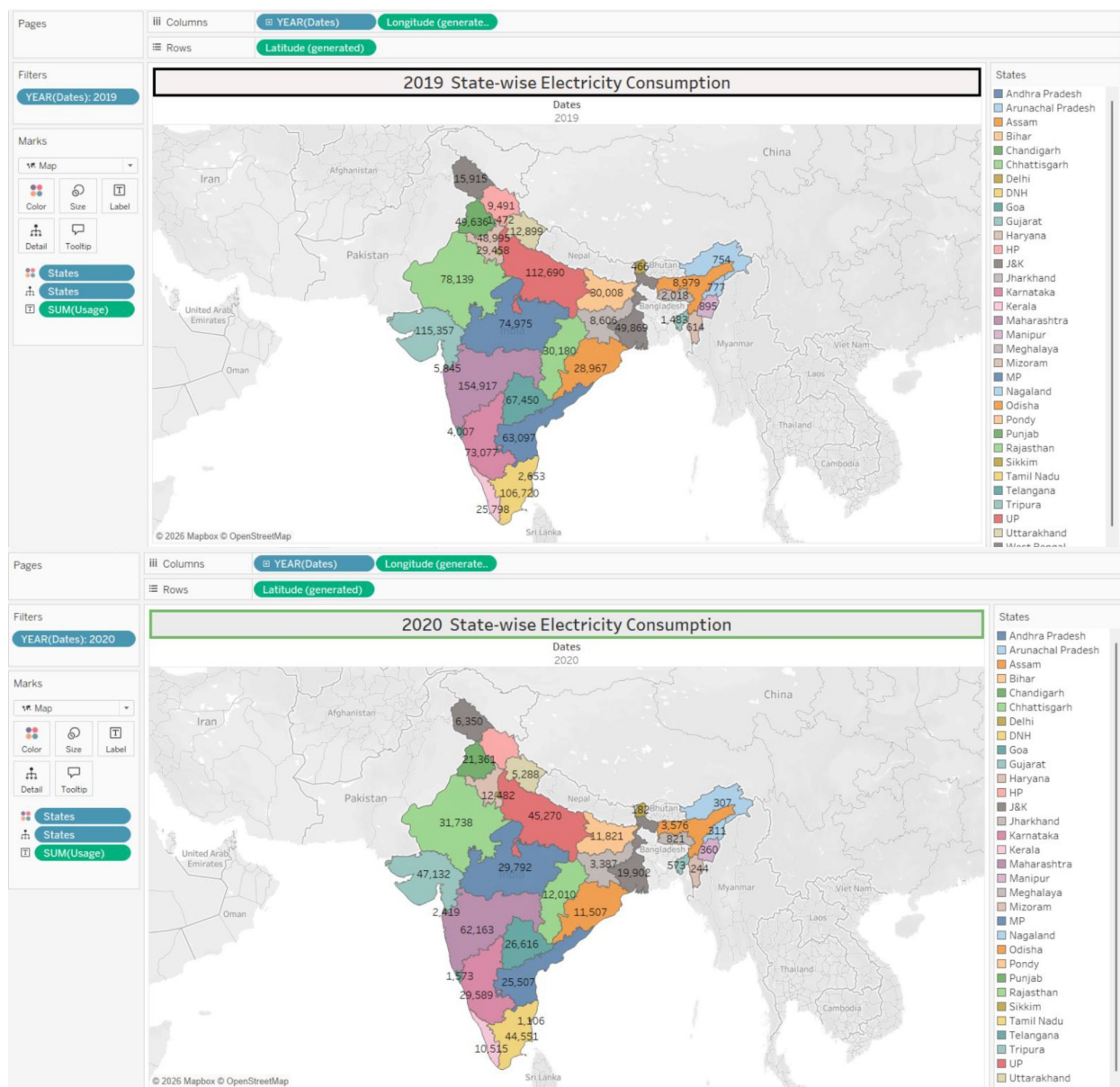
- **Data Loaded:** 1000+ records
- **Filters Used:** State, Region, Year, Quarter
- **Calculated Fields:** YoY growth, peak demand, regional share
- **Visualizations:** 14
- **Result:** Smooth performance with response time under 3–5 seconds
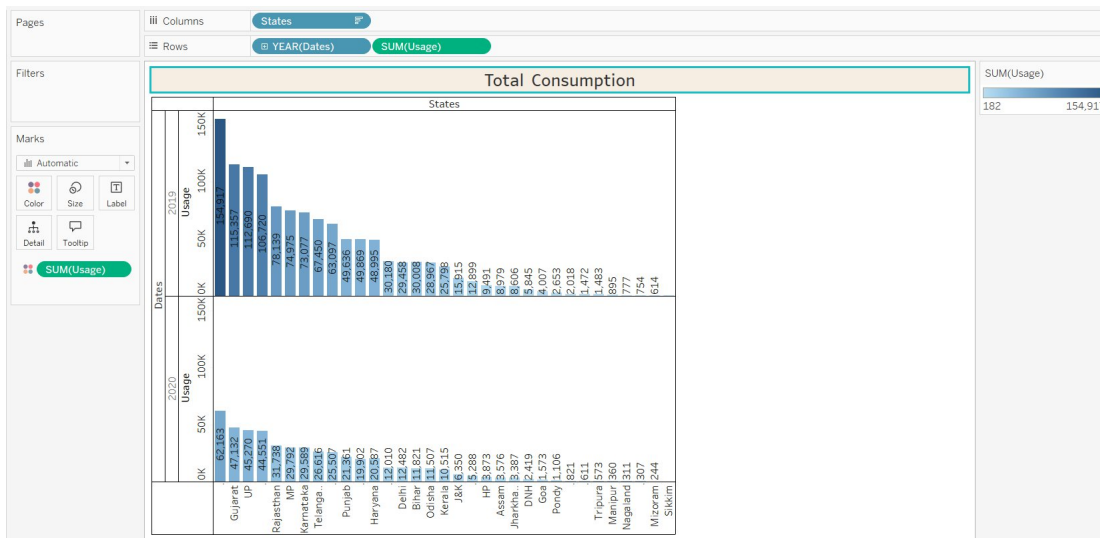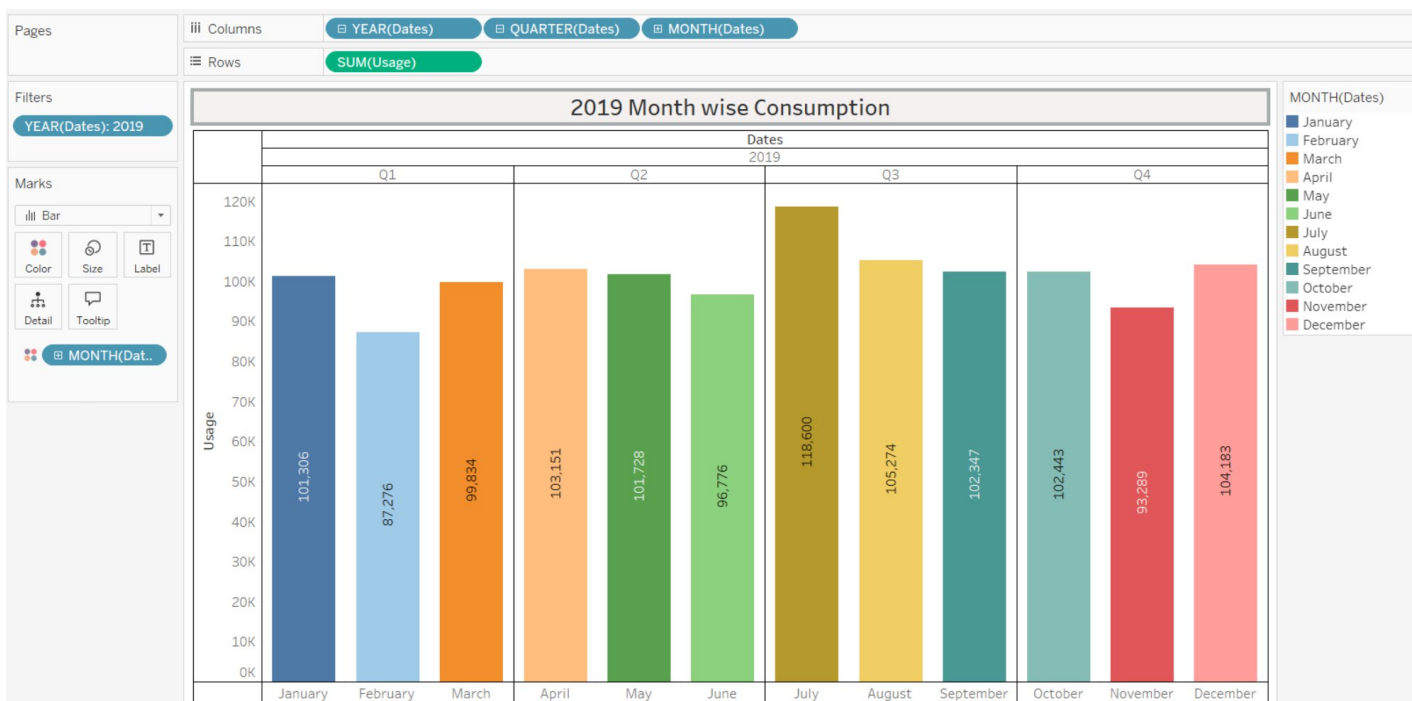
7. RESULTS

7.1 Output Screenshots
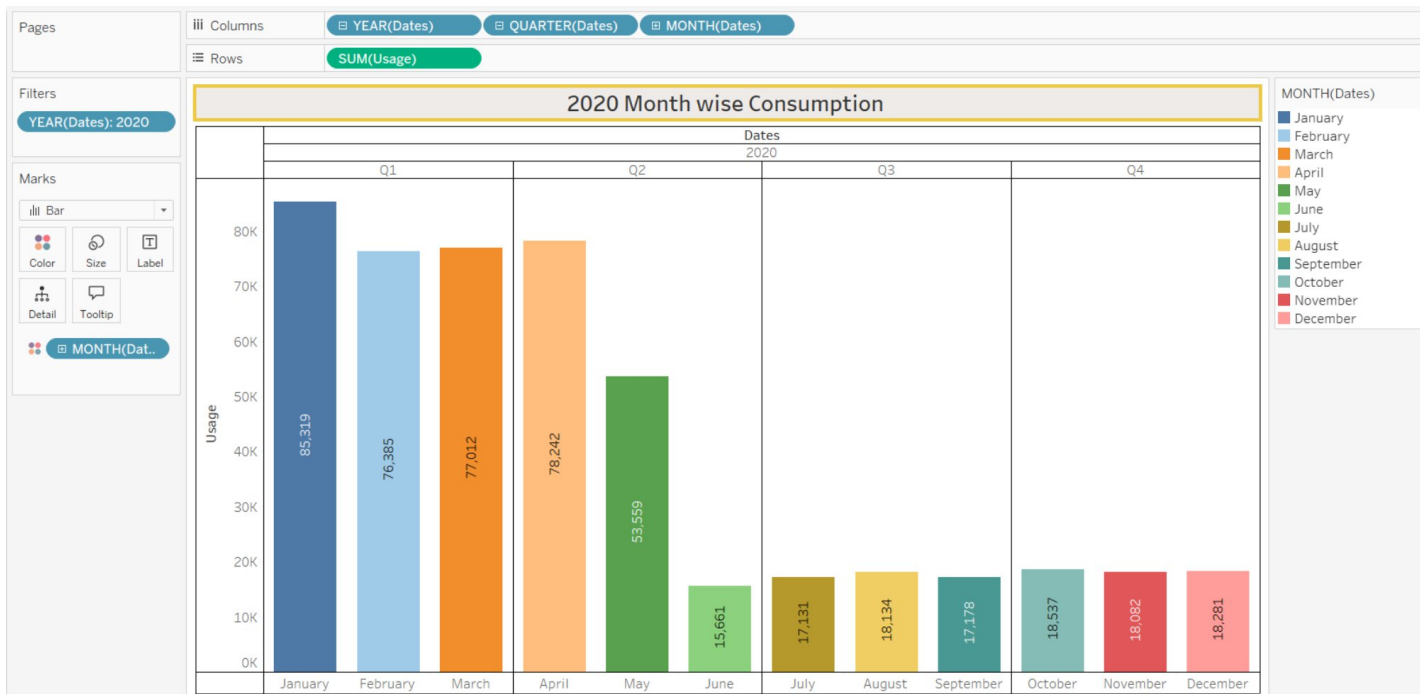
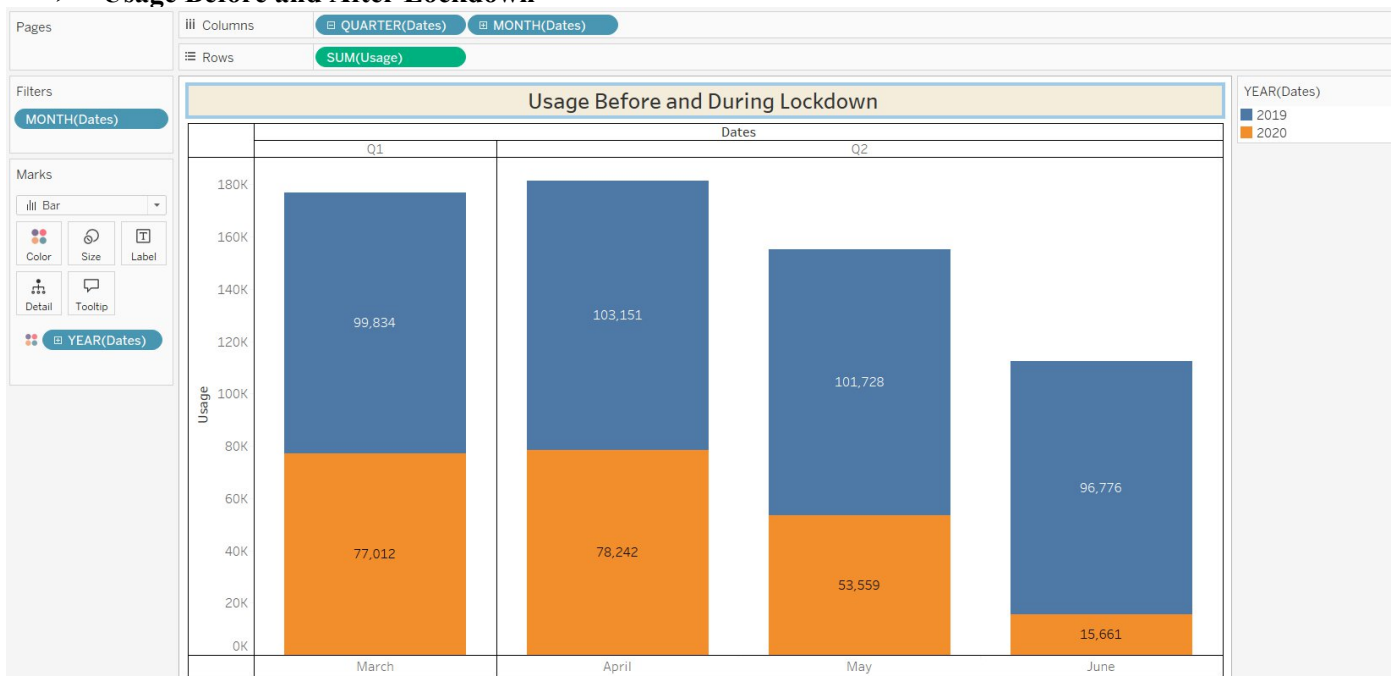➢ State-wise Electricity Consumption Map

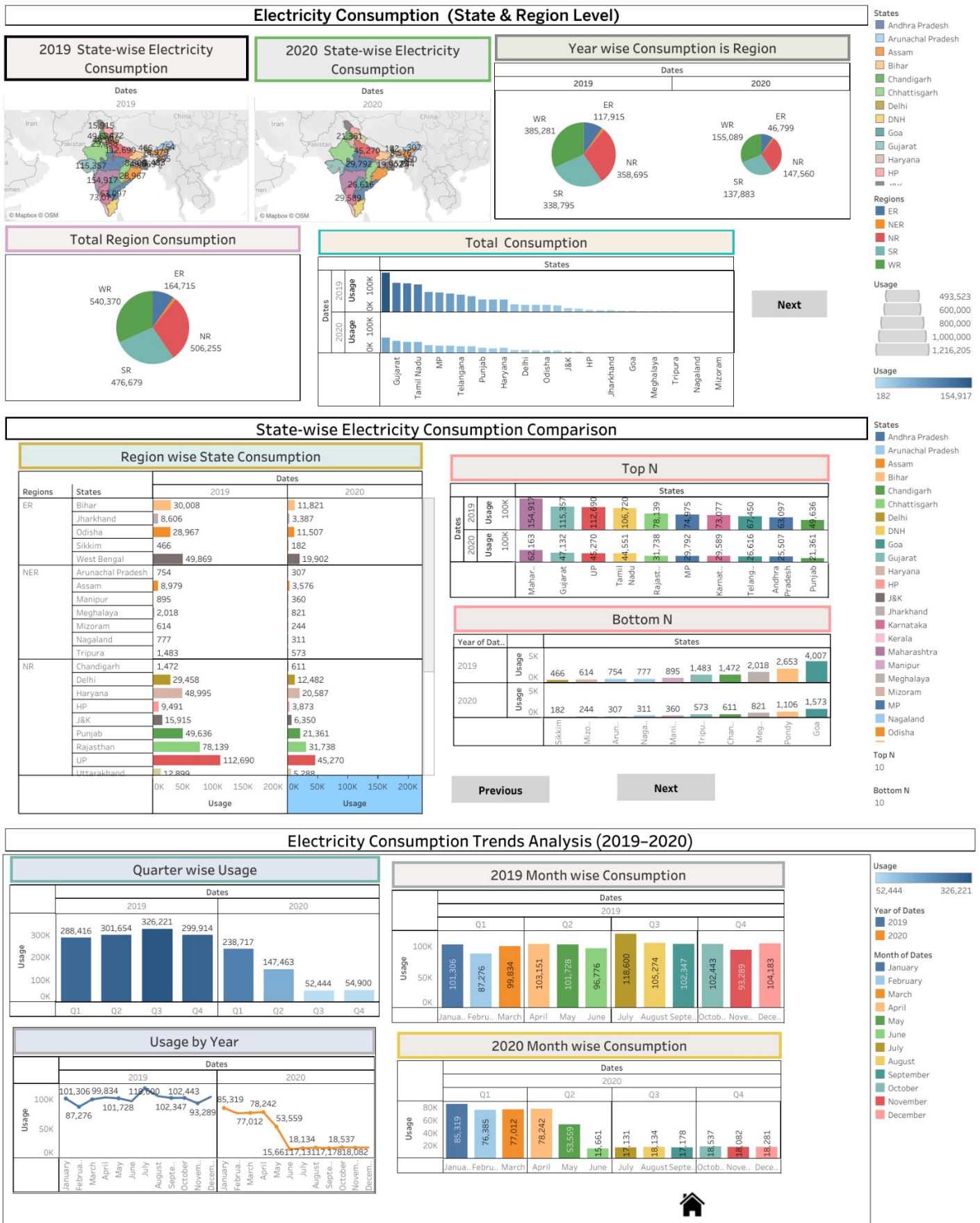
➢ Total Consumption

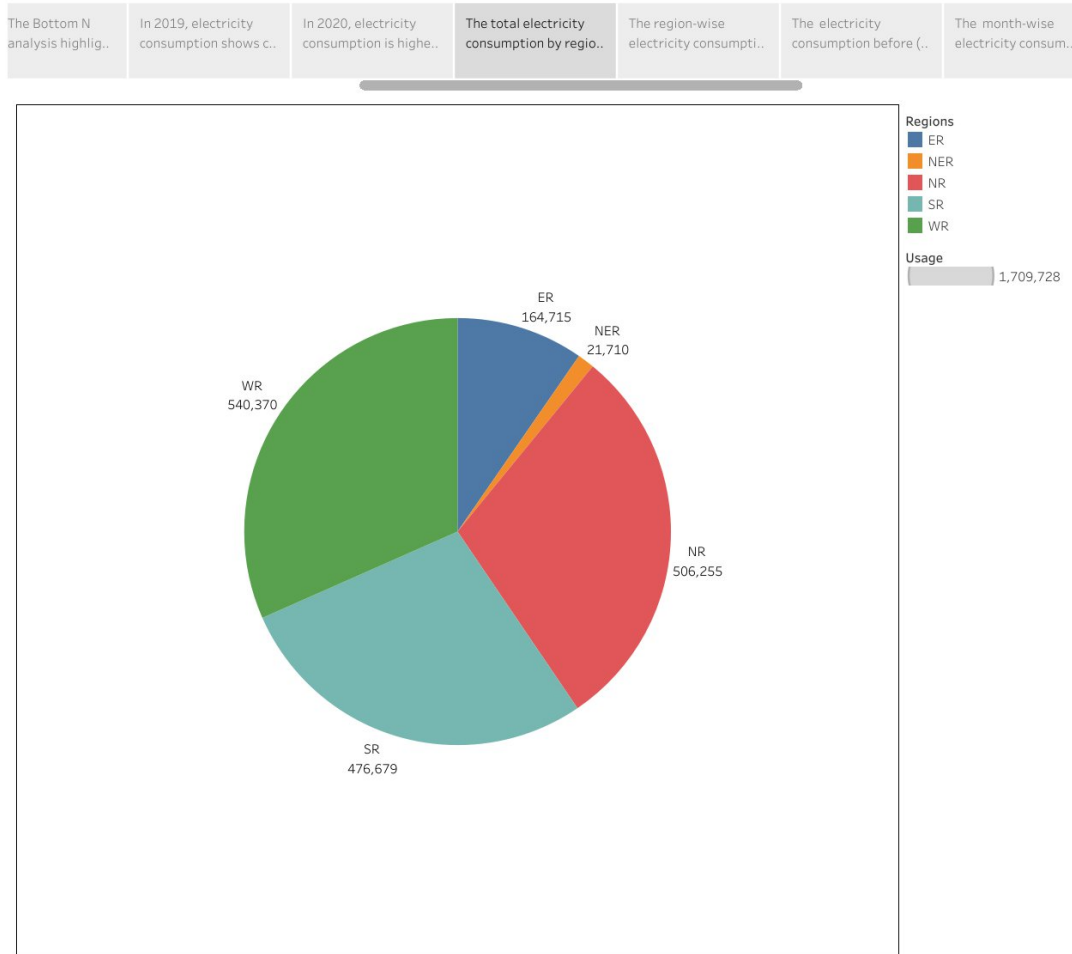➤ 2019 vs 2020 Consumption Comparison

> ➢ **Usage Before and After Lockdown**

➢ Dashboard:

Electricity Consumption (State & Region Level)

2019 State-wise Electricity Consumption	2020 State-wise Electricity Consumption	Year wise Consumption is Region

Total Region Consumption

Total Consumption

Next

State-wise Electricity Consumption Comparison

Region wise State Consumption

Regions	States	Dates 2019	Dates 2020
ER	Bihar	30,008	11,821
	Jharkhand	8,606	3,387
	Odisha	28,967	11,507
	Sikkim	466	182
	West Bengal	49,869	19,902
NER	Arunachal Pradesh	754	307
	Assam	8,979	3,576
	Manipur	895	360
	Meghalaya	2,018	821
	Mizoram	614	244
	Nagaland	777	311
	Tripura	1,483	573
NR	Chandigarh	1,472	611
	Delhi	29,458	12,482
	Haryana	48,995	20,587
	HP	9,491	3,873
	J&K	15,915	6,350
	Punjab	49,636	21,361
	Rajasthan	78,139	31,738
	UP	112,690	45,270
	Uttarakhand	12,899	5,288

Top N

Bottom N

Year of Dat..		States									
2019	Usage	466	614	754	777	895	1,483	1,472	2,018	2,653	4,007
2020	Usage	182	244	307	311	360	573	611	821	1,106	1,573
		Sikkim	Mizo..	Arun..	Naga..	Mani..	Tripu..	Chan..	Meg..	Pondy	Goa

Previous   Next

Electricity Consumption Trends Analysis (2019–2020)

Quarter wise Usage

	2019				2020			
Usage	Q1 288,416	Q2 301,654	Q3 326,221	Q4 299,914	Q1 238,717	Q2 147,463	Q3 52,444	Q4 54,900

Usage by Year

2019 Month wise Consumption

2020 Month wise Consumption

➢ Story

Story on Electricity Consumption in India

| The Bottom N analysis highlig.. | In 2019, electricity consumption shows c.. | In 2020, electricity consumption is highe.. | **The total electricity consumption by regio..** | The region-wise electricity consumpti.. | The electricity consumption before (.. | The month-wise electricity consum.. |

Regions
- ER
- NER
- NR
- SR
- WR

Usage
1,709,728

ER
164,715

NER
21,710

WR
540,370

NR
506,255

SR
476,679

8. ADVANTAGES & DISADVANTAGES

Advantages
- Easy interpretation of consumption patterns
- Centralized electricity insights
- Interactive and story-driven presentation
- Supports data-driven planning

Disadvantages
- Requires Tableau knowledge
- Uses static datasets (no live smart meter feed)
- Limited scalability without cloud integration

9. CONCLUSION

This project demonstrates how Tableau can transform raw electricity consumption data into meaningful visual insights. The dashboard simplifies complex datasets into interactive analytics, enabling stakeholders to monitor demand trends, identify peak usage periods, and support sustainable energy planning.

10. FUTURE SCOPE

- Integrate real-time smart meter data
- Implement demand forecasting models
- Add predictive analytics for consumption trends

• Develop mobile-friendly dashboards
• Expand analysis for renewable energy planning

11. APPENDIX

Source Code(Web integration)

```html
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <title>Electricity Consumption Analytics India</title>

   <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css"
rel="stylesheet">
   <link
href="https://fonts.googleapis.com/css2?family=Poppins:wght@300;400;600&display=swap"
rel="stylesheet">

   <style>
     body {
       font-family: 'Poppins', sans-serif;
       scroll-behavior: smooth;
     }

     /* Hero Section Styling */
     .hero-section {
       background: linear-gradient(rgba(0,0,0,0.7), rgba(0,0,0,0.7)),
url('https://images.unsplash.com/photo-1473341304170-971dccb5ac1e?ixlib=rb-
1.2.1&auto=format&fit=crop&w=1920&q=80');
       background-size: cover;
       background-position: center;
       height: 100vh;
       color: white;
       display: flex;
       align-items: center;
       text-align: center;
     }

     .hero-content h1 {
       font-size: 3.5rem;
       font-weight: 700;
```

```css
    margin-bottom: 20px;
}

.hero-content p {
    font-size: 1.2rem;
    margin-bottom: 30px;
}

.btn-custom {
    background-color: #00d2d3;
    color: #fff;
    padding: 12px 30px;
    border-radius: 30px;
    font-weight: 600;
    transition: all 0.3s;
}

.btn-custom:hover {
    background-color: #01a3a4;
    color: #fff;
    transform: translateY(-2px);
}

/* Section Styling */
section {
    padding: 80px 0;
}

.section-title {
    text-align: center;
    margin-bottom: 50px;
}

.section-title h2 {
    font-weight: 600;
    color: #2d3436;
    position: relative;
    display: inline-block;
    padding-bottom: 10px;
}

.section-title h2::after {
    content: ";
```

```css
    width: 50px;
    height: 3px;
    background: #00d2d3;
    position: absolute;
    bottom: 0;
    left: 50%;
    transform: translateX(-50%);
}

/* Tableau Container */
.tableau-container {
    background: white;
    padding: 20px;
    border-radius: 15px;
    box-shadow: 0 10px 30px rgba(0,0,0,0.1);
    overflow: hidden;
    display: flex;
    justify-content: center;
}

/* Contact Section */
.contact-card {
    text-align: center;
    padding: 30px;
    border: 1px solid #eee;
    border-radius: 10px;
    transition: 0.3s;
}

.contact-card:hover {
    box-shadow: 0 10px 20px rgba(0,0,0,0.05);
    transform: translateY(-5px);
}

.contact-icon {
    font-size: 2rem;
    color: #00d2d3;
    margin-bottom: 15px;
}

/* Footer */
footer {
    background: #2d3436;
```

```html
        color: white;
        padding: 20px 0;
        text-align: center;
      }
    </style>
</head>
<body data-bs-spy="scroll" data-bs-target="#navbar" data-bs-offset="70">

    <nav id="navbar" class="navbar navbar-expand-lg navbar-dark bg-dark fixed-top">
      <div class="container">
        <a class="navbar-brand fw-bold" href="#">Electricity Consumption  Analytics
India</a>
        <button class="navbar-toggler" type="button" data-bs-toggle="collapse" data-bs-
target="#navbarNav">
          <span class="navbar-toggler-icon"></span>
        </button>
        <div class="collapse navbar-collapse" id="navbarNav">
          <ul class="navbar-nav ms-auto">
            <li class="nav-item"><a class="nav-link active" href="#home">Home</a></li>
            <li class="nav-item"><a class="nav-link" href="#about">About</a></li>
            <li class="nav-item"><a class="nav-link"
href="#dashboard">Dashboard</a></li>
            <li class="nav-item"><a class="nav-link" href="#story">Story</a></li>
            <li class="nav-item"><a class="nav-link" href="#contact">Contact</a></li>
          </ul>
        </div>
      </div>
    </nav>

    <section id="home" class="hero-section">
      <div class="container hero-content">
        <div class="row justify-content-center">
          <div class="col-lg-8">
            <h1>Electricity Consumption Patterns </h1>
            <p>An Exploration of Electricity Consumption Patterns. Dive deep into data-
driven insights to understand the power trends across the nation.</p>
            <a href="#dashboard" class="btn btn-custom">View Analytics</a>
          </div>
        </div>
      </div>
    </section>

    <section id="about">
```

```html
<div class="container">
  <div class="section-title">
    <h2>About The Analytics</h2>
  </div>
  <div class="row align-items-center">
    <div class="col-md-6">
      <img src="https://images.unsplash.com/photo-1473341304170-971dccb5ac1e?ixlib=rb-1.2.1&auto=format&fit=crop&w=800&q=80" alt="Electricity" class="img-fluid rounded shadow">
    </div>
    <div class="col-md-6 mt-4 mt-md-0">
      <h4>Why Electricity Analytics?</h4>
      <p class="text-muted">Understanding electricity consumption patterns is vital for tracking industrial growth, residential needs, and overall development in India.</p>

      <ul class="list-unstyled">
        <li class="mb-3"><strong>📊 The Dashboard:</strong> Offers a high-level view of power usage, state-wise distribution, and regional analysis.</li>
        <li class="mb-3"><strong>📖 The Story:</strong> A narrative-driven visualization that walks you through consumption trends and highlights key developments.</li>
        <li><strong>⚡ Modern Solutions:</strong> Leveraging advanced data visualization to empower stakeholders with actionable insights.</li>
      </ul>
    </div>
  </div>
</div>
</section>

<section id="dashboard" class="bg-light">
  <div class="container-fluid">
    <div class="section-title">
      <h2> Dashboard</h2>
      <p>Interactive Analysis of Electricity Consumption (State & Region Level)</p>
    </div>

    <div class="row justify-content-center">
      <div class="col-11">
        <div class="tableau-container">
          <div class='tableauPlaceholder' id='viz1771117948367' style='position: relative'><noscript><a href='#'><img alt=' ' src='https://public.tableau.com/static/images/El/Electricity-Consumption/Dashboard1/1_rss.png' style='border: none'
```

```
/></a></noscript><object class='tableauViz'  style='display:none;'><param name='host_url'
value='https%3A%2F%2Fpublic.tableau.com%2F' /> <param name='embed_code_version'
value='3' /> <param name='site_root' value='' /><param name='name' value='Electricity-
Consumption&#47;Dashboard1' /><param name='tabs' value='no' /><param name='toolbar'
value='yes' /><param name='static_image'
value='https:&#47;&#47;public.tableau.com&#47;static&#47;images&#47;El&#47;Electricit
y-Consumption&#47;Dashboard1&#47;1.png' /> <param name='animate_transition'
value='yes' /><param name='display_static_image' value='yes' /><param
name='display_spinner' value='yes' /><param name='display_overlay' value='yes' /><param
name='display_count' value='yes' /><param name='language' value='en-US'
/></object></div>                <script type='text/javascript'>                var divElement =
document.getElementById('viz1771117948367');           var vizElement =
divElement.getElementsByTagName('object')[0];          if ( divElement.offsetWidth >
800 )
{ vizElement.style.width='100%';vizElement.style.height=(divElement.offsetWidth*0.75)+'px
';} else if ( divElement.offsetWidth > 500 )
{ vizElement.style.width='100%';vizElement.style.height=(divElement.offsetWidth*0.75)+'px
';} else { vizElement.style.width='100%';vizElement.style.height='1877px';}              var
scriptElement = document.createElement('script');          scriptElement.src =
'https://public.tableau.com/javascripts/api/
viz_v1.js';             vizElement.parentNode.insertBefore(scriptElement,
vizElement);            </script>
                </div>
            </div>
        </div>
    </div>
  </section>

  <section id="story">
    <div class="container-fluid">
        <div class="section-title">
            <h2>The Story</h2>
            <p>A Narrative on Electricity Consumption in India</p>
        </div>

        <div class="row justify-content-center">
            <div class="col-11">
                <div class="tableau-container">
                    <div class='tableauPlaceholder' id='viz1771117073553' style='position:
relative'><noscript><a href='#'><img alt='Story  on Electricity  Consumption in India '
src='https:&#47;&#47;public.tableau.com&#47;static&#47;images&#47;2J&#47;2JKT83Z3
Q&#47;1_rss.png' style='border: none' /></a></noscript><object
class='tableauViz'  style='display:none;'><param name='host_url'
```

```
value='https%3A%2F%2Fpublic.tableau.com%2F' /> <param name='embed_code_version'
value='3' /> <param name='path' value='shared&#47;2JKT83Z3Q' /> <param name='toolbar'
value='yes' /><param name='static_image'
value='https:&#47;&#47;public.tableau.com&#47;static&#47;images&#47;2J&#47;2JKT83Z
3Q&#47;1.png' /> <param name='animate_transition' value='yes' /><param
name='display_static_image' value='yes' /><param name='display_spinner' value='yes'
/><param name='display_overlay' value='yes' /><param name='display_count' value='yes'
/><param name='language' value='en-US' /><param name='filter'
value='showOnboarding=true' /></object></div>                <script
type='text/javascript'>                var divElement =
document.getElementById('viz1771117073553');                var vizElement =
divElement.getElementsByTagName('object'
)[0];
         vizElem
ent.style.width='1016px';vizElement
.style.height='991px';                var scriptElement =
document.createElement('script');                scriptElement.src =
'https://public.tableau.com/javascripts/api/
viz_v1.js';                vizElement.parentNode.insertBefore(scriptElement,
vizElement);                </script>
              </div>
            </div>
          </div>
        </div>
      </section>

      <section id="contact" class="bg-light">
        <div class="container">
          <div class="section-title">
            <h2>Contact Us</h2>
            <p>Get in touch with our analytics team</p>
          </div>

          <div class="row justify-content-center">

    <div class="col-md-4 mb-4">
      <div class="contact-card bg-white h-100">
        <div class="contact-icon">👦🖥️</div>
        <h5>Harini</h5>
        <p class="text-muted">Lead Analyst</p>
        <hr>
        <p><strong>Email:</strong><br>
          <a href="mailto:thandlamharini@gmail.com" class="text-decoration-none text-
```

```
dark">
              thandlamharini@gmail.com
          </a>
        </p>
      </div>
    </div>

    <div class="col-md-4 mb-4">
      <div class="contact-card bg-white h-100">
        <div class="contact-icon">⌇⋌</div>
        <h5>Shiva Kumar</h5>
        <p class="text-muted">Data Strategist</p>
        <hr>
        <p><strong>Email:</strong><br>
          <a href="mailto:kothakotashivakumar1303@gmail.com" class="text-decoration-
none text-dark">
              kothakotashivakumar1303@gmail.com
          </a>
        </p>
      </div>
    </div>

    <!-- New Card -->
    <div class="col-md-4 mb-4">
      <div class="contact-card bg-white h-100">
        <div class="contact-icon">▏▋▎</div>
        <h5>Adithya</h5>
        <p class="text-muted">Data Analyst</p>
        <hr>
        <p><strong>Email:</strong><br>
          <a href="pcadithya143@gmail.com" class="text-decoration-none text-dark">
            pcadithya143@gmail.com
          </a>
        </p>
      </div>
    </div>

</div>

      </div>
    </section>

    <footer>
```

```
    <div class="container">
        <p class="mb-0">&copy; 2026 Electricity Consumption Analytics India. All Rights
Reserved.</p>
    </div>
  </footer>

    <script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/js/bootstrap.bundle.min.js"></script>

</body>
</html>
```

Data set Link:-
CSV file used in Tableau

https://drive.google.com/file/d/1JxIkHNwXxjFztKq7ad0_KtkukCqTckNy/view?usp=sharing

Tableau Publish:-

  I.   Dashboard:
https://public.tableau.com/views/Electricity-Consumption/Dashboard3?:language=en-
US&:sid=&:redirect=auth&:display_count=n&:origin=viz_share_link

 II.   Story
https://public.tableau.com/views/StoryonElectricity-
ConsumptioninIndia/StoryonElectricityConsumptioninIndia?:language=en-
US&:sid=&:redirect=auth&:display_count=n&:origin=viz_share_link

Project Demo :-
https://drive.google.com/file/d/1Y9fc7cToXVTQqpcB9ADYFpiXj40QpYbI/view?usp=sharing