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**Major KPIs**

**1. Total GDP (US$ Billion)**  
Represents the overall economic output of a region. A higher GDP often correlates with greater energy demand and investment capacity, indicating the region’s ability to fund renewable energy projects.

**2. Total Population (Billion)**  
Shows the total number of people consuming energy. Population size directly impacts total energy demand and shapes long-term energy planning and sustainability strategies.

**3. Total Energy Consumption (TWh)**  
Measures the total amount of energy used across all sectors. It reflects the region’s energy dependency and economic activity level, helping assess efficiency and demand patterns.

**4. Renewable % in Total Energy Consumption**  
Indicates the share of renewable sources (like solar, wind, and hydro) in total energy use. It highlights the progress toward clean energy transition and carbon reduction goals.

**5. Total Energy Investment (US$ Billion)**  
Represents total capital spent on developing and maintaining energy infrastructure. It’s a key indicator of financial commitment toward expanding renewable capacity and modernizing the energy system.

**Renewable Investment vs Renewable Share in Total Energy Consumption**

🔹 **1. Basic Relationship**

Renewable investment means the money spent on developing, expanding, or maintaining renewable energy sources (like solar, wind, hydro, etc.).

Renewable share in total energy consumption shows how much of a country’s or region’s total energy demand is met by renewables.

Higher investment → leads to → More renewable capacity → leads to → Higher renewable share in total energy mix (over time).

So, there’s a **positive relationship** overall.

**🔹 2. Time Lag Effect**

The effect isn’t instant.

* When a country invests heavily in renewable energy, it takes **a few years** for those projects (solar farms, wind parks, etc.) to come online.
* So, renewable share tends to **rise with a lag** after investment.

**GDP vs Total Energy Consumption Trend Analysis**

There is a strong positive relationship between GDP per capita and total energy consumption per capita. As countries become wealthier, their citizens and industries use more energy to support higher living standards, industrial activity, and technological development. In early stages of economic growth, energy use rises rapidly with income due to industrialization and infrastructure expansion. However, in highly developed economies, the relationship tends to stabilize — energy efficiency improvements and a shift toward services and clean technologies reduce the growth rate of energy consumption.

**Top 2 Regions by Renewable % in Consumption**

Latin America leads due to natural renewable potential, while Europe leads through strong policy, investment, and early transition efforts — together making them the top two regions in renewable share of energy consumption.

Or

Latin America leads due to its **abundant natural renewable resources**, especially **hydropower and bioenergy**, making clean energy a long-standing part of its electricity mix. Europe ranks high because of **strong climate policies, early energy transition, and heavy investments** in wind and solar. Both regions also prioritize **energy security and emission reduction**, driving a higher renewable share in total consumption.

**Top Region by Renewables Investment (US$ Billion)**

Asia Pacific leads due to rapid demand, manufacturing capacity, and policy support, while Europe leads through climate-driven strategies and long-term green investment plans — together accounting for the bulk of global renewable investment.

Or

Asia Pacific attracts major investment due to **rapid energy demand growth**, **large-scale solar and wind expansion**, and its role as a **global manufacturing hub** for clean technologies. Europe’s high investment stems from **ambitious net-zero goals**, **green financing mechanisms**, and **advanced renewable infrastructure**. Together, these factors make both regions central to the world’s renewable energy investment landscape.

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**Energy Source Distribution & Consumption Trends**

**Energy Consumption by Source (TWh)**

**Explain Energy Consumption Mix and Transition**

The global energy mix includes fossil fuels (coal, oil, and natural gas), renewables (solar, wind, hydro, bioenergy), and nuclear power. In many countries, fossil fuels still dominate because they are abundant, well-established, and supported by existing infrastructure, making them cheaper and more reliable for large-scale energy needs. However, growing climate concerns, rising carbon costs, and advancements in clean technologies are driving a strong shift toward renewable sources. Regions are increasingly investing in renewables to reduce emissions, enhance energy security, and achieve long-term sustainability goals.

**Fossil Fuels Energy Consumption by Source**

* **Why Asia Pacific Consumes Most of Its Fossil Fuels energy from Coal**

Asia Pacific—especially China, India, and Indonesia—relies heavily on coal because it is abundant, locally available, and affordable. These countries have large domestic coal reserves, making it a reliable source to fuel rapid industrialization, power generation, and economic growth. Building coal-based infrastructure was faster and cheaper than transitioning to other fuels, which is why coal still dominates despite its environmental impact.

* **Why the Middle East and Africa Consume More Energy from Oil and Gas**

The Middle East has the world’s largest oil and natural gas reserves, making these resources the backbone of its economy and energy system. Abundant local supply, low extraction costs, and strong export infrastructure keep oil and gas as primary fuels. In Africa, several nations also depend on oil and gas for revenue and electricity generation, as renewables infrastructure remains underdeveloped. Hence, resource availability and economic dependence make oil and gas dominant in these regions.

**Renewable Energy Consumption by Source**

**Why Hydro Energy Holds the Major Share Among Renewables**

Hydropower dominates global renewable energy consumption because it is one of the oldest, most reliable, and cost-effective renewable sources. It provides continuous (base-load) electricity, unlike solar and wind which depend on weather. Many countries already built large hydropower dams decades ago, giving hydro a strong existing infrastructure base. Additionally, hydro projects offer energy storage through reservoirs, helping balance supply and demand — making it the backbone of renewable electricity generation worldwide.

**Total Energy Consumption vs Renewable Share in Energy Consumption**

**Why Asia Pacific Has the Highest Energy Consumption**

Asia Pacific has the largest population and fastest-growing economies, including China, India, and Southeast Asia, which drive huge demand for electricity, transport, and industrial energy. Rapid urbanization, manufacturing, and rising living standards increase both household and industrial energy use. Additionally, the region’s dependence on energy-intensive industries like steel, cement, and chemicals further raises consumption. As a result, Asia Pacific accounts for the highest share of global energy demand.

**Small Charts (Total Fossil Consumption (TWh) by Region and Total Renewables Consumption (TWh) by Region)**

**Why Asia Pacific Renewable Share Is Low Despite High Absolute Consumption**

In absolute terms, Asia Pacific — especially India and China — leads global energy use from both fossil and renewable sources due to its large population and rapid economic growth. However, in relative terms, India’s renewable share is low because its total energy demand is extremely high, and much of it is still met by coal and oil to support industrialization and affordable power supply. Limited renewable infrastructure, dependence on existing fossil-based systems, and challenges like grid stability, financing, and storage also slow the transition. As a result, even though India’s renewable capacity is expanding, it forms a smaller percentage of total energy consumption compared to other regions.

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**Electricity Generation & Demand Analysis**

**KPIs:**

**🔹 Total Electricity Generation (TWh)**  
Shows the total electricity produced across all sources — a key indicator of a region’s energy capacity and economic activity.

**🔹 Electricity Supply–Demand Gap (TWh)**  
Measures the difference between generated and required electricity, highlighting energy shortages or surpluses critical for planning and investment decisions.

**🔹 Renewable % in Total Electricity Generation**  
Indicates the share of clean energy in total power generation, reflecting progress toward sustainability and decarbonization goals.

**🔹 Fossil % in Total Electricity Generation**  
Shows the dependence on coal, oil, and gas for electricity, useful for assessing carbon intensity and transition challenges.

**🔹 Electricity Demand Per Person (MWh)**  
Represents the average electricity use per person, capturing lifestyle, industrialization level, and overall energy efficiency trends.

**Electricity Generation by Source (TWh)**

**Why Nuclear Electricity Share Is High in Europe and North America**

Europe and North America have a long history of nuclear development, with large-scale reactors built since the 1970s to ensure energy security and reduce dependence on imported fossil fuels. These regions possess advanced technology, strong regulatory frameworks, and high investment capacity, enabling safe and efficient nuclear operations. In contrast, many developing regions have a low nuclear share due to high setup costs, safety concerns, lack of expertise, and public opposition. As a result, nuclear power remains a key low-carbon energy source mainly in Europe and North America.

**Future Trends in Electricity Demand (TWh)**

* **Why Asia Pacific Has High Total but Low Per Person Electricity Demand**

Asia Pacific’s total electricity demand is highest because it has the largest population and fastest-growing economies, driving huge overall consumption. However, its electricity demand per person is low since energy use is spread across billions of people, and many still have lower living standards, limited access to electricity, and smaller household or industrial consumption compared to developed regions like North America and Europe. Thus, while total demand is massive, per capita usage remains relatively low due to economic and lifestyle differences.

* **Why Electricity Demand Fell in 2020 and 2023**

Global electricity demand fell in 2020 mainly due to the COVID-19 pandemic, which caused widespread lockdowns and sharply reduced industrial and commercial activity, cutting power use in some regions (IEA, Global Energy Review 2021). In 2023, demand declined again across several regions because of economic slowdowns, high energy prices, and milder weather that lowered heating and cooling needs (IEA, Electricity 2024 Report). Additionally, growing energy efficiency measures and distributed renewable generation further limited demand growth. Overall, both years reflected temporary shocks combined with structural shifts in global electricity consumption.

**Why Asia Pacific experience Electricity Demand Supply Deficit and Why there is a surplus in Middle East and Africa.**

The Asia Pacific region struggles with infrastructure, transmission losses, grid stability, and intermittent renewable supply, which prevent generation from always meeting peak or localized demand.

To fill these gaps, Asia Pacific utilities rely on backup fossil generation (gas, coal), imports from neighboring grids (where interconnections exist), and peaking plants.

By contrast, some countries in Middle East and Africa have a surplus in electricity generation capacity. This is often due to large fossil fuel resources, under-utilized demand, and investments in power plants that outpace local consumption. Some surplus is used to export electricity to neighboring countries, others see surplus as underutilized capacity or run plants at lower utilization.

**Why Is Most Electricity Still Generated from Fossil Fuels, and Why Is Renewable Adoption Slow?**

Fossil fuels remain dominant because they are affordable, dependable, and supported by well-established infrastructure that ensures steady power supply. In contrast, renewables face high initial costs, storage limitations, and grid integration challenges, which slow their expansion—especially in developing regions. However, falling technology costs and stronger climate policies are gradually accelerating the global shift toward clean energy.

**Year-on-Year % Change in Electricity Generation by Source Graph Explanation**

Global electricity generation trends show that renewables have maintained steady year-on-year growth, supported by falling costs and policy incentives. In contrast, fossil and nuclear generation fluctuated due to economic cycles, fuel crises, and plant maintenance issues. The pandemic in 2020 caused a sharp drop in overall demand, but renewables continued to rise, reflecting the world’s gradual transition toward cleaner energy.

**Why Latin America and Europe Leads in terms of renewable share in total electricity generation?**

Latin America and Europe have the highest renewable electricity shares because of their early policy support, favourable geography, and strong climate commitments. Latin America benefits from abundant hydropower resources in countries like Brazil and Colombia, providing a natural renewable base. Europe’s leadership stems from aggressive renewable policies, carbon pricing, and heavy investment in wind and solar infrastructure, driven by EU climate goals and energy security concerns. *(Sources: IEA, World Bank, REN21 Global Status Report)*

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**Why ” energy investment as a percentage of GDP” is important factor to analyses and what does it depicts. And If it is positive and growing, what does it depicts? What can be the possible reasons of falling energy investment as a percentage of gdp, even if the GDP is increasing continuously over the years. This trend is shown in different time periods in different region.**

Energy investment as a percentage of GDP measures how much of a country’s economic output is allocated to developing energy infrastructure, reflecting its focus on energy security and future growth. A rising share indicates increasing investment in energy capacity, modernization, or policy support, while a declining share—even amid continuous GDP growth—can result from faster economic expansion, improved energy efficiency, lower capital needs, a mature energy sector, or regulatory and market constraints. This trend helps assess how energy development keeps pace with economic growth across regions and periods.

**What can be the possible reasons of falling renewable energy investment as a percentage of total energy investment, even if the total energy investment is increasing continuously over the years. This trend is shown in different time periods in different region. What can be the possible reasons.**

Renewable energy investment as a share of total energy investment can decline even if overall energy investment is rising. This can happen when non-renewable projects grow faster, the renewable sector matures, policy support or incentives decrease, costs or technological challenges slow deployment, or new energy demand is met by conventional sources. Such trends reflect shifts in investment priorities across regions and time periods.

**Why Asia Pacific is investing highest in the Clean energy as compared to other regions.**

Asia Pacific leads global clean energy investment due to rapid economic growth, strong energy demand, and ambitious decarbonization policies. Governments across the region are actively promoting renewable energy through supportive regulations and incentives, while technological advancements and a growing focus on energy security further drive investment. Together, these factors make Asia Pacific the most attractive and dynamic region for clean energy development.

**Why Asia Pacific and Europe are Top Region by Renewable % in Energy Investment?**

Asia Pacific and Europe lead in renewable energy investment as a share of total energy investment because both regions prioritize decarbonization, energy transition, and sustainability. Strong government policies, supportive incentives, and ambitious climate goals drive investment in renewables, while economic growth and technological advancements make renewable projects increasingly viable and attractive compared to conventional energy sources.

**Why North America and Europe has high Energy Investment Intensity per Unit of Energy consumption (i.e. Energy Investment/ Energy consumption) as compared to other regions.**

North America and Europe have high energy investment intensity because they focus on modernizing and upgrading energy infrastructure, integrating advanced technologies, and transitioning to cleaner energy sources. Higher capital costs for efficiency improvements, grid modernization, and decarbonization projects mean more investment is needed per unit of energy consumed compared to regions with lower technological or infrastructure requirements.