## 1. Average Efficiency

```
Avg Efficiency % = AVERAGE('Data'[Efficiency_%])
```

## 2. Total Electrical Output

```
Total Electrical Output (MWh) =
SUM('Data'[Electrical_Output_MWh_per_hr])
```

## 3. Total Fuel Input Energy

```
Total Fuel Input (GJ) = SUM('Data'[Fuel_Input_Energy_GJ_per_hr])
```

## 4. Average Auxiliary Power

```
Avg Auxiliary Power % = AVERAGE('Data'[Auxiliary_Power_%])
```

## 5. Average Condenser Pressure

```
Avg Condenser Pressure = AVERAGE('Data'[Condenser_Pressure_bar])
```

These measures directly power the KPI cards you see at the top of the dashboard.

---

# 4. Designing the Dashboard Layout

One thing I learned while designing Looker Studio dashboards for Vectra International is the importance of hierarchy and visual flow. The same principles apply in Power BI.

Here's the exact layout structure I use:

## Section 1 → KPI Cards (High-Level Metrics)

- Avg Auxiliary Power (%)
- Avg Condenser Pressure
- Avg Efficiency (%)
- Total Electrical Output
- Total Fuel Input Energy

These KPIs answer the question:
**"What is happening at the fleet level?"**

## Section 2 → Breakdown Charts

- **Bar chart**: Avg Efficiency by Boiler Type
- **Column chart**: Avg Efficiency by Fuel Type
- **Donut chart**: Avg Efficiency by Ownership
- **Pie chart**: Avg Efficiency by Region
- **Bar chart**: Top 10 Power Plants by Efficiency
- **Scatter chart**: Output vs Efficiency (with Boiler Type legend)

This section addresses:
**"Why is it happening?"**
**"Which plant types are performing better?"**

## Section 3 → Filter Panel

On the right side:

- Boiler Type
- Fuel Type
- Ownership
- Region
- Plant Name

This allows decision-makers to slice the entire dashboard instantly.

---

# 5. Building Each Visual (Step by Step)

Let's walk through the visuals just like I do during classroom training.

---

## A. KPI Cards

Go to:
**Visualizations → Card**

Use these measures:

- Avg Auxiliary Power %
- Avg Condenser Pressure
- Avg Efficiency %
- Total Electrical Output
- Total Fuel Input

Format with:

- Bold headers
- No background or transparent
- Rounded corners
- Green color for good performance metrics

---

## B. Avg Efficiency by Boiler Type (Bar Chart)

Steps:

1. Select **Clustered Bar Chart**
2. Axis → Boiler_Type
3. Values → Efficiency_% (Average)
4. Sort by descending efficiency

Observation (as seen in the dashboard):

- Ultra Supercritical → Highest efficiency
- Subcritical → Lowest

This mirrors real-world performance patterns.

---

## C. Avg Efficiency by Fuel Type

Use a **Column Chart**.
Axis → Fuel_Type
Values → Efficiency_%

In real engineering scenarios, Biomass often appears more efficient due to specific plant designs—our chart reflects that pattern.

---

## D. Avg Efficiency by Ownership (Donut Chart)

I prefer donut charts for categorical percentages when the dataset has only two categories (Public vs Private).

Steps:

- Visual: Donut
- Legend: Ownership
- Values: Average Efficiency

---

## E. Avg Efficiency by Region (Pie Chart)

Steps:

- Visual: Pie chart
- Legend: Region
- Values: Average Efficiency

This also works well when you want a geographic slice without map visuals.

---

## F. Top 10 Plants by Efficiency (Bar Chart)

Steps:

1. Select **Bar Chart**
2. Axis: Plant_Name
3. Values: Efficiency_%
4. Filter → Top N → 10 by Efficiency %

This instantly highlights high-performing plants.

---

## G. Scatter Chart – Output vs Efficiency

This visual tells a powerful story.
Steps:

1. Visual: Scatter
2. X-Axis: Electrical Output
3. Y-Axis: Efficiency
4. Legend: Boiler Type
5. Add a Trend Line (Analytics → Trend Line)

In my digital marketing dashboards, scatter + trend lines help identify high-ROI campaigns; here they highlight high-output, high-efficiency plants.

---

# 6. Adding Slicers (Filters)

Go to **Visualizations → Slicer**

Create slicers for:

- Boiler_Type
- Fuel_Type
- Ownership
- Region
- Plant_Name

Use dropdown style for a clean, professional look.

---

# 7. Report theming and final touches

In my corporate dashboards (GA4, LI Insights, Meta Ads, CRM), branding and aesthetics matter just as much as analysis.

Apply these finishing touches:

## Use a consistent color palette

Green for performance
Blue for outputs
Yellow/red for variations

## Add borders & drop shadows for depth

## Use a clean header

**"Thermal Power Plants – Efficiency Analysis – Part 1"**

## Add your institute or brand tagline

"Created by Slidescope.com – Training Institute"

Small design details dramatically improve the dashboard's impact.

---

# 8. Analyzing Insights (How to Read the Dashboard)

## Key insight 1: Boiler Type Performance

Ultra Supercritical boilers show the highest average efficiency (~38%).
This is expected—higher pressure and temperature mean better thermodynamic performance.

## Key insight 2: Fuel Type Variation

Biomass plants show the highest efficiency here.
Coal follows closely.

## Key insight 3: Ownership Trends

Private plants tend to have slightly higher efficiencies, often due to better maintenance and modernization cycles.

## Key insight 4: Regional Differences

Regions show different efficiency levels due to ambient temperature, cooling water availability, and plant age.

## Key insight 5: Scatter Chart Trend

A positive trend line suggests that higher electrical output often correlates with better efficiency—common in large, modern plants.