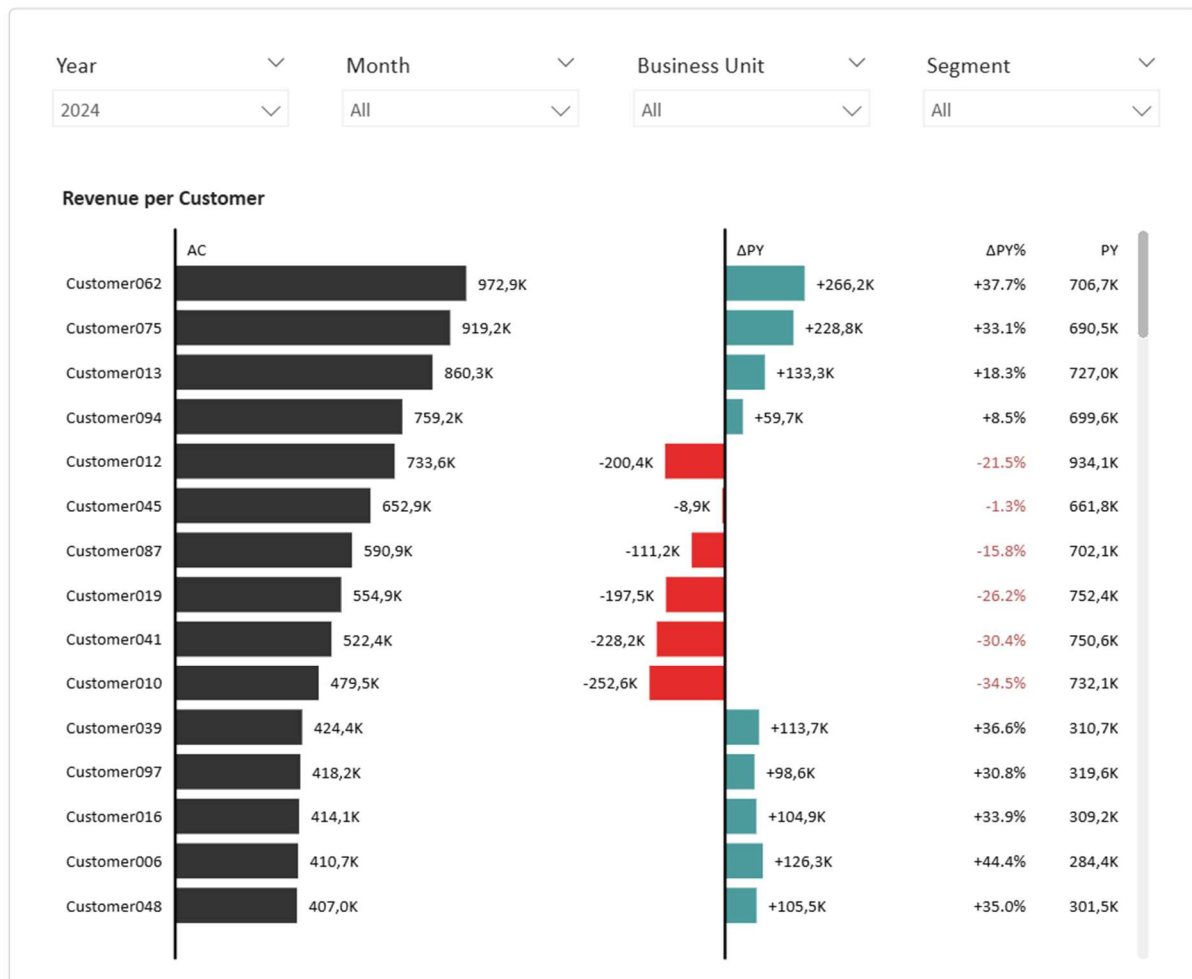# Create a Bar Chart with Absolute Variance using a native stacked bar chart in Power BI - Step by Step from Scratch

Intro

I built this variance chart using only the native Stacked Bar Chart in Power BI.
To get everything perfectly lined up, I relied on transparent bars with widths dynamically calculated using Visual Calculations.
Since data labels aren't supported by Visual Calculations, I used DAX for the label values shown inside the transparent bars.
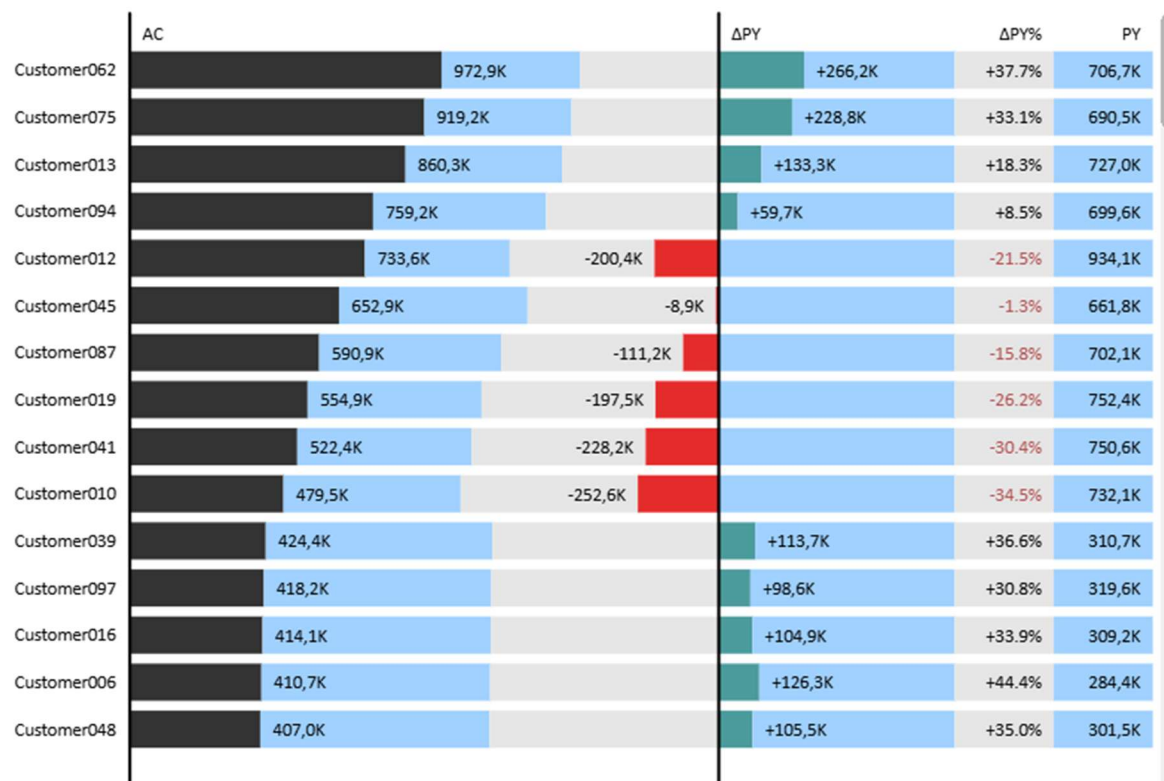I spent quite a bit of time fine tuning the layout and bar widths so the chart stays responsive and adapts well to different visual sizes.
It was a real puzzle at times, as building this from scratch does require some effort especially with all the Visual Calculations involved.
But once you have the setup in place, the Visual Calculation logic is easy to reuse for other reports or scenarios.

Building the visual from scratch (as shown in this guide) is a bit time consuming especially due to the visual calculations and reference lines involved.

Revenue per Customer

Customer	AC		ΔPY	ΔPY%	PY
Customer062	972,9K		+266,2K	+37.7%	706,7K
Customer075	919,2K		+228,8K	+33.1%	690,5K
Customer013	860,3K		+133,3K	+18.3%	727,0K
Customer094	759,2K		+59,7K	+8.5%	699,6K
Customer012	733,6K	-200,4K		-21.5%	934,1K
Customer045	652,9K	-8,9K		-1.3%	661,8K
Customer087	590,9K	-111,2K		-15.8%	702,1K
Customer019	554,9K	-197,5K		-26.2%	752,4K
Customer041	522,4K	-228,2K		-30.4%	750,6K
Customer010	479,5K	-252,6K		-34.5%	732,1K
Customer039	424,4K		+113,7K	+36.6%	310,7K
Customer097	418,2K		+98,6K	+30.8%	319,6K
Customer016	414,1K		+104,9K	+33.9%	309,2K
Customer006	410,7K		+126,3K	+44.4%	284,4K
Customer048	407,0K		+105,5K	+35.0%	301,5K

Step 1 - Create 6 DAX measures

Copy and paste the following DAX measures (if not already available in your model). In this example I used Revenue as the base measure, but you can use any metric (gross profit, etc.). For the comparison value, you can also choose budget instead of previous year.

---

1. Revenue =
```
SUM(fact_table[Revenue])
```

2. Revenue PY =
```
CALCULATE (
    [1. Revenue],
    DATEADD ('dim_calendar'[Date], -1, YEAR )
)
```

3. Revenue abs. var. PY =
```
[1. Revenue] - [2. Revenue PY]
```

4. Revenue neg. abs. var. PY =
```
VAR __Variance =   [3. Revenue abs. var. PY]

VAR __Result =
    IF(
        __Variance < 0,
        __Variance,
        BLANK()
    )

RETURN __Result
```

5. Revenue pos. abs. var. PY =
```
VAR __Variance =   [3. Revenue abs. var. PY]

VAR __Result =
    IF(
        __Variance >= 0,
        __Variance,
        BLANK()
    )

RETURN __Result
```

6. Revenue rel. var. % PY =
```
// Caps extreme variances (>100% or <-100%) for visual clarity
VAR __Variance =        [3. Revenue abs. var. PY]
VAR __Comparison =      [2. Revenue PY]
VAR __VariancePercent = DIVIDE ( __Variance, __Comparison )

VAR __Result =
        SWITCH(
            TRUE(),
            __VariancePercent > 1,    ">100%",
            __VariancePercent < -1,   "<100%",
            FORMAT(__VariancePercent, "+0.0%;-0.0%;0%")
        )

RETURN __Result
```

Step 2 - Get the basics in place

- Add a year/month slicer to the canvas
- Add stacked bar chart to the canvas
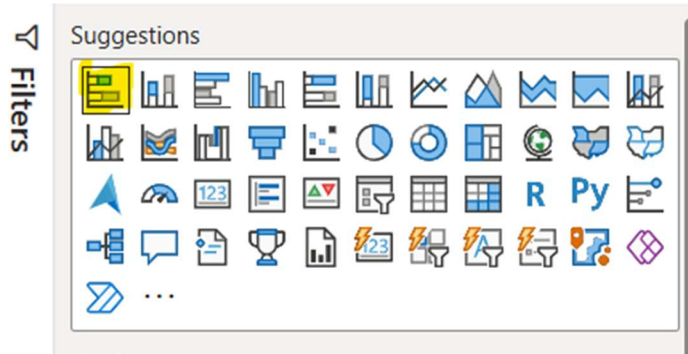
- Add dim_customer[Customer] to the Y-axis of the stacked bar chart (alternatively, you can use any other dimension or a field parameter)
- Add [1. Revenue] to the X-axis and rename to 'AC'
- Add [3. Revenue abs. var. PY] to the tooltip and rename to 'Variance'

The visual calculations reference the names 'AC' and 'Variance', so the measure names must be renamed accordingly.

Make sure:
- 'Title' and 'Data labels' are turned 'On'
- 'Legend', 'Zoom slider', 'Ribbons' and 'Total Labels' are turned 'Off'
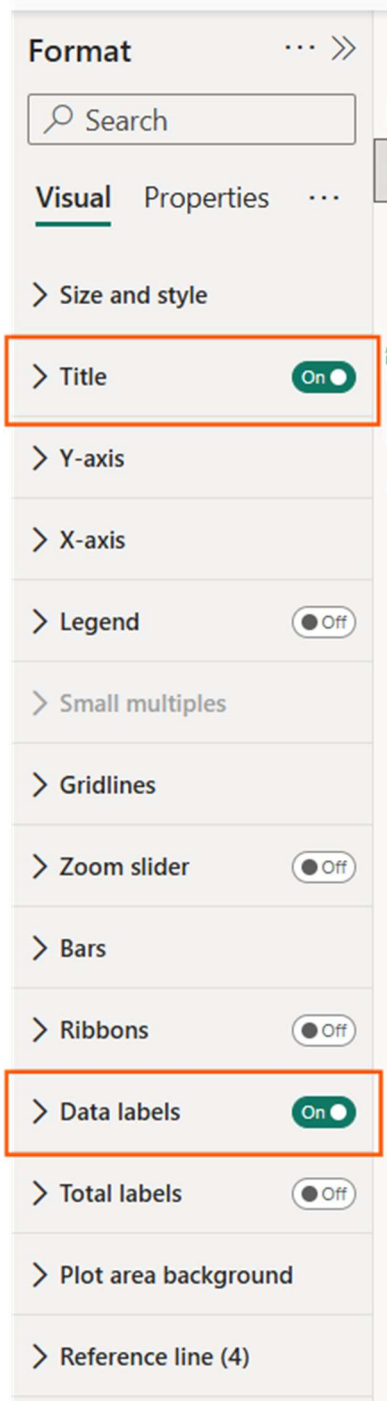
In the visual format settings, ensure that the layout settings of the Bars match the screenshot below. This ensures the bars appear in the correct order later.

Step 3 - Create visual calculations
Go to Modeling -> New visual calculation -> Custom
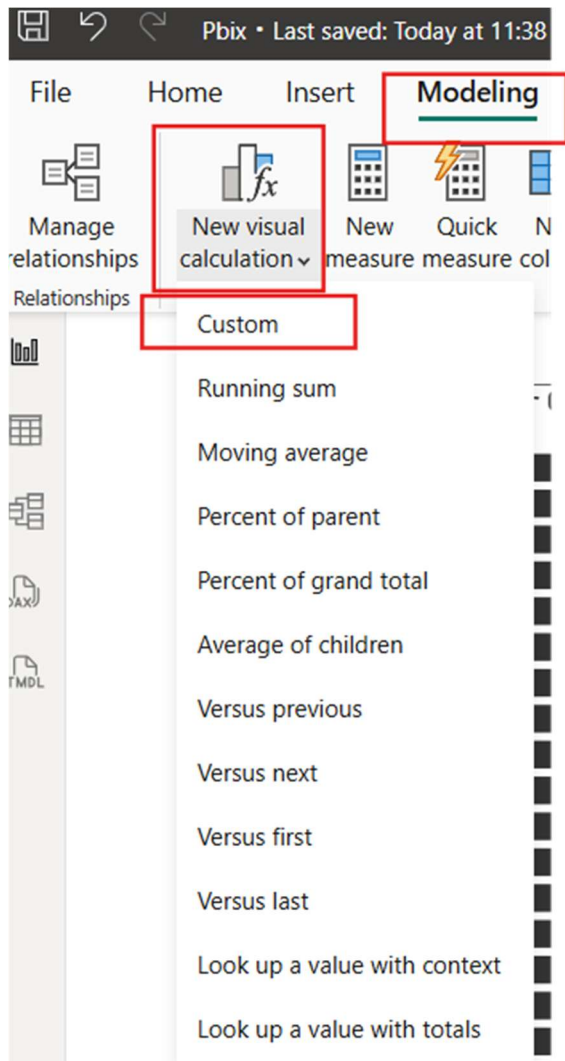
Copy and paste the visual calculations below

Max Actual Value =
```
// Helper measure to determine maximum actual value across all rows
// Used for scaling and alignment
    EXPANDALL (
        MAXX ( ROWS, [AC]),
        ROWS
    )
```

Min X-axis =
```
// Returns the lowest negative value (if present), otherwise returns 0
// Used to set the minimum X-axis value for proper chart scaling
VAR __Min_Actual_Value =
    EXPANDALL (
        MINX ( ROWS, [AC]),
        ROWS
    )
VAR __Result = IF(__Min_Actual_Value < 0, __Min_Actual_Value, 0)
RETURN __Result
```

Negative Bar =
```
// Negative variance bars are capped at 40% of the max actual value
// This prevents outliers from overlapping other visual elements and ensures
sufficient space for data labels
VAR __Variance = [Variance]
VAR __Cap = 0,4
VAR __CapValue = [Max Actual Value] * __Cap

VAR __Result =
    IF(
        __Variance < 0;
        MIN(ABS(__Variance); __CapValue)
    )

RETURN __Result
```

Ref. line abs. var. =
```
// Calculates chart width from start to reference line: max actual + max negative
bars + 50% buffer for data labels
VAR __Max_Negative_Value =
    EXPANDALL (
        MAXX ( ROWS, [Negative Bar] ),
        ROWS
    )
VAR __Multiplier = 1,5
VAR __Result = ( [Max Actual Value] + __Max_Negative_Value ) * __Multiplier
RETURN __Result
```

Transp. Bar1 =
```
// Transparent bar for positioning data labels actual values outside actual value
bars
// Multiplied by 0.5 because a second transparent bar (Transp. Bar2) is needed for
negative bar labels
VAR __ActualValue = [AC]
VAR __ActualPositiveValue = IF(__ActualValue > 0, __ActualValue, BLANK())
VAR __Result =
    ([Ref. line abs. var.] - [Negative Bar] - __ActualPositiveValue) * 0,5
RETURN __Result
```

Transp. Bar2 =
```
// Transparent bar for positioning negative variance data labels
[Transp. Bar1]
```

Positive Bar =
// Positive variance bars are capped at 40% of the max actual value
// This prevents outliers from overlapping other visual elements and ensures
sufficient space for data labels
VAR __Variance = [Variance]
VAR __Cap = 0,4
VAR __CapValue = [Max Actual Value] * __Cap

VAR __Result =
    IF(
        __Variance >= 0,
        MIN(__Variance, __CapValue)
)
RETURN __Result

Transp. Bar3 =
// Transparent bar for positioning positive variance data labels outside variance
bars
// Uses 0.35x multiplier to create appropriate spacing for data labels
VAR __Max_Positive_Bar =
    EXPANDALL (
        MAXX (ROWS, [Positive bar]),
        ROWS
)
VAR __Multiplier = 0.35

VAR __Result =
    (__Max_Positive_Bar + [Ref. line abs. var.]) * __Multiplier -
    [Positive bar]

RETURN __Result

Transp. Bar4 =
// Calculates width of transparent bar for var. % data label positioning
// Uses 0.12x multiplier to determine appropriate spacing
VAR __Multiplier = 0,12
VAR __Total_Position =
    [Ref. line abs. var.] +
    [Positive bar] +
    [Transp. Bar3]

VAR __Result = __Total_Position * __Multiplier

RETURN __Result

Transp. Bar5 =
// Transparent bar for positioning comparison value data label (same width as
Transp. Bar4)
[Transp. Bar4]

Ref. line var. % =
// Reference line position for column header placement
[Ref. line abs. var.] + [Positive bar] + [Transp. Bar3] + [Transp. Bar4]

Ref. line comparison value =
// Reference line position for column header placement
[Ref. line var. %]+[Transp. Bar5]

```
CF color var % =
// Conditional formatting of font color var. %
IF([Variance]<0,"#B34E4E","#000000")
```

After creating the visual calculations, hide these measures: 'Max Actual Value', 'Min X-axis', 'CF color var %' and all reference line measures (3x). Click the eye icons next to each measure in the visual calculation view to hide them.
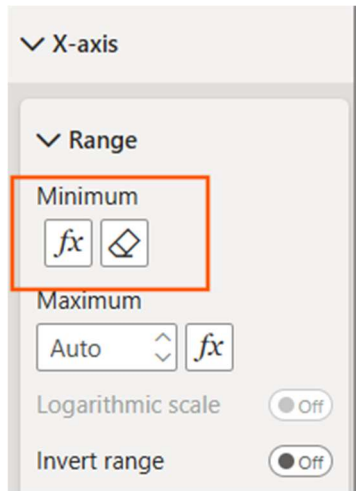
Important! Arrange the measures in the same order as shown in the screenshot below.
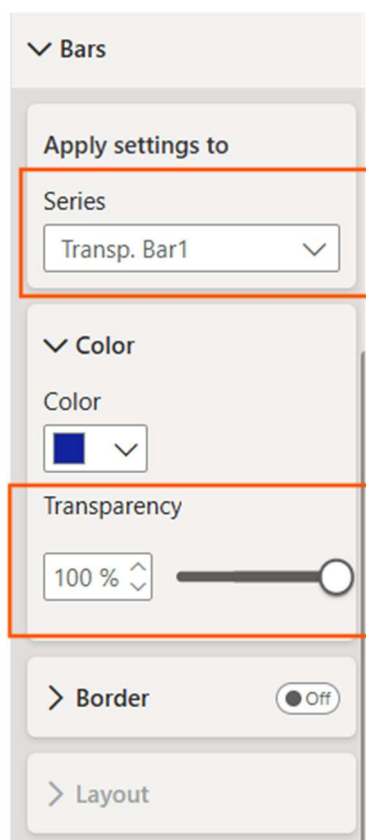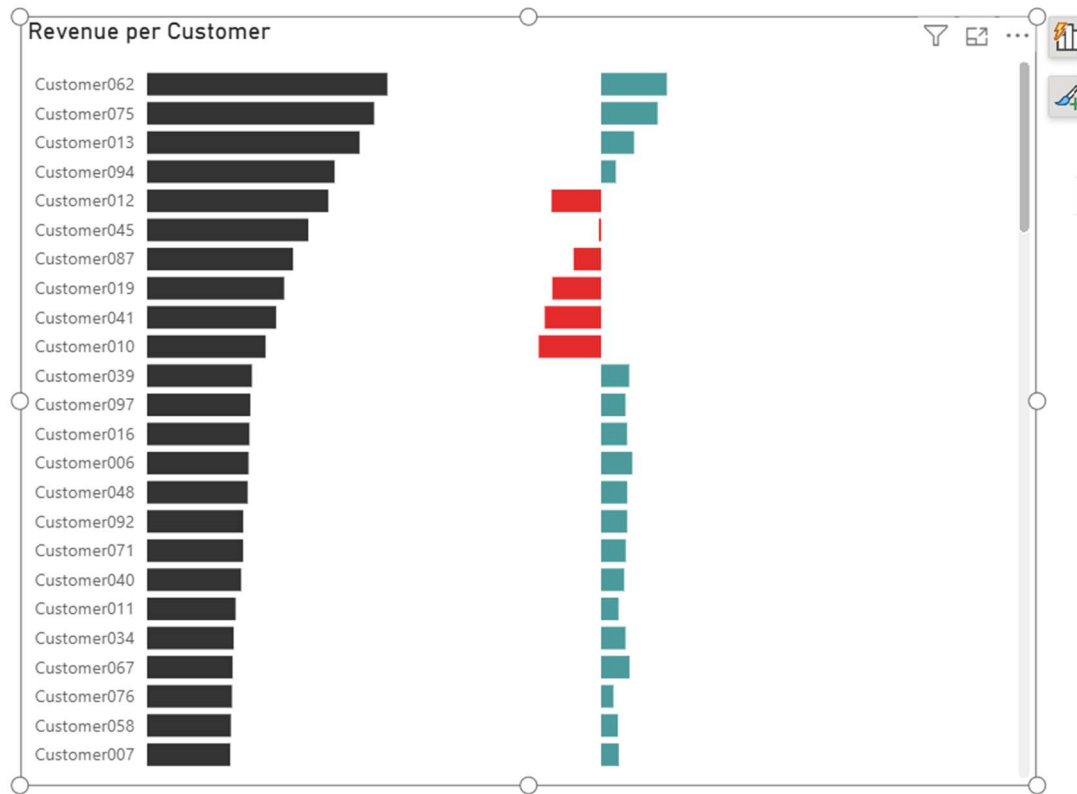
Step 4 – Visual formatting

In the visual formatting pane:

- Set a visual Title, for example 'Revenue per Customer'
- Turn Y-axis and X-axis titles off
- Set VC 'Min X-Axis' as min X-Axis value

- Go to 'Bars' and set bar colors
  - AC → choose color as preferred
  - Positive bar → green
  - Negative Bar → red
  - Set the color of all 5 Transp. Bars to 100% transparent

It should now look like this:

Step 5 – Set Data Labels

Go to data labels in the formatting pane. Turn data labels 'On' for transparent bars and 'Off' for other series. The table below shows the data label 'Position' and 'Value' that you need to set for each series. For Transp. Bar 1, 2, 3 and 5 you also need to set the display units and decimal places (or alternatively apply dynamic formatting to the DAX measures as done in the sample .pbix).
For Transp. Bar4, formatting is already applied in the DAX measure.

Series	Turn labels	Options > Position	Value > Field
AC	Off		
Transp. Bar1	On	Inside Base	[1. Revenue]
Transp. Bar2	On	Inside End	[4. Revenue neg. abs. var. PY]
Positive Bar	Off		
Negative Bar	Off		
Transp. Bar3	On	Inside Base	[5. Revenue pos. abs. var. PY]
Transp. Bar4	On	Inside End	[6. Revenue rel. var. % PY]
Transp. Bar5	On	Inside End	[2. Revenue PY]

Conditional formatting of font color var % (Transp. Bar4)
Set the Data format → Data type to Text for visual calculation 'CF color var %' (this is required to enable conditional formatting).
See screenshot below.
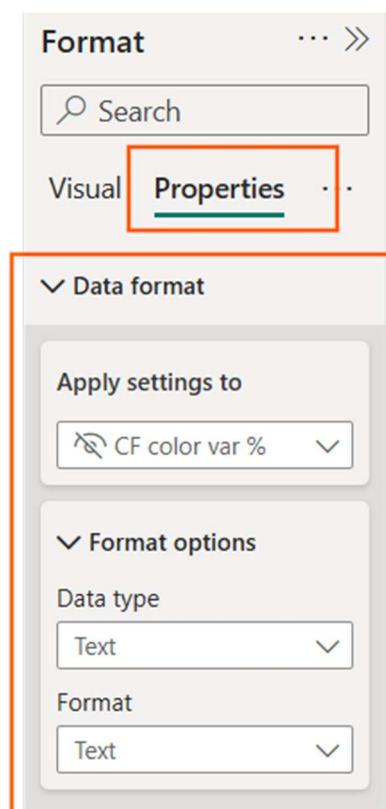
For Transp. Bar4, you can now apply conditional formatting of Font Color using the visual calculation 'CF color var %' as the Field value.

It should now look like this:
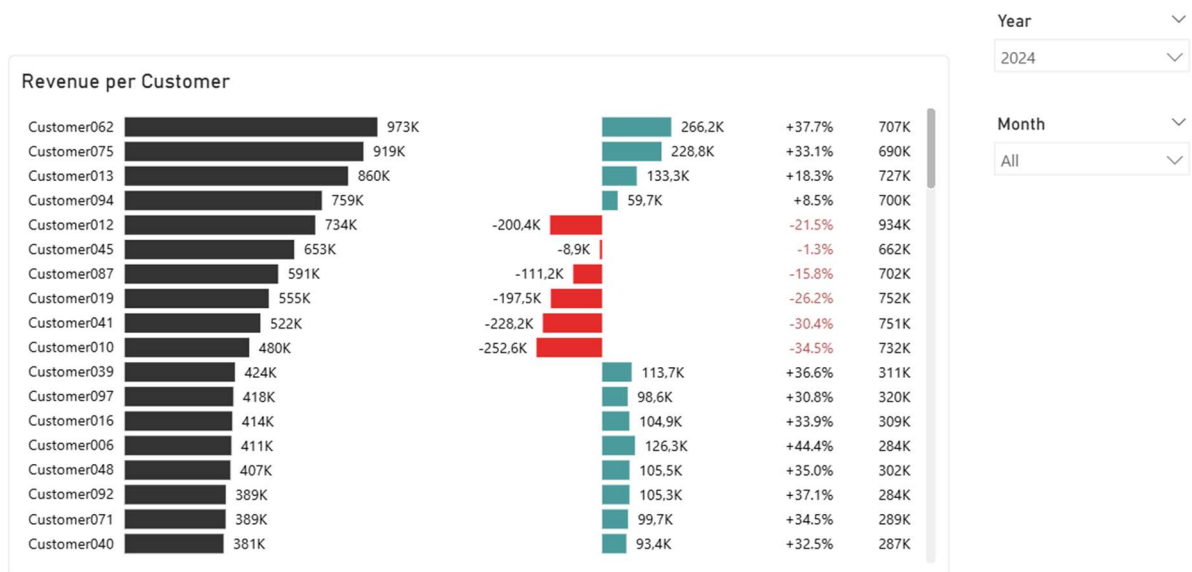
Step 6 – Add Reference Lines
The last step is adding 4 reference lines to finalize the chart

1. **Add reference line for AC (zero line)**
   See all settings in screenshots below

∨ Reference line (4)

Apply settings to

+ Add line

| AC ✎ ✕ |
| PY |
| ΔPY |
| ΔPY% |

Type

X-Axis Constant Line ∨

∨ **Line**

Value

| 0 | *fx* |

Color

■ ∨

Transparency

| 0 % | ◯ |

Line style

| Solid ∨ |

Width

| 2 px |

Width

| 2 px |

Position

| In front ∨ |

> Shade area ● Off

∨ Data label On ●

Horizontal position

| Right ∨ |

Vertical position

| Above ∨ |

Style

| Name ∨ |

Color

■ ∨

Display units

| None ∨ |

Value decimal places

| Auto |

2. Add reference line for absolute variance
   Select visual calculation 'Ref. Line abs. var.' as the Line 'Value'

3. Add reference line for rel. var %
   Select visual calculation ' Ref. Line var. %' as the Line 'Value'

4. Add reference line for comparison value
Select visual calculation 'Ref. Line comparison value' as the Line 'Value'

Reference line (4)

Apply settings to

+ Add line

| AC |
| PY |
| ΔPY |
| ΔPY% |

Type
X-Axis Constant Line

∨ Line

Value
fx ⬦

Color
🟦 ∨

Transparency
100 % ——○

Line style
Dashed

Scale by width ◉ Off

Width
2 px

Position
In front

> Shade area ◉ Off

∨ Data label On ◉

Horizontal position
Left

Vertical position
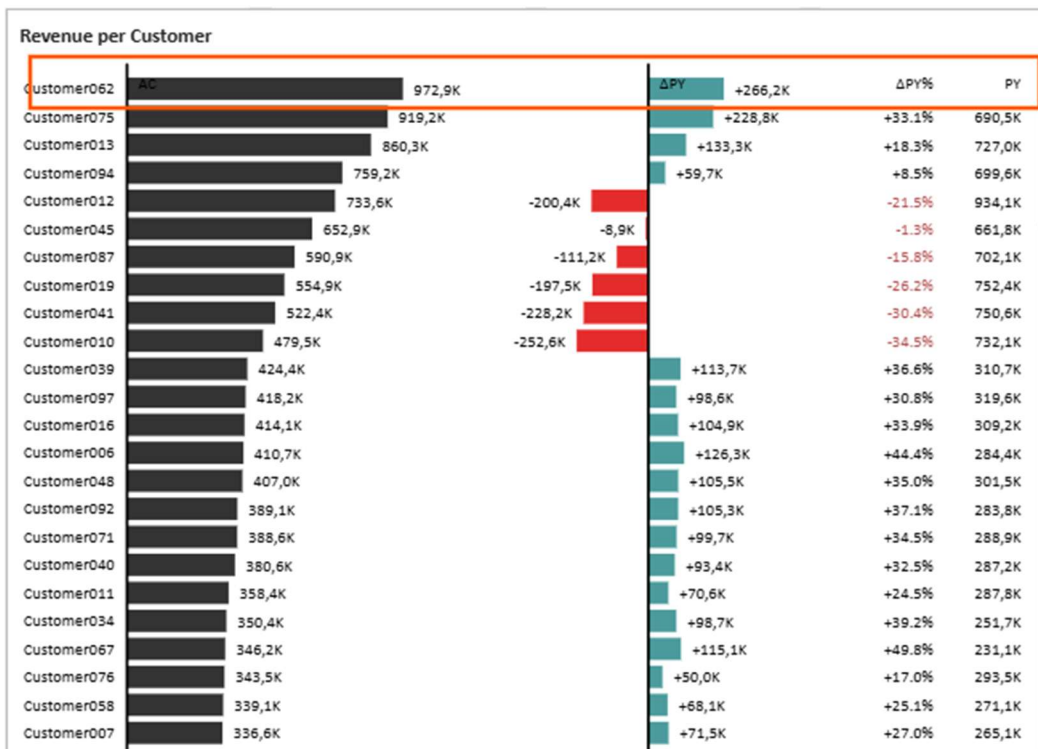Above

Style
Name

Color
⬛ ∨

Display units
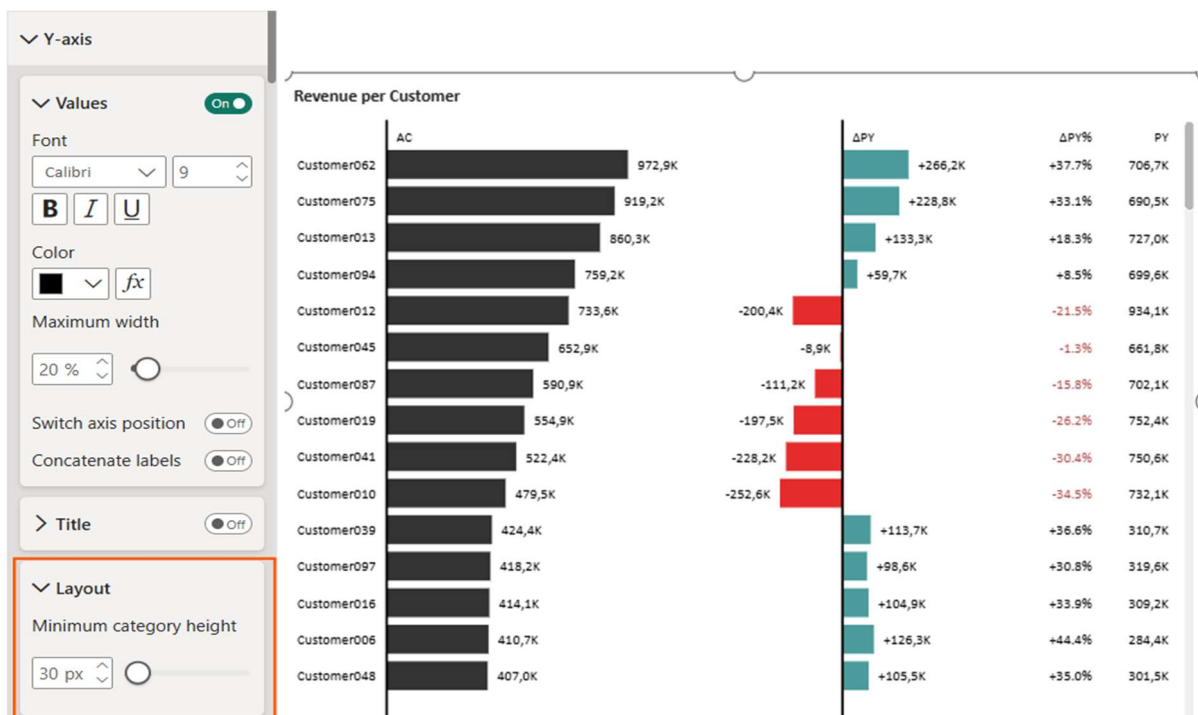Auto

Value decimal places
Auto

It should now look like this:

It can be challenging to position the reference line data labels correctly. To fix this, you can:
- Adjust the visual height
- Increase the minimum category height in Y-Axis settings. This will create more space for the data labels.

Extra – create simplified version

You can easily create a simplified version without the variance percentage and comparison value columns.

Copy and paste the visual, then:
- Remove visual calculations Transp. Bar 4 and Transp. Bar 5
- Remove hidden visual calculations 'Ref. line var. %', 'Ref. line comparison value', 'CF color var %'
- Remove the corresponding reference lines in formatting pane → reference line