



How to Create Excel Waterfall Charts That Do Not Suck

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How to Create Excel Waterfall Charts That Do Not Suck

Prior to its release, the **built-in Excel waterfall chart** was the most highly anticipated chart type in the financial community. Unsurprisingly, it has continued to enjoy widespread popularity to this day. Read on to learn why and how you can create one yourself which will bring more insights in just a few clicks.

Waterfall charts 101

A **waterfall chart** (also known as a **cascade chart** or a **bridge chart**) is a special kind of chart that illustrates how positive or negative values in a data series contribute to the total. In other words, it's an ideal way to **visualize a starting value, the positive and negative changes made to that value, and the resulting end value**. In a waterfall chart, the first column is the starting value and the last column is the end value. The floating columns between them are the contributing positive or negative values.

Note: Other fun names for waterfall charts include **Mario chart** and **flying bricks chart**, because individual chart elements resemble an old arcade game.

Some people like to connect the lines between the contributions to make the chart look like a bridge (giving us the bridge chart name), while others leave the columns floating.

Uses of waterfall charts

Waterfall charts are popular in the corporate and financial environment because they are very useful for a visualization of the positive and negative movements within a measured quantity or KPI, such as your Monthly Net Profit or Cash Flow.

Other examples of quantitative analyses, where waterfall charts are used, include:

- Visualizing profit and loss statements
- Comparing product earnings
- Highlighting budget changes on a project
- Analyzing inventory or sales over a period of time
- Showing product value over a period of time
- Creating executive dashboards

In a nutshell, use a waterfall chart whenever you want to show how a starting value increases or decreases through a series of positive or negative changes.

Tip: While the most typical waterfall chart is the one with a starting and ending value, you can also create **subtotals** as visual milestones in the series. These show up as **full columns**. For example, you might want to use **Net revenue** and **Gross Income** as two checkpoints between **Gross Revenue** and **Net income** starting and ending values.

How to create a waterfall chart in Excel

Before Office 2016 creating waterfall charts in Excel was a notoriously **difficult process**.

Note that I used the word “creating” and not “inserting”. That’s right - you did not insert a waterfall chart, you *created* it.

... using tutorials

To create a waterfall chart in Excel 2013 and earlier, you had to **define additional data series** (with complicated formulas) in the data table and then make them invisible in the chart.

And we’re not talking about 1 invisible series. If the waterfall chart dipped below zero at one point, you needed **at least seven additional series!**¹

Here are just some of the many tutorials on creating a waterfall chart in pre-2016 Excel:

- <http://peltiertech.com/excel-waterfall-charts-bridge-charts>
- <https://www.ablebits.com/office-addins-blog/2014/07/25/waterfall-chart-in-excel>
- <http://www.exceltactics.com/create-waterfall-charts-excel>
- <http://www.contextures.com/excelwaterfallchart.html>

... using templates

To get around having to follow this long process every time, people often resorted to using a **waterfall chart template**:

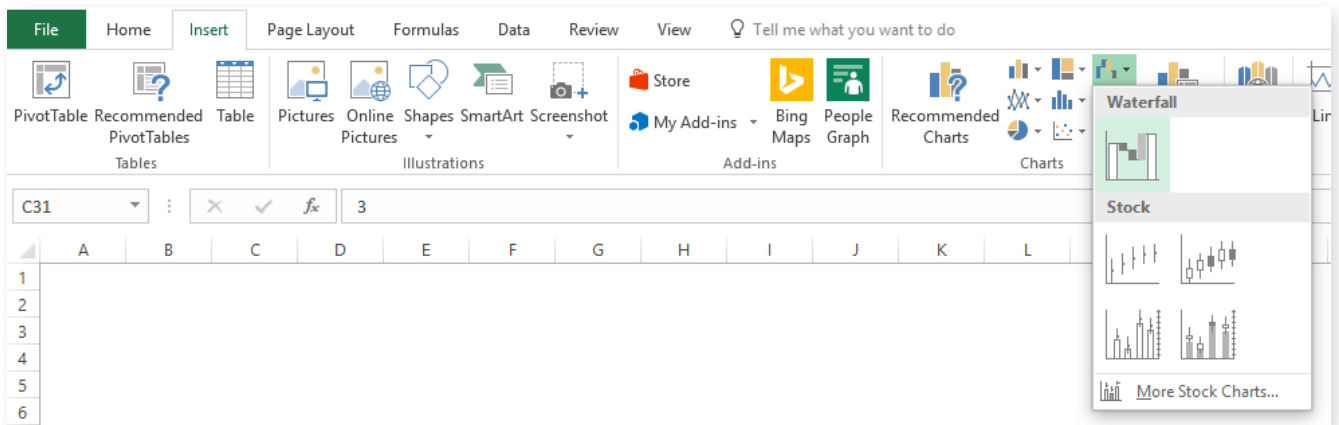
- <http://excelhelphq.com/waterfall-chart-template-download-with-instructions-supports-negative-values>
- <https://www.vertex42.com/ExcelTemplates/waterfall-chart.html>
- <https://www.smartsheet.com/how-create-waterfall-chart-excel>

Of course, using templates is not ideal. If your data has a different number of categories, you have to modify the template, which again requires **additional work**.

Ideally, you would create a waterfall chart the same way as any other Excel chart: (1) click inside the data table, (2) click in the ribbon on the chart you want to insert.

... in Excel 2016

Microsoft decided to listen to user feedback and introduced 6 highly requested charts in Excel 2016, including a built-in Excel waterfall chart.



No more templates, additional series, formulas, or tinkering with the charts. 2 clicks and your awesome waterfall chart is inserted.

Or is it?

While the addition of waterfall charts in Excel 2016 is a great step forward, the current functionality still **leaves much to be desired**.

10 steps to a perfect excel waterfall chart

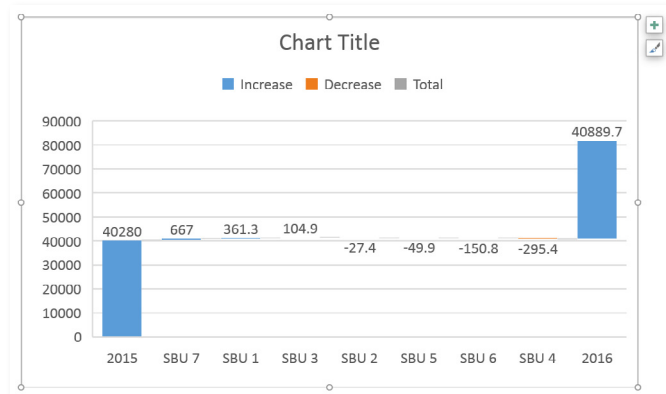
Here are some ways that can help you create better Excel waterfall charts and some things that are still missing.

1. Remember to set the totals

Let's say we want to have this data table visualized with a waterfall chart: EBITDA of our fictional company for the years 2015, 2016 and the individual contributions of 7 small business units to the change from 2015 to 2016.

	A	B	C
1			
2			EBITDA
3		2015	40280
4		SBU 7	667
5		SBU 1	361.3
6		SBU 3	104.9
7		SBU 2	-27.4
8		SBU 5	-49.9
9		SBU 6	-150.8
10		SBU 4	-295.4
11		2016	40889.7

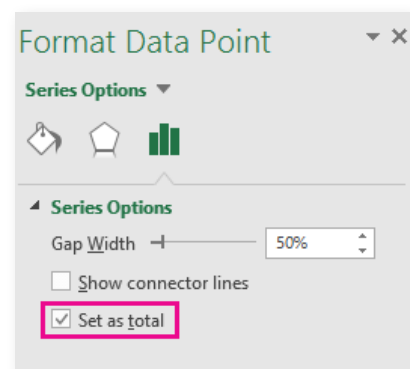
This shouldn't be too hard. Click inside the data table, go to **"Insert"** tab and click **"Insert Waterfall Chart"** and then click on the chart. Voila:



OK, technically this *is* a waterfall chart, but it's not exactly what we hoped for. In the legend we see Excel 2016 has 3 types of columns in a waterfall chart:

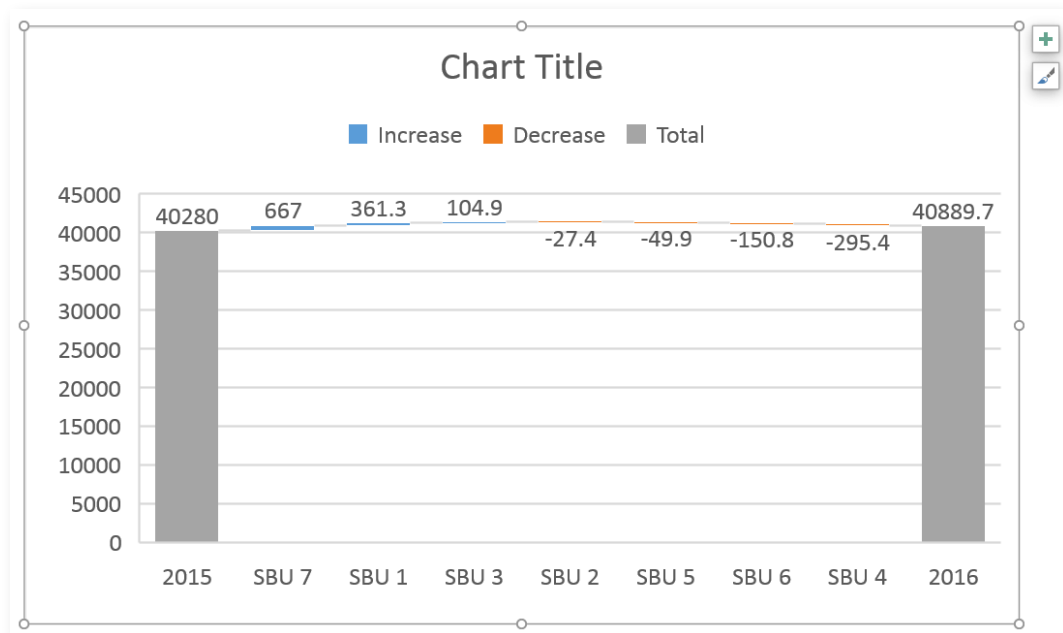
1. Increase
2. Decrease
3. Total

This is correct, but in the chart there are no Total columns, only Increase and Decrease. The first and last columns should be Total (start on the horizontal axis) and to set them as such, we have to double-click on each of them to open the **Format Data Point** task pane, and check the **Set as total** box.



You can also right click the data point and select **Set as Total** from the list of menu options.

Finally, we have our waterfall chart:

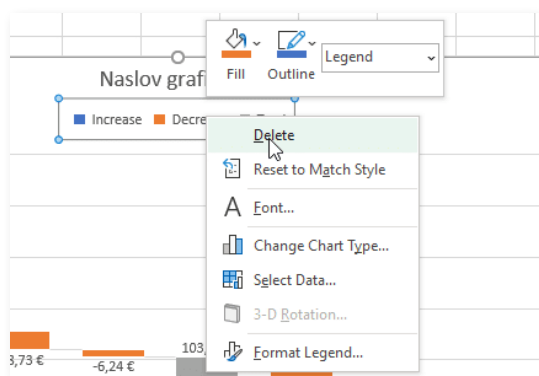


2. Ditch the clutter on your visualization

Data visualization best practice is to remove ALL elements from the visualization that are not **absolutely necessary** (if you're interested, you can learn more about this in our webinar: [Data visualization in depth²](#)).

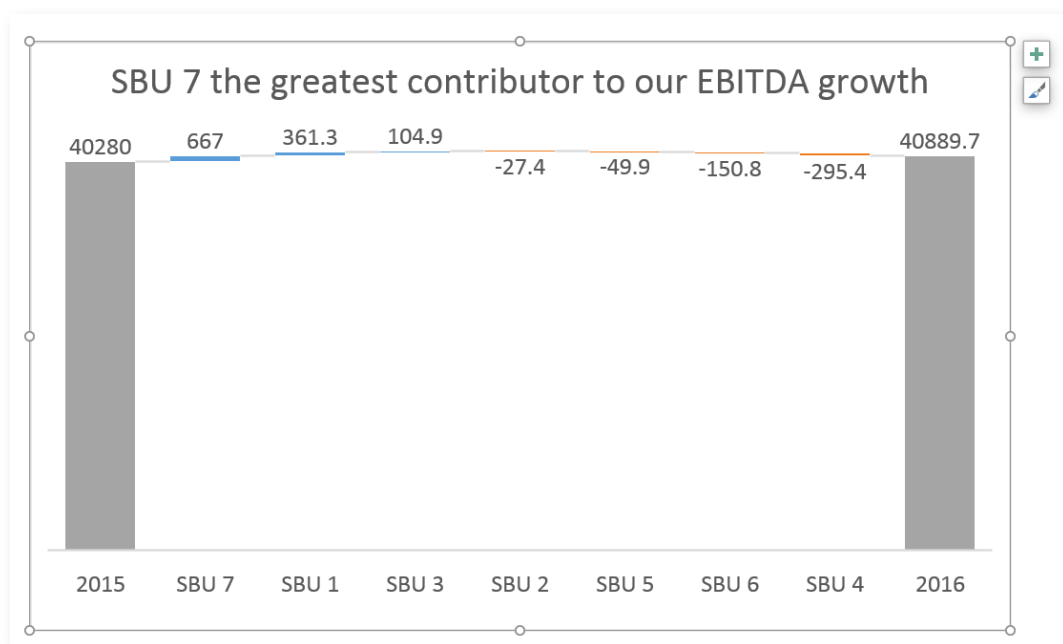
Similar to other Excel charts, the default Excel waterfall chart also suffers from having too much clutter. The legend, the vertical axis and labels, the horizontal grid lines - none of them contribute to the reader's better understanding of the data. If anything, **they are a distraction**.

So, let's remove all unnecessary elements and write our key message to the title. It's a shame that the chart title **cannot be inserted automatically** from a cell.



Tip: To remove the distracting chart elements, right-click on each of them and then click **"Delete"**.

Great, this is much better. But it required **additional work** that would not be required if Excel defaults were better. In Zebra BI for Excel, we'll show you how to do it better.



3. Break the axis to highlight contributions

This limitation is especially noticeable in waterfall charts, because waterfall charts have essentially two different types of data:

- 1. Totals:** usually the first and last column in a series.
- 2. Contributions:** the floating bricks making up the “bridge” between the two totals.
A common problem is that contributions are often very small compared to totals. This is also apparent in our example (see image above).

First, a point of order: this chart correctly visualizes the situation as the contributions really ARE that small compared to totals. Our 2016 result is essentially the same as our 2015 result.

This visualization is also completely in line with **IBCS Standards**.³

However, users (and their bosses) are sometimes **more interested in contributions than in totals** and the relationship between the two.

In this case the only viable option would be to **break the vertical axis** and have the totals start at some value larger than 0. Let's say 35,000. This highlights individual contributions, but risks guiding unaware readers to **false conclusions about the data**.

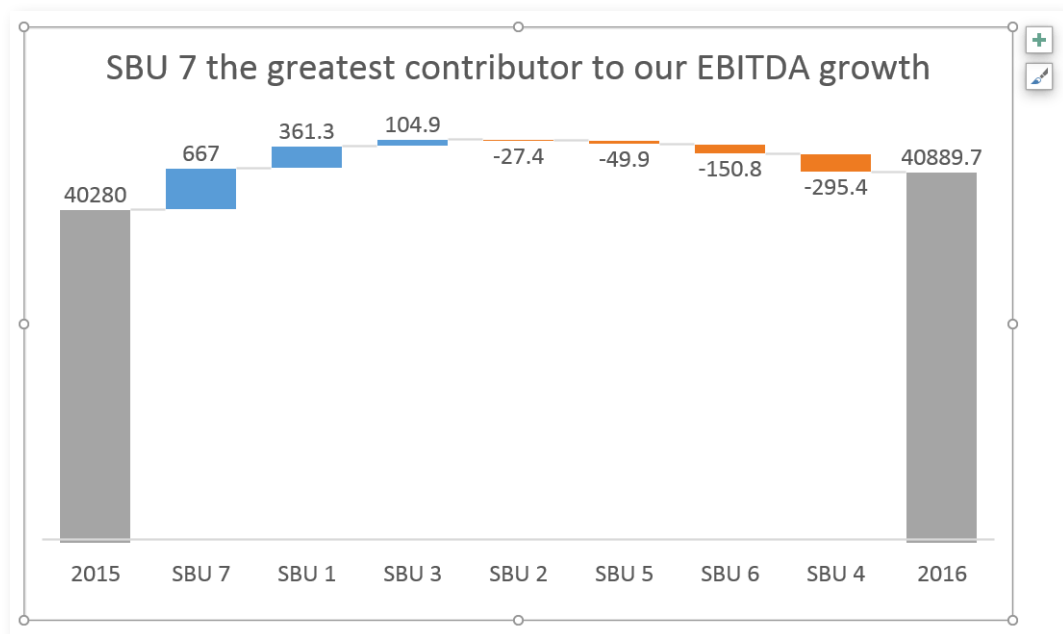
You can again resort to using tutorials and templates:

- peltiertech.com/broken-y-axis-in-excel-chart/
- tushar-mehta.com/excel/newsgroups/broken_y_axis/tutorial/index.html
- andypope.info/charts/brokencolumn.htm
- peltiertech.com/Excel/ChartsHowTo/PanelUnevenScales.html

Another, somewhat simpler option is to do the following:

- Click on the chart to select it
- Re-add vertical axis: Go to **Design >> Add Chart Element >> Axes >> Primary Vertical**
- “Break” vertical axis: right click on the vertical axis and click **“Format Axis...”**, then under • Axis Options write **“35000”** under **Bounds >> Minimum**.
- Remove vertical axis: right click on the vertical axis and click **“Delete”**

This is the chart we end up with:



Now the contributions are much more prominent, but there's **no obvious indication that the vertical axis does not start at zero** which is really bad because the user does not draw the correct conclusion from the visualization.

4. Add relative contributions in percentages

When analyzing contributions you're often more interested in **relative contributions** (in percentages of the total) than in absolute contributions.

Unfortunately if you want to do that in a default Excel waterfall chart, **you're out of luck** - you're stuck with displaying absolute contributions only.

Look to the **end of this article** to see how easy this is to do in Zebra BI.

5. Highlight differences between totals

Another thing that you're not able to do in an Excel waterfall chart is display the total **difference between 2015 and 2016** in our example.

Sure, you can see in the chart that the 2016 column is higher than the 2015 column (especially now that we cut the vertical axis). But by how much? Unless you can do complex subtractions in your head, you don't know the exact number. There's also no way to display the relative difference in percentage.

Since this **difference between totals** is rather important, it's definitely a major feature that's missing in Excel waterfall charts.

[Click here⁴](#) to see how Zebra BI does it.

6. Use vertical waterfall charts

We know from the [How to Choose the Right Business Chart⁵](#) article that **horizontal charts** (i.e. the charts that have a horizontal category axis) are used to display **time-related data**. For **everything else** we should use **vertical charts** instead.

Waterfall charts are no exception. Strangely, in Excel 2016 there is no way to insert a vertical waterfall chart. While this feature has been requested, there's no indication whether it will be implemented and when.

So if you wanted to visualize an income statement with a vertical Excel waterfall chart, you'd again have to resort to using templates and tutorials [like this one⁶](#) ...

We prepared a demonstration in Zebra BI, so you can see how to [create an income statement with vertical waterfall charts⁷](#).

7. Add (some) subtotals

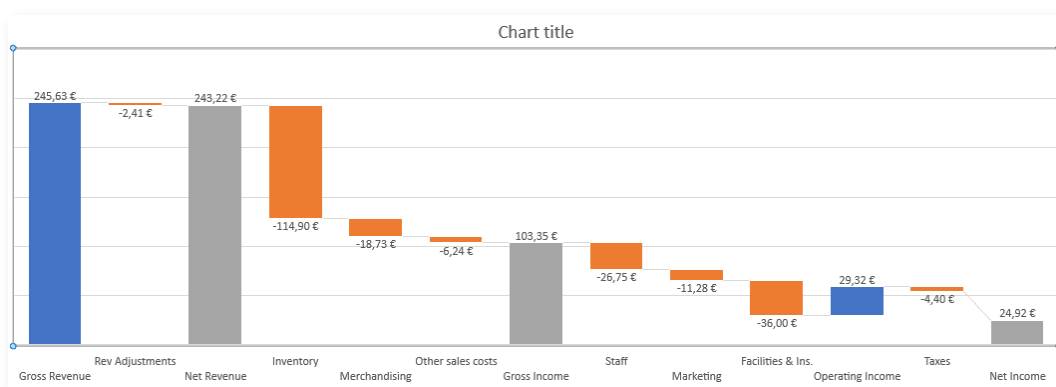
Since we're on the subject of visualizing income statements - in a typical income statement there are some categories that are actually **sums of several other categories**.

For example: you can choose to calculate a sum of all Operating Expenses (OpEx). This better visualizes the relationship between "Revenue" and "Earnings before interest and taxes" (EBIT). $EBIT = \text{Revenue} - \text{OpEx}$.

In a table this is easy to do - just write a formula and you're done.

When you create a waterfall chart in Excel? Not so much. It's apparently so hard to do it manually that there's **not a single tutorial or template** available on the internet.

You can, however, enter **subtotals** and designate them as such in your waterfall chart. However, you need to calculate them yourself to make sure they are correct.



You can see how Zebra BI automatically creates subtotals **in this handy animated gif at the end of this article**.

8. Customize your chart with colors

The default color scheme in Excel could be better. Visit the **Chart Design** tab and open the **Change Colors** gallery.

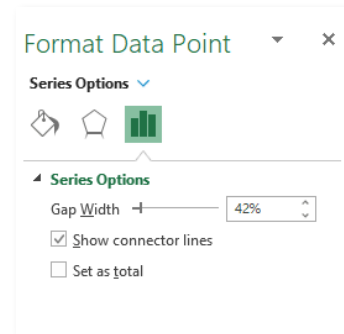
Here, you can select a color palette. You can also choose a different theme on the **Page Layout** tab. To adjust how the colors are used, click the **Colors** button and select **Customize Colors** at the bottom of the list.

You can set it up to display positive values in green and negative values in red, which is a common approach in financial reporting.



9. Turn connector lines on or off

Connector lines connect columns to show the movements in values in the chart. You can turn them on or off by right-clicking a data series to open the **Format Data Series** pane, and checking/unchecking the **Show connector lines** box.



10. Scale your charts

Finally we arrive at one major feature that's missing in Excel from the very beginning: **scaling multiple charts**.

While this problem is not limited to waterfall charts, it's too important not to mention it here.

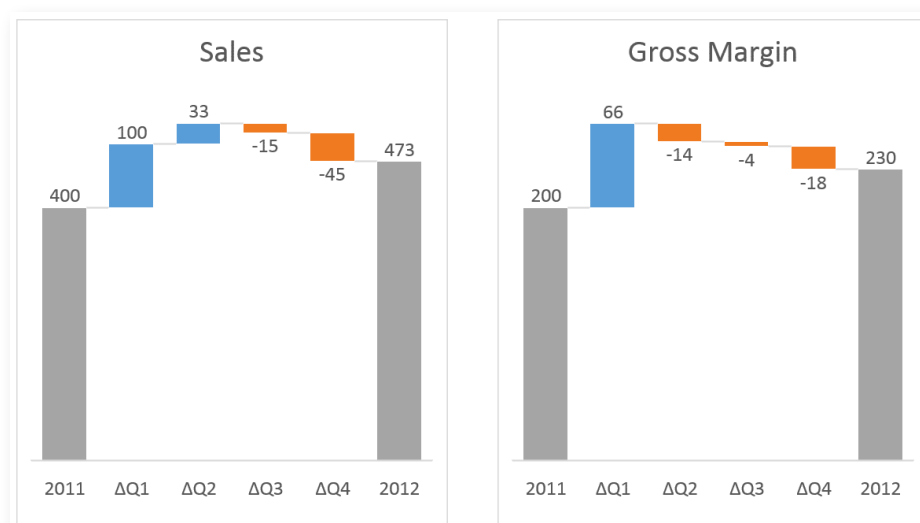
Making sure that all related charts in a report or dashboard are on the same scale is **one of the most important concepts in data visualization**.

If you don't synchronize scales, don't even insert the charts

All too often you see **two Excel charts side by side with completely different scales**. While each of them is an adequate data visualization on its own, you **must** make sure they are scaled once you put them side by side! Otherwise don't even insert the charts and just leave the data in a table.

So, how do you synchronize scales of Excel charts? While the procedure is **not particularly hard, it is time consuming**. It's a similar procedure that we used to break the axis.

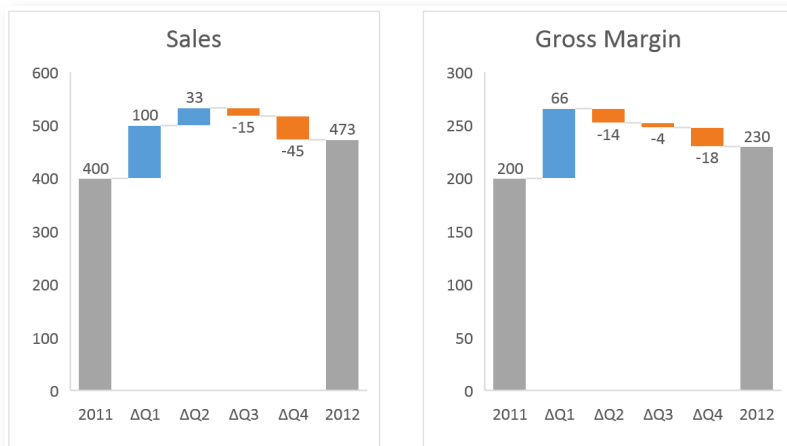
Say we have these two default Excel waterfall charts and we need to scale them:



The first step is to re-add Vertical Axis on both charts.

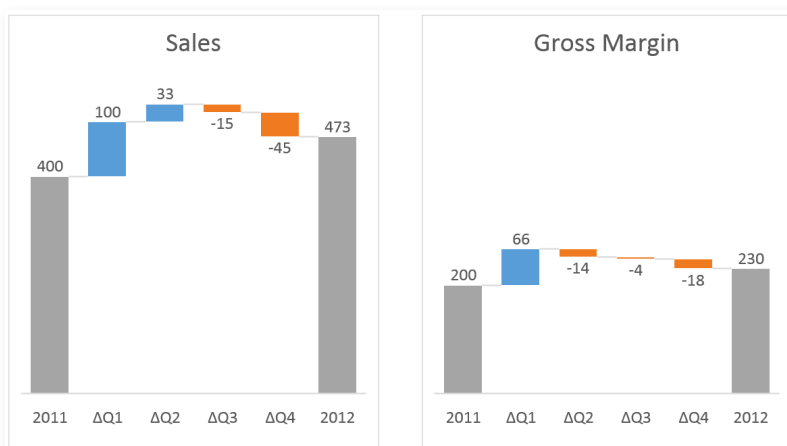
- Click on the first chart to select it
- Re-add vertical axis: Go to **Design >> Add Chart Element >> Axes >> Primary Vertical**
- Repeat for the second chart

This is what we have so far:



Now we have to adjust the scale of the right chart to be the same as the left. Right click on the vertical axis and click **"Format Axis..."**, then under Axis Options write **"600"** under **Bounds >> Minimum**.

Remove vertical axis from both charts (right click on the vertical axis and click **"Delete"**) and we have our correct visualization:

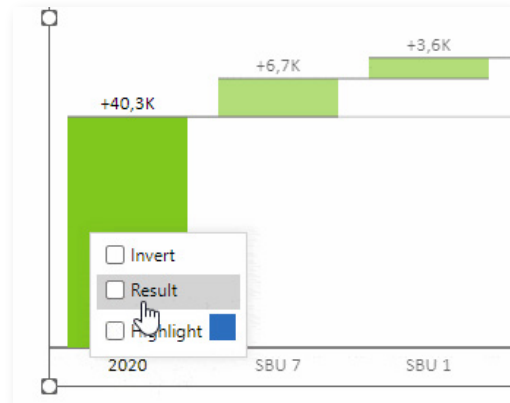
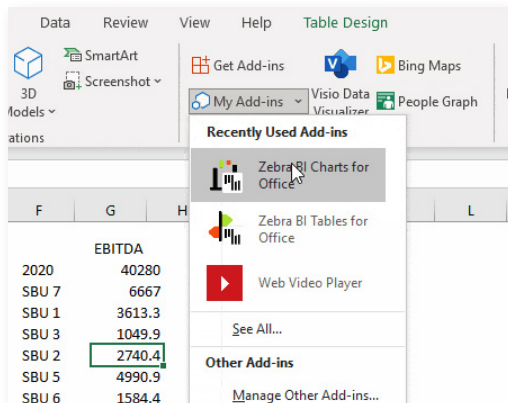


OK, that wasn't too bad. Now what if you have a **monthly report with 6 waterfall charts** on it? Would you do this procedure for 6 charts every month when the data changes? I guess not.

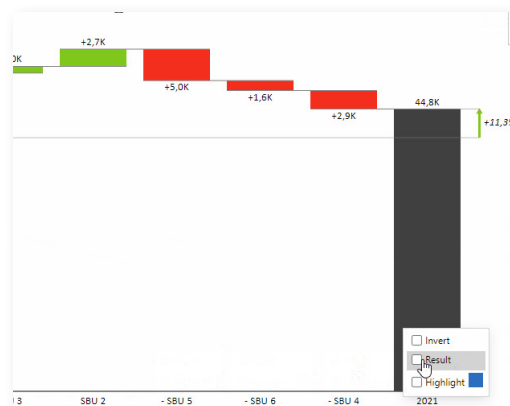
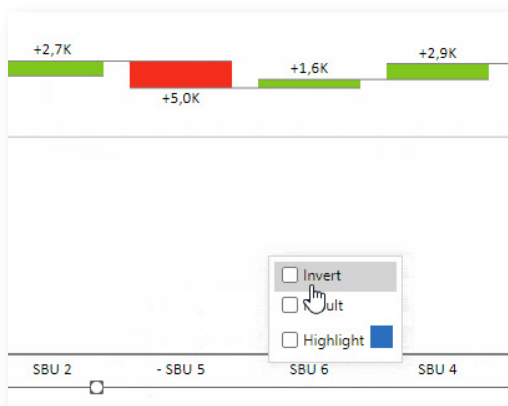
Of course you can automate this, but you have to use VBA to do it. If you don't want to use VBA, maybe [this article from 2012 by Jon Peltier⁸](#) will help you ...

There has to be a better way!

If you **don't have time to tweak default Excel waterfall charts** and would like to add those advanced features to your waterfall charts with a few clicks, take a look at the animation below:



1. With your data table selected, click the Zebra BI Charts for Office button under the My Add-ins tab.
2. Select the newly created Zebra BI chart and select the "Result" property for the first value.

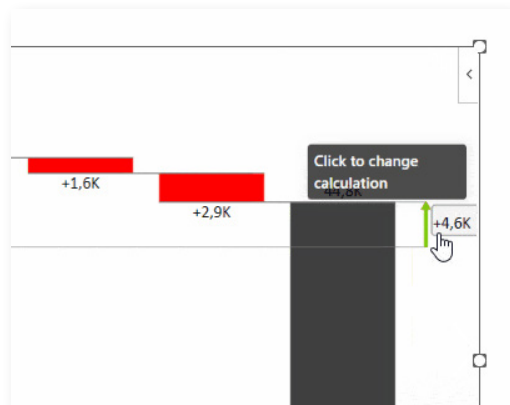


3. Continue along the chart and select the "Invert" property on you desired values.
4. Lastly, select the last value in the chart and set it's property also to "Result". Done!

I'm sure you'll agree that compared to other methods with following tutorials and using templates linked in this article this looks **so easy it's scary!** By the way, **you can do this in Office 2021 and 2019, Office 365, and Office for Mac.** It's also possible to do the same thing in **PowerPoint.**⁹

Adding variances and difference highlights

The default Excel waterfall charts do not show a very important feature that is crucial for the understanding of your performance: **variances (absolute & relative) and difference highlights**. In Zebra BI for Office, both features are applied automatically.

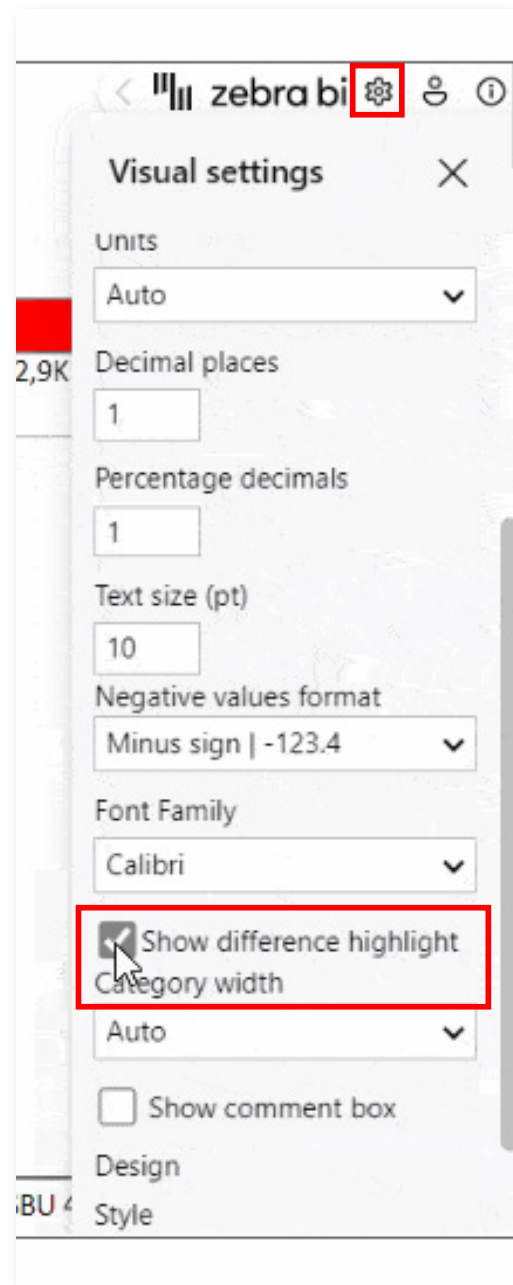


You can easily switch between **variances displayed in relative and absolute values**. By simply clicking on the variance on the chart, you can switch between the values or display both at the same time.

You can also control whether an increase is a positive or a negative event. We know that in some cases, like when it comes to costs, an increase is a negative development. You can simply right-click on the category where data should be inverted and select a custom calculation "Invert". This will automatically adapt the visualization to display the right context.

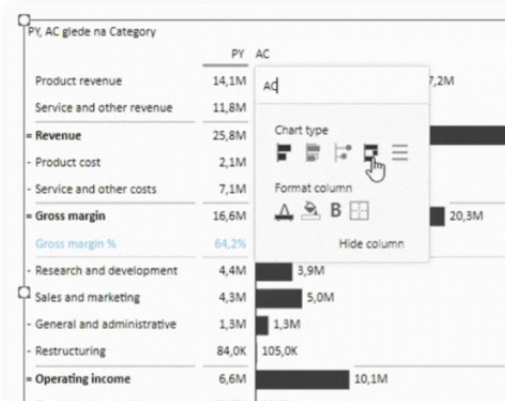
Another useful feature we added is **difference highlights between starting and ending values**. The difference highlight is added automatically and is on by default. By going to the settings in the global toolbar, you can also switch it off.

In the example above, you can see that the increase between EBITDA in 2020 and 2021 was 4.6k or 11.3%.

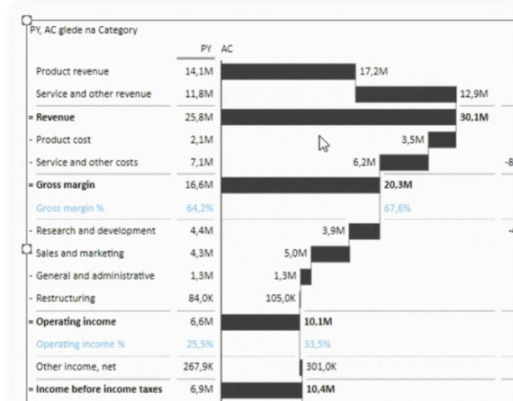


Creating an income statement with vertical waterfall charts

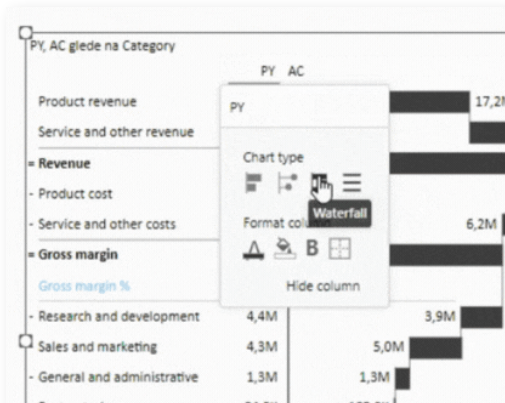
How about inserting a waterfall chart into an income statement? With Zebra BI Tables for Office add-in, this is just a few clicks away.



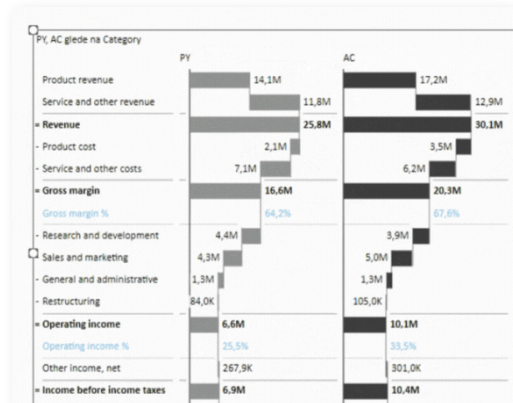
1. With your chart selected, click the AC Sort Settings button and select Waterfall under the Chart type tab.



2. Your values are now presented with a single vertical waterfall chart.



3. Continue by clicking the PY Sort Setting button and selecting Waterfall under the Chart type tab.



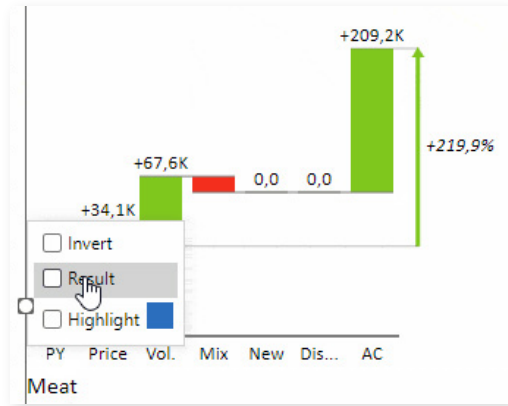
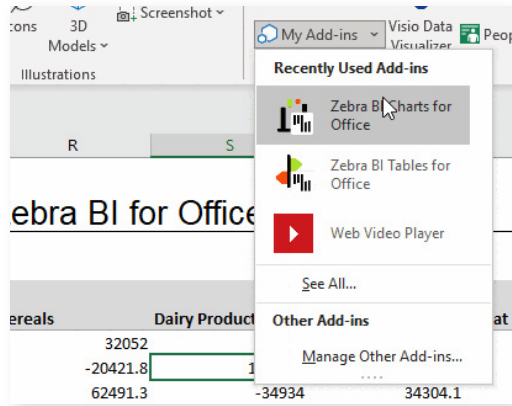
4. Done! Your vertical waterfall income statement is now complete.

The cool thing about this is that by glancing at the waterfall chart, you can already see how you're performing. The calculations like "Result" and "Invert" are reflected in the waterfall chart and all **categories get subtracted** so that you can clearly see the contribution of each to the final result.

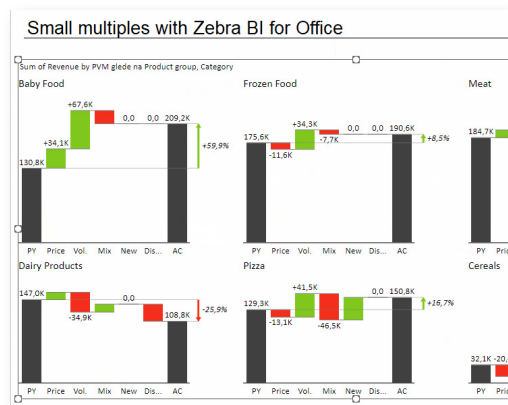
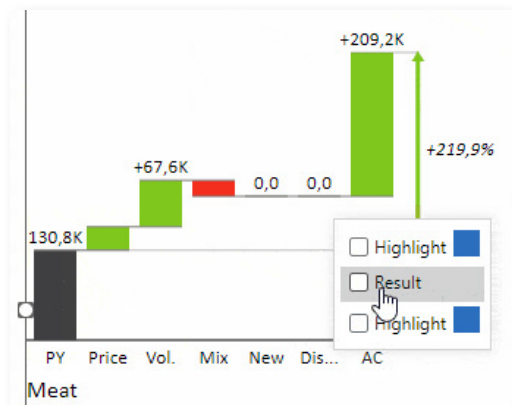
You can [download the free template here](#).¹⁰

Small multiples with waterfall charts

We saved the best for last: here are **6 waterfall charts in 2 clicks**:



1. With your data table selected, click the Zebra BI Charts for Office button under the My Add-ins tab.
2. Select the newly created Zebra BI chart and select the "Result" property for the first value.



3. Then, do the same for the last value.
4. Done!

You only need to select a single cell in your data and insert the Zebra BI Charts for Office add-in. Use the chart slider to get to the waterfall chart, use the custom calculation "Result" on the first and last entry, and Zebra BI will do the rest.

You will see the automatically calculated variances and highlighted differences. But, most importantly, no matter how many charts you have, they are all inserted **within the same visual** and also **automatically scaled** between each other which immediately puts the data into the right perspective.

You can **download the free template here**.¹¹

Appendix: Hyperlinks

1. **Cash Flow Waterfall Charts in Excel 2016:** <http://sfmagazine.com/post-entry/september-2015-excel-cash-flow-waterfall-charts-in-excel-2016/>
2. **Data visualization in depth:** <https://zebrabi.com/data-visualization-webinar/>
3. **IBCS:** <https://zebrabi.com/ibcs>
4. **Highlight differences between totals:** <https://zebrabi.com/excel-waterfall-chart/#h-adding-relative-contributions-and-difference-highlights>
5. **How to Choose the Right Business Chart:** <https://zebrabi.com/how-to-choose-the-right-chart/>
6. **Waterfall Chart Template:** <https://www.vertex42.com/ExcelTemplates/waterfall-chart.html>
7. **How to Create an Income Statement with Vertical Waterfall charts:** <https://zebrabi.com/excel-waterfall-chart/#h-creating-an-income-statement-with-vertical-waterfall-charts>
8. **Consistent Axis Scales Across Multiple Charts:** <https://peltiertech.com/consistent-axis-scales-across-multiple-charts/>
9. **Zebra BI for Power BI:** <https://zebrabi.com/powerpoint-add-in/>
10. **Download Income Statement:** [https://zebrabi.com/Templates/New/A041_PL_-_Income_statement_\(PY-AC_and_AC-PL\).xlsx](https://zebrabi.com/Templates/New/A041_PL_-_Income_statement_(PY-AC_and_AC-PL).xlsx)
11. **Download Price-Volume-Mix Bridge Template :** https://zebrabi.com/Templates/New/A072_Bridge_-_Price_Volume_Mix.xlsx

Interested? Try it yourself!

If you'd like to explore all our Power BI dashboard examples and templates, click on the button below and give Zebra BI a try for free!

