

Lecture 3

DD 324:

Data Visualisation

Ways to visualise

14 Jan 2025 · Gyan Lakhwani · gyanlakhwani@gmail.com · Department of Design, DTU

Course Website

gyanl.com/dv

The screenshot shows a web browser window with the URL gyanl.com. The page title is "Data Visualization". In the top right corner, there are links for "About" and "Syllabus", along with a settings icon. The main heading is "DD 324 - Data Visualisation", with a subtitle "Notes and other resources." Below this is a search bar with the placeholder text "Search notes..". Underneath the search bar is a section titled "LECTURES". The first lecture listed is "Lecture 3", dated "21 January 2025". The description for Lecture 3 includes the text: "Exploring Unstructured Data Morning Grading Scheme Visualise a dataset. Which tool? Flourish Activity with Flourish Visualisation types Encoding schemes ...".

Data Visualization About Syllabus

DD 324 - Data Visualisation

Notes and other resources.

LECTURES

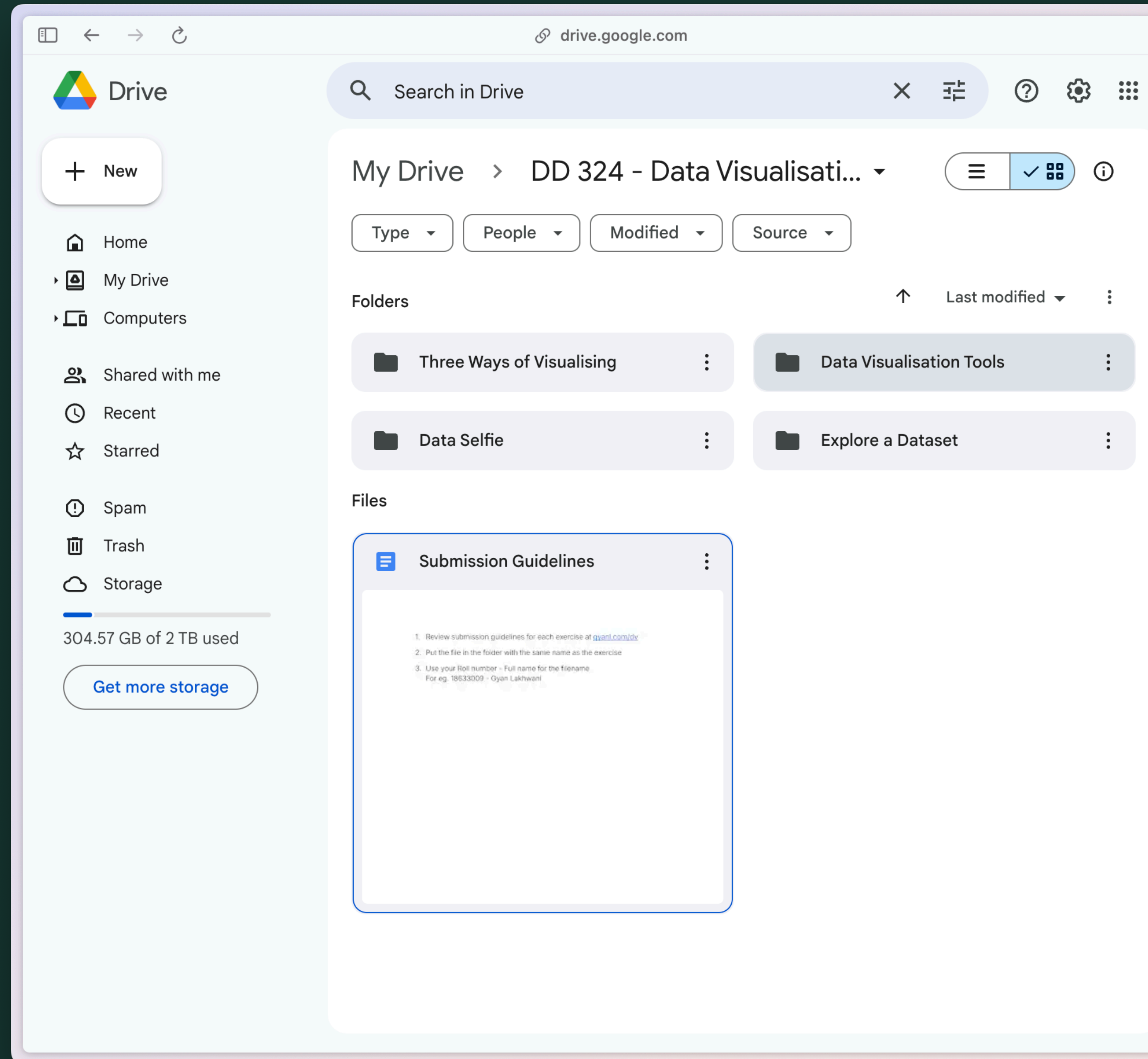
Lecture 3
21 January 2025

Exploring Unstructured Data Morning Grading Scheme Visualise a dataset. Which tool?
Flourish Activity with Flourish Visualisation types Encoding schemes ...

DD 324

Grading & Submissions

- Submissions on Google Drive
- Use your roll number + name as the filename
- There is a folder for each exercise



What can we do with data?

Exhibit

Show raw data

List, Table, Infographic

Explain

Answer Questions

Data journalism, report

Explore

Finding what to ask

Dashboards, simulations

Experience

Finding meaning in data

Data art piece, New media
installation

Enable

Building tools to visualise

specific use cases
Software for data viz

Data → **Visuals**



1 dataset 100 visualizations



1 dataset 100 visualizations

Number of World Heritage Sites

Norway Denmark Sweden

2004

5

4

13

2022

8

10

15

HOW COULD WE ENCODE THIS DATA?

Number of World Heritage Sites

Country

Year

1 dataset 100 visualizations

Number of World Heritage Sites			
	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

HOW COULD WE ENCODE THIS DATA?

Number of World Heritage Sites (Ratio)

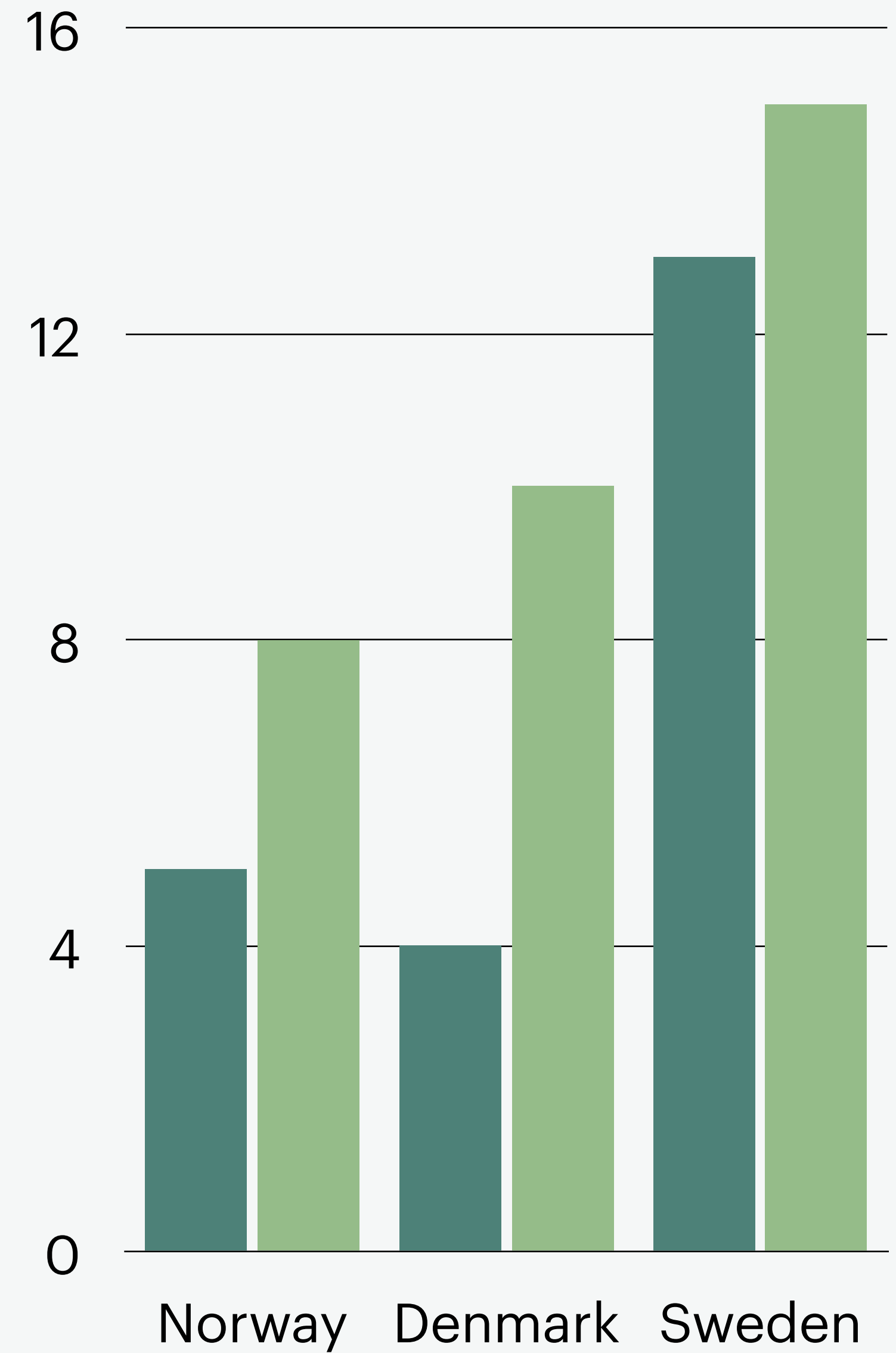
Country (Nominal)

Year (Interval)

1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

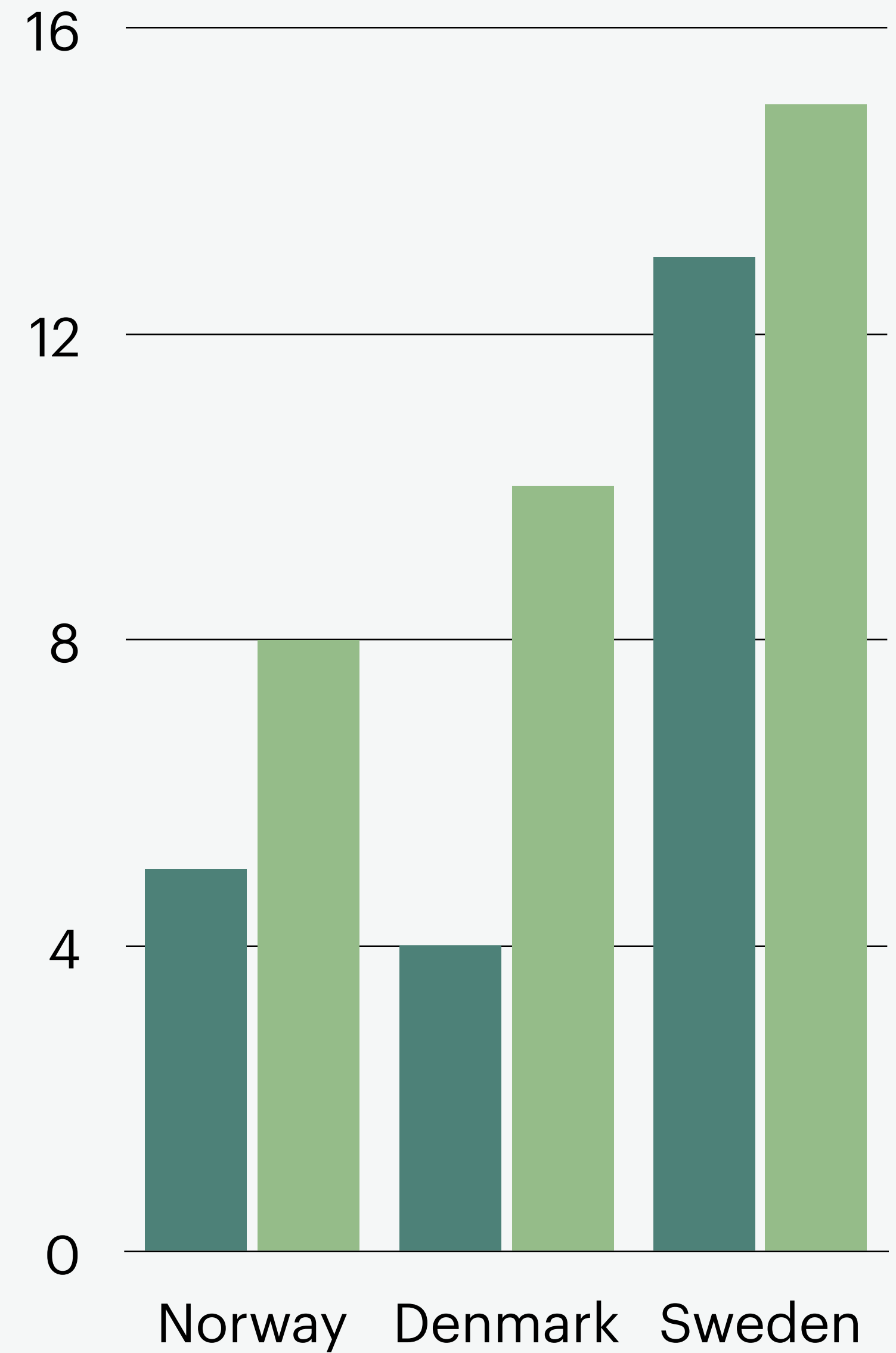


1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

What is this?

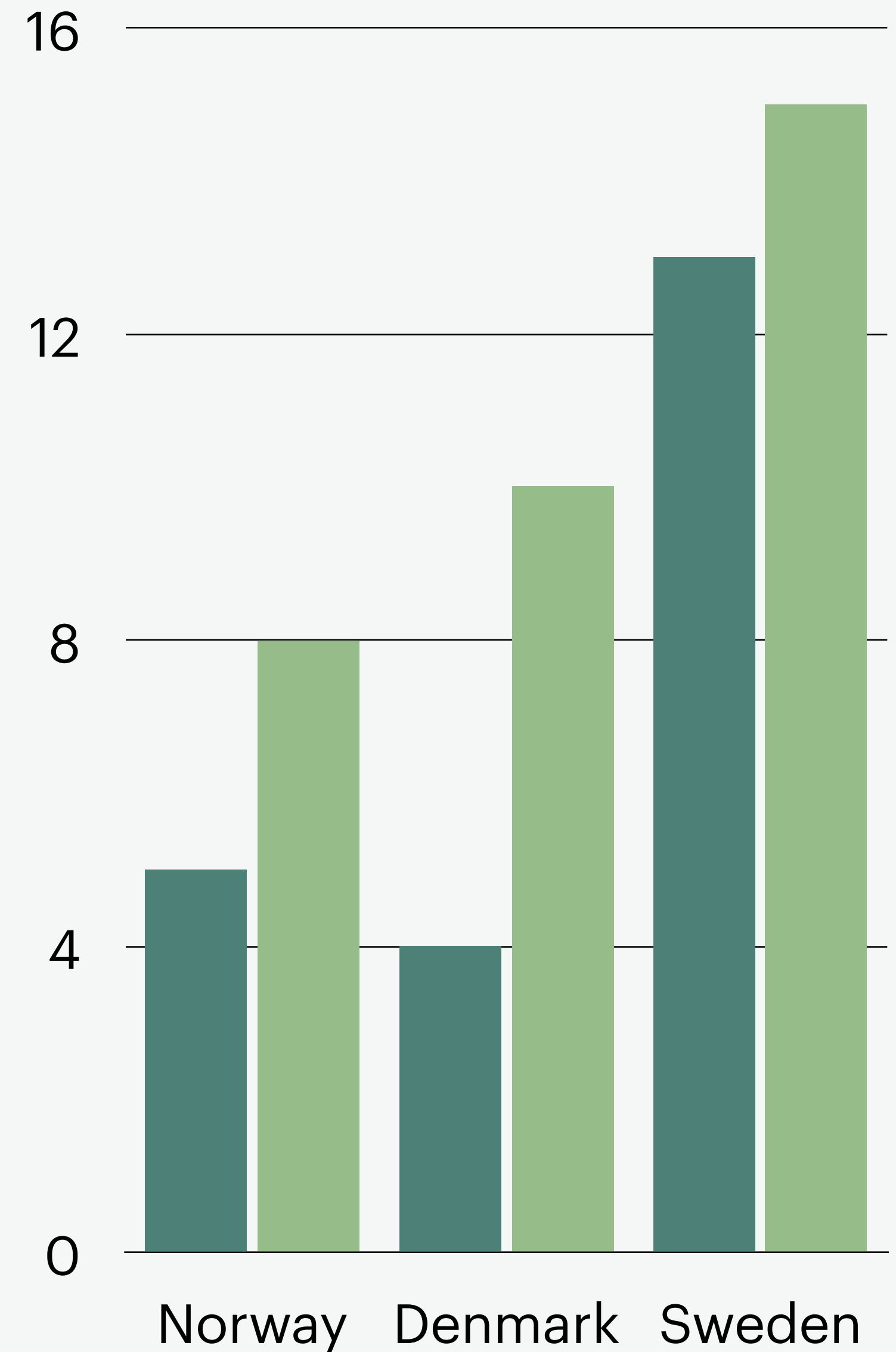


1 dataset 100 visualizations

Number of World Heritage Sites

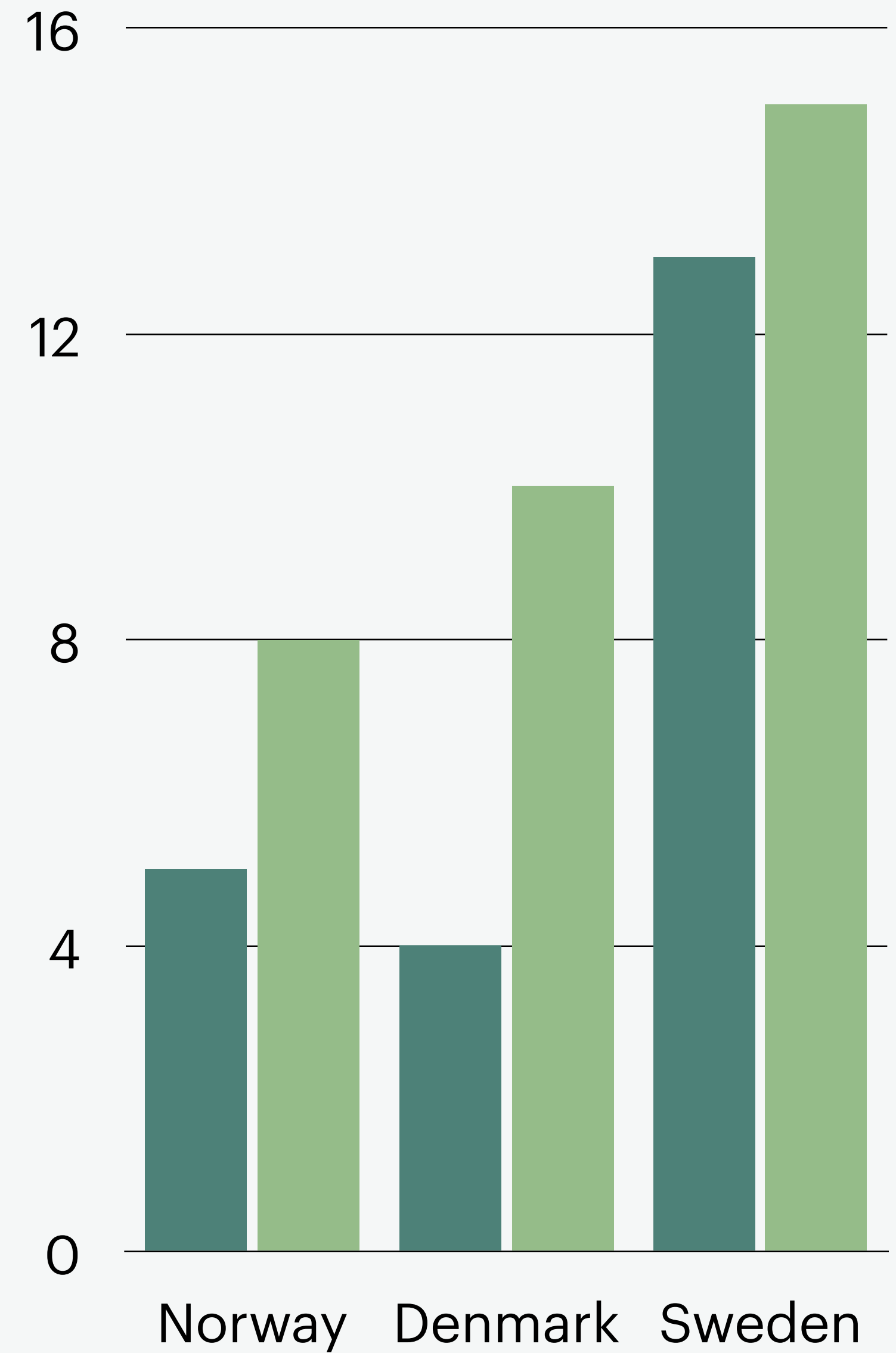
	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

Bar Chart



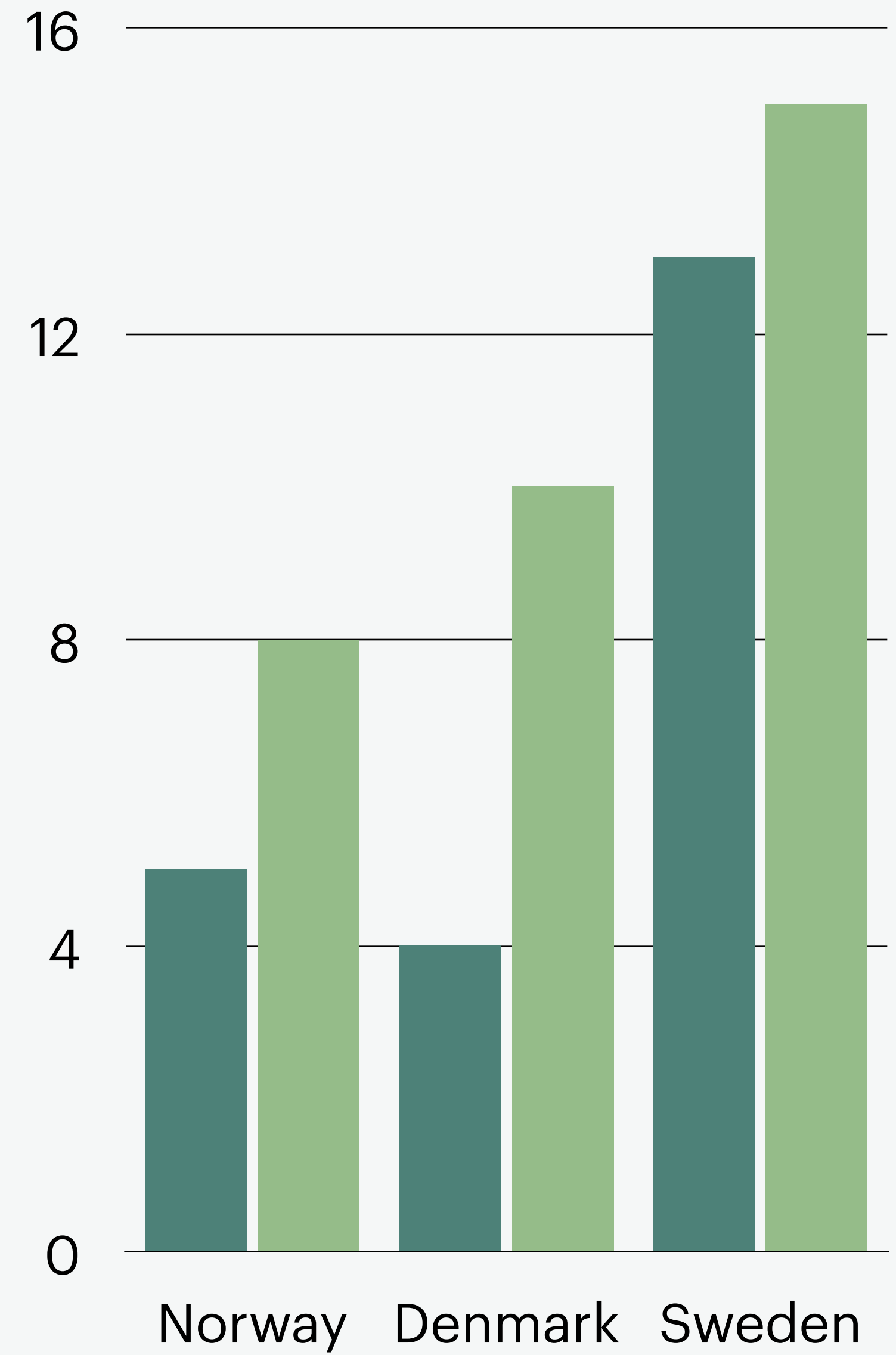
What can a viewer understand from this chart?

Bar Chart



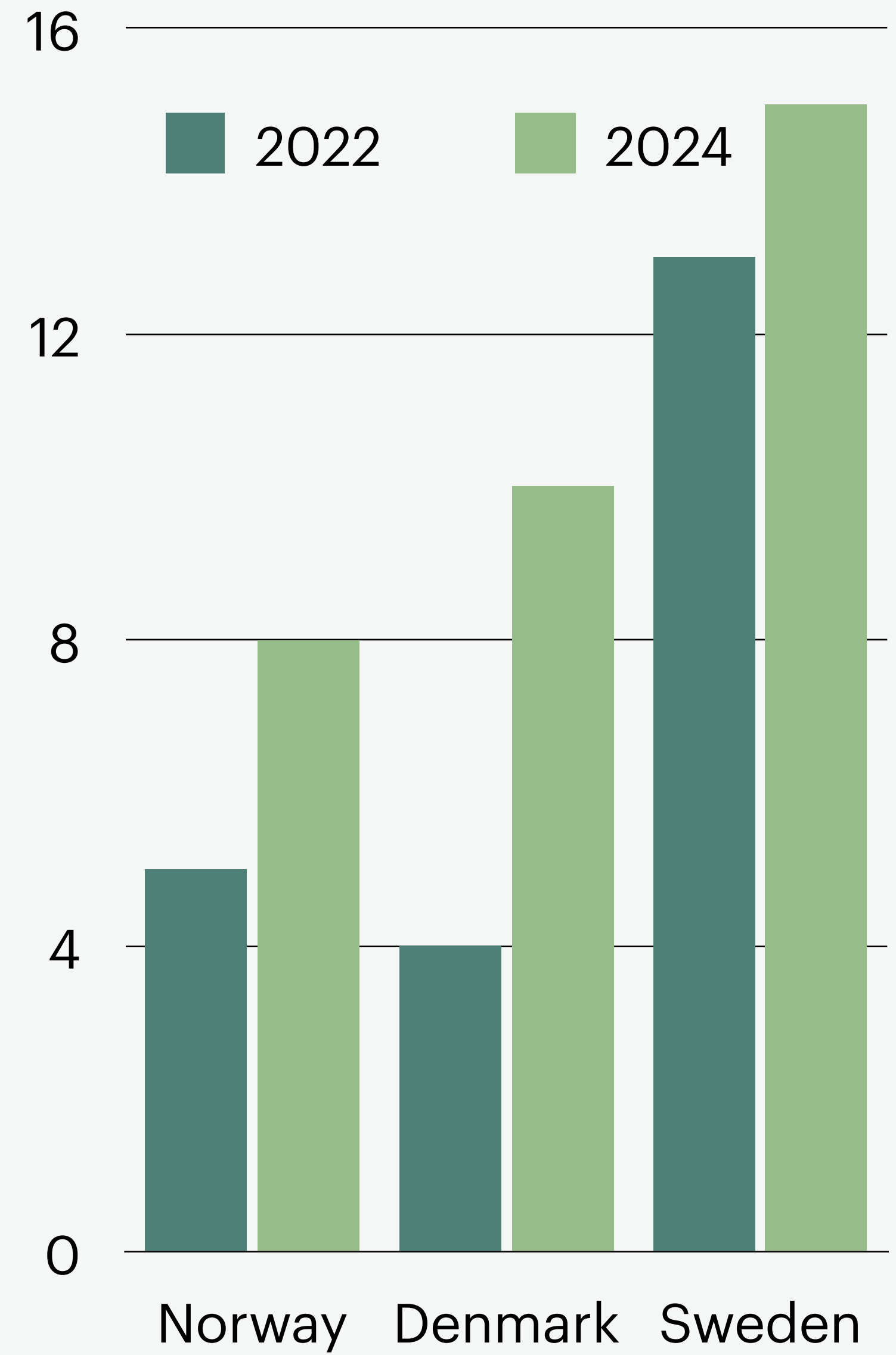
Is there anything missing?

Bar Chart



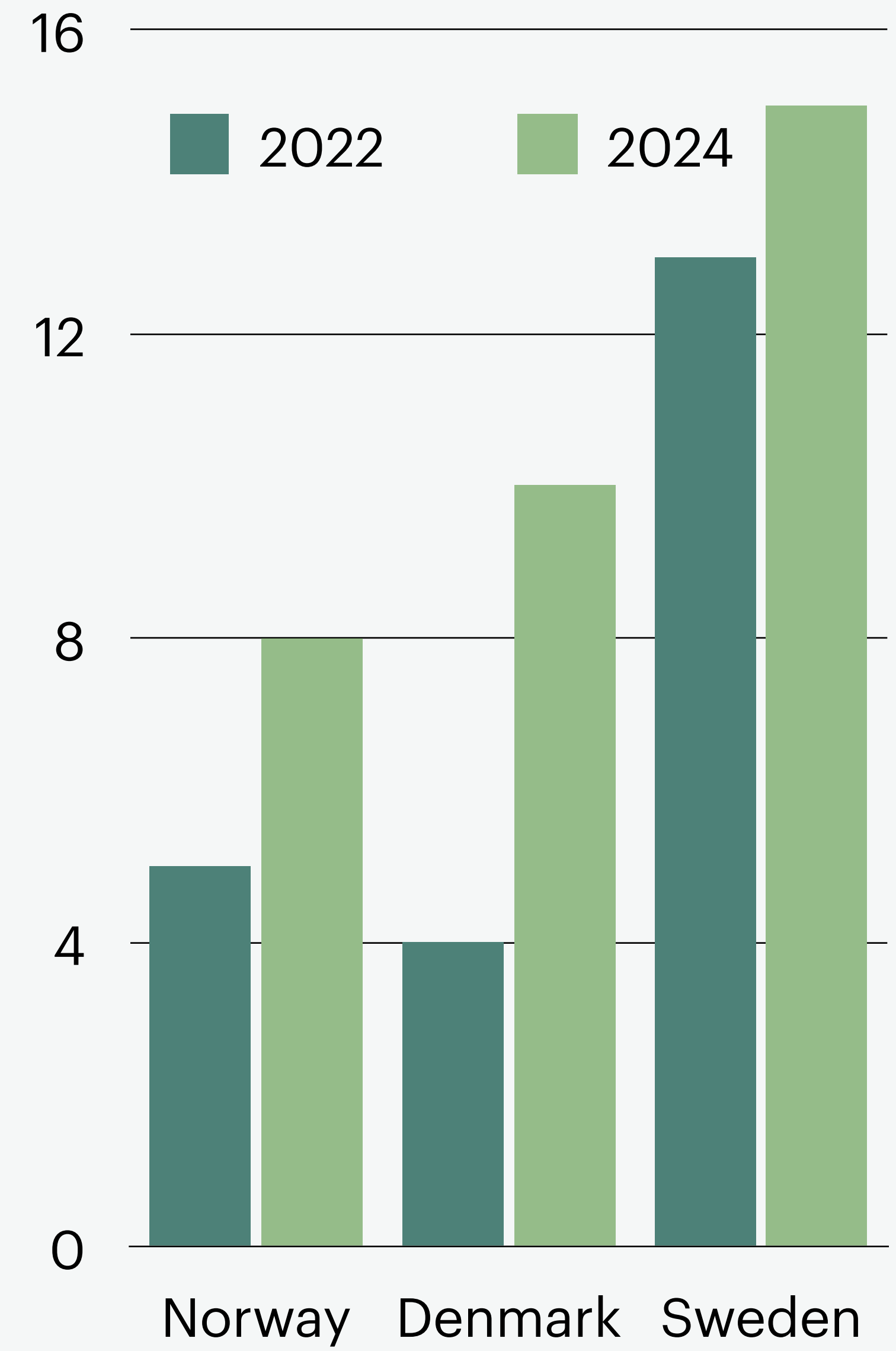
What's this?

Bar Chart



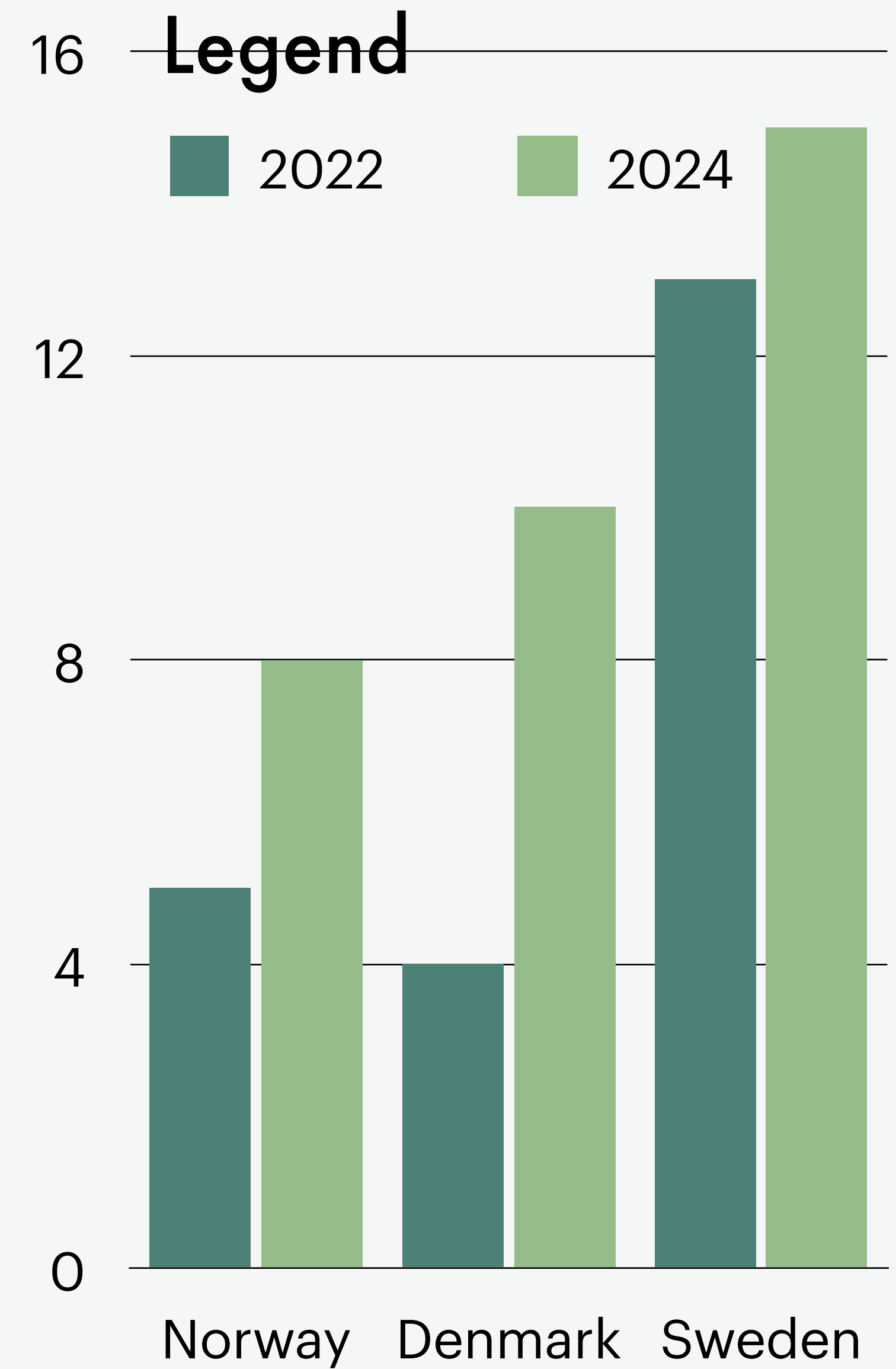


(Hint)



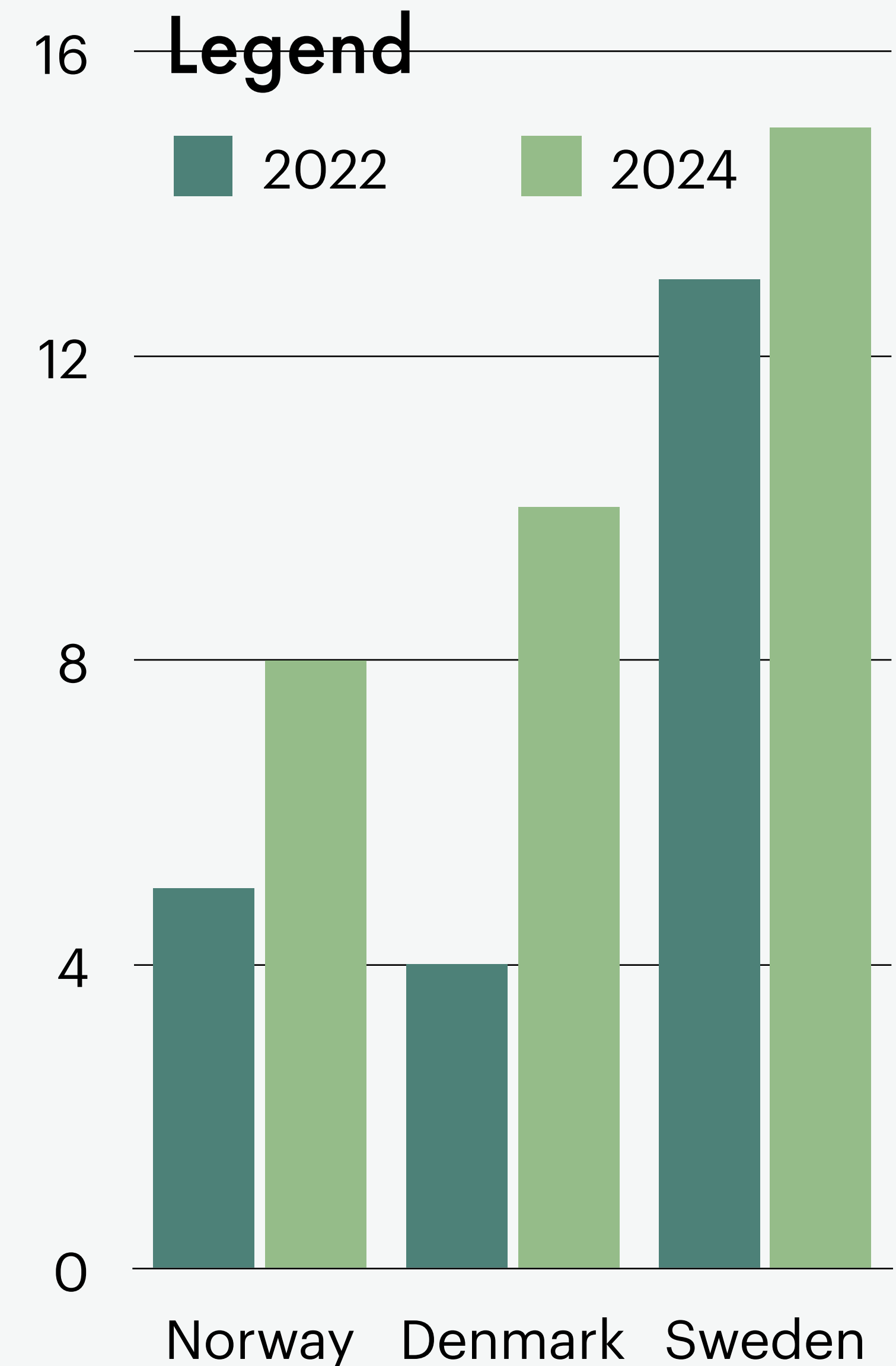
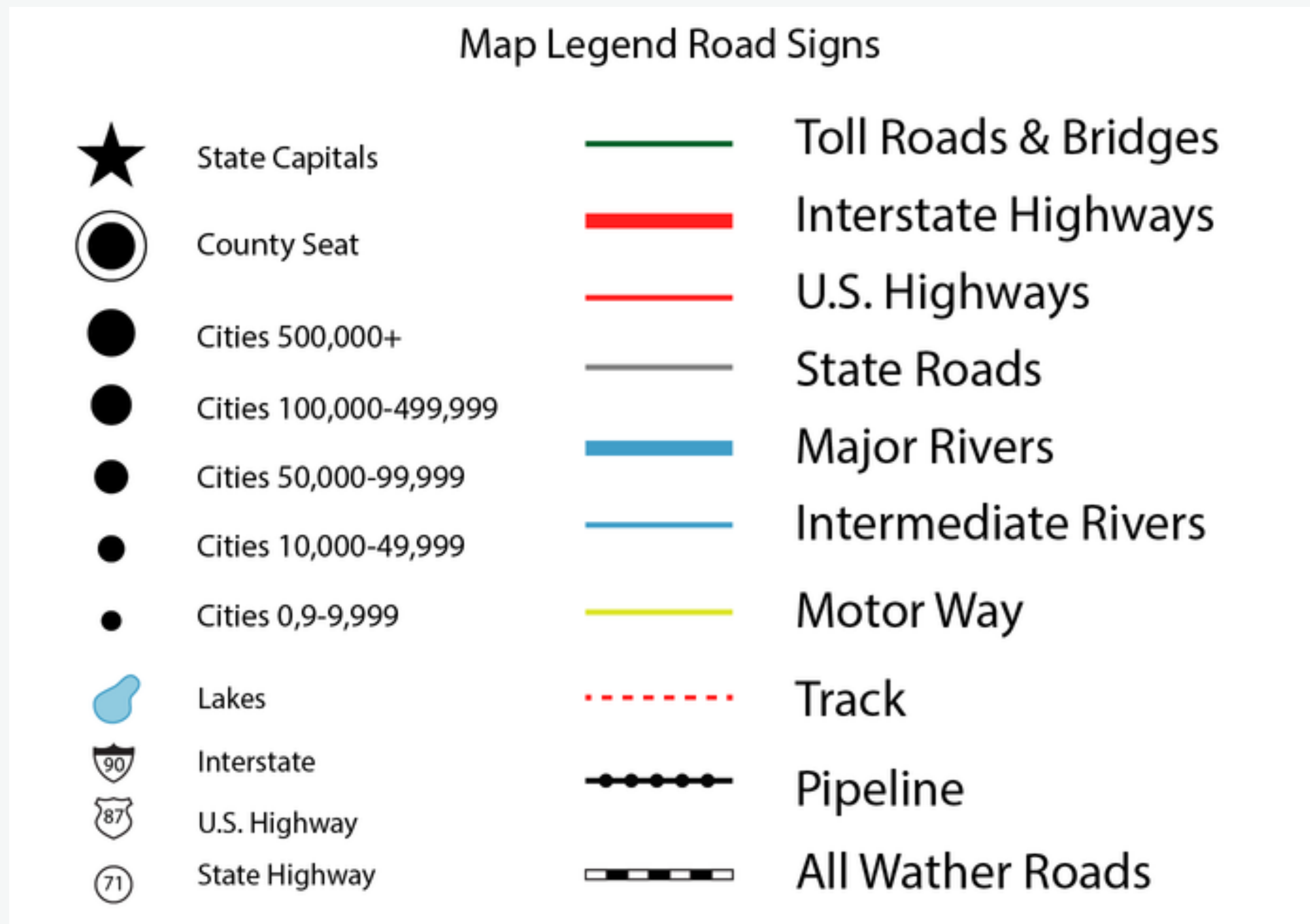
Legend

Tells you something about how data is encoded

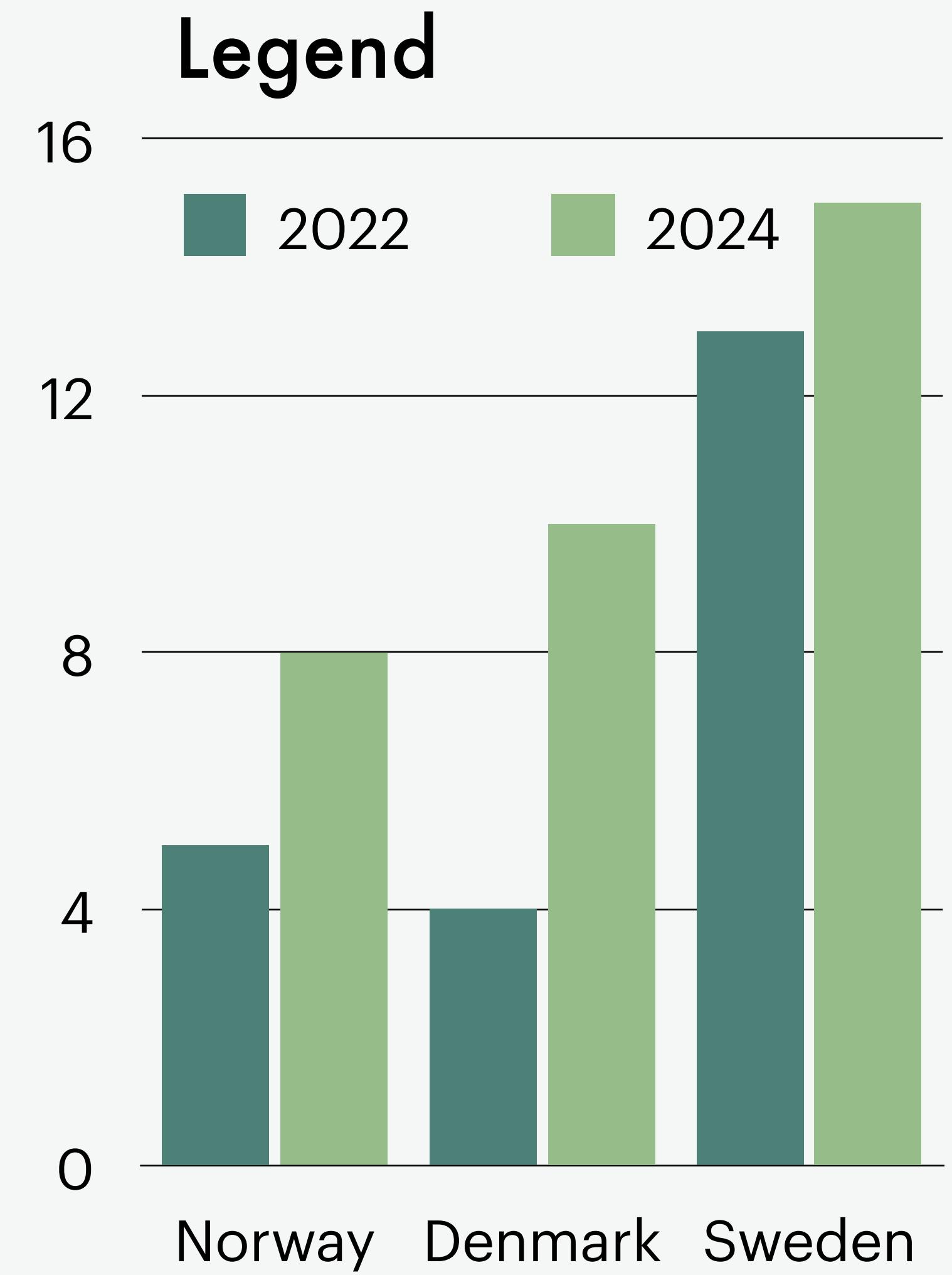


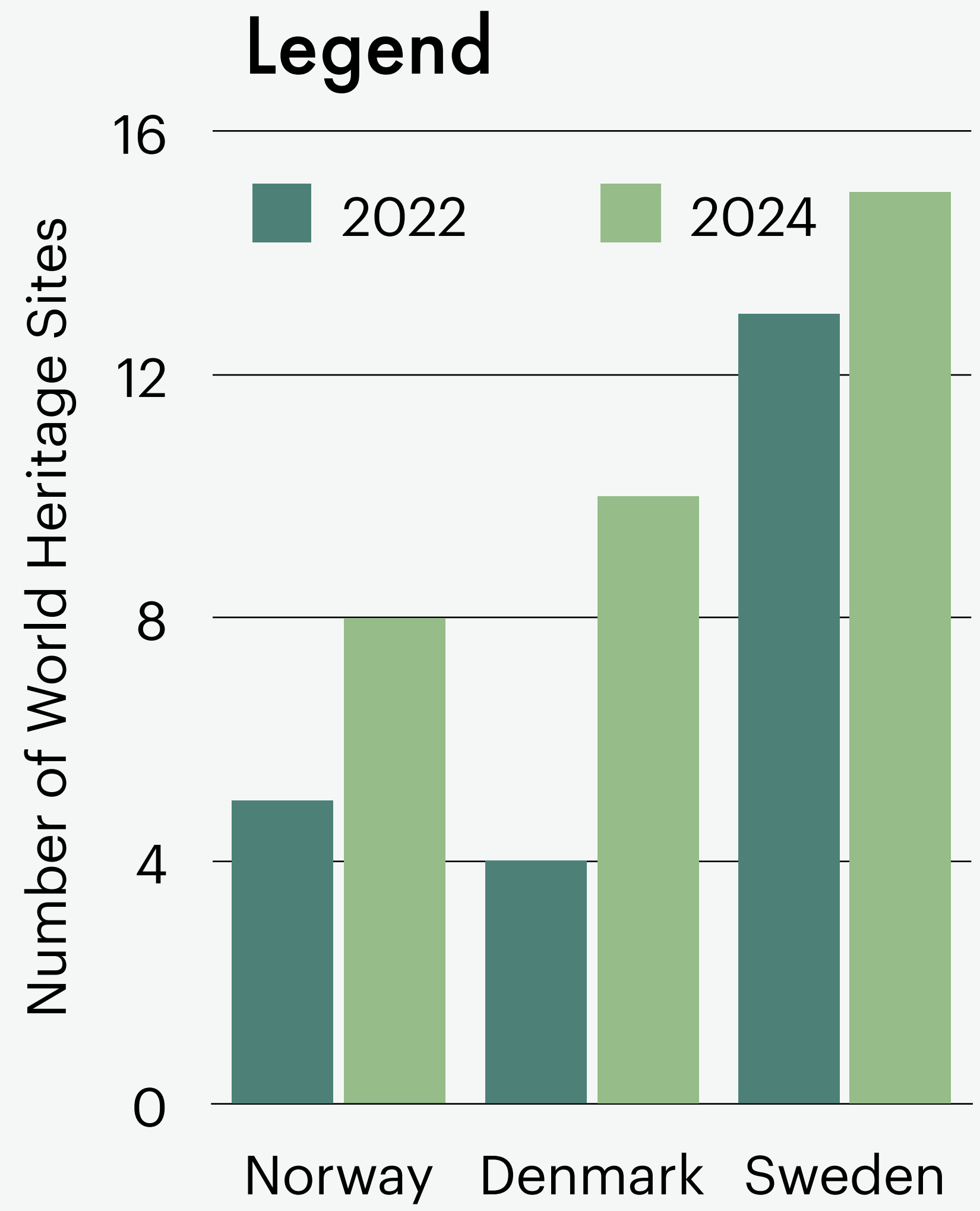
Legend

Tells you something about how data is encoded

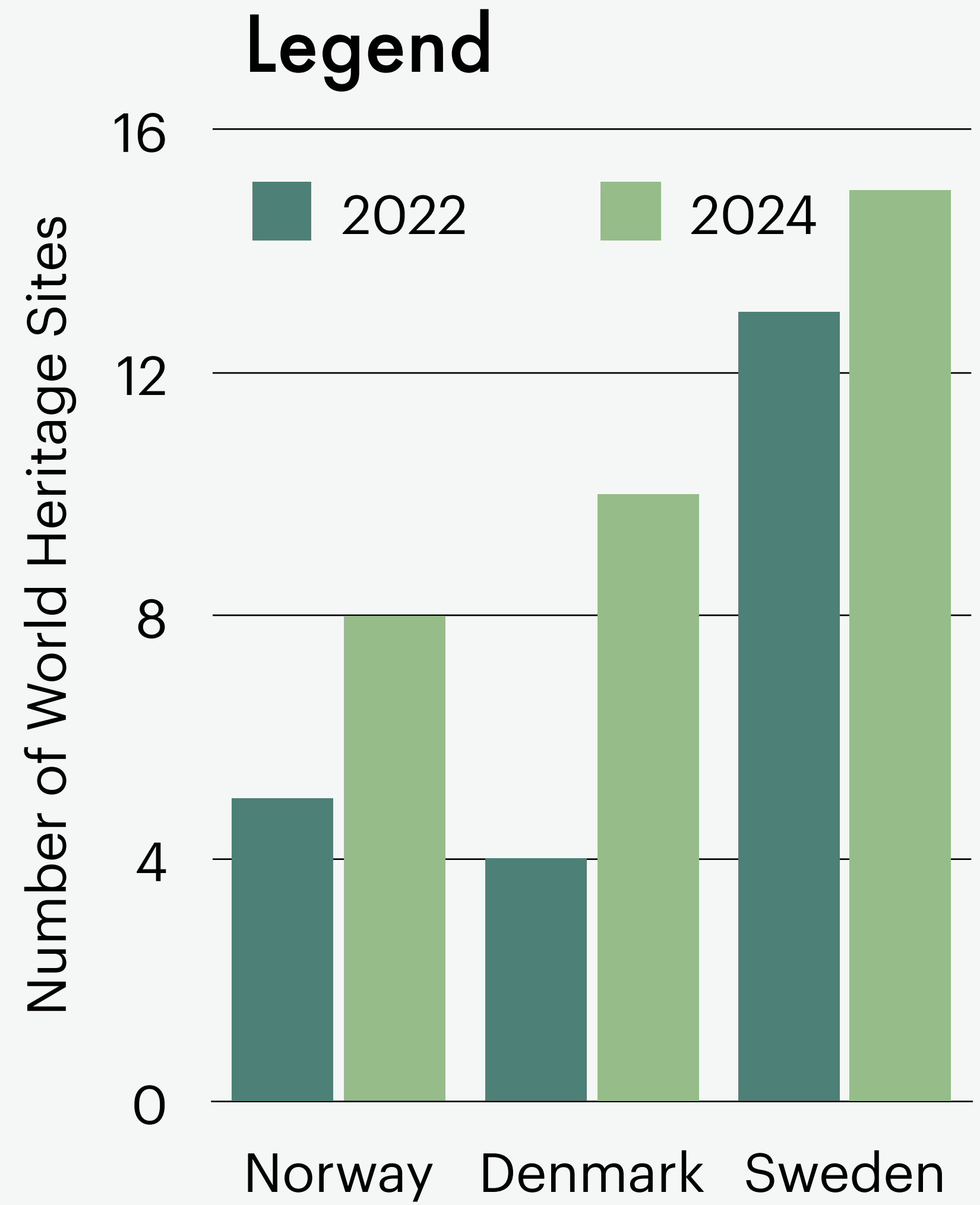


Anything else?

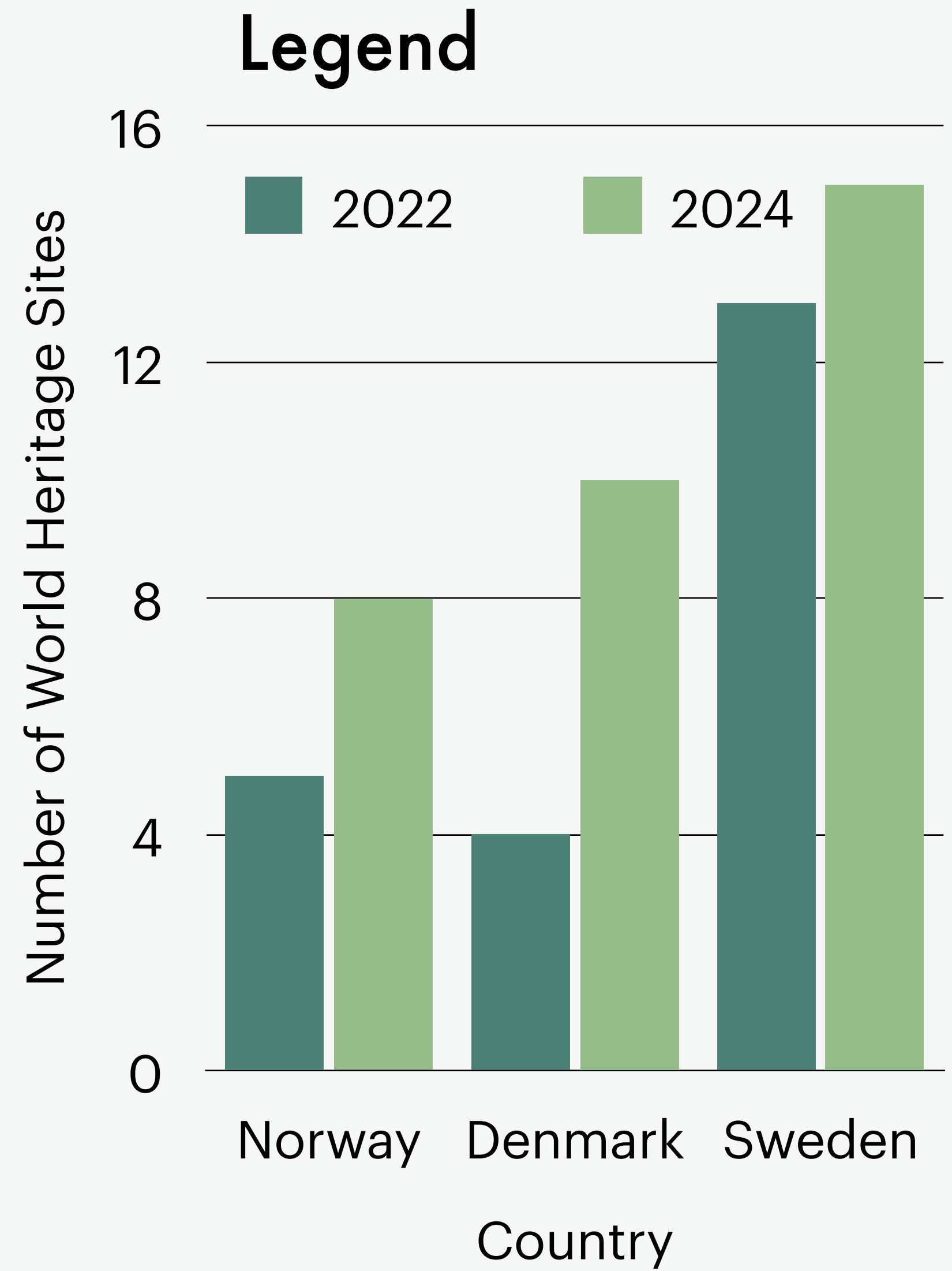




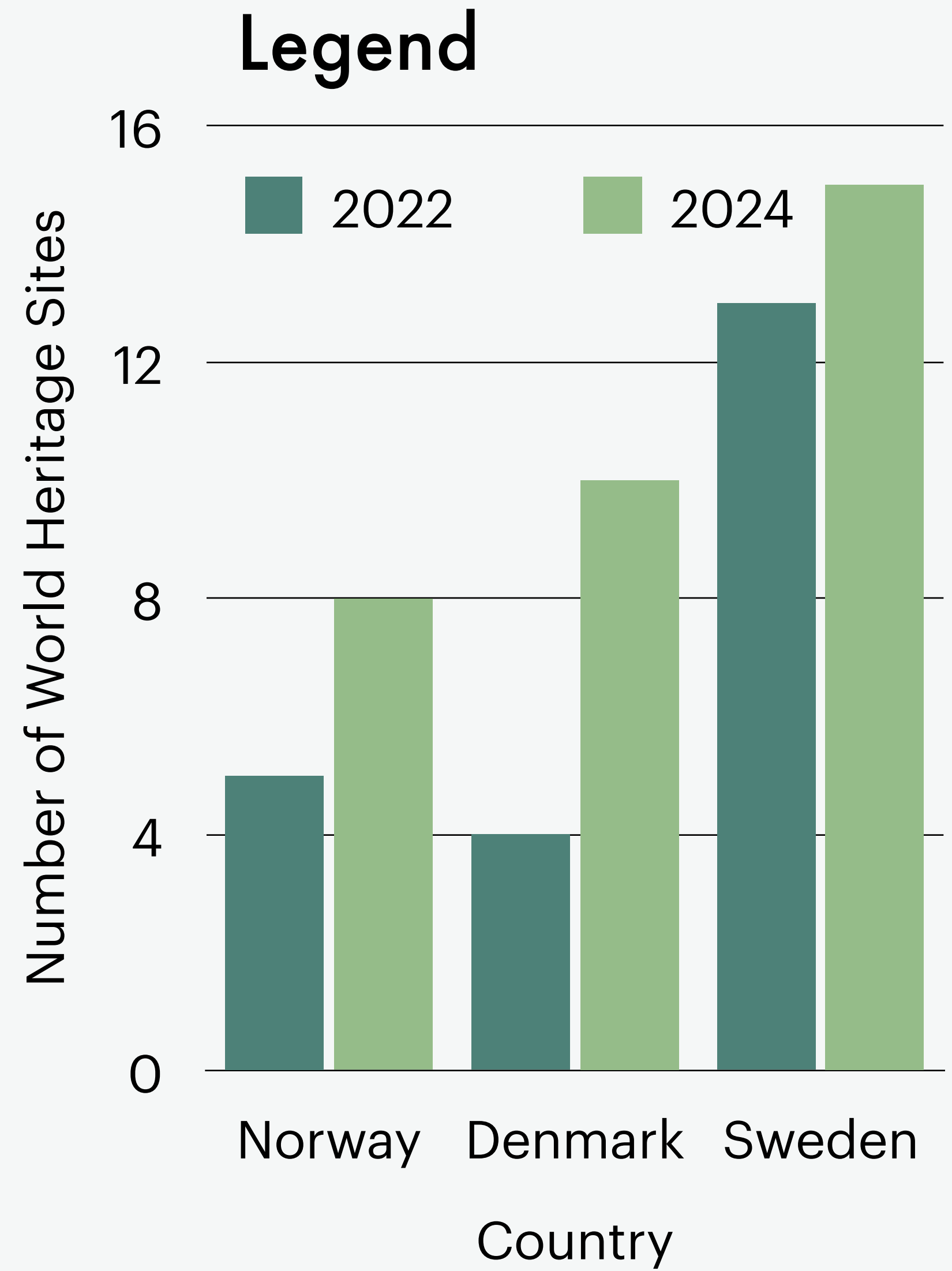
Y Axis Label



Y Axis Label

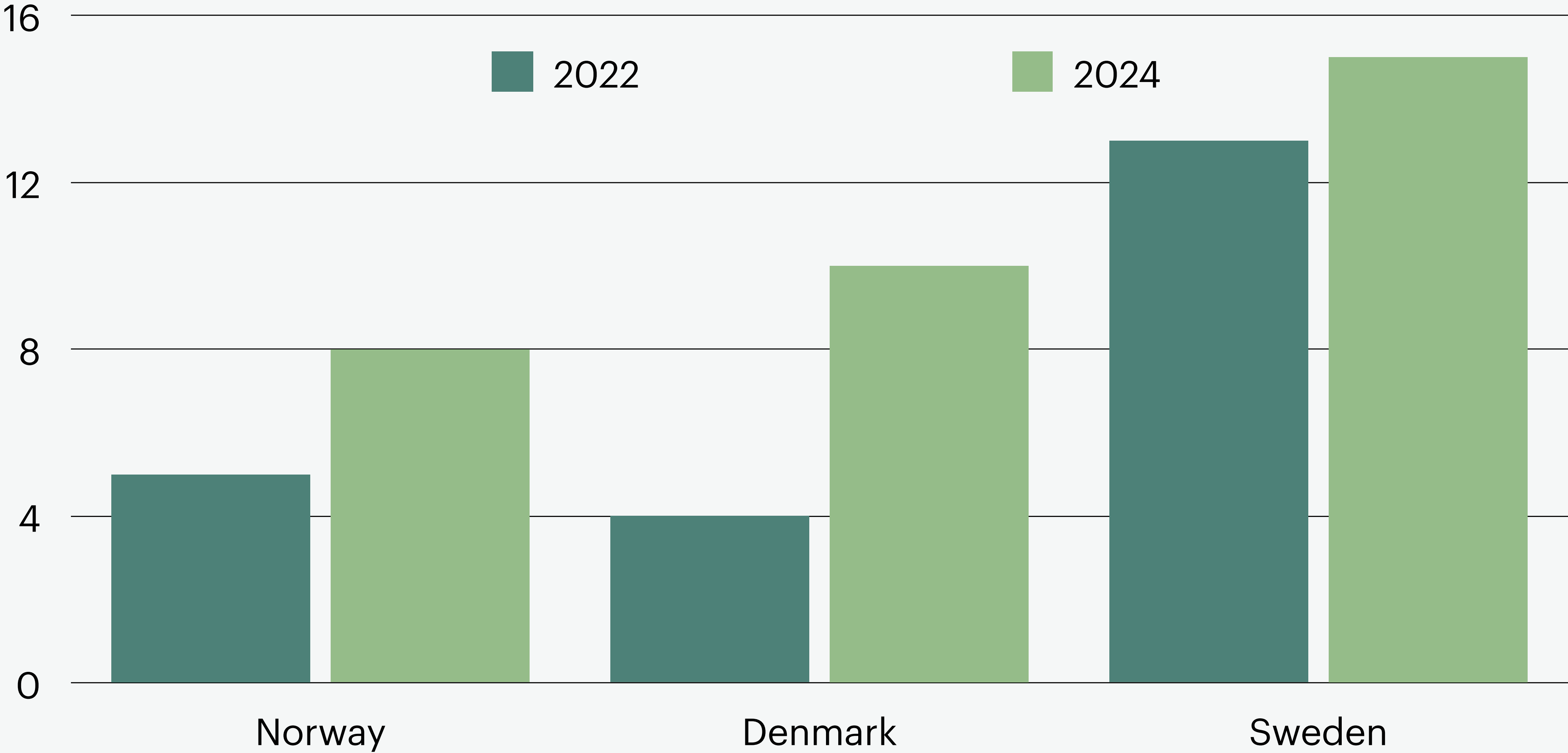


Y Axis Label



X Axis Label

Number of World Heritage Sites by Country and Year

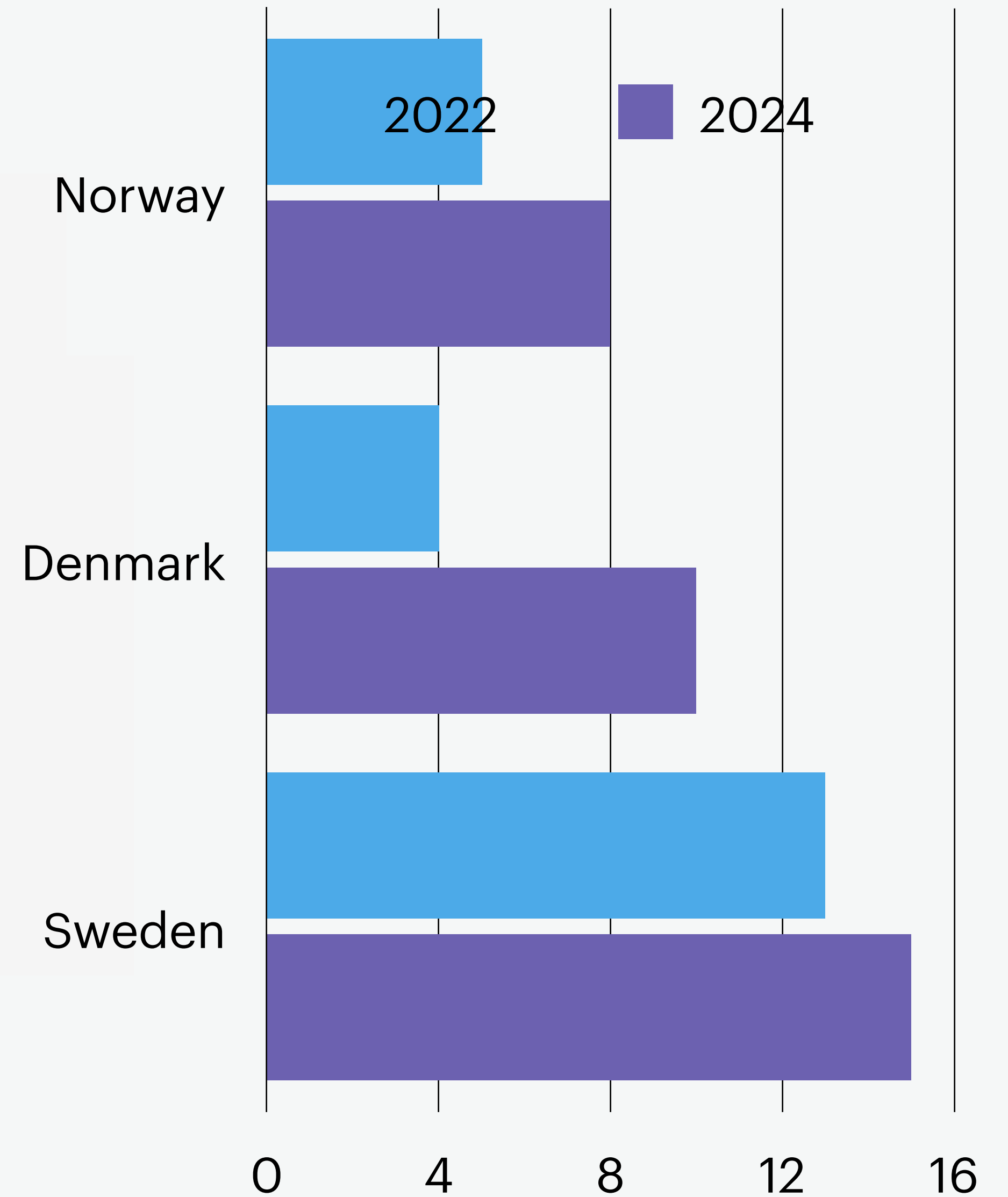


1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

Bar Chart

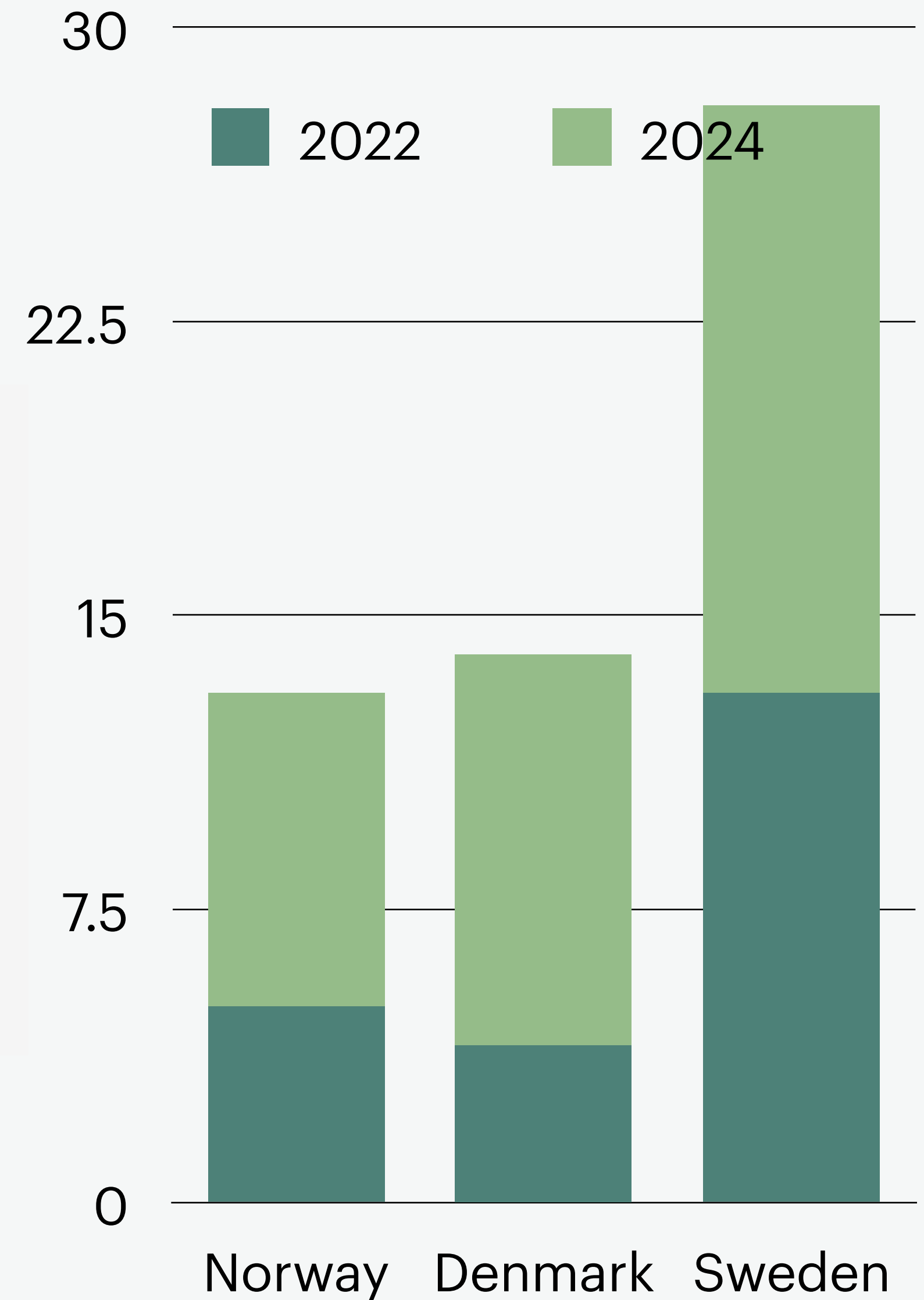


1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
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Stacked Columns

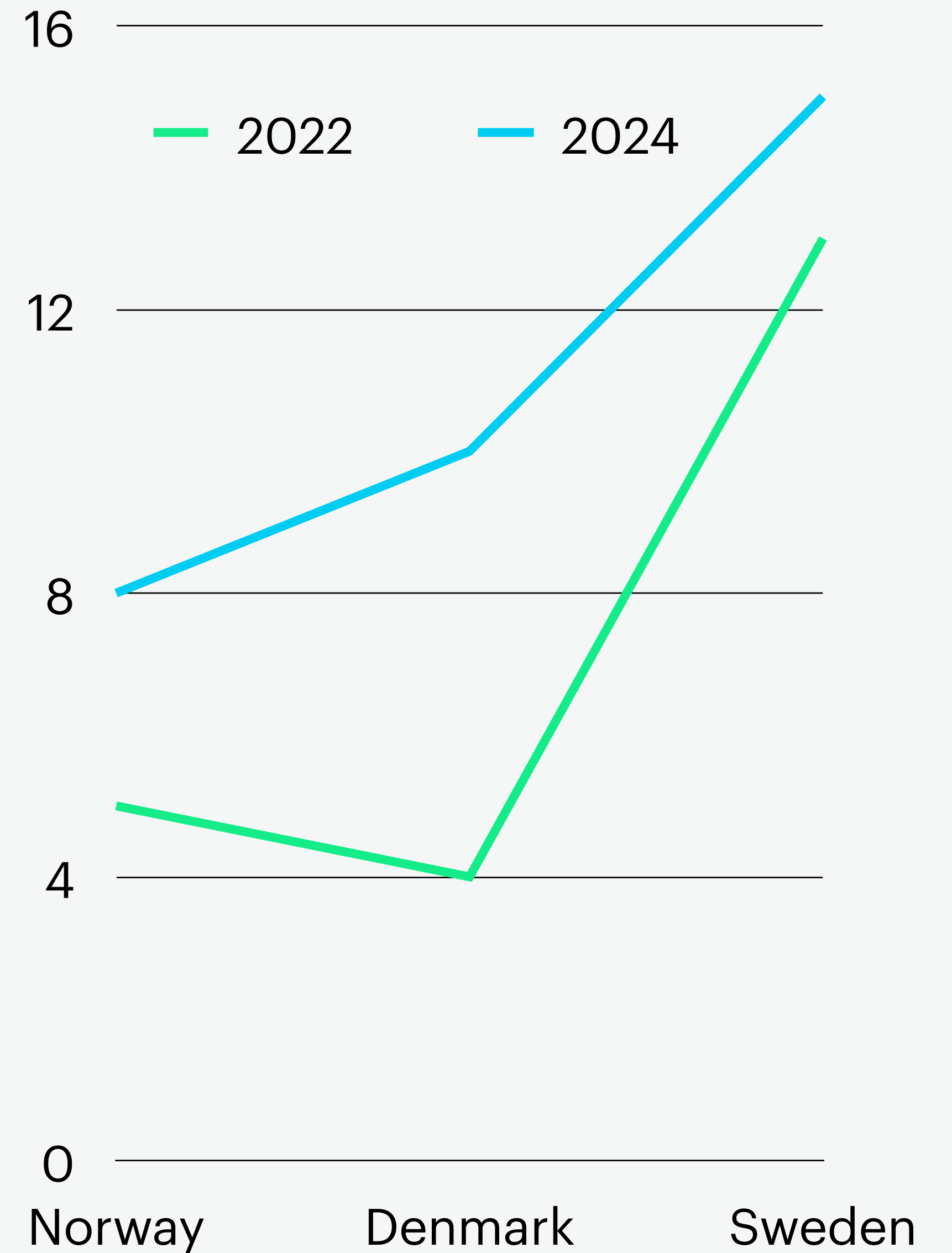


1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
2004	5	4	13
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Line Chart

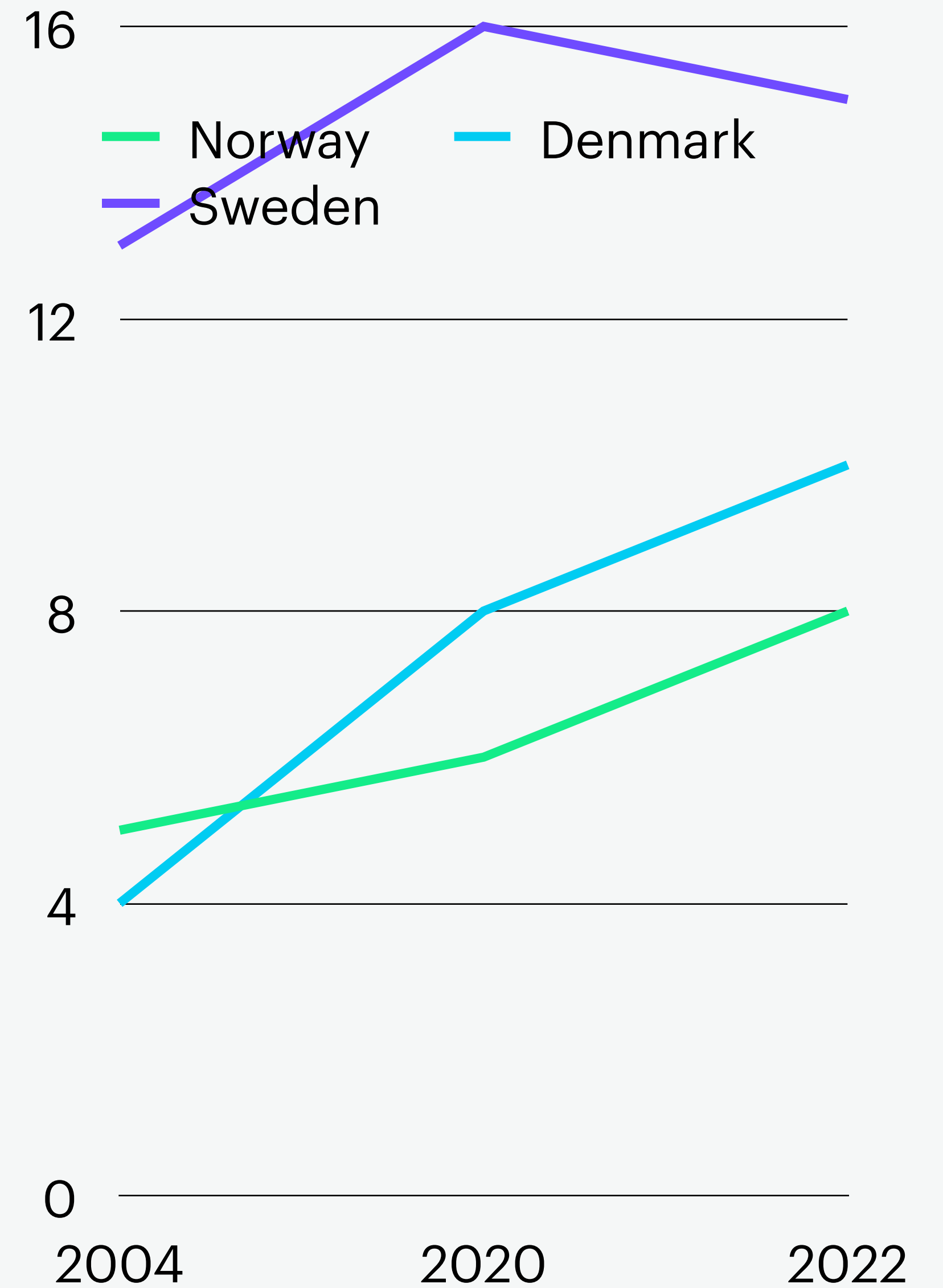


1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
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2022	8	10	15

Line Chart

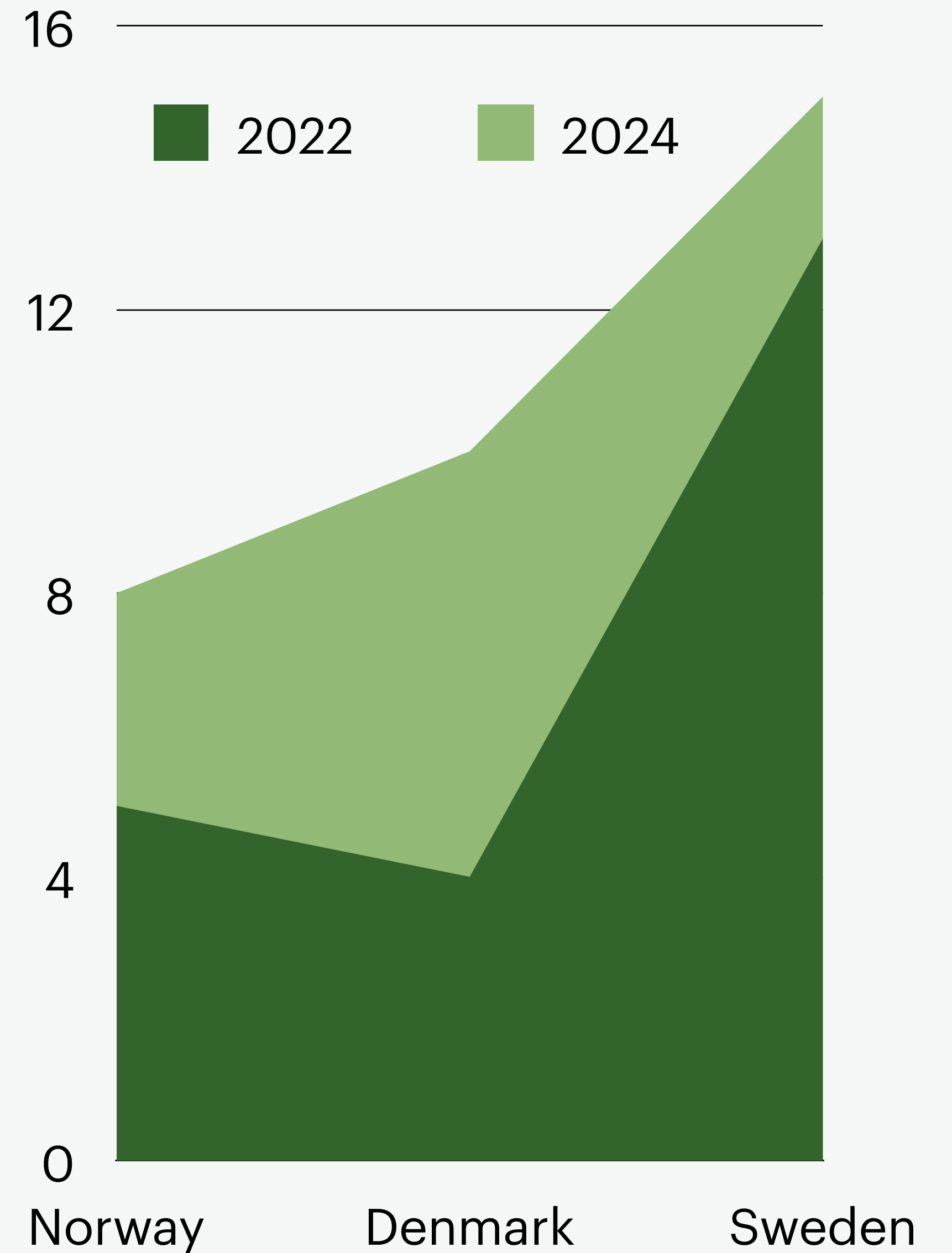


1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
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2022	8	10	15

Area Chart

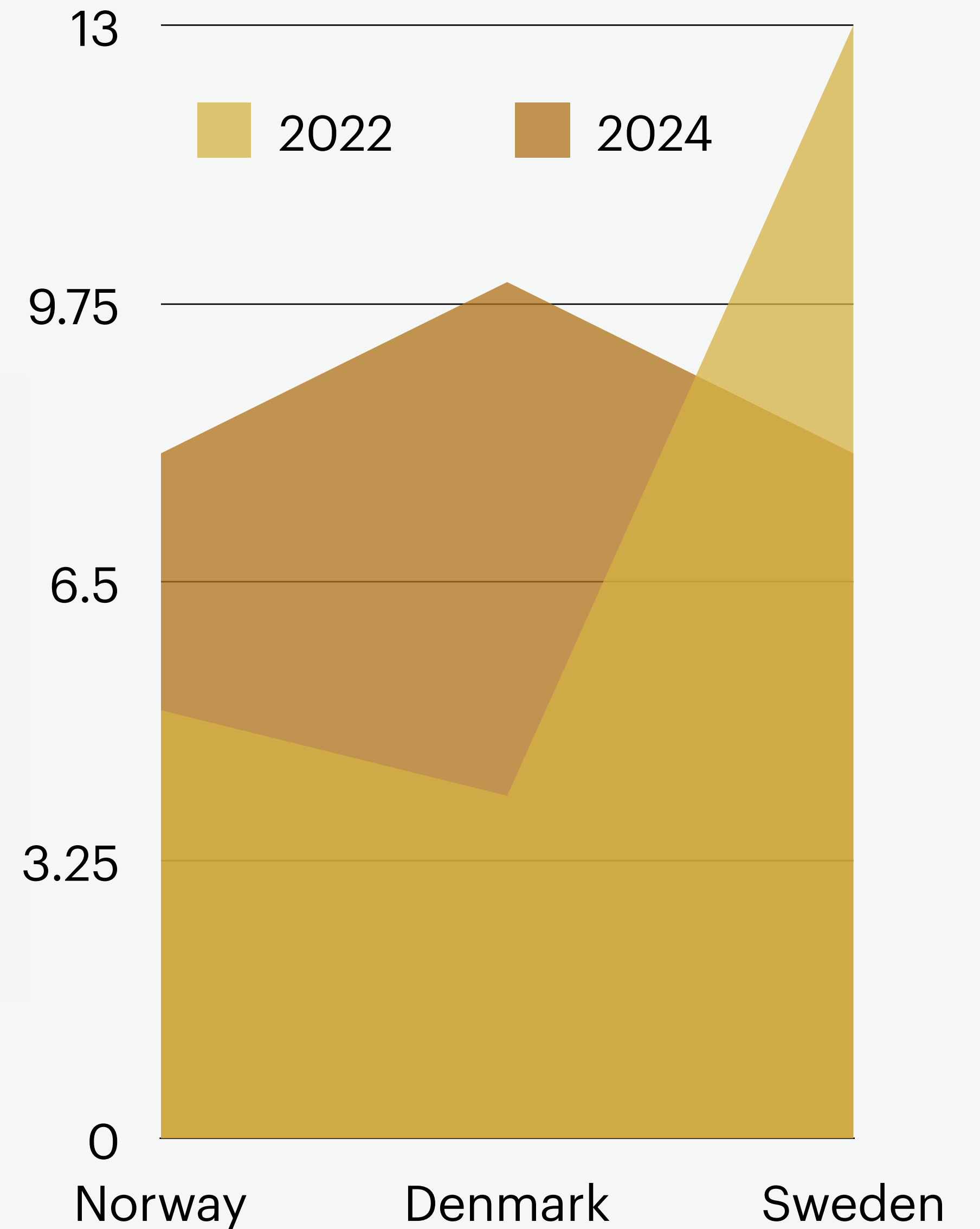


1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

Area Chart

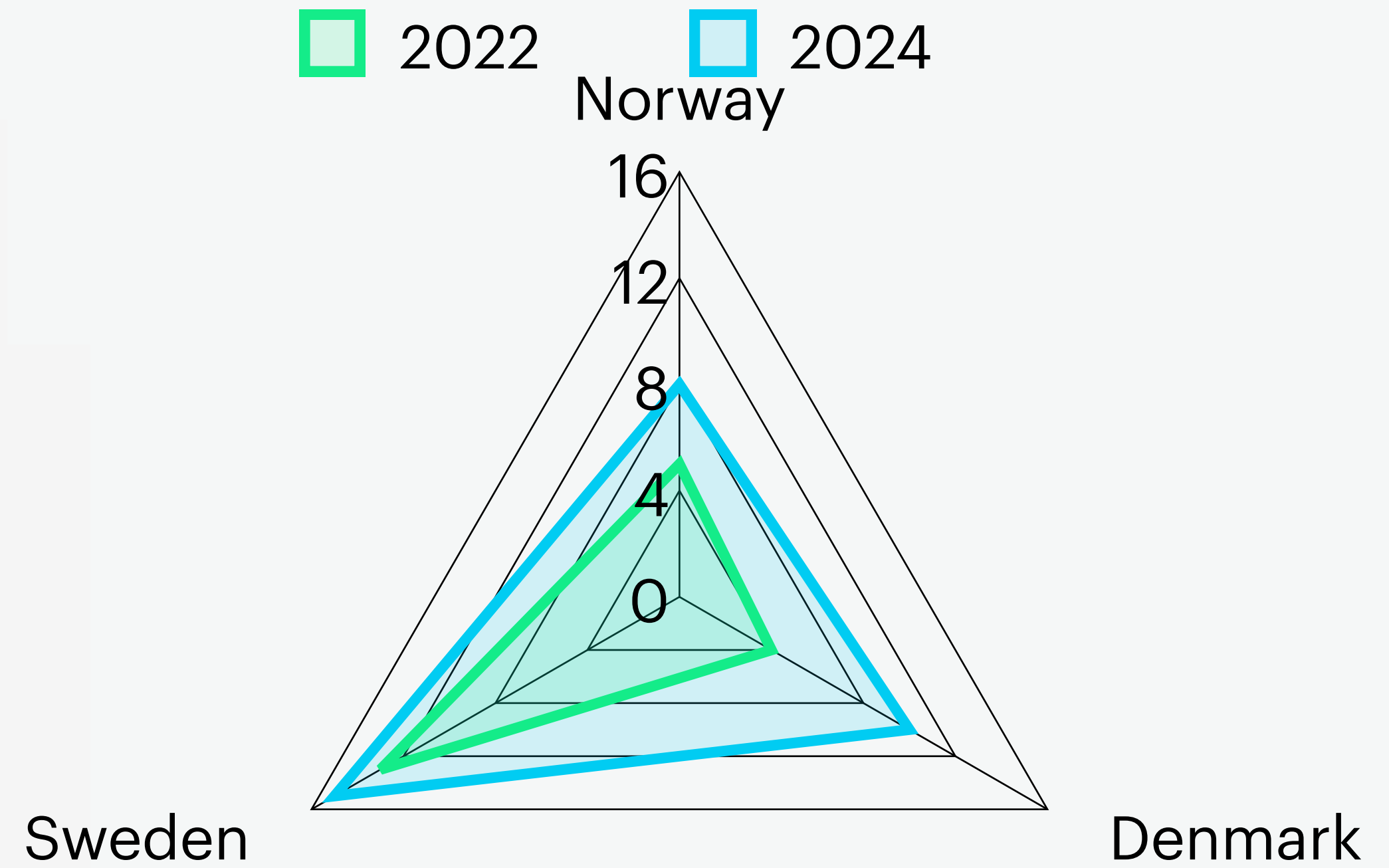


1 dataset 100 visualizations

Number of World Heritage Sites

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Radar



1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
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● 2022 ● 2024



Pie

1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
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Doughnut

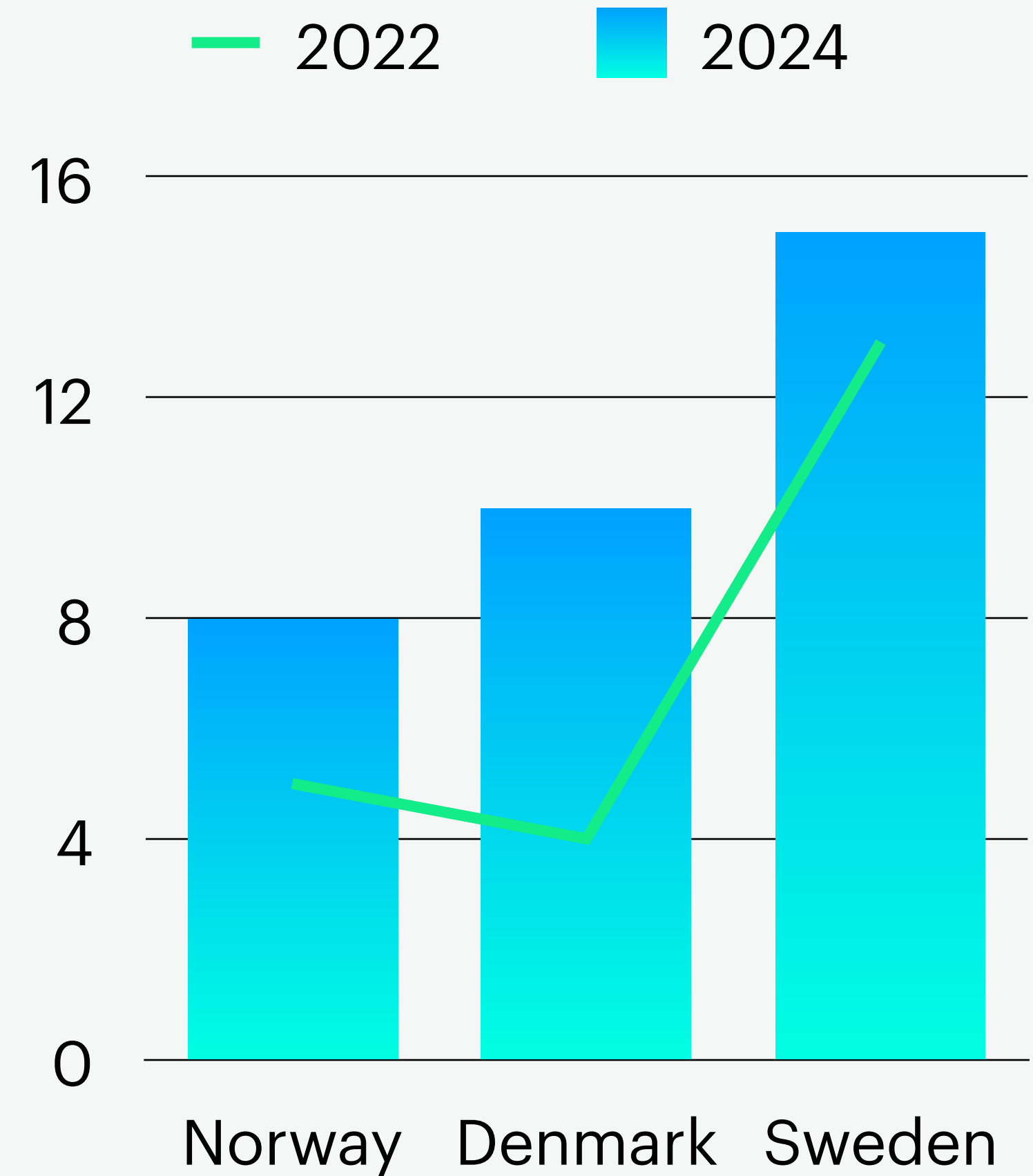
● 2022 ● 2024



1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

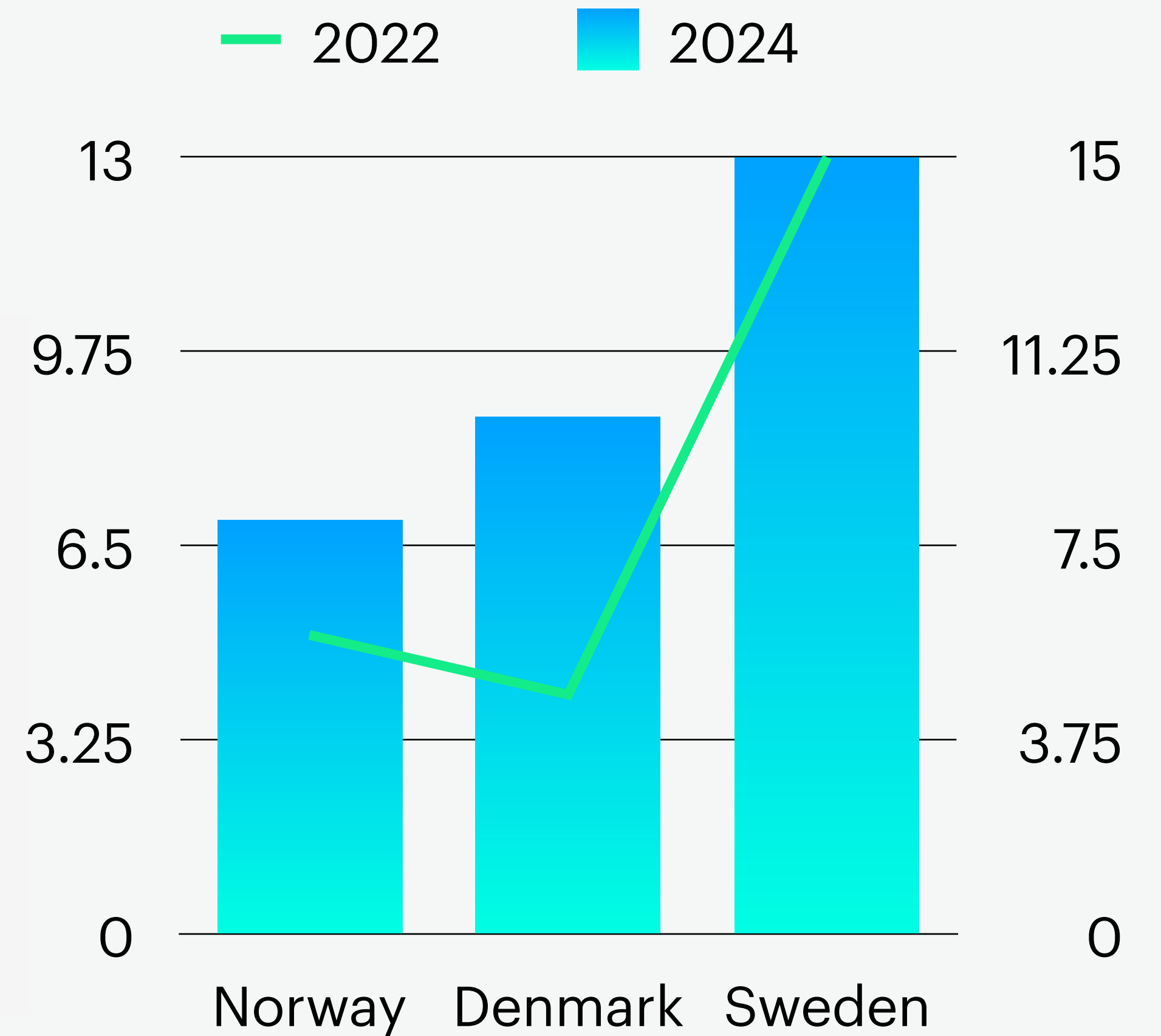


Mixed

1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15



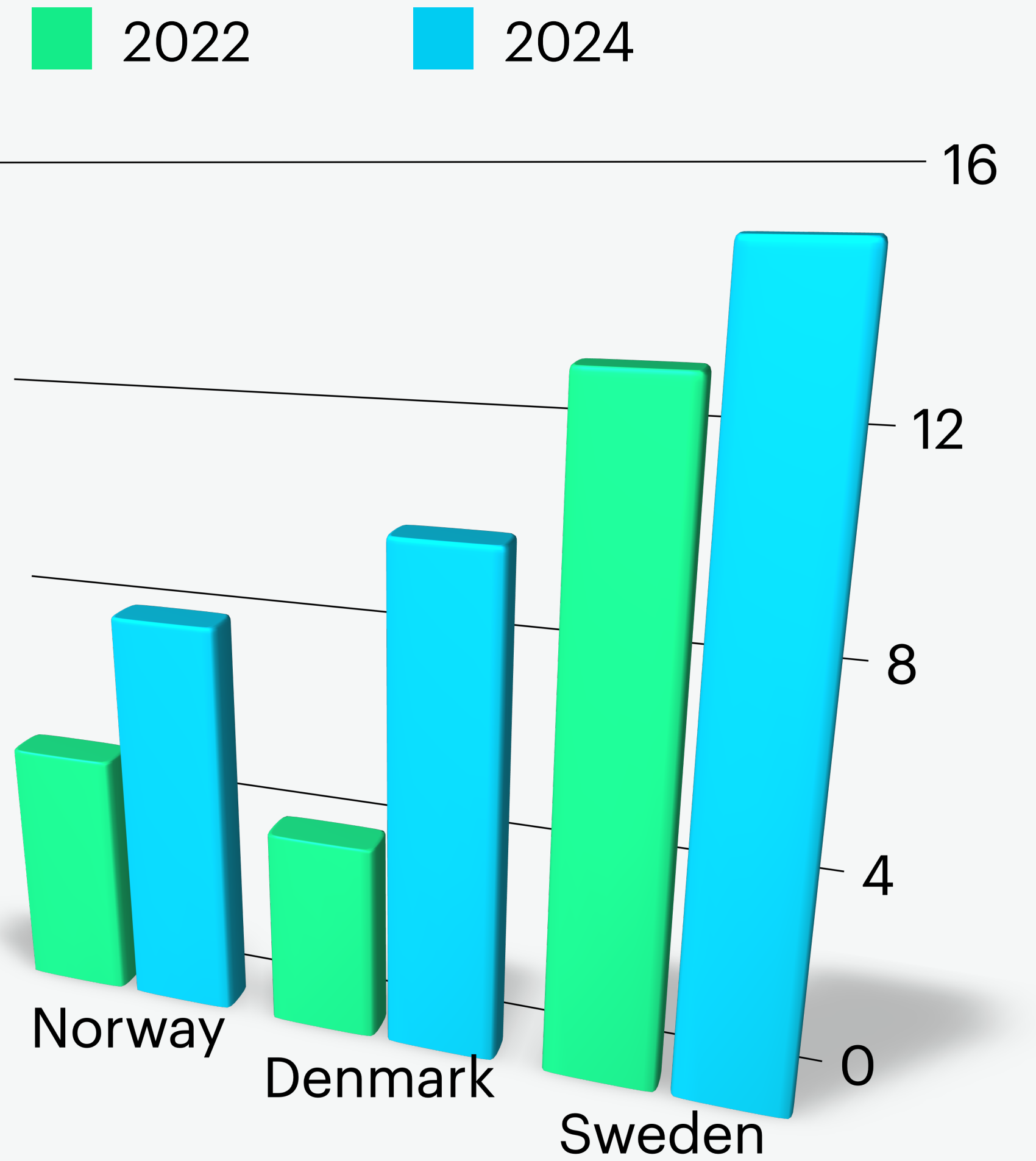
Different Y axis

1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

3D Bar chart

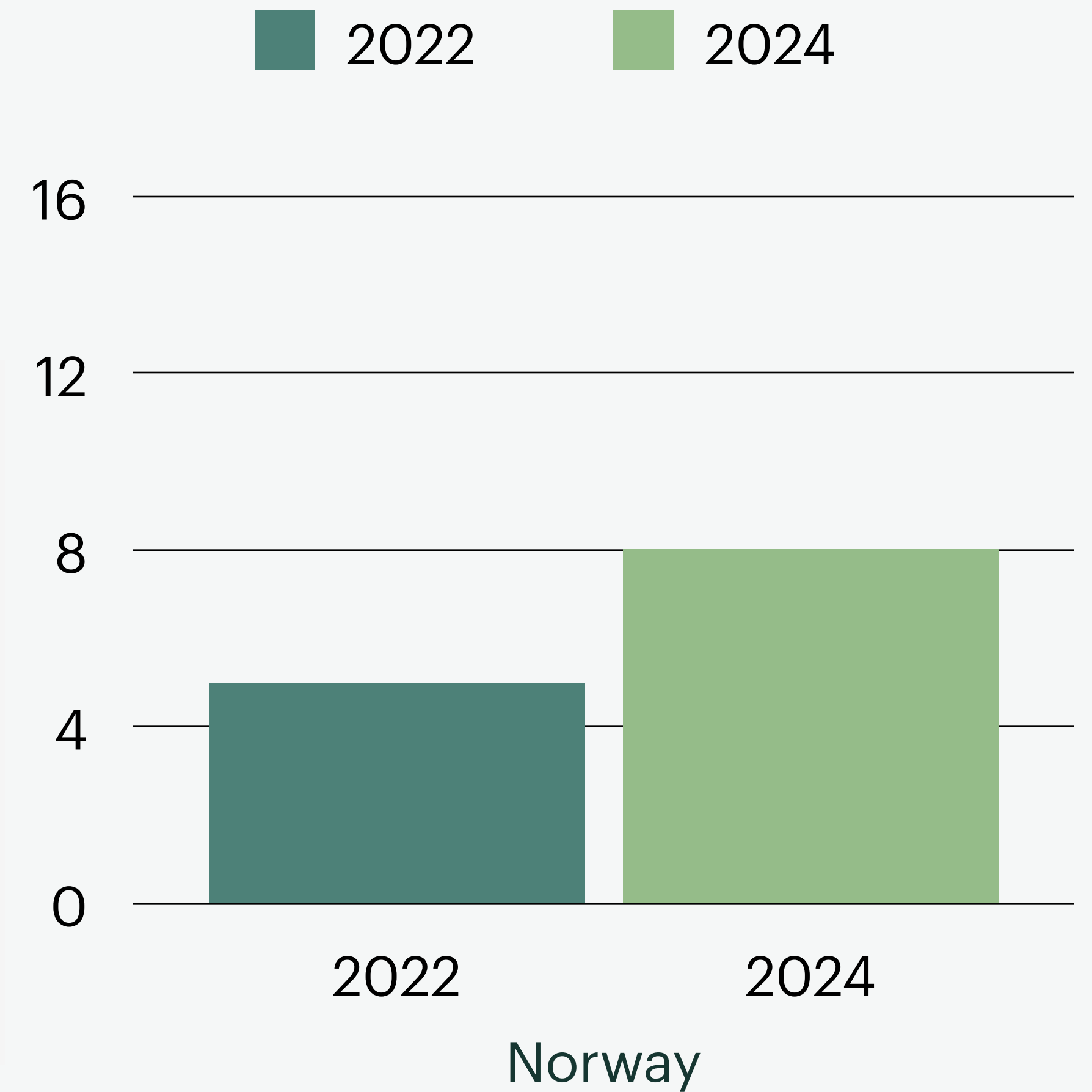


1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

Interactive



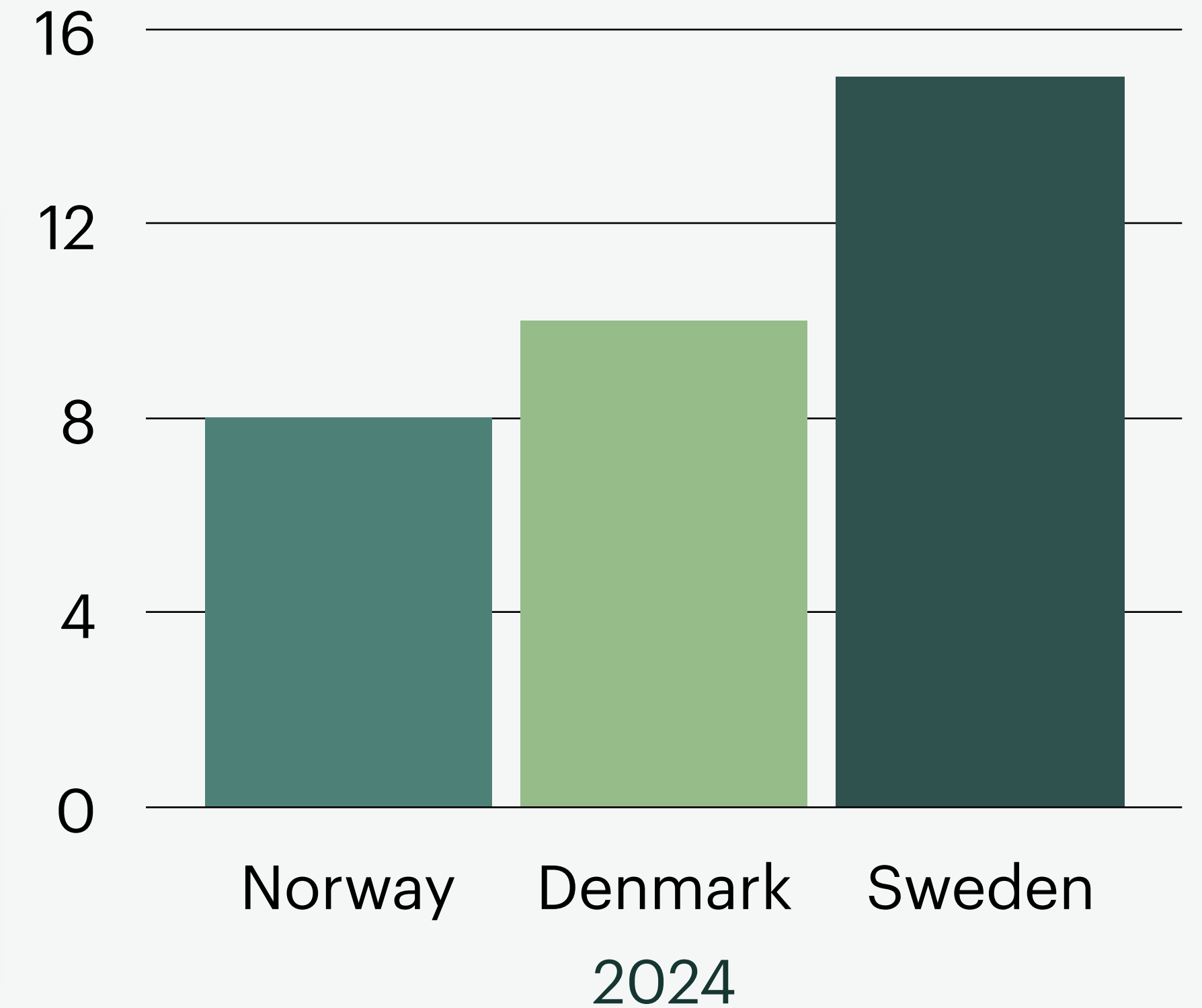
1 dataset 100 visualizations

Number of World Heritage Sites

	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

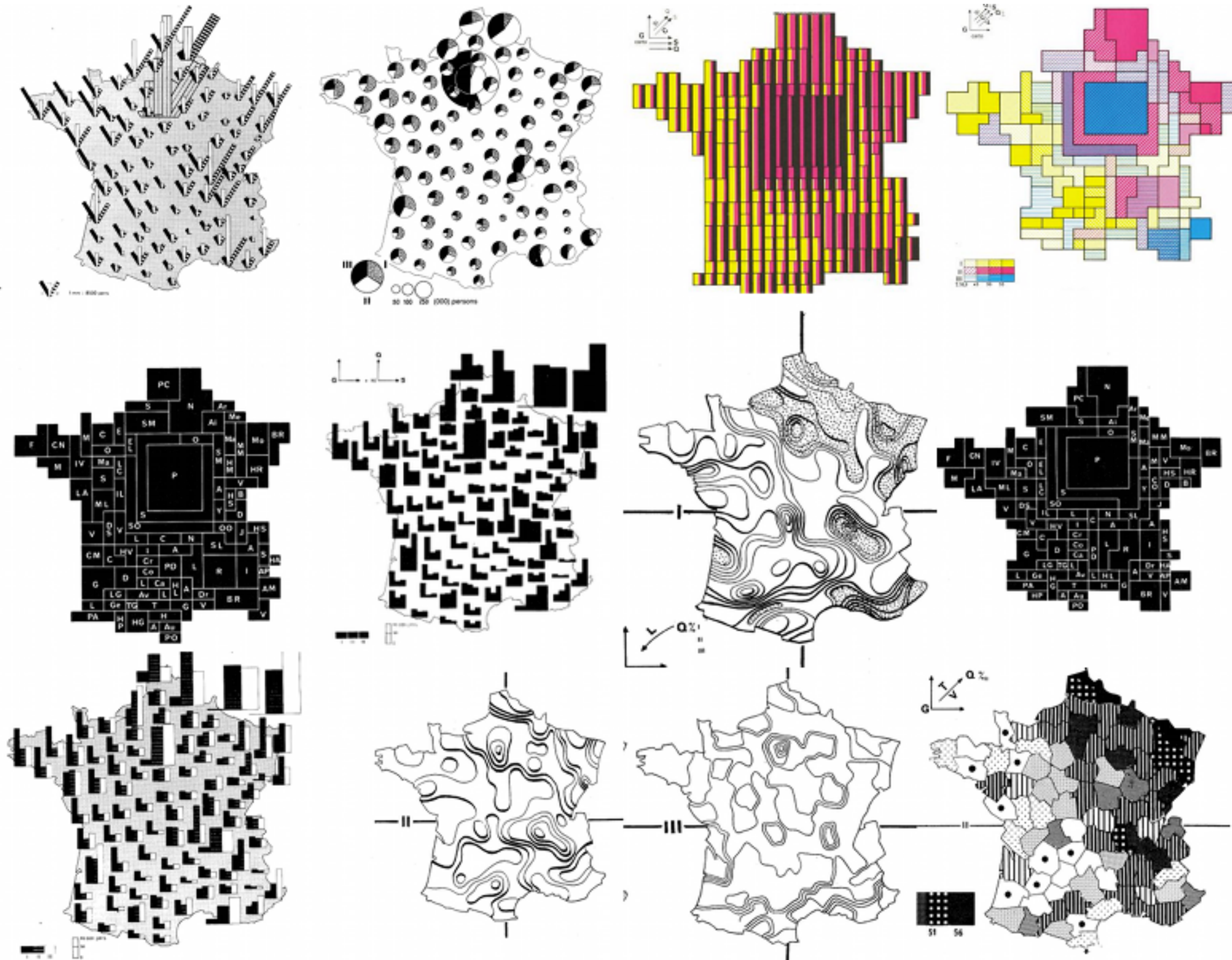
Interactive

Norway Denmark
Sweden



Visual Implantations & Retinal Variables

Visual perception operates according to rules that can be followed to express information visually in intuitive, accurate and efficient ways.



Jacques Bertin

Semiology of
Graphics [1967]

VARIABLES OF THE IMAGE

XY 2 DIMENSIONS OF THE PLANE

Z

SIZE

VALUE

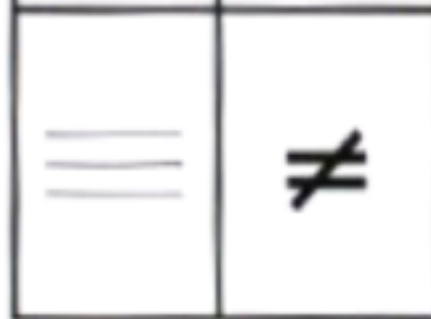
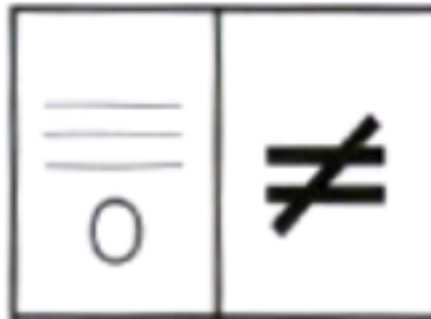
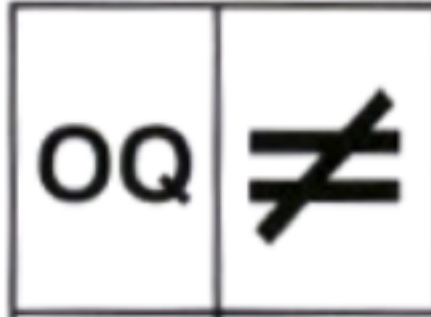
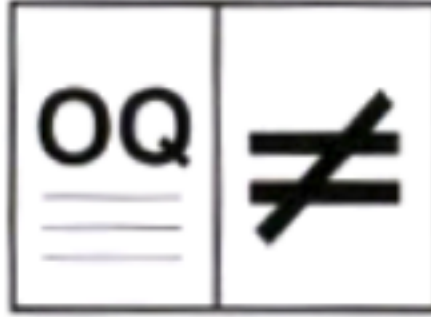
DIFFERENTIAL VARIABLES

TEXTURE

COLOR

ORIENTATION

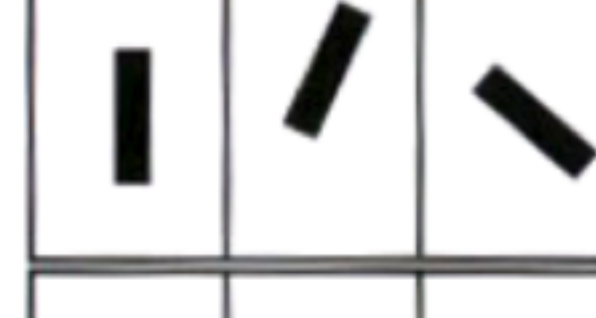
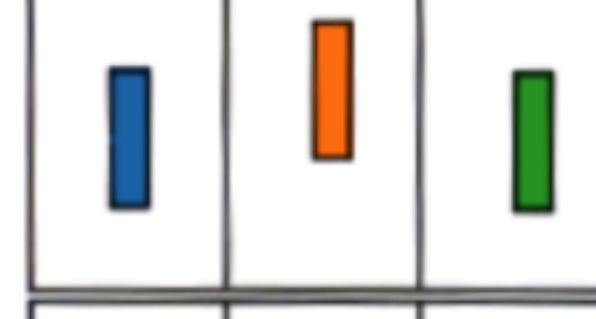
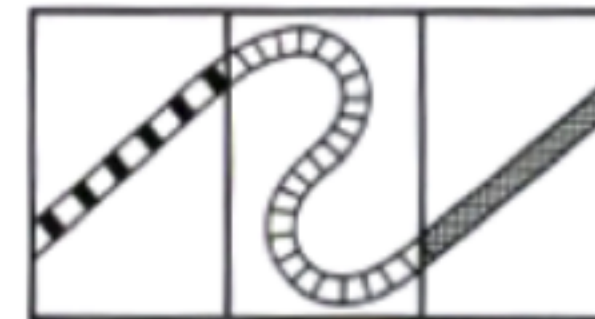
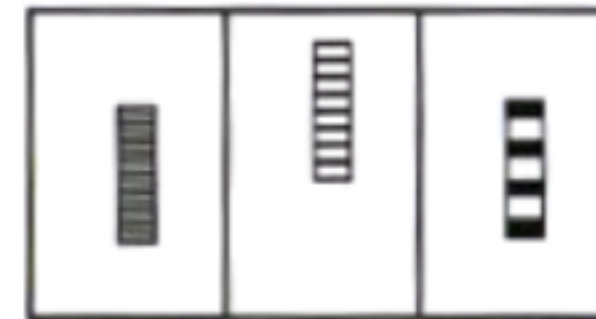
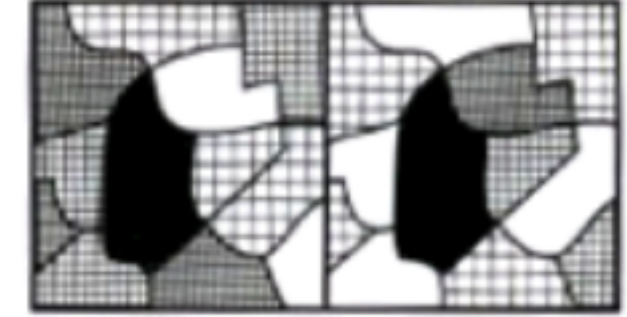
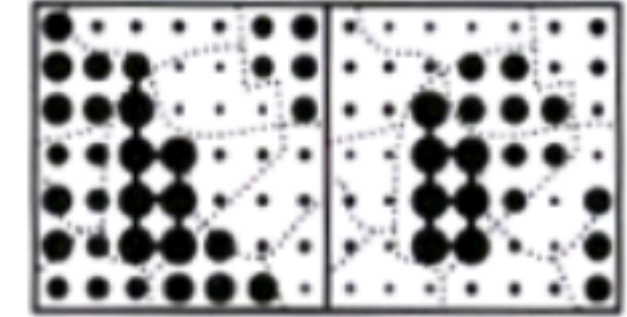
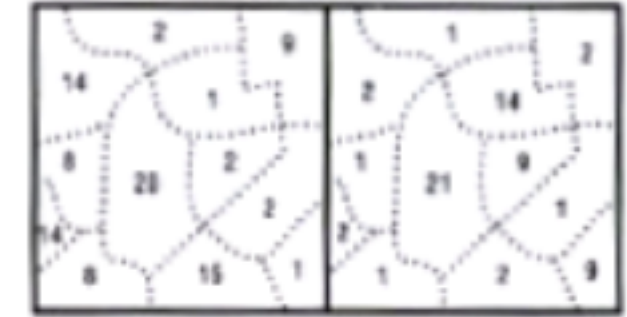
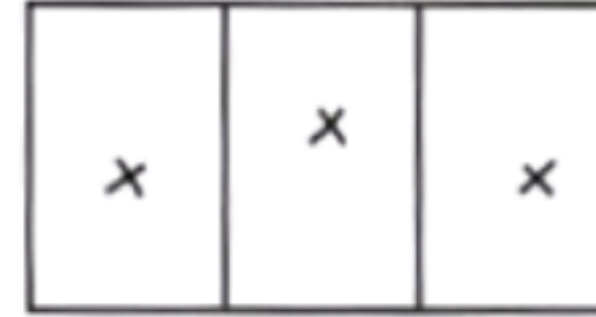
SHAPE



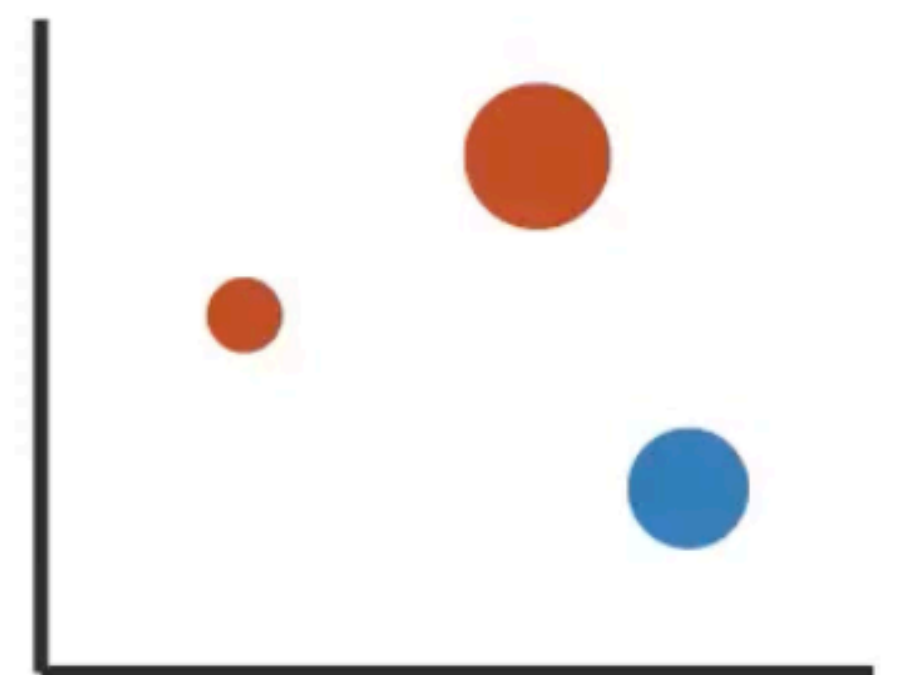
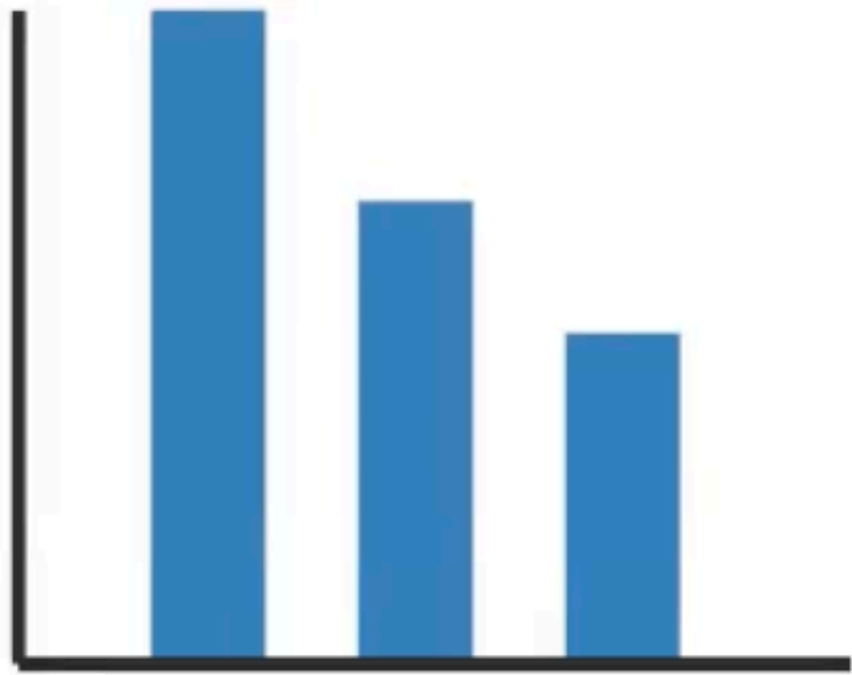
POINT

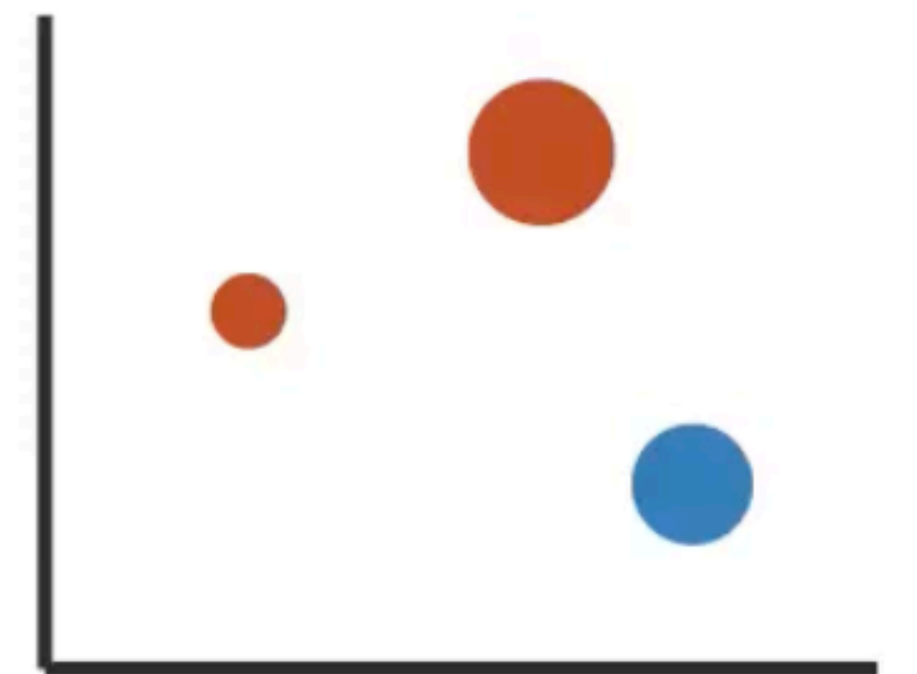
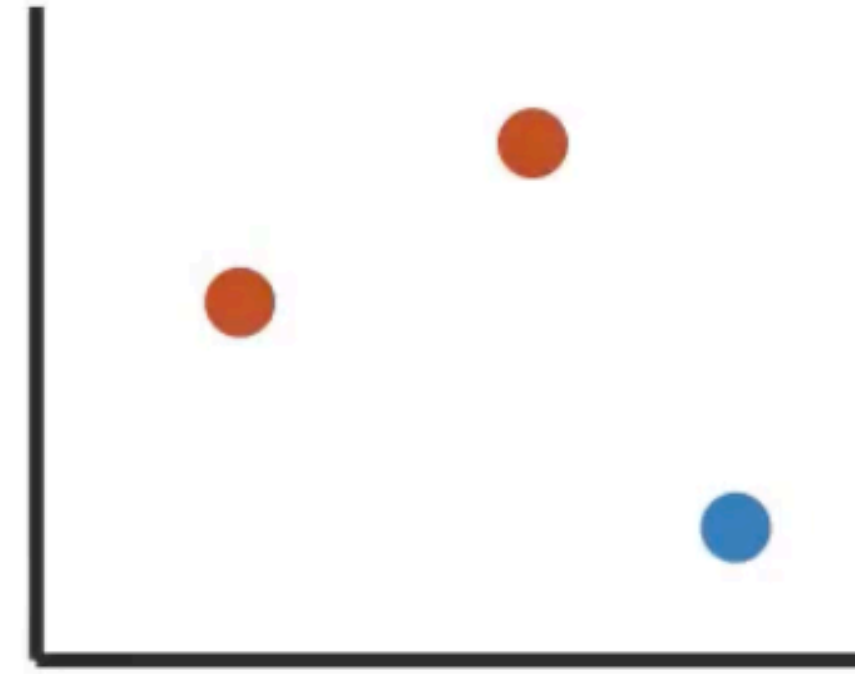
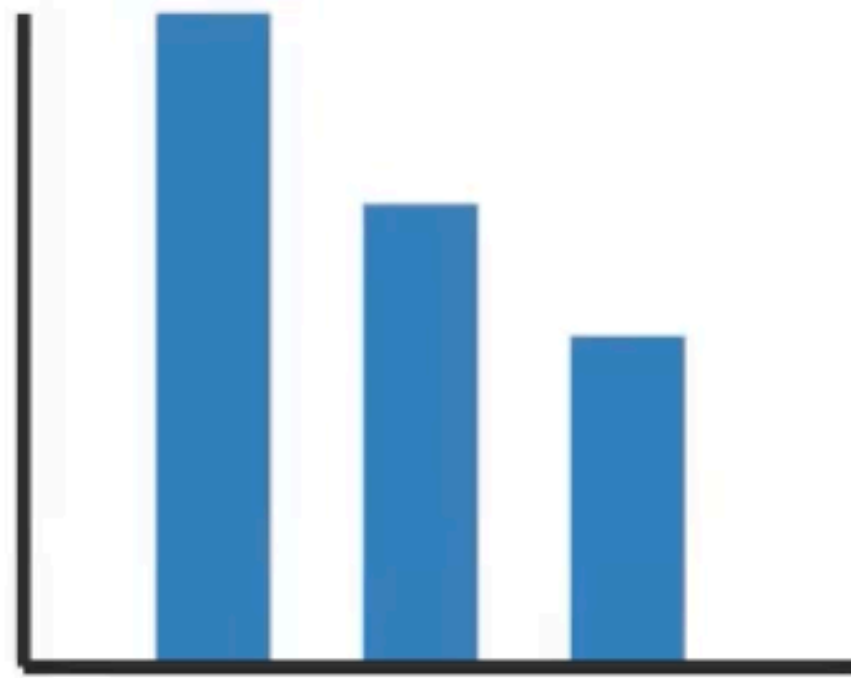
LINE

AREA (ZONE)

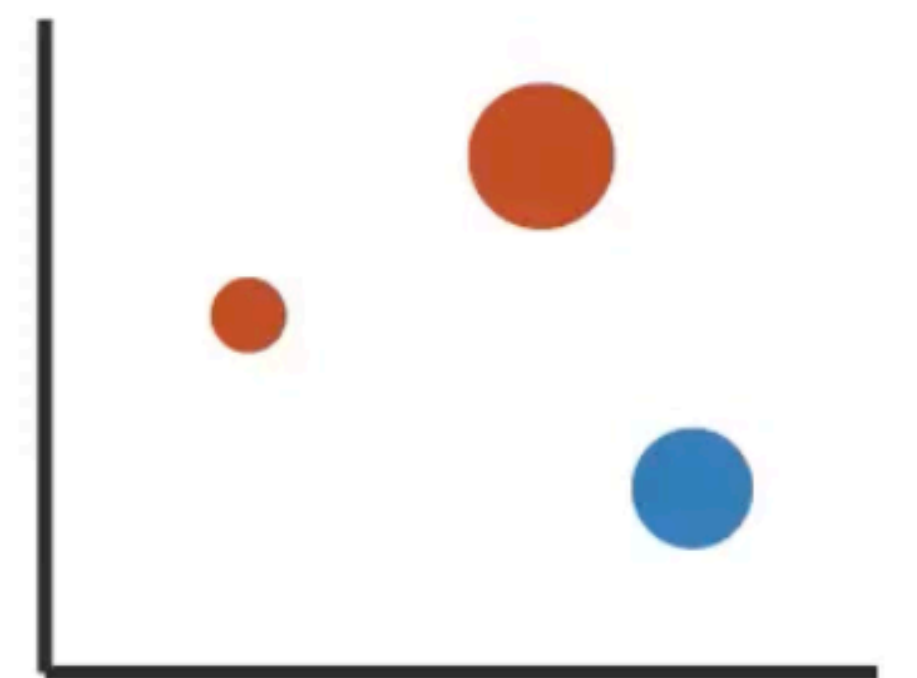
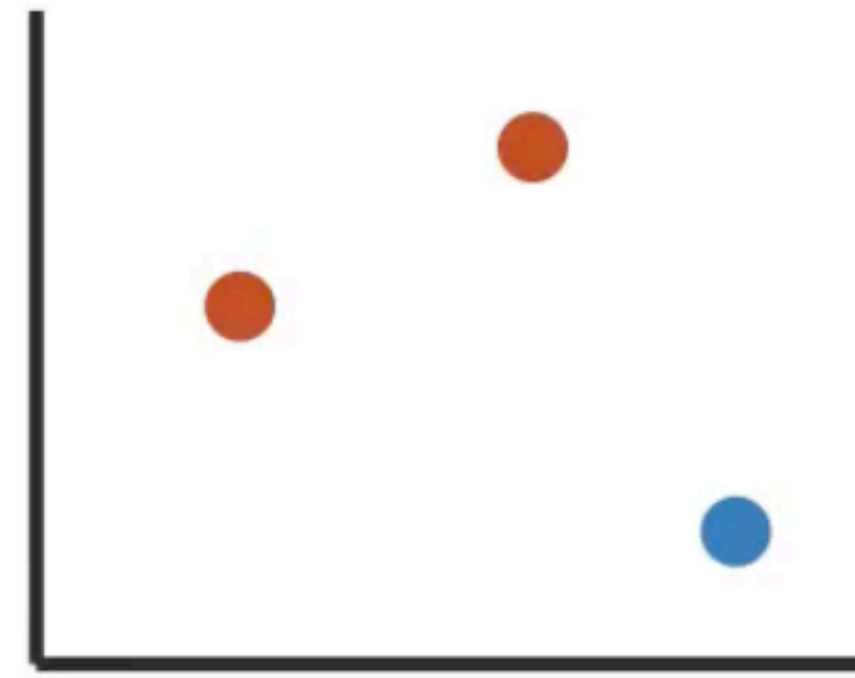
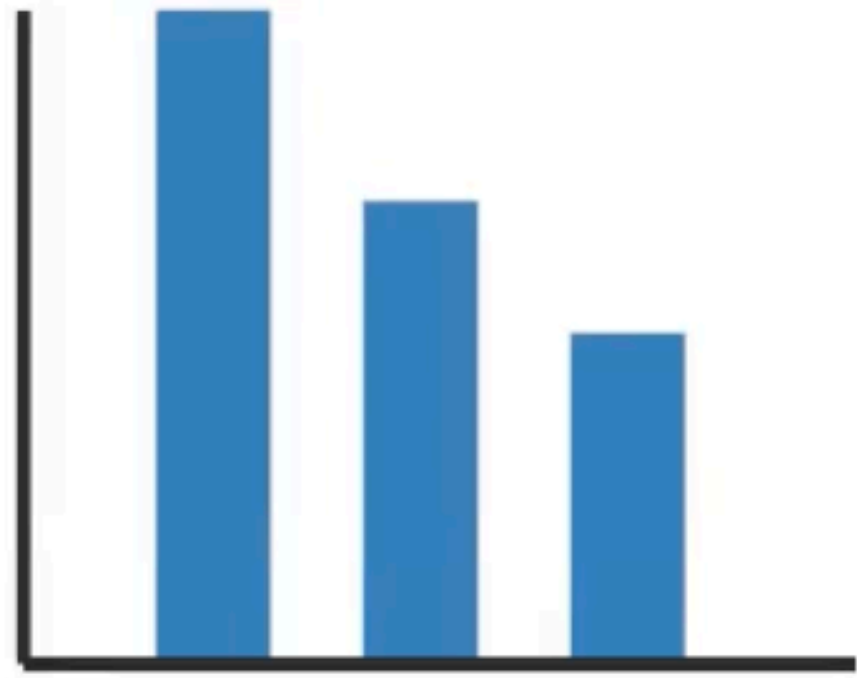


Marks & Channels





What's being represented here?

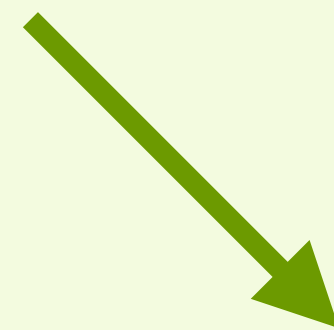


Marks & Channels

Represent items or links

Change appearance of marks
based on attributes

Marks & Channels



Represent items or links

Change appearance of marks
based on attributes



Marks & Channels

Change appearance of marks
based on attributes

Marks & Channels

Represent items or links

Marks

Represent **items** or links

0D - Points



1D - Lines



2D - Area



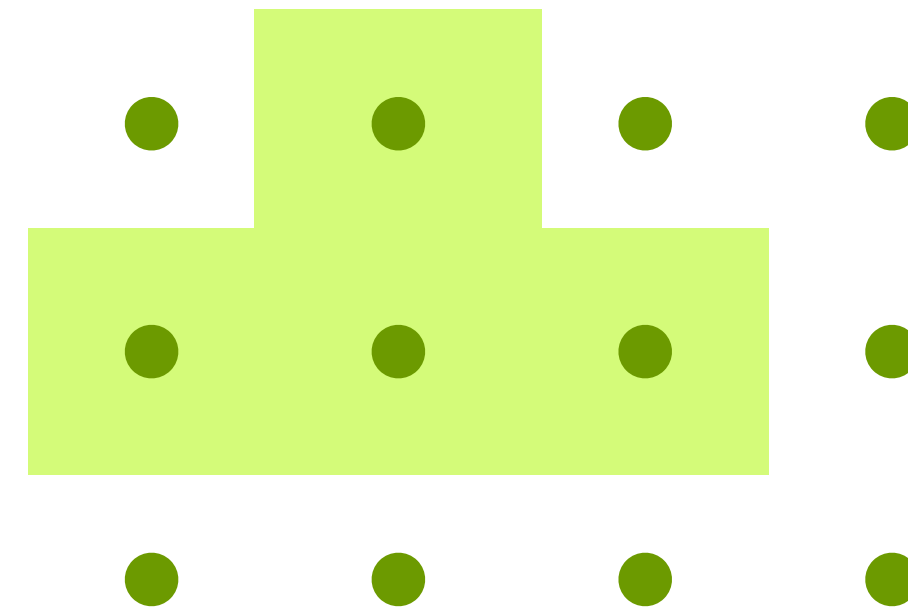
3D - Volume



Marks

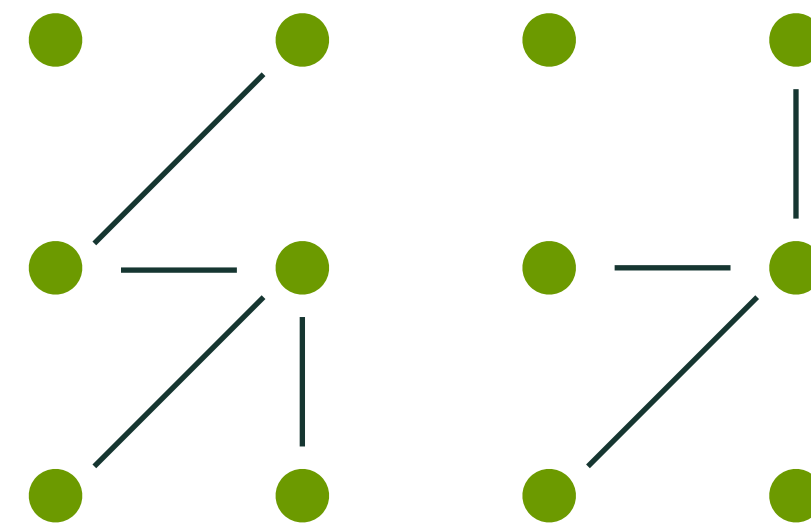
Represent items or links

Containment



Represent items or links

Connection



Channels

Change appearance of marks based on attributes

Nominal Ordinal Interval Ratio



Categorical

→ Identity Channels: Categorical Attributes

Spatial region



Color hue



Motion



Shape



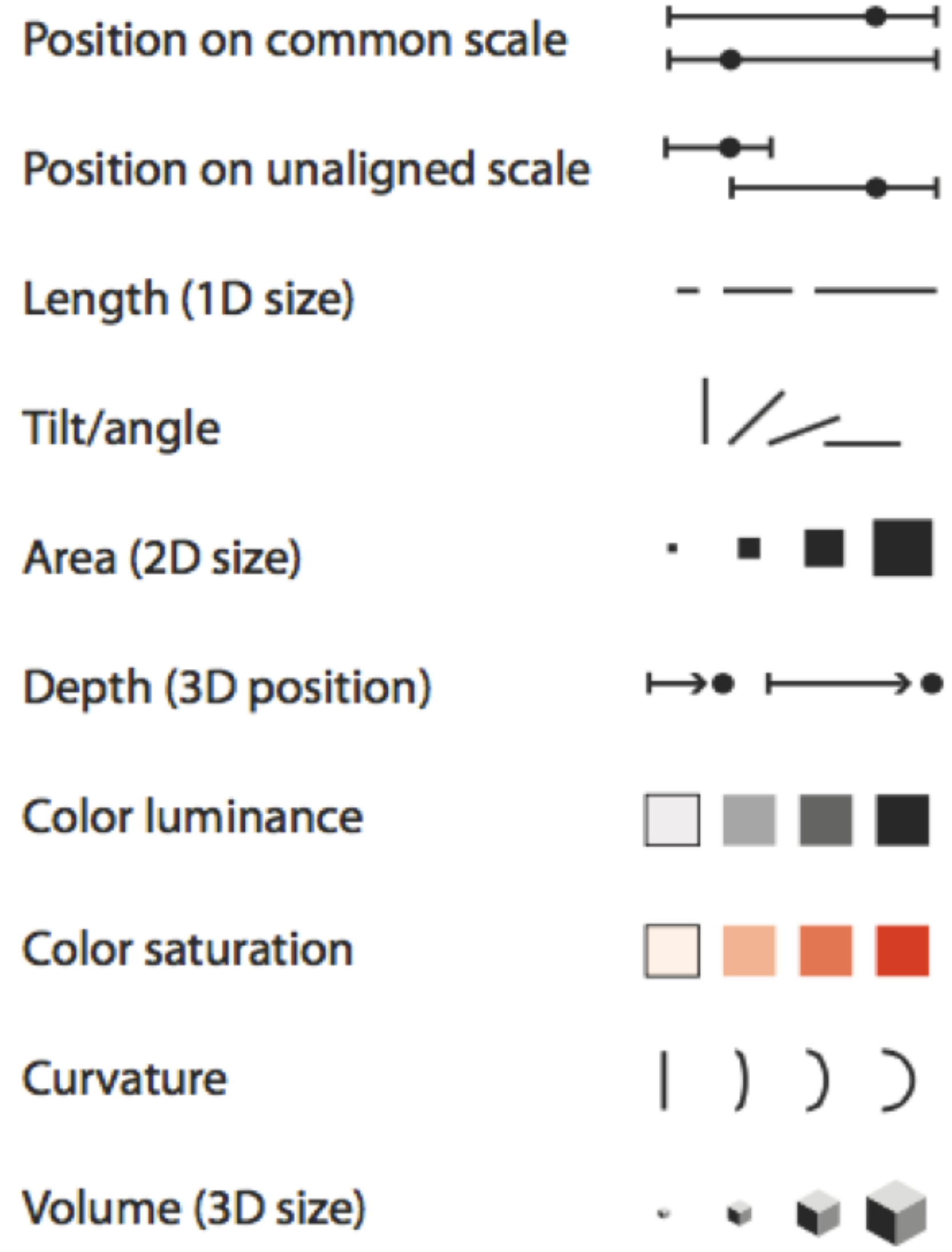
Channels

Change appearance of marks based on attributes

Nominal Ordinal **Interval Ratio**

Magnitude

➔ Magnitude Channels: Ordered Attributes





Area



More than 1 channel
can be used at the same
time

Area (2D size)



More than 1 channel
can be used at the same
time



Area



Color Saturation

Area (2D size)



Color saturation



More than 1 channel
can be used at the same
time



Area



Color Saturation



Area and Color Saturation

Area (2D size)



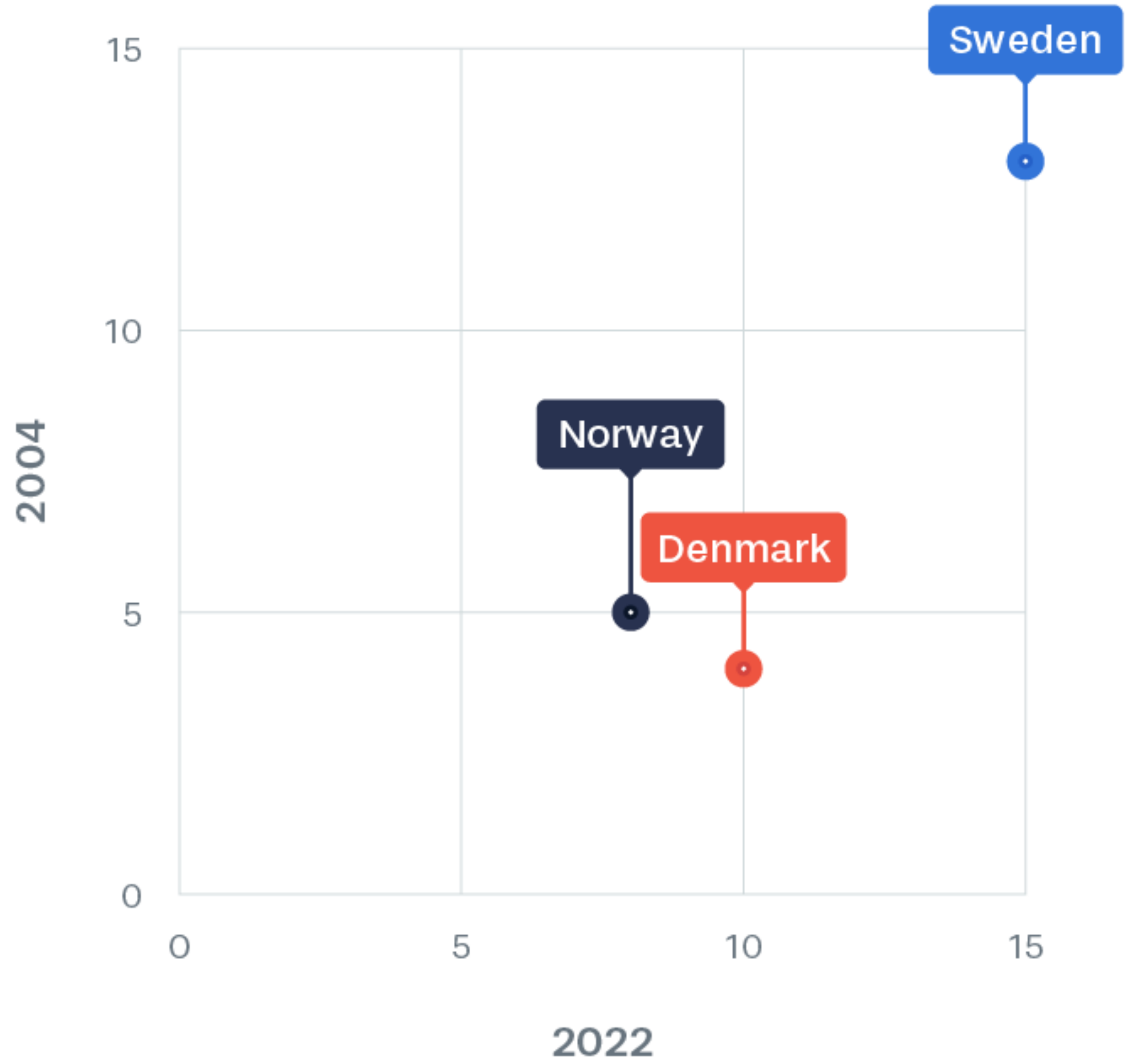
Color saturation



Identify the
Marks and Channels
...and what they represent

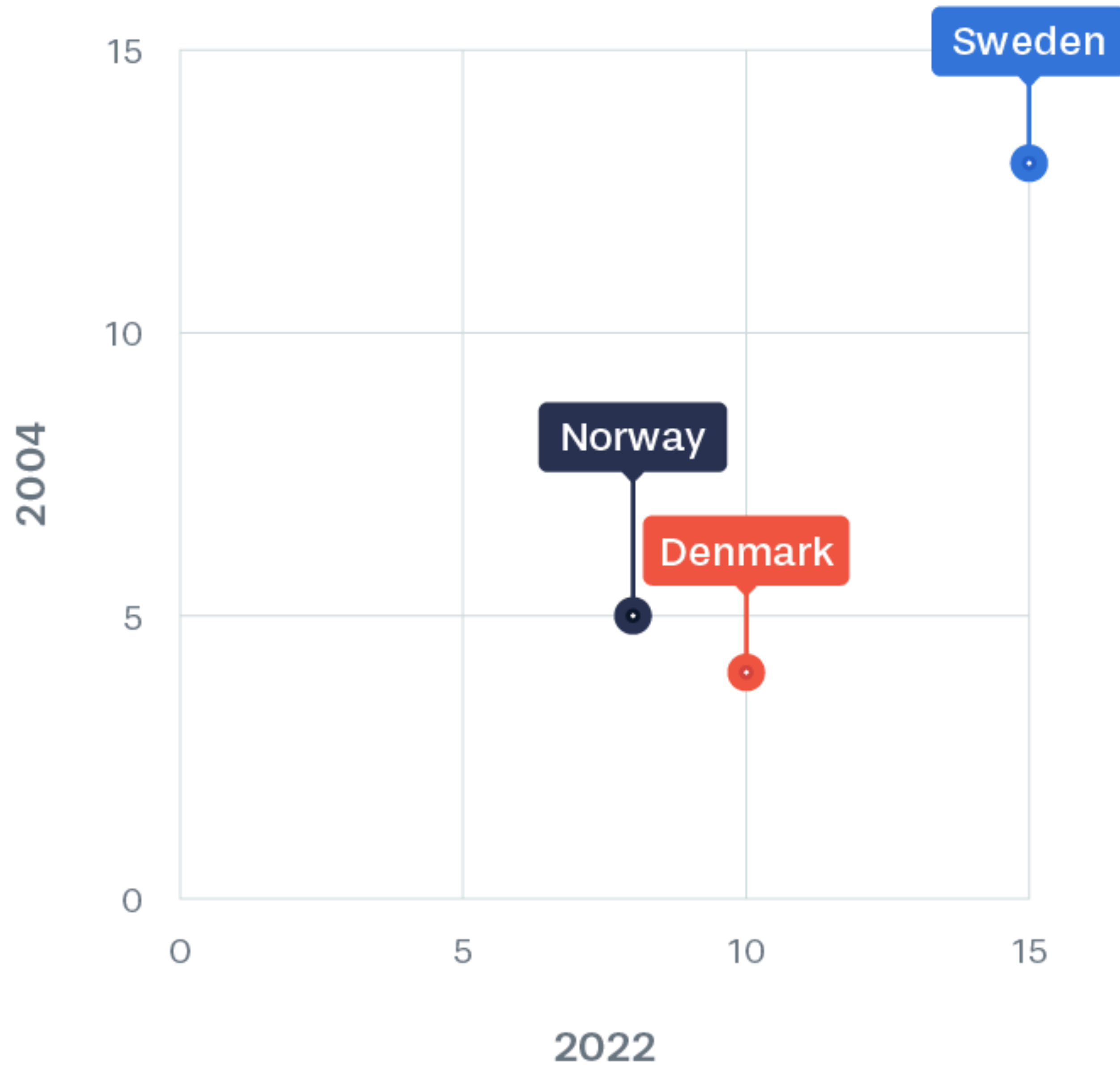
1 dataset 100 visualizations





Marks

Channels



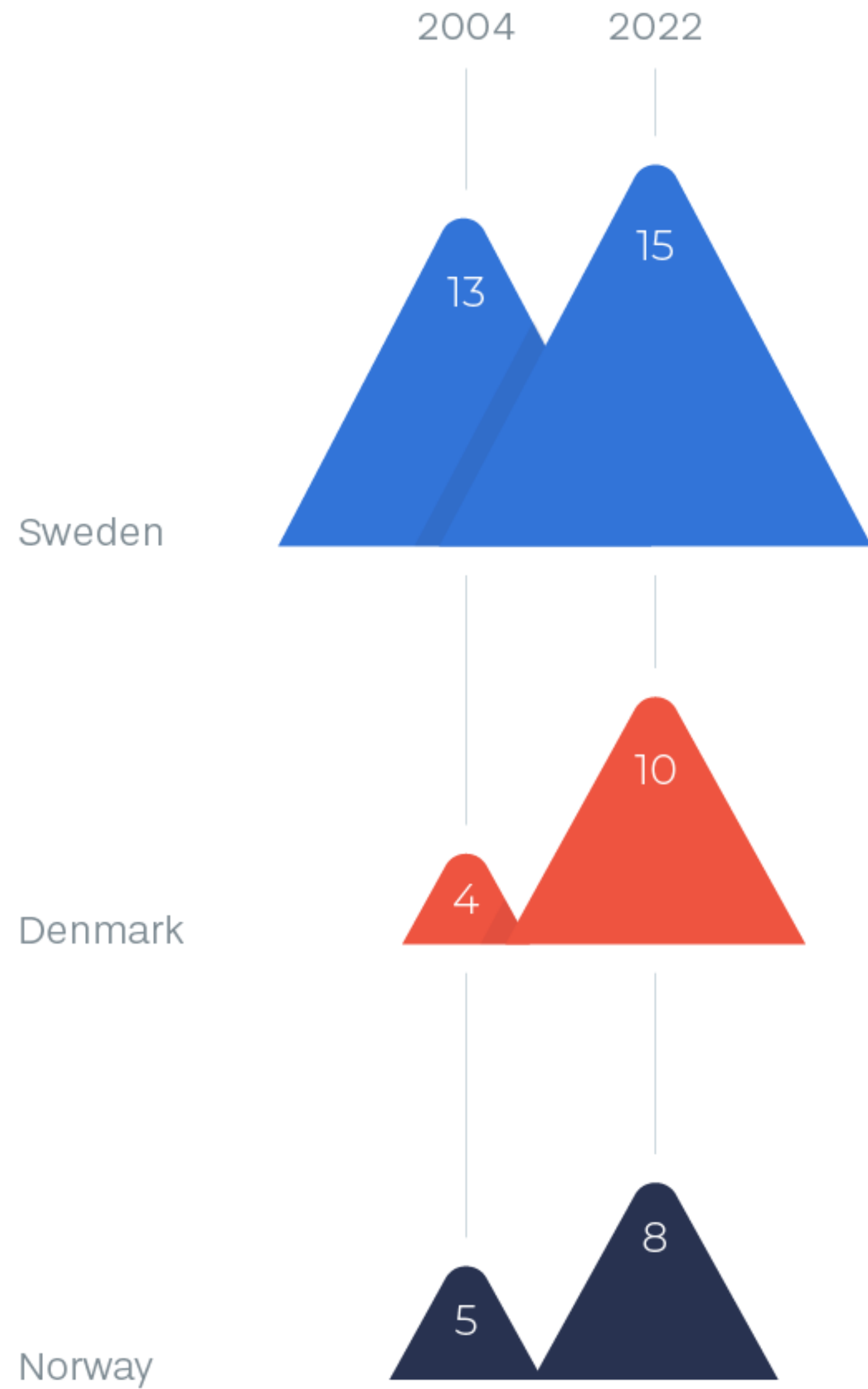
Marks

● Shape

Channels

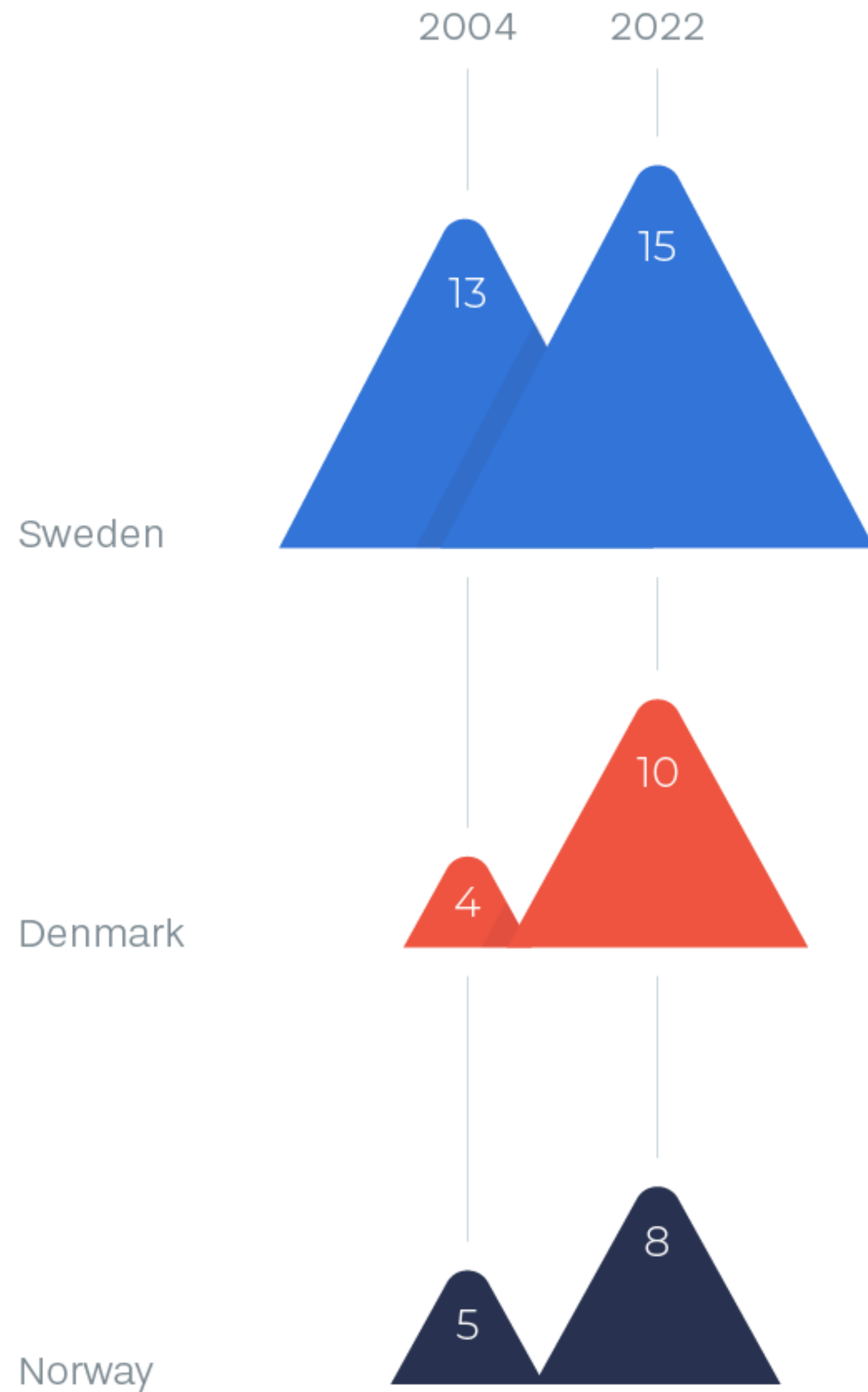
Position on common scale (magnitude)

Color (Categorical)



Marks

Channels



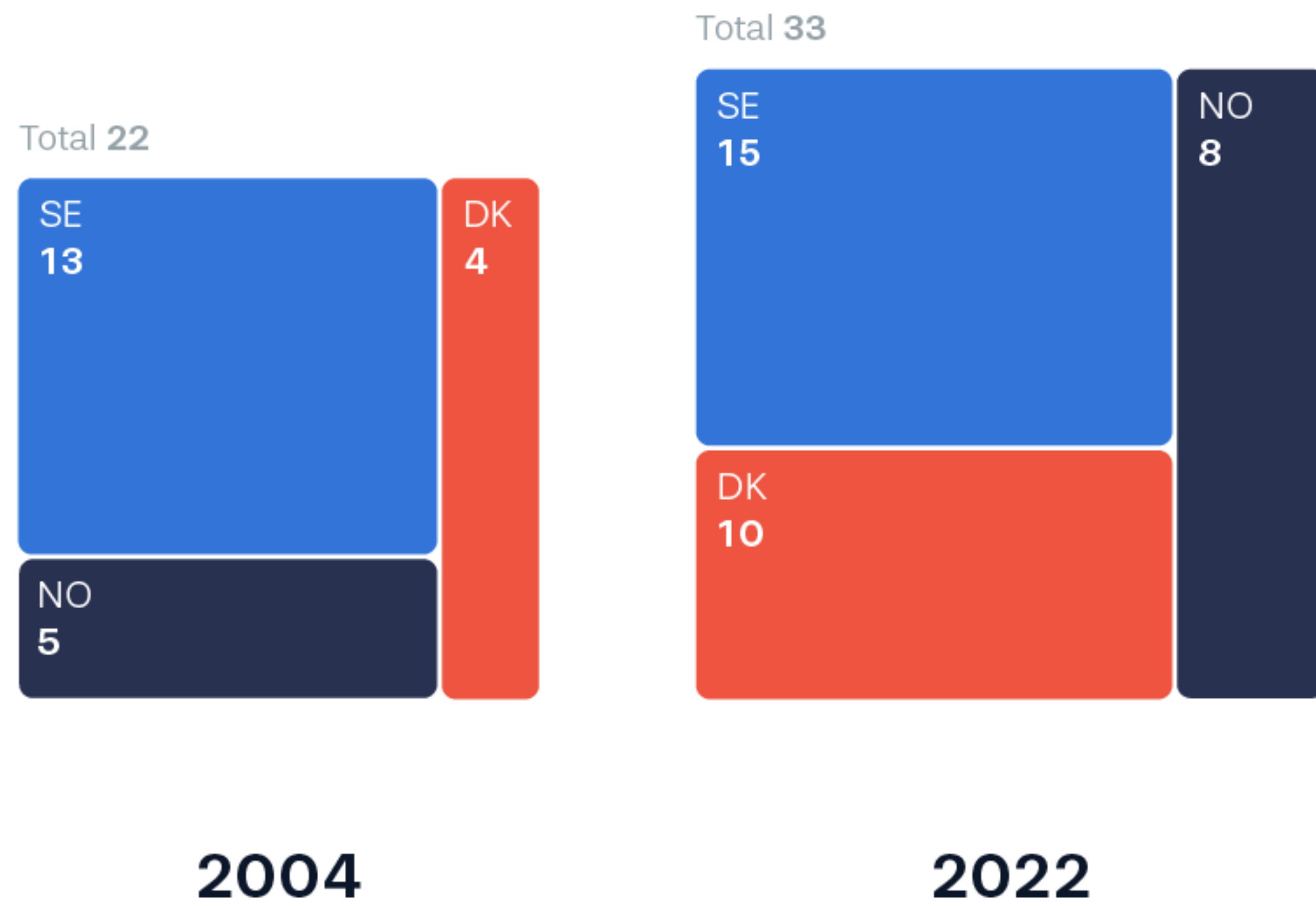
Marks

▲ Shape

Channels

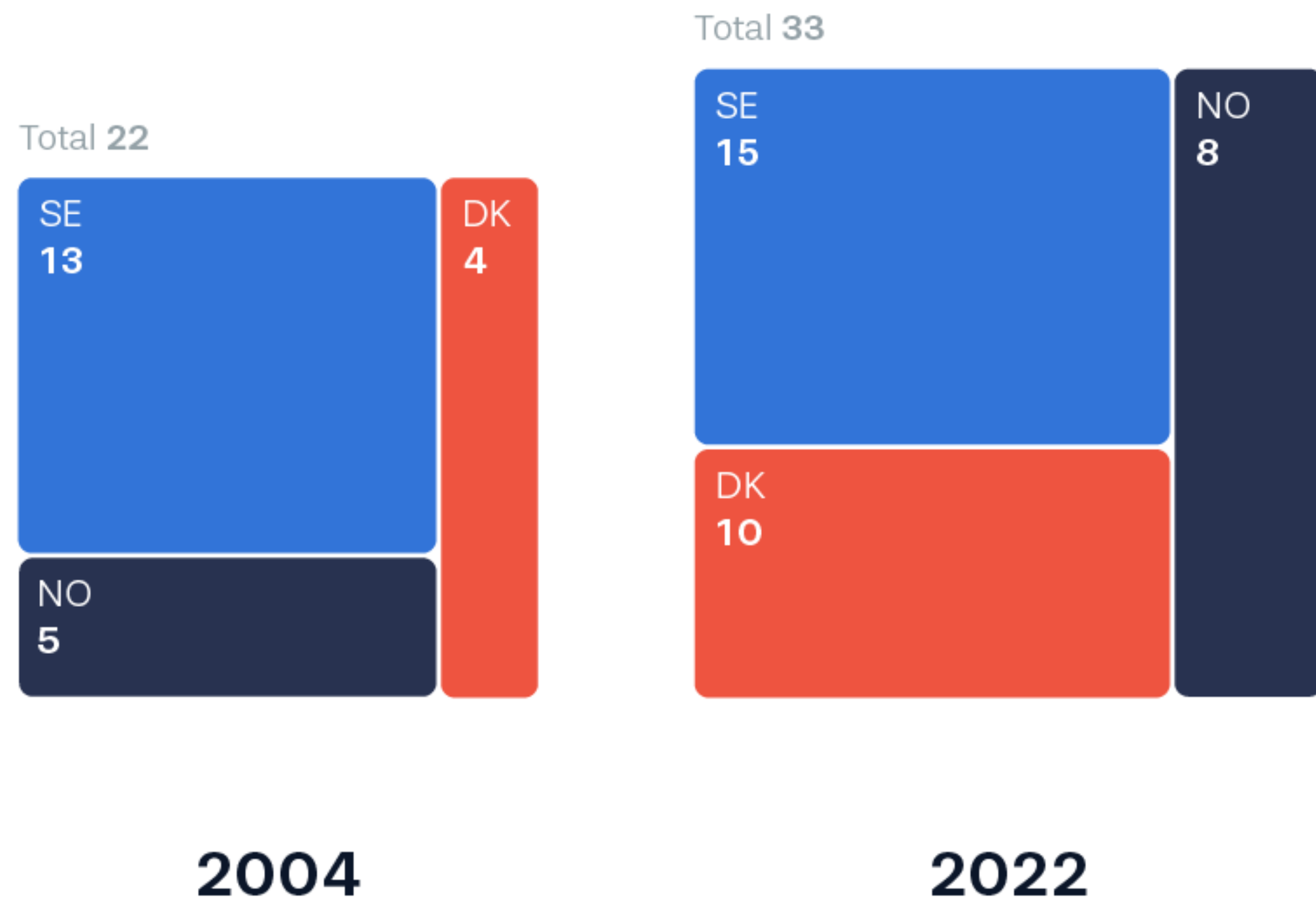
Size (Magnitude)

Color (Categorical)



Marks

Channels



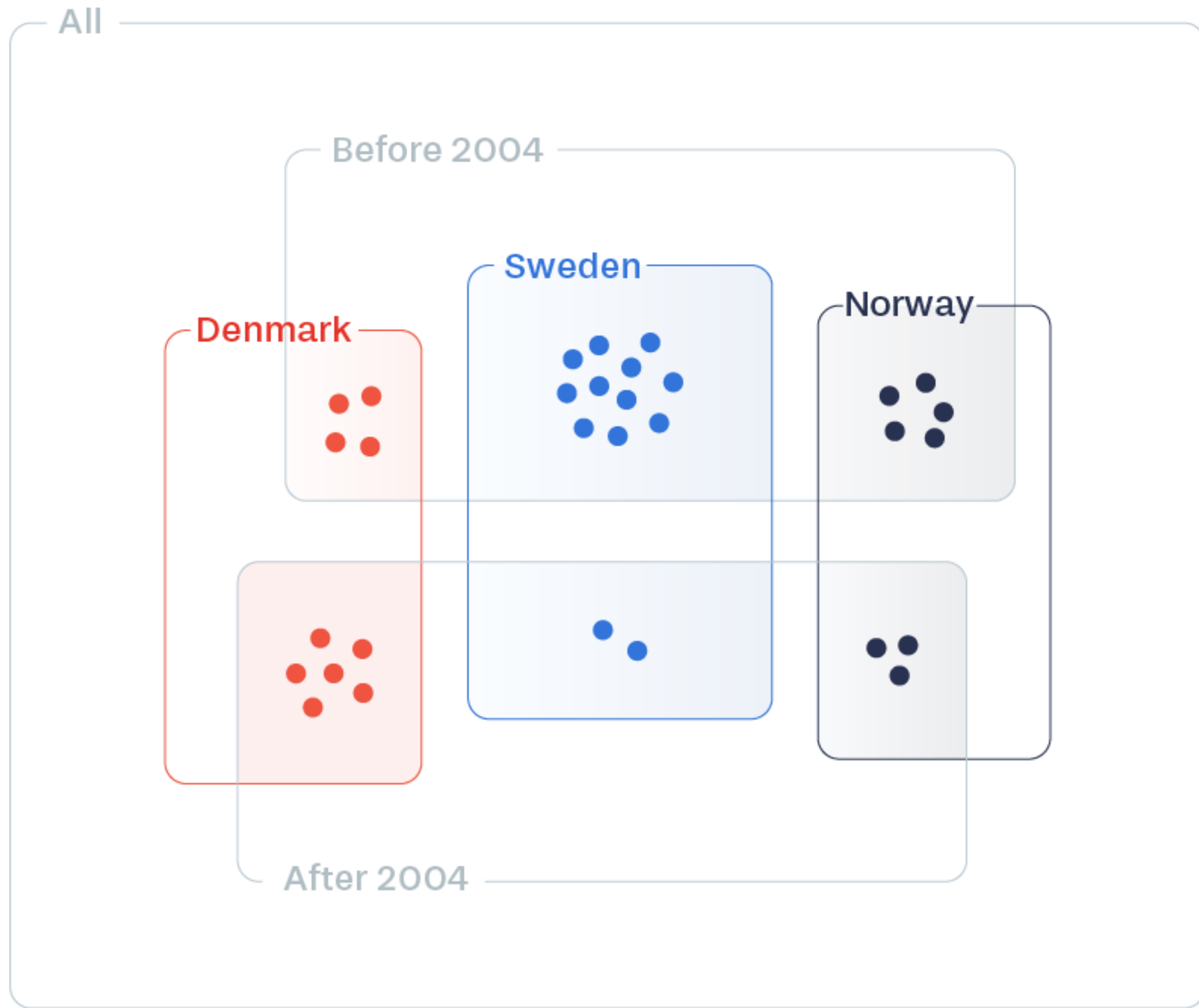
Marks



Channels

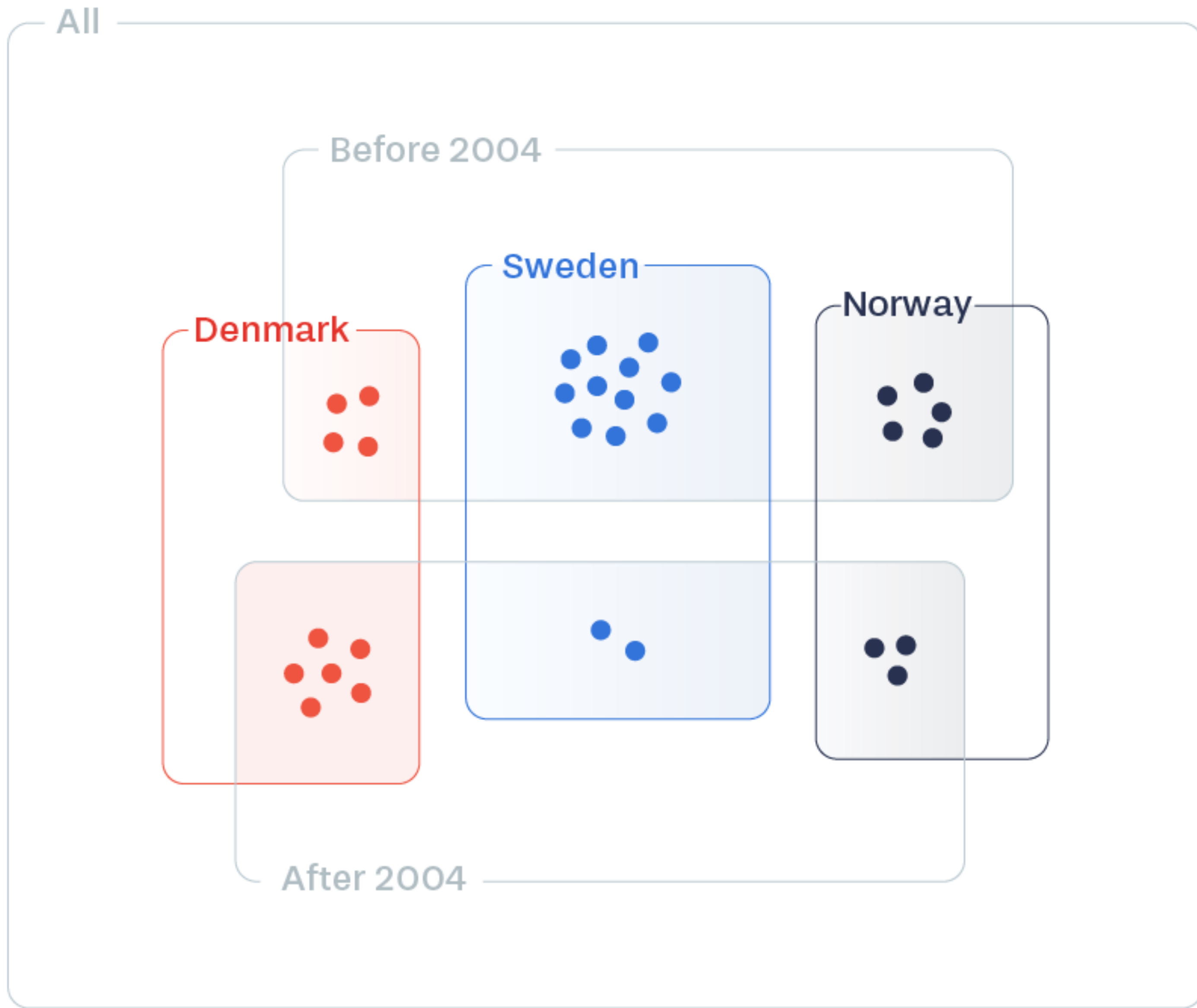
2D Area size
(Magnitude)

Color (Categorical)

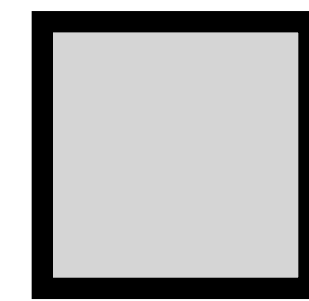


Marks

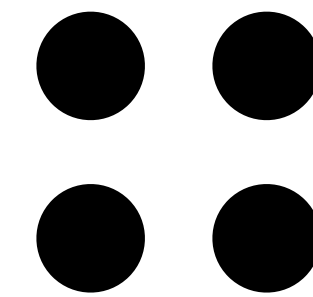
Channels



Marks



Containment



Shape

Channels


Color (Categorical)

It's very easy to make

Bad Charts

Visualizations that make no sense

viz.wtf



The screenshot shows a web browser window with the URL viz.wtf. The page features a large, colorful, abstract visualization of a landscape, possibly a topographic map or a data visualization, with a rainbow color palette. The visualization is set against a dark background. In the top right corner of the page, there is a "Follow wtf-viz" button and a "tumblr" logo. Below the visualization, there is a circular logo with colorful, interlocking shapes. The main heading is "WTF Visualizations". Below the heading, there is a description: "Visualizations that make no sense. For a discussion of what is wrong with a particular visualization, tweet at us @WTFViz. Submit a WTFViz you found." At the bottom of the page, there are two links: "SUBMIT A POST" and "ARCHIVE".

Search wtf-viz

Follow wtf-viz

tumblr

WTF Visualizations

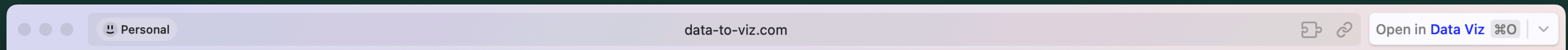
Visualizations that make no sense.
For a discussion of what is wrong with a particular visualization, tweet at us [@WTFViz](#).
[Submit a WTFViz you found.](#)

[SUBMIT A POST](#) [ARCHIVE](#)

BetMGM 🐒 🍷 @BetMGM

Visualisation Caveats

data-to-viz.com



from Data to Viz

EXPLORE STORY ALL CAVEATS POSTER INSPIRATION ABOUT CONTACT

CAVEATS

A collection of dataviz caveats by data-to-viz.com

Show all Top 10 Improvement Misleading Map Bar



Order your data

When displaying the value



To cut or not to cut?

Cutting the Y-axis is one of



The spaghetti chart

A line graph with too many

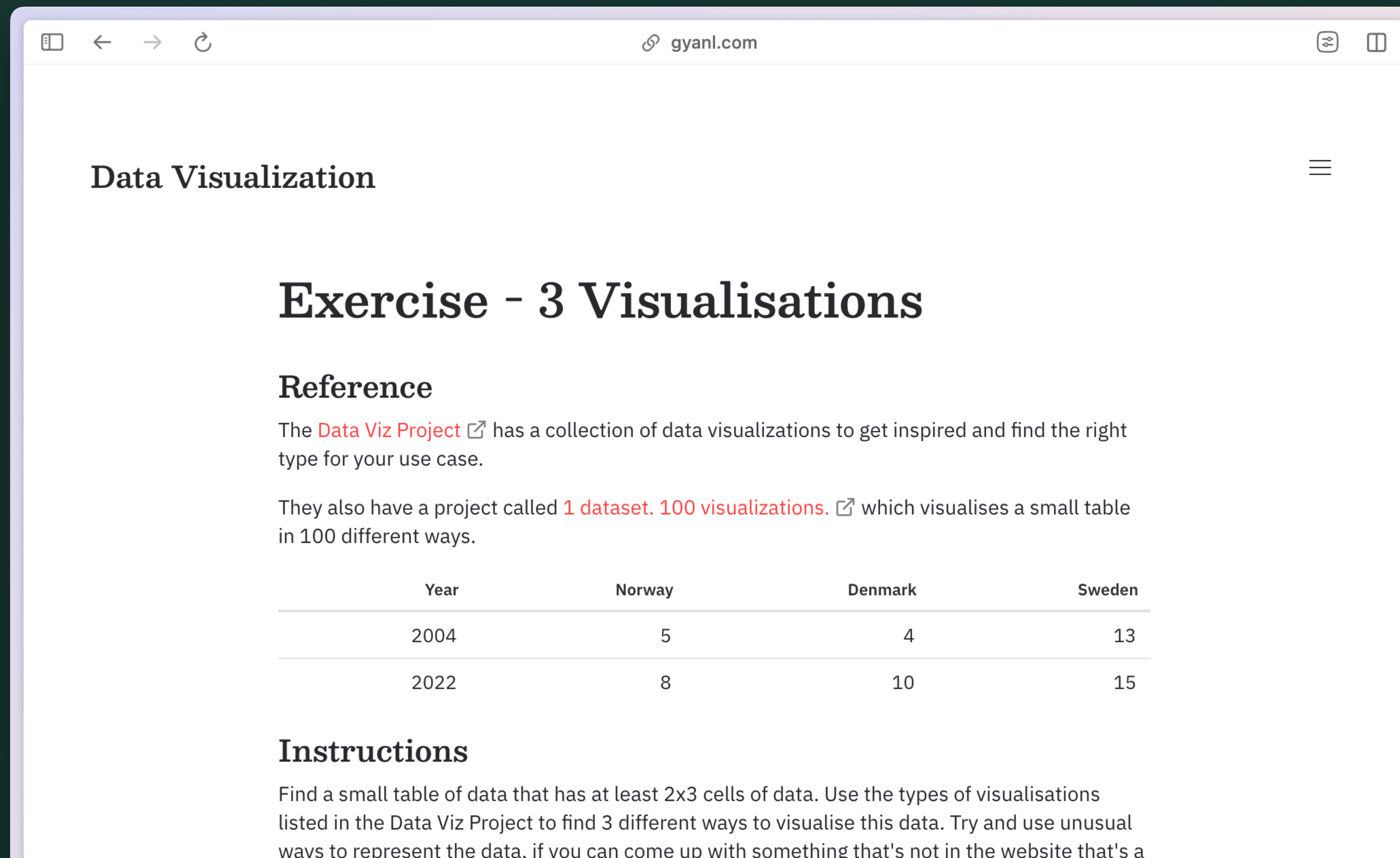


Pie chart

The human eye is bad at

Exercise

3 Visualisations



The screenshot shows a web browser window with the URL gyani.com. The page content includes a navigation menu with 'Data Visualization' and a hamburger menu icon. The main heading is 'Exercise - 3 Visualisations'. Under the 'Reference' section, there are two paragraphs of text. The first paragraph mentions 'The Data Viz Project' with a link icon. The second paragraph mentions '1 dataset. 100 visualizations.' with a link icon. Below the text is a table with four columns: 'Year', 'Norway', 'Denmark', and 'Sweden'. The table has two rows of data. The first row shows values for 2004: Norway (5), Denmark (4), and Sweden (13). The second row shows values for 2022: Norway (8), Denmark (10), and Sweden (15). Below the table is an 'Instructions' section with a paragraph of text.

Data Visualization

Exercise - 3 Visualisations

Reference

The [Data Viz Project](#) has a collection of data visualizations to get inspired and find the right type for your use case.

They also have a project called [1 dataset. 100 visualizations.](#) which visualises a small table in 100 different ways.

Year	Norway	Denmark	Sweden
2004	5	4	13
2022	8	10	15

Instructions

Find a small table of data that has at least 2x3 cells of data. Use the types of visualisations listed in the Data Viz Project to find 3 different ways to visualise this data. Try and use unusual ways to represent the data. If you can come up with something that's not in the website that's a

Exercise

3 Visualisations

- Find a small table of data that has at least 2x3 cells of data.
- Use the types of visualisations listed in the Data Viz Project to find 3 different ways to visualise this data.
- Try and use unusual ways to represent the data, if you can come up with something that's not in the website that's a bonus.
- Present it to the class. Also, put your slides into the Google Drive folder shared on the WhatsApp group in PDF or Google Slides.

Visual Perception and Encoding

- Using special properties of the visual system to help us think.
- Your visual system is good at specific tasks.
- All visualizations are made from a series of compromises.

Lecture 4

DD 324:

Data Visualisation

Visual Perception

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