

# 经济数据解读 02（丽湖校区）

## 第三次线下课

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中国经济特区研究中心

<https://huangjp.com/teaching/econdata>

2025.4.17



# 小组汇报

- **汇报内容**：围绕一个经济、金融、民生或其他社会领域的热门话题，获取与其紧密相关的变量的历史数据，结合图表展示数据特征，并讲述隐藏在数据背后的故事。
- 选课人数 **37** 人，共分为 **14** 组。分组名单已在课程群中发布。

课程日期	汇报顺序
5月8日	<b>6, 8, 1, 14, 12</b>
5月15日	<b>5, 2, 3, 4, 9</b>
5月22日	<b>10, 13, 11, 7</b>

# Al Gore 的演讲与数据展示

# Al Gore

- Al Gore (Albert Arnold Gore, Jr.) 是 Bill Clinton 执政时期的美国副总统（1993-2001）。
- 在 2000 年的美国总统大选中，Gore 在普选阶段获得了超过 George W. Bush 50 万张选票的成绩，但最终依然在选举人团投票中以微弱劣势（266 : 271）失败。

参考：澎湃新闻，“美国大选 | 得选民票少也能当总统？美国选举人团制度解析”

[https://www.thepaper.cn/newsDetail\\_forward\\_9815177](https://www.thepaper.cn/newsDetail_forward_9815177)

- Gore 也是著名的环保活动家，曾因唤起公众对气候变化的关注所作出的贡献，与联合国政府间气候变化专业委员会（IPCC）一起获得 2007 年诺贝尔和平奖。
- Gore 主演的纪录片 *An Inconvenient Truth* 《难以忽视的真相》(2006) 获第 79 届奥斯卡金像奖最佳纪录片奖。



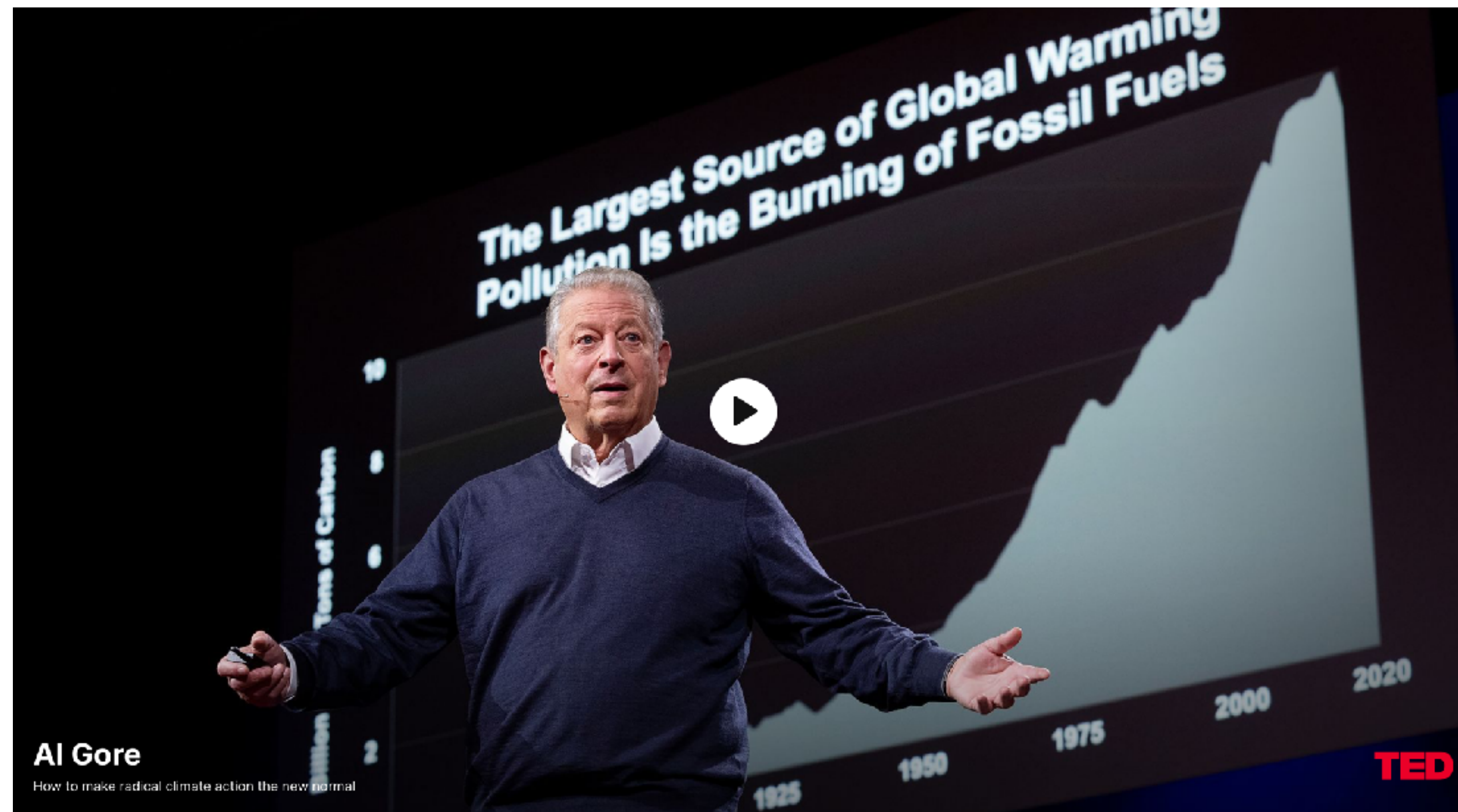
Al Gore (1948 -)

图片出处：<https://algore.com/>

# ***How to make radical climate action the new normal***

Al Gore @ TED Countdown Summit, Oct 2021

<https://algore.com/news/how-to-make-radical-climate-action-the-new-normal>



# Gore 演讲中的展示技巧

- **单纯的文字或图片**  
以视觉上的冲击力突出重点信息，给听众留下深刻印象
- **图片结合文字说明**  
兼顾视觉效果和信息的准确性
- **数据图表**  
通过数据展示提高证据的可信度
- **示意图**  
讲解概念或机制

**The world could see up to  
1 billion climate migrants.**

**The Lancet Countdown Report 2018**

**With each additional 1° (C) of  
temperature, the capacity of the  
warmer air to hold  
water vapor  
increases by 7%**

# Midland, Texas

June 1, 2021



Photo © 2021 Mike Olbinski

## Red Sea, Egypt

October 18, 2020



Photo © 2020 Andrey Nekrasov/Barcroft Media via Getty Images

# Gore 演讲中的展示技巧

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- 示意图  
讲解概念或机制

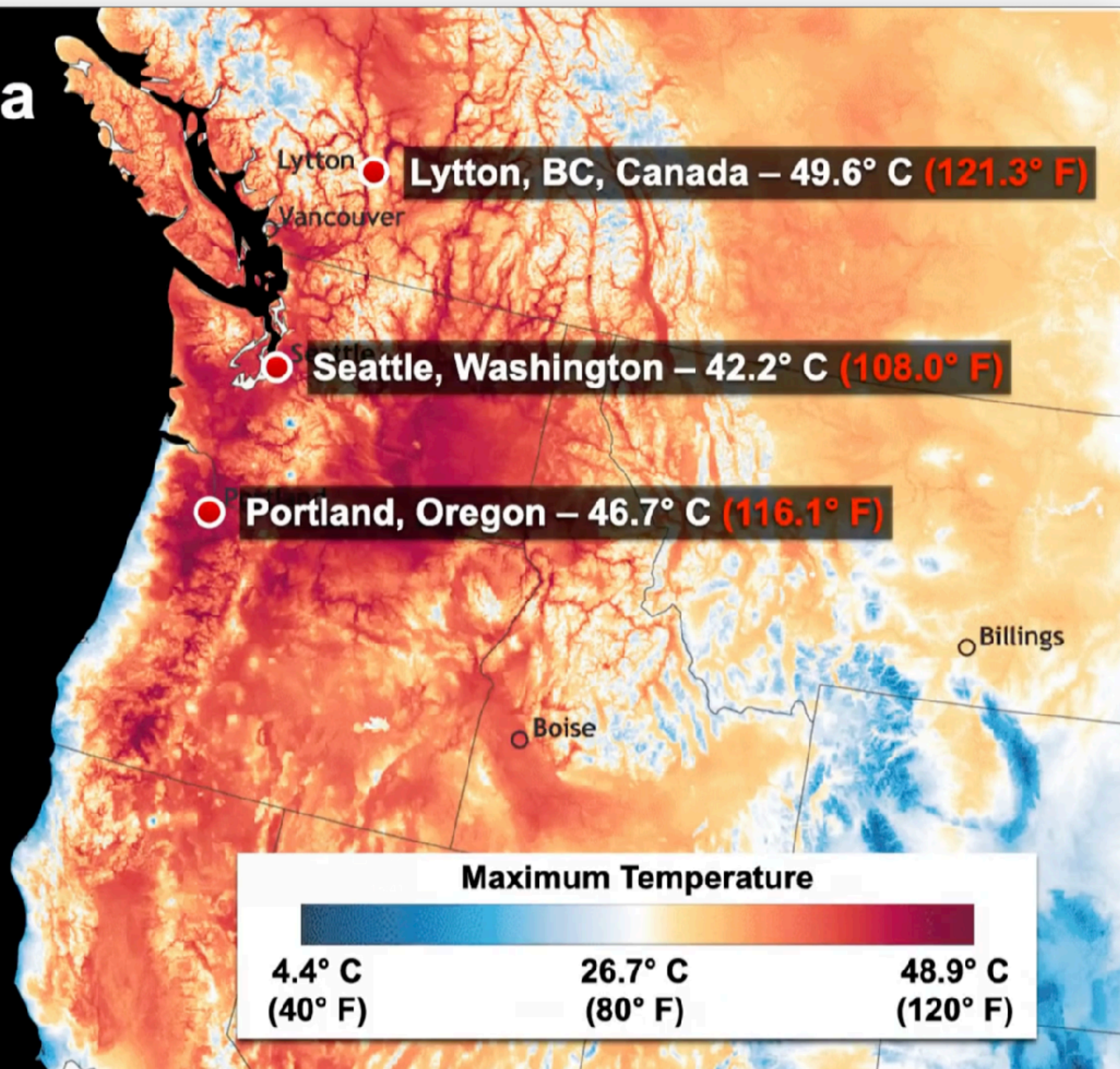
We are spewing **162 million tons** of manmade global warming pollution into the thin shell of our atmosphere **every 24 hours** — as if it were an open sewer.

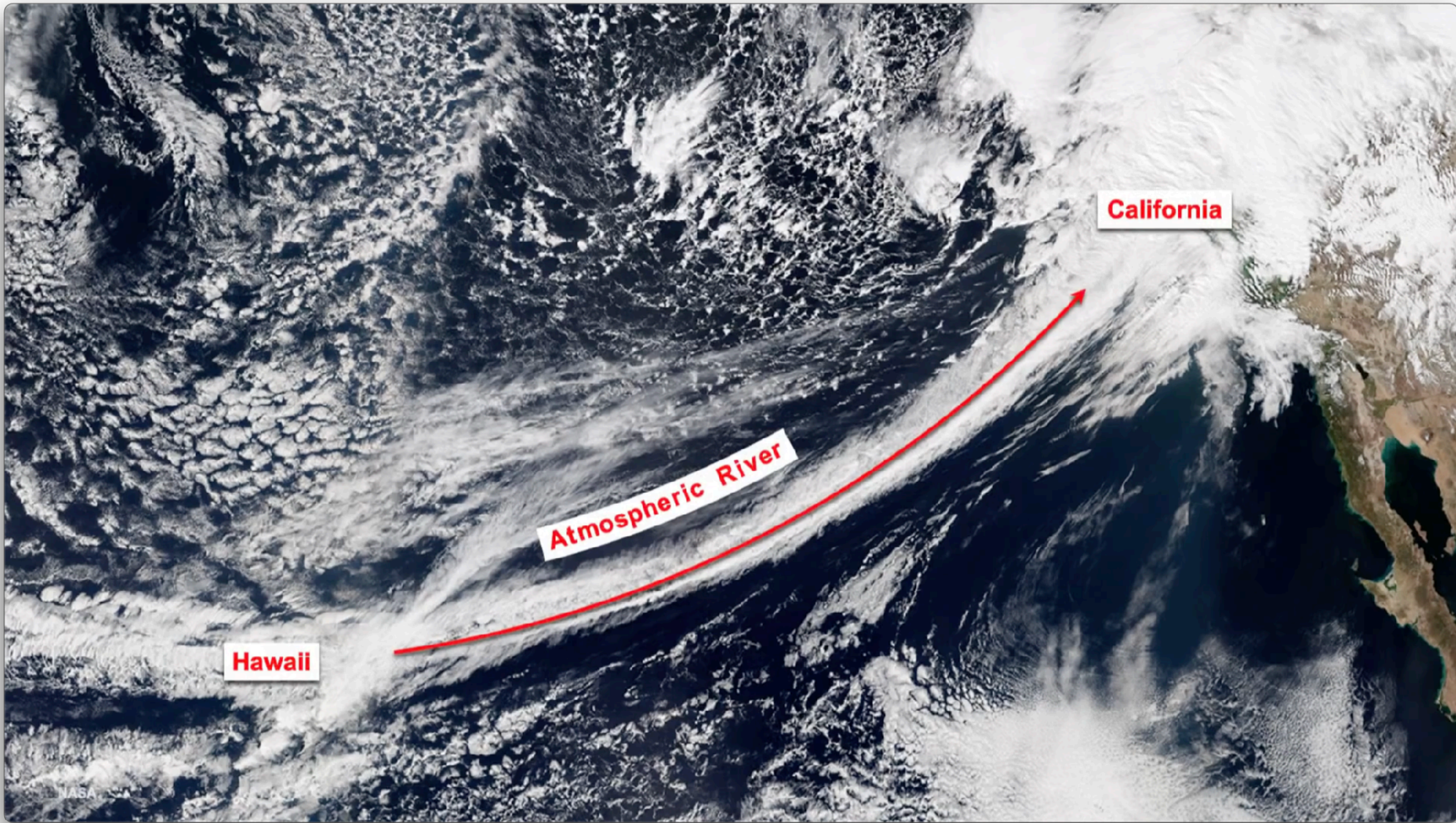


# Northwestern America

June, 2021

The 2021 Pacific Northwest heat wave was “the most anomalous extreme heat event ever observed on Earth since records began two centuries ago.”





Hawaii

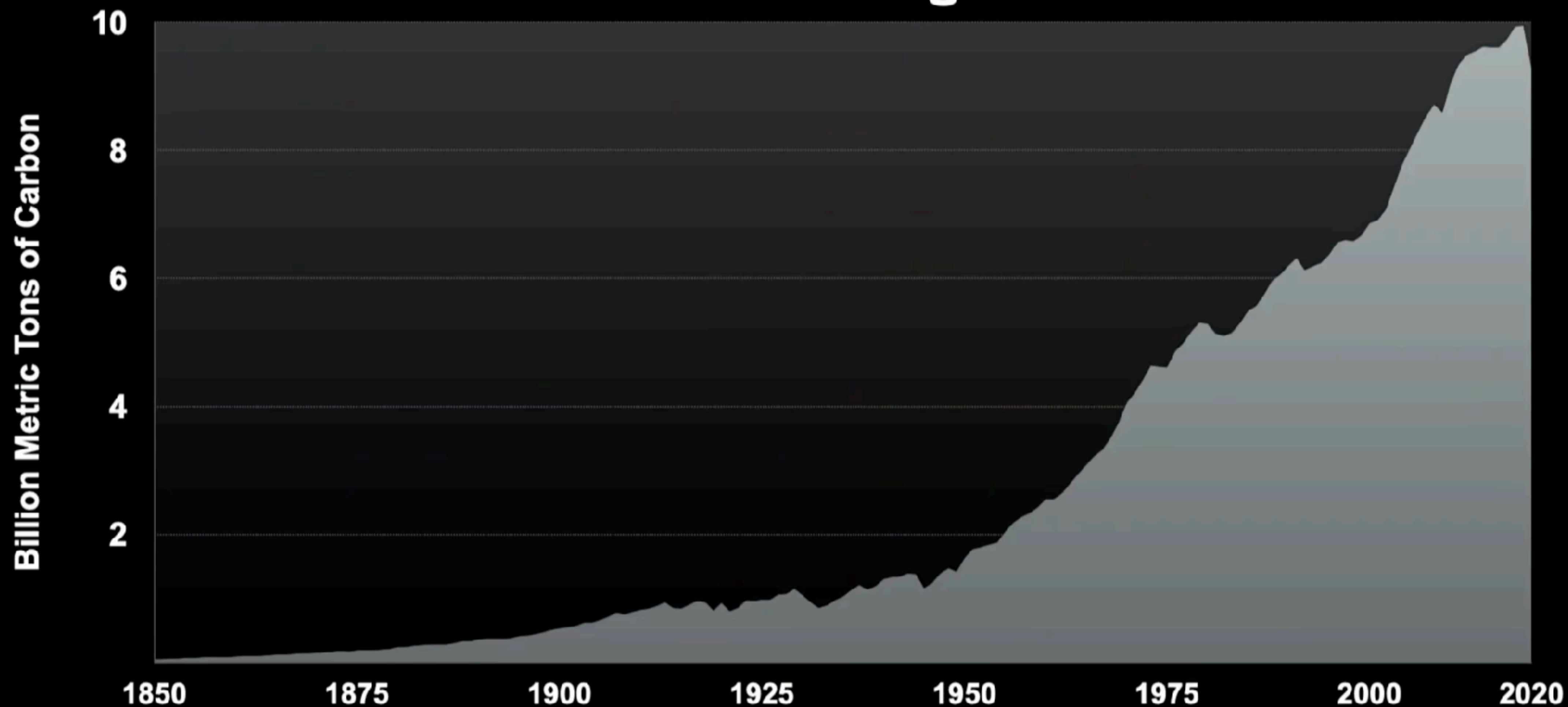
Atmospheric River

California

# Gore 演讲中的展示技巧

- 单纯的文字或图片  
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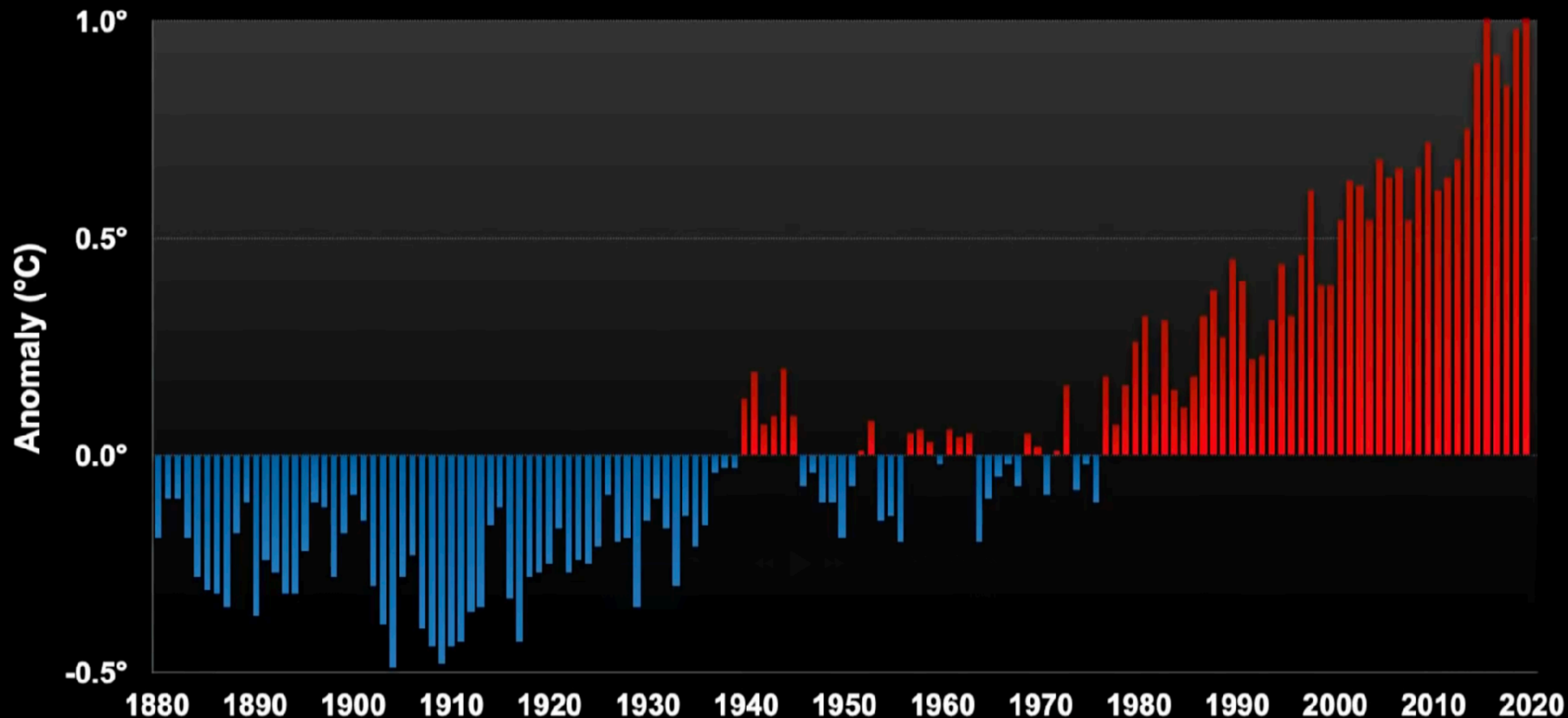
# The Largest Source of Global Warming Pollution Is the Burning of Fossil Fuels



Data: U.S. Department of Energy/CDIAC/Global Carbon Project

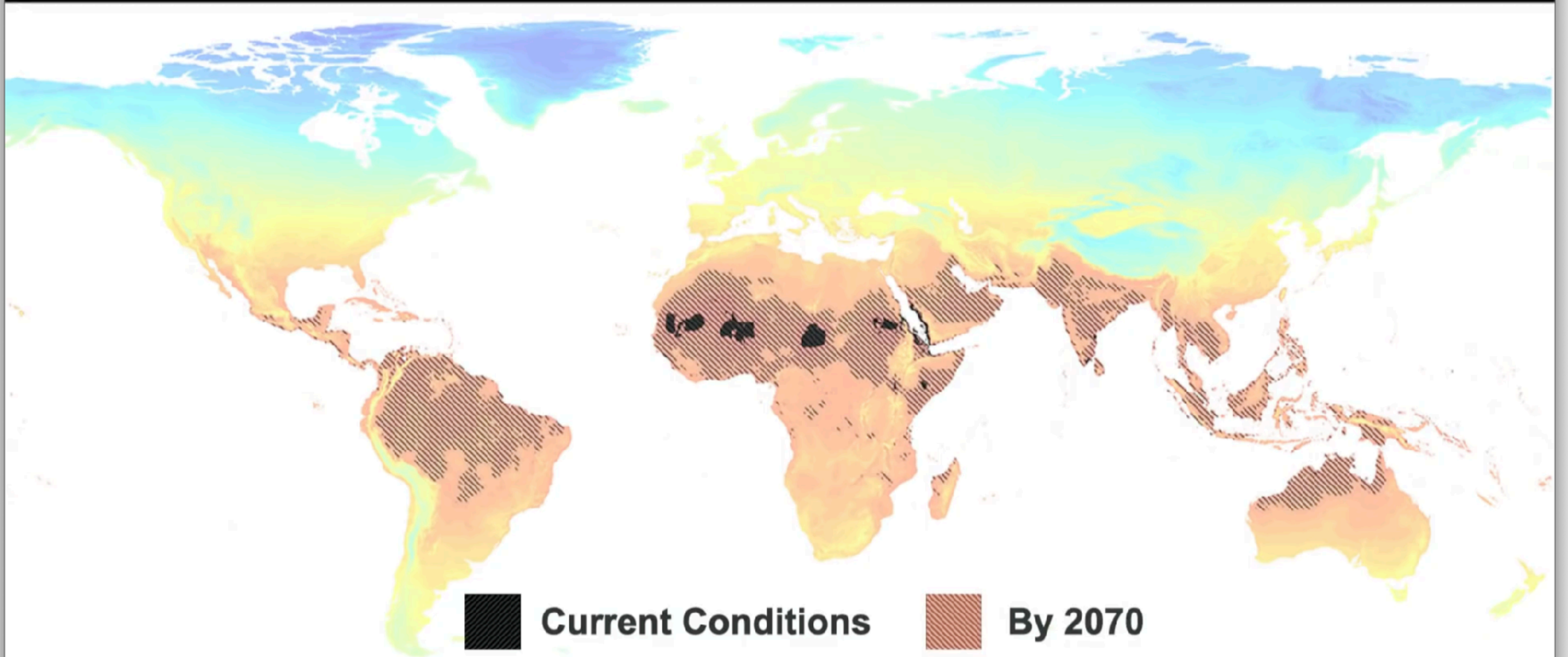
# Global Surface Temperature – Departure from Average

1880 – 2020



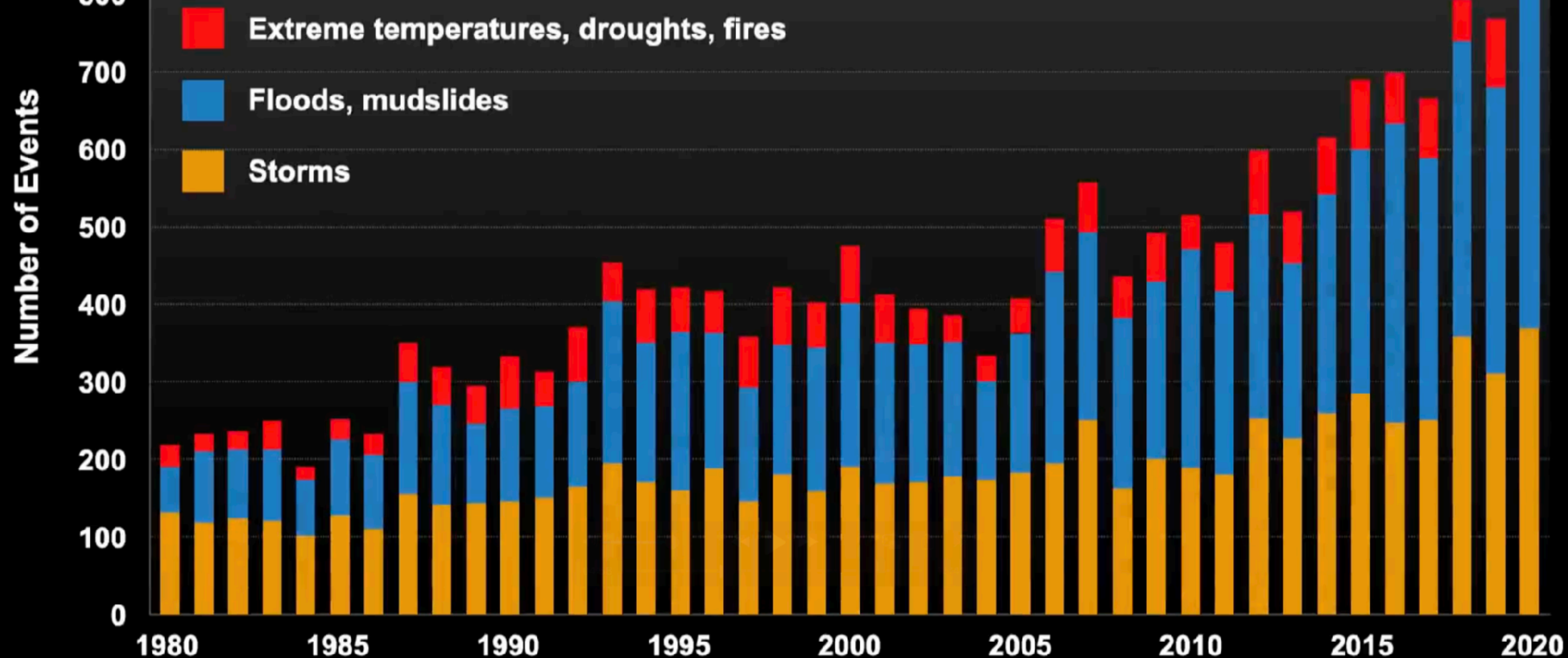
Data: NASA

# Earth's "Uninhabitable" Zones



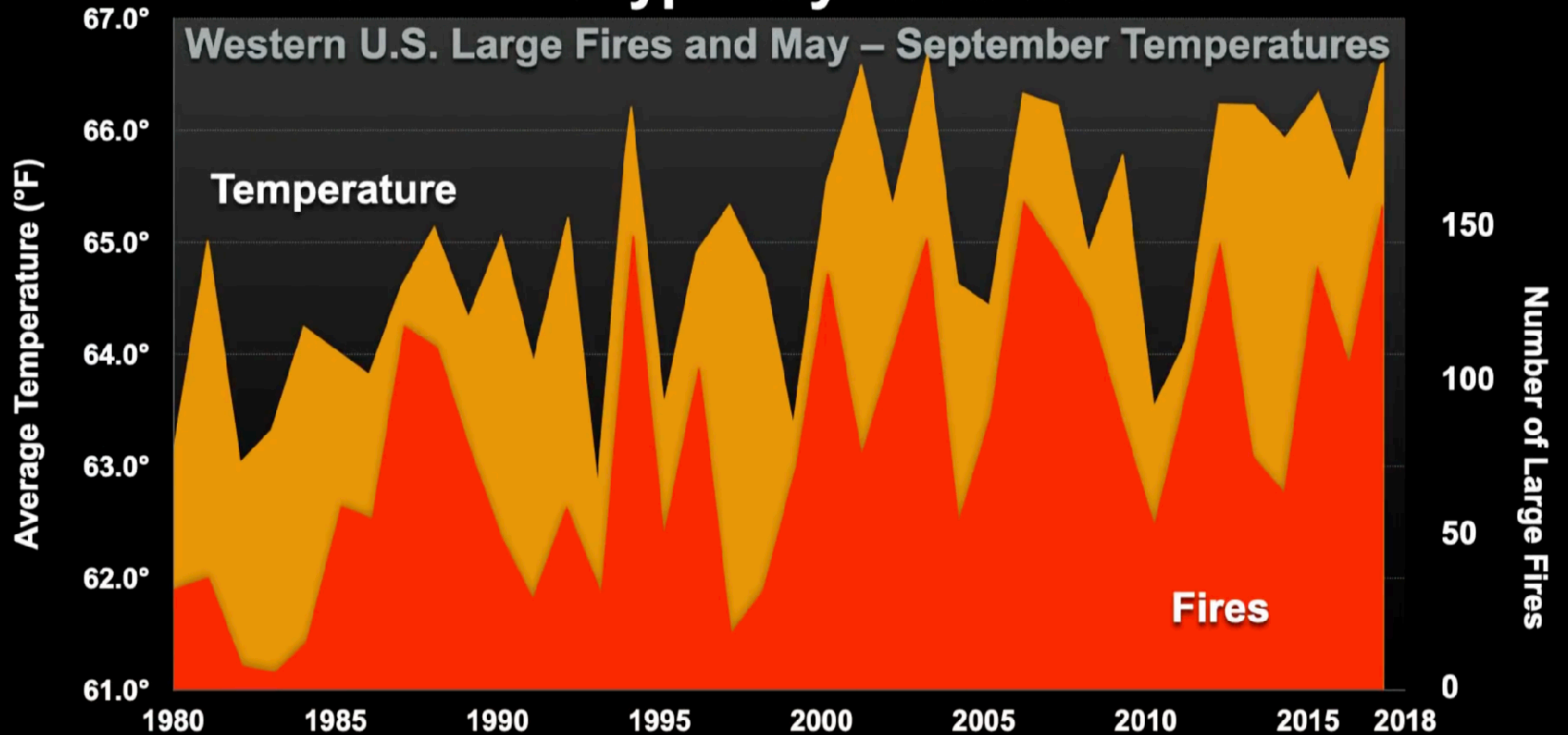
# Worldwide Extreme Weather Catastrophes

## 1980 – 2020



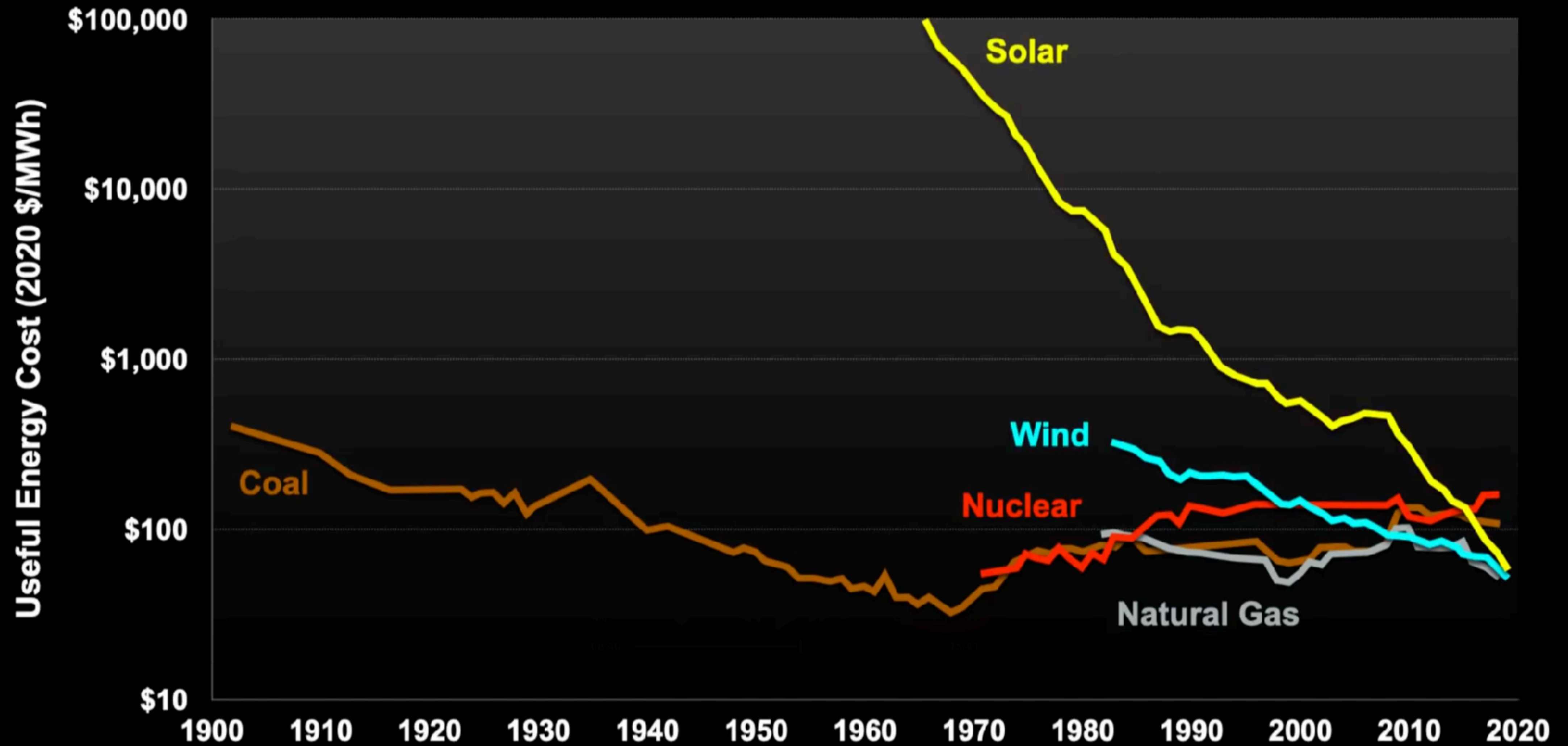
Data: Munich Re

# Hotter Years Typically Have More Fires



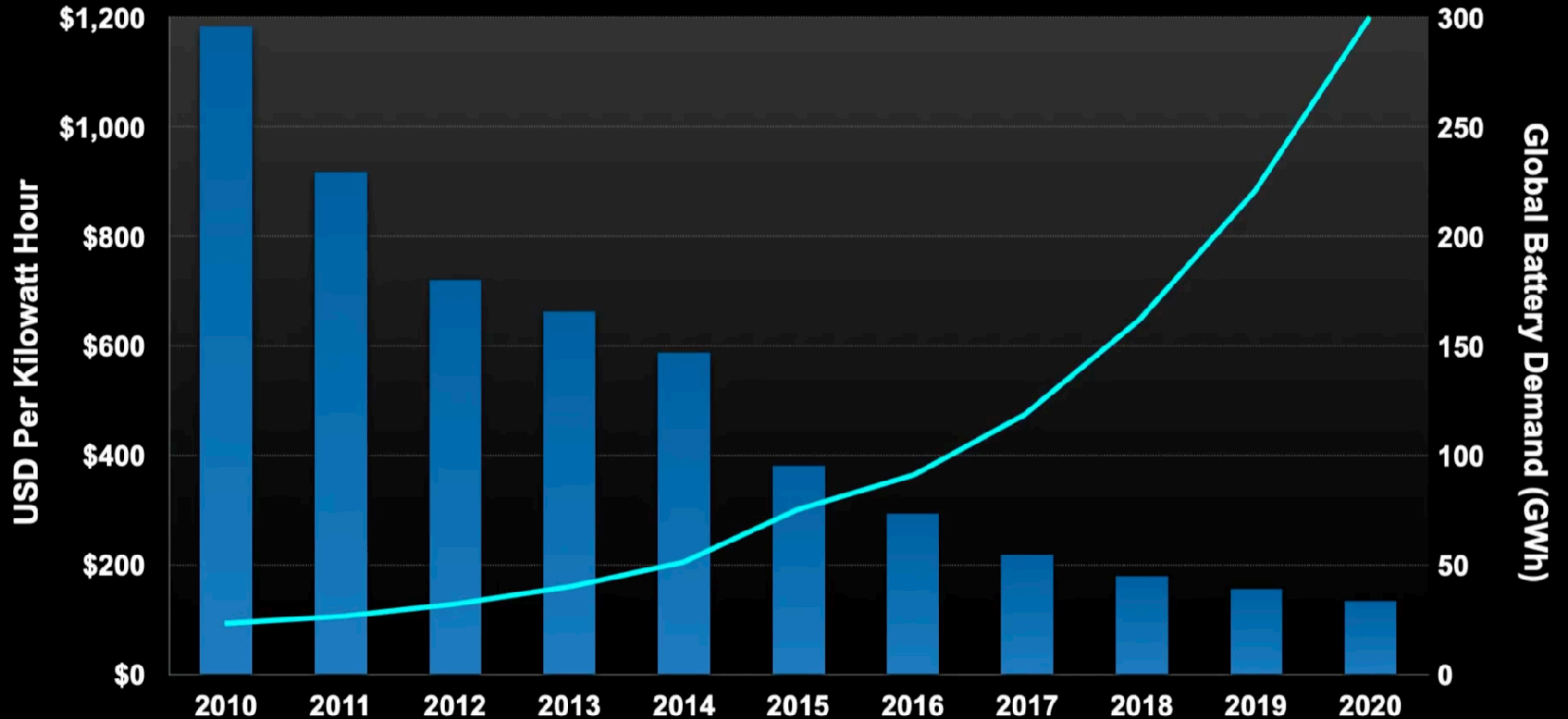
Data: NOAA, USFS/Climate Central

# Historical Cost of Electricity Per MWh



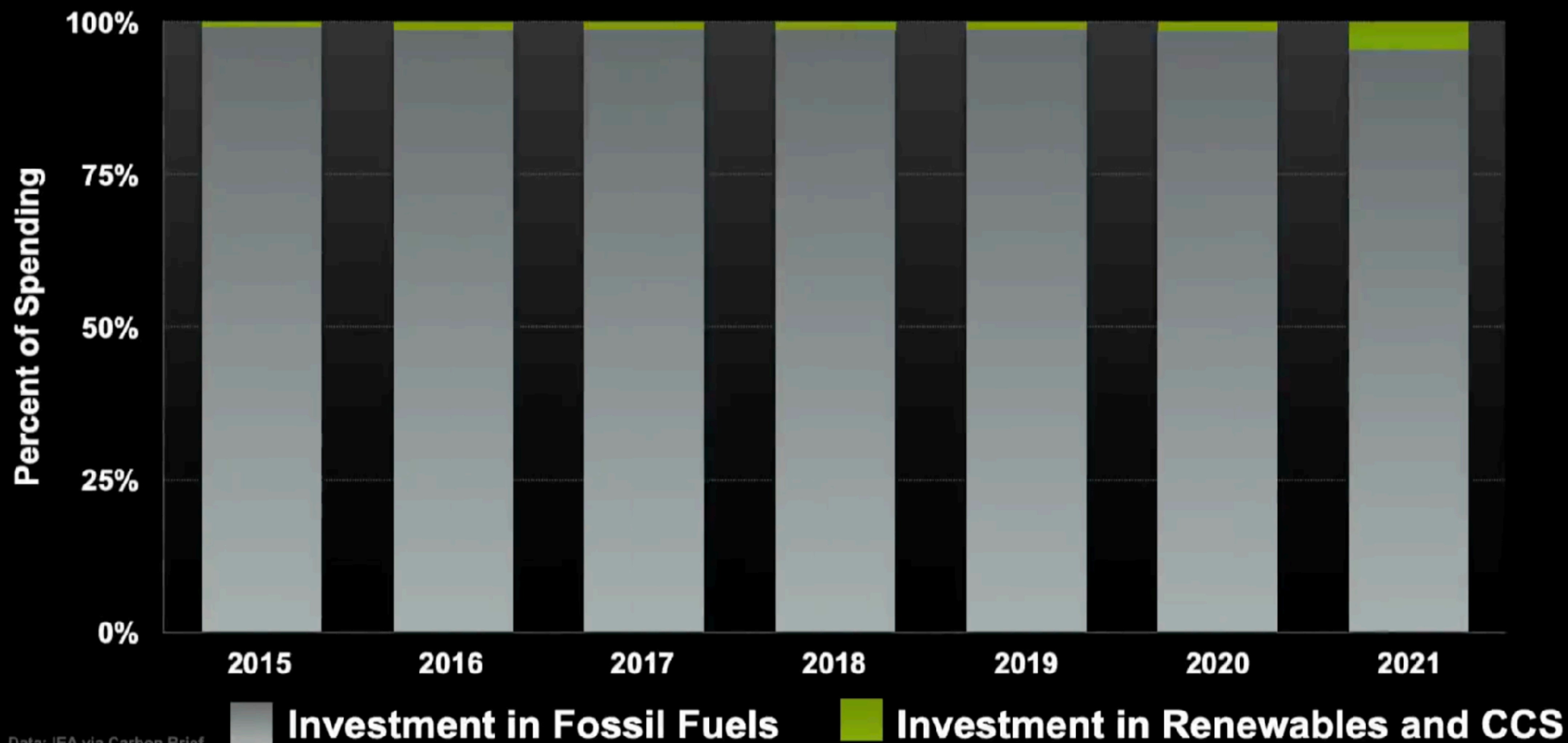
Data: The Oxford Martin School, 2021

# Lithium-ion Battery Prices and Demand



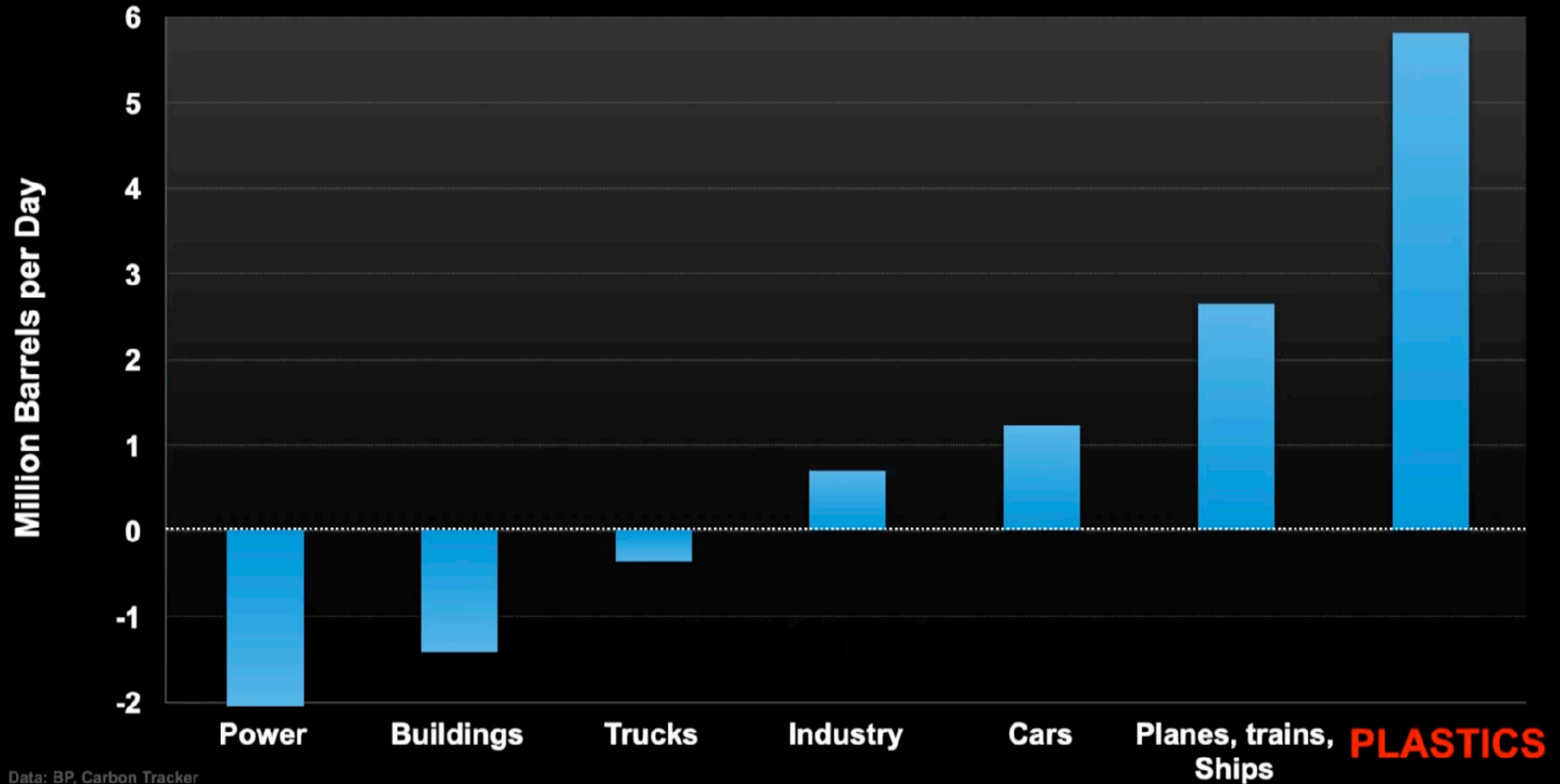
Volume-weighted averages  
Data: Bloomberg New Energy Finance

In 2021, the Oil and Gas Industry Is **Tripling** the share of spending going to renewables and CCS ...to 4.1%



Data: IEA via Carbon Brief

# Oil Demand Growth Forecast, 2020 – 2040



Data: BP, Carbon Tracker

**In 2014,**  
electricity  
from solar and  
wind was  
cheaper than  
new coal and  
gas plants in  
approximately  
**1 percent of  
the world.**

**By 2019,** only  
five years  
later, solar and  
wind provided  
the cheapest  
sources of  
new electricity  
in **two-thirds  
of the world.**

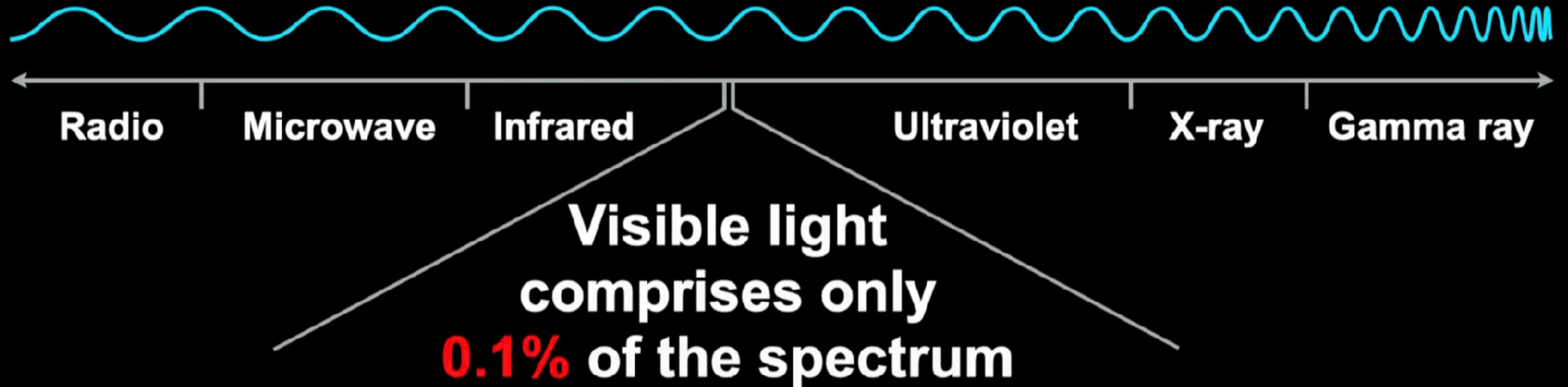
**Within three  
more years,**  
these sources  
are expected  
to provide the  
cheapest new  
electricity in  
**the entire  
world.**



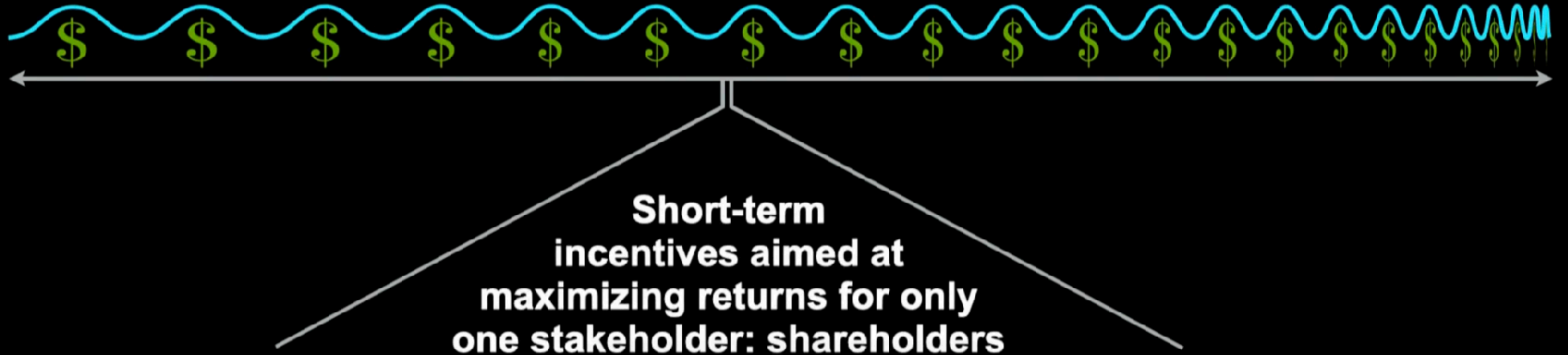
# Gore 演讲中的展示技巧

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以视觉上的冲击力突出重点信息，给听众留下深刻印象
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- 数据图表  
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- 示意图  
讲解概念或机制

# The Electromagnetic Spectrum



# The **Value** Spectrum



# 利用数据讲故事

Knaflic, C. N. (2015). *Storytelling with data: a data visualization guide for business professionals*. Wiley.

# 不同类型的 presentation

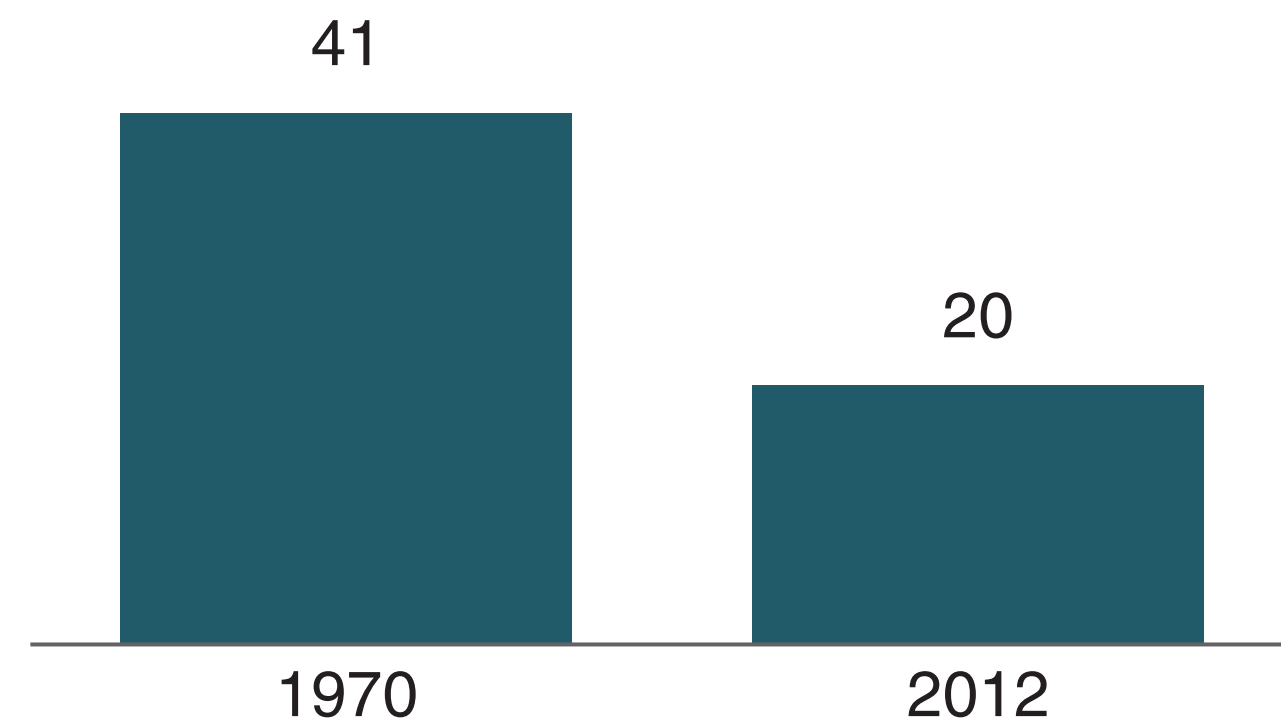
	听众的特征	内容的侧重点	场地环境	可用时间
学术分享	老师、同学、同事等 (学术背景相近)	突出问题、方法、结论 需要恰当地展示细节	教室或礼堂、环境明亮 投影面积较大	组会：10-60分钟 会议口头报告：15-30分钟 会议海报：5-10分钟
日常工作汇报	领导、同事等 (听众为 1 人或少数人)	突出结论 根据需要展示或忽略细节	会议室、环境明亮 投影设备较小或没有	5-20分钟 由领导的偏好和汇报内容决定
大型工作会议	领导、访客等 (听众较多、知识背景多样)	强调背景、突出结论	大型会议室或礼堂 投影面积较大或没有	2-10分钟
公开演讲	多数为普通人 (年龄、学历跨度大)	突出故事性 注重内容的吸引力	需事先确认	10-60分钟

# 选择合适的展示方式

- **纯文本**：适合展示1-2个数据
- **表格**：通过阅读理解内容，适合展示多个变量的数据，但不适合用在演讲中（听众在读取数字时无法同时听你讲故事）
- **图表**：通过视觉认知理解内容，速度更快，更适合在演讲中展示数据
  - **高效图表**：散点图、折线图、斜线图（slopegraph）、柱形图
  - **低效图表**：用面积展示数据的图表
  - **避免使用**：饼图、3D图、双纵坐标图

## Children with a "Traditional" Stay-at-Home Mother

*% of children with a married stay-at-home mother with a working husband*



Note: Based on children younger than 18. Their mothers are categorized based on employment status in 1970 and 2012.

Source: Pew Research Center analysis of March Current Population Surveys Integrated Public Use Microdata Series (IPUMS-CPS), 1971 and 2013

Adapted from PEW RESEARCH CENTER

**FIGURE 2.2** Stay-at-home moms original graph

## 用纯文本展示更有效

20%

of children had a **traditional stay-at-home mom** in 2012, compared to 41% in 1970

**FIGURE 2.3** Stay-at-home moms simple text makeover

# 表格应突出数据的印象

Heavy borders

Group	Metric A	Metric B	Metric C
Group 1	\$X.X	Y%	Z,ZZZ
Group 2	\$X.X	Y%	Z,ZZZ
Group 3	\$X.X	Y%	Z,ZZZ
Group 4	\$X.X	Y%	Z,ZZZ
Group 5	\$X.X	Y%	Z,ZZZ

Light borders

Group	Metric A	Metric B	Metric C
Group 1	\$X.X	Y%	Z,ZZZ
Group 2	\$X.X	Y%	Z,ZZZ
Group 3	\$X.X	Y%	Z,ZZZ
Group 4	\$X.X	Y%	Z,ZZZ
Group 5	\$X.X	Y%	Z,ZZZ

Minimal borders

Group	Metric A	Metric B	Metric C
Group 1	\$X.X	Y%	Z,ZZZ
Group 2	\$X.X	Y%	Z,ZZZ
Group 3	\$X.X	Y%	Z,ZZZ
Group 4	\$X.X	Y%	Z,ZZZ
Group 5	\$X.X	Y%	Z,ZZZ

不好

更好

# 表格应突出数据的印象

Table

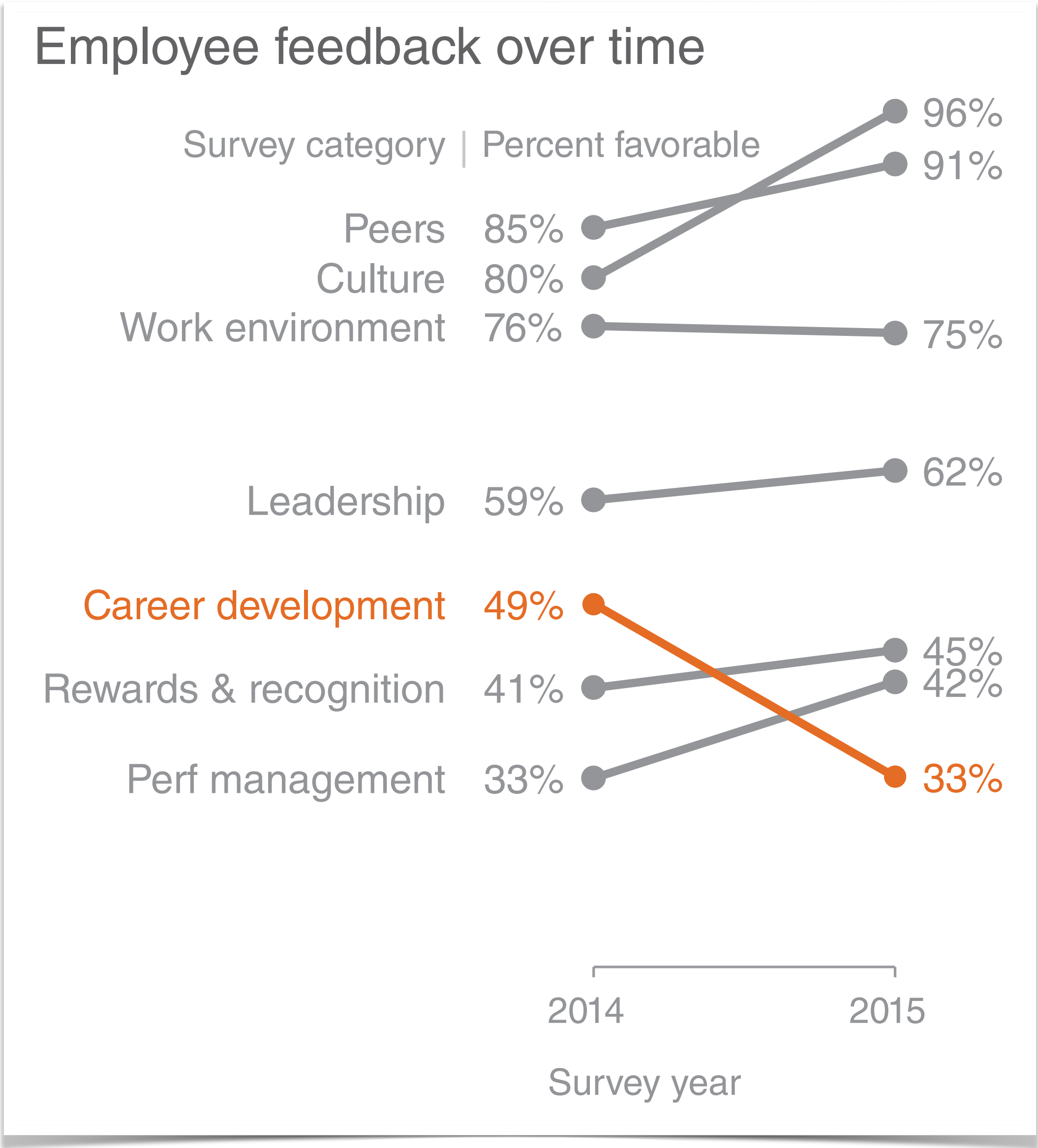
	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

Heatmap

LOW-HIGH

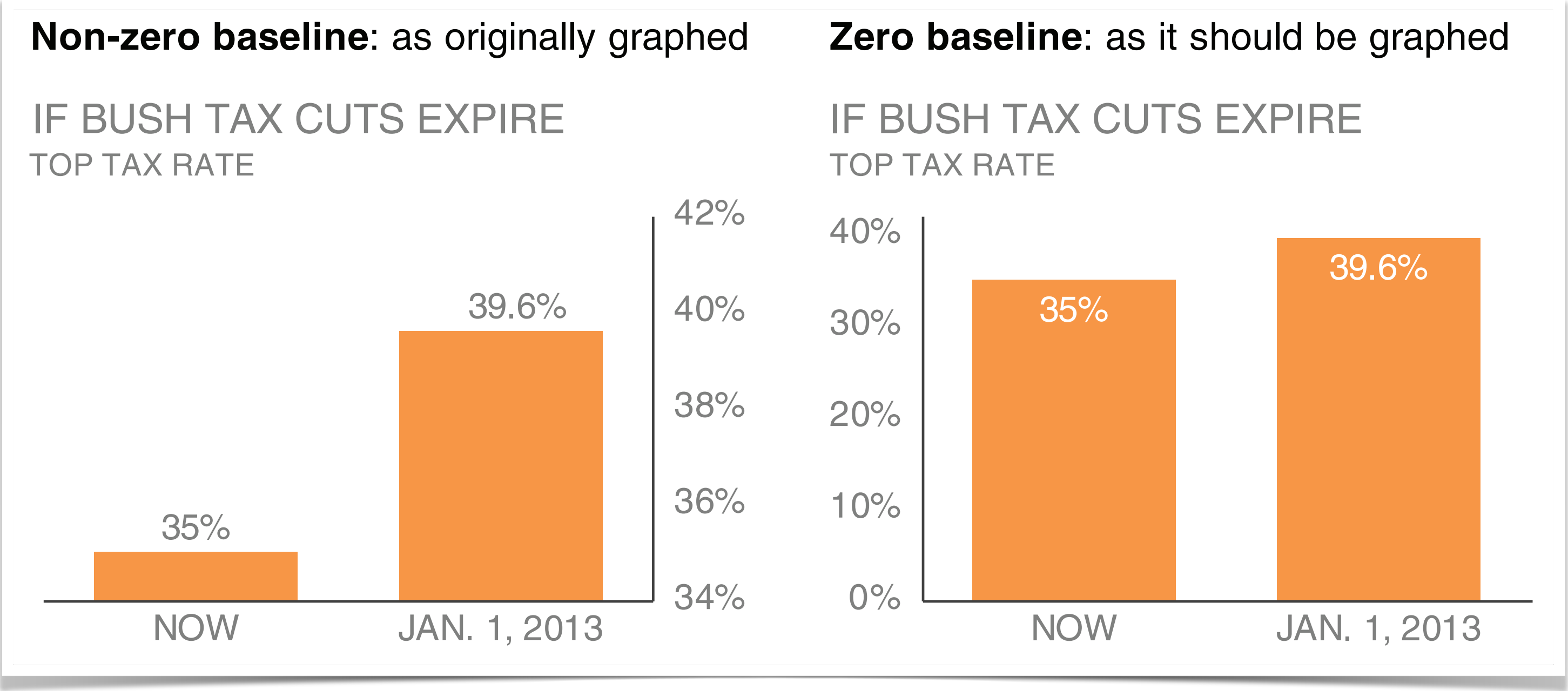
	A	B	C
Category 1	15%	22%	42%
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Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

# 斜线图 slopegraph

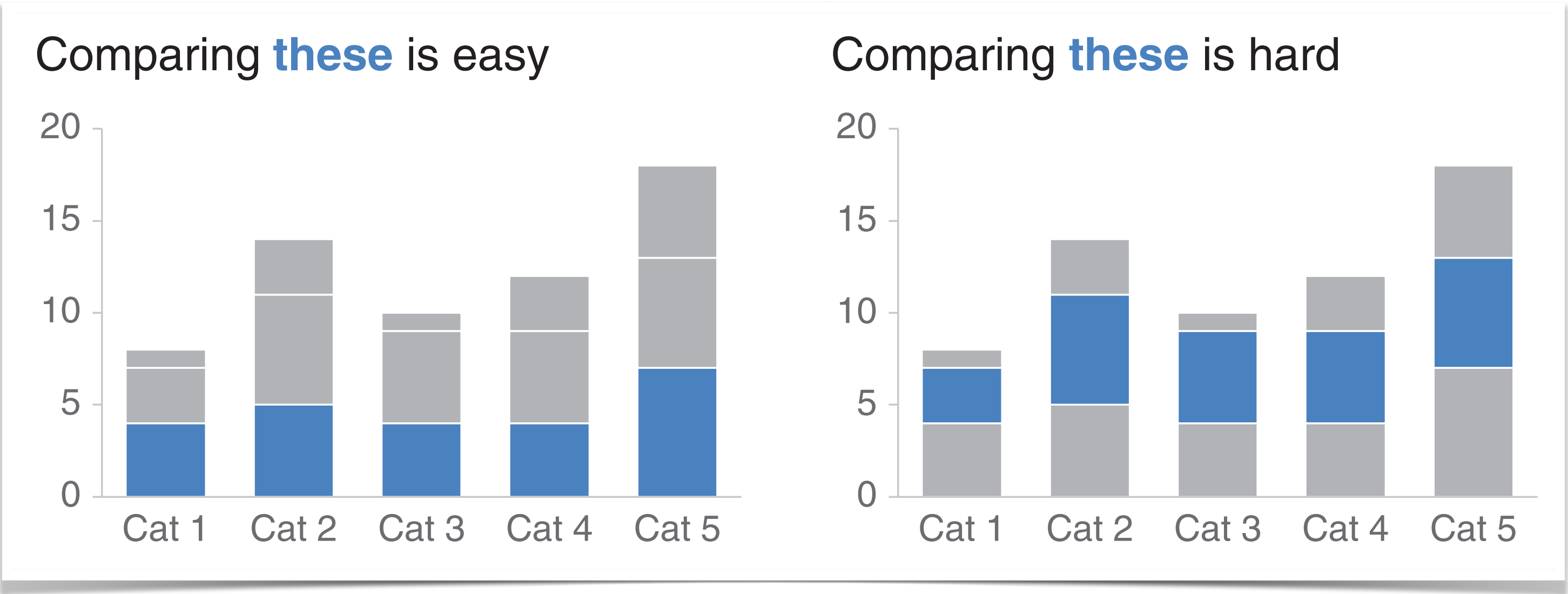


# 柱形图

纵坐标应从零点开始

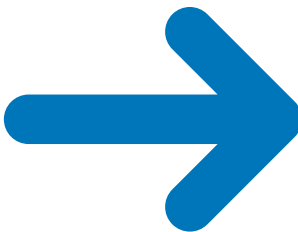
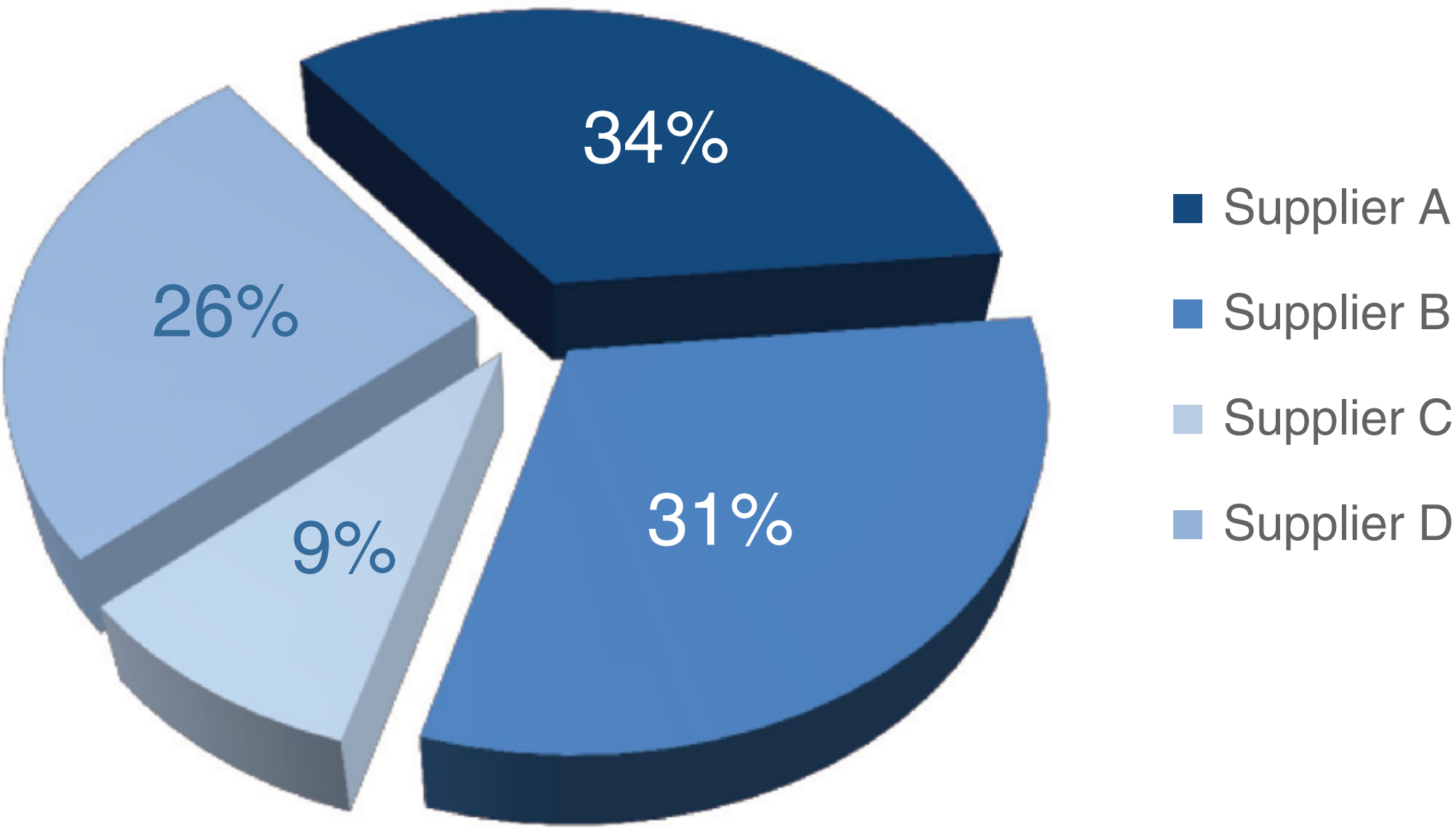


堆叠柱形图会增加认知难度

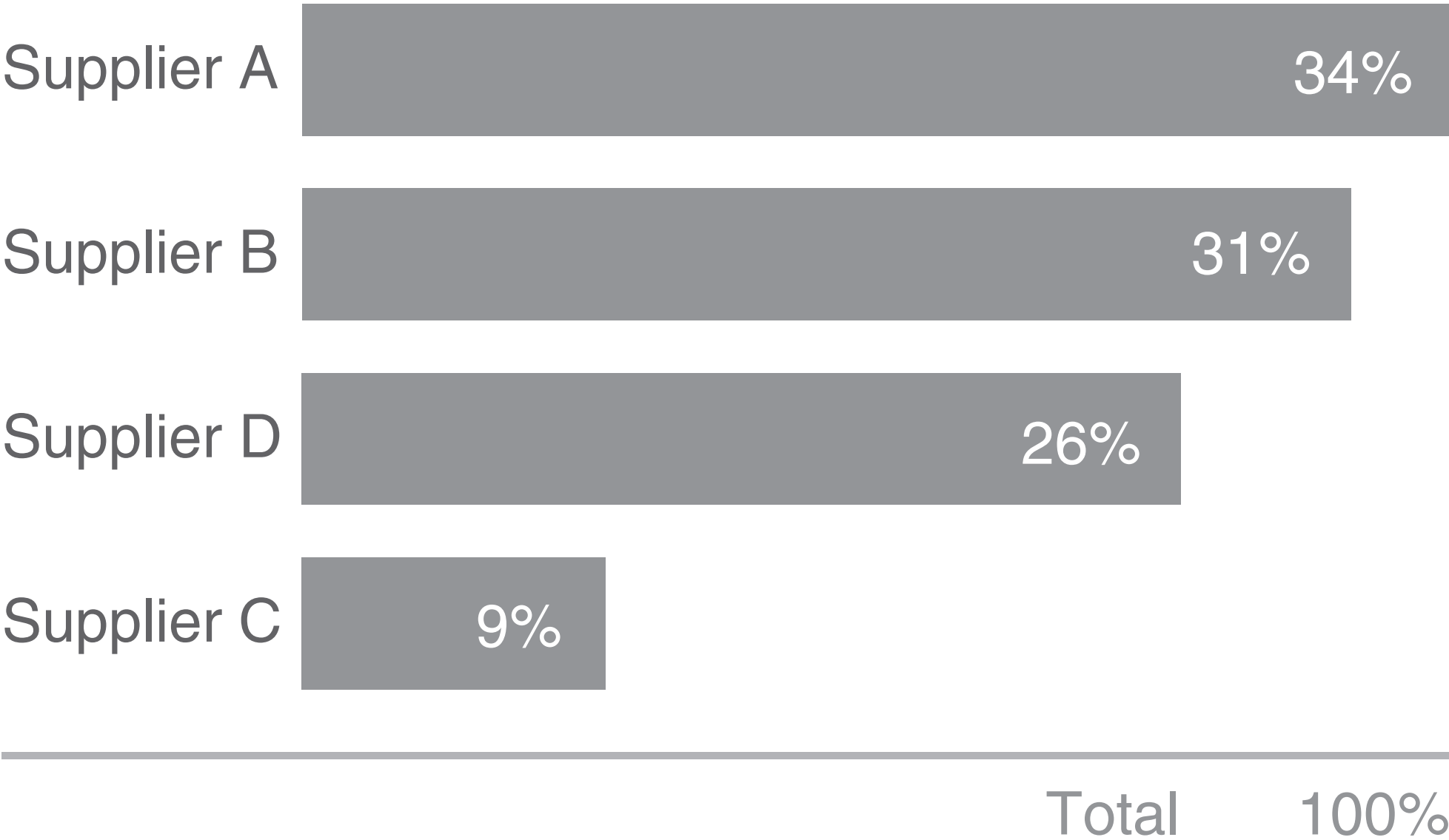


# 避免使用饼图

Supplier Market Share

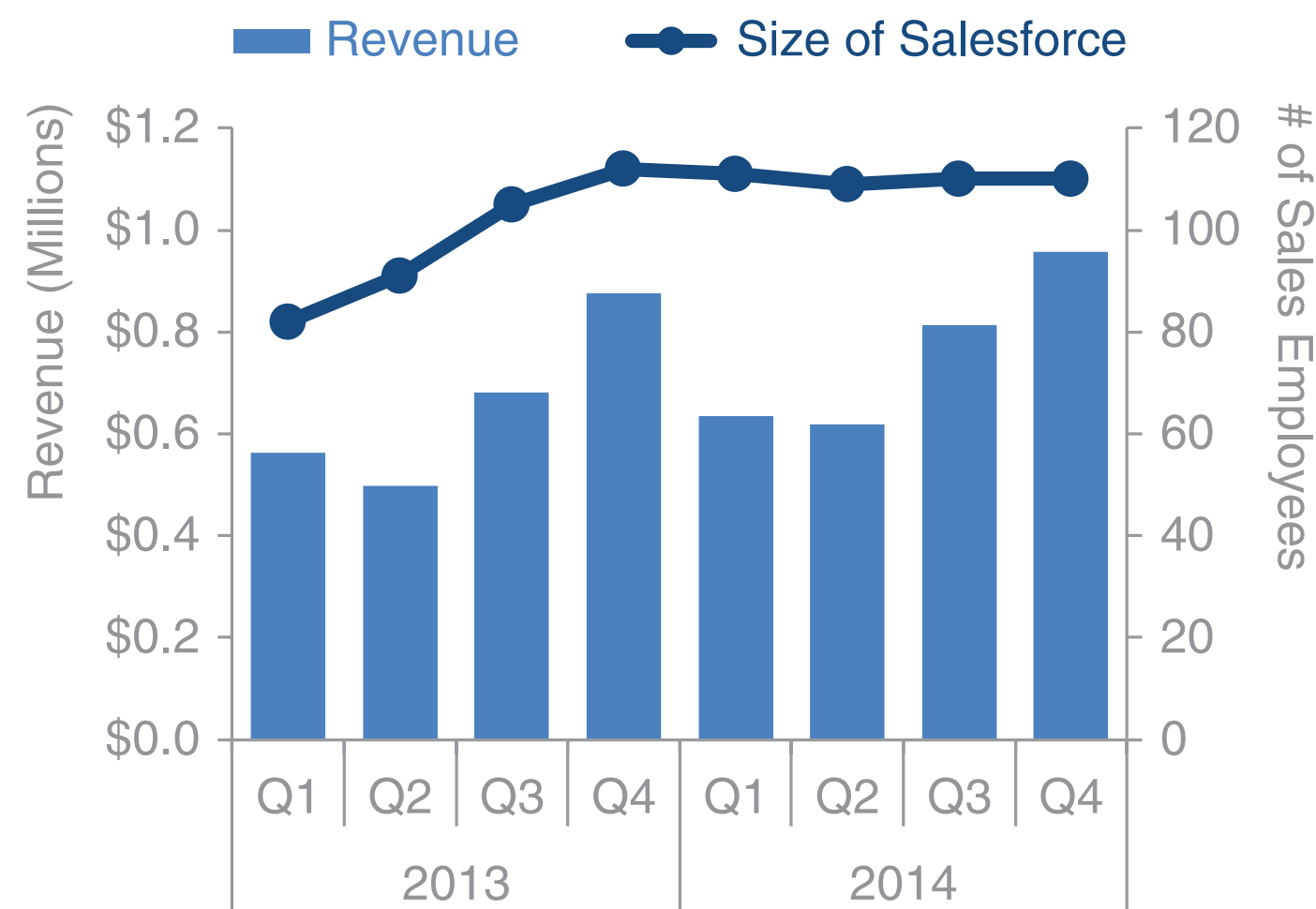


Supplier Market Share

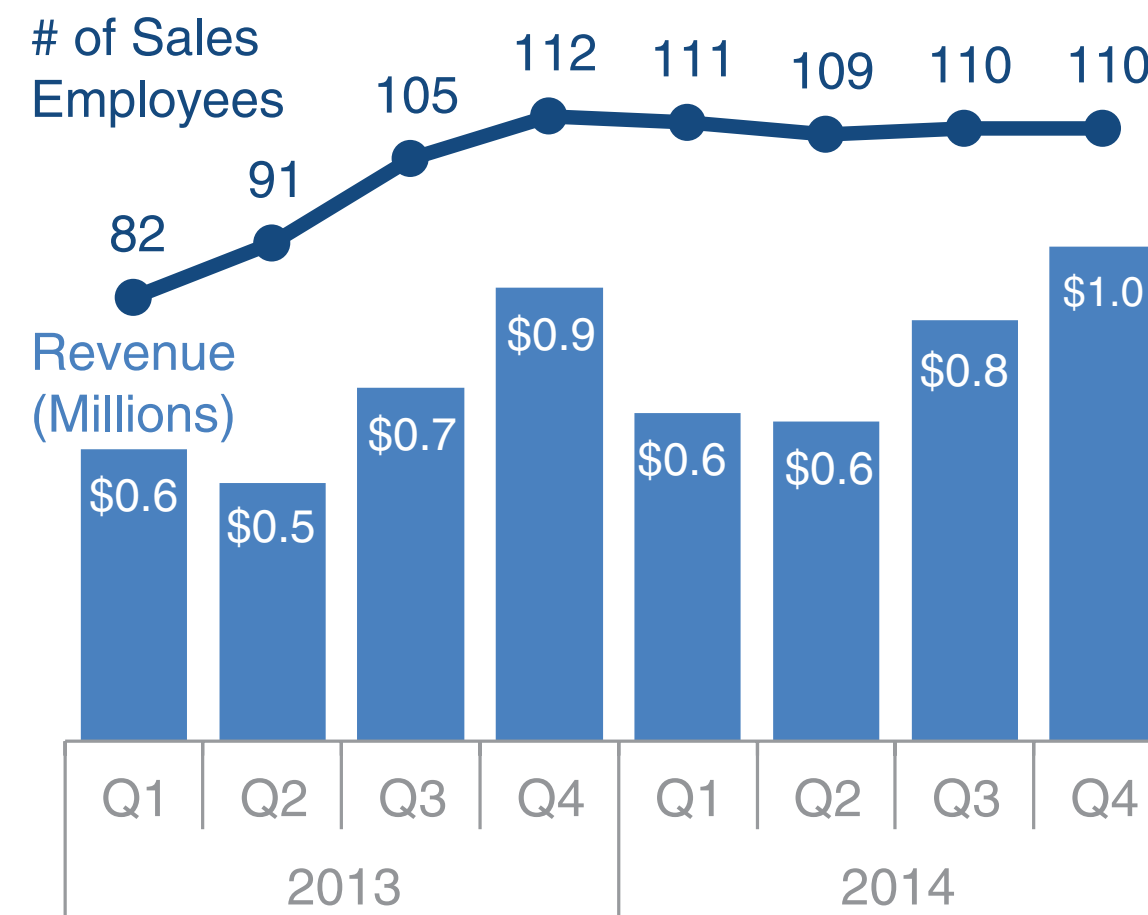


# 避免使用双纵坐标

Secondary y-axis

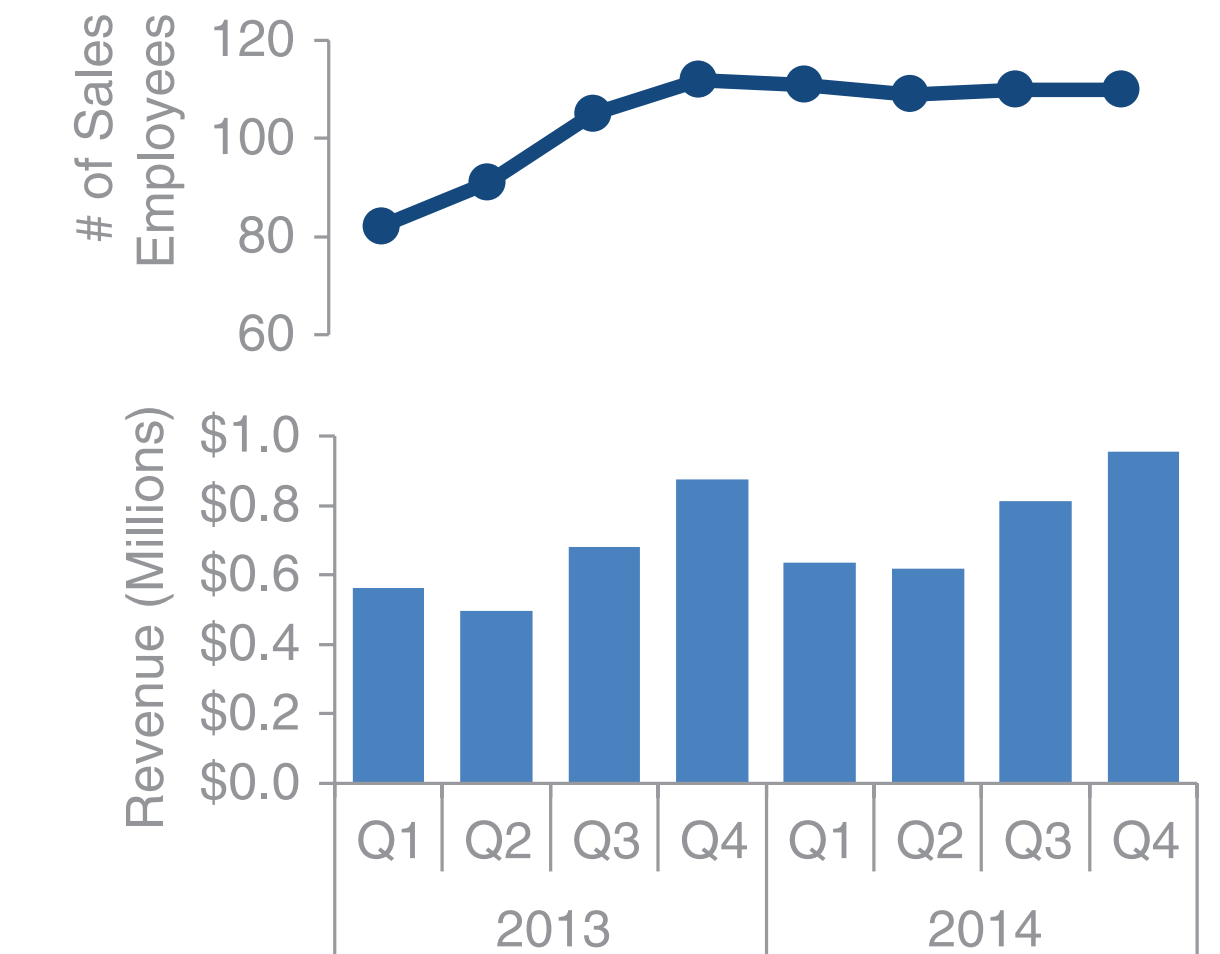


Alternative 1: label directly



直接在图中标注变量和数值

Alternative 2: pull apart vertically



纵向分离

# 删除不必要的信息

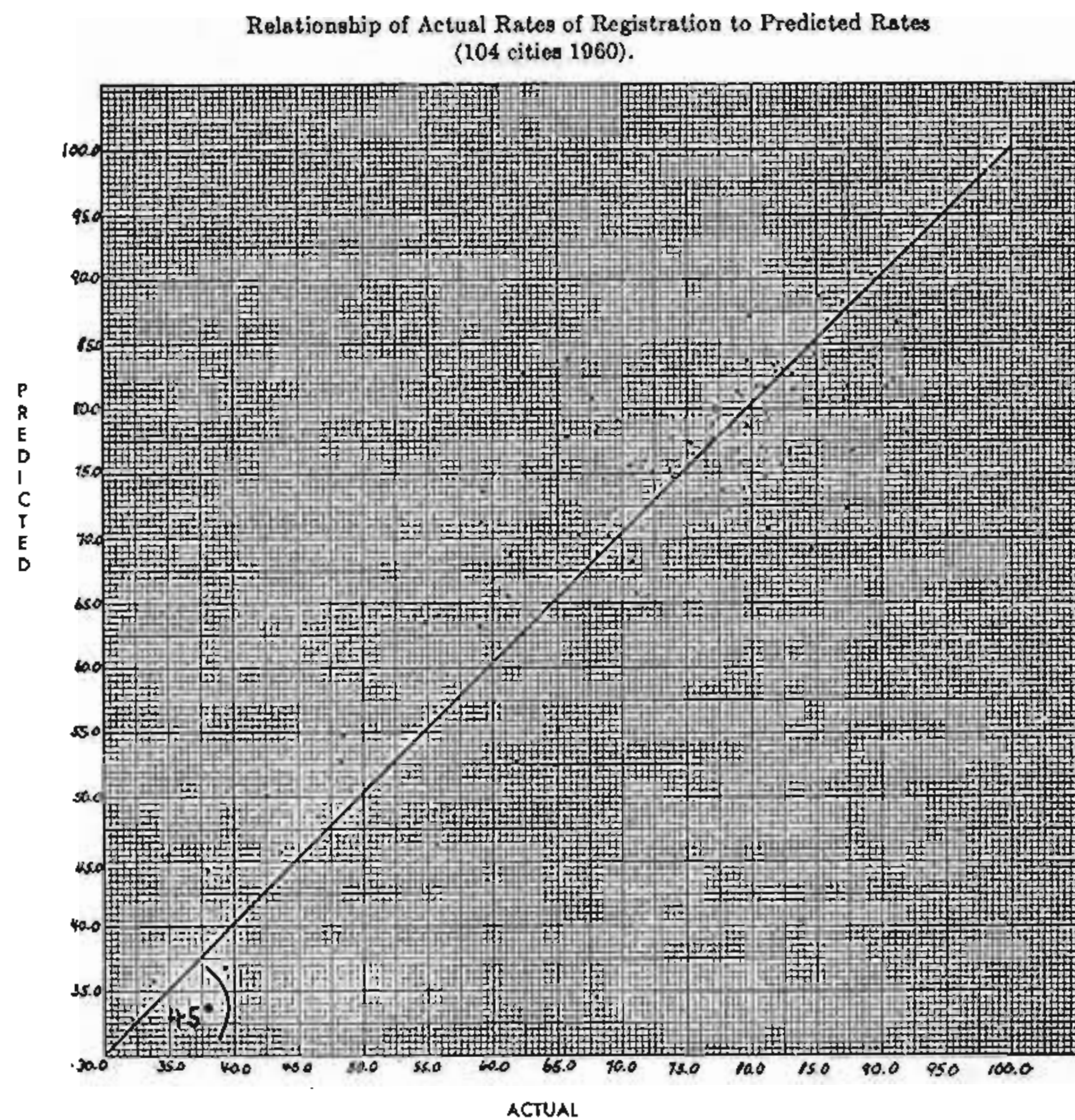
**Data-ink:** Tufte, E. R. (2001). *The visual display of quantitative information*, 2nd edition.

*“A large share of ink on a graphic should present data-information.”*

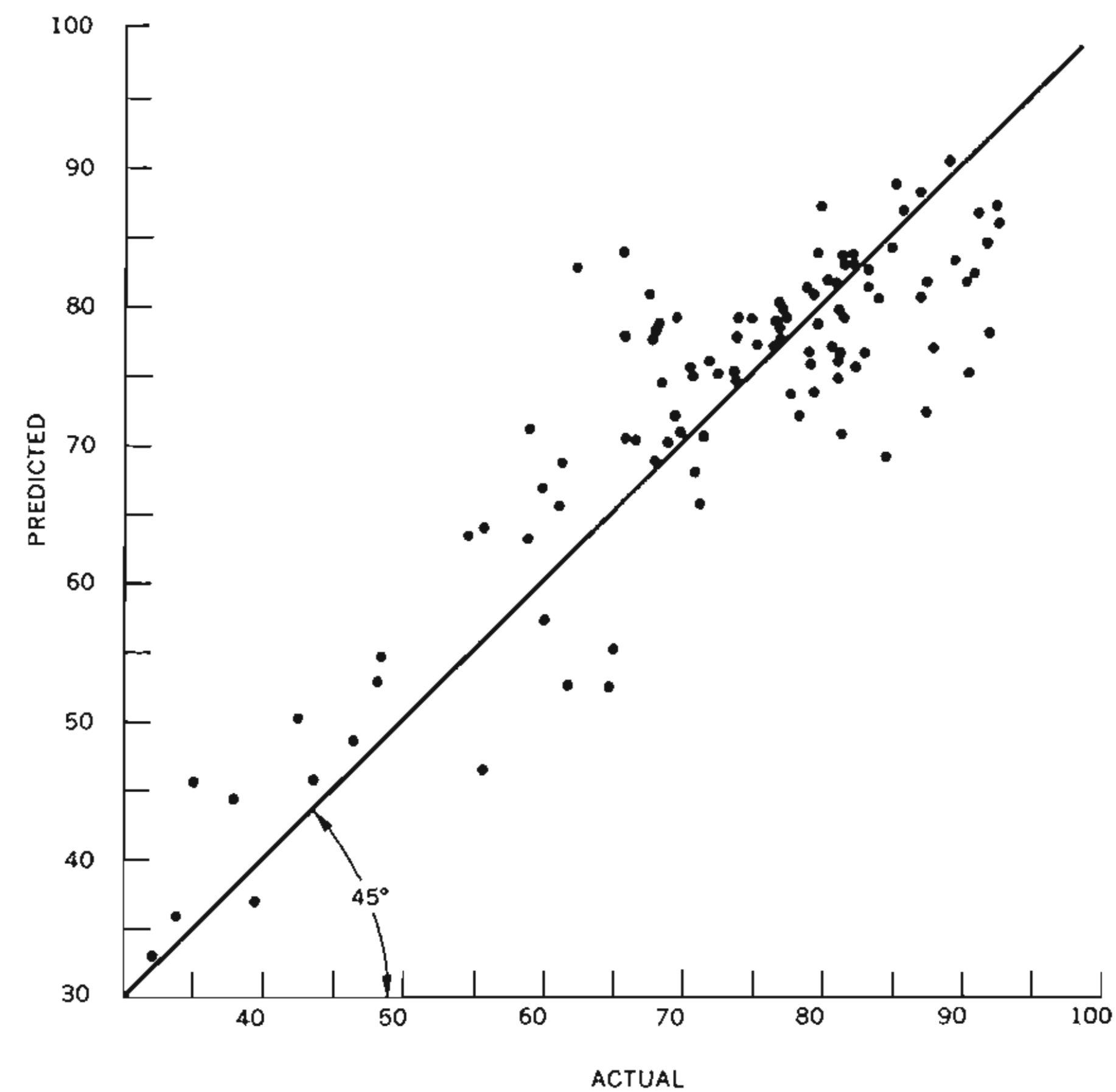
*“Data-ink is the non-erasable core of a graphic.”*

$$\text{Data-ink ratio} = \frac{\text{data-ink}}{\text{total ink used to print the graphic}}$$

*“The larger the share of a graphic’s ink devoted to data, the better (other relevant matters being equal).”*



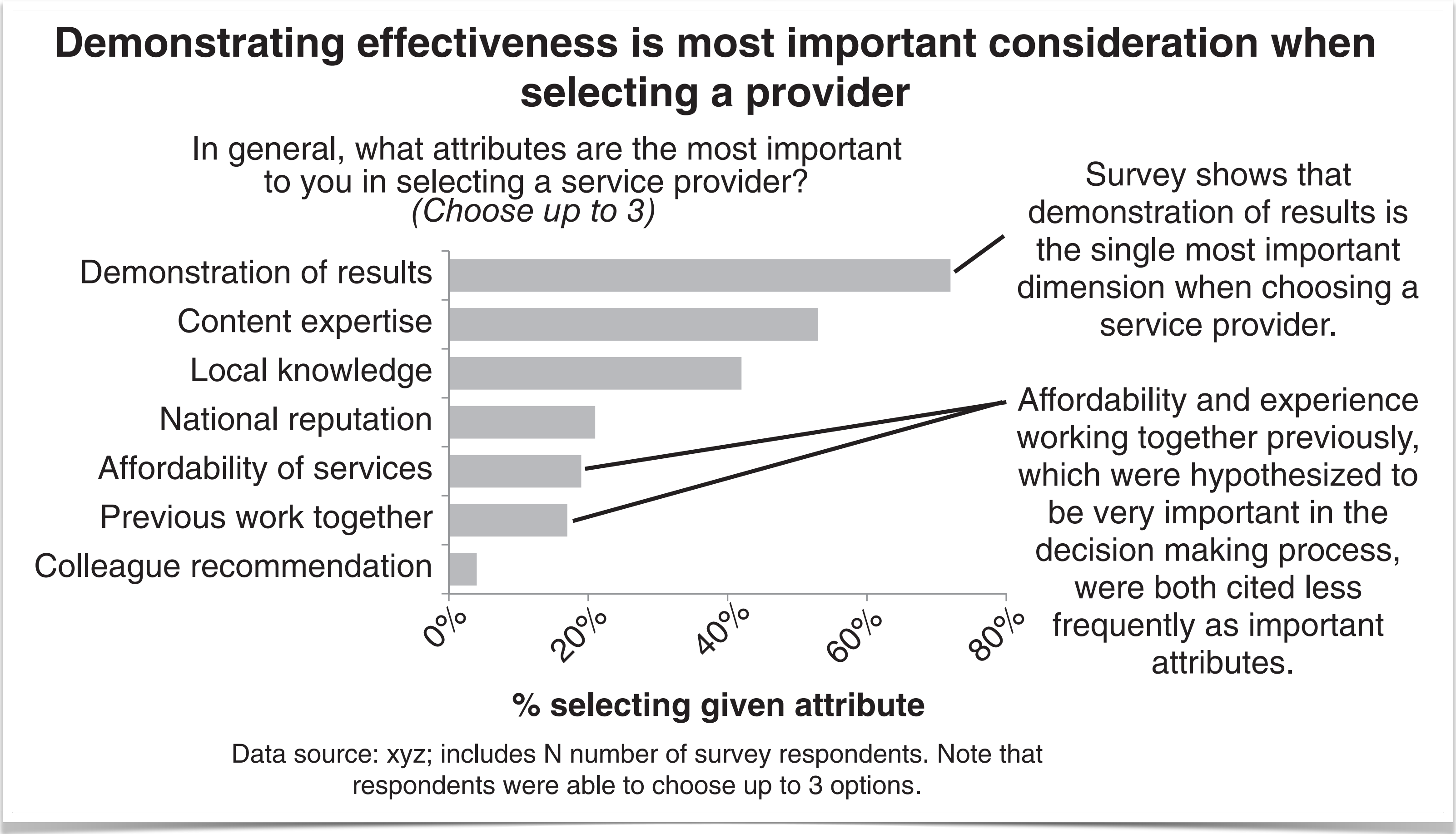
极低的 data-ink ratio



Relationship of Actual Rates of Registration to Predicted Rates (104 cities 1960).

data-ink ratio  $\approx 0.7$

# 避免杂乱无章的表达



提供了有效信息，但是看上去不太舒服的图表

# 避免杂乱无章的表达

**Demonstrating effectiveness** is most important consideration when selecting a provider

In general, **what attributes** are the most important to you in selecting a service provider?

(Choose up to 3)



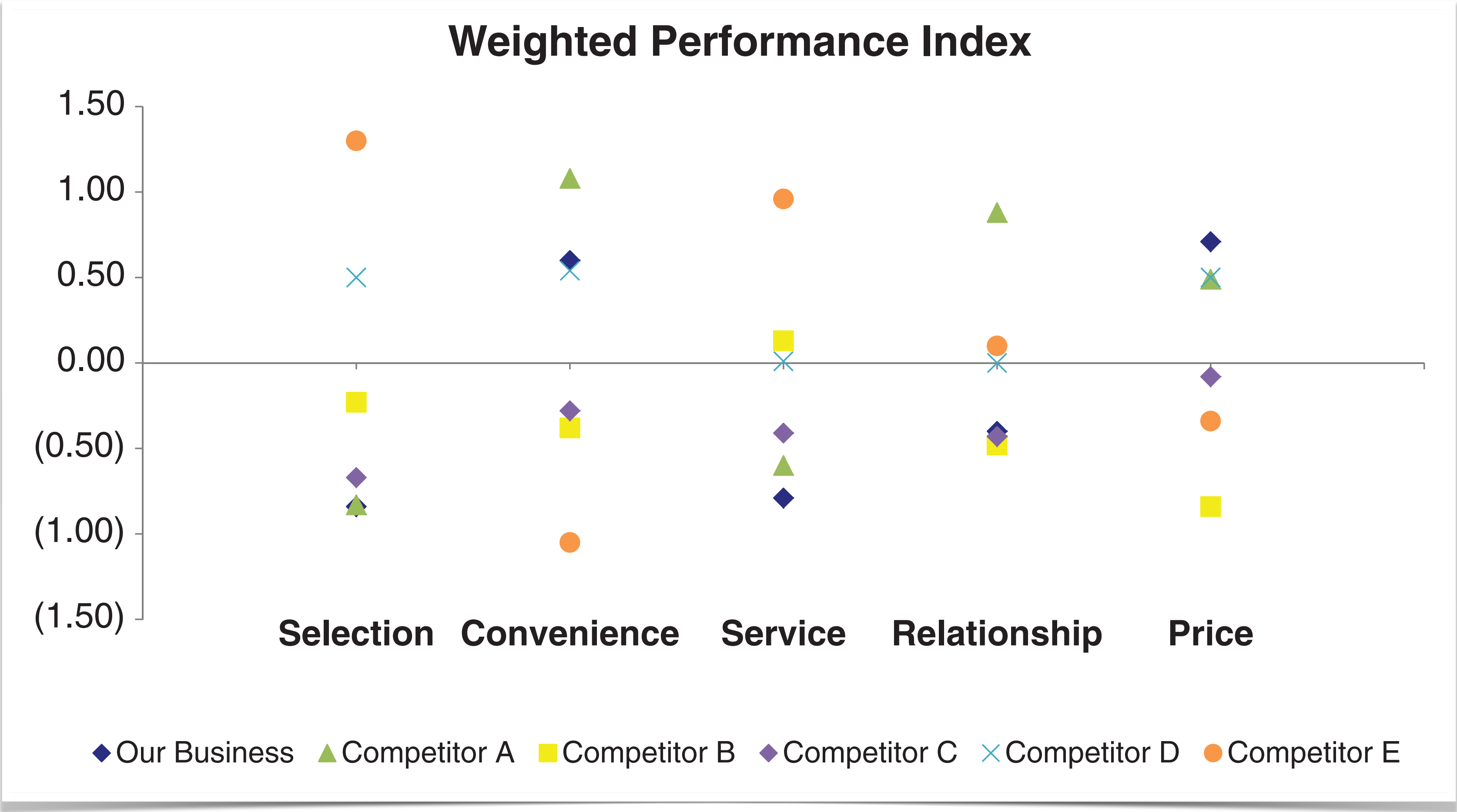
Survey shows that **demonstration of results** is the single most important dimension when choosing a service provider.

**Affordability** and **experience working together previously**, which were hypothesized to be very important in the decision making process, were both cited less frequently as important attributes.

Data source: xyz; includes N number of survey respondents.  
Note that respondents were able to choose up to 3 options.

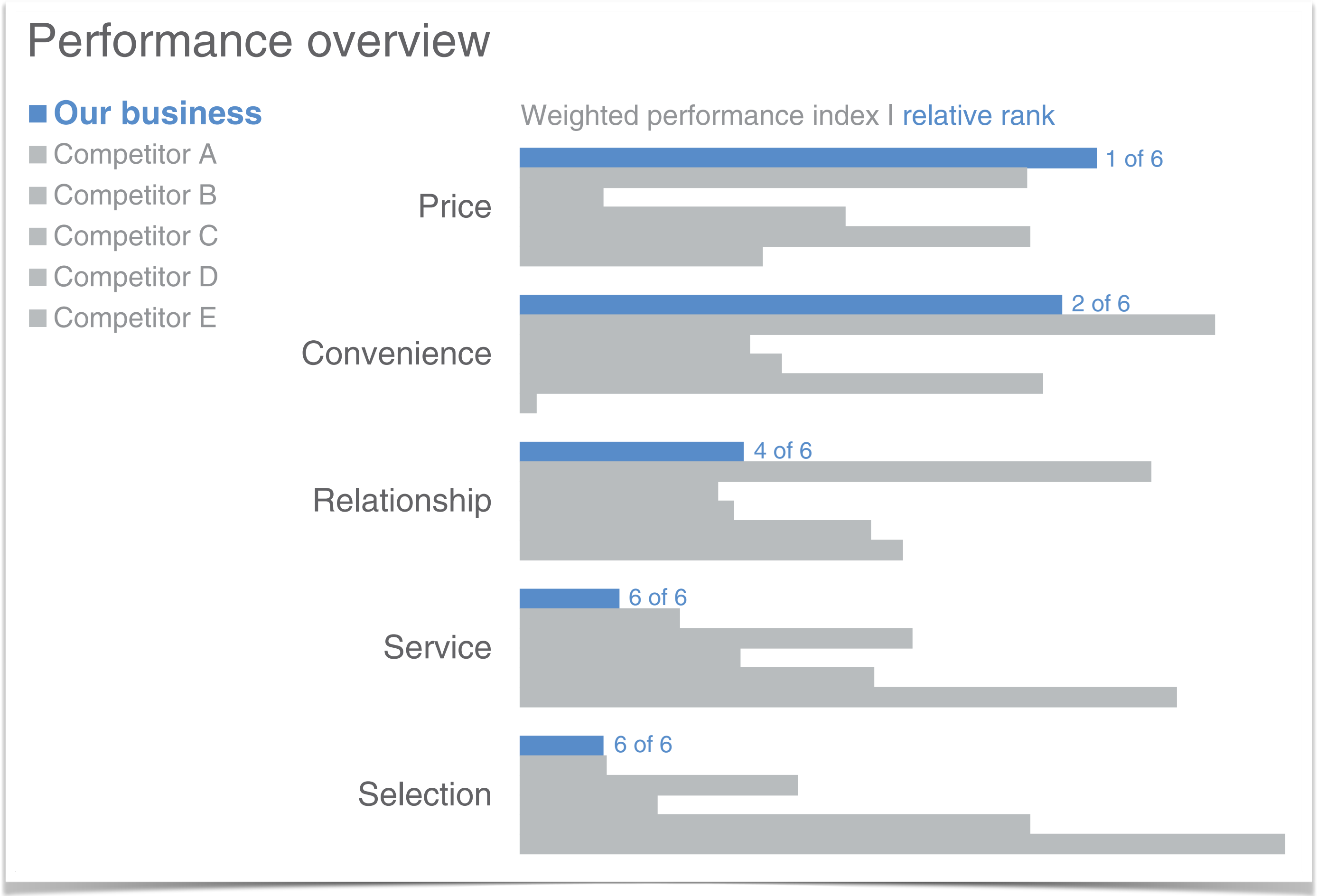
调整文字排版和文本位置后的图表

# 避免杂乱无章的表达



看上去非常复杂的图表

# 避免杂乱无章的表达



对比运用得更好

# 引导听众的注意力

在人类对视觉信息的处理中，不同类型的记忆发挥不同的作用

- **感觉记忆**：迅速且短暂（微秒级），发生在大脑理解信息内容之前

➡ **利用“前注意属性”引导听众的注意力**

前注意属性 (Preattentive attributes)：在潜意识下吸引注意力的可视化属性，包括形状、长度、粗细、大小、色彩、强弱、位置等

- **短时记忆**：可维持几秒至几分钟，但储存信息有限（不超过四组视觉信息）

➡ **避免在一幅图中展示太多的分组**

- **长时记忆**：区分对图像和文字的记忆。图像可以帮助我们唤起文字记忆。

图中有多少个 3 ?

756395068473

658663037576

860372658602

846589107830

756**3**9506847**3**

65866**3**0**3**7576

860**3**72658602

8465891078**3**0

# 通过不同方式强调文字

## No preattentive attributes

What are we doing well? Great Products. These products are clearly the best in their class. Replacement parts are shipped when needed. You sent me gaskets without me having to ask. Problems are resolved promptly. Bev in the billing office was quick to resolve a billing issue I had. General customer service exceeds expectations. The account manager even called to check in after normal business hours. You have a great company – keep up the good work!

## Color

What are we doing well? Great Products. **These products are clearly the best in their class.** Replacement parts are shipped when needed. You sent me gaskets without me having to ask. Problems are resolved promptly. Bev in the billing office was quick to resolve a billing issue I had. General customer service exceeds expectations. The account manager even called to check in after normal business hours. You have a great company – keep up the good work!

## Bold

**What are we doing well?** Great Products. These products are clearly the best in their class. Replacement parts are shipped when needed. You sent me gaskets without me having to ask. Problems are resolved promptly. Bev in the billing office was quick to resolve a billing issue I had. General customer service exceeds expectations. The account manager even called to check in after normal business hours. You have a great company – keep up the good work!

## Italics

What are we doing well? Great Products. These products are clearly the best in their class. *Replacement parts are shipped when needed.* You sent me gaskets without me having to ask. Problems are resolved promptly. Bev in the billing office was quick to resolve a billing issue I had. General customer service exceeds expectations. The account manager even called to check in after normal business hours. You have a great company – keep up the good work!

## Size

What are we doing well? Great Products. These products are the best in their class. Replacement parts are shipped when needed. You sent gaskets **without me having to ask**. Problems are resolved promptly. Bev in the billing office was quick to resolve a billing issue I had. General customer service exceeds expectations. The account manager even called to check in after normal business hours. You have a great company – keep up the good work!

## Outline (enclosure)

What are we doing well? Great Products. These products are clearly the best in their class. Replacement parts are shipped when needed. You sent me gaskets without me having to ask. Problems are resolved promptly. Bev in the billing office was quick to resolve a billing issue I had. General customer service exceeds expectations. The account manager even called to check in after normal business hours. You have a great company – keep up the good work!

## Separate spatially

What are we doing well? Great Products. These products are clearly the best in their class. Replacement parts are shipped when needed. You sent me gaskets without me having to ask.

Problems are resolved promptly.

Bev in the billing office was quick to resolve a billing issue I had. General customer service exceeds expectations. The account manager even called to check in after normal business hours. You have a great company – keep up the good work!

## Underline (added marks)

What are we doing well? Great Products. These products are clearly the best in their class. Replacement parts are shipped when needed. You sent me gaskets without me having to ask. Problems are resolved promptly. Bev in the billing office was quick to resolve a billing issue I had. General customer service exceeds expectations. The account manager even called to check in after normal business hours. You have a great company – keep up the good work!

# 建立视觉等级

## What are we doing well?

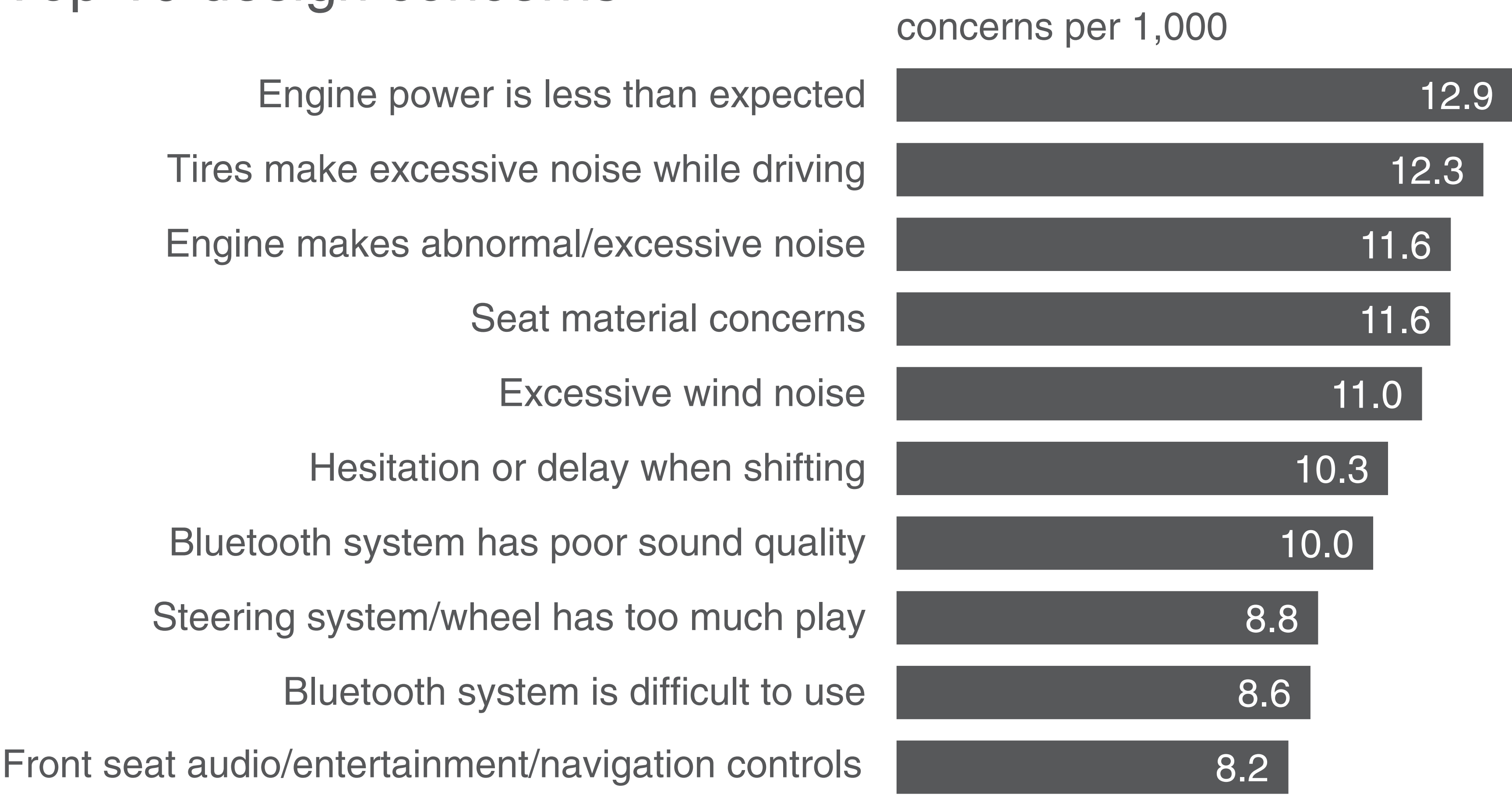
Themes & example comments

- **Great products:** "These products are clearly the best in class."
- **Replacement parts are shipped when needed:**  
"You sent me gaskets without me having to ask, and I really needed them, too!"
- **Problems are resolved promptly:** "Bev in the billing office was quick to resolve a billing issue I had."
- **General customer service exceeds expectations:**  
"The account manager even called after normal business hours.  
*You have a great company - keep up the good work!"*

# 在图表中的应用

没有前注意属性

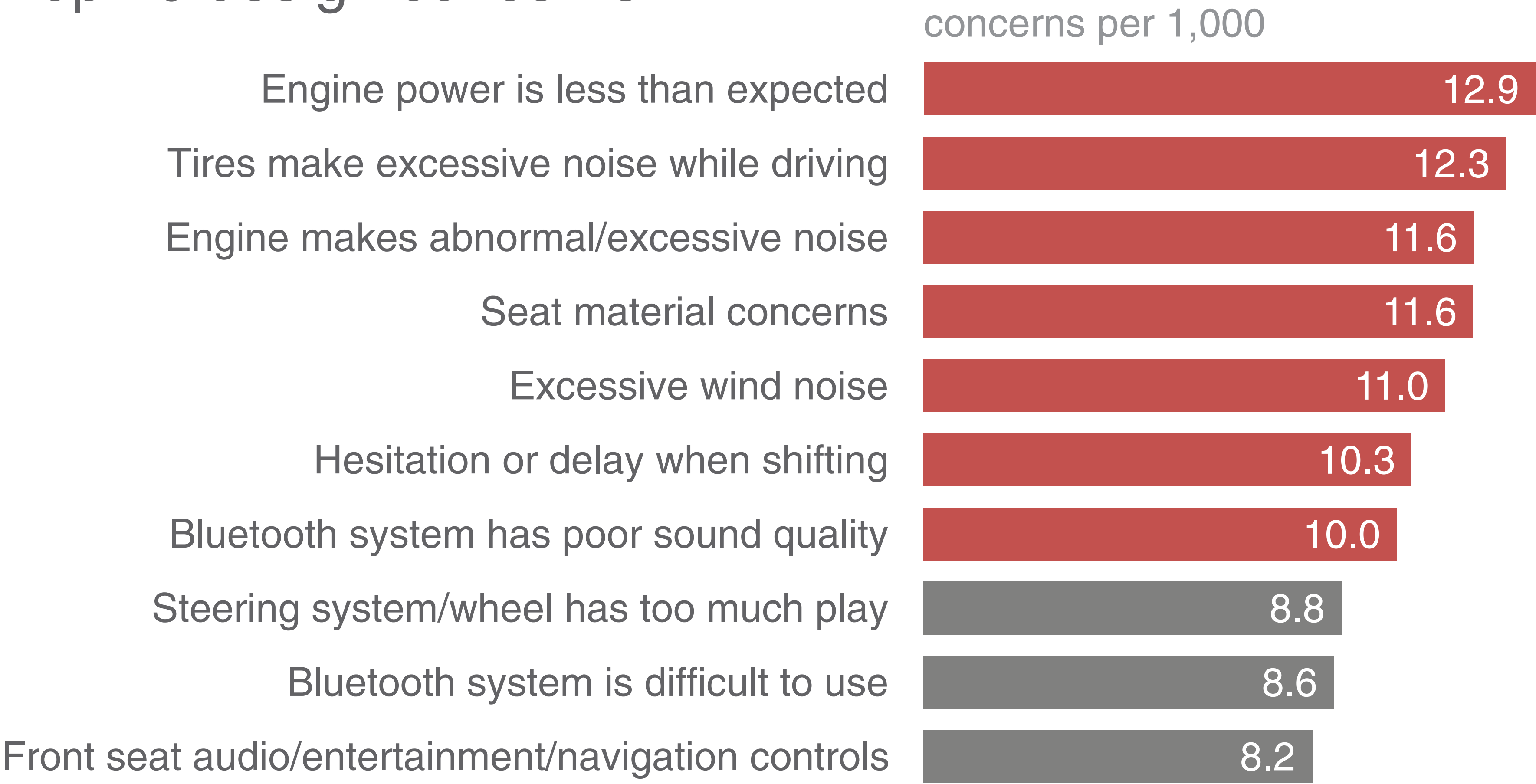
## Top 10 design concerns



# 在图表中的应用

加入颜色的对比，  
强调前 7 名的取值  
在 10 以上

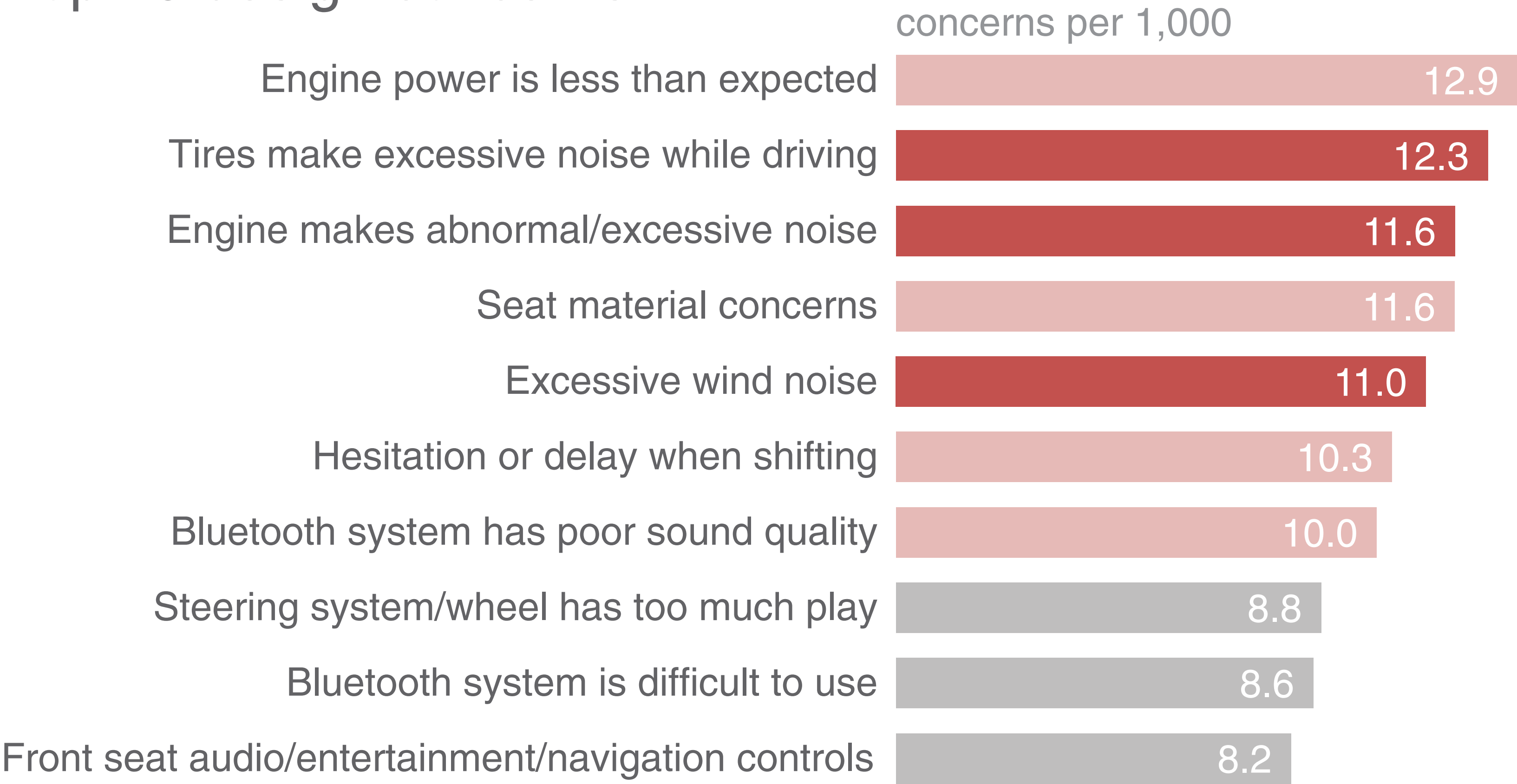
## Top 10 design concerns



# 在图表中的应用

通过视觉等级，强调和噪音相关的条目

## Top 10 design concerns

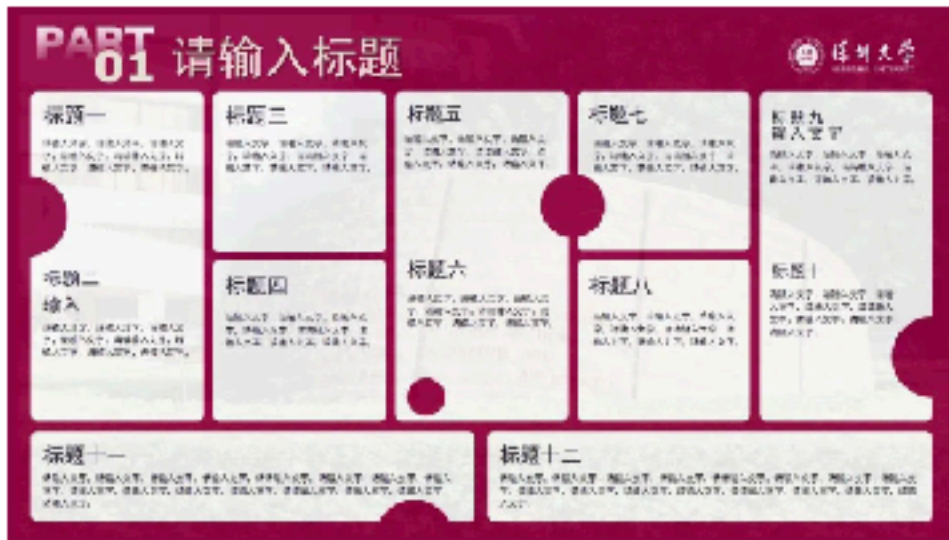
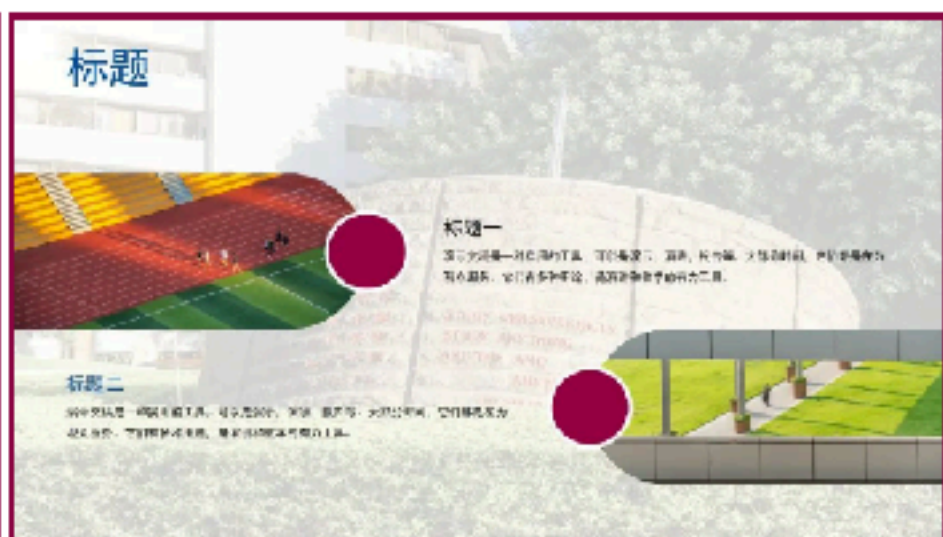
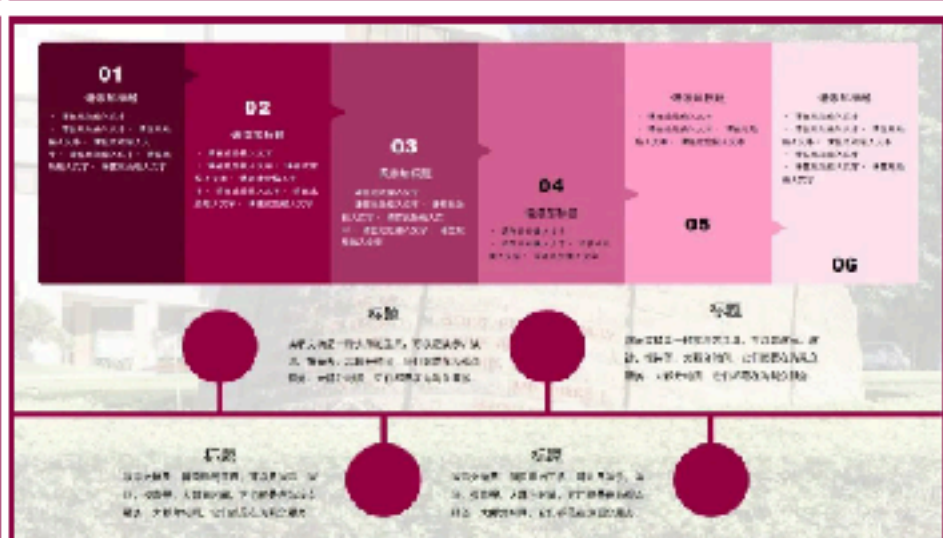
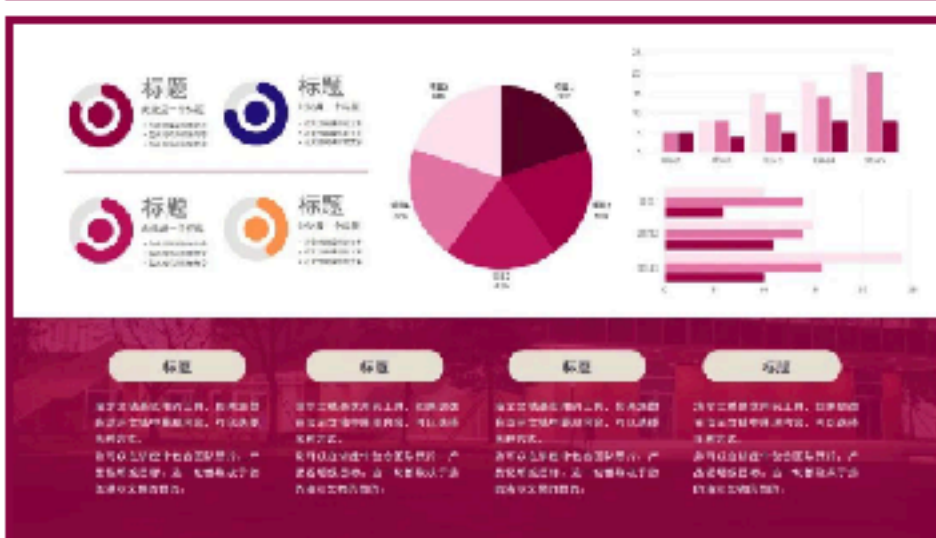
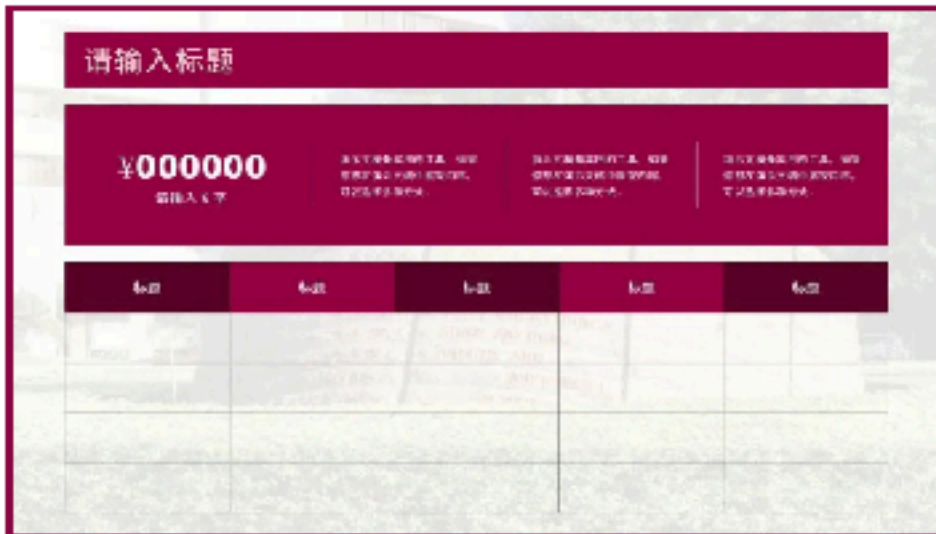


Comments indicate that **noisy tire issues** are most apparent **in the rain**.

Complaints about **engine noise** commonly cited **after the car had not been driven for a while**.

Excessive **wind noise** is noted primarily in **freeway driving at high speeds**.

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- 不建议使用
- 原因：
- 背景喧宾夺主
  - 字号太小
  - 页面设计通用性差