VEGALITE VISUALISATION

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Domain

The domain of the visualisation pertains to climate change. Climate change became topical due to the upcoming Conference of Parties 26 (COP26) which will be held in Galsgow in October 2021. The visualisation analyses climate change at global and local level. It contrasts each country's contribution to the issue, climate change's impact, and observes Australia's position and response to the problem.

Munzer's Framework

What

The datasets were gathered from online platforms such as data.world, github, ourworldindata and data.worldbank. The visualisation comprises of six public datasets and are table dataset types. Note that the map visualisations extract data from https://geojson-maps.ash.ms/ . Mapshaper (https://mapshaper.org/) was used to convert GeoJSON to TopoJSON formats. Datasets were wrangled by performing basic excel functions.

The data attributes of the visualisation include (Munzer, 2014):

Ordered – Ordinal:

- Year

Categorical:

- Country
- Disaster type
- Primary fuel use
- Power plant location

Ordered – Quantitative:

- CO_2 Emissions per capita
- Number of disasters
- Number of deaths due to natural disasters
- Capacity of power stations (MW)
- Renewable energy percentage of total electricity

Why

The visualisation attempts to prompt the audience to Analyse – Present the findings and to Query – Compare each country's performance. (Munzer, 2014) It attempts to target trends and the similarities. Hence design choices were thoughtfully made with these actions and targets in mind.

Who

The targeted audience comprise of global citizens and younger age groups who are more concerned of climate change's effects as it poses a threat to their generation specifically. It also targets Australians in the latter section of the visualisation. This visualisation doesn't use technical scientific

jargon to exclude anyone. It is comprehendible to the average person who may not know much about climate change.

Idiom Analysis (How)

Chart 1: CO2 Emissions per Capita

Marks:

- Geographic regions

Channels:

- Luminescence – Representing the emissions per capita

Rationale: It allows for comparison and contrasts to be made in an efficient and succinct manner through a choropleth map visualisation.

Chart 2: Number of Disasters by Disaster Type

Marks:

- Area
- Line

Channels:

- Position – Representing the number of disasters against time
- Colour hue – Representing the type of disaster

Rationale: The stacked area chart is used as it provides a detailed breakdown of the type of disasters from the total highlighted by the line chart.

Chart 3: Number of Deaths due to Natural Disasters

Marks:

- Geographic regions

Channels:

- Colour luminescence – Representing the number of deaths per country due to natural disasters

Rationale: The map depicts the information of deaths succinctly allowing for easy comparison and contrast.

Chart 4: Power Stations in Australia

Marks:

- Points

Channels:

- Colour hue – Representing the different power station types
- Position – Representing the latitude and longitude of the power station on the map

Rationale: The dot plot captures the density and breakdown of Australia's power stations. Capacity was not included as a separate channel as some large capacity power stations may hide others in the cluster, forming a less understandable visualisation.

Chart 5: Renewables as a % of Total Electricity

Marks:

- Points
- Line

Channels:

- Length – Representing the change in percentage
- Position – Representing the adoption of renewables as a percentage of total electricity generated for various countries

Rationale: The dot plot captures the comparison of the start points of each nation in 1990 and each nation's change in 2018. We notice some developing countries have progressed backwards as these countries have increased demand for electricity and have met it through the supply of non-renewable sources.

Design Choices:

Layout

Figure 1 depicts sight lines to ensure maximum balance and symmetry through its use of text and charts. The visualisation (Figure 1) utilises the viewing path principle from top left to bottom right. (Munzer, 2014) The text is strategically placed so the audience follows the viewing path. Although the principle of the viewing centre isn't quite used, the varying fonts of the title captures the audience's attention to follow the viewing path. (Schinkel, 2015) White space has been adequately used to separate the visualisations and text from eachother. The visualisation (Figure 1) follows a symmetrical and balanced guide.

The Green Transition

"We can't save the world by playing by the rules, because the rules have to be changed" - Greta Thunberg
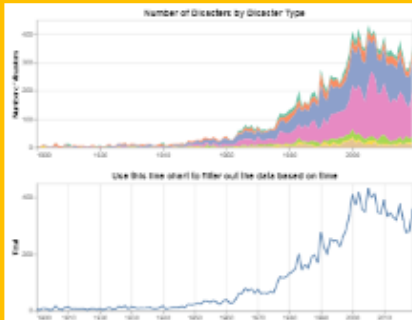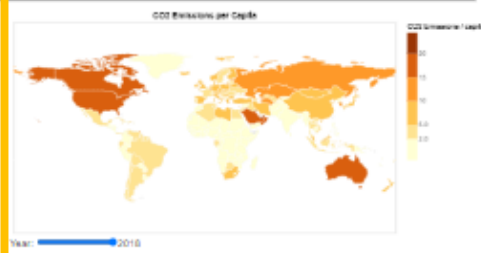
By Sohan

Climate change

Climate change is one of the greatest challenges humankind is to face. It is a challenge that must be overcome to keep Earth functional, as a planet for humans to thrive.

The burning of coal propagated the industrial revolution which brought an immense change – a higher standard of living. People had access to readily available electricity, fuel for transport and efficient machinery resulting in production at scale. Although industrial revolution brought great benefits, a few decades later humans have come to terms with its harrowing effects.

Over the years we notice countries, which are considered to be highly developed, are the prime emitters of carbon dioxide (CO2) and other environmentally damaging gases.

CO2 Emissions per Capita

Year: 2010

Increasing natural disasters

Number of Disasters by Disaster Type

Use this time chart to filter out the data based on time

The science has been crystal clear since the late 1900s on the effects that these gases are causing to the planet. These effects include:

The list is endless. Throughout time there has been a dramatic increase in natural disasters. Flooding and extreme weather seem to be the leading disasters. After 1975, the number of natural disasters has nearly quadrupled. This is not a mere coincidence. It is directly correlated with the increase in emissions.
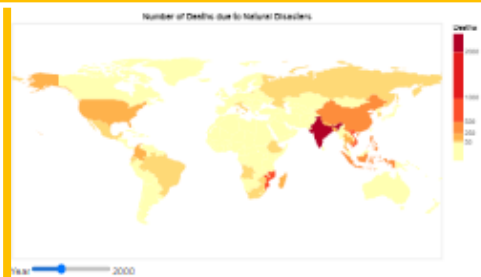
The emissions create a greenhouse effect, which is why extreme weather is one of the leading natural disasters. This extreme weather has been warming and melting ice caps in the north and south poles causing an increase in water levels. Due to this increase, communities residing on islands and coastlines have become more prone to floods. Even communities residing in the centre of their country experience torrential rains and flash flooding.

Natural disasters effects on lives

Climate change isn't a local issue, it is a global systemic problem. The devastating effects of climate change has a dual effect.

The first is on the economy in which millions of dollars must be poured into response and recovery efforts, extracting a portion of a nation's GDP which could best have been used to provide other services to advance its wellbeing of its citizens.

More importantly, the second effect of climate change is in which people lose their lives. This has been ever growing proportionally to the trend of increasing number of natural disasters. These deaths aren't mapped to just a single country. Its effects are mapped to every continent in the world.

Number of Deaths due to Natural Disasters

Year: 2000

Australia's power stations

Power Stations in Australia

Primary Energy Selection: Show All
Zoom: 600
Map Centre: Default

According to the OECD, Australia has been labelled as the second dirtiest country through electricity generation in the world. Australia is also renowned in the world for its astonishingly slow adoption of renewables. Although Australia is obnoxiously infamous for their slow adoption, they have nevertheless committed to going net-zero by 2050 as per the Paris agreement.

Numerous steps have been taken in Australia's development of green infrastructure, especially in solar energy. However, this is limited to the Eastern coast of Australia. Western Australia which is renowned for its booming mining sector, is slow in its advancements in the adoption of green energy.

As a developed economy, Australia must join its counterparts in advancing the green economy and committing to more aggressive emission targets such as some of the European countries. The point has already been made that the temperature has already risen above one degree Celsius and is continuing to rise rapidly. Unfortunately this means that Australia's commitment to carbon neutrality by 2050 may not be enough.

Australia's slow transition

Since the 1990s, Australia have not progressed much. The percentage of Australia's electricity grid which remains on renewables has been for the majority, the same. Some other developed countries, especially in Europe, which had much less of their electricity from renewables, have now advanced to overtake Australia.

Another area of concern is the backward transition to renewables from some of the more developing economies such as India, South Africa and China. Undoubtedly, access to electricity and technologies is needed to develop an economy. These developing countries' appetite for energy is immensely growing. However, they must be supported to ensure they grow their economies in a sustainable and renewable manner.

Although developed countries are responsible for climate change, its effects strike developing countries and economies such as south-east Asia, Africa and parts of Southern America. It is the responsibility of the developed countries to ensure that the developing countries are able to advance their economies using renewables and not major polluters such as coal.
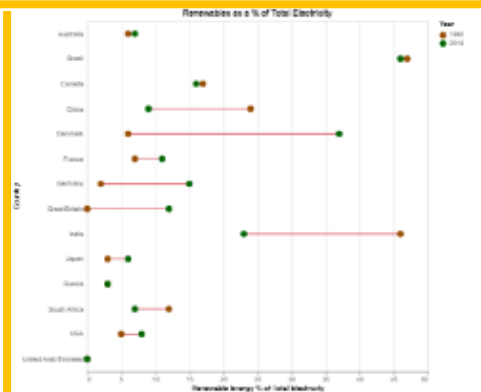
Renewables as a % of Total Electricity

(Figure 1: Visualisation incl. Sight Lines)

Colour & Figure-Ground

The white background was inspired by the white papers in the scientific field. The white theme is appropriate as climate change has become topical in numerous studies and white papers in the scientific domain. Although it's simple, the messaging and feel of the visualisation is very appropriate.

Colour has strategically been picked so that colour-blind people are accommodated for. (Muth, 2020)

Figure-ground is established by adding numerous layers to the TopoJSON map visualisation. Chart 4 is a prime example in overlaying the points on the Australian geographic regions. The choice of colour for geographic regions is light grey as it provides a neutral look, avoiding the shift in focus away from the points.

A darker shade of grey is used to layer the geographic regions with no data available. It is observed in Chart 1, located east of Africa.

Typography

The typeface used in the title is Taviraj. The Serif typeface was chosen for its formal look which aligns with the seriousness of the issue. The Italiano typeface was chosen for Greta Thunberg's quote as it represents the authenticity of the quote. The Source Sans Pro typeface was chosen for the main body of the visualisation because of its open-shape, Sans-serif glyphs, resulting in optimal readability. (Claudia, 2021) Paragraphs were maintained to ensure approximately ten words per line. The various font sizes build visual hierarchy. The bolding and colouring emphasise the title.

Storytelling

The story depicts the issue of climate change and the disappointingly negligible commitments Australia has made. The story-telling genre is a partitioned poster or annotated chart. It's guided by text which explains the story of the issue.

The story is aided with interactivity such as sliders, time-brush filters and drop-down options for comparison and contrast.

It also uses annotations in individual visualisations, to give further hints to what the audience should be inferring from the visualisation.

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Appendix – 5 Design Sheet Methodology

IDEAS

Climate change

- World point of view
- Australian point of view
- State vs State comparison
- Australia vs other countries
  - CO2 emissions
  - Effects:
    - Rise in sea levels
    - warmer atmosphere
    - Floods
    - GDP % gone
    - Extinction of habitat and wildlife
    - Wild fires
  - Future outlook of planet
  - Power Station types

Talking about Paris Agreement and history of negligence

Dot map

Dot plot

Choropleth

FILTER → CATEGORIZE → COMBINE & REFINE

FILTER

Datasets:
- CO2 emissions world
- % renewables by county
- Number of natural disasters by type
- GDP % lost to natural disasters
- Global sea level rise
- Global temperatures
- Species extinct by year

STORY: Australia's inadequate response to climate change
- N world using

CATEGORIZE

World situation
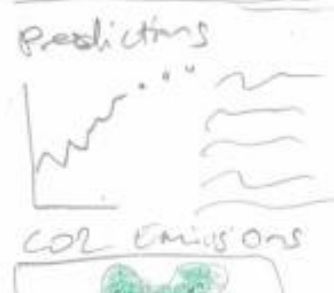- CO2 emissions
- GDP % gone
- Future outlook

Australia
- power station type
- state to state comparison
- Maybe policy effects
  E.g Carbon tax

- Renewable adoption

Effects
- sea levels
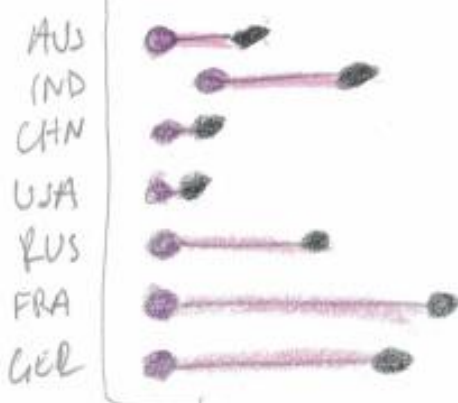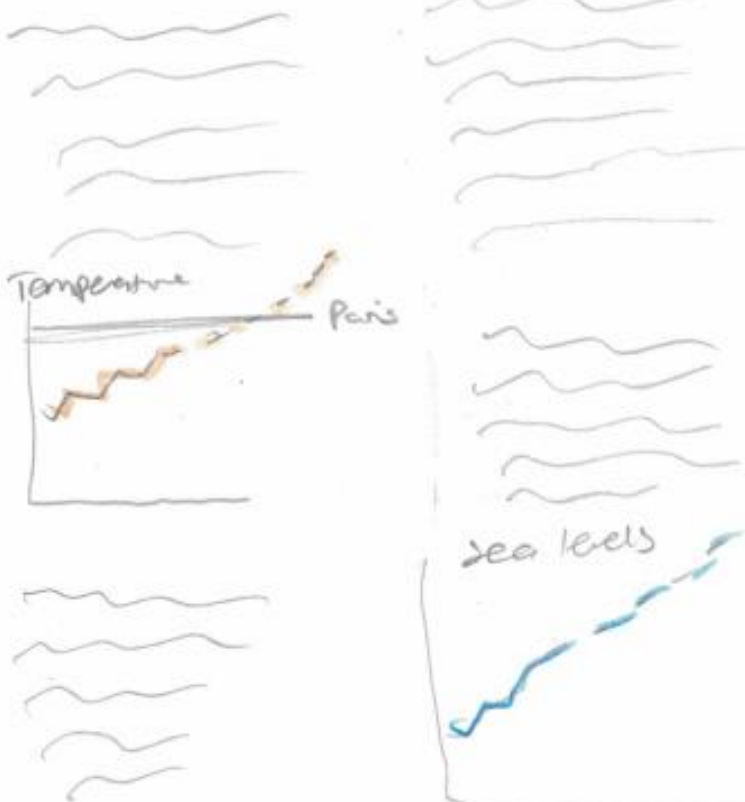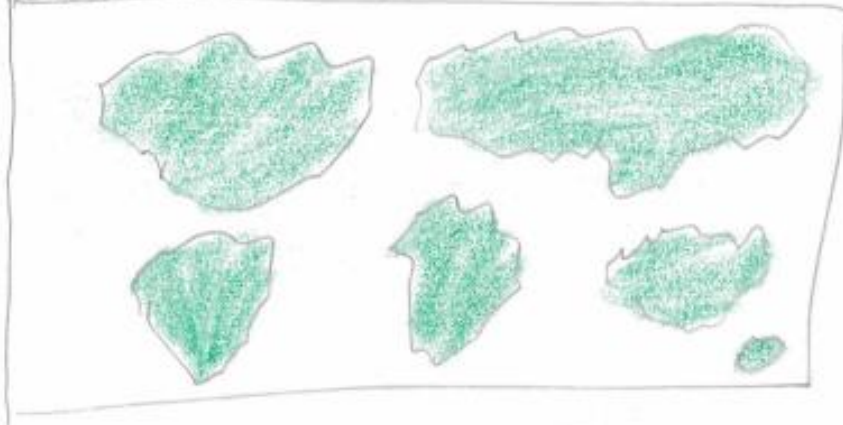- temperature increase
- Natural disasters
- Deaths/homeless

Can do prediction on this and show No. of deaths

COMBINE & REFINE

CO2 emissions

sea level   Temp. inc   disasters

Predictions

CO2 emissions

SHEET #2

CO2 Emissions

Temperature

Paris

sea levels

AUS
IND
CHN
USA
RUS
FRA
GER

OPERATIONS

CO_2 Emissions:
- User has tooltips
- Uses has zoom
- User has map-centre
- Year slider

Temperature & Sea levels:
- Tooltips

Dot plot:
- Tooltips
- Highlight in legend
  upon selection

Scrolly - telling

Text tells story

DISCUSSION

to Is there too much
   text?

Adv
- Story telling
- Explanation so
  anyone can understand

Disadv
- Not attractive to audience
- Flow isn't easy to
  decipher

2. Is it Meaningful to
   generate predictions

Adv
- Interesting to see
  future outlook

Disadv

Title: Australia's
Climate failures
Author: John Right
Date: 30/9/21
Sheet: #3

OPERATIONS

CO2 emissions
- Tooltips
- Zoom
- map-centre
- year slider

Natural Disasters
- Tooltips
- Slider filter?

Dot plot
- tooltips
- Highlight in legend upon selection

Dot map
- Tool tip
- Drop-down filter

GDP%LOSS
- Zoom centre
- year
- Tooltip

DISCUSSION

+ves
- Numerous visuals different idioms
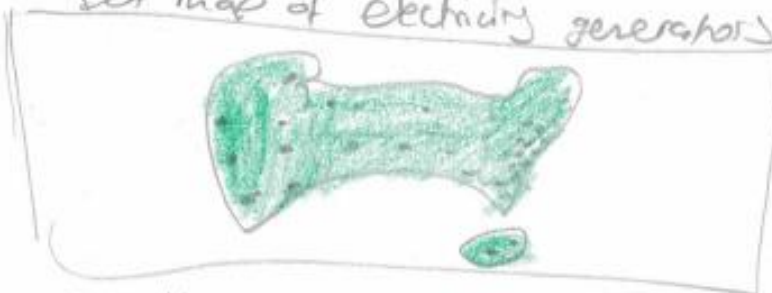- Targetted to Aus public/audience
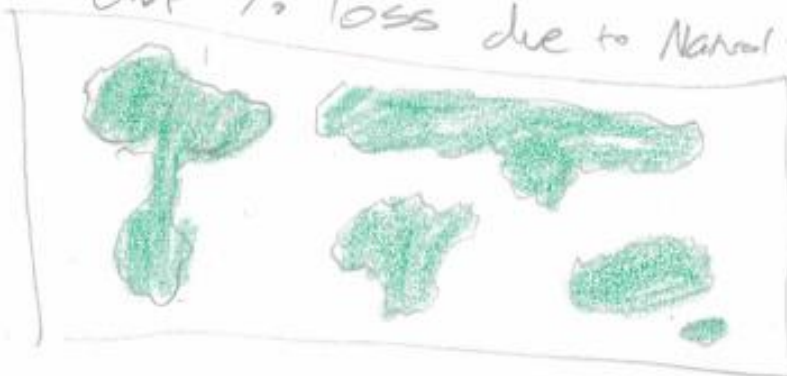
-ves
- Maybe inappropriate to include GDP %

SHEET #3

CO2 emissions

Number of natural disasters

floods
wildfires
Drought

Dot map of electricity generators

Renewables

AUS
USA
RUS
CHN
IND
UK
RSA

GDP % loss due to Natural Disaster

Title: The green transition

Author: Sohan Rajan

Date: 30/9/21

Sheet: #4

OPERATIONS

CO2 emissions:
  — year slider
  — tooltips

Natural Disasters
  — Sliding filter

Number of deaths
  — Tooltips
  — year slider

Dot map
  — Zoom
  — map centre
  — Drop-down filter
  — Tool tips

Dot plot
  — Nil

Scrolly – telling

Added section to hyperlink author and repo of assignment

SHEET #4

CO2 Emissions

Natural disasters

Deaths due to Natural Disaster

Power Stations

Renewables

AUS
USA
UK
RSA
RUS
IND

DISCUSSION

POSITIVES
— Numerous visuals various idioms
— Symmetric + Balanced
— Story – like

NEGATIVES
— Time-consuming for 6 visuals
— Compromised interactivity
— Not too creative/

REALISATION

LAYOUT   FOCUS

| The Green Transition
| By Sohan Pujar

climate change

Natural Disasters

use chart below to filter

Effects of Natural
Disasters

Energy [▾]
zoom ●——
Map centre [▾]

Australia's slow
transition

Renewables
Aus
GER
USA
UK
RSA
IND

CO2 Emissions

Year ——● 2018
Increasing Natural
Disasters

Lives lost due to natural disaster

Year ——● 2000
Australia's power stations

OPERATIONS
- Tooltips
- Slider filter
- zoom
- year slider
- Map centre
- primary energy

RATIONALE
Story:
climate change →
Increase natural disasters
→ effects →
Australia's poor
response

Choropleth maps
Good for comparison
Needs to be normalised

Dot maps
-Good to show density

Stacked area chart
Good to show the
breakdown by type
May be difficult
to compare areas
Tooltips will help

Dot plot
Good to show change
and strongly measures
for comparison

ESTIMATES
30/9 - SDS
3/10 - 2 vis
10/10 - Equis
15/10 - 6 vis
16/10 - HTML
17/10 - Report

DATASET &
DEPENDENCE

Datasets	Dependencies
CO2 Emission	- Excel/CSV
No. of natural disasters	- CSS/HTML