Process Book – User Perception of Carbon Footprint by States

Kayla Afonesca, Christian George, Daniel Onyema

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Week 1: The Problem We Chose to Solve

We began by brainstorming issues that felt socially relevant. Climate change emerged as a top contender, but we wanted to avoid generic messaging. We asked ourselves: How aware are people of the carbon footprints of their own communities?

This led to our working hypothesis: while carbon emissions are widely discussed at the national and global levels, most people lack a clear understanding of their local impact. We decided to address this by creating a visualization that highlights carbon emissions across the United States—not just in aggregate, but by region, source, and per capita metrics. We then drew up a mock-up of what the visualization could look like, and our project was approved.

We drafted a one-sentence goal to keep us anchored:
"To determine how large each state's carbon footprint is, how well users understand that information from a visual map, and whether visualizations can improve awareness of carbon emissions."

Week 2: Data Collection & Early Exploration

Our first major hurdle was identifying the right dataset. We needed granular emissions data—ideally down to ZIP codes—with breakdowns by sector. After evaluating several options, we selected a dataset that provided:
- ZIP code, city, county, and state
- Carbon output per sector (transportation, housing, food, goods, services)
- Utility data (electricity, oil, and gas)

We performed light preprocessing—removing unused attributes like elevation and PMSA_Name—and retained only relevant geographic and emission-specific variables. We also had to standardize the figure to deal with outliers. Minimal cleaning was needed overall, which allowed us to quickly begin prototyping.

Week 3-5: Designing the Visualization

We chose a scatter map as our primary visual medium, focusing on interactivity and ease of interpretation. Each county appears as a data point on a U.S. map, colored by emission level (darker red = higher emissions).

The data volume impacted performance, especially with real-time rendering.

We debated different encoding options but ultimately chose color intensity for immediacy. We also planned to incorporate filters by emission type. Our definition for our minimum viable product was:
- A functioning scatter map
- Color-coded emission data per county
- Sector breakdowns accessible via interaction

Week 6: Finalizing, Testing and Future Directions

We began gathering informal feedback. Early testers mentioned they were surprised by the high emissions in some expected "green" states, showing that our visual encoding was working.

We took this as validation of our approach, but we also noted confusion in distinguishing sector-specific emissions. In response, we considered layered maps or toggles for each sector (transport, food, energy, etc.).

As we neared completion, we compiled the features that defined success for us:
- A visually compelling, interactive map
- The ability to filter by sector and explore data per county
- A visualization that leaves users more informed than they were before

Looking ahead, we're thinking about enhancements: historical overlays, predictive modeling, and deeper storytelling around emissions inequality. But for now, the visualization stands as a proof of concept: a map not just of emissions, but of awareness.