Quantifying Transport Energy Resilience: Active Mode Accessibility

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Energy = Coal, Petrol, Electricity, Biomass, Human Power, etc.

Transport Energy $\approx$ Oil
Motivation

Background - Adaptation

Low Impact

- Change travel time
- Shift mode
- Change destination
- Forgo activity

High Impact
Background
Active Mode Accessibility (AMA):

- The proportion of activities that can be reached by active modes.
- Low AMA: high fuel input required
- High AMA: low fuel input required
Method

Builds upon:

- Accessibility Analysis
Method

Builds upon:

- Accessibility Analysis
- Activity Modelling
For every residence:

1. Measure travel time and distance required to capture activities

2. Select travel mode for each activity

3. Calculate the annual travel and fuel consumption
Method

- For every residence:
  1. Measure travel time and distance required to capture activities
     - **Accessibility Analysis**
  2. Select mode for each activity
     - **Mode Model**
  3. Calculate the annual travel and fuel consumption
     - **Activity Model**
Method

- AMA:
  - Percentage of **four key activities** that can be accessed by active mode
  - Percentage of **trips** that can be met by active mode
Implementation - Current

python

GDAL
Implementation - Future
**Case Study**

**Rolleston**
- Pop.: 7,000
- Area: 15 sq. km
- Destinations: 103

**Central City**
- Pop.: 5,700
- Area: 5 sq. km
- Destinations: 1755
Case Study - Networks
Case Study - Demography

![Bar chart showing age distribution for Central City and Rolleston]
Accessibility & Mode Model
Results – Central City

Activities
- Social
- Retail
- Recreation
- Other
- Cultural
- Maintenance
- Health
- Grocery
- Fast Food
- Component Food
- Tertiary Education
- High School
- Primary School
- Pre-School

Percentage of households

- Walk
- Bicycle
- Drive
AMA Results – Central City

- AMA of key destinations: 100%
- AMA of trips: 100%
Accessibility & Mode Model
Results – Rolleston

![Bar Chart]

- Activities:
  - Social
  - Retail
  - Recreation
  - Other
  - Cultural
  - Maintenance
  - Health
  - Grocery
  - Fast Food
  - Component Food
  - Tertiary Education
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- Graph shows the percentage of households for different activities, categorized by mode of transport:
  - Walk
  - Bicycle
  - Drive

- The chart indicates the proportion of households engaging in each activity via different modes of transport.
AMA Results – Rolleston

- AMA of key destinations: 66%
- AMA of trips: 59%
Activity Model Results

The graph illustrates the activity model results for different categories such as Grocery, Retail, Social, Pre-School, Primary School, and High School. The x-axis represents the categories, and the y-axis shows the distance traveled in kilometers per year per household. The bar graph comparison of Central City and Rolleston shows different levels of activity for each category.
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Conclusions

- Quantifies transportation energy resilience
- Indicates facilities that are inaccessible without private vehicles
- Future: Transport Energy Footprinting