

## FUEL CONSUMPTION RATE IN WASTE COLLECTION SERVICES



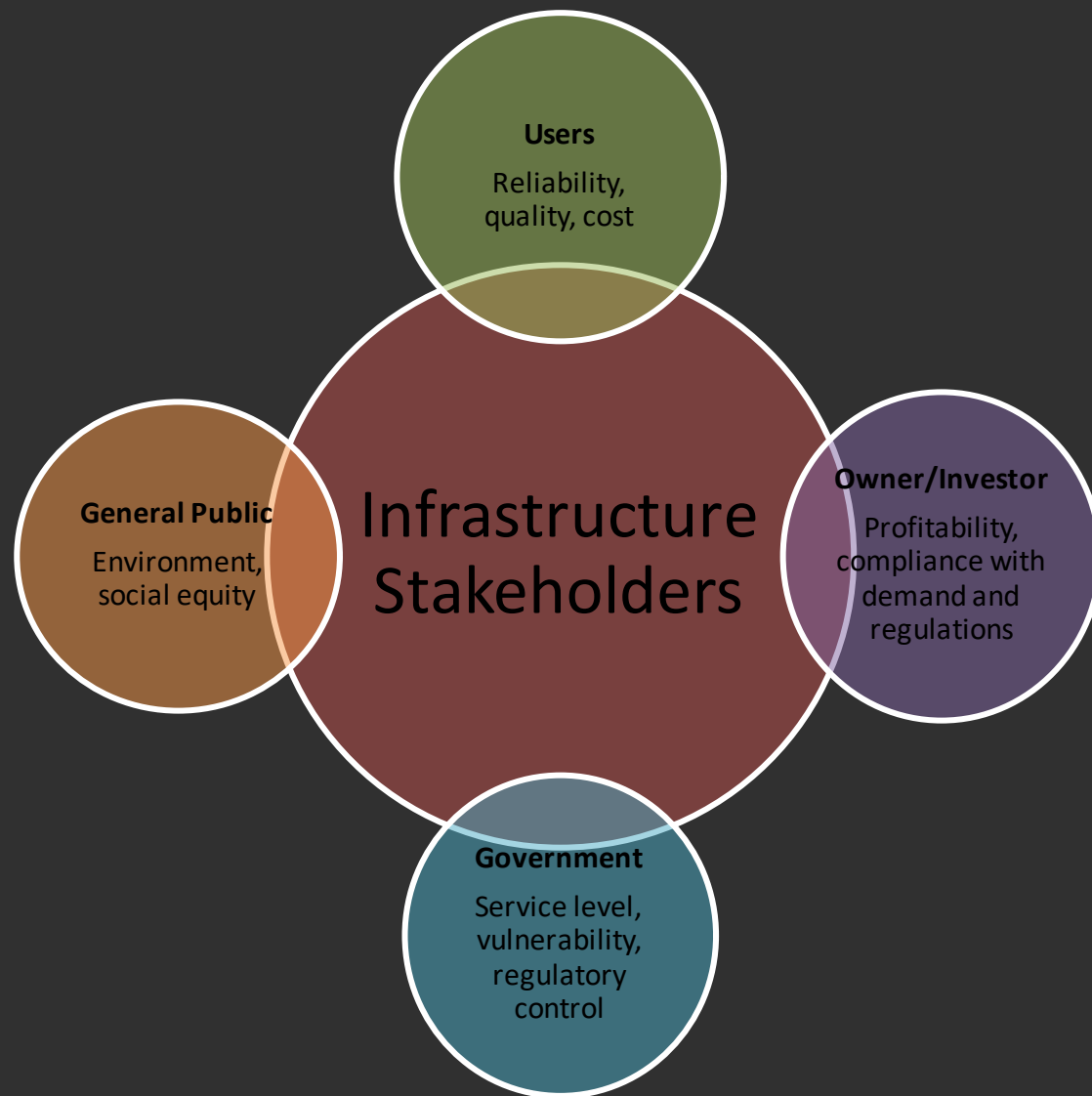
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1. Introduction
2. Fuel consumption
3. Case study
4. Results and discussion
5. Final remarks



# 1. INTRODUCTION

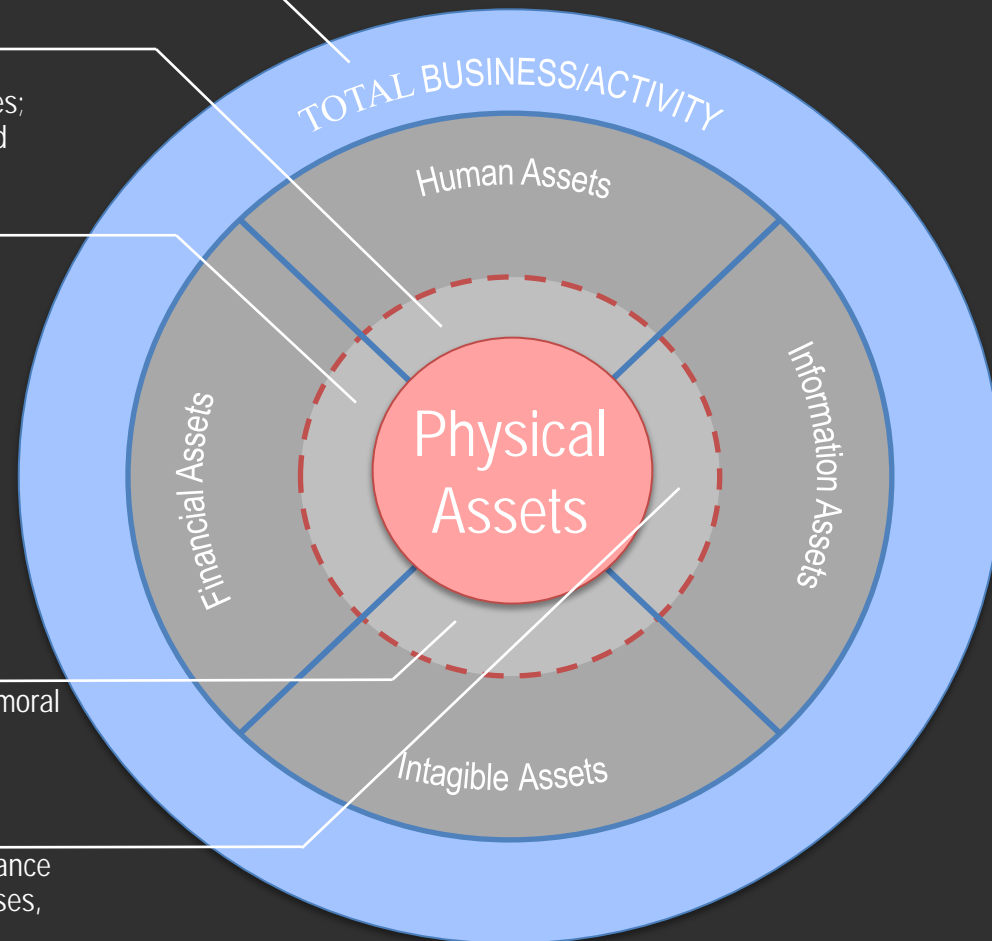
**Vital context:** business/activity objectives, policies and market; legal and regulatory requirements; socio-cultural context; performance and risk goals

**Important interface:** motivation; communication; roles and responsibilities; knowledge; experience; competence and capability; leadership; teamwork

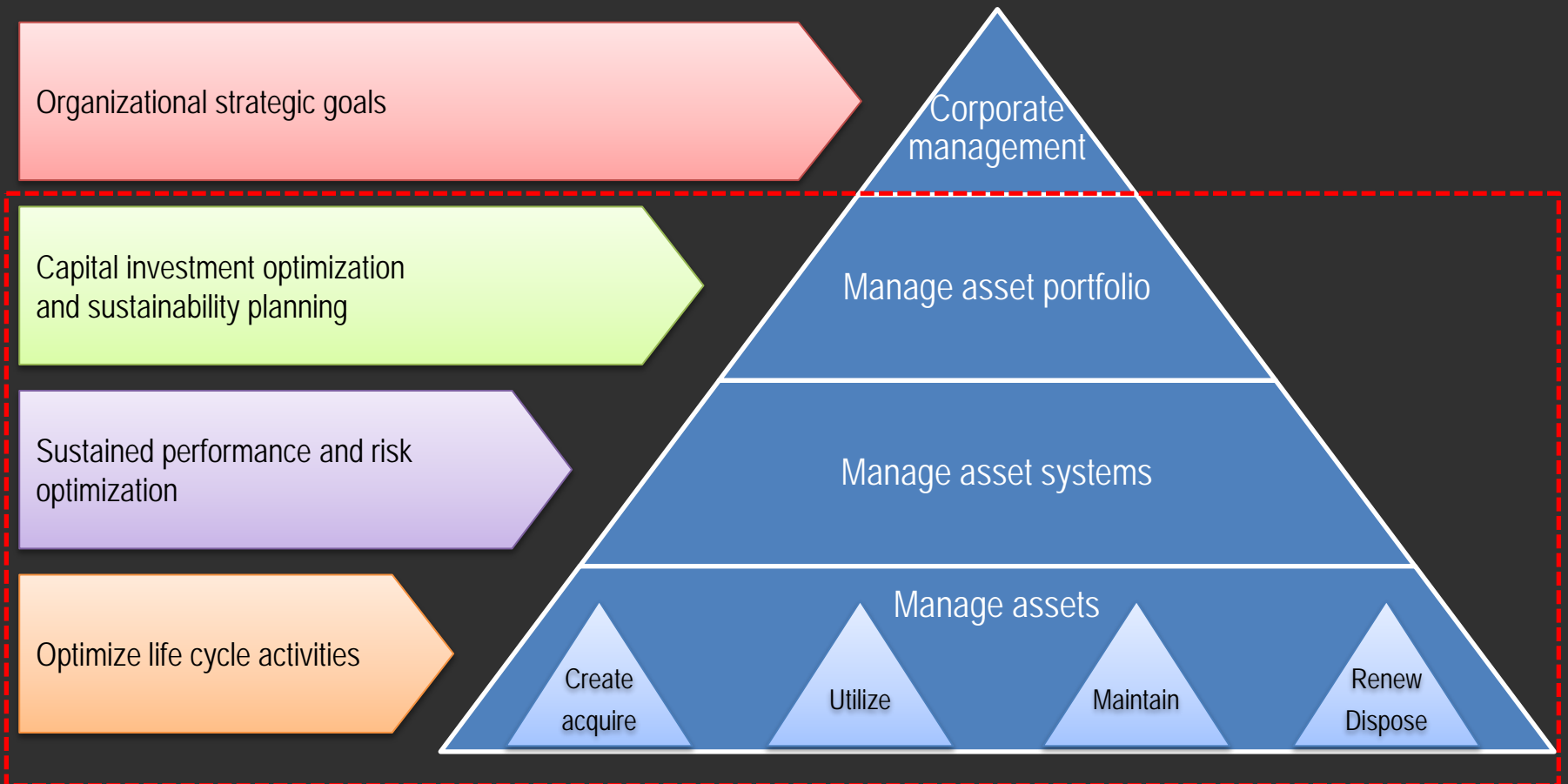
**Important interface:** life cycle cost; investment criteria, value of asset performance

**Important interface:** reputation/image; moral and ethics constraints; socio-cultural and environmental impact

**Important interface:** condition; performance level; hazards and opportunities; processes, protocols and activities



# 1. INTRODUCTION



Municipal solid waste collection represents the largest share (from 50% to 70%) of waste management costs and fuel is a substantial expense in waste collection and transportation (Sonesson 2000; Sousa et al. 2018).

Previous studies of rear- and side-loader garbage trucks reported fuel consumptions from 53 L/100 km up to 235 L/100 km (Agar et al., 2007; Ivanič, 2007; Thiruvengadam et al., 2010; Sandhu et al. 2015).

Bender et al. (2014) measured a fuel consumption of 79 L/100 km, from which nearly 60% was due to the compactor operation / idling.

In Portugal, Teixeira et al. (2014) estimated an average fuel consumption of 3.96 L/Tonne for mixed waste collection in the city of Porto, Portugal.

### 3. CASE STUDY



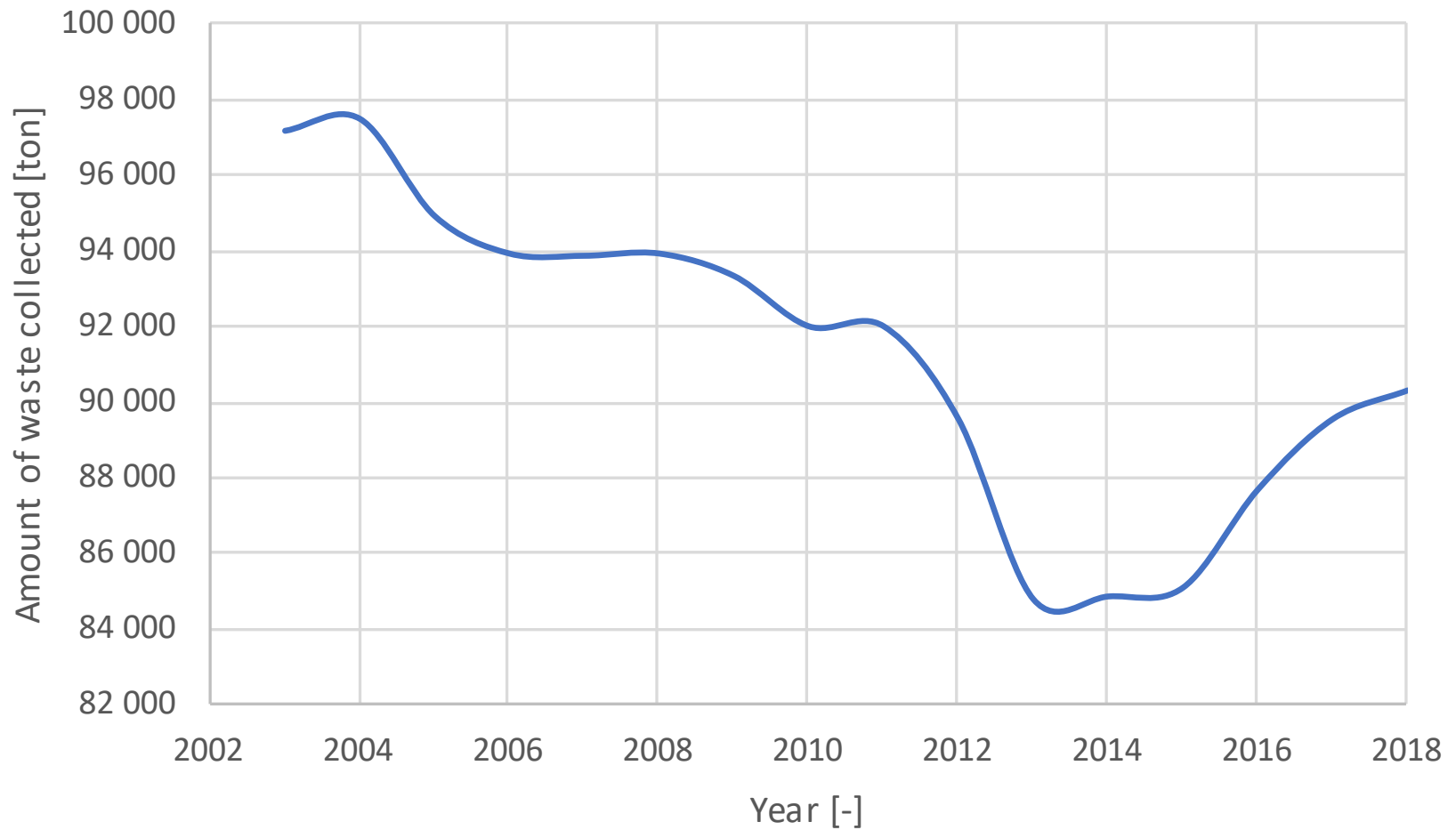
Area: 100 km<sup>2</sup>

Population: 212 000 inhabitants

Waste production: 136 000 tonnes per year

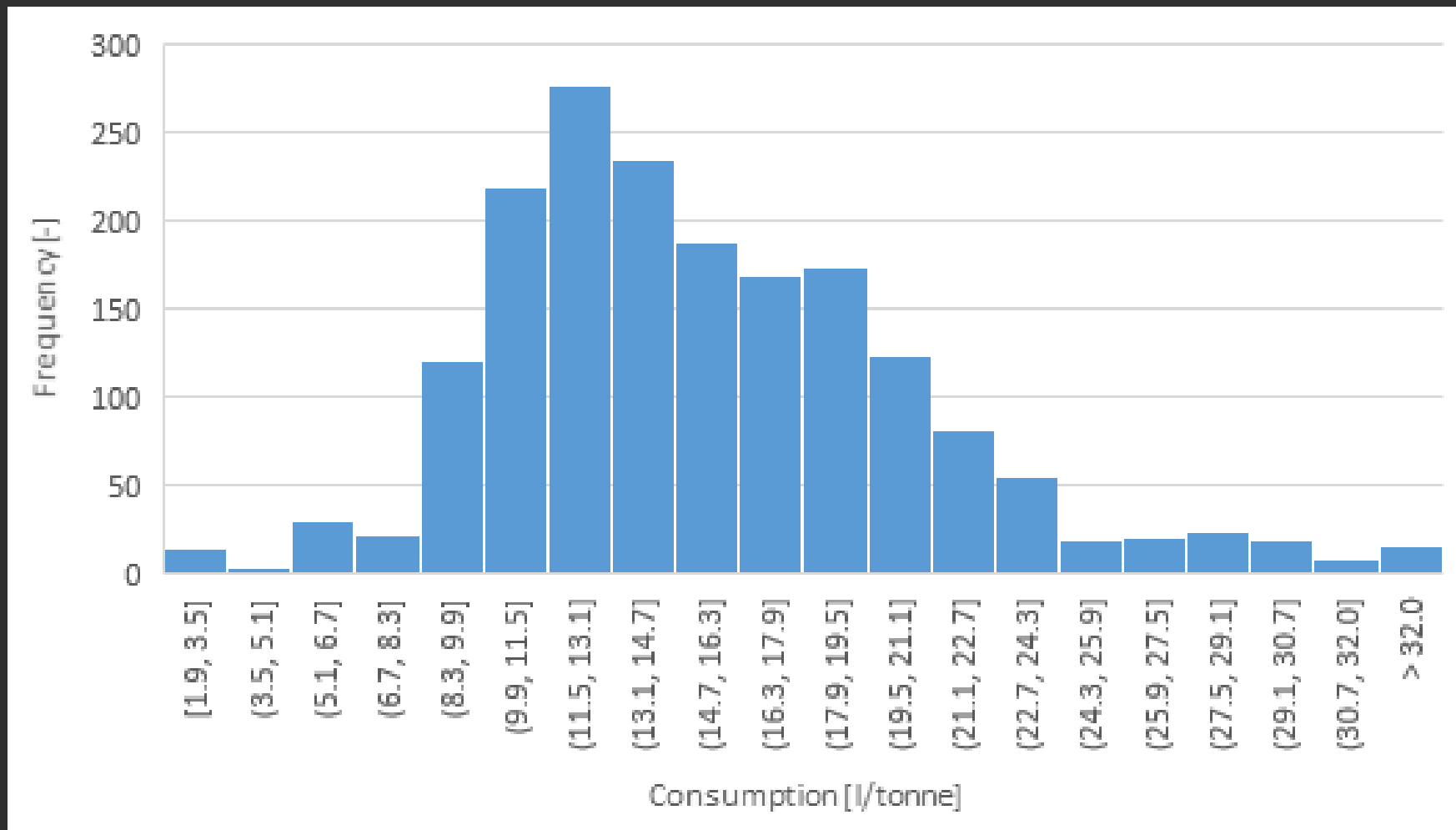


## 4. RESULTS AND DISCUSSION



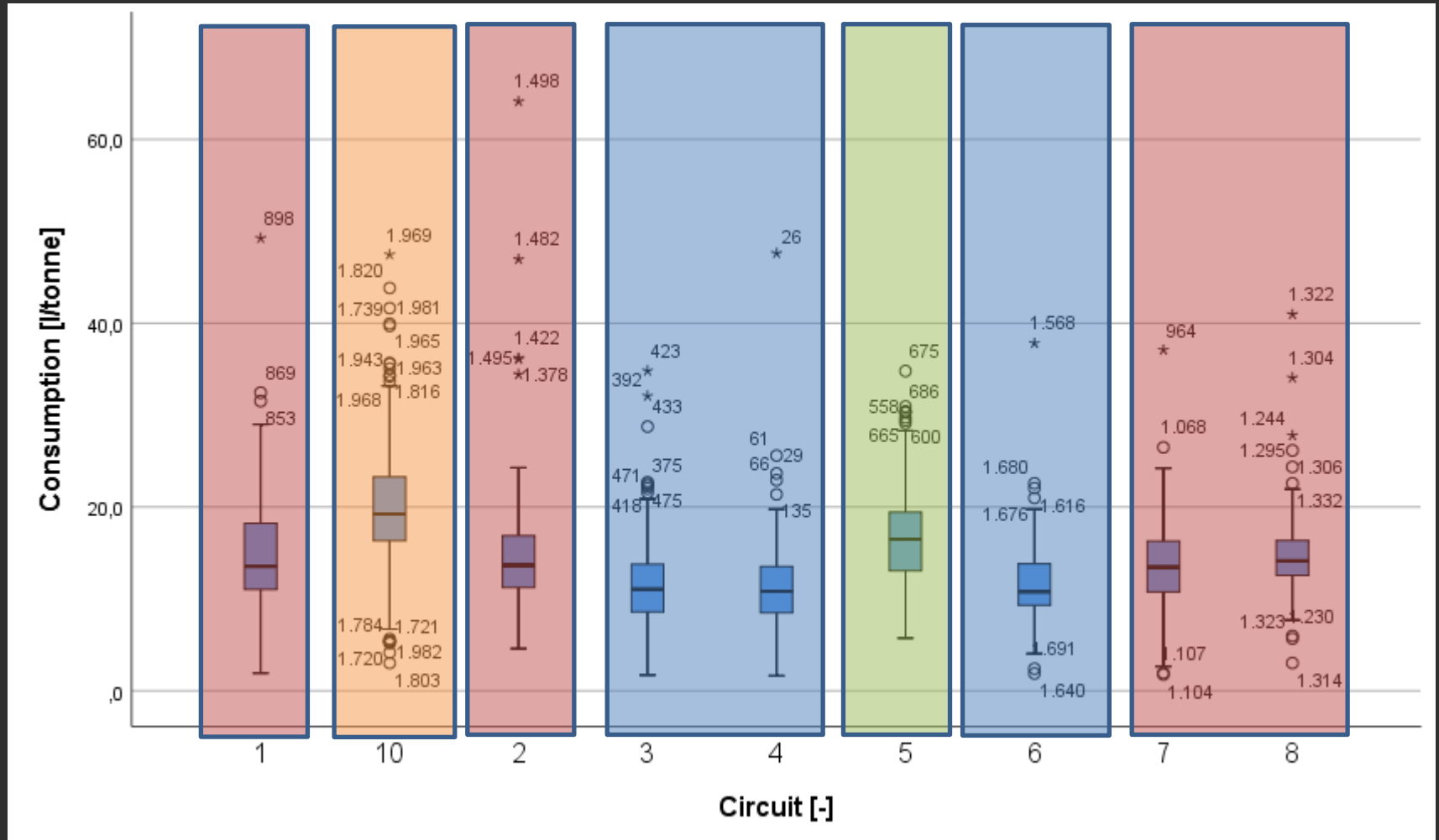


## 4. RESULTS AND DISCUSSION



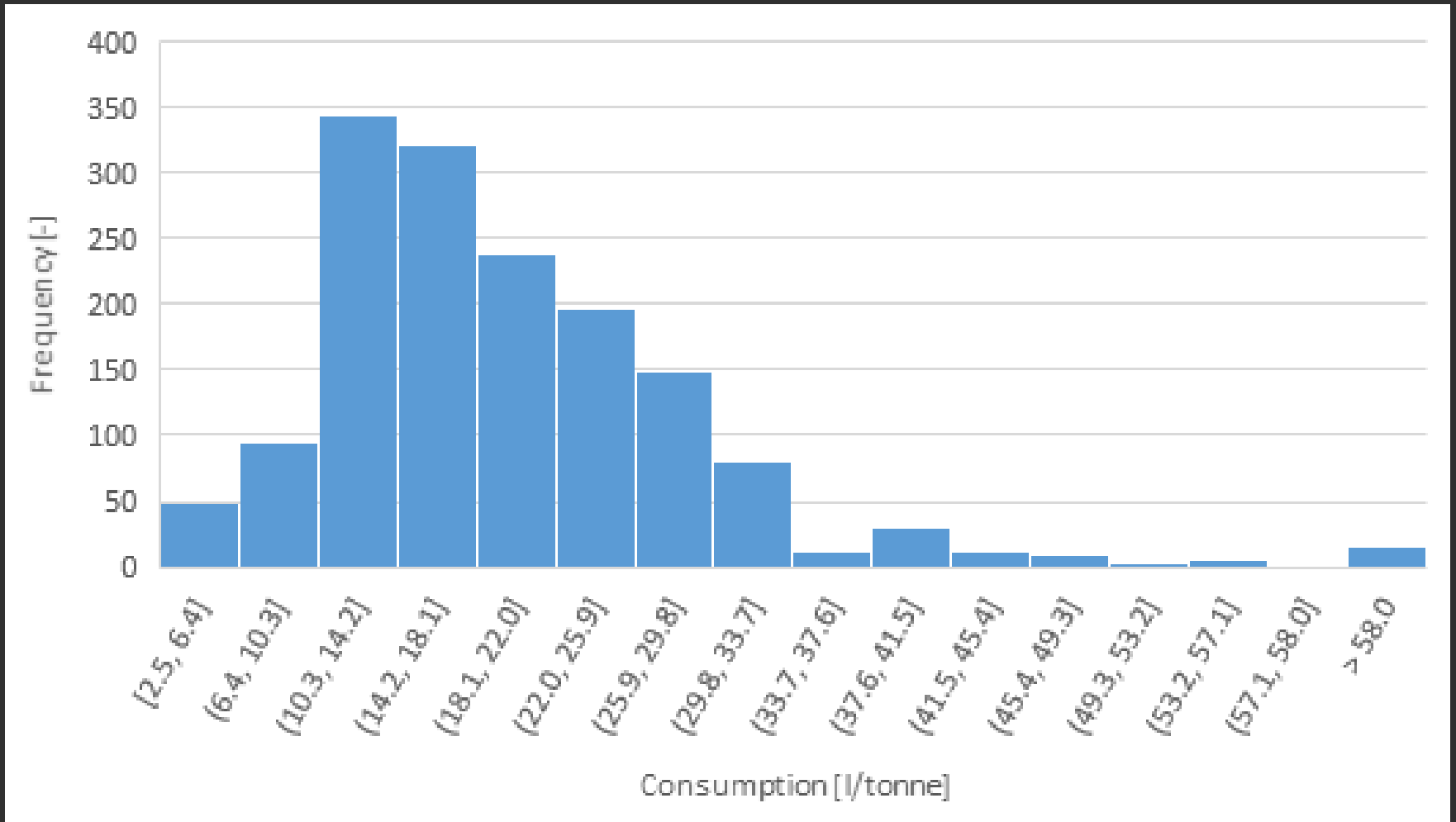
Paper

# 4. RESULTS AND DISCUSSION



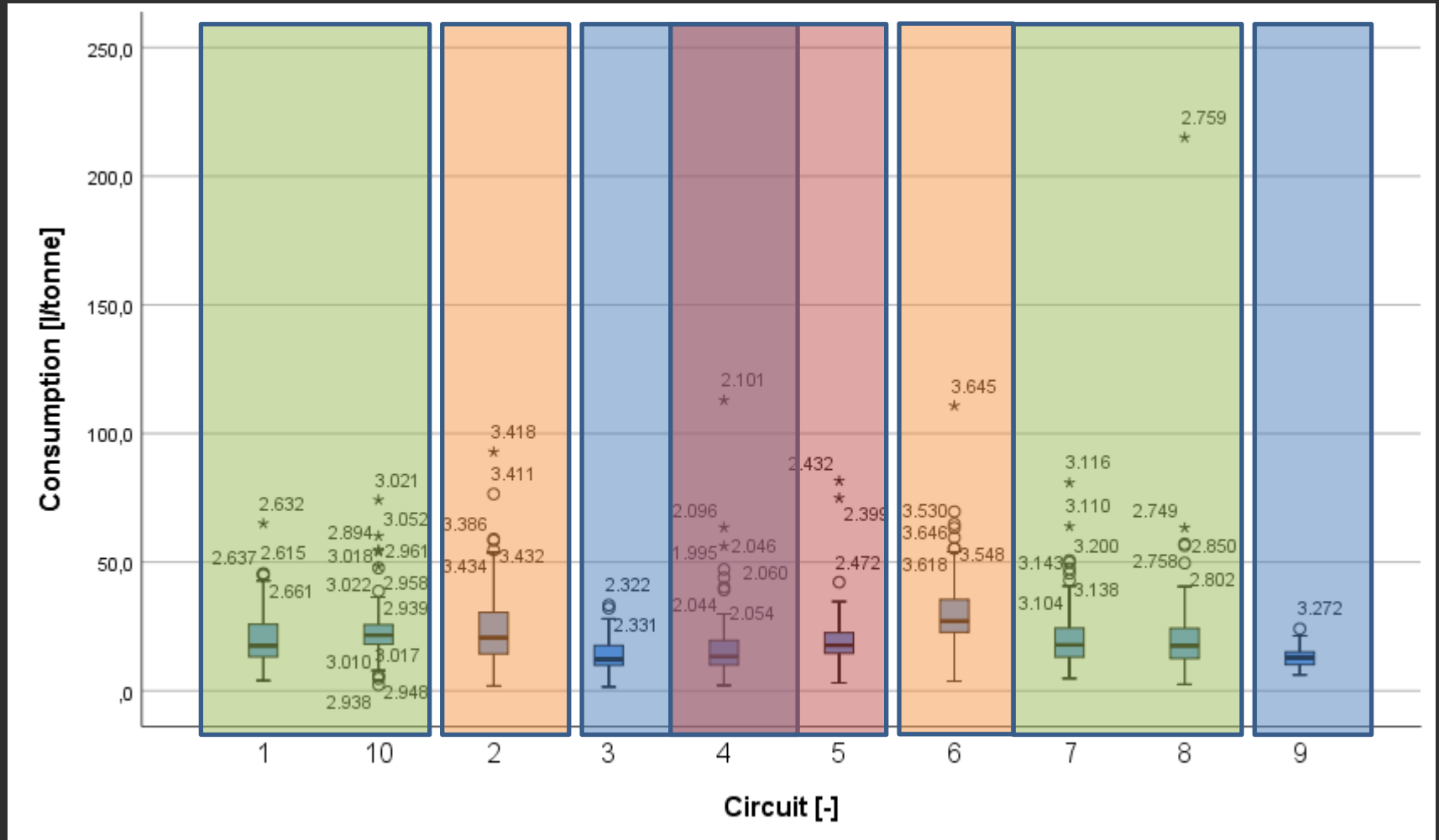
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## 4. RESULTS AND DISCUSSION



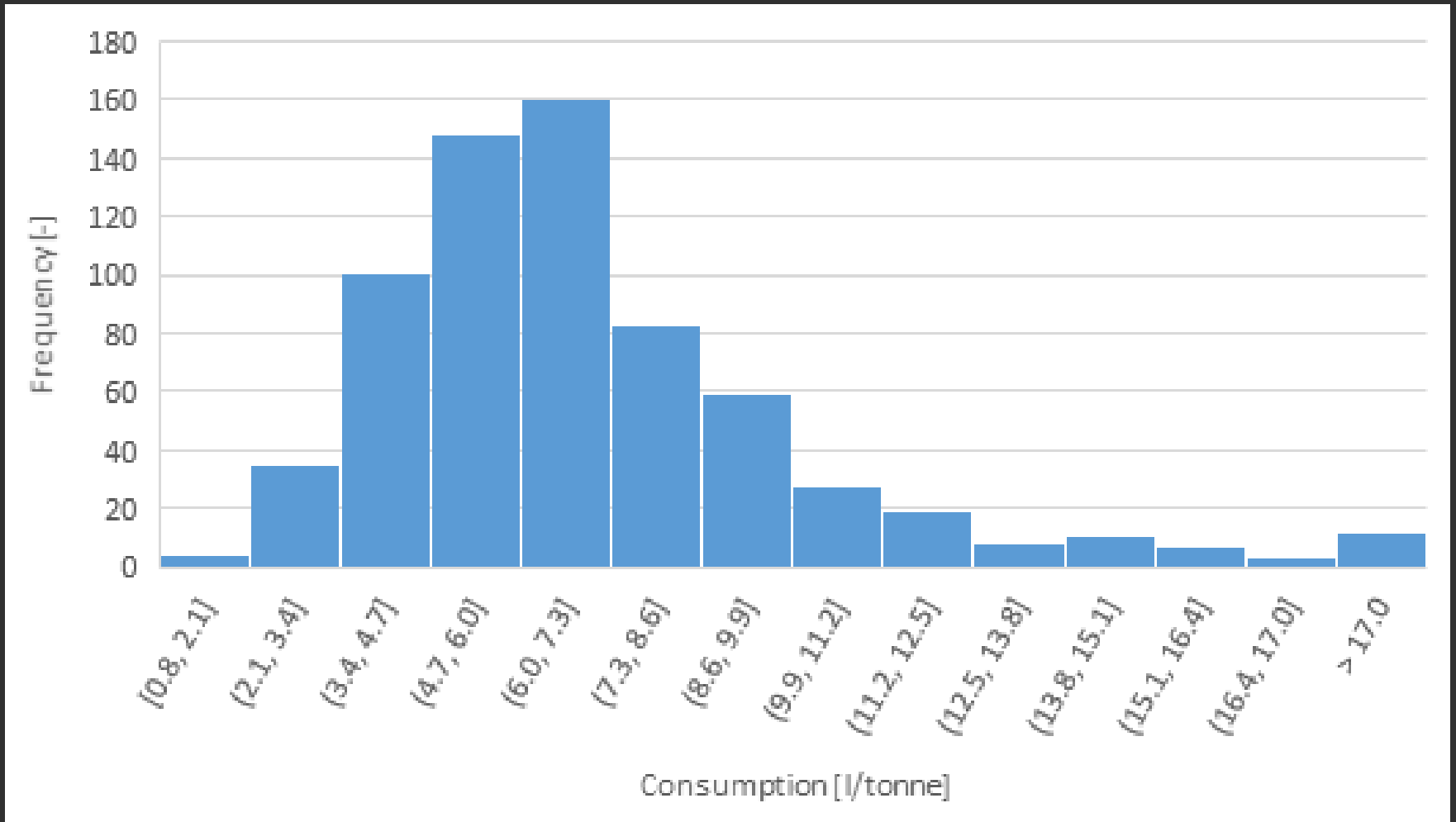
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# 4. RESULTS AND DISCUSSION



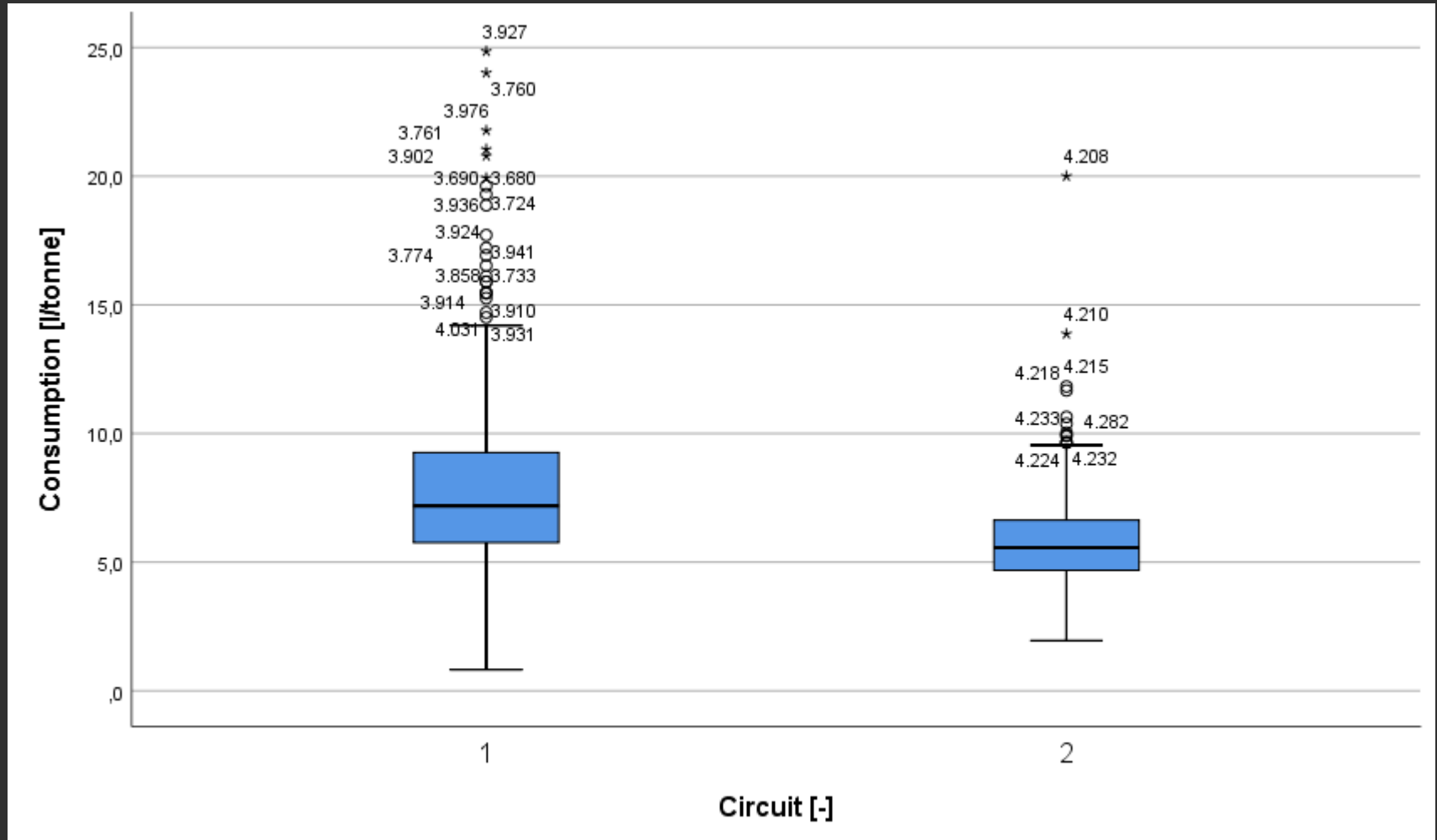
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## 4. RESULTS AND DISCUSSION



Glass

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Glass

The fuel consumption rate per distance was estimated in 83 L/100 km, which is within the range of values published in the literature.

The fuel consumption rate per amount of waste ranged from 0.63 L/tonne to 53.59 L/tonne, with an average of 4.95 L/tonne, a median of 4.66 L/tonne and a standard deviation of 1.90 L/tonne

Considering an average of 90 000 tonnes of mixed municipal solid waste collected yearly, this corresponds to an average of 2.1 l/inhabitant per year.