



# Modular Housing

Market Analysis & Solvency Scoping

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*Identifying Affordable Zones for Social Mobility*

# Context & Core Hypothesis

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## The Housing Challenge

Low-income households face a critical affordability crisis. Traditional rental markets consume disproportionate shares of income, leaving minimal disposable funds and limiting financial mobility.

Disposable Income

**Significantly Reduced**



## Our Solution Hypothesis

Modular housing ownership through Tiny Houses and Container homes can significantly increase household left-to-live income compared to traditional rental arrangements, while maintaining responsible 30% debt-to-income ratios.

Target Land Cost

$\leq \text{€}50/\text{m}^2$

# Data Foundation

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## DVF Database

Property Transactions

**18,000,000+**

Nationwide Records

1. Land prices & characteristics
2. Parcel-level granularity
3. Optimized variables



## INSEE & BPE

Demographics & Services

**35,000+**

Geographic Codes

1. Income & demographic data
2. Service infrastructure mapping
3. 100% national coverage

# Strategic Land Categorization



Focus on Nature Culture codes with optimal acquisition costs while maintaining buildability

## Micro-Plots

< 50m<sup>2</sup>

Urban solutions for single young workers prioritizing mobility and social connectivity

## Standard Plots

50m<sup>2</sup> - 5,000m<sup>2</sup>

Classical modular housing projects suitable for families and couples

## Large Estates

> 5,000m<sup>2</sup>

Collective projects enabling eco-villages and community-based solutions

# Statistical Methodology



Ensuring data integrity and analytical rigor

## 0 **Geographical Granularity**

1 Municipality-level analysis prioritized for sufficient transaction volumes and statistical significance

## 0 **Median Pricing**

2 Median values used to neutralize outliers and data entry errors, ensuring realistic cost estimates

## 0 **Reliability Threshold**

3 Minimum 5 transactions per segment required to prevent aberrant single-case pricing

## 0 **Volatility Assessment**

4 IQR/Median ratio calculated to identify price stability and market homogeneity

# Service Infrastructure Mapping

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Evaluating livability through comprehensive service availability assessment

## Essential Services

### Education

Primary & elementary levels

### Healthcare

Medical facilities access

### Transport

Public mobility options

### Commerce

Essential retail services

## National Coverage

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**35,000+**

Geographic Codes

**100% Coverage**

Service Density Score computed for every municipality

# Technical Challenges & Solutions

## Initial Challenges

- Empty dataset from initial cross-analysis attempt
- Granularity mismatch between IRIS-level services and municipality-level pricing
- Geographic code format inconsistencies across datasets



## Strategic Resolution

1. Adopted municipality-centered strategy ensuring consistent granularity
2. Filtered BPE database to retain only 5-digit municipality codes
3. Standardized all geographic code formats across datasets
4. Implemented Python extraction via SQLAlchemy/Pandas to bypass GUI limitations
5. Successfully captured complete 22,154 records including previously excluded regions

# End-to-End Data Pipeline

1

## Data Extraction

DVF (18M+) & BPE (35K+)

2

## Cleaning & Filtering

Outliers & null handling

3

## Categorization

Plot size segmentation

4

## Aggregation

Median price calculation

5

## Service Integration

BPE mapping & scoring

6

## Final Dataset

Optimized analytical DB

# Key Insights & Deliverables



Mission Accomplished

## Geographic Sweet Spots Identified

Mapped municipalities where land costs  $\leq \text{€}50/\text{m}^2$  align with service infrastructure requirements

## Financial Viability Framework

Integrated 30% debt-to-income ratio with left-to-live income optimization modeling

## Service Density Scoring System

Comprehensive municipal attractiveness index based on essential service availability

## Scalable Analytical Methodology

Established replicable pipeline applicable to future market expansion studies

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**≤ €50/m<sup>2</sup>**

# Market Reality: The €50/m<sup>2</sup> challenge



## The €50/m<sup>2</sup> Constraint

Our analysis reveals that parcels at or below €50/m<sup>2</sup> with adequate public transport infrastructure do not currently exist in the French market. This price point, while ideal for modular housing economics, represents a threshold below current market realities even in rural areas with basic service access.

## Market Segmentation

*Based on Tableau analysis of land price distributions*

### Idéal

≤ €400/m<sup>2</sup>

Target range for financially viable modular housing projects

### Tendu

€400 - €900/m<sup>2</sup>

Challenging but potentially feasible with careful optimization

### Hors Budget

> €900/m<sup>2</sup>

Beyond modular housing economic viability threshold

# Strategic Opportunity: Below-Median Acquisitions



## Below-Median Strategy

While absolute price thresholds prove challenging, a relative pricing strategy reveals significant opportunities. Throughout France—including competitive Île-de-France markets—parcels are available below local median prices. This approach enables modular housing deployment by targeting undervalued parcels within each municipality's price distribution.

## National Coverage Confirmed



### Relative Pricing Approach

- Municipality-specific median calculation
- Identification of below-median parcels
- Service density cross-reference
- Transaction volume validation ( $\geq 5$ )



### Nationwide Viability

#### Every Region

Below-median opportunities exist in all French regions

#### Including Île-de-France

Even competitive urban markets show viable parcels

**Strategic Implication:** Focus on relative value within local markets rather than absolute price thresholds



## Next Steps

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1. Field validation of target municipalities
2. Development of financial simulation models
3. Engagement with local authorities
4. Pilot project scoping in top-ranked zones

*Questions & Discussion*