

The urban metabolism of housing in New Orleans

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Urban metabolism

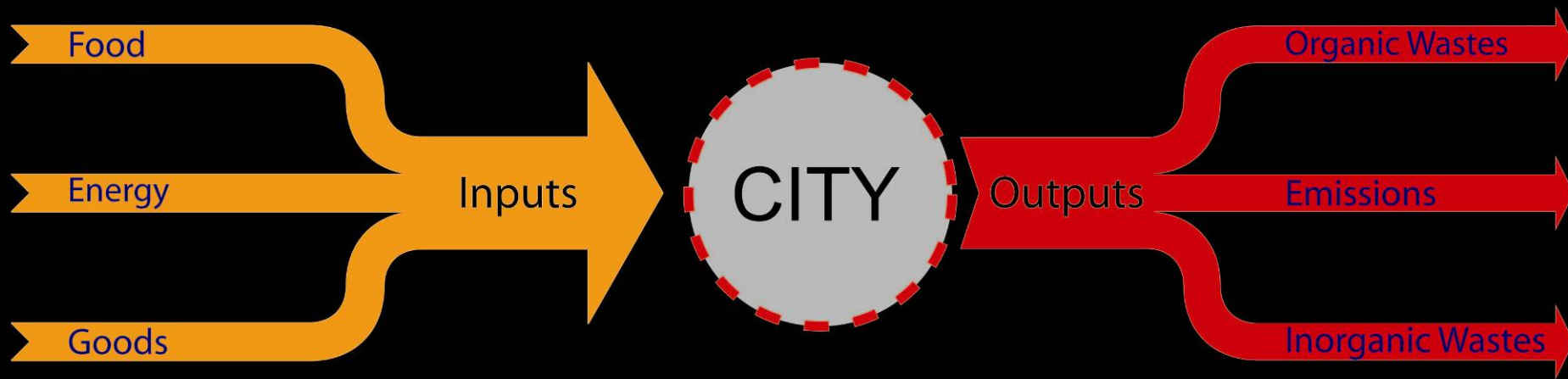
Theoretical definition:

The flow of matter and energy within the city
which illustrates trends in human energy consumption
and material usage

Definition for this work:

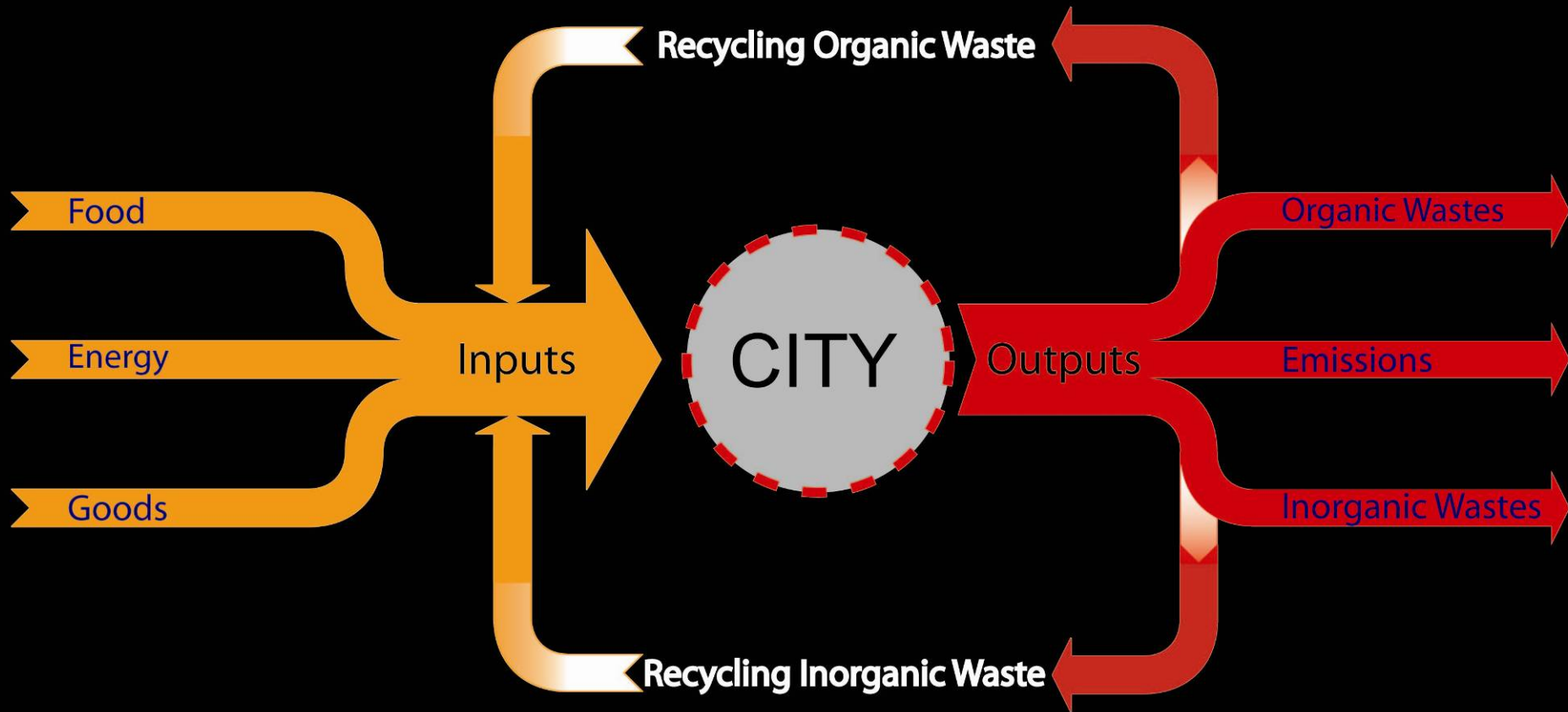
Examining the material, energy and labor resources
required for rebuilding housing in New Orleans after
Hurricane Katrina

Examining the urban metabolism



Linear Metabolism

Examining the urban metabolism



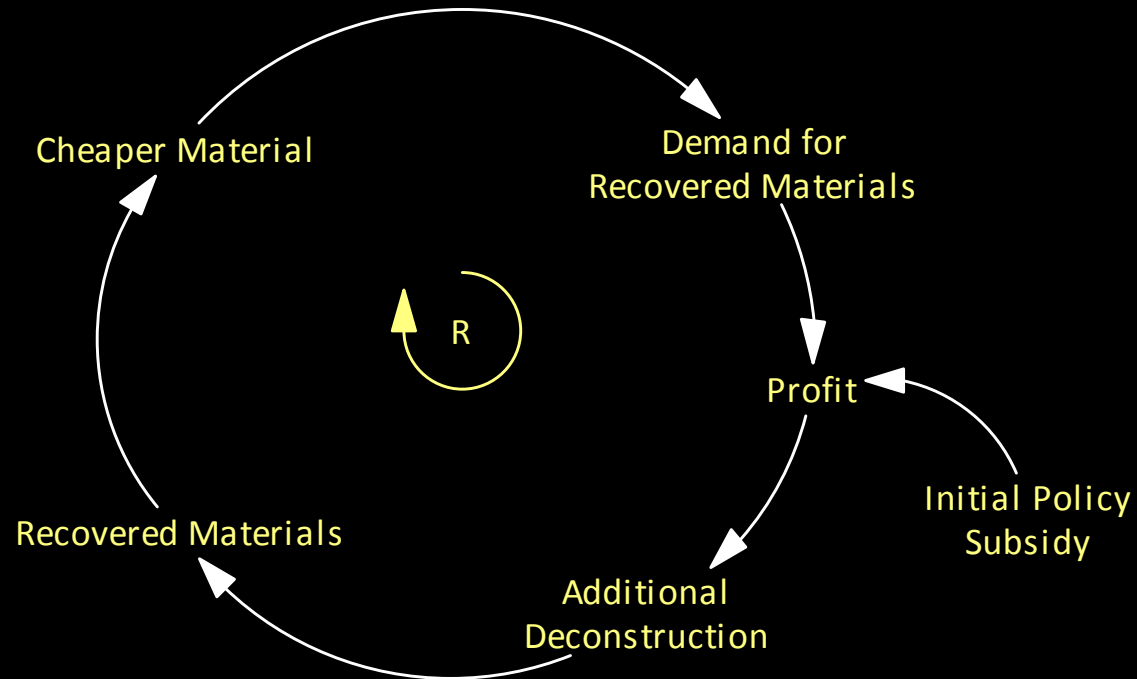
Circular Metabolism

Methodology

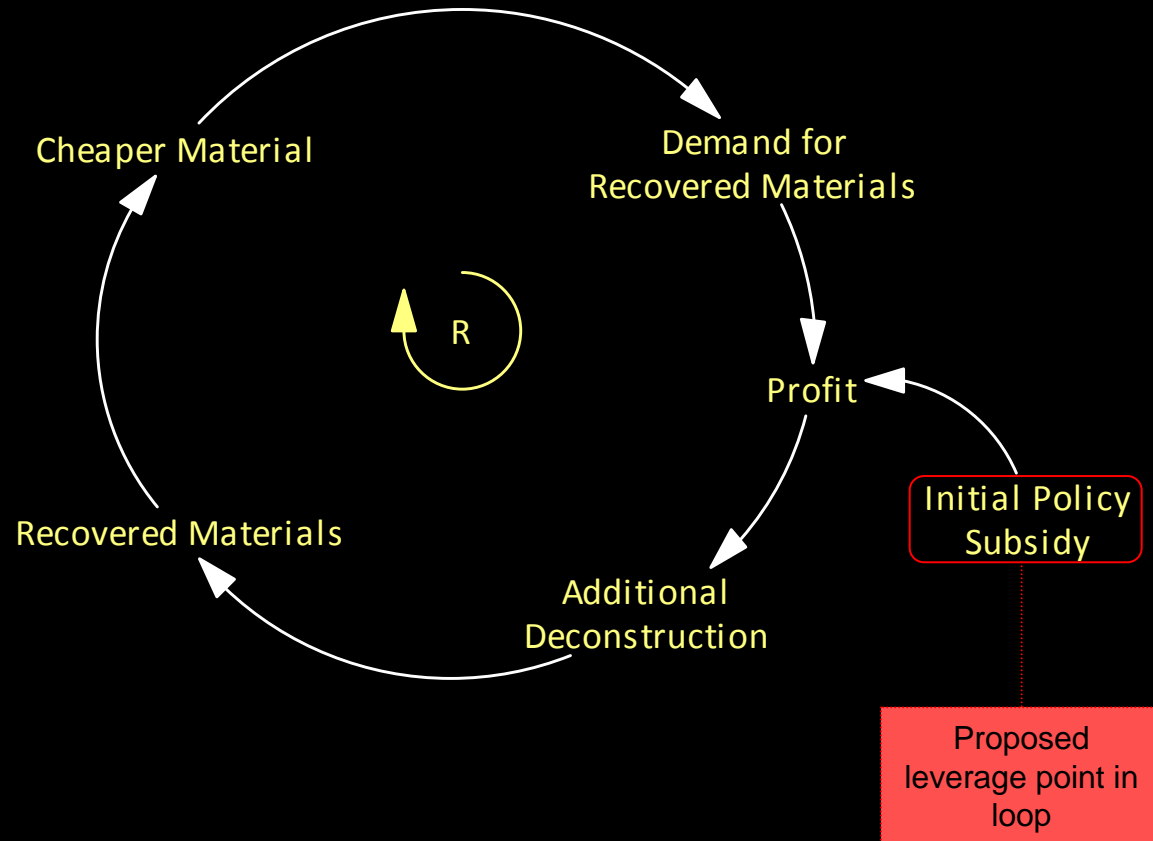
- Examination of urban metabolism using *System Dynamics*¹
- Causal Loops (Reinforcing or Balancing)
- Leverage point in system
 - Example: Where is the best place to intervene to increase the deconstruction rate of houses

¹ System Dynamics developed by Forrester, circa 1970

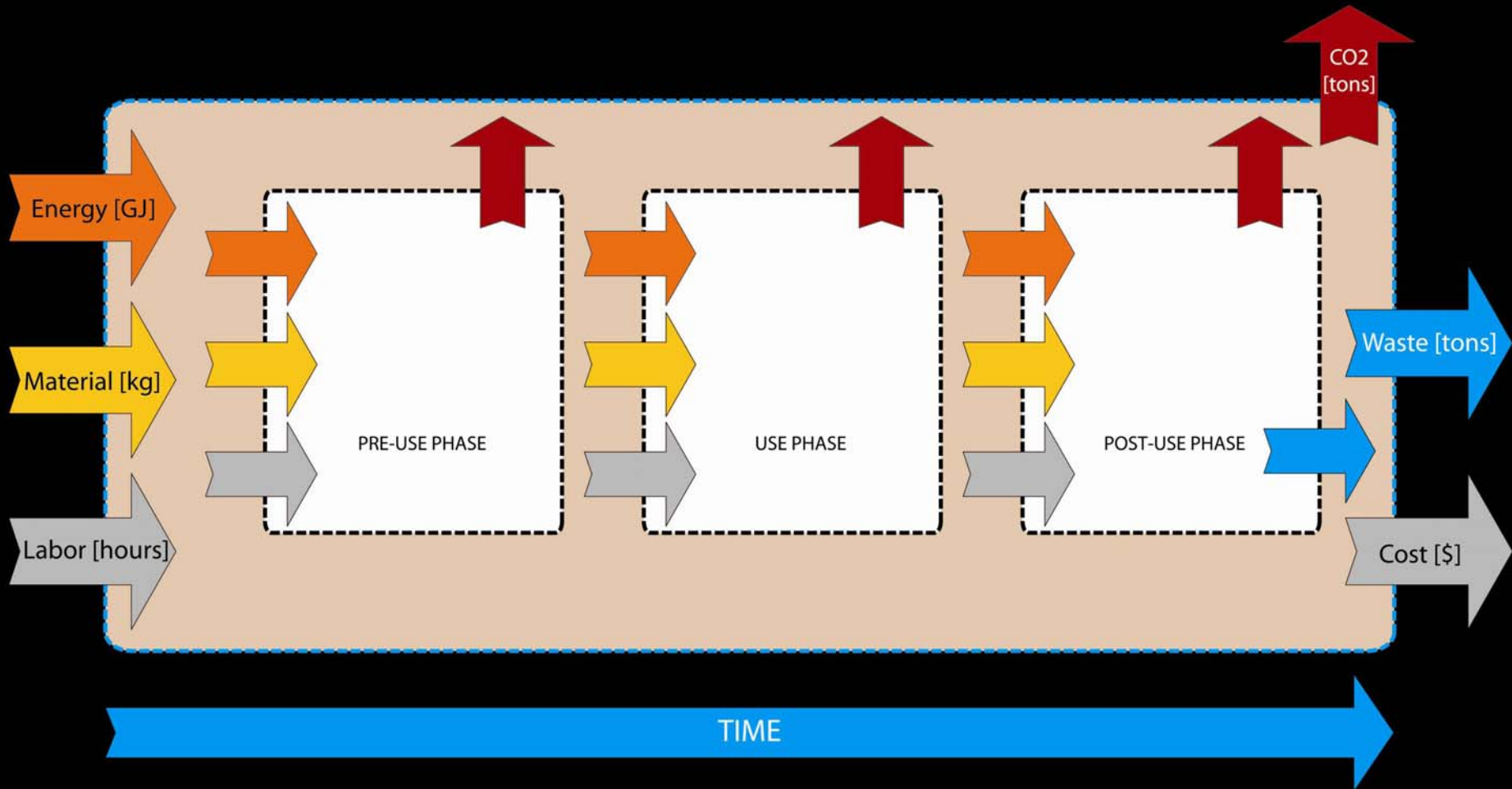
Causal Loop of housing deconstruction



Causal Loop of housing deconstruction

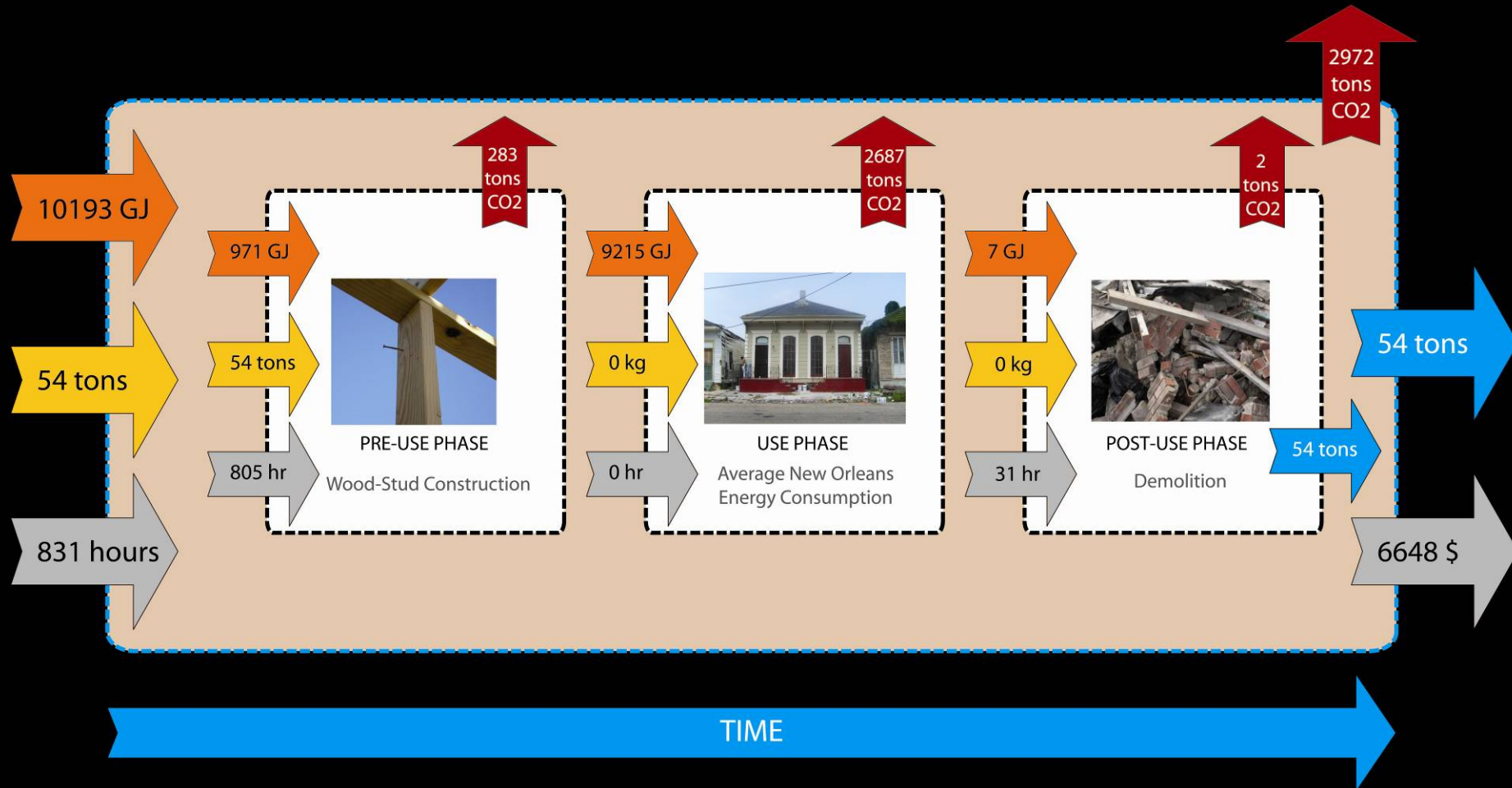


Resources used over lifetime of house



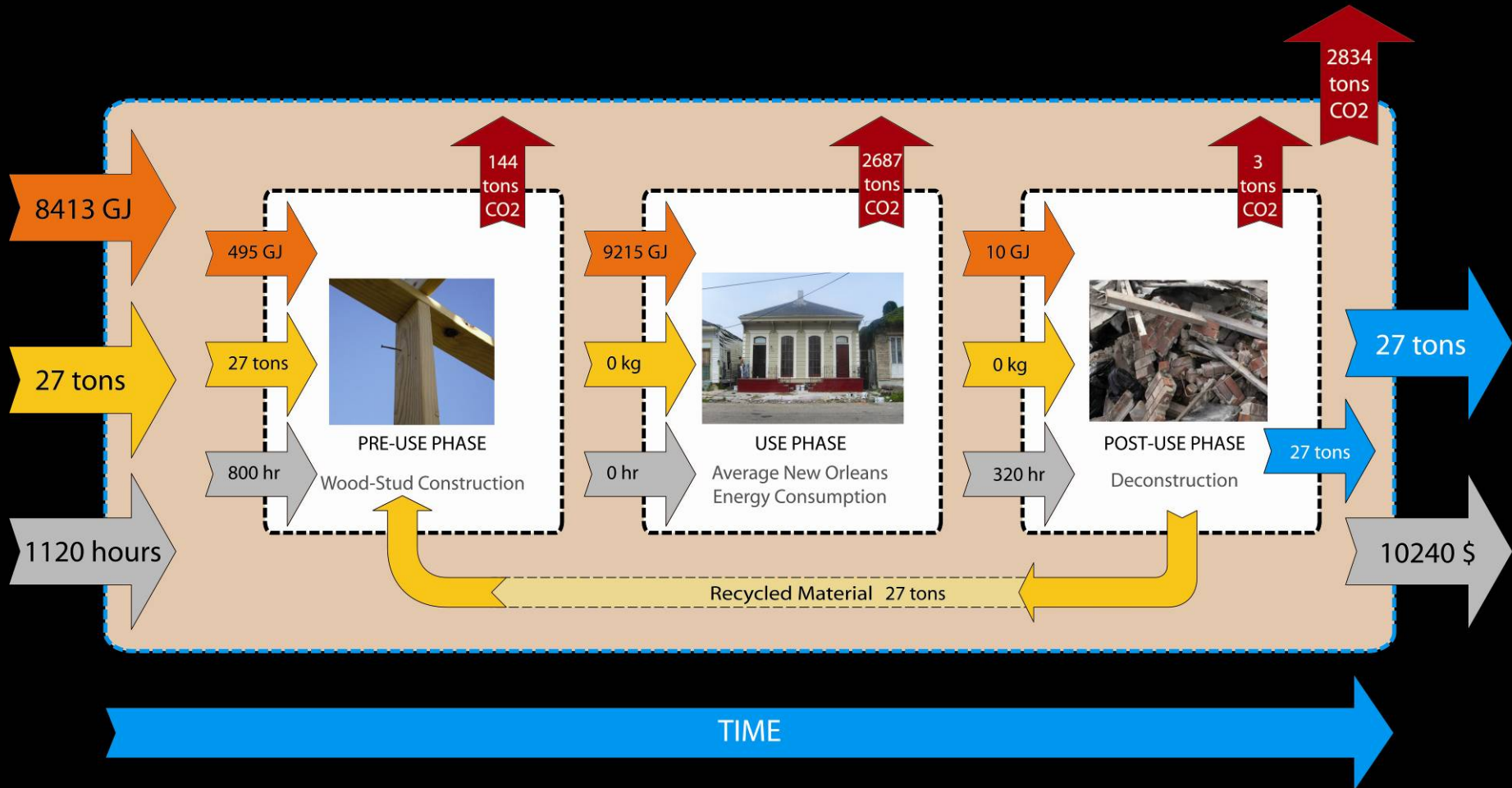
Lifespan 75 years; House size 2000 sq ft

Resources used over lifetime of house



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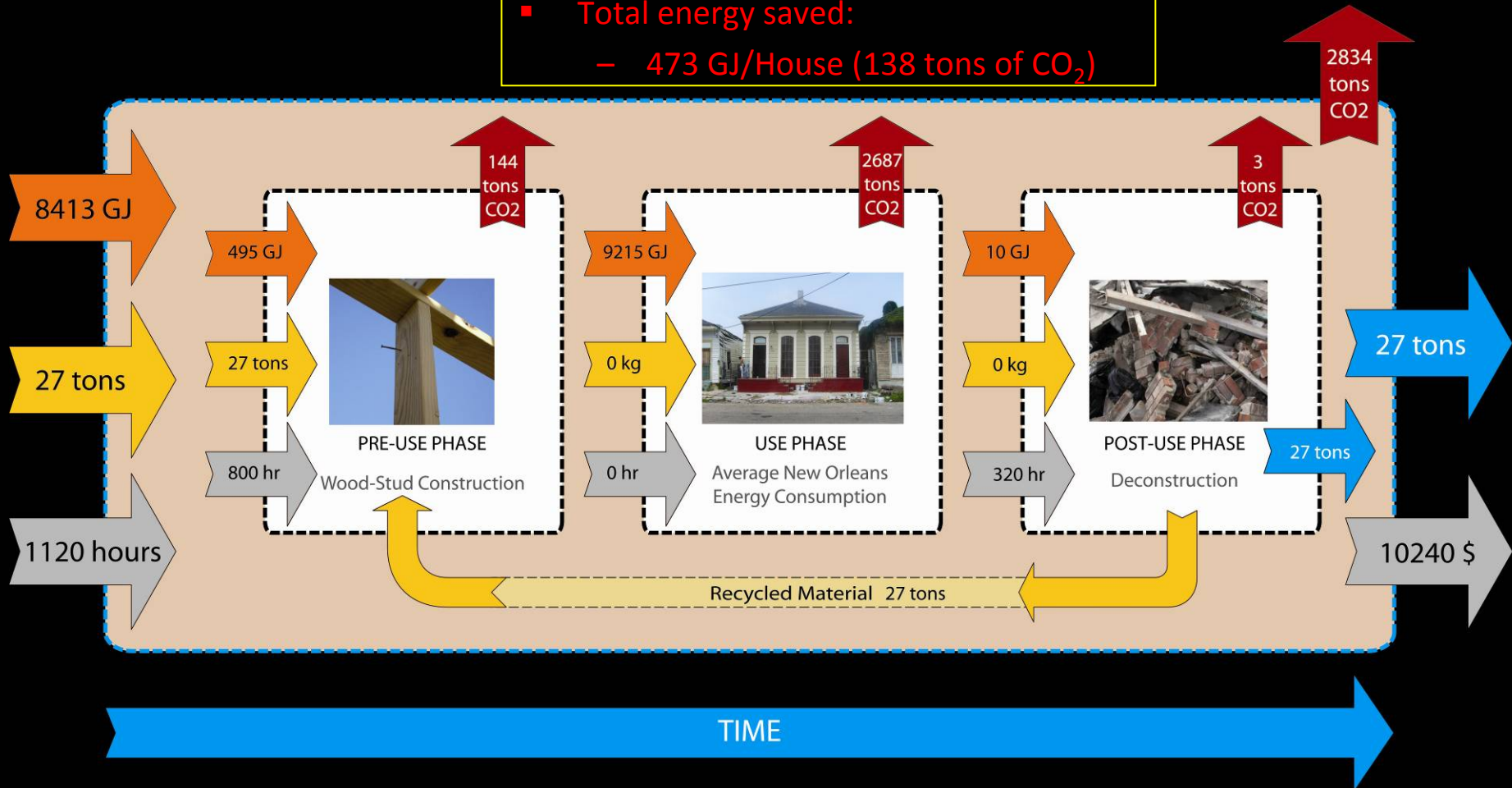
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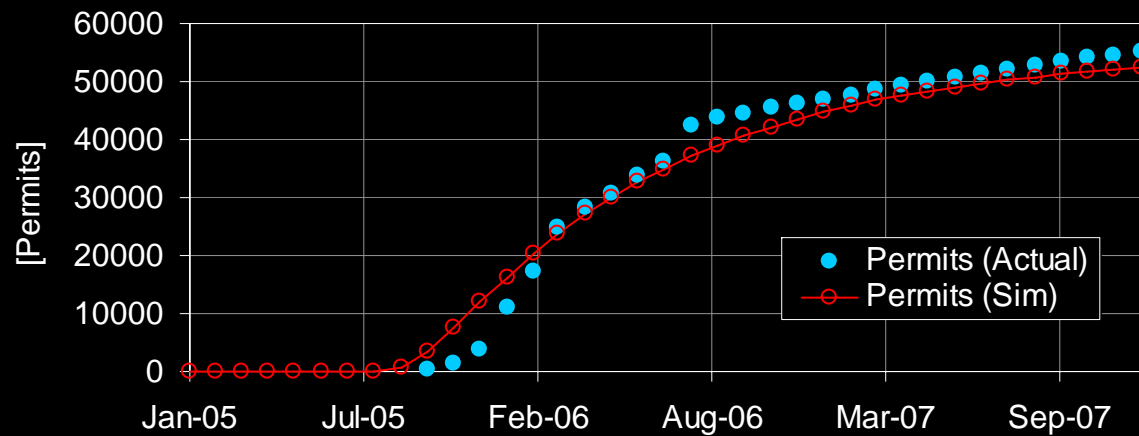
- Total energy saved:
 - 473 GJ/House (138 tons of CO₂)



Lifespan 75 years; House size 2000 sq ft

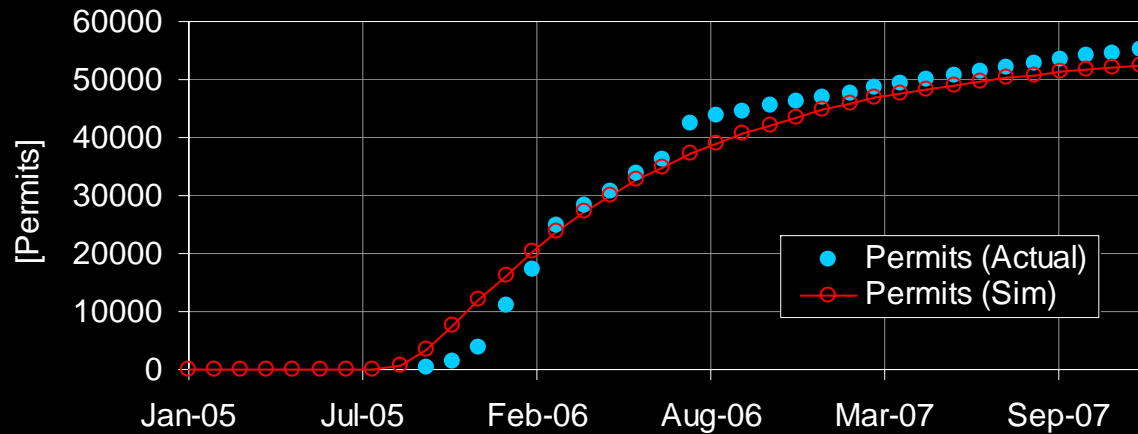
Scenario 1: Demolition and Construction

Cumulative Reconstruction Permits Issued

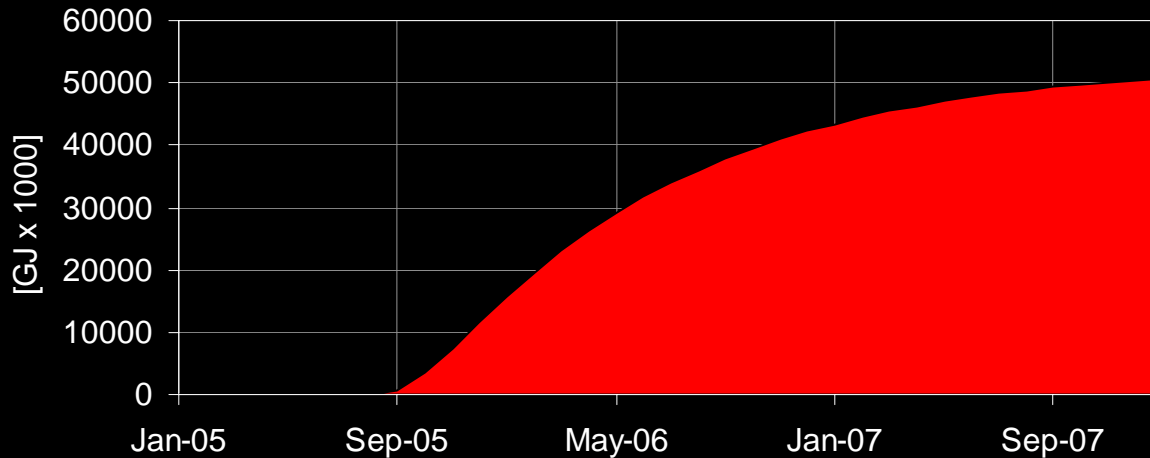


Scenario 1: Demolition and Construction

Cumulative Reconstruction Permits Issued

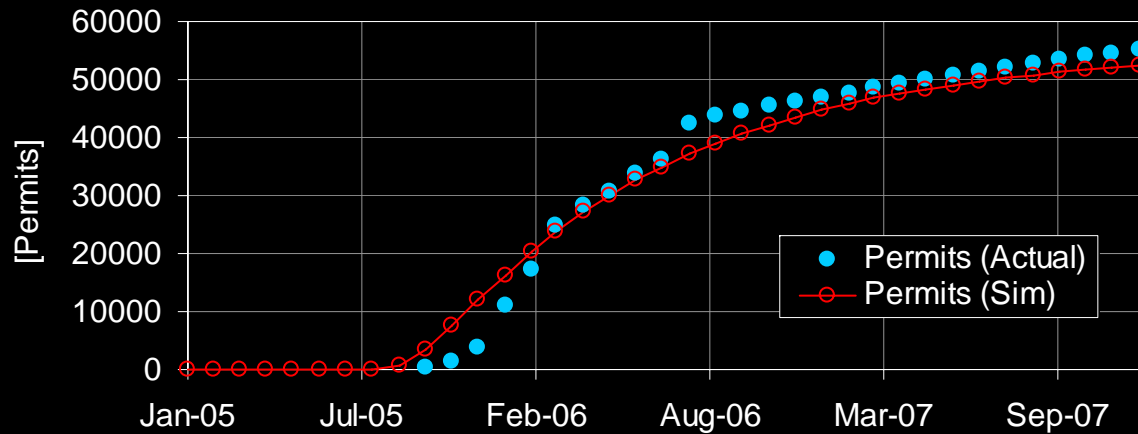


Energy for Construction and Demolition



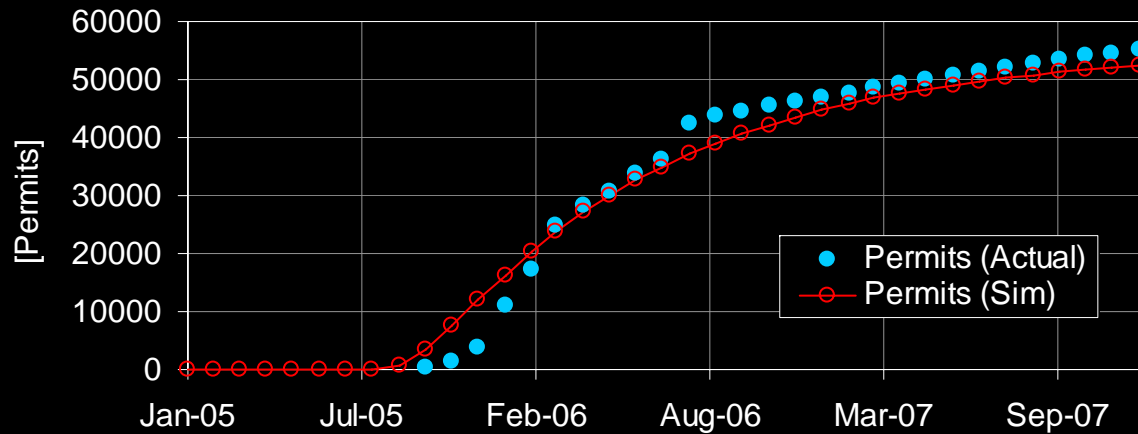
Scenario 2: Deconstruction and Construction

Cumulative Reconstruction Permits Issued

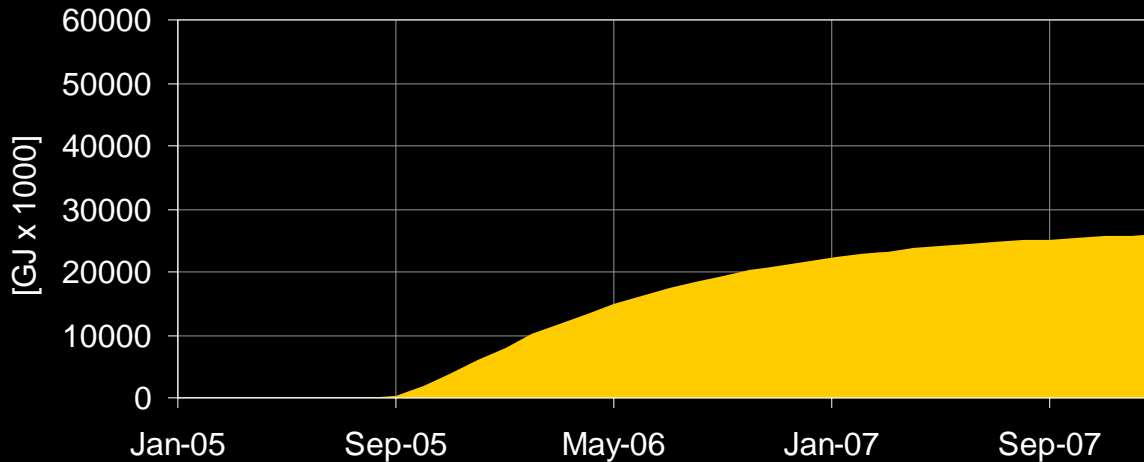


Scenario 2: Deconstruction and Construction

Cumulative Reconstruction Permits Issued

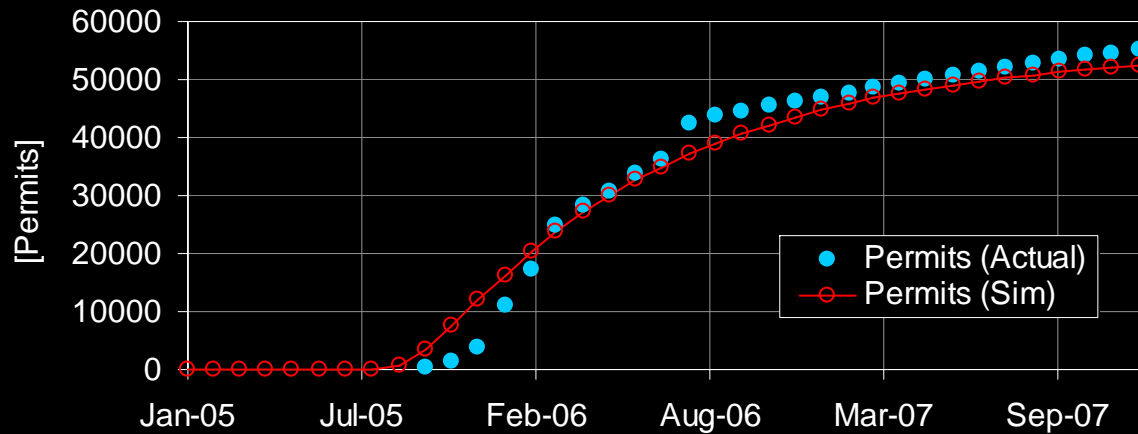


Energy for Construction and Deconstruction

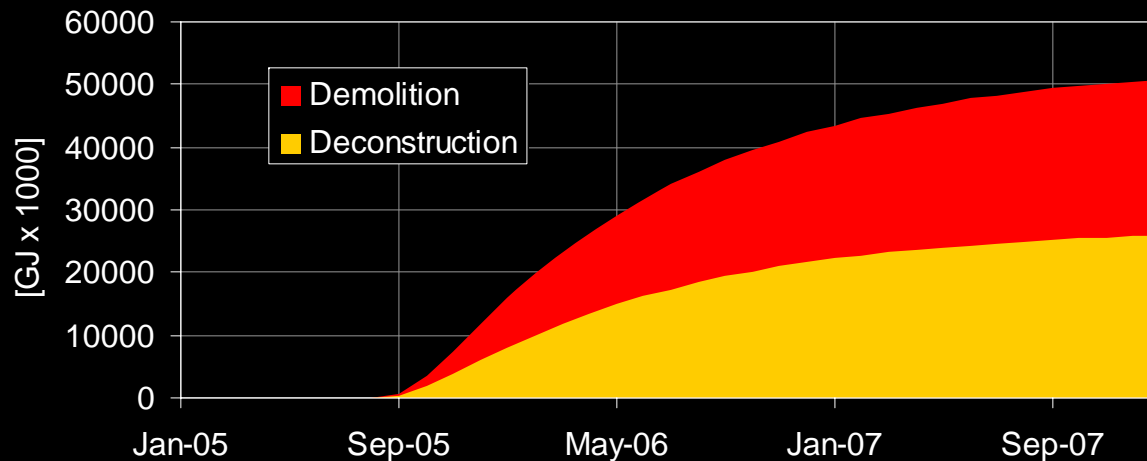


Scenario 2: Deconstruction and Construction

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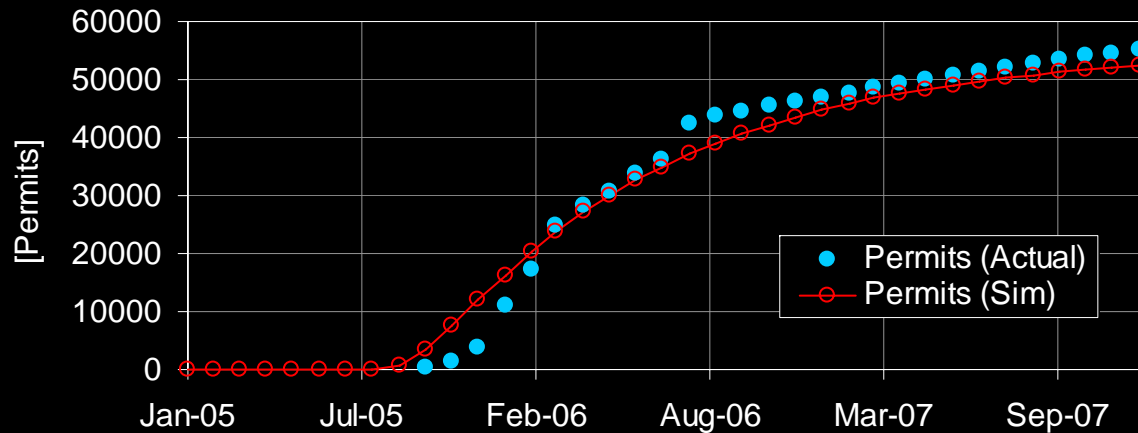


Comparison of Scenarios 1 and 2

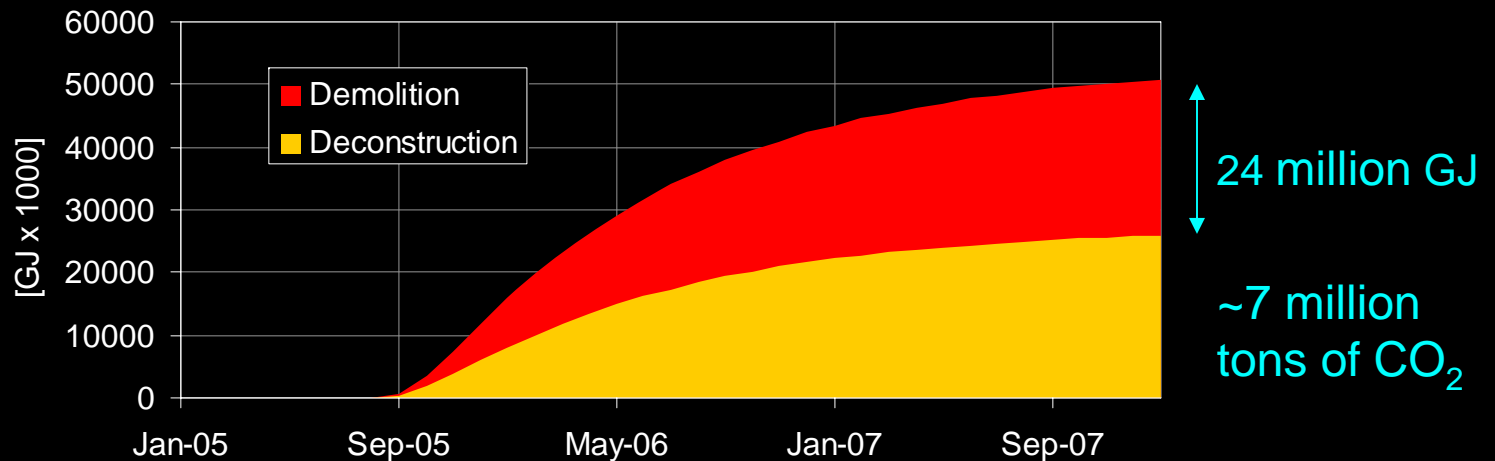


Scenario 2: Deconstruction and Construction

Cumulative Reconstruction Permits Issued



Comparison of Scenarios 1 and 2



Analysis of methodology

- By describing the city using *System Dynamics*, future projections can be made using this analysis
- Potential difficulties with approach:
 - Causal loops need verification
 - Results specific to particular system examined

Conclusions

- Appropriate methodology for examining resource flows in cities
- Feedback loops need to be identified and quantified
- Methodology for examining and quantifying the effect of policies

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