



Dynamic models for understanding infrastructure and housing investments

ACC Sustainable Human Settlements Citylab
Urban Transformation: Challenges For Infrastructure & Housing Provision
Nick Graham
30th October 2012

Why use dynamic models?

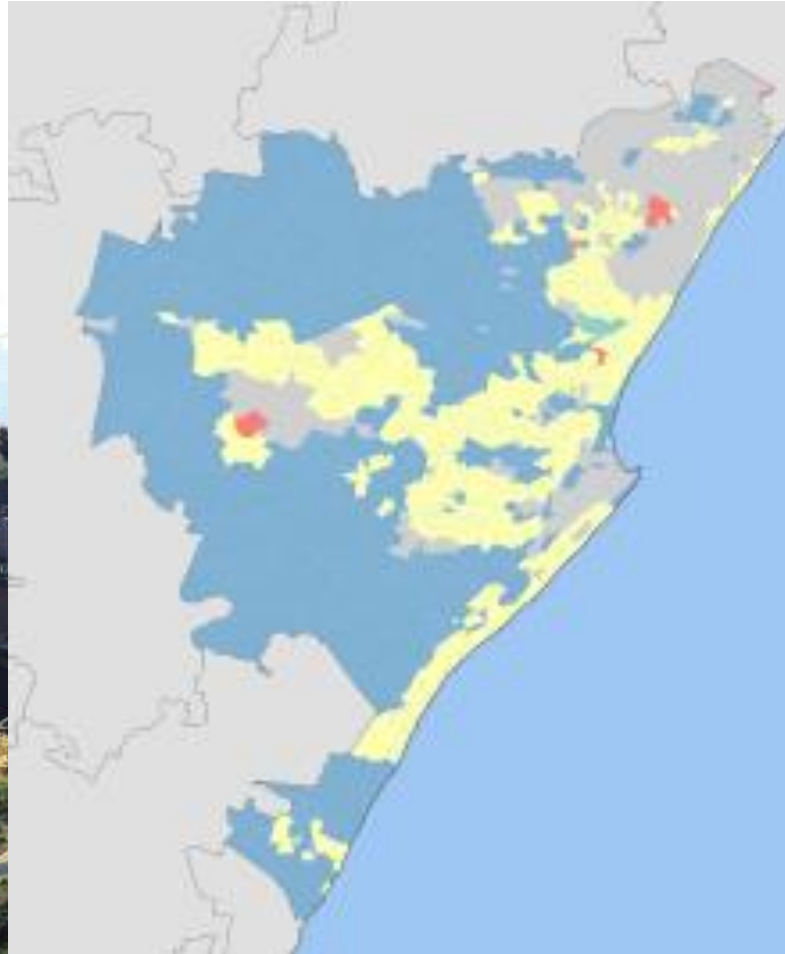
1. To understand the multiple processes and variables that simultaneously affect housing supply and demand

Example: eThekweni Housing Model

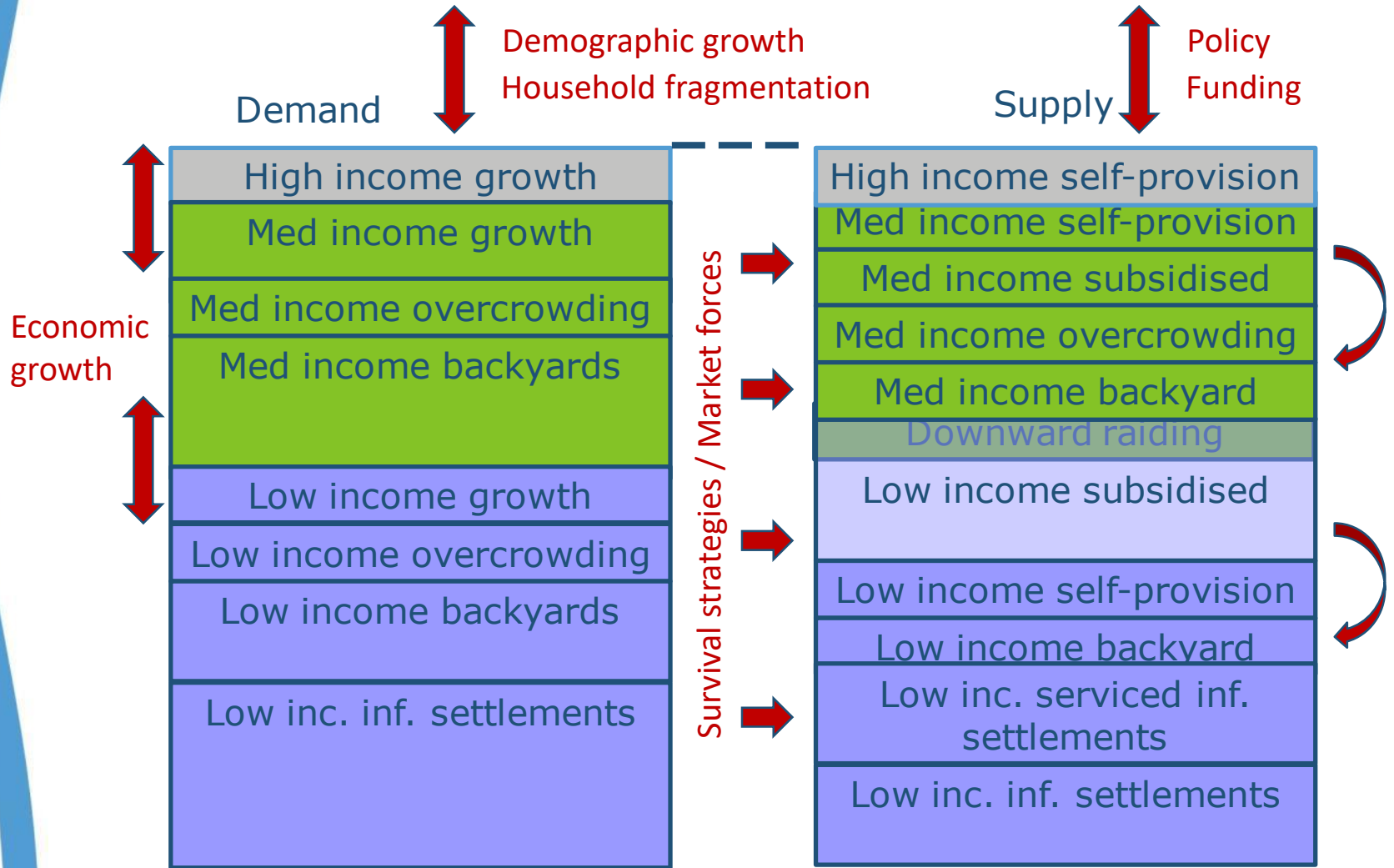
2. To understand the interactions between housing, infrastructure, transport, space and money.

Example: City Efficiency Costing Model

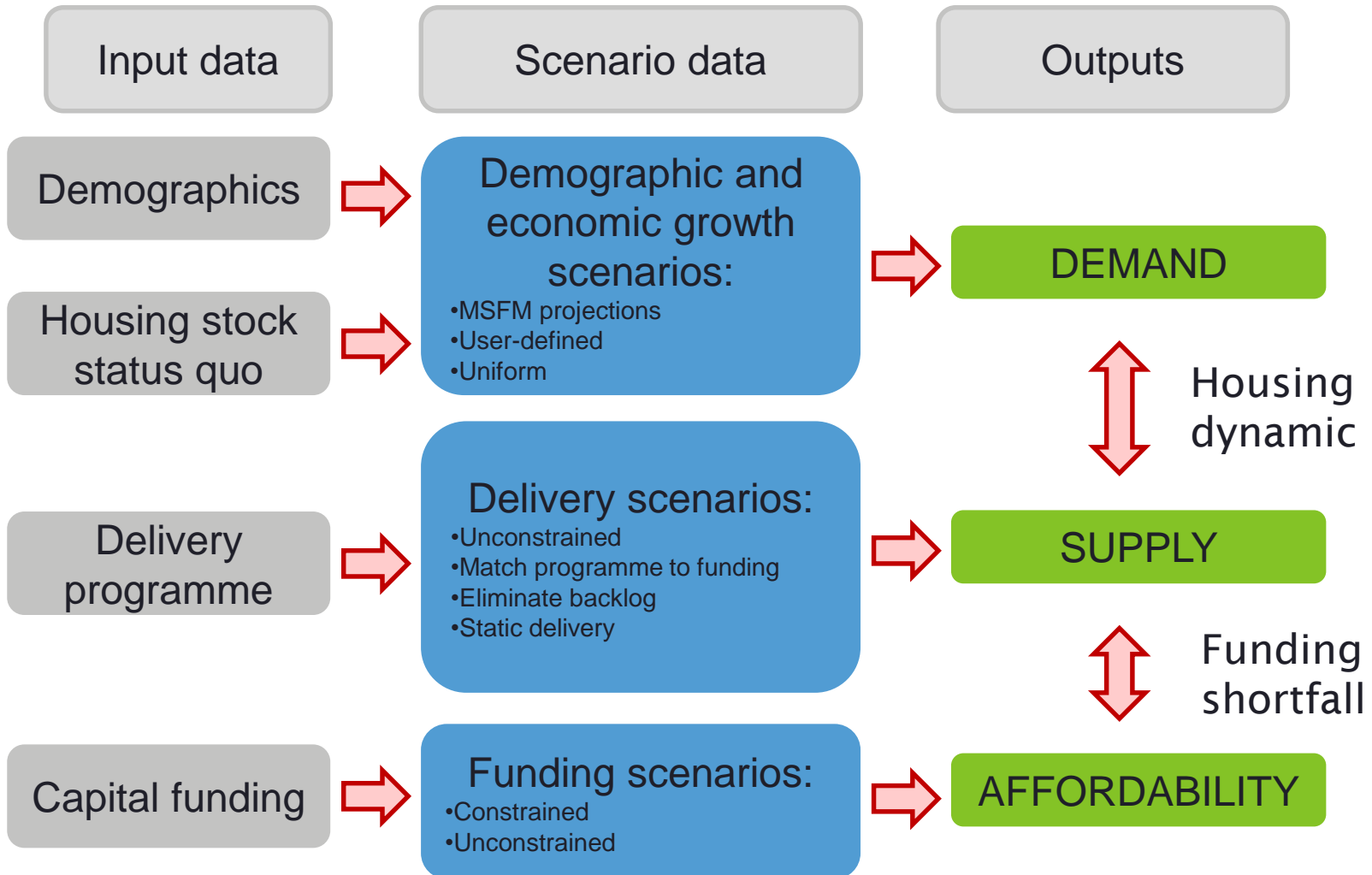
eThekweni Housing Model



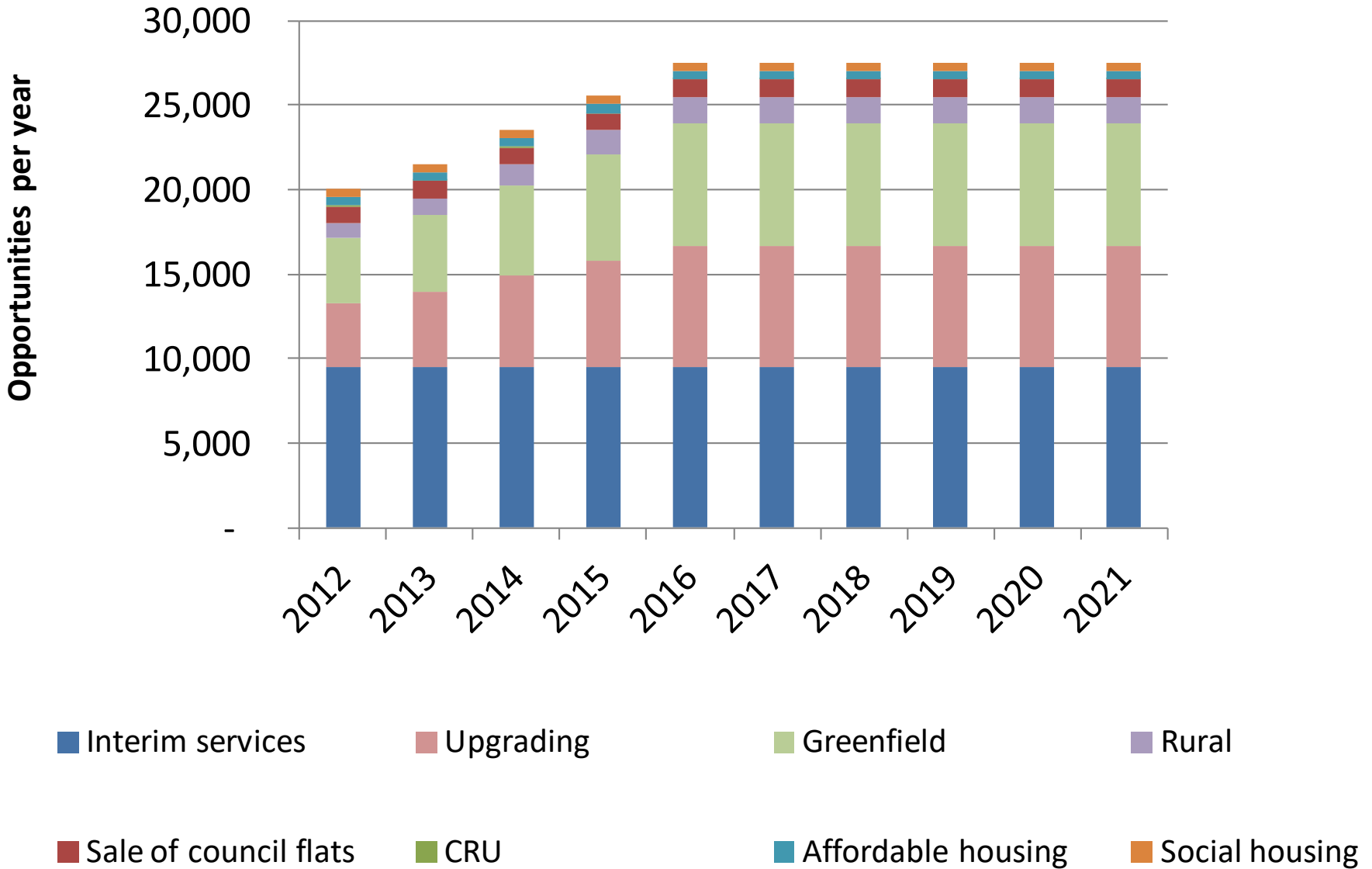
Supply and demand in the housing market at city scale



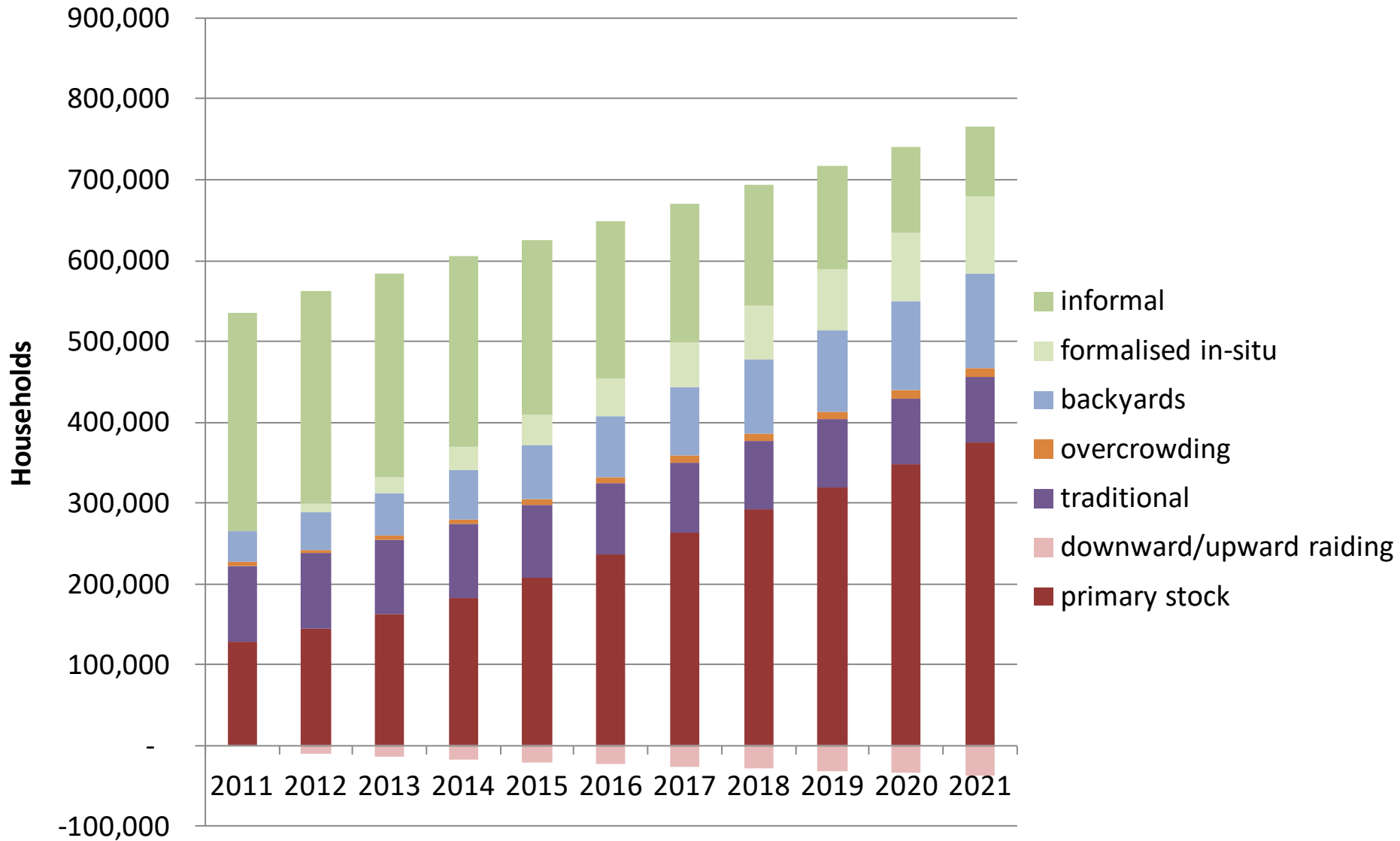
Dynamic housing model



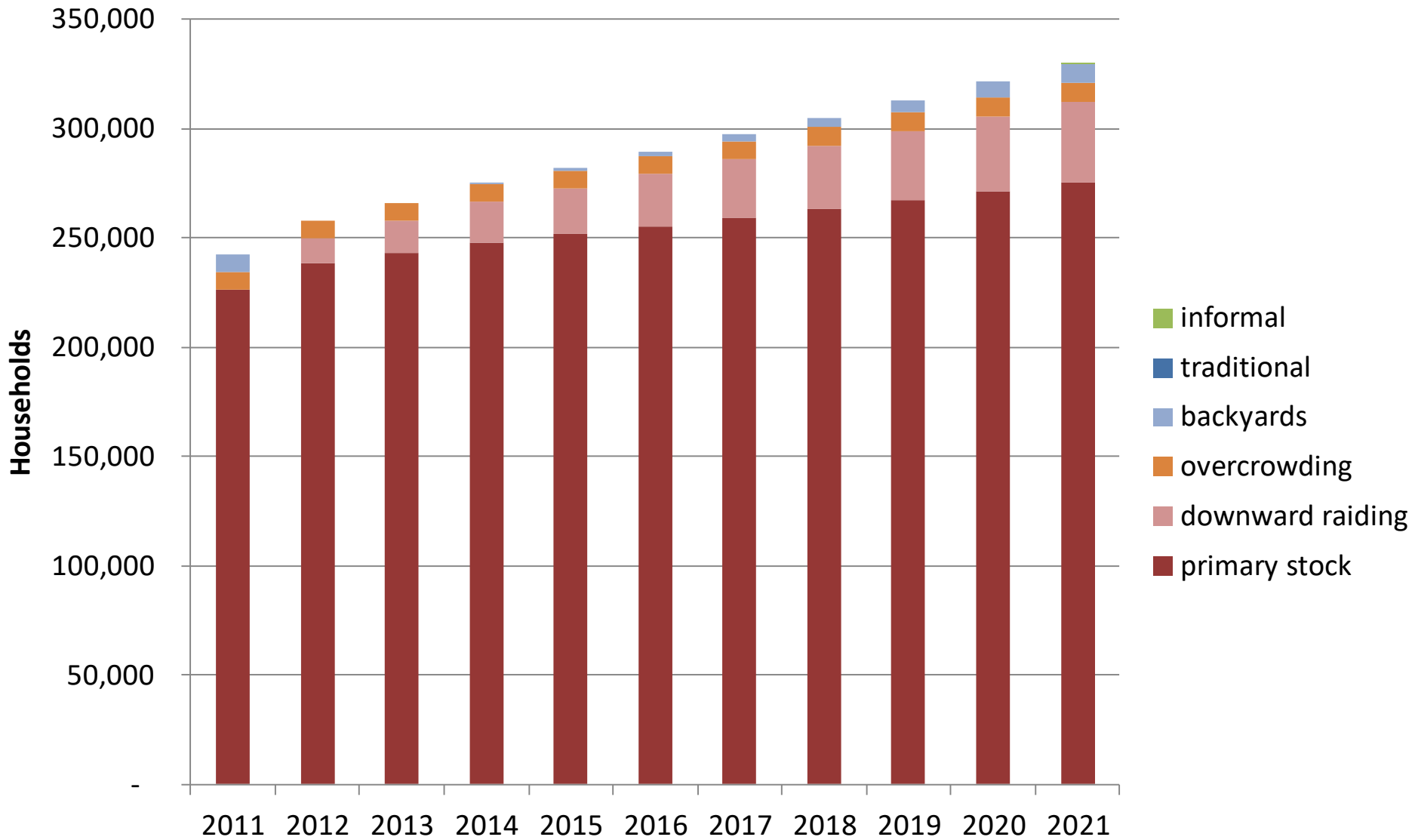
Housing delivery



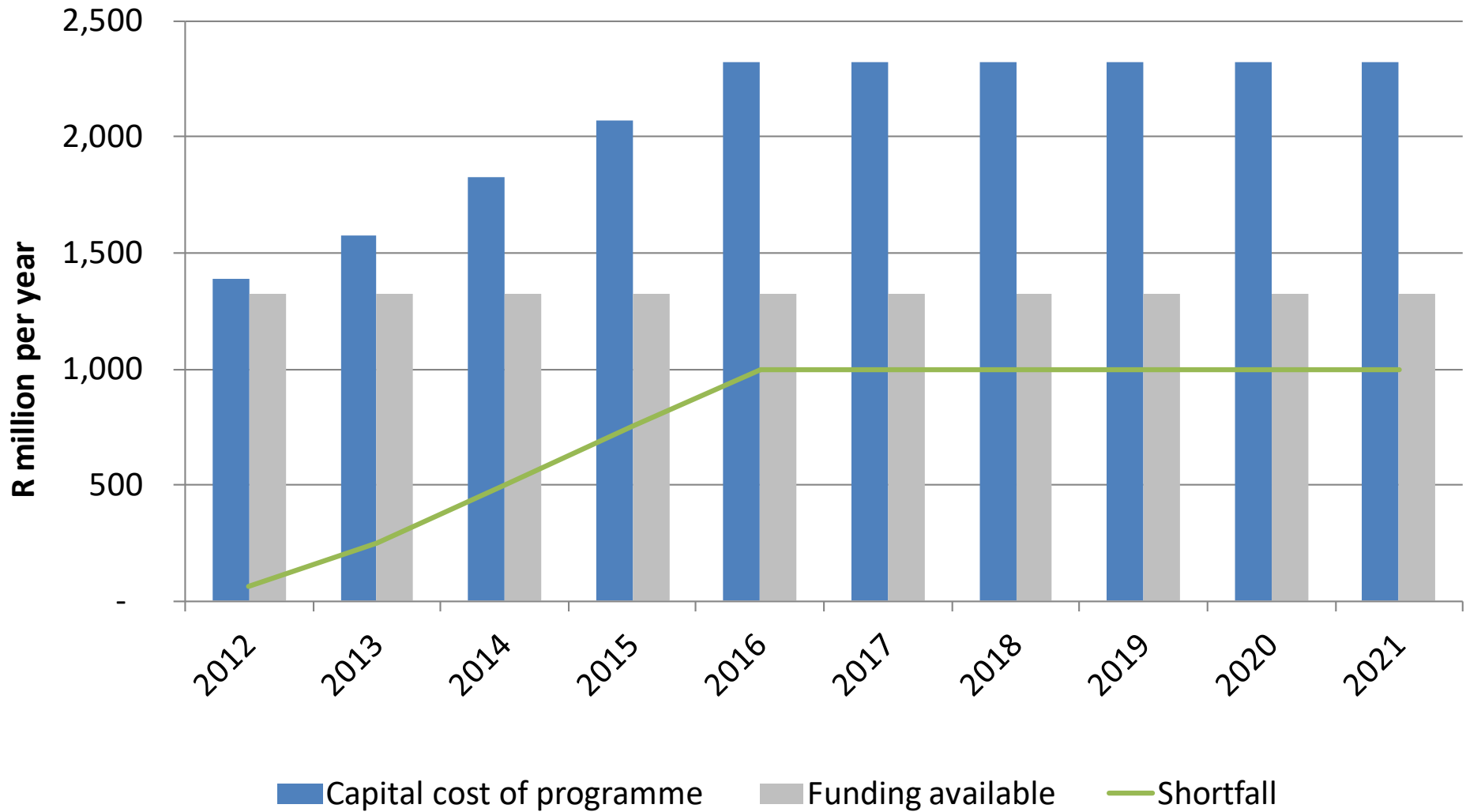
Low income household housing situation



Medium income household housing situation



Funding for housing programme



Dynamic model: eThekweni

Housing module for eThekweni Metro Municipality
DASHBOARD

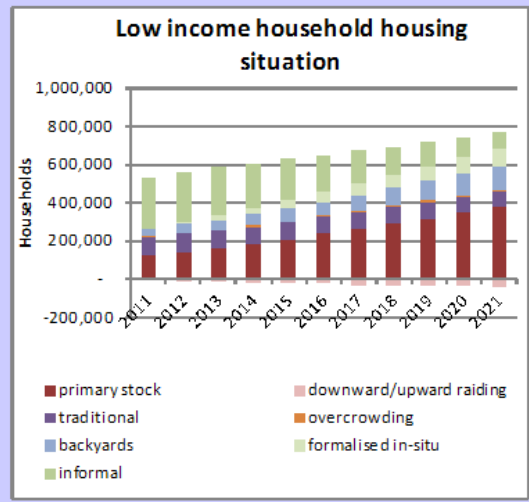
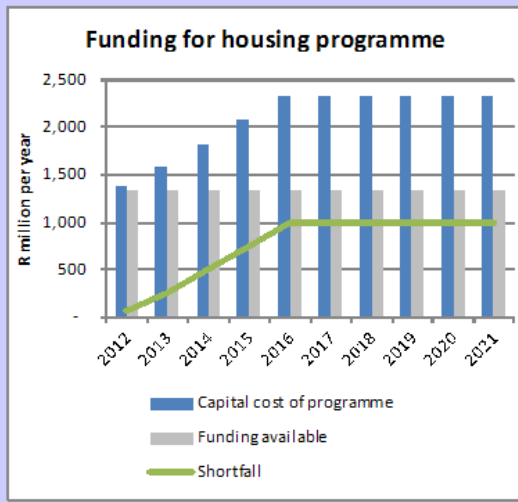
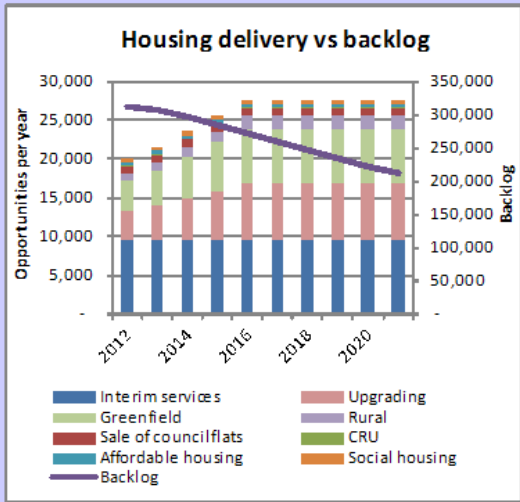
Scenario: Planned programme

Base year 2011

Housing delivery scenario: **Planned programme**
Household growth scenario: **User defined**

- Define housing status quo
- Define household growth
- Define delivery programme
- Define capital costs
- Define funding sources

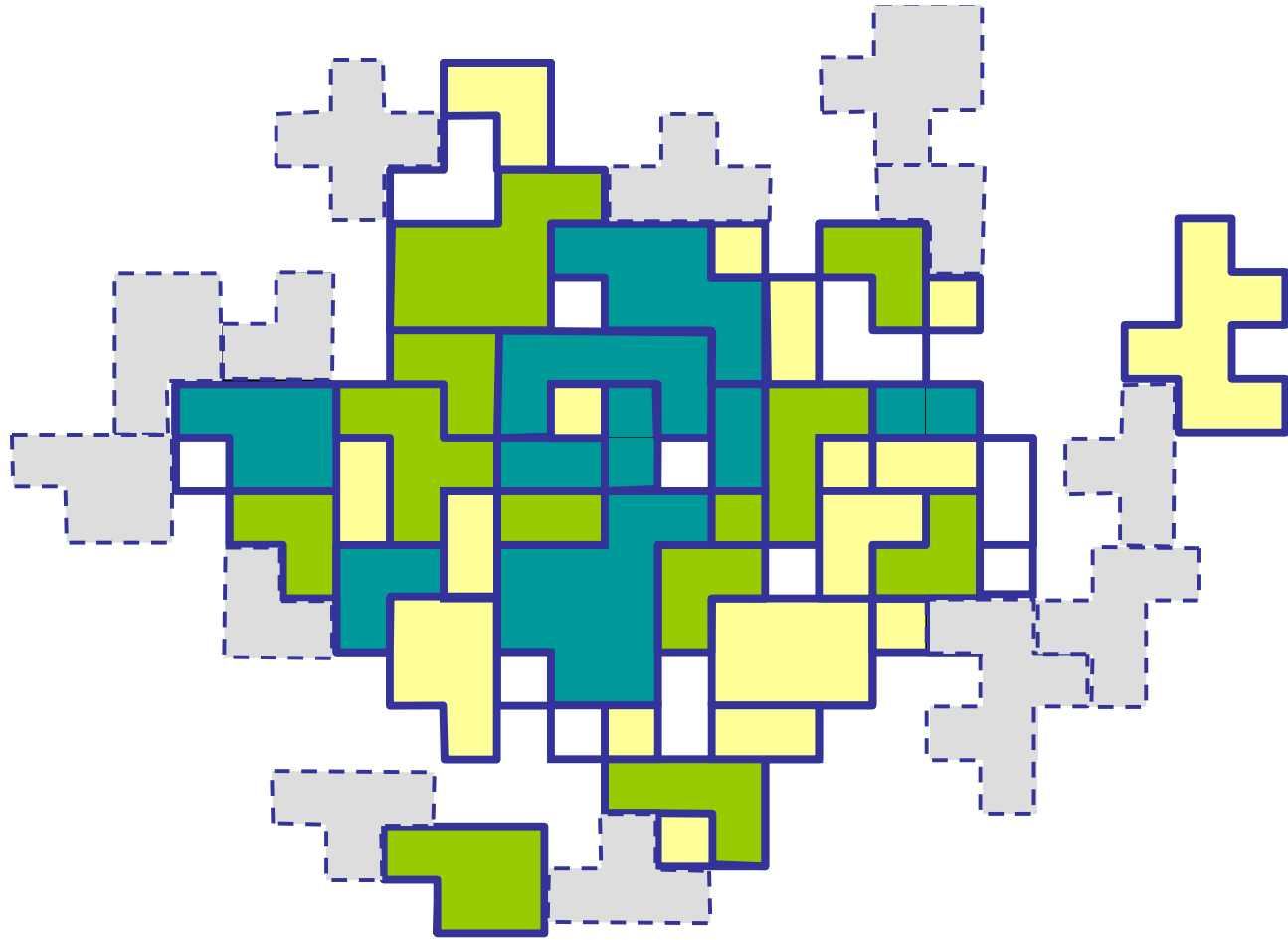
RESULTS	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Opportunities delivered	20,050	21,550	23,550	25,550	27,550	27,550	27,550	27,550	27,550	27,550
Capital cost (Rm)	1,389	1,576	1,826	2,075	2,325	2,325	2,325	2,325	2,325	2,325
Capital funding available (Rm)	1,325	1,325	1,325	1,325	1,325	1,325	1,325	1,325	1,325	1,325
Capital Surplus/shortfall (Rm)	-64	-251	-501	-750	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000
Housing backlog	311,961	305,700	296,881	285,521	271,639	258,426	245,900	234,080	222,988	212,644



Learning

- Interventions need to be understood in the context of **market distortion** and general **supply shortage**
- Targets, budgets and programmes do not tie up and are **unrealistic**.

City Efficiency Costing Model



Capital cost components

TOP STRUCTURE

SERVICES

LAND

PREPARATORY WORK

SOCIAL SERVICES



Capital cost drivers

	<i>PRIMARY DRIVER</i>	<i>SECONDARY DRIVER</i>
<i>LAND</i>	<i>LOCATION</i>	<i>TYOLOGY</i>
<i>TOP STRUCTURE</i>	<i>TYOLOGY</i>	
<i>BULK INFRA.</i>	<i>LEVEL OF SERVICE</i>	<i>TYOLOGY</i>
<i>CONNECTOR INFRA.</i>	<i>LOCATION</i>	<i>LEVEL OF SERVICE</i>
<i>INTERNAL INFRA.</i>	<i>LEVEL OF SERVICE</i>	<i>TYOLOGY</i>

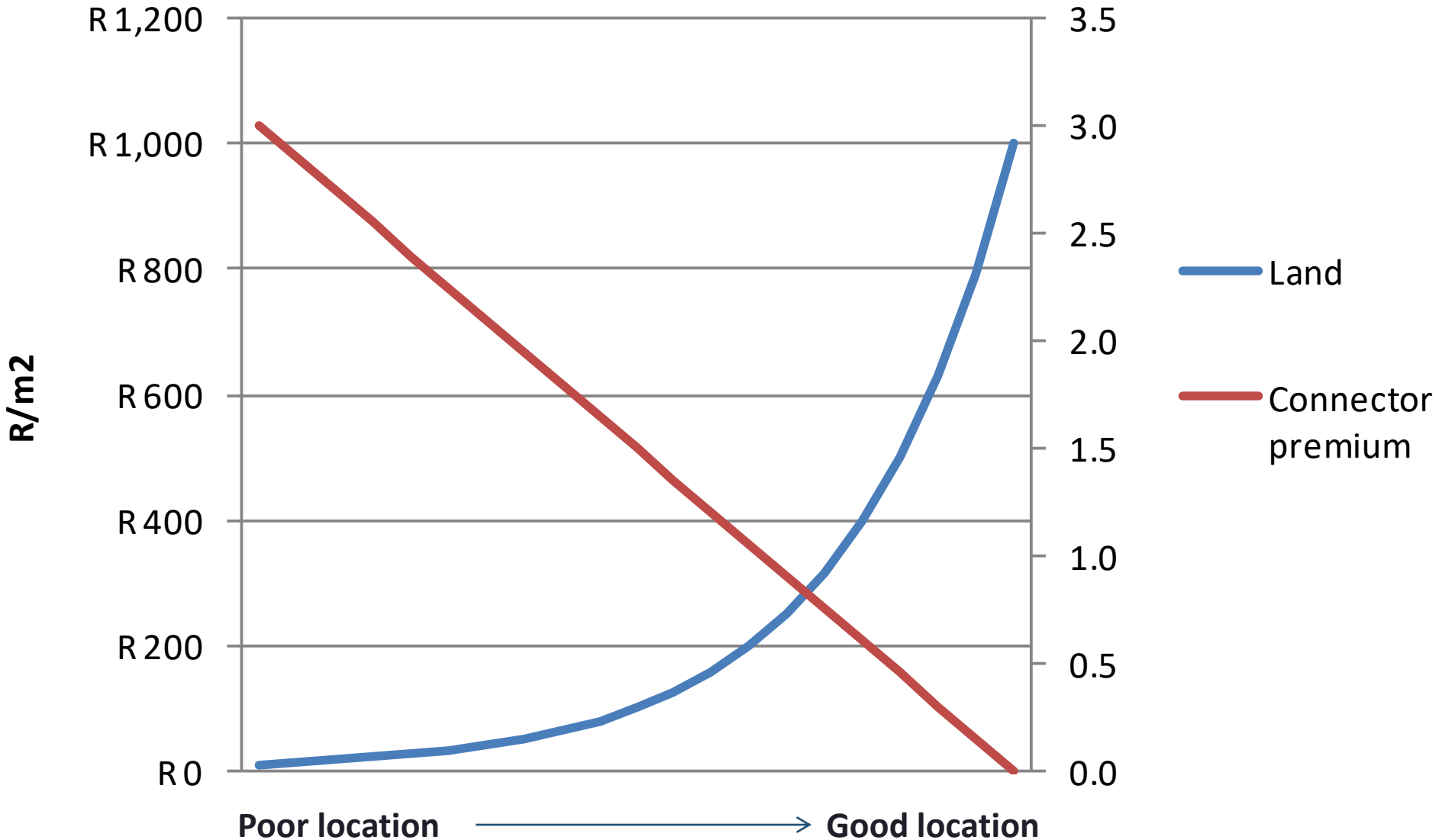
Capital cost drivers

	<i>PRIMARY DRIVER</i>	<i>SECONDARY DRIVER</i>
LAND	LOCATION	TYOLOGY
TOP STRUCTURE	TYOLOGY	
BULK INFRA.	LEVEL OF SERVICE	TYOLOGY
CONNECTOR INFRA.	LOCATION	LEVEL OF SERVICE
INTERNAL INFRA.	LEVEL OF SERVICE	TYOLOGY

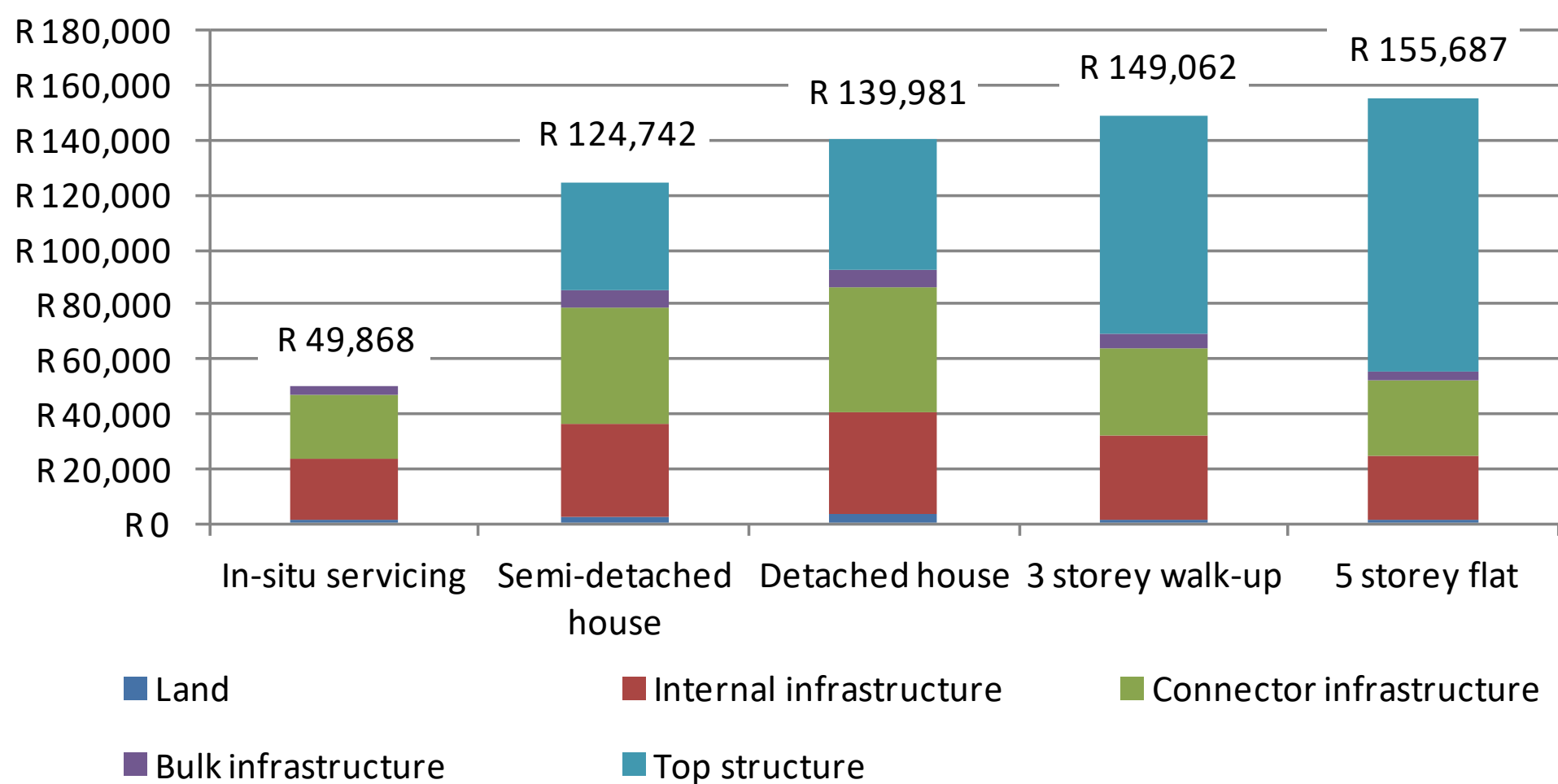
Capital cost drivers

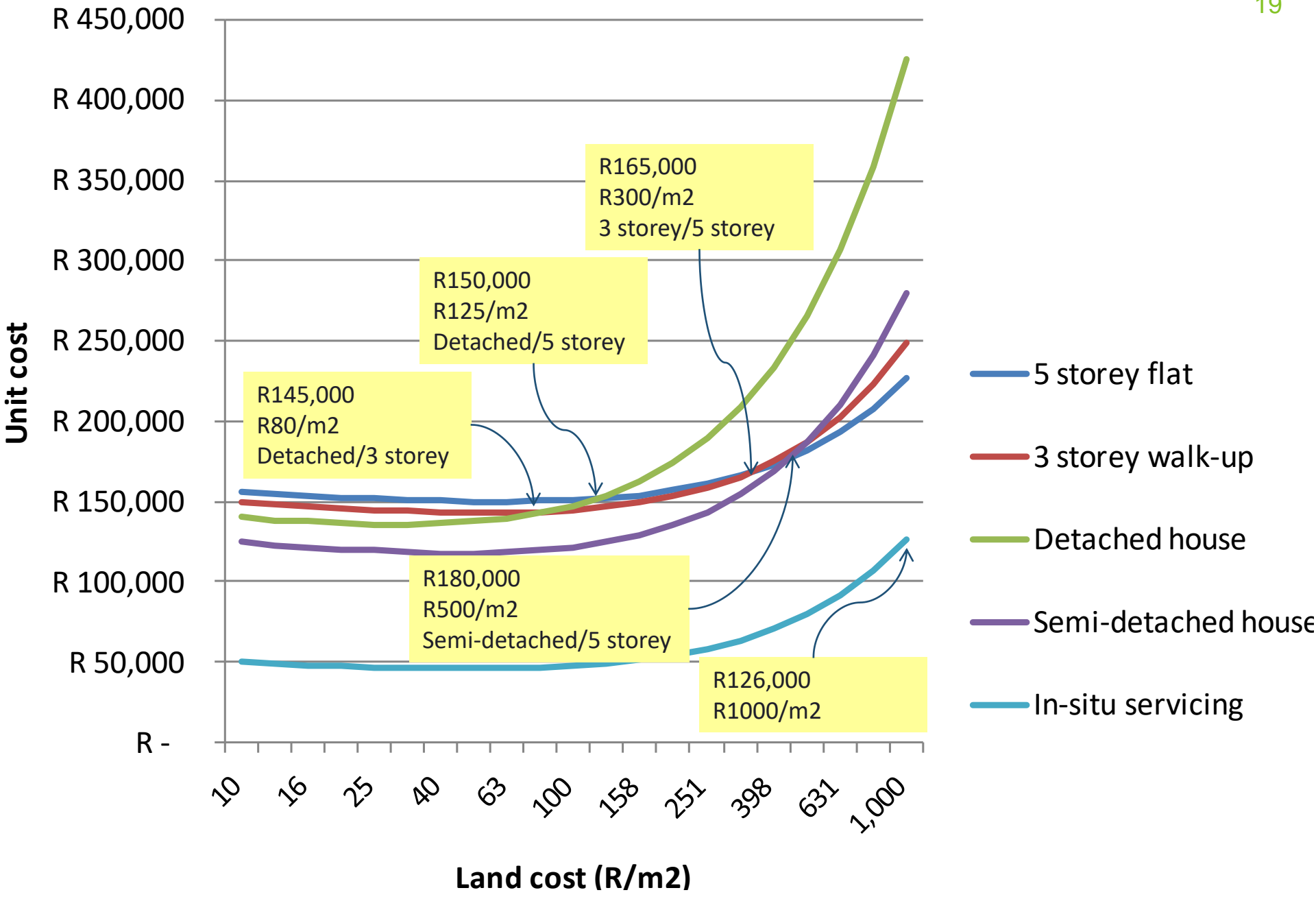
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Location, land price and connector infrastructure

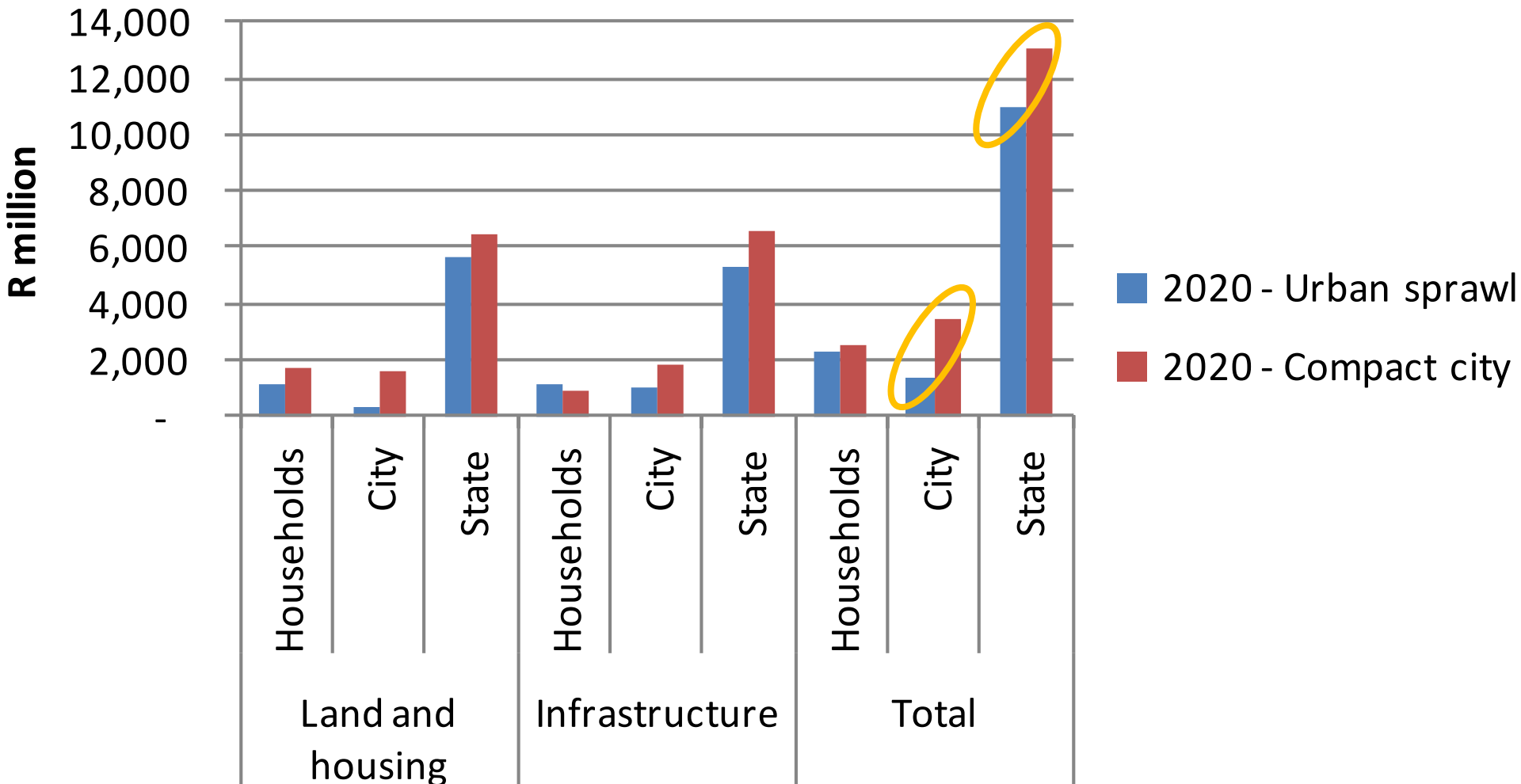


In-situ servicing Semi-detached house Detached house 3 storey walk-up 5 storey flat

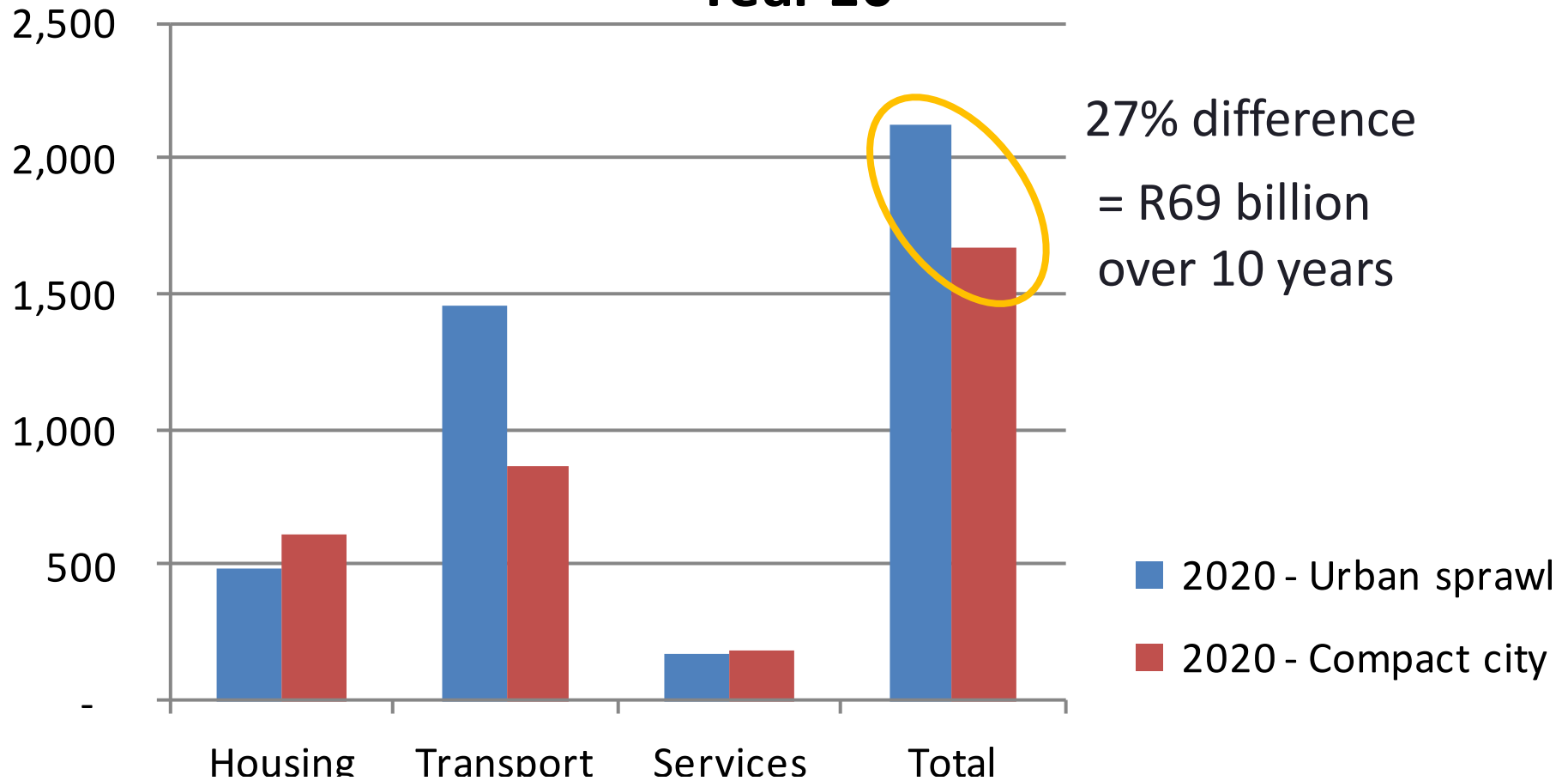




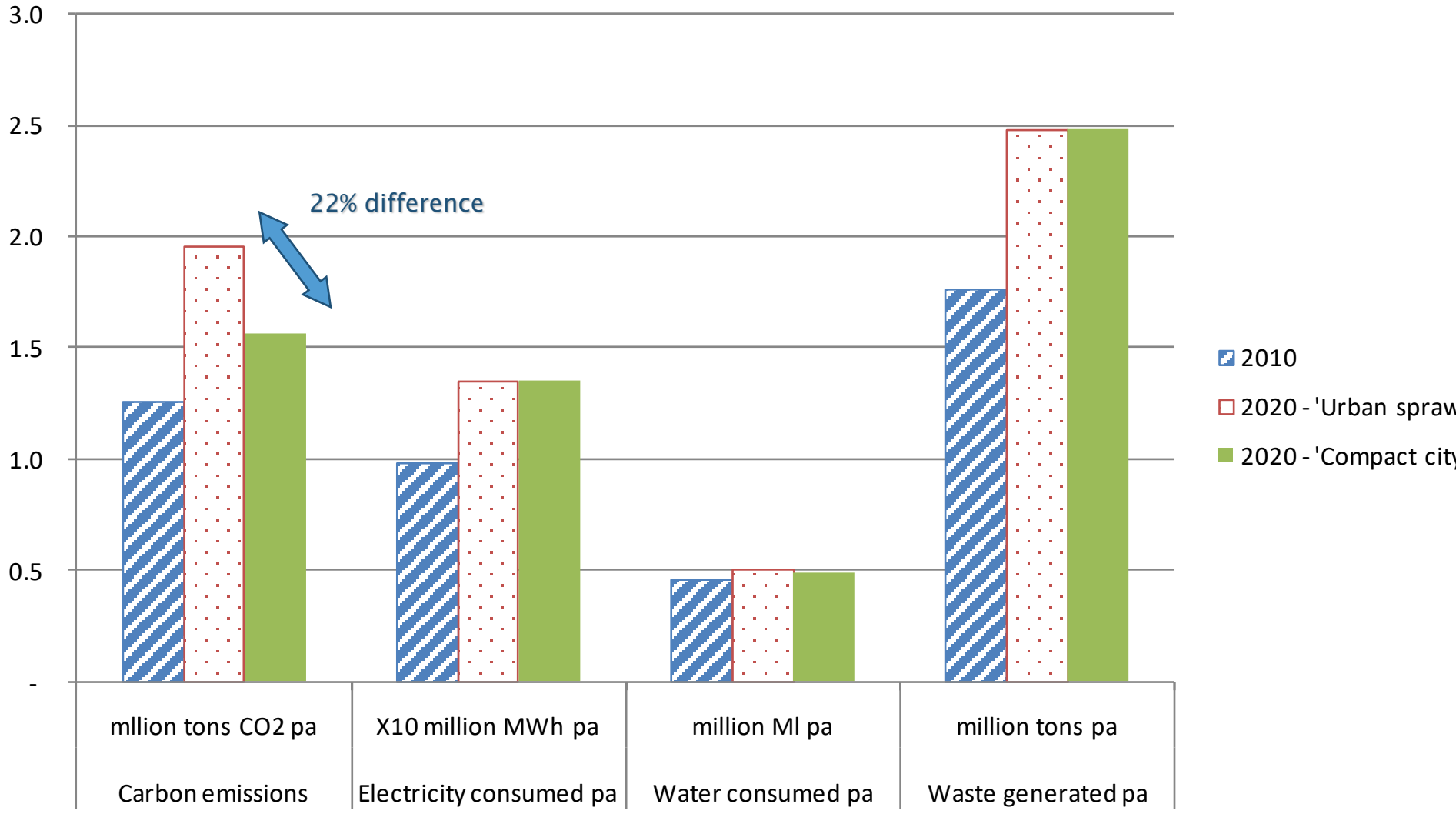
Capital cost of development over 10 years



Operating costs for low income households in Year 10



Environmental impacts



Learning

- There is no apparent capital financial incentive for the City or State to densify
- Capital costs are strongly driven by top structure costs and land costs, not by infrastructure costs
- Short-term capital decisions outweigh longer term operating cost savings
- The majority of the costs of urban sprawl and potential benefits of a compact city, are borne by households and the environment, and not by developers, the City or the State.



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