



Energy and Climate Change Strategy in the Public Building Sector

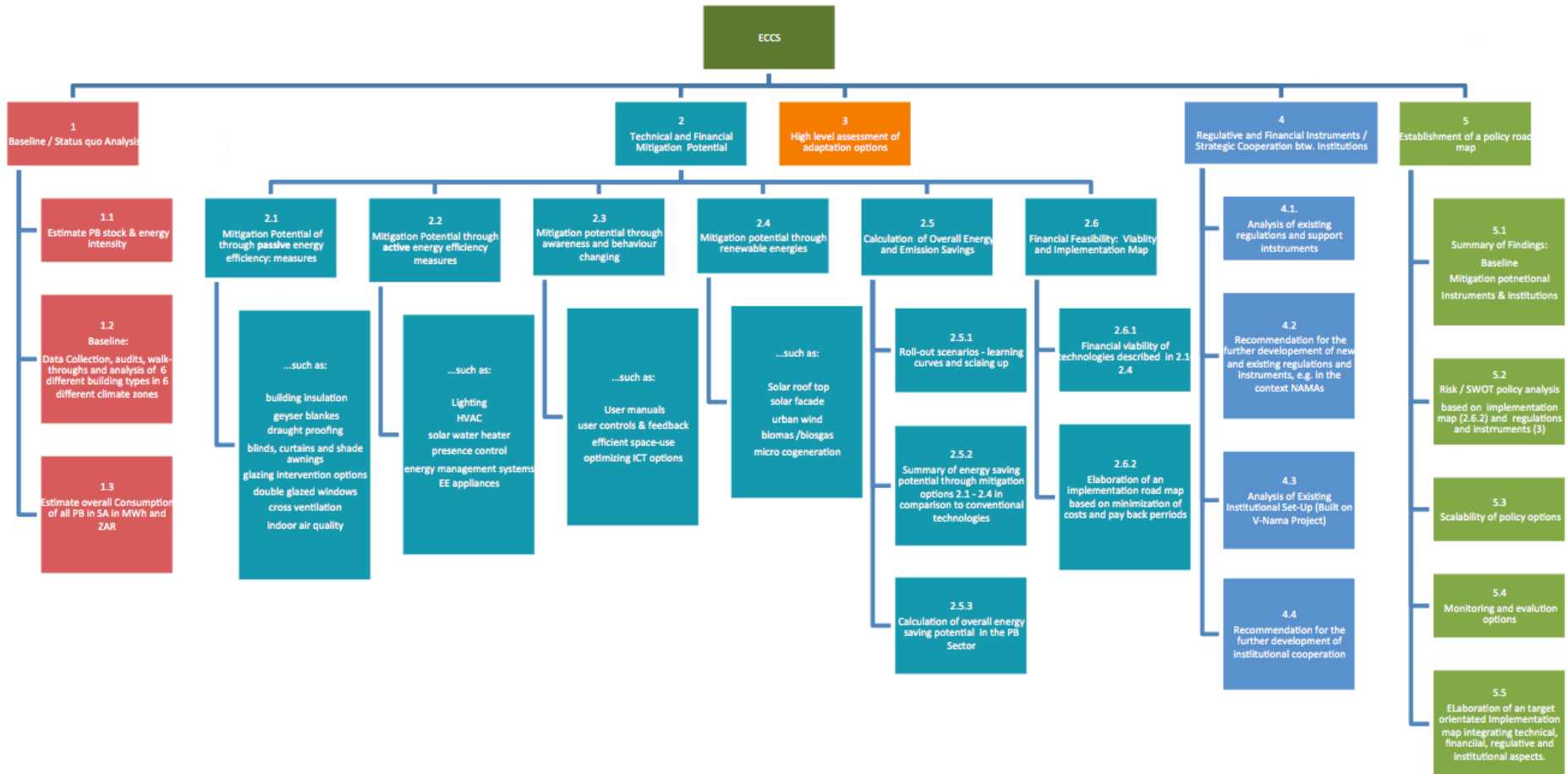
**IEA Workshop
Pretoria - 28th January 2015**

Presentation Overview

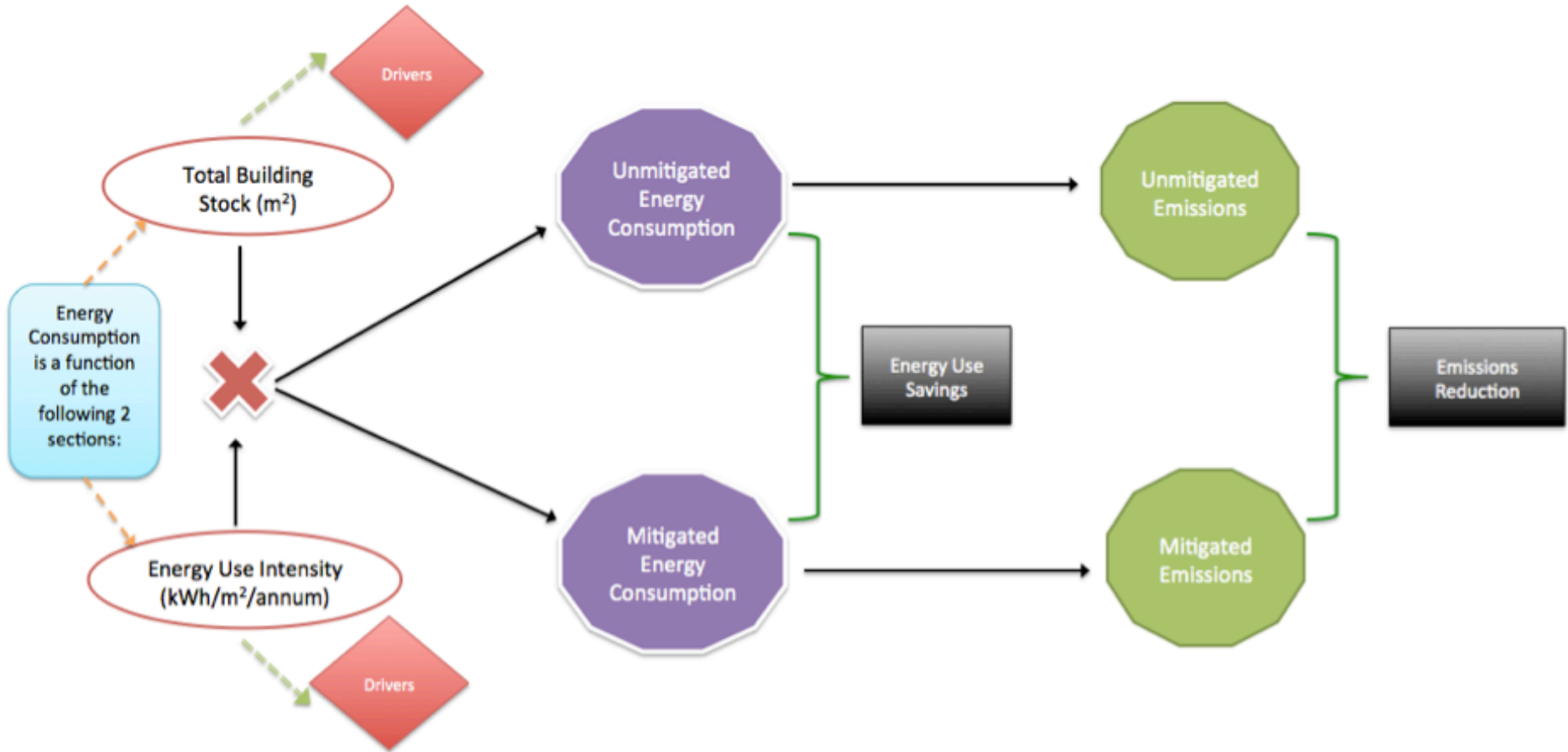
- ▶ **Introduction to the Project**
 - ▶ Background, Key Objectives and Scope
- ▶ **Baseline and Potential for GHG Emissions Reduction**
 - ▶ Derivation of Baseline Energy Consumption and GHG-Emissions
- ▶ **Interventions under Refurbishment Scenarios:**
 - ▶ Potential Energy Savings
 - ▶ Potential GHG Emissions Reduction
 - ▶ Cost Estimates and Life-Cycle Costs Appraisal
 - ▶ Co-Benefits Appraisal
 - ▶ Institutional and Legislative Framework
- ▶ **Strategy Highlights**
- ▶ **Timelines Towards Finalisation**



Key Elements of Project Scope



Baseline Derivation Concept:



Setting Baseline Scenario to 2050:

▶ Building Stock:

- ▶ 50.2million m² of existing Public Building Stock (2014)

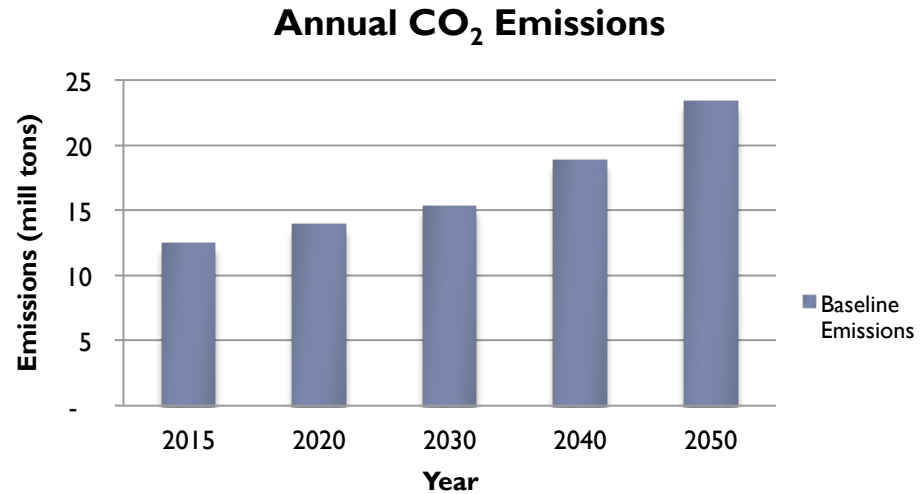
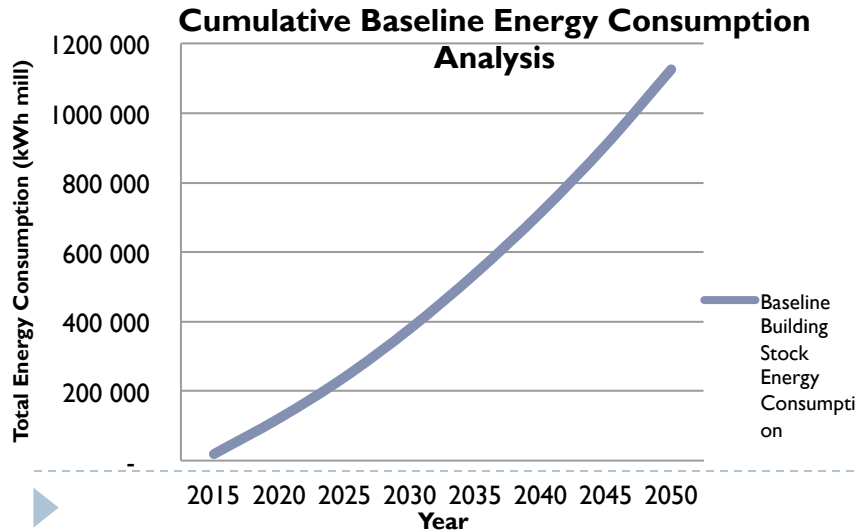
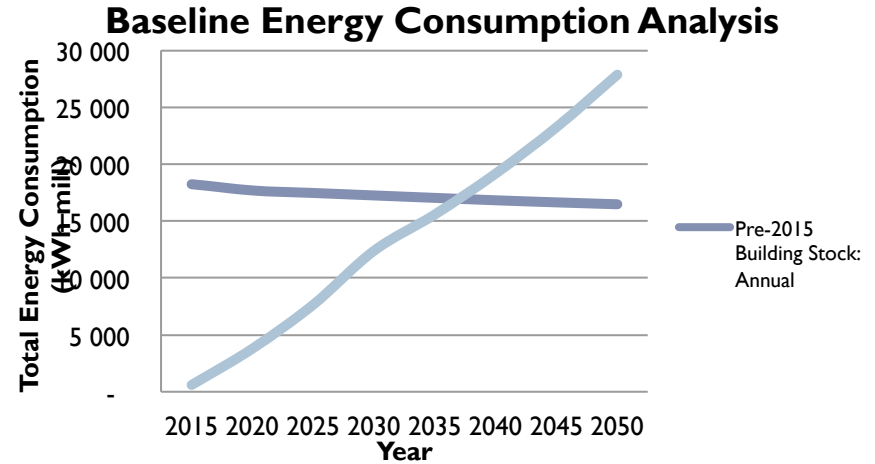
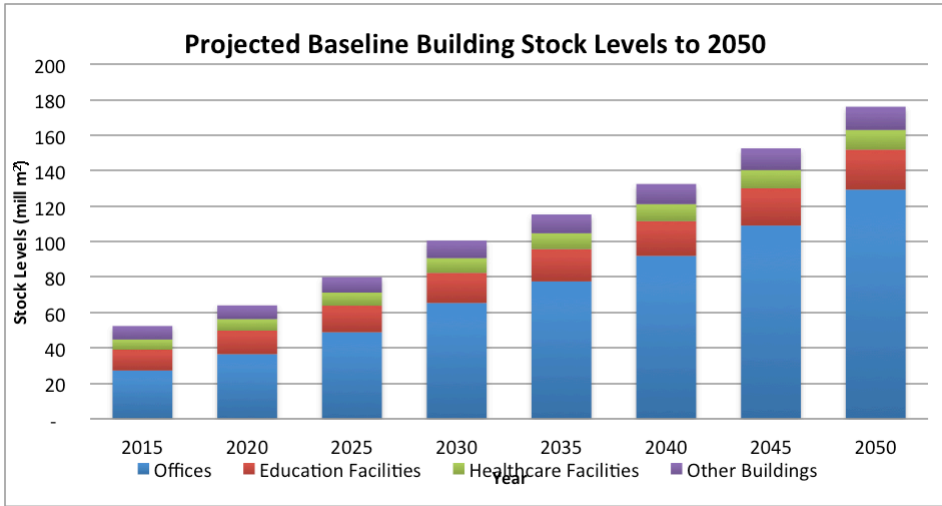
▶ Energy Use Intensity:

- ▶ **Top Down Approach:** Based on Literature and Desk Top Research
- ▶ **Bottom Up Approach:** Based on Walk Through Audits - From the 42 buildings, 394.000m² and 46.6million kWh/annum consumption, EUI established at **118 kWh/m²/a**
- ▶ **Municipalities Own Consumption:** Based on EEDSM Data - From the 73 buildings, 302.000m² and 45million kWh/annum consumption, EUI established at **149.26 kWh/m²/a**

- ▶ **Suppressed Demand:** Although EUI's seem to indicate acceptable to excellent building performance relative to benchmarks, this is most likely not related to EE, more a case of Suppressed Demand.
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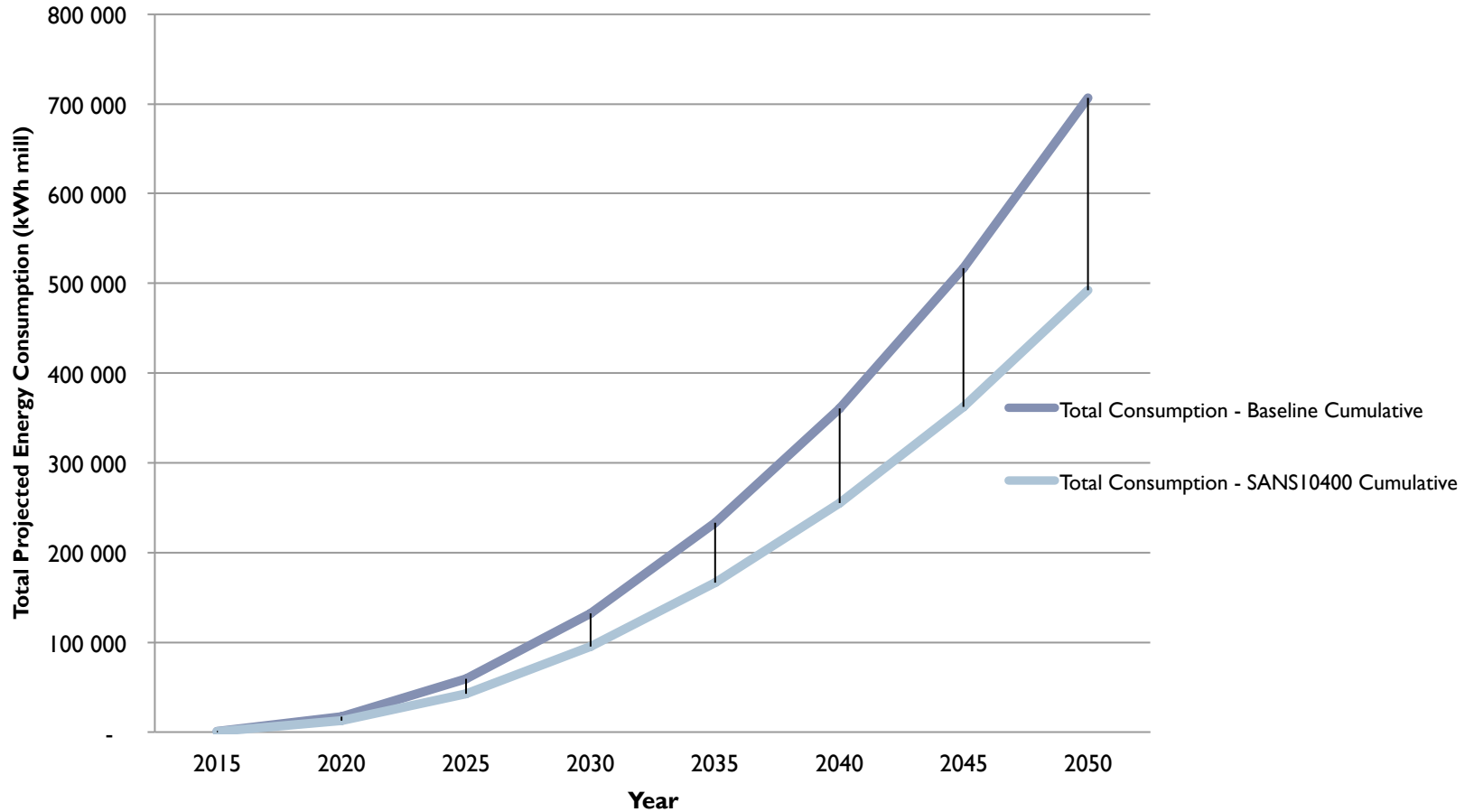


Baseline Derivations – Key Findings:



Baseline Derivations – Key Findings:

Significance of SANS 10400-XA on Energy Consumption - New Stock



Mitigation Interventions:

▶ Energy Efficiency - Passive and Active Interventions:

- ▶ Building Orientation, Building Insulation,
- ▶ External Shading, Double Glazed Windows
- ▶ Building and Energy Systems (BEMS),
- ▶ EE-Lighting
- ▶ EE-Appliances

▶ Behavior Change + BEMS:

▶ Renewable Energy:

- ▶ Solar Water Heating and PV
- ▶ Bio Fuels
- ▶ Co & Tri generation
- ▶ Fuel Switching

▶ Deriving Energy-Savings + Emissions Reduction



Green-Retrofit versus Eco-Refurbishment Approach:

Green-Retrofit: Key Attributes	Eco-Refurbishment: Key Attributes
<ul style="list-style-type: none">• Building is in a good working-condition• Regular operations & maintenance in place• Plans and manuals readily available• Energy and occupational data systematically captured (BMS likely in place already)• Lower possibility of suppressed demand• Building-specific baseline reliable and easy to validate• Immediate procurement/Agreement with ESCo likely to be a viable option	<ul style="list-style-type: none">• Building is not in acceptable working condition with some buildings at risk of being condemned for major health and safety defects• Backlog in operations & maintenance possibly at 5-years and above• Plans and manuals likely to be unavailable• Reliable energy and occupational data unavailable• Suppressed demand likely• Reliable building-specific baseline cannot be determined• “Making-good” essential before ESCo can be engaged for EE-intervention



Eco-Refurbishment Driver:

Table 2.14 Condition of State-owned buildings

Department	Condition of State-owned buildings										Total	
	(Number and percentage)											
	Very good		Good		Fair		Poor		Very poor			
	C5	C4	C3	C2	C1							
Defence	1	0%	274	30%	490	54%	96	11%	51	5%	912	100%
Correctional Services	1	0%	11	6%	151	80%	20	11%	5	3%	188	100%
Justice	4	0%	146	22%	461	69%	51	8%	10	1%	672	100%
Other clients combined	7	2%	86	23%	250	68%	21	6%	6	2%	370	100%
SAPS	39	3%	142	10%	952	66%	254	18%	9	1%	1,396	100%
Unutilised	-	-	-	-	-	-	-	-	394	100%	394	100%
TOTALS	52	1%	659	18.2%	2304	67.4%	442	11%	475	18.5%	3,932	100%

- The table above represents a number of buildings in the Department's portfolio for which property strategies, including high-level condition assessments, were concluded in the year under review.
- Property strategies excluded residential accommodation except for Defence portfolio.
- Condition rating for Defence is derived from the draft UAMP and it includes residential units.
- SAPS portfolio includes condition ratings for devolved police stations. Unutilised buildings comprise offices, residential units and other structures, some of which are within the complexes.

(d) Major maintenance projects undertaken during the period under review.

Very Good + Good = Minor

15%

Fair = Moderate

60%

Poor + Very Poor = Major

25%

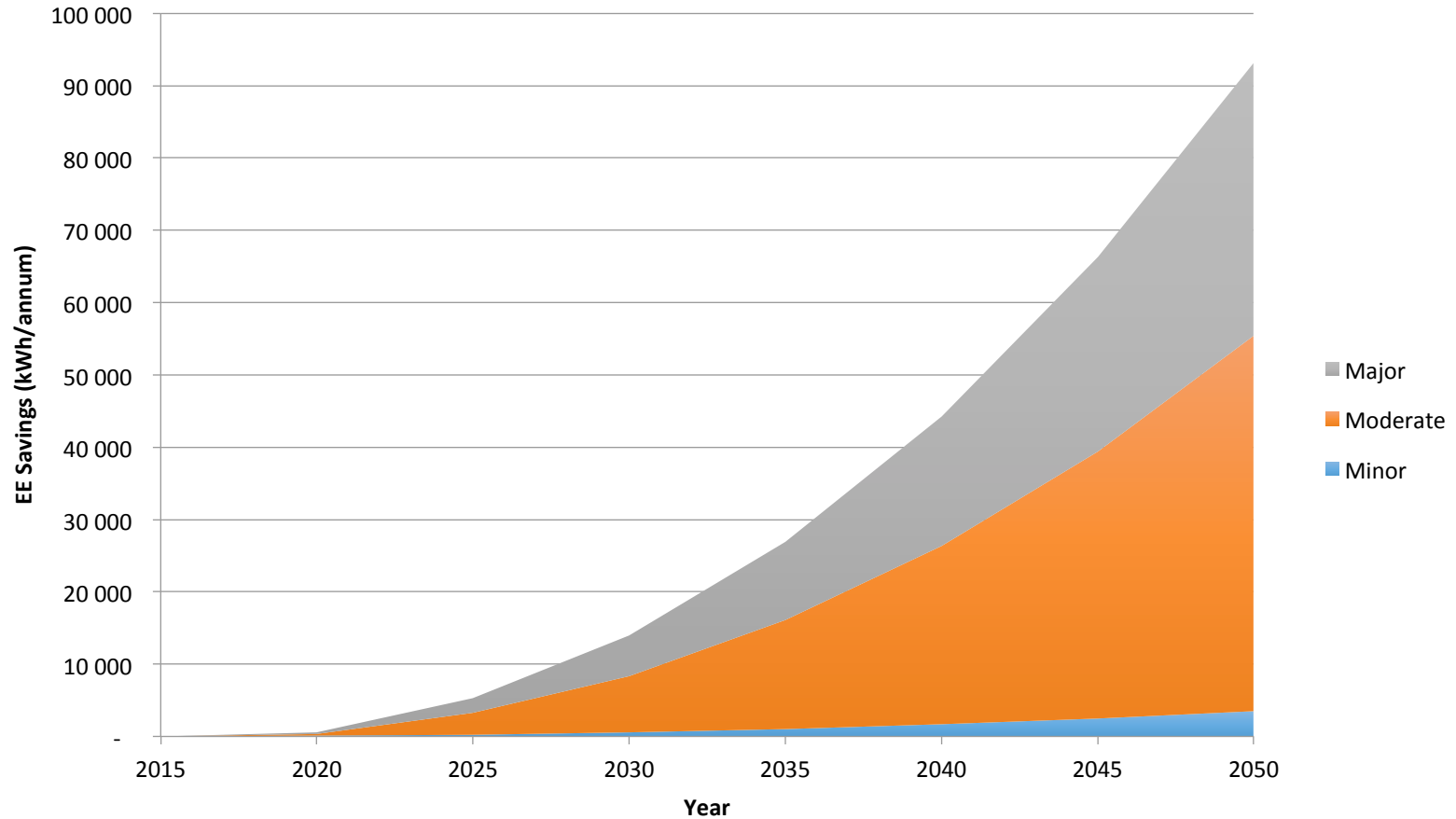
Eco-Refurbishment Interventions: Key Elements

Minor: 15%	Moderate: 60%	Major: 25%
<ul style="list-style-type: none">• Behaviour change + BEMS + User-manuals• EE-Lighting + Appliances• Paint (including cool-surfaces paint)• Draught-proofing• Normal plant and equipment service and re-commissioning• Minimal interiors upgrade• NO Major External-Fabric or glazing upgrade• NO Major mechanical systems overhaul	<ul style="list-style-type: none">• Behaviour change + BEMS + User-manuals• EE-Lighting + Appliances• Moderate interiors upgrade (daylight optimisation as key goal)• Moderate envelope upgrade (including draught-proofing)• Major glazing upgrade• Moderate mechanical systems upgrade and re-commissioning	<ul style="list-style-type: none">• Behaviour-change + BEMS + User-manuals• EE-Lighting + Appliances• Major re-configuring of interiors (spatial-efficiency + daylight optimisation as key goal)• Major envelope upgrade (including cool-surfaces paint and glazing)• Major mechanical systems overhaul and re-commissioning

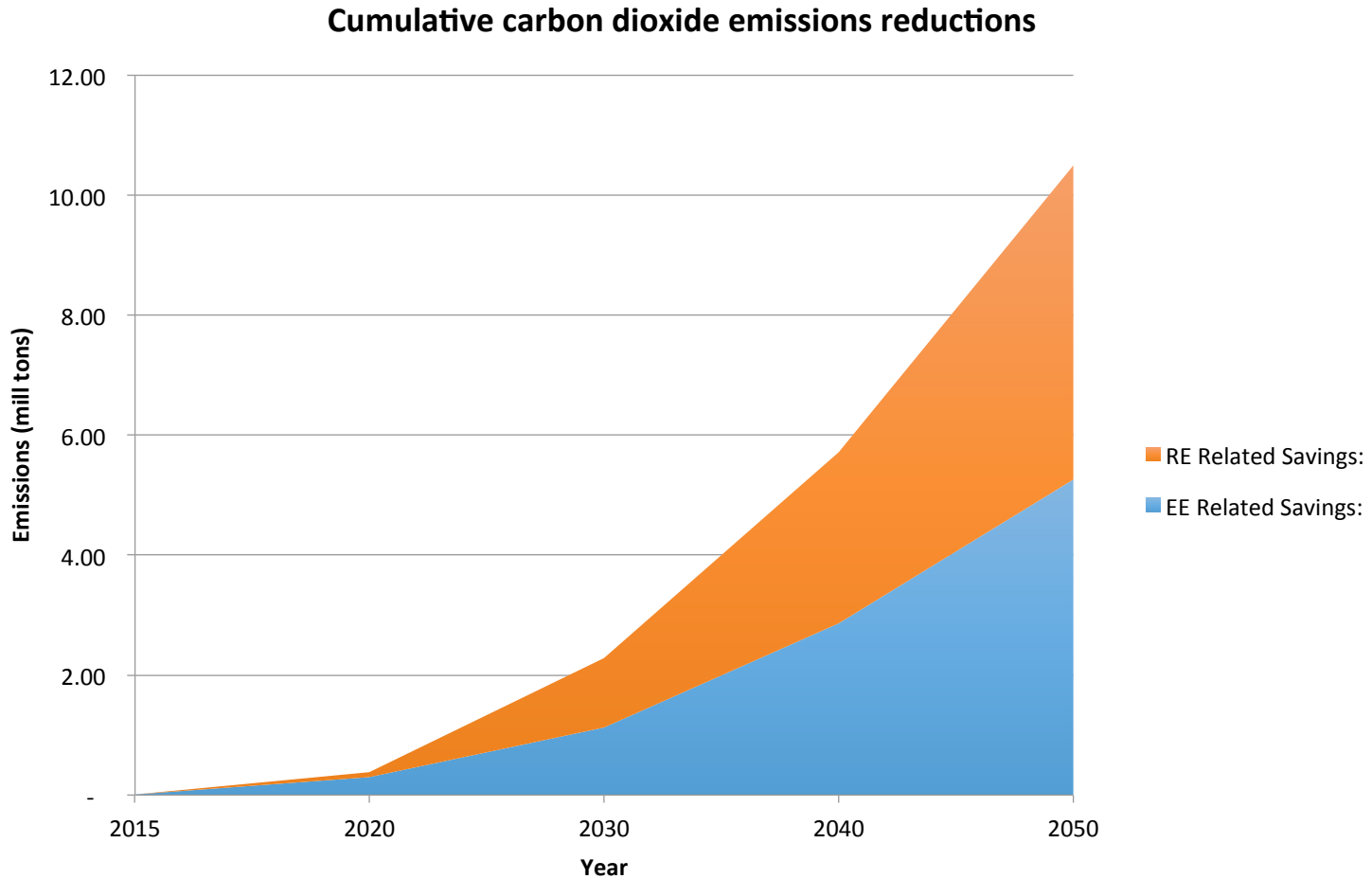


Energy-Savings: Refurbishment Scenario 1:

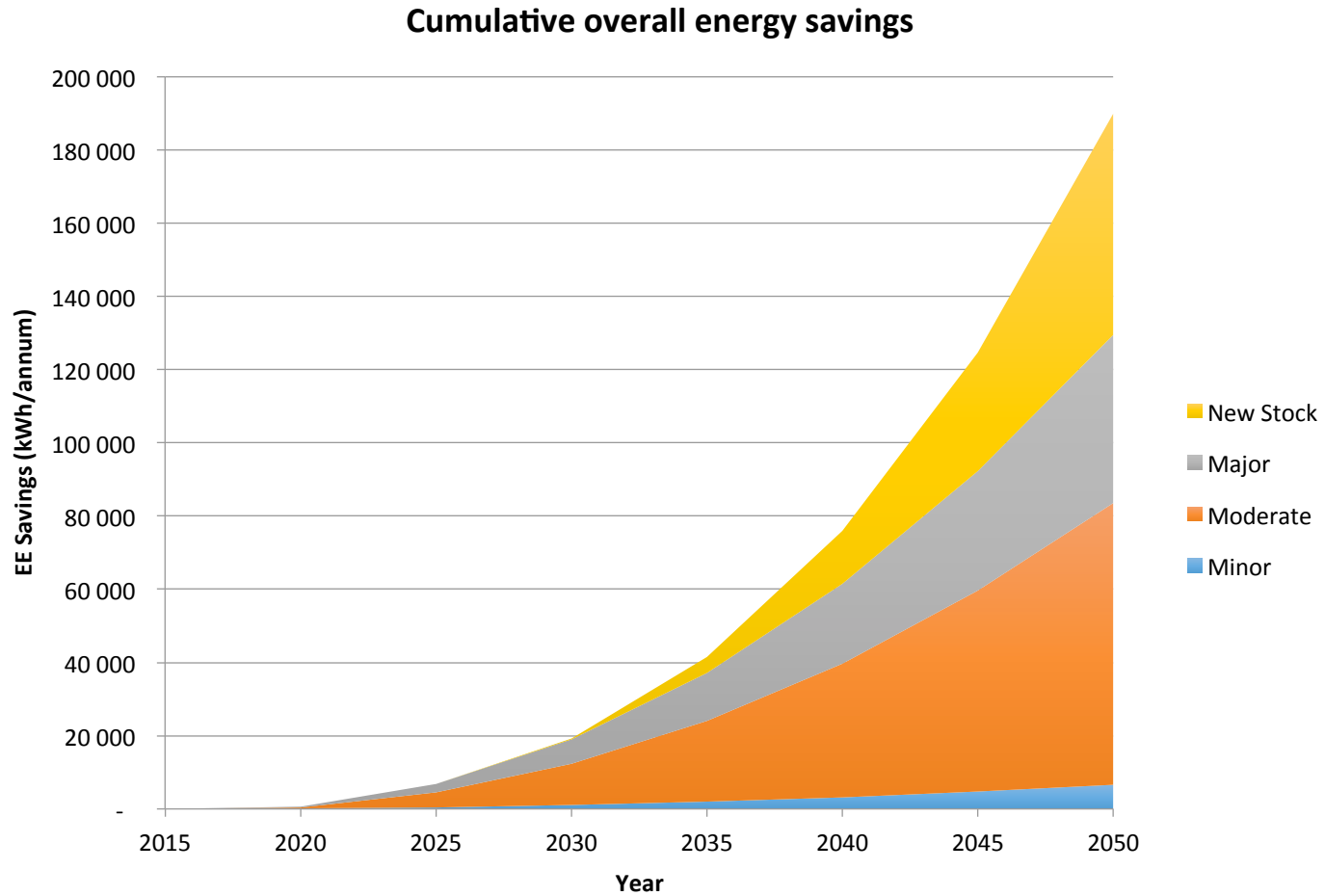
Cumulative overall energy savings



Emissions-Reduction: Refurbishment Scenario 1

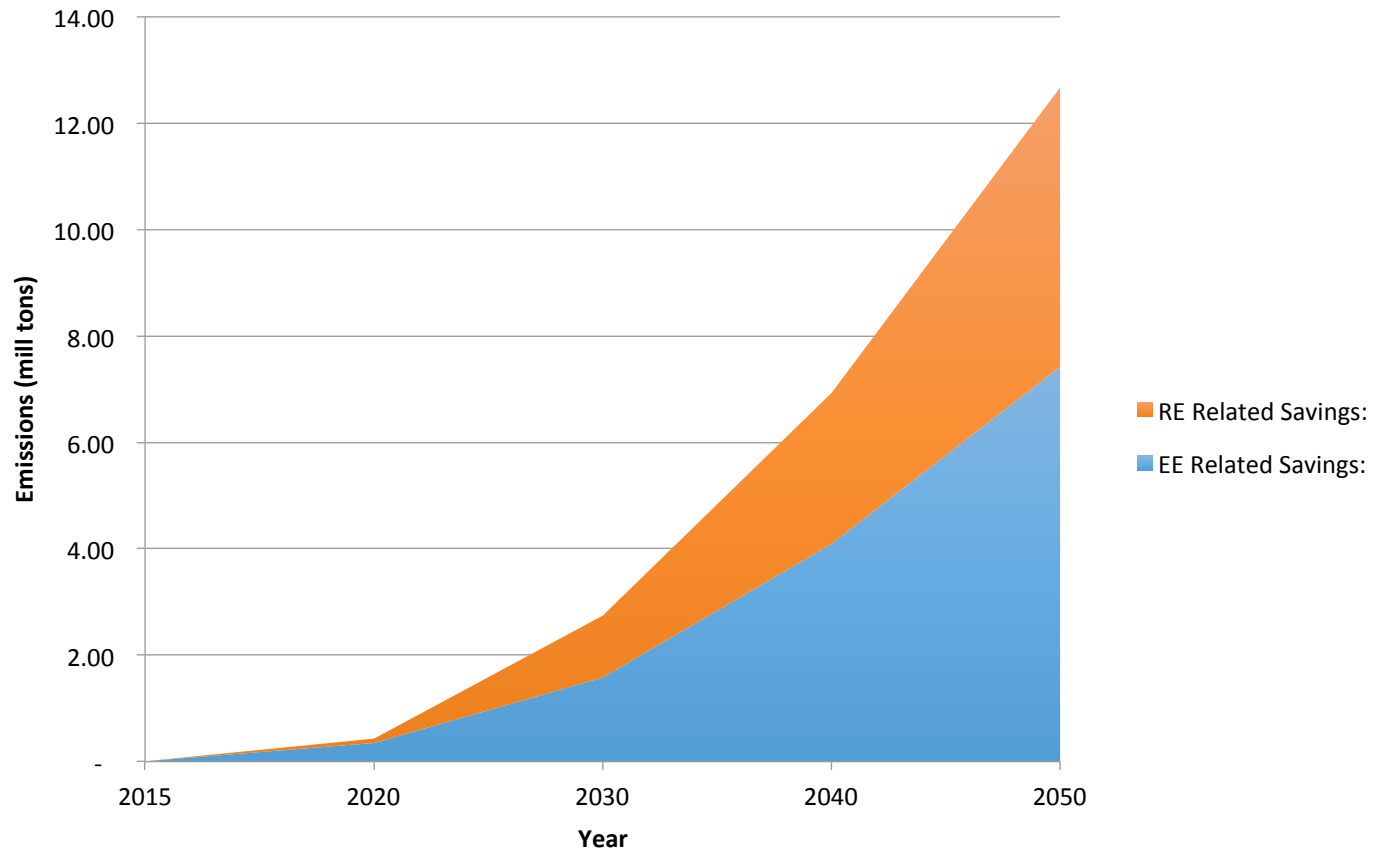


Energy-Savings: Refurbishment Scenario 2:

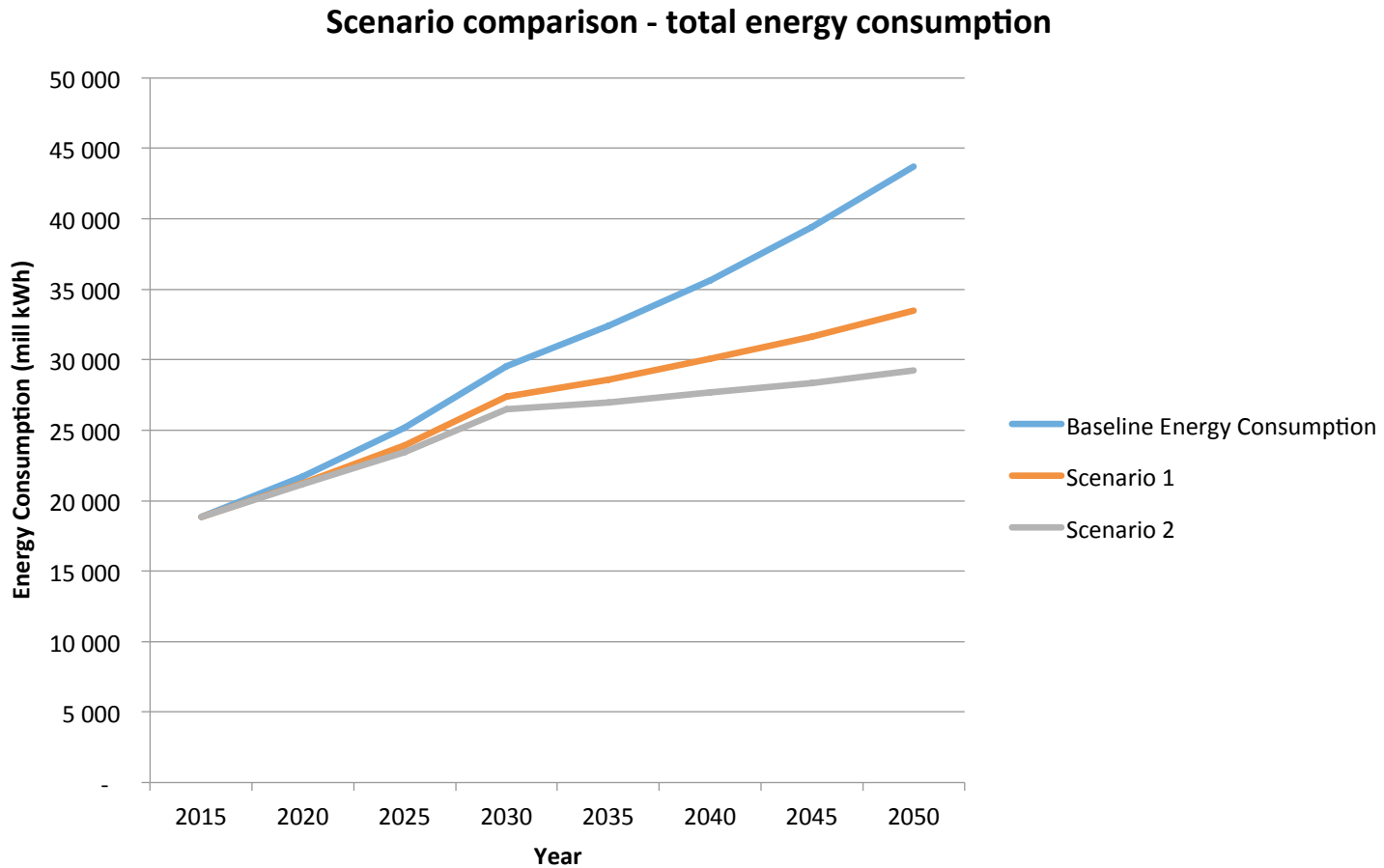


Emissions-Reduction: Refurbishment Scenario 2

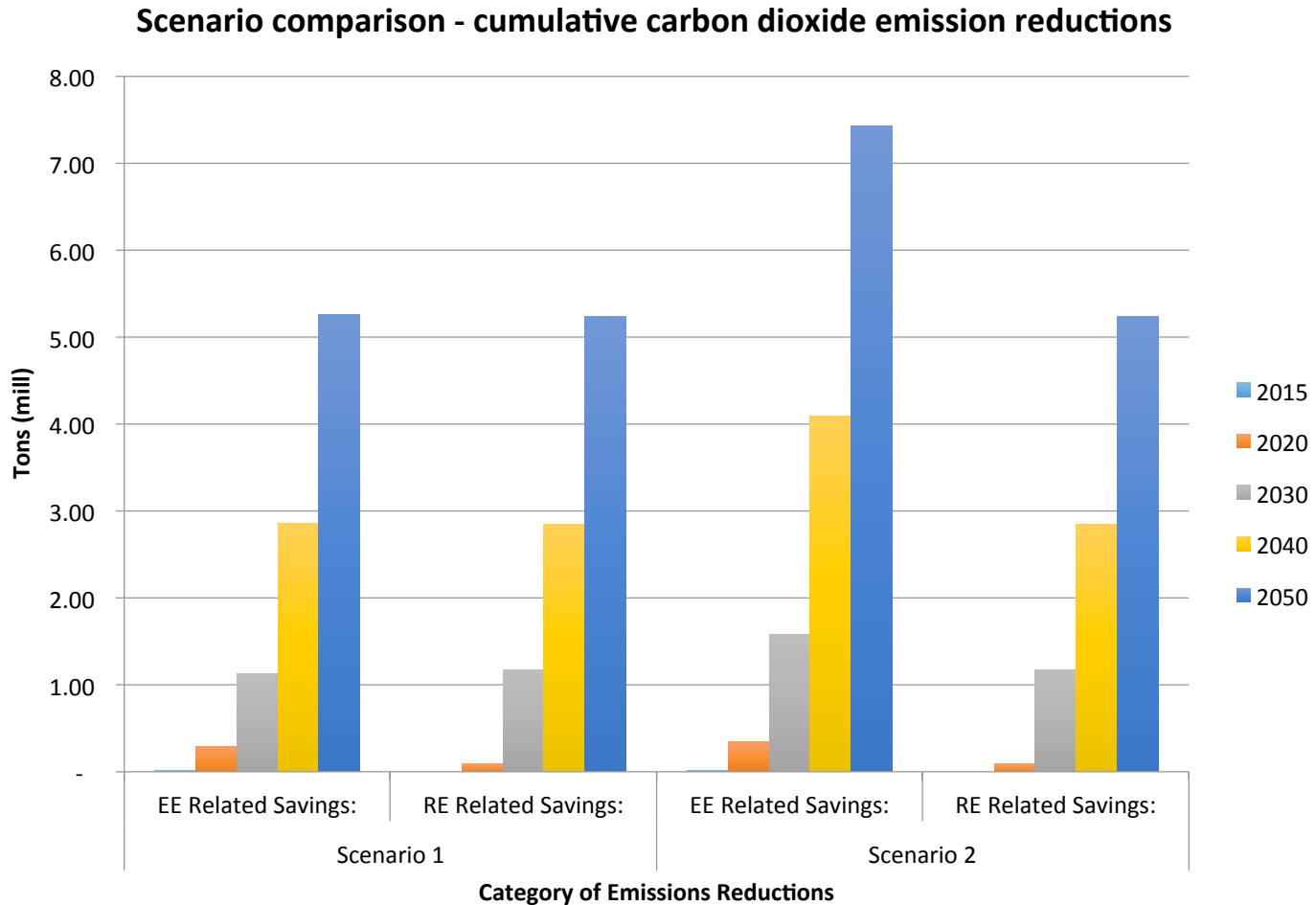
Cumulative carbon dioxide emissions reductions



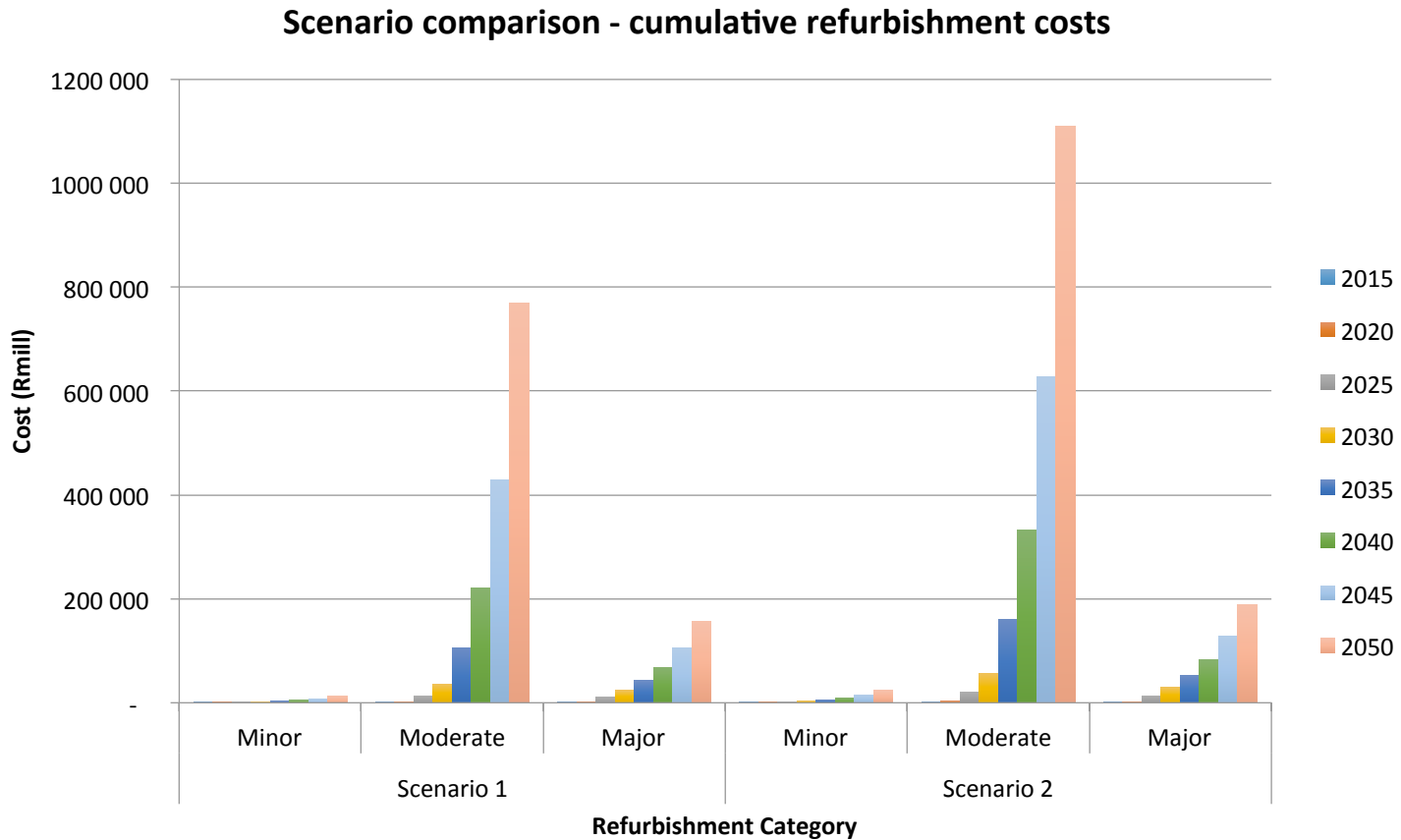
Energy-Consumption: Baseline v Refurbishment Scenario 1 & 2:



Emissions-Reduction Comparison: Scenario 1 and 2

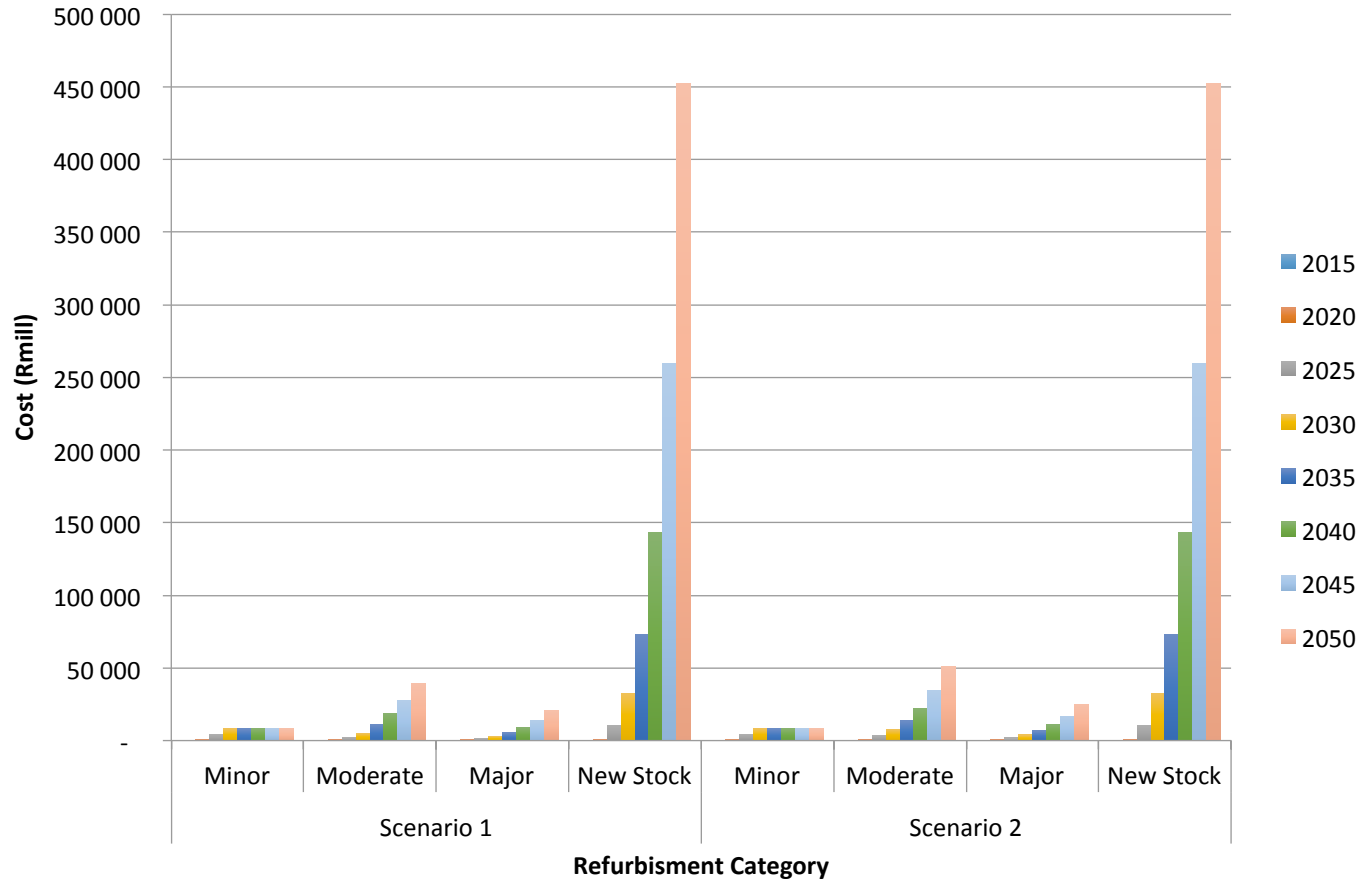


Refurbishment +EE-Costs: Scenario-1 and 2

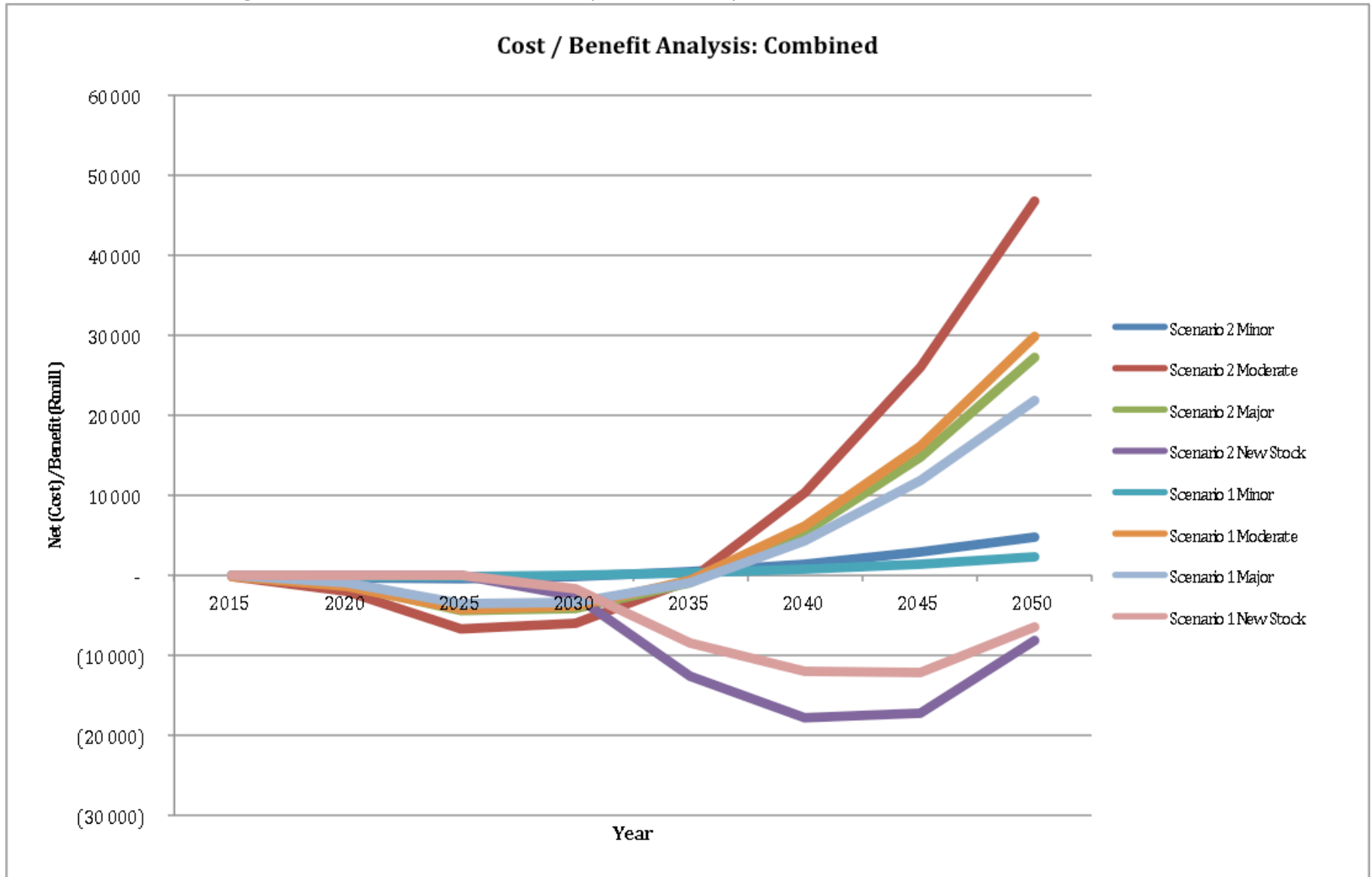


RE Costs - Nominal:

Scenario comparison - cumulative RE installation costs



Life-Cycle Costs (LCC) Perspective:



Co-Benefits:

- ▶ **Jobs:** Job-creation opportunities to 2050
 - ▶ 12-Jobs per year for every R1-million in Refurbishment
 - ▶ 22-Jobs per year for every R10-million in RE-PV
 - ▶ 19-Jobs per year for every R10-million in for EE for buildings.
- ▶ **Enterprise:** In support of Revitalised Refurbishment, EE and RE sub-sectors.
- ▶ **Energy Security:** Estimates on coal-depletion at around 120-years at current rates of use.
- ▶ **Resource Efficiency:** Savings of 12.2 billion litres of water per year over 35 years to 2050
- ▶ **Health Benefits:** Mitigates Impacts of Air, Soil and Ground-water Pollution close to power-stations and coal-mining.
- ▶ **Economic Competitiveness:** Stimulates innovation and International Competitiveness
- ▶ **Green Maintenance & Green Economy Transition:** Public-sector commitment Demonstrate unequivocal leadership by example and inspire confidence in private-sector initiatives and investments along similar transition goals and objectives.



Institutional & Legislative Considerations:

- ▶ Championing within Infrastructure Development Act 23 2014: Treasury Funding Prioritisation for Refurbishment Costs
- ▶ DPW & CIDB Anchors (IAR, Green Buildings Policy and NIMS as Key policy frameworks)
- ▶ DoE & DEA as Programme Champions (with NCCRWP 2011 as key policy framework)
- ▶ Municipal EEDSM, Gauteng's e-Maintenance, and DBSA-Infrastructure Barometer as Incubator Programmes
- ▶ CIDB and Industry Professional Bodies Boost Industry Capacity
- ▶ Eskom and Municipalities Expedite Smart/Net-Metering and Grid-Interactive Distribution Protocols
- ▶ DBSA, Commercial Banks, Bilateral and Multi-Lateral Partners Provide Funding Streams
- ▶ DTI Expedites SANSI 544 on EPCs for existing Stock



Strategy Formulation Process:

- ▶ **Why we are concerned about the Public Building Sector and related GHG-Emissions**
 - ▶ Key points from Inception and Baseline Report
- ▶ **Where we are now and where we are headed (Business-as-usual)**
 - ▶ Key points from Baseline Report
- ▶ **Where we want to be and by when:**
 - ▶ Key points from Mitigation versus Baseline Reports
 - ▶ The 2050 Horizon and the 50% GHG-Emission Reduction Benchmark
- ▶ **How we get from here to there and how fast:**
 - ▶ The Green Retrofit versus Eco-Refurbishment Dilemma
 - ▶ The Scenario-Choice: Low versus Fast(er)
 - ▶ Opportunities and Constraints: Building from existing initiatives, Aligning Financial Resources, Addressing Industry-Capacity, Streamline Institutional Set-up
 - ▶ Demonstration Project – Immediate Start of the Implementation programme



Timeline to Completion:

- ▶ **15th January:** Submission of Institutional Set Up
 - ▶ **16th January:** Comments return on Mitigation Report.
 - ▶ **27th January:** Submission of Roadmap, Recommendations and Strategy
 - ▶ **28th January:** Stakeholders Workshop
 - ▶ **3rd February:** Return Comments on Strategy
 - ▶ **15th February: FINAL SUBMISSION**
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