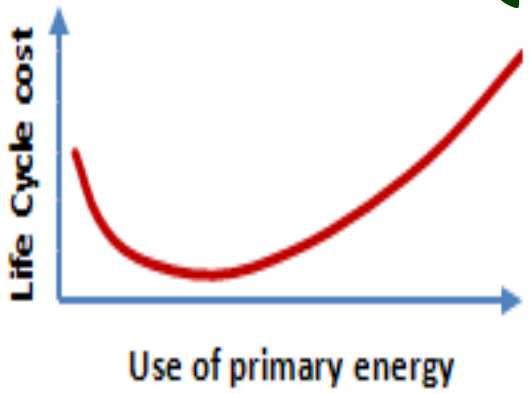
Development of Cost Optimal Building Performance Requirements for housing in a Mediterranean Climate



Alan Abela, Mike Hoxley, Paddy McGrath, Steve Goodhew

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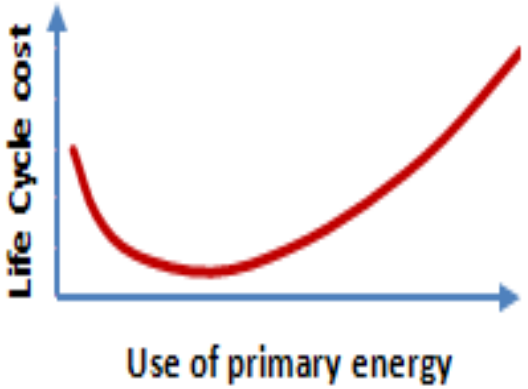
Overview

- Scope
- Introduction
- Methodology
- Case Study and Analysis
- Conclusions



Scope

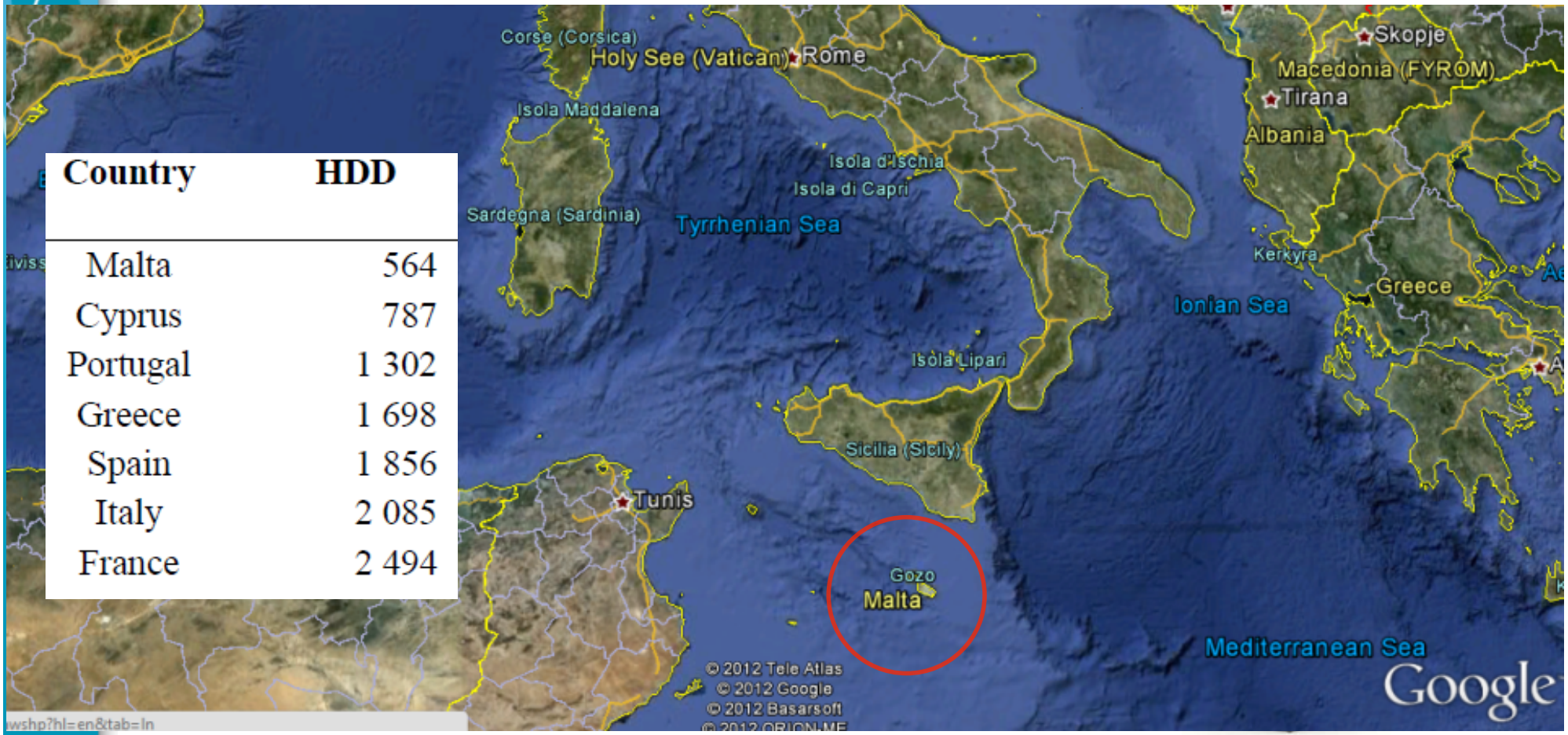
minimum requirements for the energy performance of buildings and building elements should be set with a view to achieving the **cost-optimal balance** between the **investments involved** and the **energy costs saved** throughout the **lifecycle of the building**

(Art. 10, DIRECTIVE 2010/31/EU)

Introduction

316 km^2, 35°50' N, 14°30' E, pop 419,000

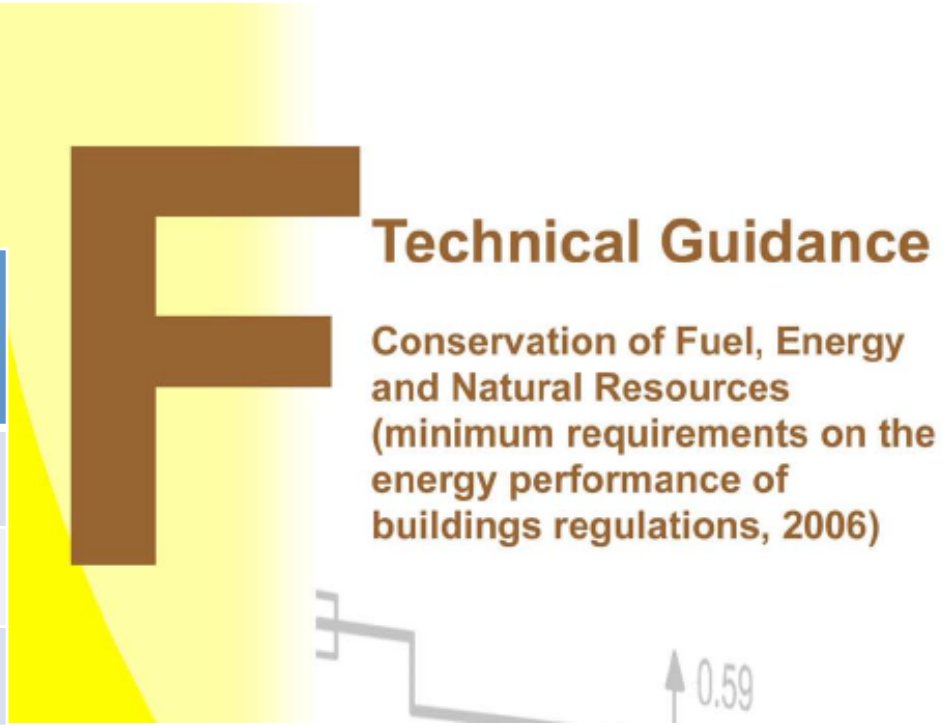
Country	HDD
Malta	564
Cyprus	787
Portugal	1 302
Greece	1 698
Spain	1 856
Italy	2 085
France	2 494



Introduction

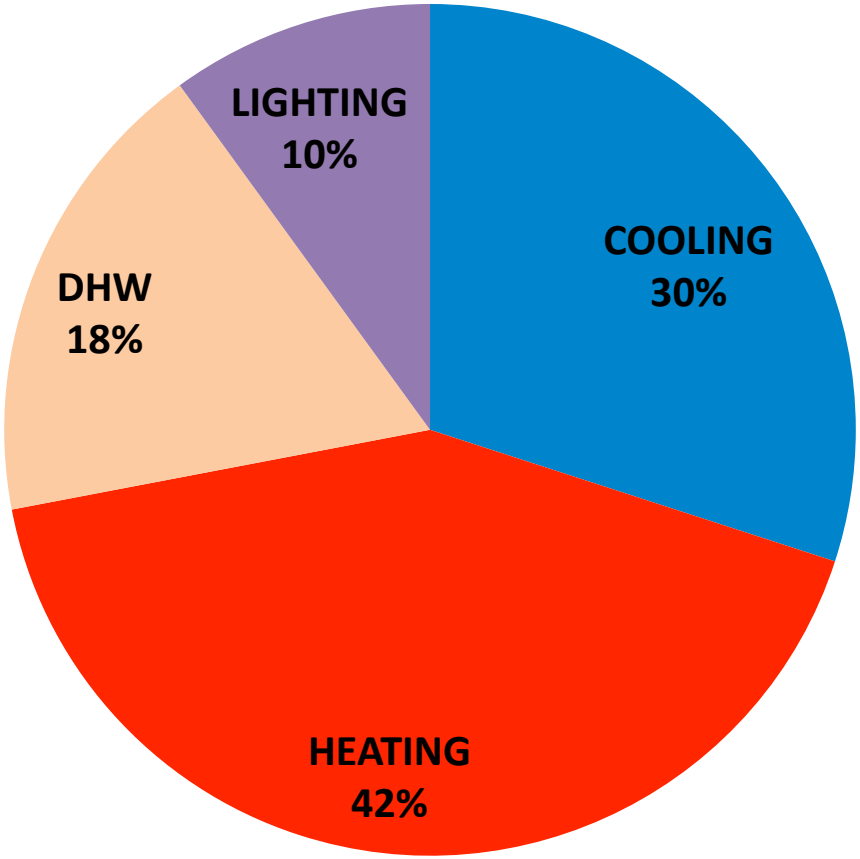
Introduction

	Maximum U-values (W/m²K)
WALLS	1.57
FLOORS	1.57/1.97
ROOFS	0.59
WINDOWS	5.8



Introduction

Primary Energy/m^2 yr

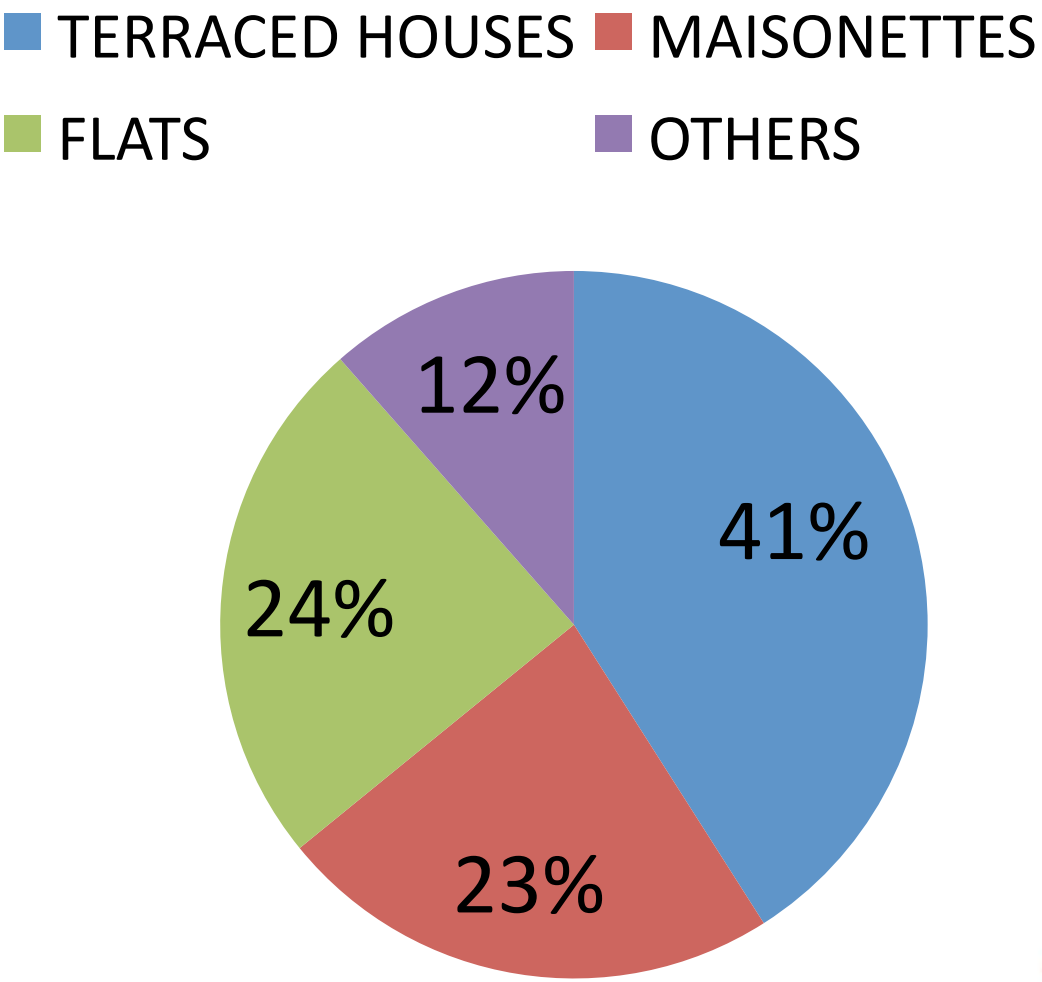


Abela et al, An investigation into the practical application of energy certificates, SEB12 Sustainability in Energy and Buildings, Stockholm, September 2012.

Methodology

- Establish reference buildings
- Identify energy efficiency measures
- Calculate primary energy demand resulting from application of measures
- Calculate the global cost

Limited data on building stock



National Statistics Office, Malta, 2005

Typologies

- Traditional (mainly rural)
- British Colonial Period
- Post war development
  - Speculative
  - Owner occupied
- 2006 Regulations (EPBD)

Energy Efficiency Measures

Passive Measures	Roof Insulation
	Wall Insulation
	Floor Insulation
	Different window types
	Improving air tightness
	Shading Elements
Active Measures	Improve Heating System Efficiency
	Improve Cooling System Efficiency
	Solar Water Heating
	Photovoltaic Systems
	Energy Efficient Lighting

Calculation of primary energy

- **National methodology – EPRDM**

  Based on EN 13790

  monthly calculation

Malta Resources Authority

Ministry for Resources and Rural Affairs

Building Regulation Office

ENERGY PERFORMANCE CERTIFICATE OF DWELLINGS MALTA

- **IES- VE – dynamic simulation software**

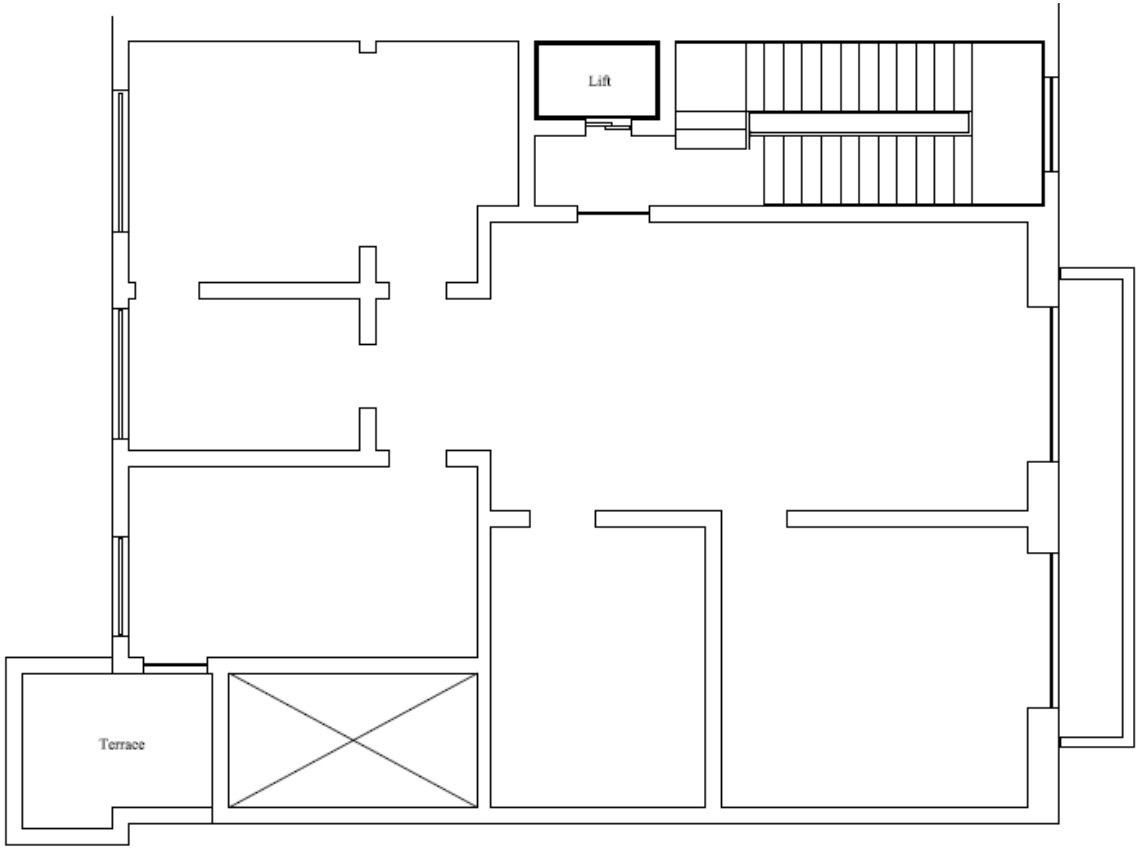
INTEGRATED ENVIRONMENTAL SOLUTIONS

VE-Pro

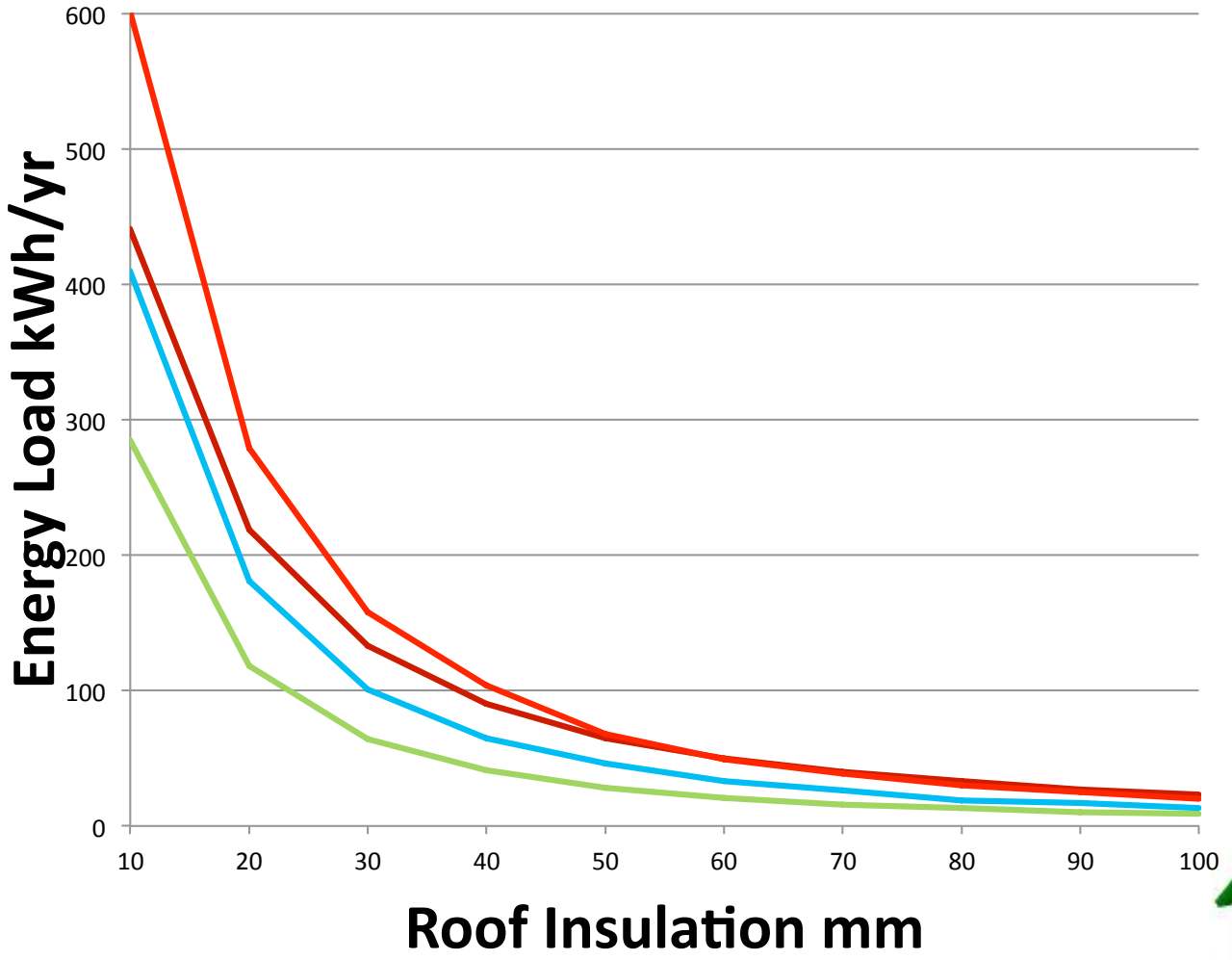
Global costs

- No local databases available so costs of measures obtained from contracting firms
- Energy costs obtained from the sole supplier
- Discount rates assumed at 3% for government and 6% for private

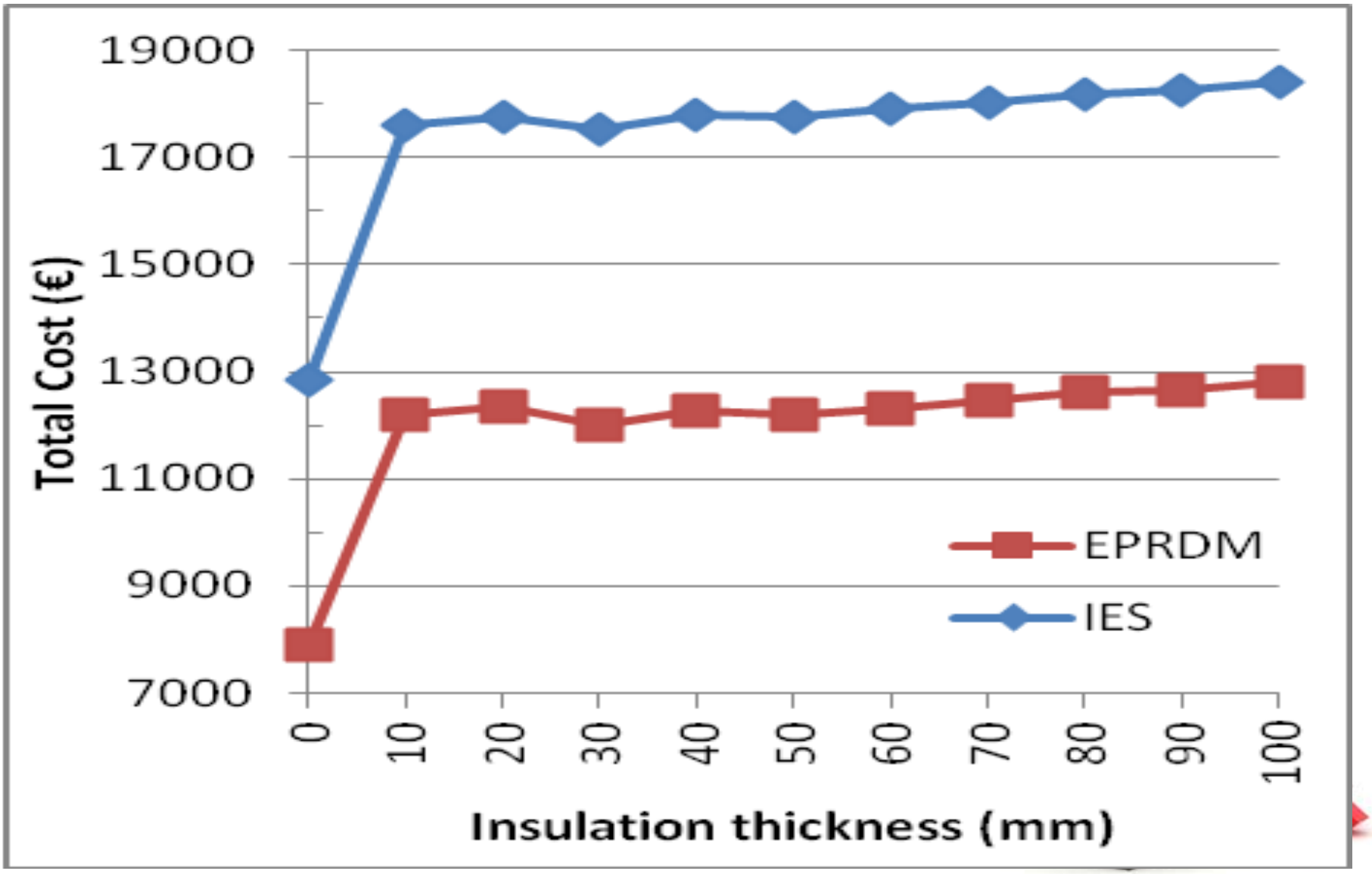
Case Study and Analysis



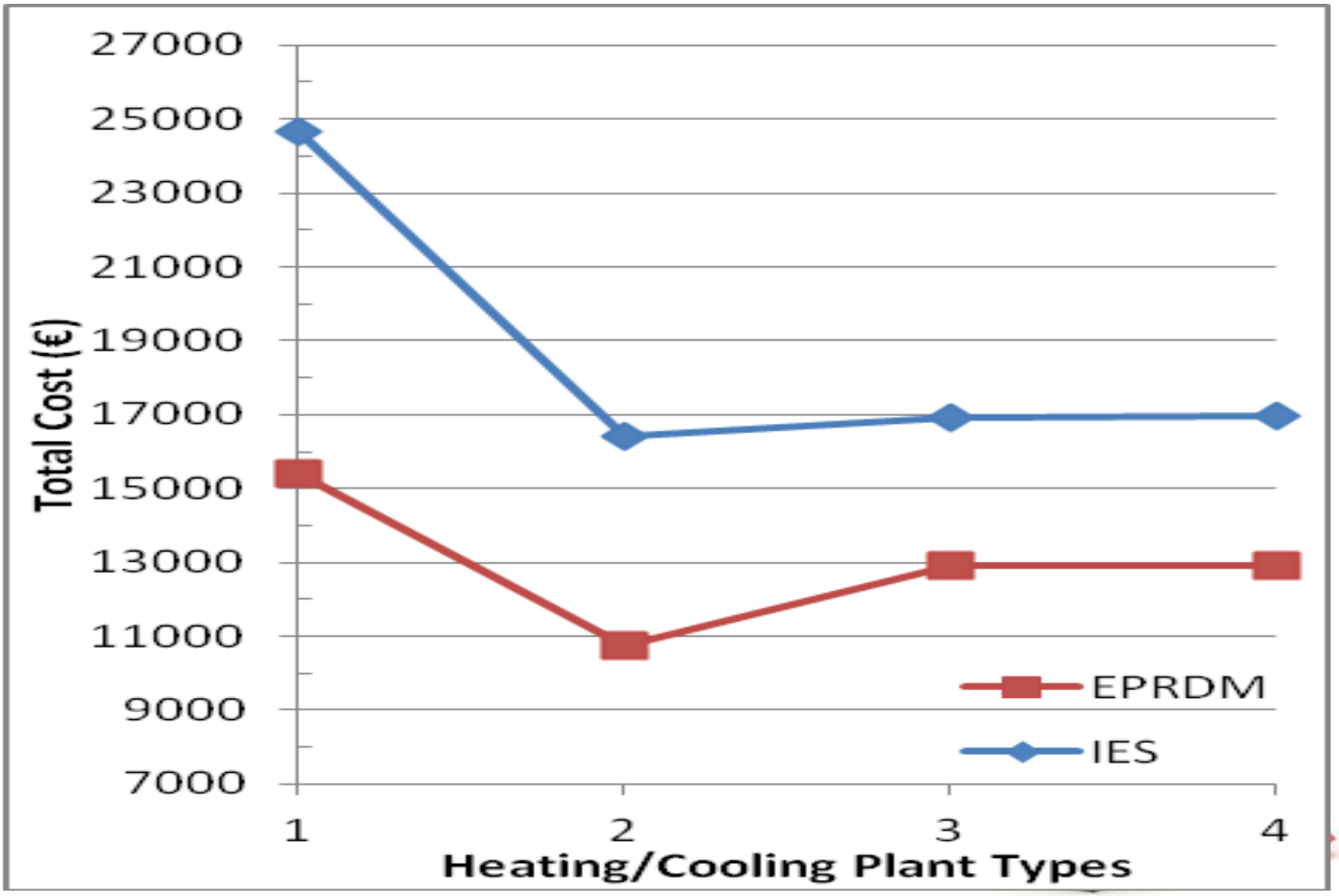
Change in heating & cooling load



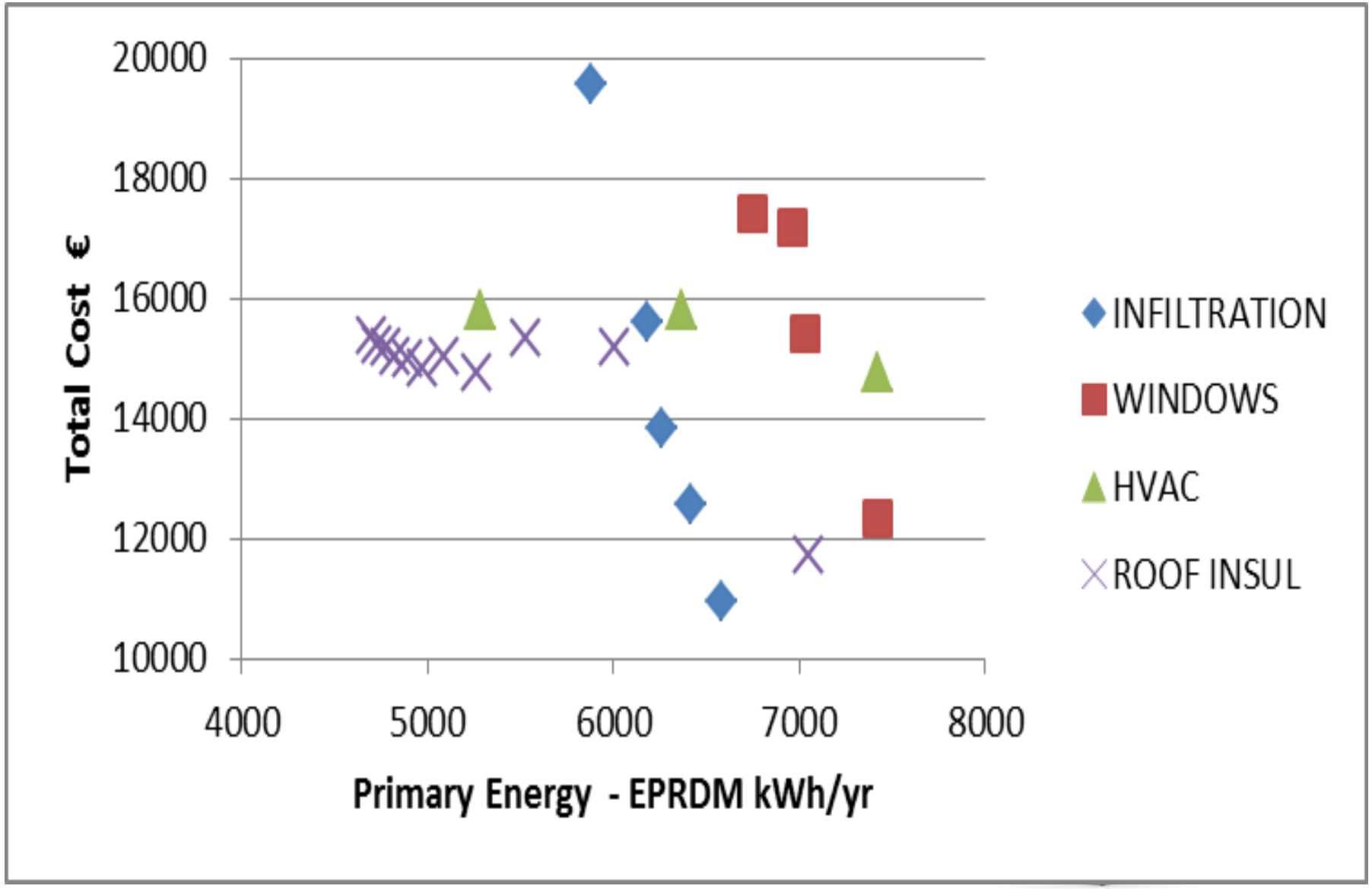
Global cost 30 yrs & 6% discount rate



Global cost 30 yrs & 6% discount rate



Global cost 30 yrs & 3% discount rate



Conclusions

- Methodology for calculation of primary energy
- Different cost optimal for new build and for existing buildings

Conclusions

- A different approach for mild climatic regions?
- Active measures could be preferable

Conclusions

- Effect of discount rates and predicted energy price increases
- Cost-optimal or NZEB?

THANK YOU

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