Energy certification of office buildings in 6 EU countries:

EUROPROSPER

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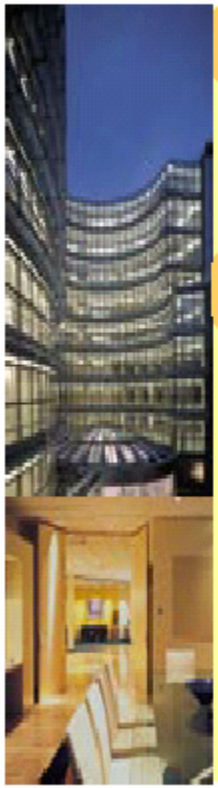
For the Europrosper UK Team

EUROpean PRogramme for Occupant Satisfaction, Productivity and Environmental Rating of buildings

Certification schemes for all buildings



Why?

- To facilitate the transfer of clear and reliable information on the energy performance of buildings
- To make energy efficiency more attractive

How?

Energy performance **certificates** for new and existing buildings should be available when they are constructed, sold or rented out

The certificates should:

- not be more than 5 years old
- include advice on how to improve the energy performance
- be displayed in publicly owned, occupied or frequented buildings. The displayed information should include the current as well as the range of indoor temperatures

Directorate General for Energy and Transport Information and Communication

EPD latest version : key points for building certification

Common position adopted by Council of European Union 5 September 2002

Recital 16: The Energy Certification process….

"…..To the extent possible, the certificate should describe the actual energy performance situation of the building and may be revised accordingly…..

……Member states should facilitate the use of **incentive systems** (*for their certification schemes*)"

Common position of 5 September 2002
key points for building certification

Article 2: Definition of energy performance of a building

"**the amount of energy actually consumed** or estimated to meet the different needs associated with a standardised use of the building, which may include inter alia heating, hot water heating, cooling, ventilation and lighting. This amount shall be reflected in one or more numeric indicators which have been calculated, taking into account insulation, technical and installation characteristics, design and positioning in relation to climatic aspects, solar exposure and influence of neighbouring structures, own-energy generation and other factors, including indoor climate, that influence the energy demand"

Common position of 5 September 2002
key points for building certification

Article 4: Setting energy performance requirements

"….These requirements shall take account of general indoor climate conditions, in order to avoid possible negative effects such as inadequate ventilation…."

Common position of 5 September 2002
key points for building certification

Article 7.1

- Certificate required when building constructed, sold or rented out
- Certificate expires after 10 years

Article 7.2

- Certificate must compare energy performance with reference values such as benchmarks
- Certificate must include advice on how to improve energy performance cost-effectively

Common position of 5 September 2002
key points for building certification

Article 7.3

- For buildings > 1,000 m² frequented by public, energy certificate must be displayed in prominent place clearly visible to public

- Recommended and actual indoor temperatures MAY also be clearly displayed

Common position of 5 September 2002
key points for building certification

Article 15.1

- Member states must comply with EPD within 3 years of it coming into force

  ie Jan 2006

Article 15.2

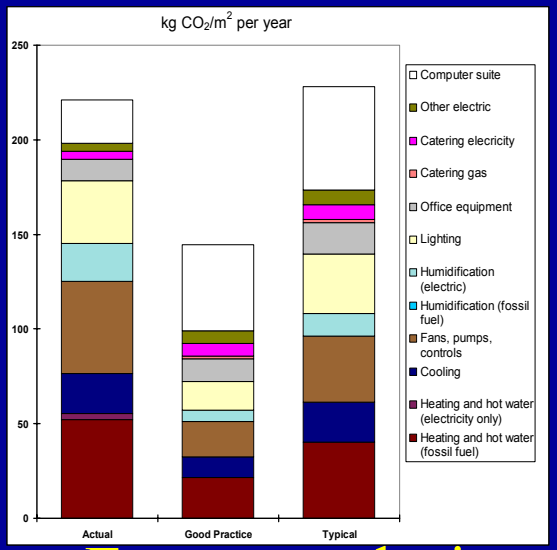
- Implementation of certification may be delayed by up to a further 3 years if a Member State lacks sufficient qualified assessors

  ie Jan 2009

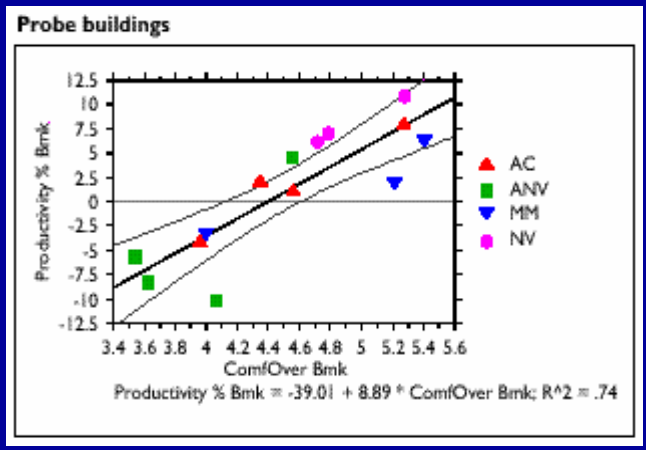
The timetable for Certification

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Ratification by €Parliament										
Europrosper										
Adoption by Member States										
Certs for Public buildings										
Certs for Private buildings					Voluntary If incentivised			Mandatory At time of sale		

To give energy saving advice, certification must be based on understanding how energy is used in a building and the internal environmental conditions achieved

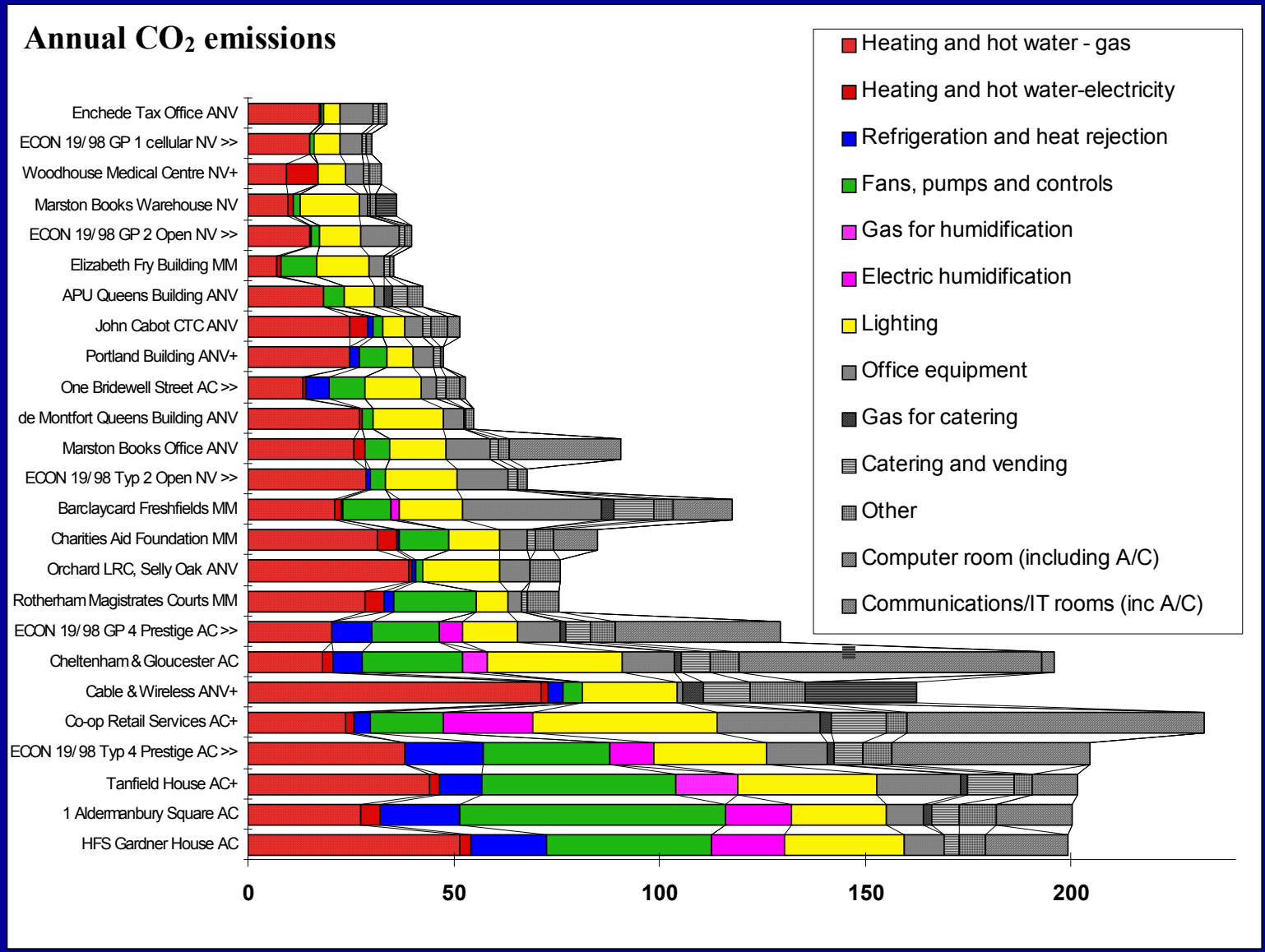


Energy analysis



Productivity and comfort

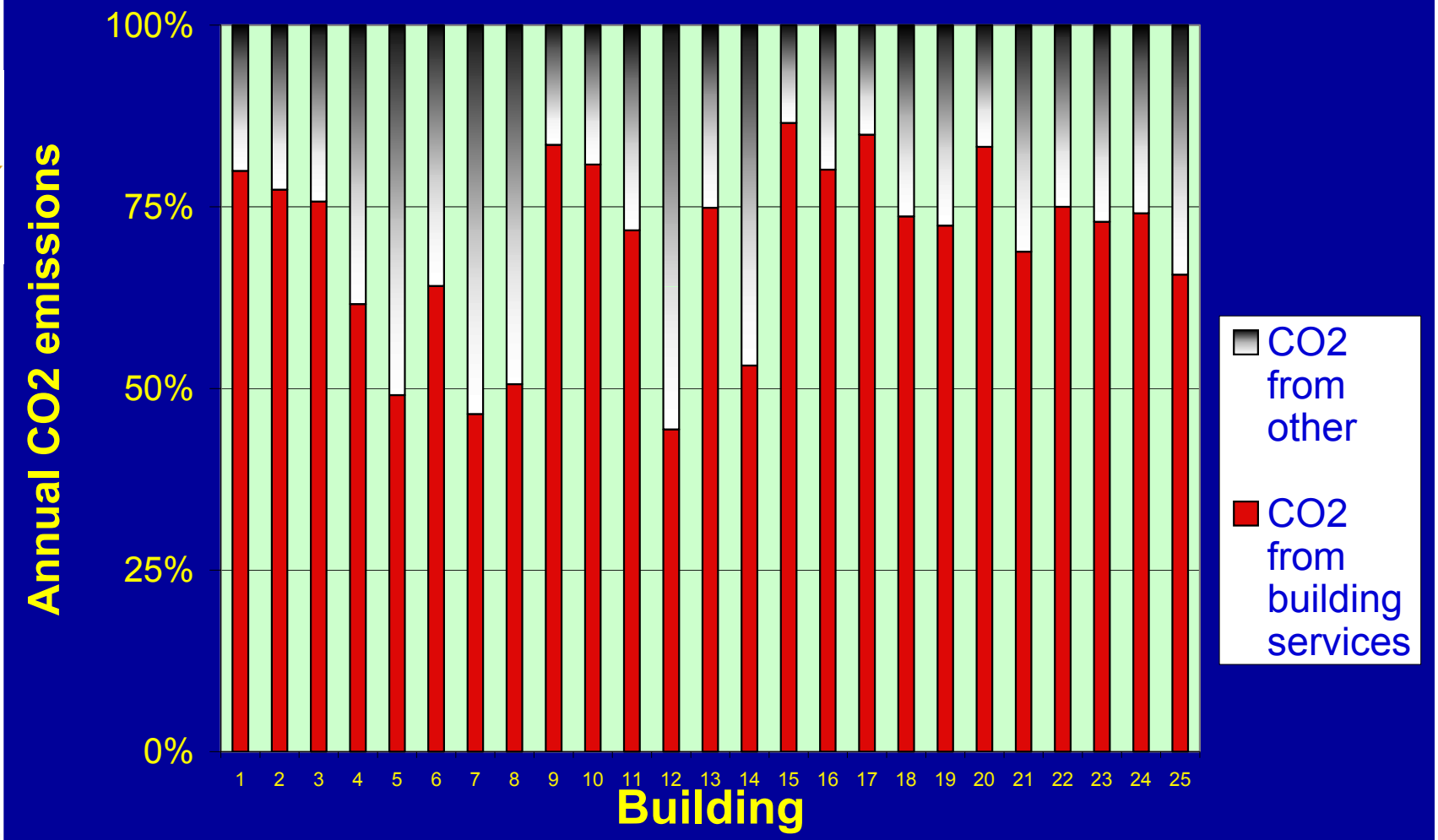
End use analysis of metered energy



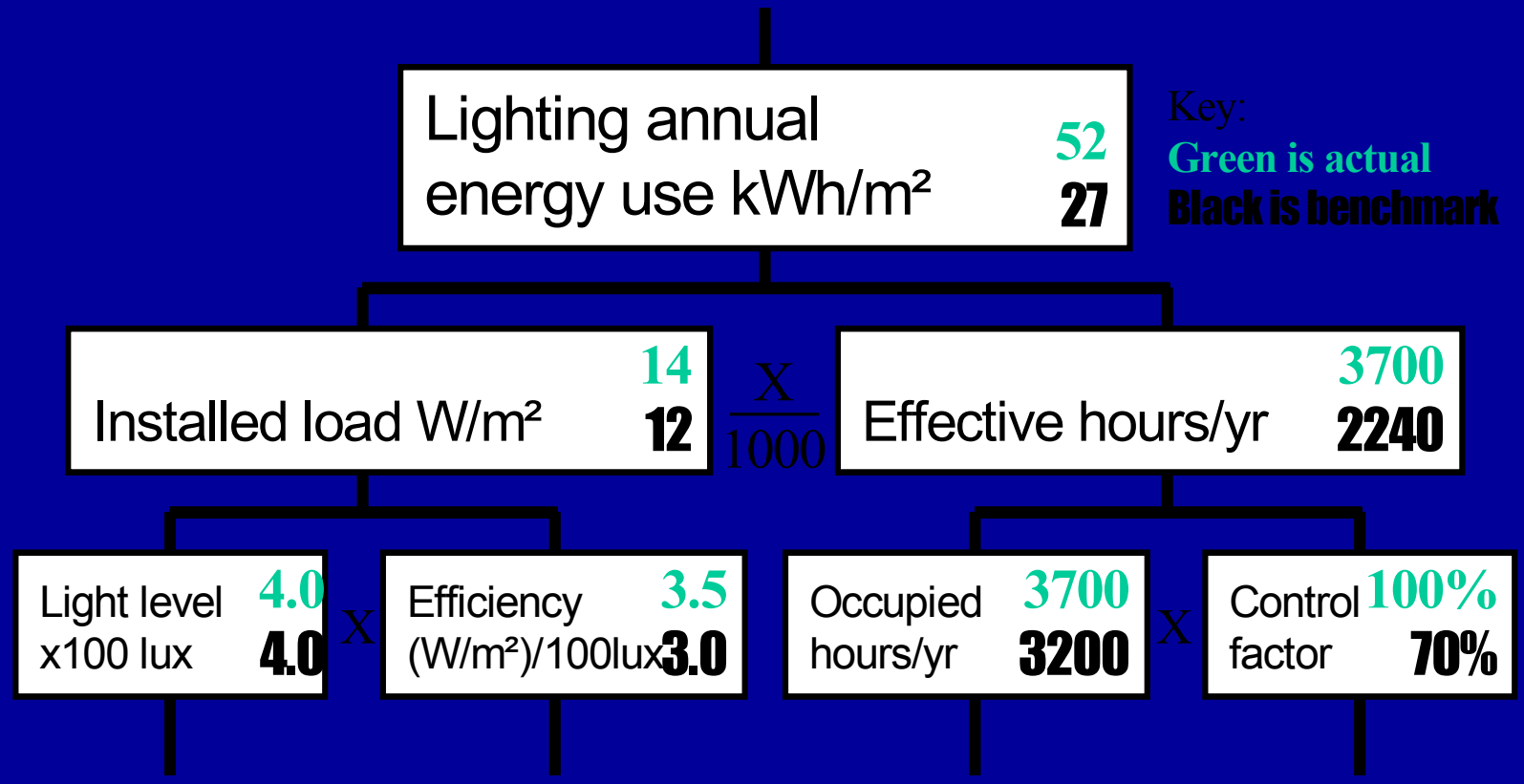
WHAT MAKES UP MEASURED CONSUMPTION?

- *The theoretical potential* of the base building's fabric and services under standard assumptions.
- *The build quality* of the above.
- *The fitout* by the occupant. *THIS OFTEN UNDERMINES THE DESIGN INTENTIONS.*
- *The equipment added* by the occupant.
- *The pattern of use* of the building & equipment.
- *Operation, control, maintenance, management* of all the above.

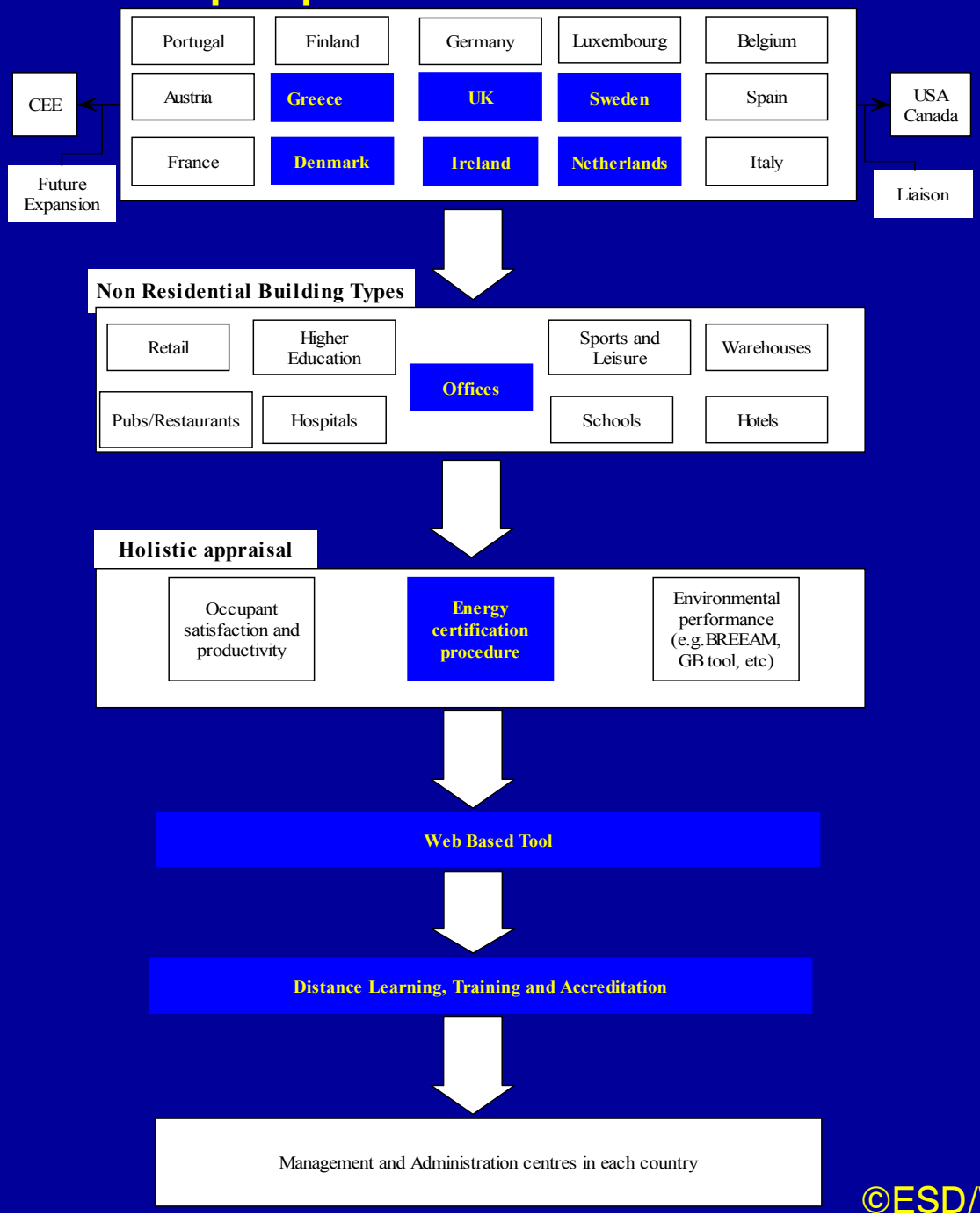
Building services energy (CO2) is 50-75% of total metered consumption



Tree diagrams: the 'roots' of energy end use



The Europrosper vision - realistic deliverables



Europrosper objectives

- Review existing benchmarking methods in each country and on the web
- Develop Certification methods
  - Build on existing methods
  - Consult with Industry Steering Groups
  - Develop site survey manuals for trained or self-assessors
- Develop training material
  - State of the art distance learning
  - Web based tools (for accessibility and ease of maintenance)
  - Face to face training and examination days
- Dissemination and exploitation
  - Write business plan for administration centres
  - Report on extending methods to other building types

Europrosper Timetable: April 2002 – March 2004

Activity	Description	Phase Leader	Activity duration	Month 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	**Phase 1: Mobilisation**	ESD																									
1.1	Negotiate contracts with partners, co-funders and steering groups		2																								
1.2	Confirm project plan		1																								
1.3	Establish project Web site		2																								
2	**Phase 2: Establish current state of art for benchmarking energy use by office building**	ESD																									
2.1	Document state of art on energy benchmarking in all Partners' countries		3																								
2.2	Review Web based non-domestic building benchmarking schemes from worldwide sources		3																								
2.3	Document fundamentals in each country's proposed benchmarking method		2																								
3	**Phase 3: Develop building energy certification methods**	ESD																									
3.1	Agree methods with country steering groups		7																								
3.2	Develop energy audit tool in each country		6																								
3.3	Develop site survey manual for each country		4																								
3.4	Demonstration of pilot scheme in each country		4																								
4	**Phase 4: Develop training courses**	UCD																									
4.1	Distance learning module to teach building energy auditing		7																								
4.2	Mount assessment tools on the Web and Beta test		4																								
4.3	Face to face training course with hands on case study in host building		3																								
4.4	Accreditation procedures		3																								
4.5	Transfer training course material to Swedish, Danish, Greek and Dutch partners		3																								
4.6	Demonstration of pilot training scheme in each country		3																								
5	**Phase 5: Dissemination and terms of reference for EUROPROSPER admin centres**	Esbensen																									
5.1	Identify the scope and nature of the centre's activities		3																								
5.2	Write specification for administration centre		2																								
5.3	Draft business plan for administration centre		3																								
5.4	Review extension to other building types and other EU countries and CEE		3																								
6	**Phase 6: Project management and meetings**	ESD																									
6.1	Hold 5 project progress meetings in months 4, 9, 13, 18 and 23		5																								
6.2	Project management and financial control		24																								
6.3	Project reporting		8																								
7	**Phase 7: Liaison with SAVE project ENPER-TEBUC**	BBRI																									
7.1	Liaison with BBRI on SAVE ENPER-TEBUC project		24																								
Activity	Description		Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

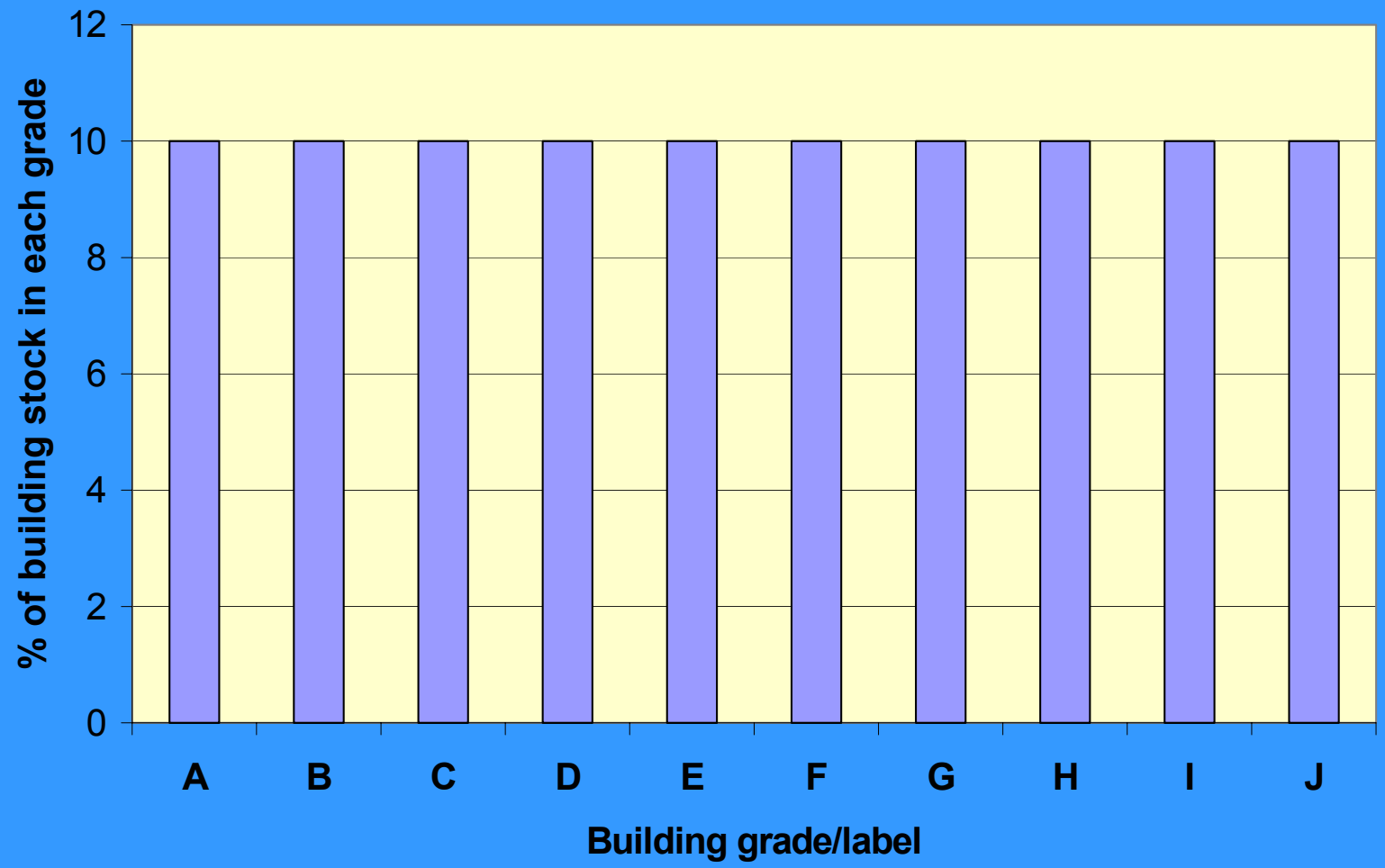
KEY

- General Activity
- ISG Workshops
- Project Meetings
- 6 Monthly Reports
- Interim Report
- Final Report

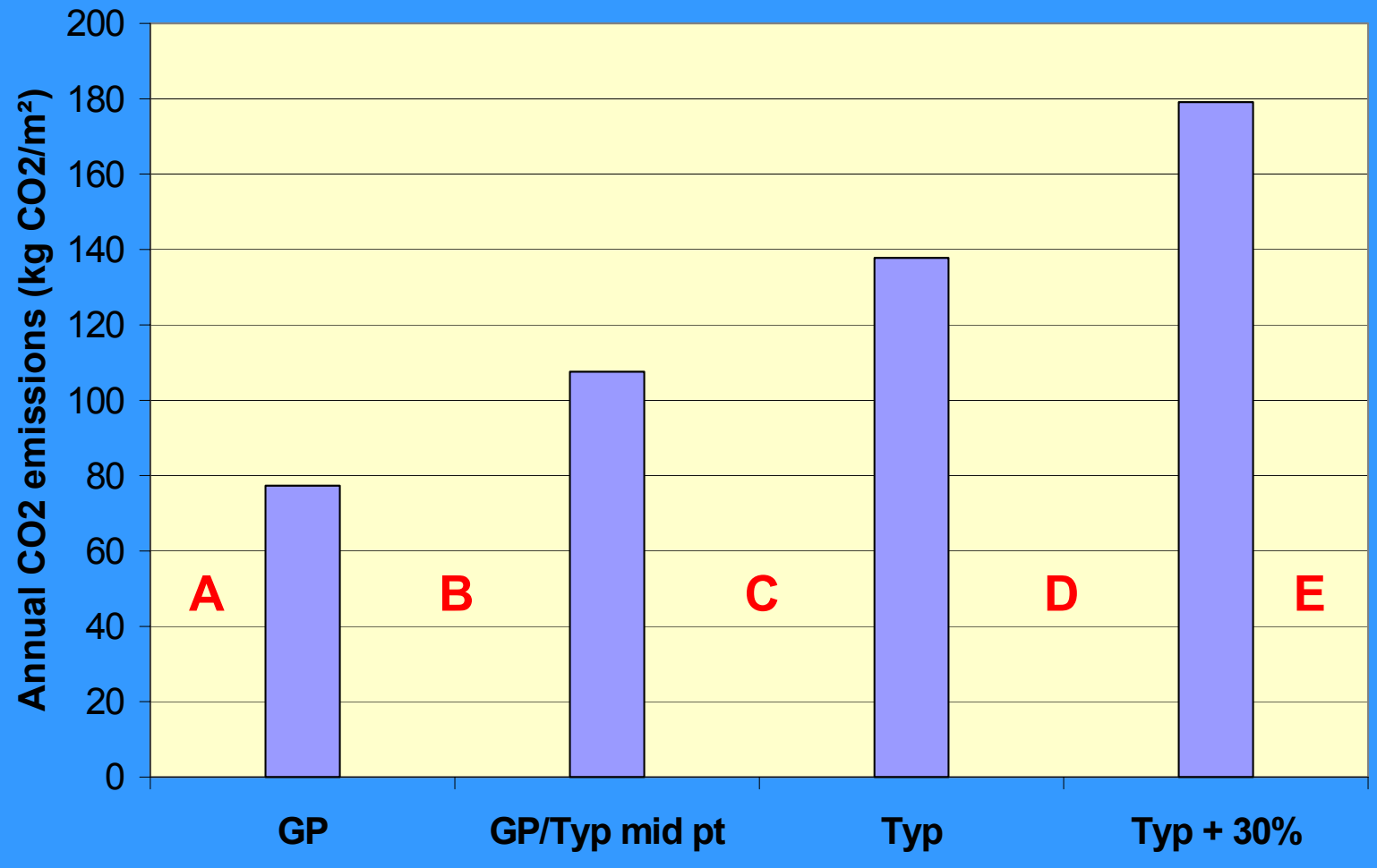
State of Art Review findings

Country	Name of scheme	Type of scheme	Grading method	Energy saving advice?	Comfort assessed?
Experience with national certification schemes					
Denmark	ELO	Mandatory audit & certification for buildings > 1,500 m²	By statistical distribution of peers	Detailed	No
Finland	Energy Audit Programme (EAP)	Incentivised audits	N/A	Detailed	No
US	Energy Star	Voluntary web scheme	By statistical distribution of peers	No	Yes
Australia	Australian Building Greenhouse Rating (ABGR)	Voluntary web scheme	Against benchmarks for a typical office building	No	No
Experience with national benchmarking schemes					
UK	ECONs 19 and 78 TM22	Voluntary 'official' rating with benchmarks for end uses	Against benchmarks for 4 iconic office buildings	Generic	No
Norway	Key Numbers	Voluntary 'official' rating by end use analysis	Against benchmarks for a typical office building	Detailed ENCON measures	No

Absolute Grading, say by equal deciles eg ELO, Energy Star



Grading **Relative** to benchmarks

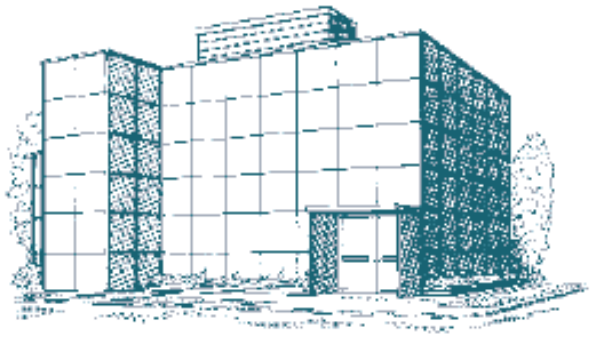


Iconic offices used for UK benchmarks

1 naturally ventilated cellular

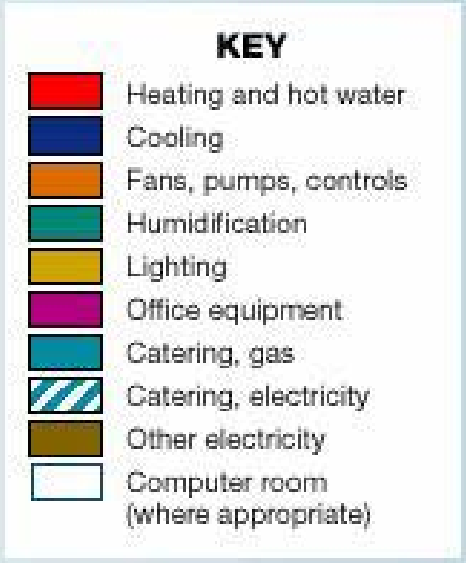
2 naturally ventilated open-plan

3 air-conditioned, standard



4 air-conditioned, prestige

End use breakdown for iconic offices



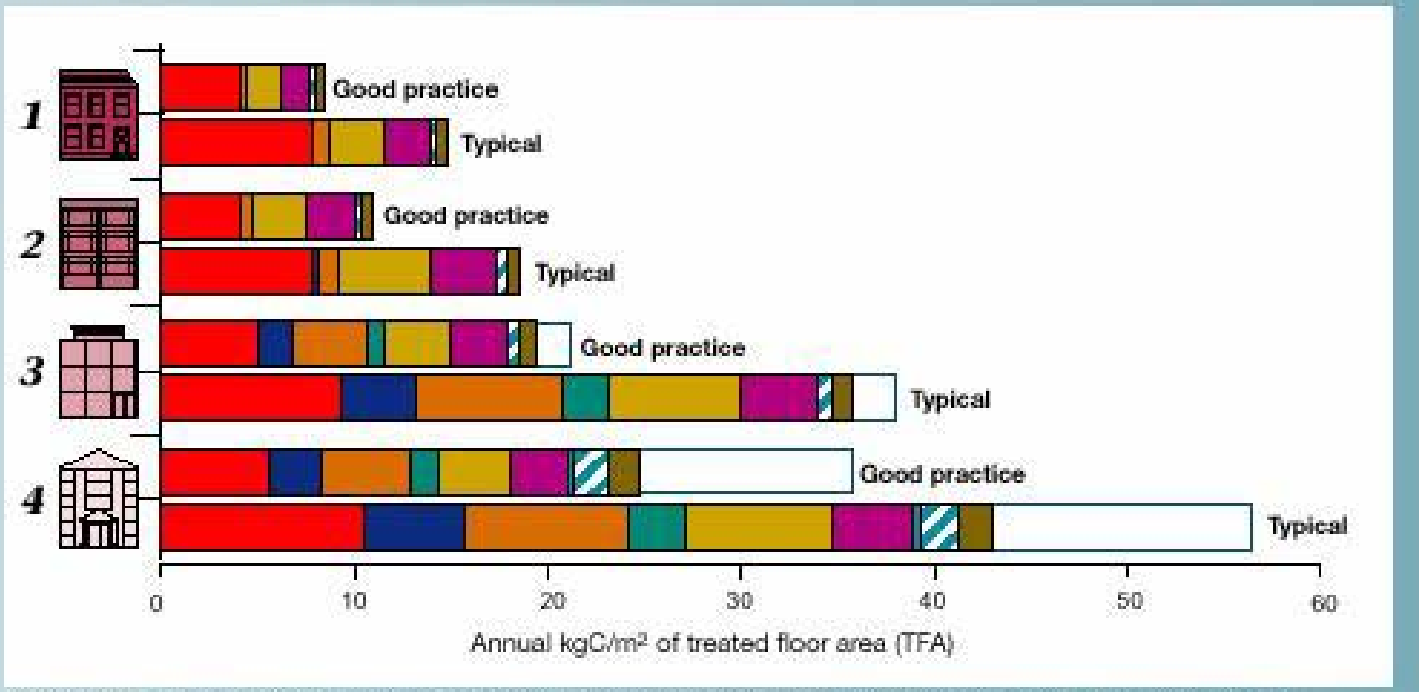
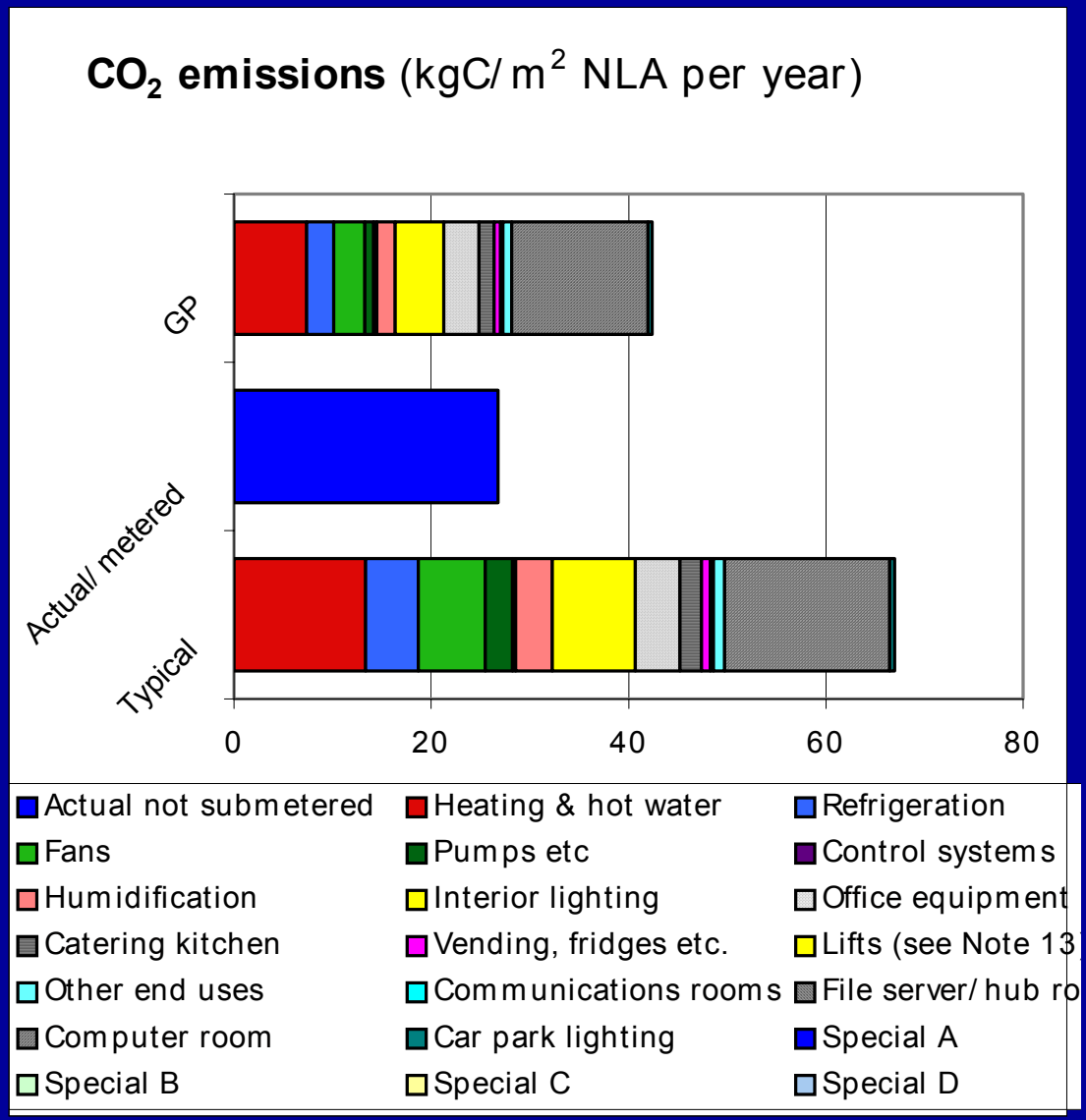


Figure 3 Carbon dioxide emission indices (CEIs) for good practice and typical examples of the four office types

Schedule of accommodation to generate a 'tailored' benchmark

Percent of NLA used by: *NOTE: Circ/ support incl special areas at the bottom of the sheet*	Nat vent	Air Con	MM	Total % of NLA	Calc areas sq m NLA	% of this area type well daylit	Total wkstns in area	Calc per sq m local area
Call Centre, true area		15%		15%	1485		250	5.9
Dealing room, true area		15%		15%	1485		200	7.4
Cellular offices, true area		5%		5%	495	100%	30	16.5
Open plan offices, true area		20%	20%	40%	3960	20%	300	13.2
Circ/ support (default 25% total)		25%		25%	2475		8	309.4
Totals	0%	80%	20%	100%	9900		788	12.6
Common parts uplift **Note 2**		25%		25.0%	2475		2	1237.5

Benchmarks tailored for Schedule of accommodation

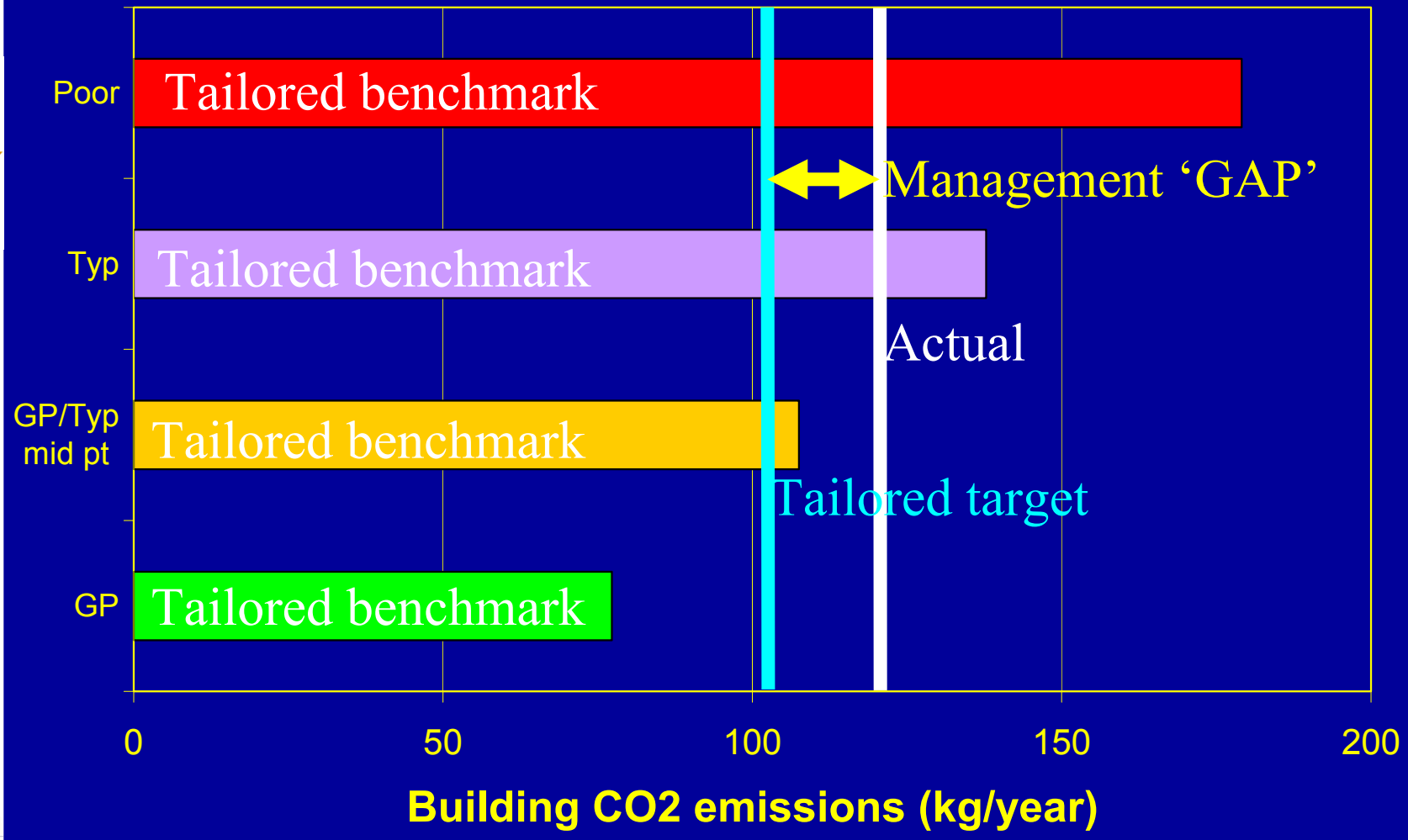


How to identify energy saving advice?

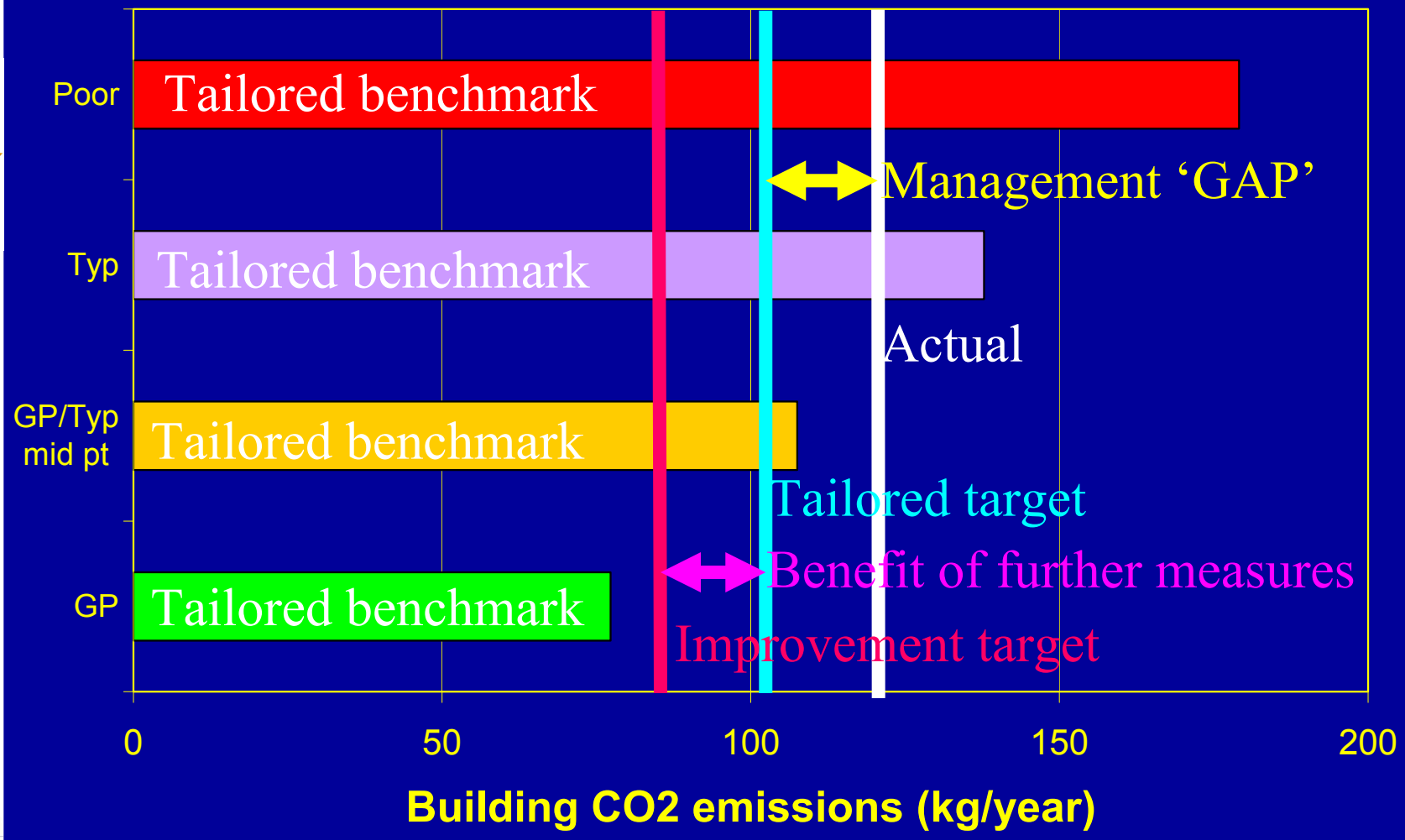
- **Automatically over the web for self-certifiers**
  - By asking questions about what standard energy efficiency measures are in place or might be installed
- **Via a site survey by trained assessor**
  - Using prescribed procedures set out in a manual

Knowing what energy efficiency measures are in place produces the tailored target.

The difference between this and the actual is the management 'GAP'



The scope for further energy saving measures identifies the 'improvement target'



Conclusions

- For simple buildings (80 – 90% of total), self-certification via web with QA check by trained assessor should be an option
- For complex buildings or where owner/occupier does not wish to self-certify, certification may require a site visit by a trained auditor
- The energy certificate will contain headline indicators plus detailed energy saving advice
- The headline indicators should include at least:
  - A grading relative to a fair/relevant benchmark eg tailored to the use and location of the building
  - An absolute grading (per m^2 or per occupant) to identify the unadulterated energy intensity of the building
  - Confirmation of satisfactory internal conditions

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