the impact of environmental constraints on the urban design in case of mega-events

case study: Summer Olympic Games

student: Darina Skiba
supervisor: Mindjid Maizia

Raised Issues

- Are the forthcoming Olympic Games "greener" than Olympic Games held without green legacy?

- What is the role of IOC in achieving "green" results?

Literature

- Sustainable Olympic Games: A dream or a reality?

  P. Furrer, the project manager, IOC

Olympic Movement has a big potential for advertising and implementing basic principles of sustainable development - Olympic Games being mega-events of international scale attract intense media and international attention and therefore can be used as advertisement tool.

- Green Olympics: Intension and reality

N. Maslova, Master of Science Thesis, Royal Institute of Technology, Stockholm, 2010

"..despite continuously improvement in the requirements through years the Host Cities are still managing to fail the preparation of environmental side of the Games"

"After the carried work it is recommended to enforce the cooperation between Non-Government Organizations and International Olympic Committee and create common system for evaluation of environmental performance, state more clear requirements for the ecological organization of Olympic Games and change focus from environment to sustainability".

Case study

Barcelona Summer Olympic Games 1992

- - The most successful Olympic Games in the history
- Huge regeneration project

London Summer Olympic Games 2012

- Claim to be “The Greenest Olympics ever”
- Ken Livingstone, "We have set ourselves two very challenging aims, to stage not only the greatest games ever but, as importantly, those games in 2012 must be the most sustainable in the history of the modern Olympics."




Analysed dimensions

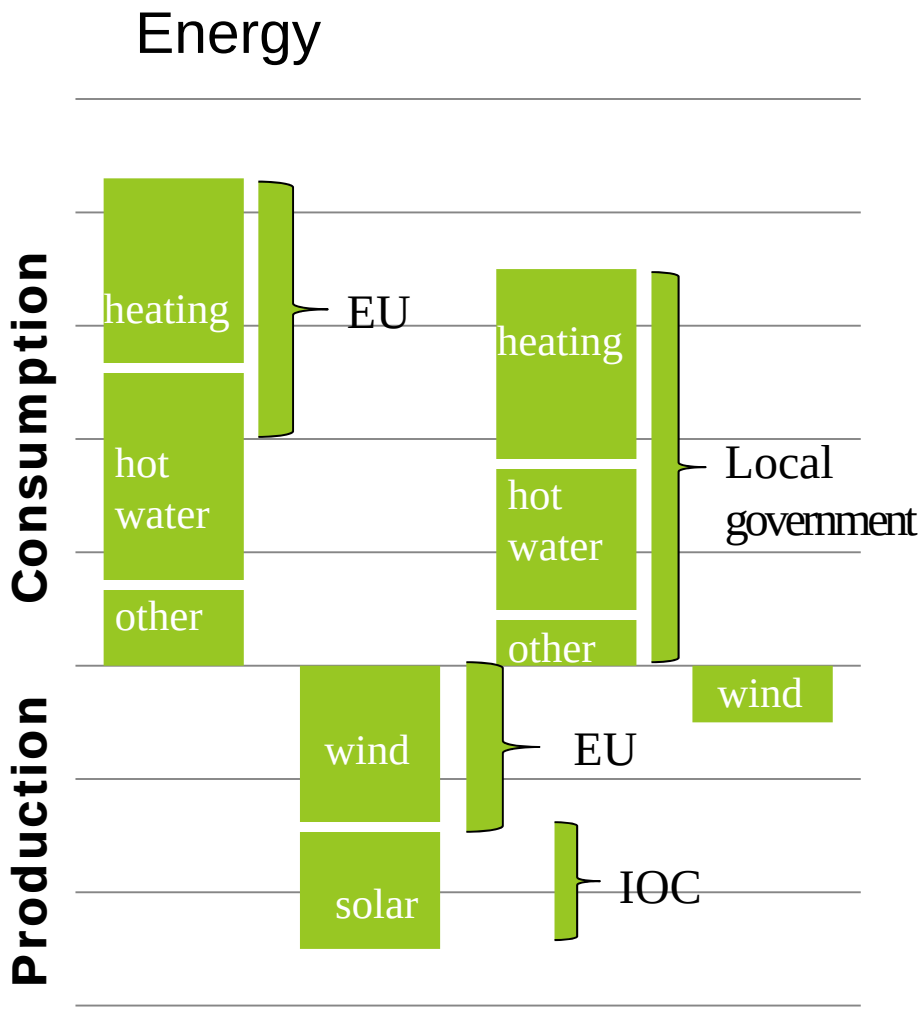
	Objects	IOC Specifications	Other Specifications
LONDON	Energy	- Proportion of energy from renewable sources - 20%	- Reduce energy use by 20%; 22% of energy - from renewable sources (EU Energy Efficiency Directive) - minimize energy use at all stages of development of the project; - replace fossil fuel energy sources with renewable; ban nuclear energy (GreenPeace)
	Buildings	- Include enrgy concerns in architectural plans, espesically thermal considerations - Avoid using toxic substances - Use environmentally-friendly materials and techniques	- Insulation, natural ventilation should be given preference - use of environmentally-friendly materials (GreenPeace)
	Carbon Emissions	- Reduce carbon emissions of the Olympic Park by 50%	- Reduce carbon emissions by 20% (EU Energy Efficiency Directive) - There should be no pollutant emissions to the air during construction or eco-lifecycle of the building or venue (GreenPeace)
	Transport	- 100% of visitors to use walking, cycling of public transport - 50% of materials for construction transported by water or rail	- Reduce need of private transportation - Establish non-fossil fuel based public transport - Ban fossil fuel based transportation vehicles for public and official access to the Olympic Games (Green Peace)
	Waste Management	- 90% of materials from construction must be recycled or reused - Minimize waste - Avoid useless construction	- ban burial of hazardous waste as part of any Olympic development - establish 100% closed-loop recycling systems (Green Peace)
	Water Management	- treat wastewater - protect water resources - satisfy the demand of sport event without endangering water supply of the region	- There should be no pollutant emissions to the water during construction or eco-lifecycle of the building or venue (GreenPeace)

Methodology

Quantitative Data → Qualitative Data

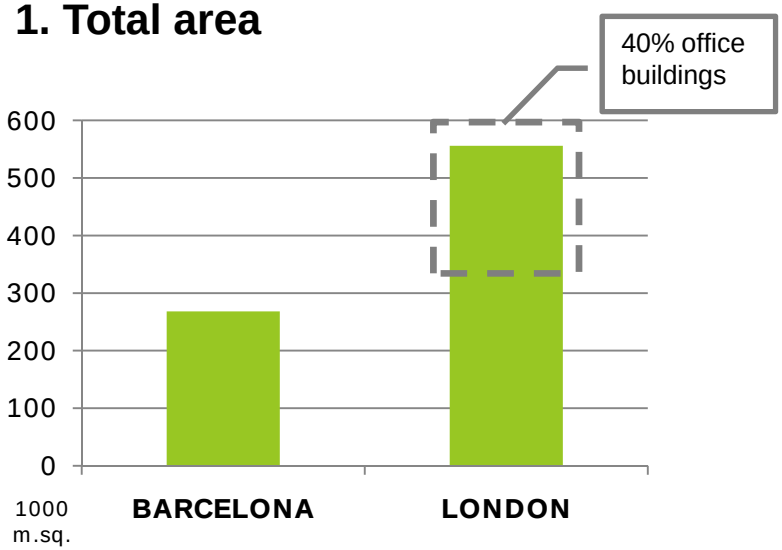
Comparative analysis of energy consumption and carbon emissions of constructed buildings related to the Summer Olympic Games in Barcelona 1992 and London 2012

Using following data:
Buildings' orientation, envelopes, insulation, meteorological data, electricity emissions for countries and etc.

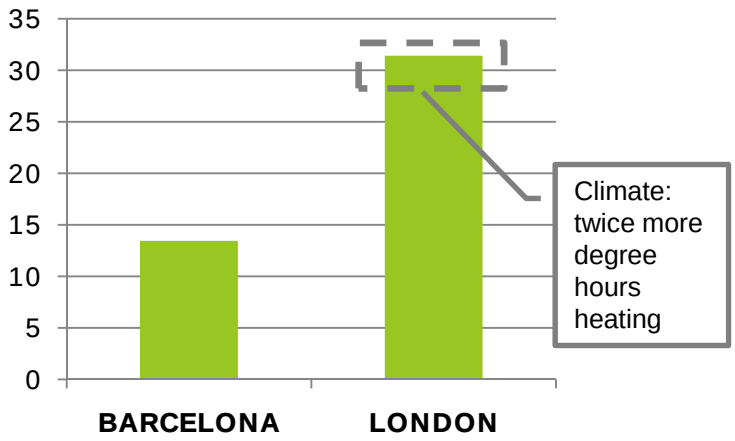


Results

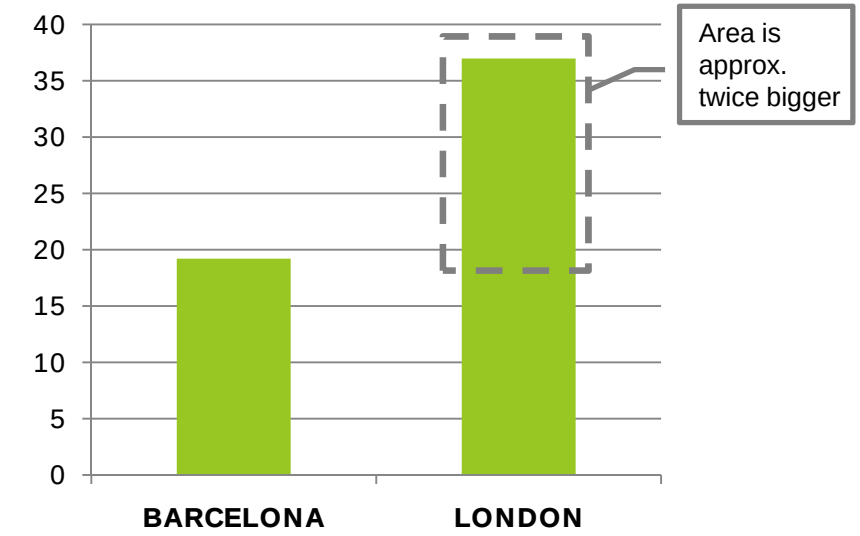
1. Total area



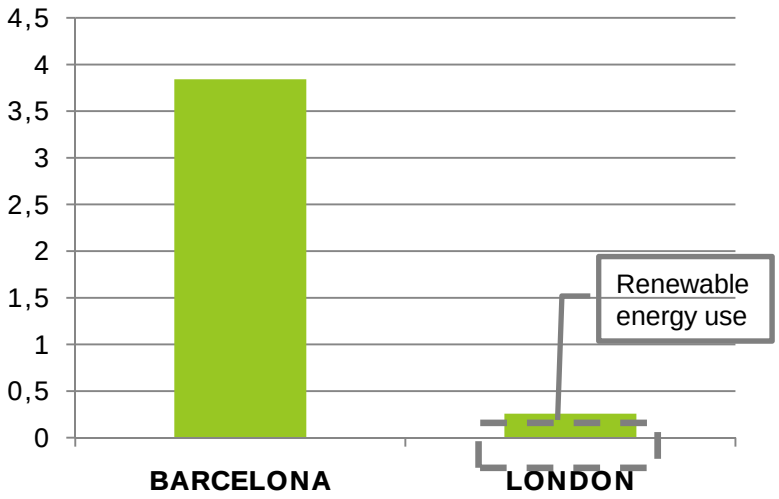
2. Total requirements GWh/year



3. Final consumption GWh/year



4. Total carbon emissions mega tones CO2/year

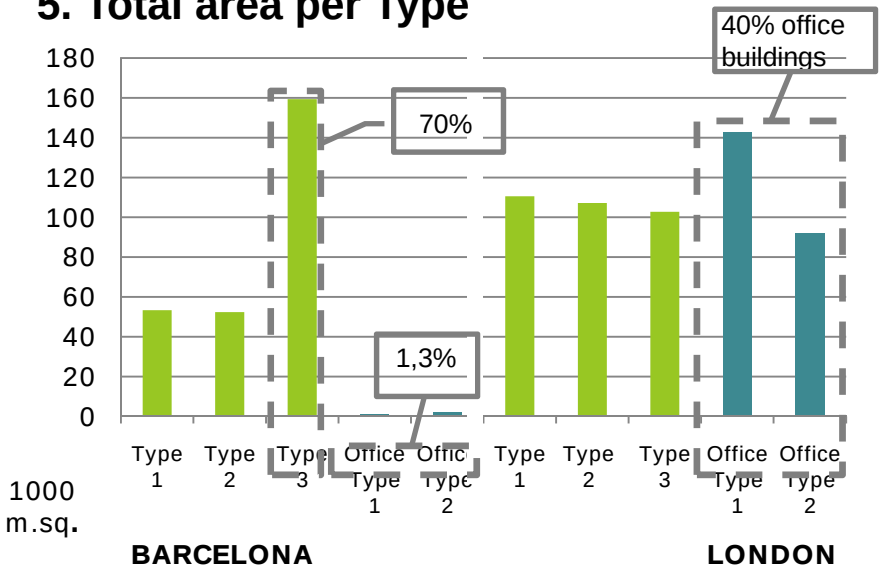


Technical data

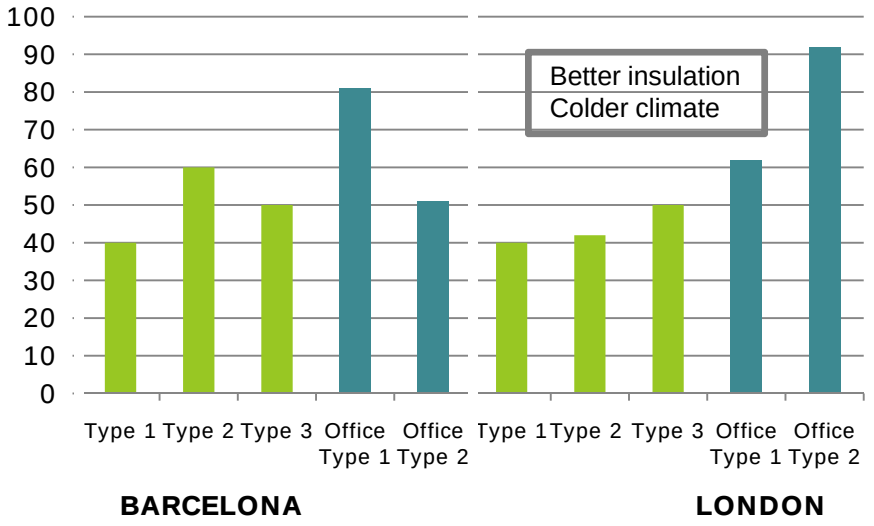
	Barcelona	London	Ratio
Degree Hours *Heating (C°*hours)*	45,756	74, 568	**3 : 5**
Winter solar radiation *(KWt/m2)*	280	472	**3 : 5**
Summer Solar radiation *(KWt/m2)*	780	528	**3 : 2**
Electricity Emission *(Kg of CO2/MWh)*	0,2	0,007	**28 : 1**
System type	gas	biomass	
Yield of the system	0,7	0,85	

Results: performance per m.sq.

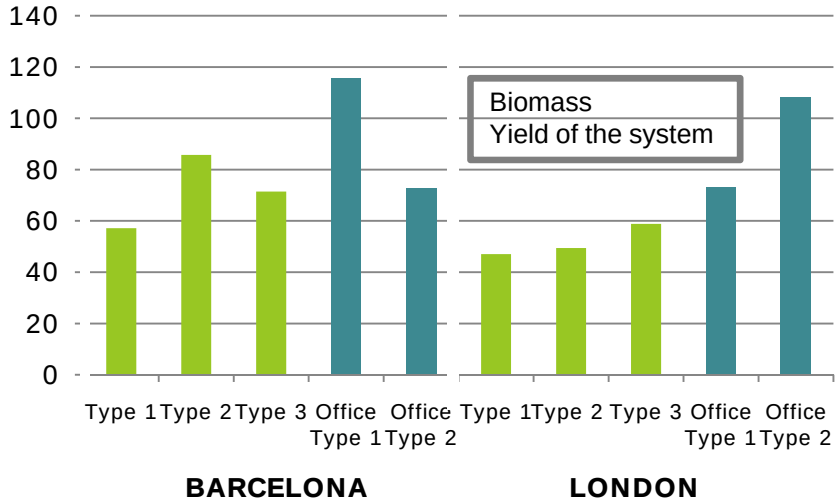
5. Total area per Type



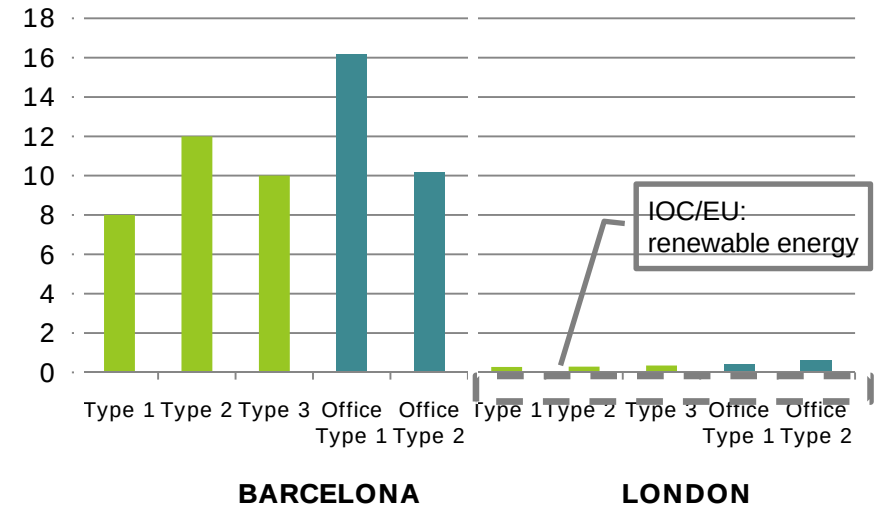
6. Energy requirements kWh/m.sq./year



7. Final consumption KWh/m.sq./year

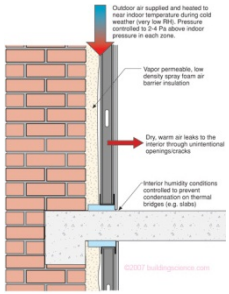


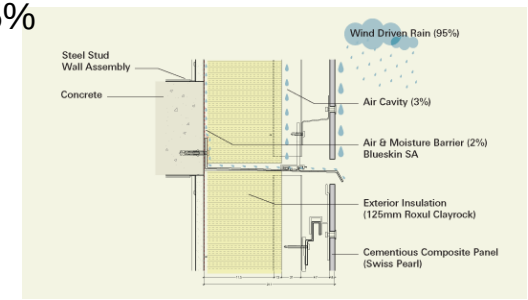
8. Carbon emissions kg CO2/m.sq./year



Types sample

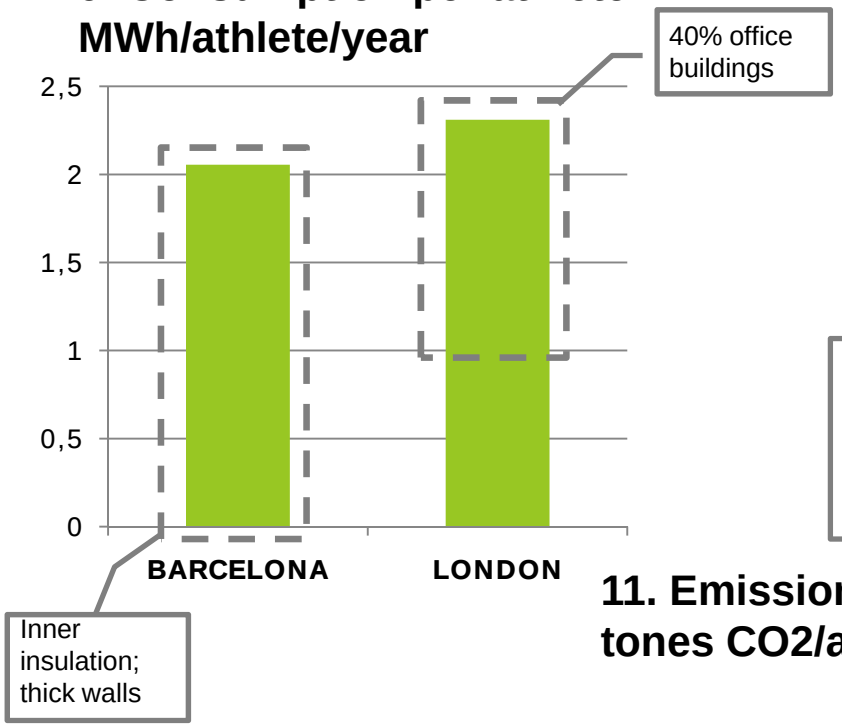
	BARCELONA	LONDON
Housing Type 1	Mapfre Tower	Stratford Village Type 1
Period of Construction	1991-1992	2008-2012
Building envelope material and thickness	aluminium 40 mm	cementous composite panels 150 mm
Building insulation and thickness	rock and slag wool 100 mm	roxyl clayrock 125mm
Type of roof	plain	plain
Number of floors	40	10
Floor height	2600	3000
Glazing rates	50%	37,5%



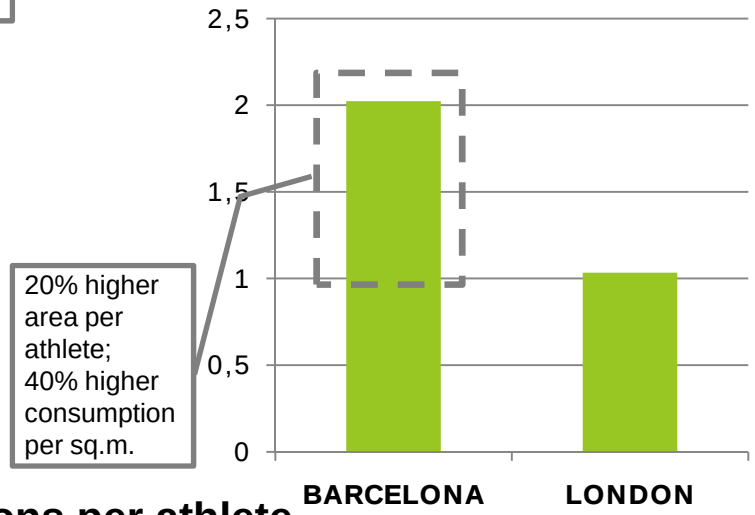


Results: per athlete

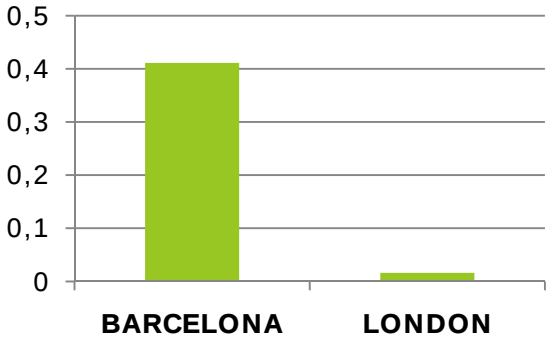
9. Consumption per athlete MWh/athlete/year



10. Consumption per athlete (housing only) MWh/athlete/year



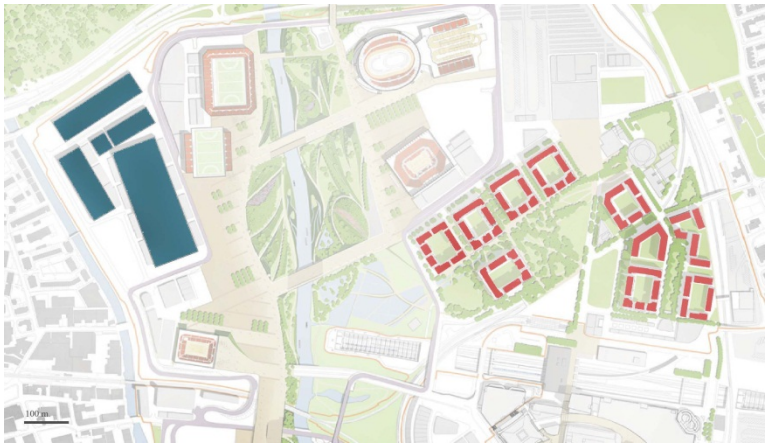
11. Emissions per athlete tones CO2/athlete/year



	Barcelona	London	Ratio
Number of athletes	9350	16000	**3 : 5**
Total area *(sq.m.)*	320 000	555 000	**3 : 5**

Vila Olimpica, Barcelona

Olympic Village, London



Conclusion

- Olympic Games in London are more sustainable than in Barcelona in the field of carbon emissions, while energy consumption indicators can be interpret differently

- The IOC does not participate actively in green legacy due to vague recommendations and duplicating other regulations (e.g. EU energy directive)

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