



SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY



TASK 59

Deep Renovation of Historic and Listed Buildings

Alexandra Troi – Eurac Research (IT)
Rainer Pfluger – University of Innsbruck (AT)

IEA Solar Heating and Cooling Research Co-operation Workshop

Wien, 5th June 2019

2018 
ANNO EUROPEO
DEL PATRIMONIO
CULTURALE
#EuropeForCulture

Around the world Partners & programmes



TASK SHARING

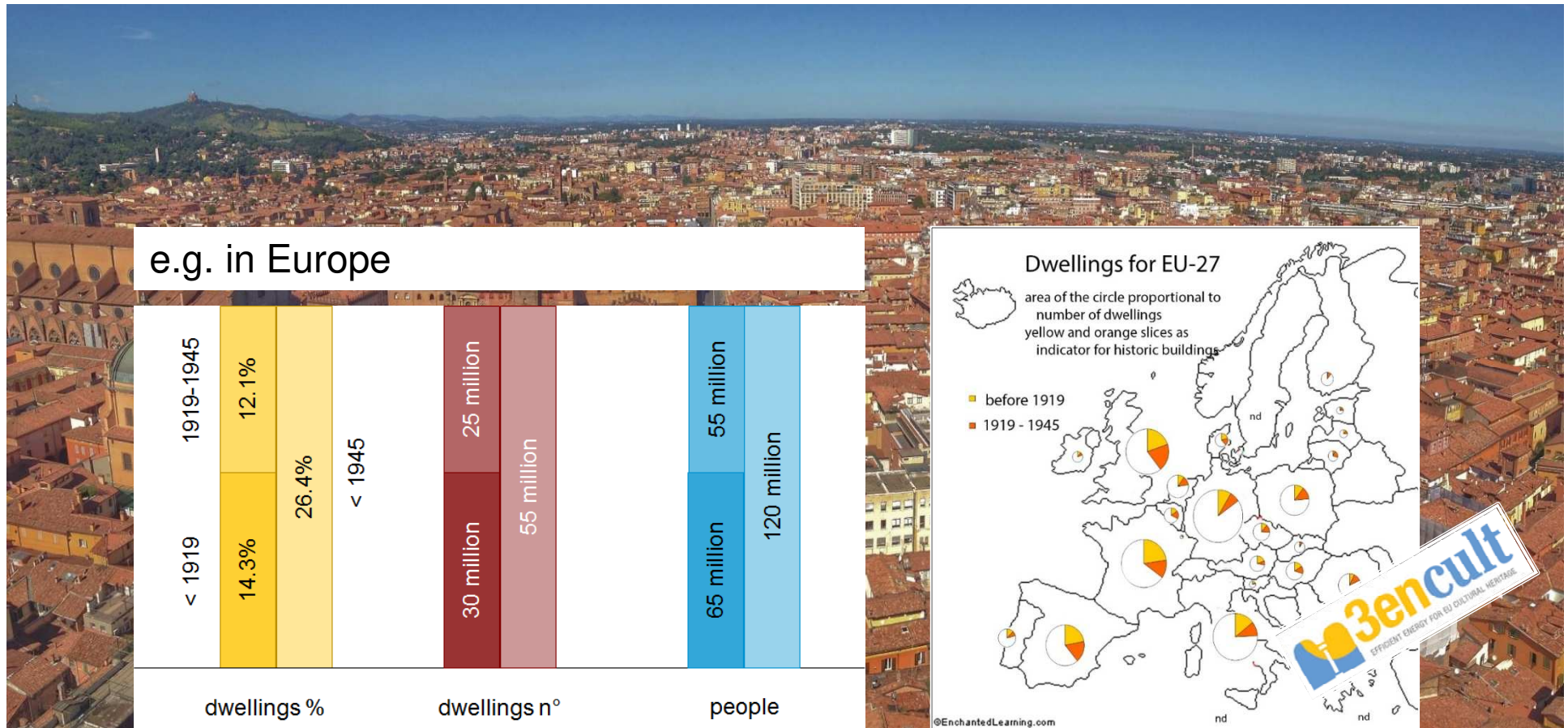
Twenty-two institutions from eleven different countries. Task59 will benefit from the expertise and previous experiences that the different partners will bring to the project.



TASK 59



There is a need



TASK 59



Vision

Conservation of historic buildings and climate protection is not an antagonism

Historic buildings will survive if **maintained as living space**. Energy efficient retrofit is useful for structural protection as well as for comfort reasons - comfort for users and “comfort” for heritage collections.

Understand the building and find the right solutions



TASK 59

Now is an important moment

In the last 10 years, a shift could be observed, from *“don’t touch our buildings”* to *“let’s find the right solutions together”*

DRIVERS

2010 EPBD 2010/31/EU

towards NZEB, exemption for listed buildings

2012 Energy Efficiency Directive 2012/27/EU

deep renovation rate of 3% for public buildings

OBSERVED INITIATIVES

2013 ICOMOS established

Scientific Committee for Energy and Sustainability

2017 CEN standard 16883

Improving the energy performance of historic buildings



TASK 59

Definitions / scope

Historic buildings according EN 16883 all buildings with elements “worthy of preservation” which can be buildings of all types & ages, not just listed/protected buildings

NZEB according IEA SHC Task 40 | EBC Annex 52 as equalized energy balance is reached by bringing together architectural design, energy efficiency and local use of renewable

Lowest possible energy demand – heritage value as constraint, but not only, additional parameters like comfort & economic feasibility

Solar renovation as a holistic approach, reducing the energy demand and providing energy from the sun (daylight, passive & active solar)



TASK 59

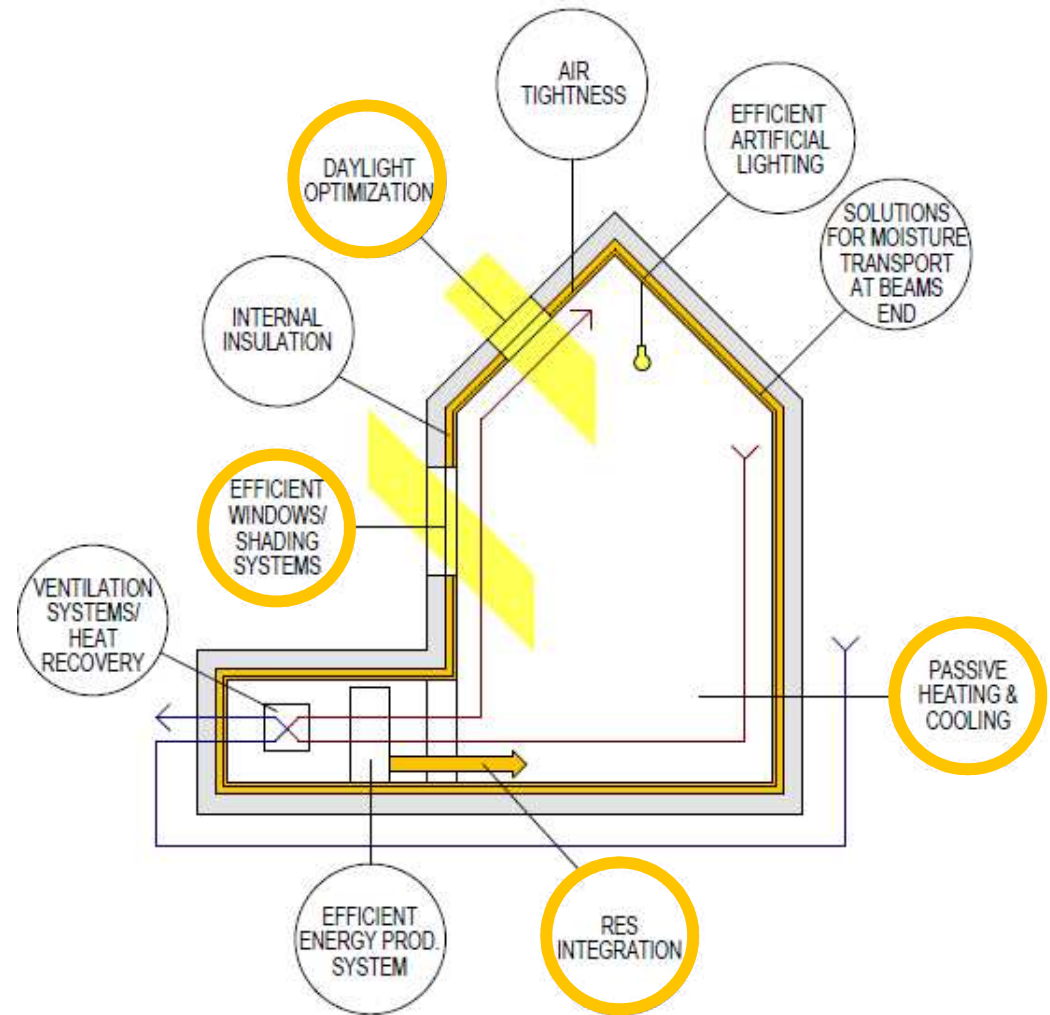


Holistic approach – Solar renovation

- ① REDUCE DEMAND
- ② PROVIDE FROM SUSTAINABLE SOURCES

Whole range of solar!

- Daylighting
- Passive solar energy
- Solar thermal
- Photovoltaics
- Hybrid



TASK 59

Solar energy in historic buildings & deep renovation

Villa Castelli
Lago di Como



**solar
raum** | architectu
energy
mobility

Energy concept:

- ① Low energy demand
18kWh/m²a
- ② High solar gains
~30%
- ③ covered by ground
source heat pump with
- ④ electricity from PV



TASK 59



Proposed Task Structure

- A. Knowledge Base
- B. Multidisciplinary planning process
- C. Conservation compatible retrofit solutions
- D. Demonstration and dissemination



TASK 59

A – Knowledge Base

Task lead: e7 / Austria

INSPIRATION

to trigger the demand

LEARNING

from the experience

DETAILS

for a deeper understanding

Interreg Alpine Space ATLAS

Projects About Partner Contact

Search

TASK 59 SHC EBC

Rainhof

Magdalenastraße 29, Gsies
39030 Dobbiaco South Tyrol - Italy

+ Contact Details

ulus mus. Donec quam felis, ultricies nec, pellentesque eu, pretium quis, sem. Nulla consequat massa quis enim. Donec pede justo, fringilla vel, aliquet nec, vulputate eget, arcu. In enim justo, rhoncus ut, imperdiet a, venenatis vitae, justo.

Energy performance A	Protection level Listed/not listed	Building age before 1600	Building use Residential (rural)	Surface area Net floor area [m ²]	Construction type Stone masonry wall
-------------------------	---------------------------------------	-----------------------------	-------------------------------------	--	---

GENERAL INFORMATION

RENOVATION PROCESS

RETROFIT SOLUTIONS

EVALUATION



TASK 59





Deep Renovation of Historic and Listed Buildings

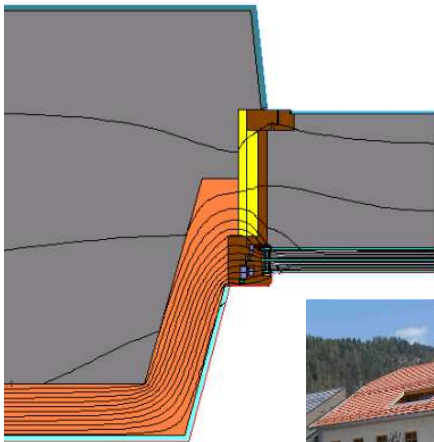
IEA Solar Heating and Cooling Research Co-operation

Alexandra Troj, Rainer Pfluger

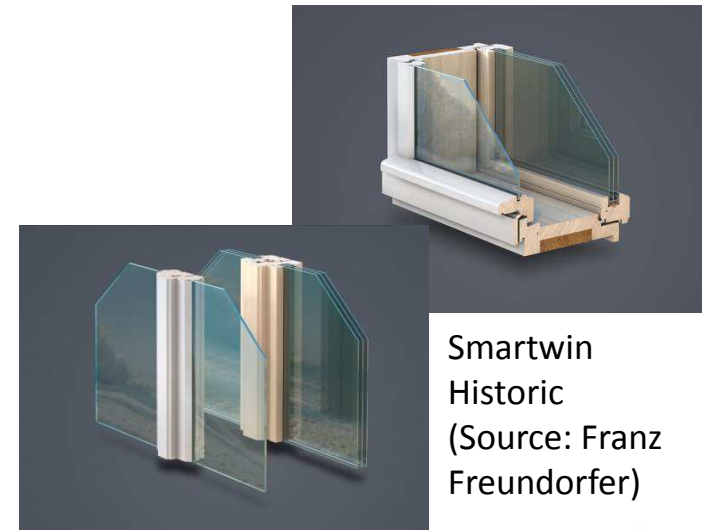
Improving of historic windows

Conservation, comfort and energy saving

- » Restauration/conservation of historic windows/parts
- » Additional glass layers/windows at the inside (ventilated cavity), new technology: thin glass (2/10/2 or 2/8/2/8/2)
- » If no historic window remaining: reconstruction as a thermal high efficient box-type or composite window



3ENCULT
Waaghaus Bolzano



Smartwin
Historic
(Source: Franz
Freundorfer)

Internal insulation – High comfort and reduction of transmission losses

- » „Robust Internal Insulation“ EU-projekt RIBuild
- » Driving rain protection – solutions
- » Visual inspection (Cracks, Salt, rising damp...)
- » Beam end solutions

3EUNCULT NMS
Hötting, Wegscheider



3EUNCULT NMS Hötting, Remmers IQ-Therm
(Source: Gerald Gaigg)

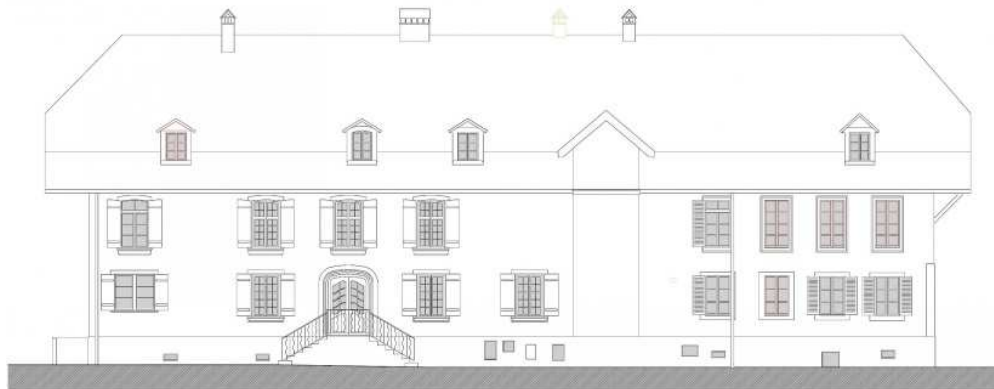
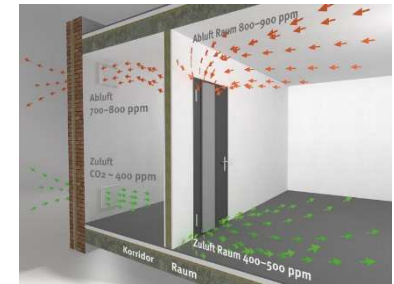


3EUNCULT Final report
(Source: Sören Peper, PHI)



High efficient HVAC and control Building services tailor-made for historic buildings

- » HRV-Ventilation with reduced ductwork by active overflow ventilation strategy
- » Wall integration
- » Controlled natural ventilation
- » Simulation based control, sensor network etc.



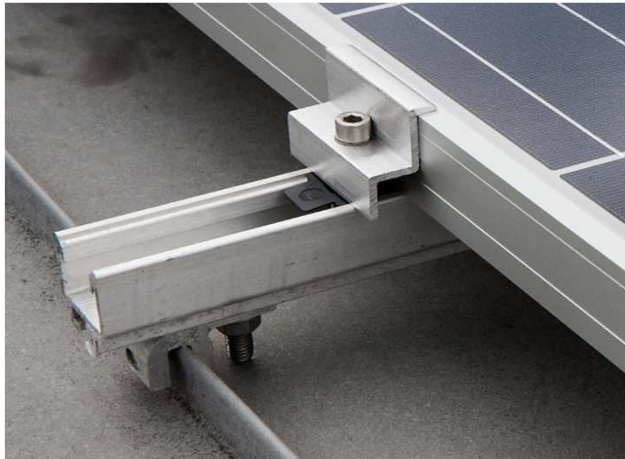
Herrenhaus Brännengut, Bern (CH)



Active overflow (Source: Erich Keller AG)

Heritage conservation and renewable energy – a cultural challenge for our CO2-neutral future

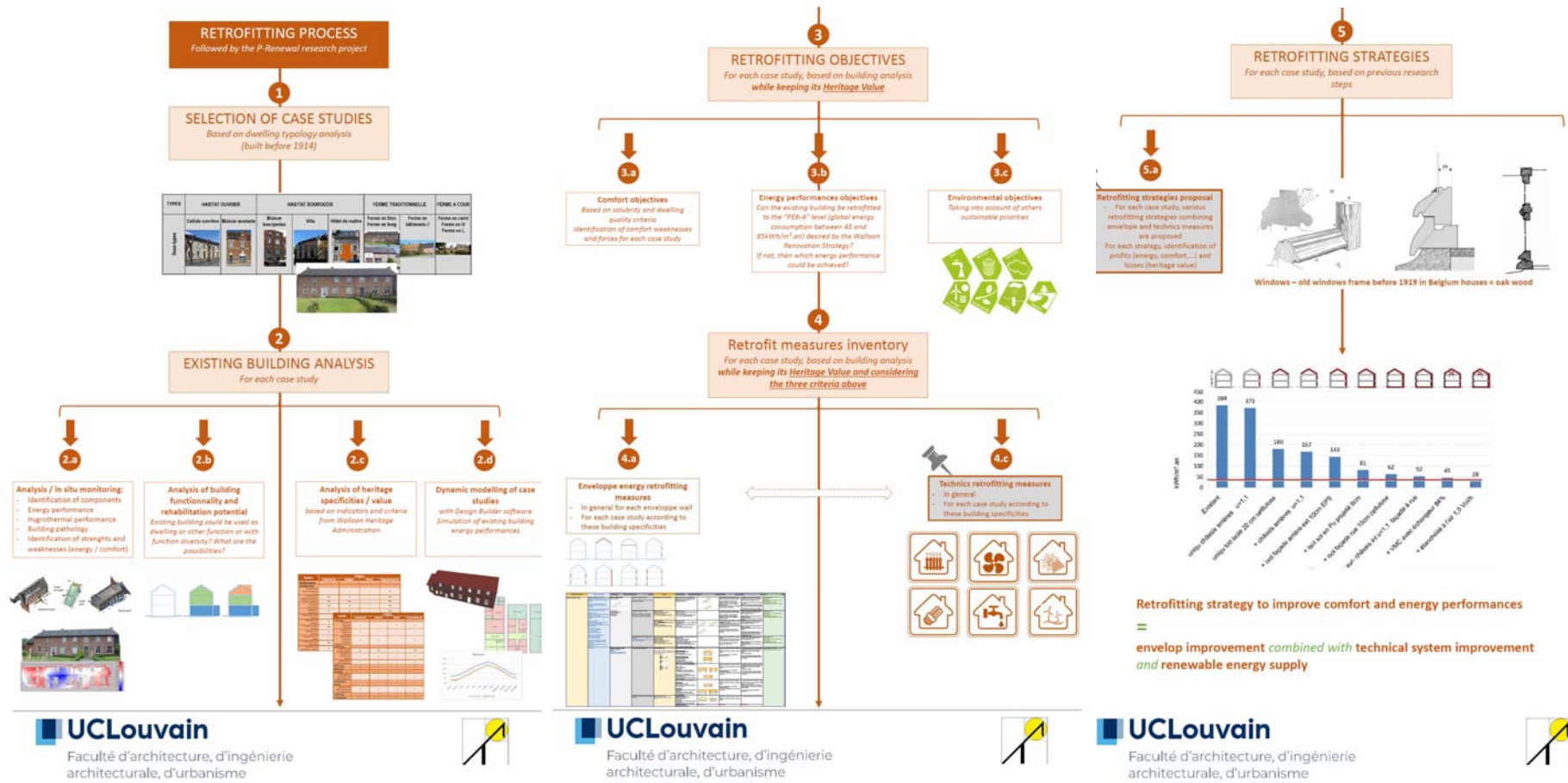
- » Roof integration, visual aspects
- » MPP-tracking per module
- » Mounting
- » Coloures, reflection, surface quality



Summary and Outlook

- » IEA-Report on solutions and research results
- » Link to best practice examples
- » Link to reference solutions
- » Online solutions repository in ATLAS - project

Heritage conservation and renewable energy – a cultural challenge for our CO₂-neutral future



See you in autumn?



TASK 59



European Congress on the Use, Management and Conservation of Buildings of Historical Value



Logo of **Burg** hauptmannschaft österreich

BEH

TASK 59
RENOVATING HISTORIC BUILDINGS
TOWARDS ZERO ENERGY

2018 ANNO EUROPEO DEL PATRIMONIO CULTURALE #EuropeForCulture

Federal Ministry
Republic of Austria
Digital and
Economic Affairs

16.-17. October 2019

Hofburg Vienna

→ **Keynote**

→ **Dedicated session**



Thank you for your attention

www.iea-shc.org



SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

