



regenerative energy for
metropolitan areas and cities

www.regenerative-energy.org

METREX

The **network** of
European Metropolitan Regions and Areas





EUCO2 80/50 Project

Welcome to METREX - the Network of European Metropolitan Areas and Regions.

METREX was founded in 1996 and now has members from around 50 of the major urban areas of Europe. It is a self-help network of practitioners in spatial planning and development at the metropolitan level. Practitioners include politicians, officials and their advisers. The purpose of METREX is the exchange of knowledge and experience on metropolitan affairs.

A key issue for urban Europe is climate change. Most of Europe's emissions of greenhouse gases come from its urban areas. The EU has set targets for emission reductions that have progressively risen from 60 to 80 to 95%.

The EUCO2 80/50 project was promoted by METREX in 2008 to explore an appropriate and effective metropolitan response to the issue of greenhouse gas emissions. It has been led by the Metropolregion Hamburg and uses the innovative Greenhouse gas Regional Inventory Protocol or GRIP. GRIP is a computer-based tool for the investigation of mitigation options.

EUCO2 80/50 Project



EUC02 80/50 Project

EUCO2 80/50 involved 14 European metropolitan areas running GRIP during 2010. Some 350 stakeholders, from all the interests with a role to play in mitigation, participated in over 40 exploratory Workshops.

The outcome was confirmation that a target of 80% could indeed be achieved in metropolitan areas.

The full report on the EUCO2 80/50 project can be downloaded from www.euco2.eu

EUCO2 80/50 – GRIP in action



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reMAC© is Planning for Energy in Metropolitan Areas. It is one outcome of the EUCO2 80/50 project. reMAC is designed to help answer the question "Can metropolitan areas become largely self sufficient in renewable energy"?

The EU Council of Ministers has now concluded that the European economy needs to be decoupled from carbon fuel dependency. The reasons are the prospects of rising prices and the need for energy security. It has also now raised the greenhouse gas emission reduction target to 80-95%, which effectively means decarbonisation.

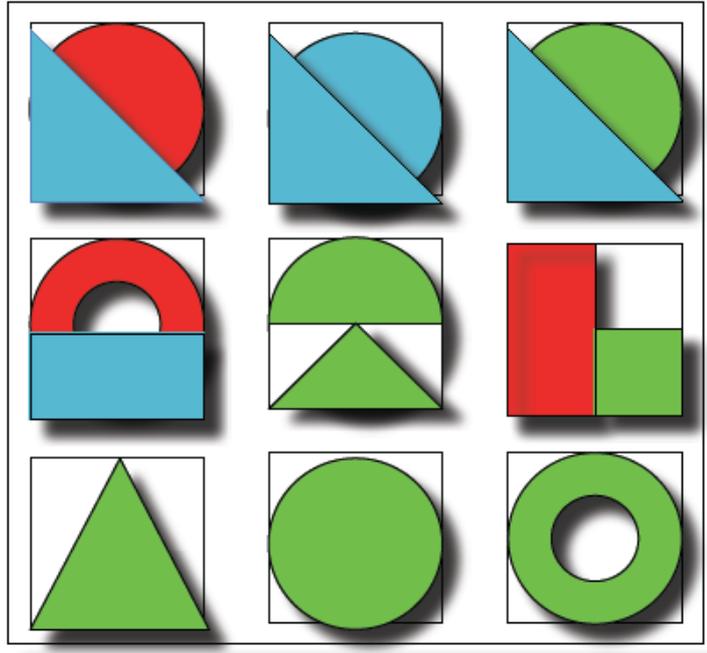
It is in this context that metropolitan areas are now considering their own energy futures. Energy is a key component of a competitive metropolitan economy. Greater self-sufficiency brings many benefits including lower costs and greater energy security but also employment opportunities. In current economic circumstances these advantages are significant.

reMAC is a computer based tool that allows metropolitan areas to explore the savings that can be made from reducing energy wastage. For decades Europe has used low cost carbon fuels in a profligate way. It is only now, when facing the prospect of rising prices and uncertain supplies that Europe is legislating for more energy efficient buildings and vehicles.

Dramatically reduced energy demand from buildings and vehicles opens up the prospect of metropolitan renewable energy self-sufficiency. Whereas the need for urban areas to become more efficient in their use of energy is well understood, what is not yet so fully appreciated is their energy generating potential.

reMAC has been designed by METREX to enable metropolitan areas to explore their energy saving and their energy generating potential.

Planning for Energy in Metropolitan Areas



reMAC – Concept and Building Blocks

reMAC is a tool to enable metropolitan planners to explore energy as an aspect of spatial planning and development and to consider options to reduce energy waste, lower energy consumption and demand and meet this lower demand from urban renewable energy resources.

A consequence will then be the effective decarbonisation of their energy supplies in support of the EU target of an 80-95% reduction in greenhouse gas emissions.

reMAC also enables the broad costs and benefits of waste reduction and urban renewable energy provision to be assessed and the investment required to be quantified and specified.

reMAC uses 9 building blocks to construct metropolitan renewable energy self sufficiency. The feasibility of the reMAC approach has been tested in the Glasgow and the Clyde Valley metropolitan area. It is now offered to other METREX members and other European metropolitan areas.

reMAC – Concept and Building Blocks

- 1 Reduce waste energy
- 2 Lower energy demand
- 3 Meet lower energy demand from metropolitan renewable energy sources
- 4 Capture and store residual carbon energy emissions
- 5 Provide for electromobility and hydrogen mobility
- 6 Save energy costs
- 7 Improve economic competitiveness
- 8 Become energy self sufficient
- 9 Achieve energy security

- 10 Achieve 80-95% decarbonisation

reMAC – Concept and Building Blocks

reMAC consists of a series of interactive Panels. They enable data and relationships that are normally worked out on spreadsheets to be illustrated in a visually understandable way. Alternative assumptions and approaches can be explored and the consequences displayed. The important point is that the quantitative implications and, eventually, the cost implications of energy development options can be explored and measured.

reMAC supports the exploration energy as an aspect of spatial planning and development on an informed basis.

reMAC – Concept and Building Blocks

Change 2050 Domestic Services / Industry **Transportation** Financial Outcomes Decarbonisation Scenario EN

Road Transport

Total Transportation Energy Use (GWh) Fuel Mix Transportation (%)

Petroleum 93.1 %

Electricity 120%

Bio-Fuel

Hydrogen

Natural Gas

Liquid Petroleum Gas

Change 2050 Domestic Services / Industry Transportation Financial Outcomes Decarbonisation Scenario EN

Electricity

Existing Buildings New Buildings

Grid Electricity 100 100

Solar PV 0.0

Other PV 0.0

Wind 0.0

District 0.0

Efficiency Demand

Change 2050 Domestic Services / Industry Transportation Financial Outcomes Decarbonisation Scenario EN

Population / Households

Population / Housing

Population 1,772,000

Households 970,000

Household Size 1.83

Generational Cohorts %

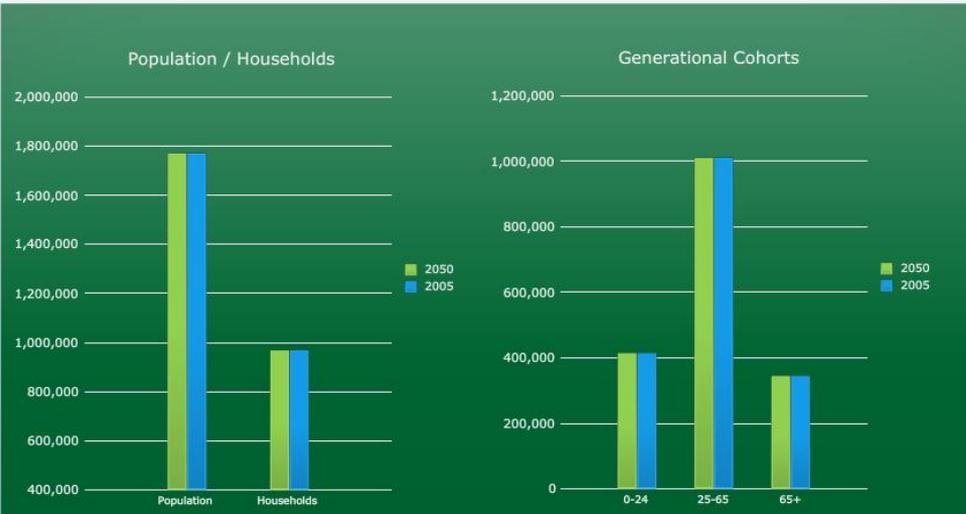
0-24 23.4

25-65 57.1

65+ 19.5

100%

Population / Households Generational Cohorts

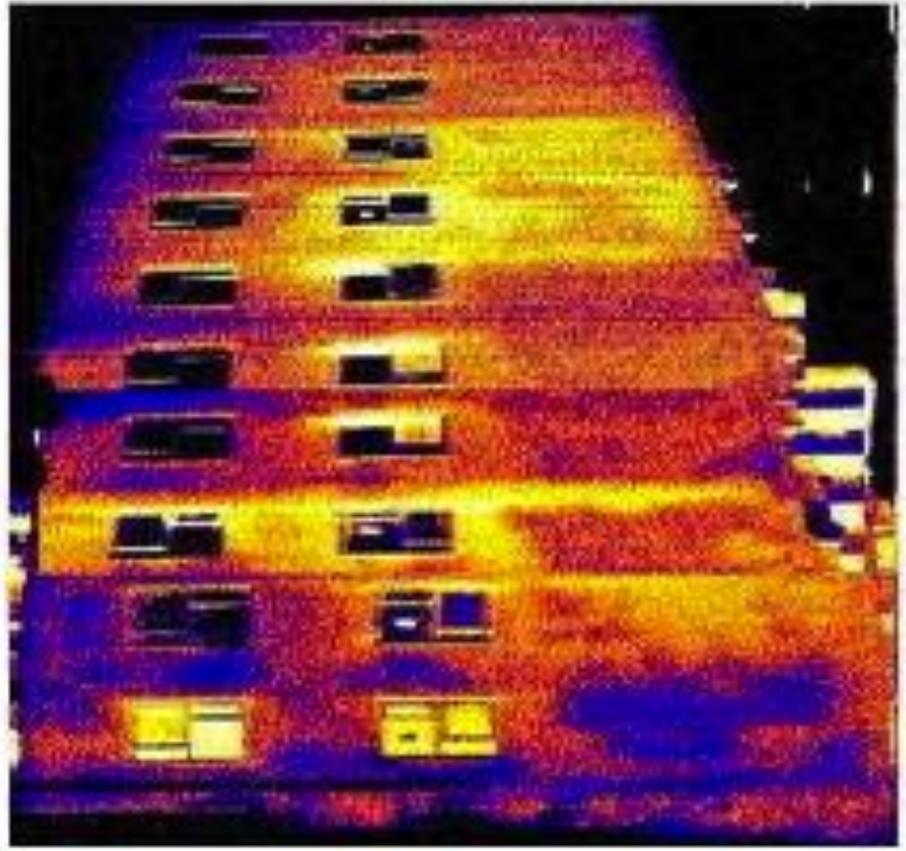
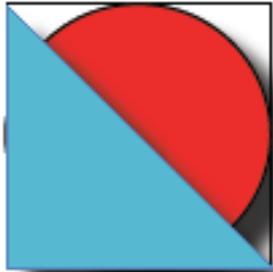


Category	2050	2005
Population	~1,772,000	~1,772,000
Households	~970,000	~970,000
0-24	~400,000	~400,000
25-65	~1,000,000	~1,000,000
65+	~300,000	~300,000

Population	0.0%	0-24	0.0%	Change	0%
Households	0.0%	25-65	0.0%	Change BAU	0%
Household Size	0.0%	65+	0.0%	Total Energy 2050	46,287

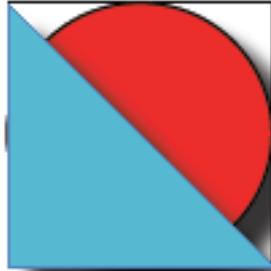
Hamburg Metropolitan Region

Print Page reMAC Info V2.0.8



1

Reduce waste energy



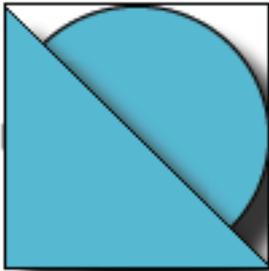
More urban energy is wasted than is used. More greenhouse gas emissions come from wasted energy than from used energy. So there is absolutely no doubt that the first target for energy self sufficiency is the reduction of waste energy, particularly from buildings.

EUCO2 80/50 has shown that northern European metropolitan areas have already achieved the necessary standards of insulation and energy efficiency in buildings because of their climatic conditions. The rest of Europe now has to catch up, for economic as well as climatic reasons.

reMAC enables the retro fitting options for existing buildings to be explored and their reduced energy needs to be assessed. It also enables the energy needs of prospective new building, in the longer term to 2050 and the medium term to 2020 or 2030 to be quantified. New building involves using the tool to explore levels of population, household and employment change and the development consequences.

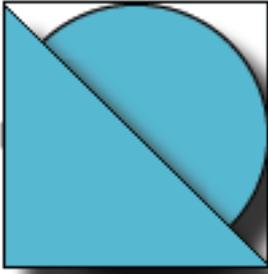
1

Reduce waste energy



2

Lower energy demand



Energy saving and the more efficient use of energy in buildings may be offset by greater energy demand for new building, domestic appliances and equipment, industrial processes, service industries and transportation. The balance between consumption reduction and demand growth can be assessed.

There is also the issue of base and peak loads and the role of centralised national and decentralised metropolitan energy supply to consider. With a growing decentralised energy supply the issue of local energy storage arises. The role of the national electricity grid may be less for transmission and more to balance decentralised sources of supply.

reMAC enables these issues to be explored and the balance of centralised and decentralised energy supply, from metropolitan areas, to be assessed.

2

Lower energy demand



3

Meet lower energy demand
from metropolitan renewable
energy sources

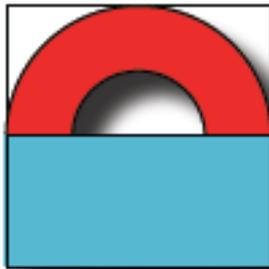


The renewable energy generating capacity of urban areas has been a neglected area of energy policy-making. New technologies are opening up opportunities for urban land and buildings to become sources of energy supply and for metropolitan areas to become power stations of the future.

reMAC enables the energy generating potential of the building stock to be assessed. The more detailed the information that is available the more accurate will be the assessment. In most European metropolitan areas the domestic, industry and services and transportation sectors are the primary energy users. Most metropolitan areas will have the necessary detailed information on the breakdown of their building stock, by category and type, to enable their generating capacity to be assessed. For example, the solar generating capacity of their roofs.

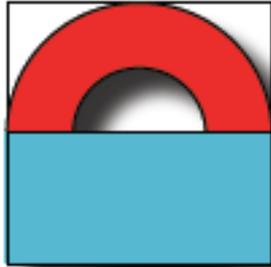
3

Meet lower energy demand
from metropolitan renewable
energy sources



4

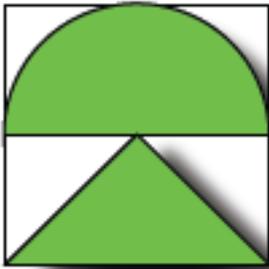
Capture and store residual
carbon energy emissions



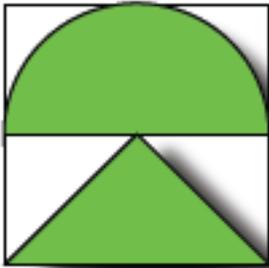
Carbon-capture and storage has been seen as a bridging measure to enable the continued use of carbon fuels on a less damaging basis. However, there are industrial processes, such as cement manufacture and the production of some chemical feedstocks, for which there are no known alternatives. It would seem to be wise to use carbon capture and storage capacity for these purposes rather than to reduce the damaging effect of carbon fuels.

4

Capture and store residual carbon energy emissions



5 Provide for electromobility
and hydrogen mobility



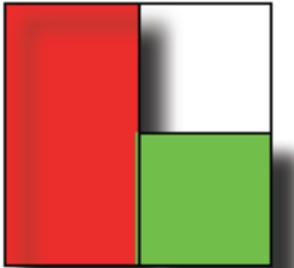
The motor industry has made it clear that petrol and diesel engines will be progressively replaced by electric and hybrid power. As long as the electrical energy comes from renewable energy sources this will offer major savings in running costs and major reductions in greenhouse gas emissions.

The development of a hydrogen economy could be related to the increased generation of renewable energy in metropolitan areas. Hydrogen has energy storage potential as well as providing hydrogen fuel and hydrogen fuel cells for vehicle engines.

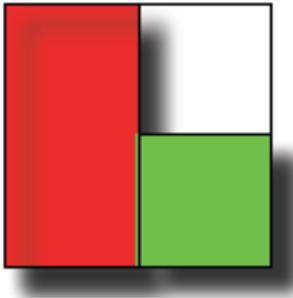
Metropolitan areas need to begin to plan the infrastructure needed for electromobility.

5

Provide for electromobility and hydrogen mobility



6 Save energy costs

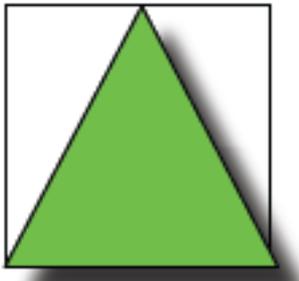


"Smart" energy controls and metering will enable energy use and generation by and from the building stock to be measured and costed. Energy management can be expected to become a normal feature of domestic, industrial and service industry life. Wastage will become an expensive indulgence.

reMAC allows an overall metropolitan picture to be obtained of energy usage and cost savings. This is important because savings can be used to finance the renewable energy generating investment required to enable metropolitan areas to approach energy self sufficiency.

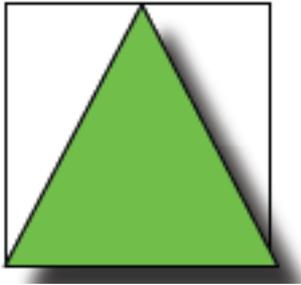
6

Save energy costs



7

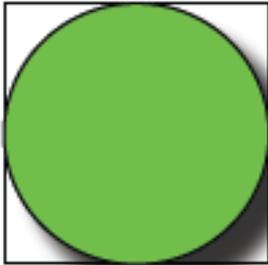
Improve economic competitiveness



Energy costs and energy security can be expected to become significant factors in the relative attractiveness of Europe and its metropolitan areas in the future. Such factors affect both the public sector and the cost of the public services that support a local economy, such as health, education and transport, and private sector economic activities.

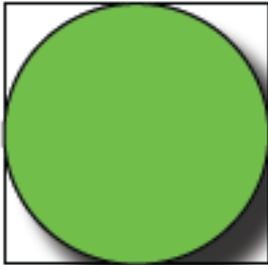
7

Improve economic competitiveness



8

Become energy self sufficient



Energy self-sufficiency offers many advantages as well as the obvious economic ones. It can support local energy intensive industries such as food production and reduce their carbon footprint. It can offer the prospect of energy as an export. It can offer employment opportunities.

reMAC enables the specification of an overall renewable energy investment package for a metropolitan area over the medium term, to 2020 or 2030, and the longer term, to 2050. It enables the package to be costed and the pay back time to be calculated.

8

Become energy self sufficient



9

Achieve energy security



Energy security gives security to other energy intensive investment decisions in the public and private sectors, for example, to electromobility and investment in public transport systems.

9

Achieve energy security



10

Achieve 80-95% decarbonisation

Decarbonisation to the level of 95% by 2050 will leave only those greenhouse gas emitting processes for which there are no available alternatives.

Metropolitan areas can reduce their energy needs to a level that can be largely met by their renewable energy generation capacities.

Conventional wisdom is that Europe will achieve its mitigation targets by connecting all its varied renewable energy resources of wind, wave, tide, geothermal and solar through a new renewable energy grid and replacing carbon energy.

What has not yet been appreciated and factored in is the potential for energy self-sufficiency within Europe's metropolitan areas. This needs to be appreciated at the EU level and within the European metropolitan community.

reMAC enables this appreciation and gives metropolitan areas the opportunity to develop a renewable energy investment package on a reasoned and broadly quantified basis.

The reMAC approach is INSULATION+GENERATION=DECARBONISATION

10

Achieve 80-95% decarbonisation

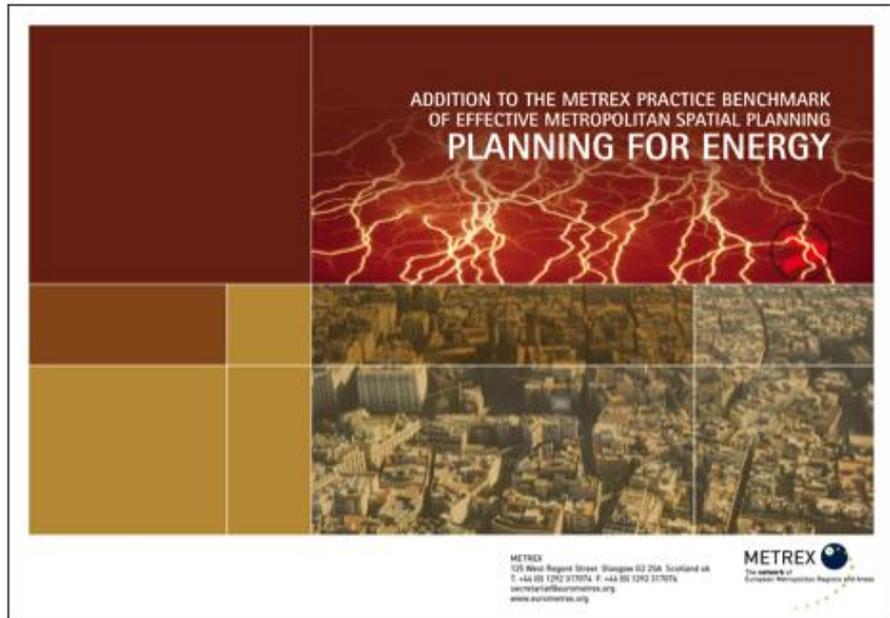


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If you are are METREX Member you can use reMAC on line at www.regenerative-energy.org

If you are not a Member of METREX you can use reMAC by arrangement with the Secretariat at www.eurometrex.org

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Planning for Energy in Metropolitan Areas

You may also find the METREX Practice Benchmark of Effective Spatial Planning – Planning for Energy - of interest. It can also be downloaded from the METREX web site at www.eurometrex.org

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