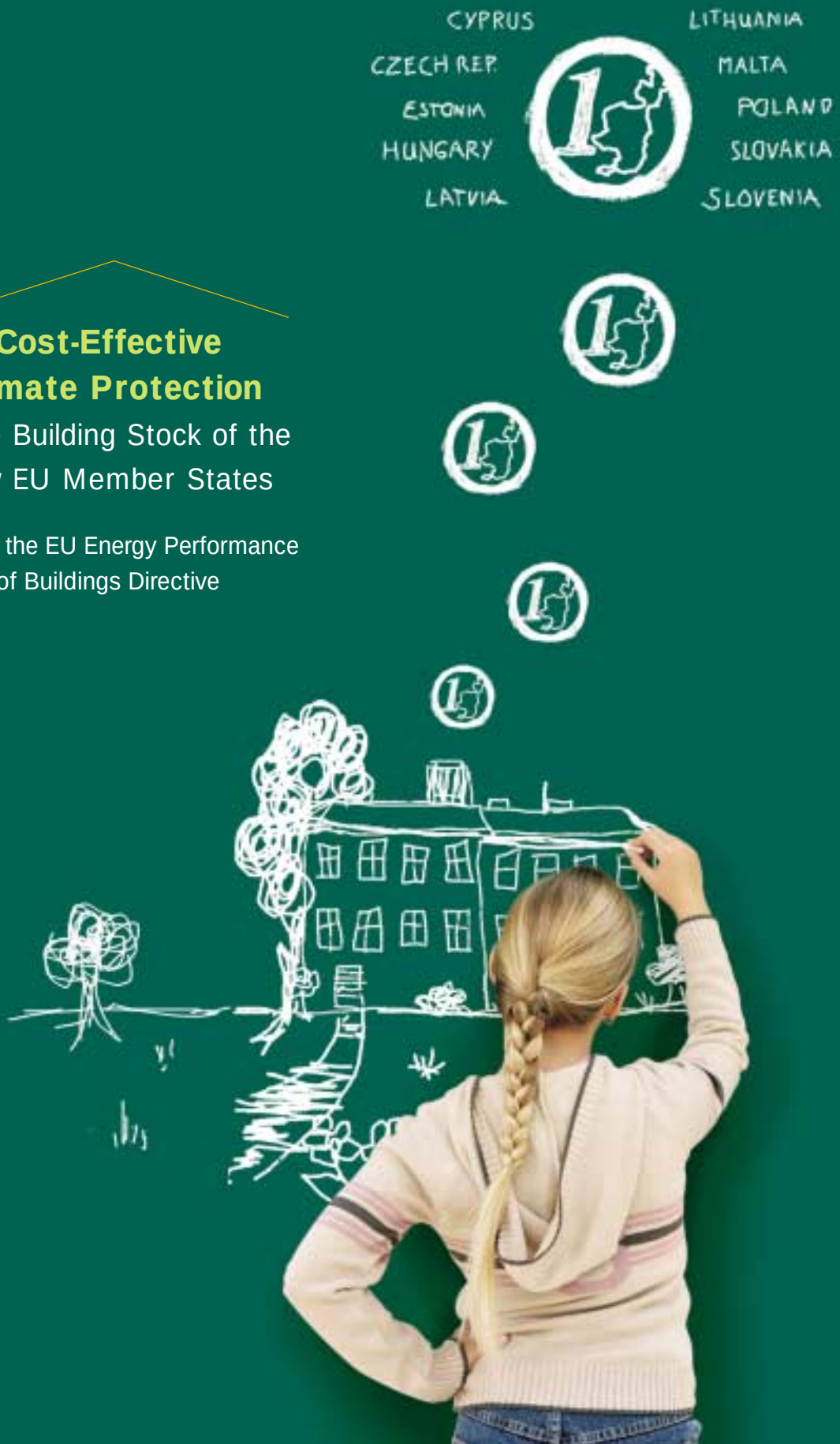
# Cost-Effective Climate Protection

in the Building Stock of the New EU Member States

Beyond the EU Energy Performance of Buildings Directive



# UNDERSTANDING THE CHANGING LANDSCAPE

## Energy use in the EU 15

In the EU 15 (i.e. those countries who were already EU members before the most recent accession) energy use is associated with three major concerns:

- Environment: Growing energy use through the associated increased emissions of carbon dioxide is driving climate change. Alongside this, the impact of the air pollution caused by energy use in buildings and cars is a particular problem in the urban environment.
- Security of supply: Currently 50% of the EU's energy is imported and this is expected to rise to 70% by 2030. This dependence on foreign energy supplies puts Europe's economy at risk.
- Cost: With world oil prices having recently increased dramatically, there is a growing recognition of the money that is being wasted from the inefficient use of energy in buildings.

## Energy use in the new EU Member States

### Different history, different concerns

The challenges for the new EU Member States are different, although in the process of changing.

- Energy costs: Historically low energy prices, due to government subsidies and a different energy mix, means that there has been less of a focus on energy efficiency. In fact, the new EU Member States use 25% more energy per metre square of floor space than the EU 15.
- Climate change: With carbon dioxide emissions well down on 1990 levels in the new Member States, there is likely to be no obligation to reduce these emissions under the Kyoto Protocol.

### A changing landscape

Accession to the EU is bringing about significant changes, particularly in the provision and cost of energy for homes and buildings. In particular, there are two economic factors that may change the perception of saving energy and reducing emissions:

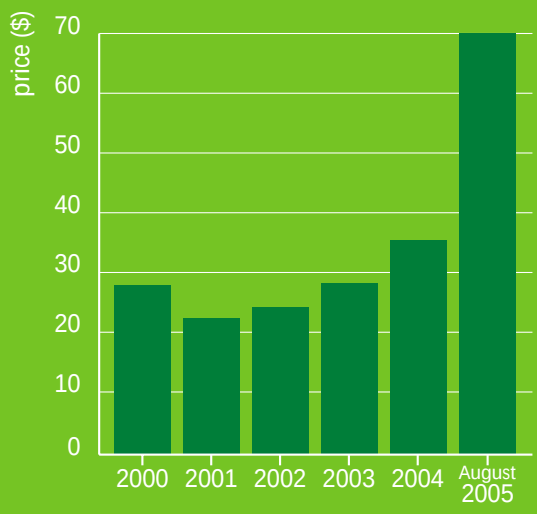
- Energy prices: As governments reduce subsidies, the current fuel mix changes and the market plays a greater role, energy prices are already beginning to increase substantially.
- Carbon trading: As carbon dioxide emission credits become a more valuable commodity (recent prices have been around 25 EURO a tonne), each tonne emitted of $CO_2$ is a potential tonne that can not be sold.

## A strong rationale for energy efficiency

These issues create a strong rationale for a greater focus on energy efficiency. Therefore, Eurima asked one of Europe's leading institutes for energy efficiency, Ecofys, to examine the situation for buildings in the new Member States. The findings were clear:

- Saving energy: As for the EU 15 there is massive potential to save energy in buildings in the new Member States and through this to reduce $CO_2$ emissions, to limit air pollution and protect security of energy supply.
- Saving money: Taking these measures would save, rather than cost money, **with improved thermal insulation** once again coming out as the most cost-effective solution to reduce energy use in buildings.

### Oil prices ($) over last five years




### Gross inland consumption of primary energy (1000 toe)

| | 2000 | 2003 | % |
|---|---|---|---|
| Czech Republic | 40361 | 43665 | 8,2 |
| Estonia | 4572 | 5456 | 19,3 |
| Latvia | 3970 | 4378 | 10,3 |
| Lithuania | 7249 | 9004 | 24,2 |
| Hungary | 24941 | 26744 | 7,2 |
| Poland | 90779 | 94109 | 3,7 |
| Slovenia | 6454 | 6948 | 7,7 |
| Slovakia | 16988 | 18894 | 11,2 |
| **Total** | **195314** | **209198** | **7,1** |

Source: Eurostat

# A CRISIS WAITING TO BECOME A SUCCESS STORY

## Energy use in buildings

In the EU 15, buildings account for 40% of all energy use of which half could be saved through simple and effective measures, such as **better insulation**. This is a poor state of affairs.

The story in the new Member States is even worse. As in the EU 15, the new Member States use over 40% of their energy in buildings. However, $CO_2$ emissions per square metre of floor space are 25% higher, due in large part to lower levels of thermal insulation. This means more waste but also, a greater opportunity to save energy.

In fact, up to 80%[1] of energy use could be reduced by implementing cost-effective and technically simple energy efficiency packages.

**80% is simple**

Simple energy efficiency measures including improved wall, roof and cellar insulation, better windows and a more efficient boiler were shown to reduce energy use by 80% in a Polish terraced house. These measures have a pay back period of only 9 years, yet will continue saving money for the entire lifetime of the house.

## Renovation in the new Member States

### Not just a matter of energy efficiency

In many of the new EU Member States, renovating the existing building stock is urgently required whether or not energy use is considered. These renovations are needed as much for social reasons – much of the residential building stock is in need of urgent repair – as for economic or environmental reasons.

[1] This is for a terraced house in Poland

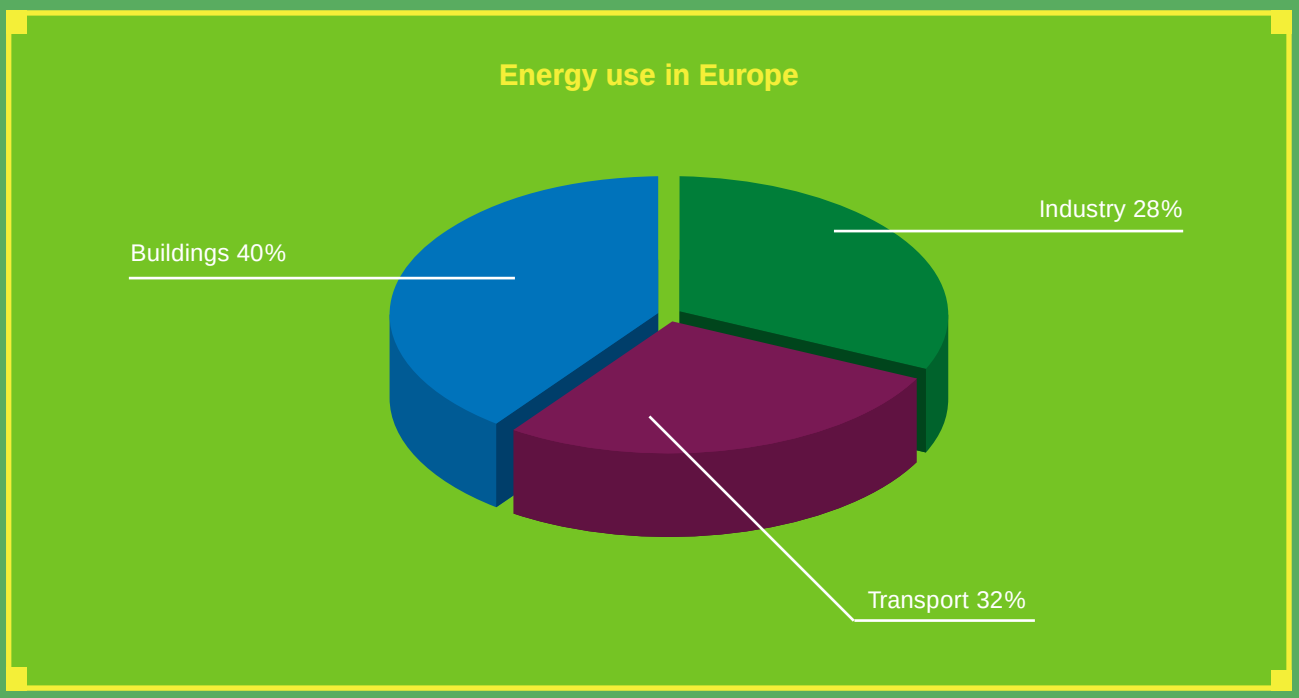
## A crises waiting to become a success story

What the new Ecofys study demonstrates is that by ensuring that energy efficiency is central to the renovation process, this process can be changed from an expensive burden to an economic, social and environmental success story. To explain:

- Economic: An appropriate energy efficiency retrofit programme would create 1.7 billion EURO a year in energy savings – substantially offsetting the overall annual renovation costs for existing buildings.
- Social: Retrofit programmes would not only create between 150,000 and 230,000 new jobs (EURIMA estimate) but would radically improve housing conditions and protect vulnerable sections of society from future increases in energy prices.
- Environmental: Carbon dioxide emissions would be reduced by 14 million tonnes a year and air pollution could be reduced dramatically.

## The EU holds the key

Turning the current building crises in the new Member States into a success story is about financing. Energy efficiency measures need upfront financing. Unlike many other measures this financing will create much needed jobs, will reduce $CO_2$ emissions which aggravate climate change and over a short period more than pay back the initial investment. However, without the initial investment none of this can happen and without the EU there will be no initial investment.



# CAPTURING THE POTENTIAL – THE CURRENT SITUATION AND BEYOND

## EU rules - The EPBD does apply

As with the EU 15, the new EU Member States have to implement the European Energy Performance of Buildings Directive (2002/91/EC) (EPBD) by January 4th 2006. The main obligations created by this legislation are:

- Existing buildings above 1000m² must upgrade their energy efficiency standards during major renovations.
- All buildings when sold or rented must provide a certificate on energy use based on a standard calculation methodology.
- Member States must set minimum energy efficiency standards for buildings.

## The EPBD - A good start but not enough

In principle, the EPBD provides a strong framework to stimulate energy-efficiency improvements. When Ecofys investigated it for the EU 15, it found however that the Directive would only capture 10% of the technical potential – the exclusion of existing buildings below 1000m² from the renovation requirements was the major reason for this.

The situation in the new Member States is almost identical with the EPBD likely to deliver only 9% of the technical potential by 2010.

## Beyond the EPBD - Capturing more of the potential

Two measures are needed to capture more of the potential in the new Member States:

1. The extension of EPBD to renovation of all buildings: This would lead to capturing 25% of the technical potential by 2010 and almost 50% by 2015.
2. Funding: Access to funding to overcome the initial investment costs associated with energy-efficiency measures is a major barrier in the new Member States. Without proper funding mechanisms this historic opportunity to vastly improve the housing situation, reduce energy use and save money will be missed.

### Don't **miss** the boat

Every renovation of a building is an opportunity to bring its energy performance up to standard. If you miss the renovation, you miss the opportunity and it may be another 30 years before another renovation occurs.

Thus, excluding buildings below 1000m² from the EPBD means that many buildings that could be cost-effectively upgraded today, will miss the energy-efficiency boat.

# CAPTURING THE POTENTIAL – LESS ENERGY MORE MONEY

The evidence from the EU 15 was clear, energy efficiency in buildings is not only cost-effective but it also creates huge cost savings. A fully extended EPBD would lead to 7.5 billion EURO a year in savings by 2010, rising to over 13 billion by 2015.

The evidence for the new Member States is also clear. The EPBD in its current form leads to cost savings and as in the EU 15, extending the EPBD to all buildings significantly extends the savings. Ecofys has shown in its recent study focused on energy savings in the new EU Member States that:

- The EPBD leads to cost savings: If fully implemented in the new EU Member States the current EPBD would lead to a total annual profit of 154 million EURO a year by 2010, rising to 365 million a year by 2015.
- Extending the EPBD extends the savings: If all buildings were to be included in the renovation requirements of the Directive this would lead to a total profit of 371 million EURO a year by 2010 rising to 927 million EURO a year by 2015.

## EU 15 vs. new Member States

When comparing the figures between the EU 15 and the new Member States it is important to consider:

**Size:** The building stock in the new Member States is only one tenth of the size of the EU 15 and therefore, total emission and cost savings will necessarily be lower in absolute terms.

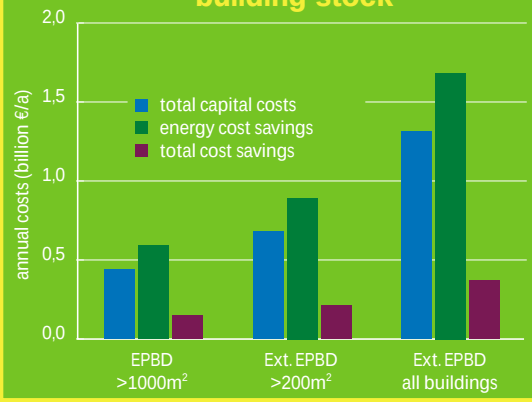
**Capital costs:** These are higher due to higher interest rates in the new Member States.

**Energy costs:** The cost of energy is lower in the new Member States by approximately 40% due mainly to the different energy mix.

The combined effect of higher capital costs and lower energy costs is to reduce the cost savings that can be made per square metre, compared to the EU 15.

However, the situation in the new Member States is evolving quickly due in large part to rapidly increasing energy prices. (see box on Today's Prices)

## Cost analysis (2010) of EPBD and possible extensions NEW-8 building stock




## Today's prices

In order to ensure that the analysis done is comparable with the previous study on the EU 15, the present Ecofys study uses 2002 energy prices.

However, these do not reflect the final price to the consumer nor the recent dramatic increases in oil and gas prices. If these more realistic prices for the average homeowner were used, EURIMA estimated that cost savings would be 30 to 50% higher than the results of the Ecofys study.

# BEHIND THE HEADLINES – GETTING TO THE DETAIL

## Which measures are most cost effective?

### Insulation:

In the new Member States taking action to improve insulation levels almost always delivers cost savings. This is the case whether or not the measure is taken as part of the normal renovation cycle or solely to improve energy efficiency. Taking the different measures in detail:

### Insulation of external walls:

- In all the countries under investigation, insulation measures were found to create cost savings when coupled with ongoing renovation.
- In all countries except Estonia, Latvia and Lithuania non-coupled measures were seen to create cost savings.

### Insulation of roofs:

- The insulation of roofs cannot be done as a coupled measure in the new Member States as the placing of insulation under rafters must be seen as an independent measures of maintenance of the roof. Nonetheless, improving insulation levels always creates cost savings in all the countries under investigation.

### Insulation of cellar ceilings:

- In all countries except, Estonia, Latvia and Lithuania measures to improve insulation of the cellar ceiling are cost-effective. However, as for roofs this measure can only be carried out as an independent measure as the cellar ceiling is not usually subject to maintenance.

### Other measures:

Replacing windows and changing the heating system were also investigated.

- Windows: Upgrading windows to better levels of energy efficiency during a renovation cycle is always cost-effective in the new Member States.
- Heating: Replacement of current heating systems with newer condensing gas boiler is seen to be cost effective in large buildings if done as part of the replacement cycle of a boiler.


# BEHIND THE CALCULATIONS

## How were the calculations made?

### The regions

New Member States – the Ecofys 2005 (DM70067) study examined the situation in 8 out of the 10 new EU Member States. Cyprus and Malta were excluded as they only represent 1% of the household $CO_2$ emissions, from the new Member States and have low specific heat related emissions. The eight Member States were grouped into three regions:

- Estonia, Latvia and Lithuania
- Poland
- Czech Republic, Hungary, Slovakia and Slovenia

### The costs

Capital costs – two approaches were taken:

- Non-coupled: In this scenario, all costs including the labour costs, materials, applicable taxes, overheads as well as the profits needed to undertake the energy saving measure, were taken into account as a stand alone project.
- Coupled: In this scenario, it is presumed that the renovation measures are taking place (e.g. replacement of the façade of a large building block or replacement of old gas boilers) and only the additional costs related to improving the energy efficiency characteristics, i.e. the cost of the materials and additional labour, are included.

### Operational and maintenance costs

- Energy costs: The energy costs are based on standard energy prices for 2002 in the investigated countries related to the equivalent monetary value of the EURO in 2002. The study assumes a 1.5% increase in energy costs per year. The study does not take into account that energy prices are expected to rise more quickly in these new Member States, nor does it consider the recent increases in oil prices.
- Maintenance costs: The maintenance costs for insulation are negligible but when comparing insulation against other measures such as replacement of boilers, then the annual maintenance costs for these measures are taken into account.

### The lifecycle

A period of 30 years was taken as the lifetime of the measure in terms of its cost-effectiveness and saving potential. In reality, insulation measures often perform for as long as the house itself, reaching an effective lifetime of 70-100 years without maintenance.

### Investigated measures:

- Insulation of exterior walls
- Insulation of roofs (both flat and pitched)
- Insulation of cellar/ground floor
- Replacement of windows
- Replacement of heat generation
- Feasible packages of measures
- U-values according to expert forecasts for the EPB standard

# RECOMMENDATIONS

## Different situations need different responses

The different buildings and economic situations in the new EU Member States compared to the EU 15 creates a different analysis of what needs to be done. As in the rest of the EU, there is a huge potential to improve energy efficiency and make major cost savings. However, certain characteristics make the situation in these new Member States different.

- The state of the building stock: A major percentage of the building stock needs urgent refurbishment. On top of drastically improving living conditions, improving energy performance is also a fundamental reason to initiate action.
- The changing energy landscape: Much of the current building stock was designed when energy prices were heavily subsidised, as the situation changes, this lack of energy efficiency will create a growing and significant cost unless buildings are brought-up to standard.
- Funding: Although much can and needs to be done, these new Member States and individuals within these countries are less able to fund the upfront cost of such renovations.
- Job creation: The potential for creating new jobs through energy efficiency in buildings is amazing. Even with one-tenth of the floor space, the total job potential is up to 230,000 jobs compared to 300,000 (EURIMA estimate) in the EU 15.

## A way forward

In order to support these countries to move towards a building stock that is designed for the challenges of tomorrow and can liberate energy for their growing industries, Eurima recommends the following:

- Extension of the EPBD: Extending the EPBD to renovation of all buildings is seen to be cost-effective in the new Members States, this needs to be done and coupled with strong information support to ensure that these EU rules can get applied on the ground.
- Funding: The urgent need for refurbishment of the building stock provides the EU with a once in a lifetime opportunity not only to use structural funding to create massive savings, but to also provide individuals in the new Member States with a better living environment and to prepare them against future challenges.
- New buildings: As the new Member States' economies and standard of living increase, it is likely to lead to many people choosing to live in new houses and apartements. As these are likely to last for many years, it is critical that they are built for the energy situation and costs of tomorrow rather than those of today.


The Ecofys report on "**Cost-Effective Climate Protection in the Building Stock of the New EU Member States - Beyond the EU Energy Performance of Buildings Directive**" is available on **www.eurima.org**

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