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► **To cite this version:**

Francisco Rego, Eric Rigolot, Paulo Fernandes, Cristina Montiel, Joaquim Sande Silva. Towards integrated fire management. European Forest Institute, 16 p., 2010, 978-952-5453-48-5. hal-02823739

HAL Id: hal-02823739

<https://hal.inrae.fr/hal-02823739v1>

Submitted on 6 Jun 2020

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EFI Policy Brief 4

Towards Integrated Fire Management

Francisco Rego
Eric Rigolot
Paulo Fernandes
Cristina Montiel
Joaquim Sande Silva



Foreword

Climate change is forecast to cause more droughts, higher temperatures and more windy periods, especially in southern Europe. This will raise the likelihood and severity of fires, which means that future weather conditions in the EU Mediterranean region are likely to lead to an increase in the risk of wildfire and thus burned areas.

More than 50,000 forest fires are ignited each year in the most affected Member States with an average of 500,000 ha of forest burnt in the EU annually with associated emissions of CO₂, and other gases and particles.

This higher wildfire risk and the increasing magnitude of forest fires have resulted in huge burned areas in Portugal in 2003 (more than 400,000 ha) and 2005, and in Spain in 1985, 1989 and 1994. In 2007, when temperatures reached 46°C in Greece, five major fires burnt 170,000 ha in the Peloponnesus region alone.

As well as causing human casualties, damaging property and reducing soil fertility through loss of organic matter, large fires hamper biodiversity conservation. During summer 2009, at least 30% of the burned area was in Natura 2000 sites in Bulgaria, France, Greece, Italy, Portugal, Spain and Sweden. Seriously affected forests in Natura 2000 sites face major challenges to return to their pre-fire condition, particularly with regard to biodiversity.

The EU's and its Member States' efforts to address the issue of forest fire prevention have been significant and have focussed on training, research, awareness-raising and structural prevention. However, these efforts now need to be stepped up as a consequence of climate change. A clear correlation also exists between active forest management and the reduction of wildfire risks: a well functioning bio-energy market, often obstructed by the lack of proper management due to fragmented forest ownership, could play a key role in fire prevention by giving economic incentives to remove the biomass that currently feeds wildfires in abandoned forests. Further, fire management concepts, such as those resulting from the EU's Fire Paradox research project, are needed to ensure Europe's ability to prevent and fight fires in the most effective way.

This project offers a departure from the traditional fire management concept as it is based on best scientific knowledge pertaining to prescribed burning applications. It presents a balanced approach to the management of both non-afforested and afforested land, as well as the management of undesired fires in general.

I therefore encourage the international community to make the best use of the results of Fire Paradox.

Ernst Schulte
Head of Forest Sector DG ENV.B1
European Commission
Directorate General Environment



The paradox of fire

*'Fire is a bad master but a good servant'
(Finnish proverb)*

For many years, fire has been on Europe's political agenda both in the process of Forest Europe (the Ministerial Conference on the Protection of Forests in Europe), and in the various discussions and decisions made by the European Council and the European Commission.

Fire has also been an important issue for public debate and a constant source of paradoxes that have arisen from its controlled use in everyday life and its threats to life and property as uncontrolled wildfires.

Despite the debates, however, there is a lack of integration of the different aspects of fire in a coherent conceptual framework that allows for efficient operational systems.

Integrated Fire Management can provide such a conceptual framework, and the launch of an initiative for a Framework Directive on Fire can contribute to its implementation in Europe.



GFMC

Historic slash-and-burn demonstration in the Black Forest of Germany near Freiburg. The historic procedure of rotational cutting and use of coppice trees, the burning of residuals, followed by seeding and harvesting wheat, with subsequent fallow and forest regrowth period, shaped many landscapes all over Europe.

Europe's tradition of fire use

In Europe, human use of fire has been long recognized as one of the most significant causes for the modification of natural fire regimes.

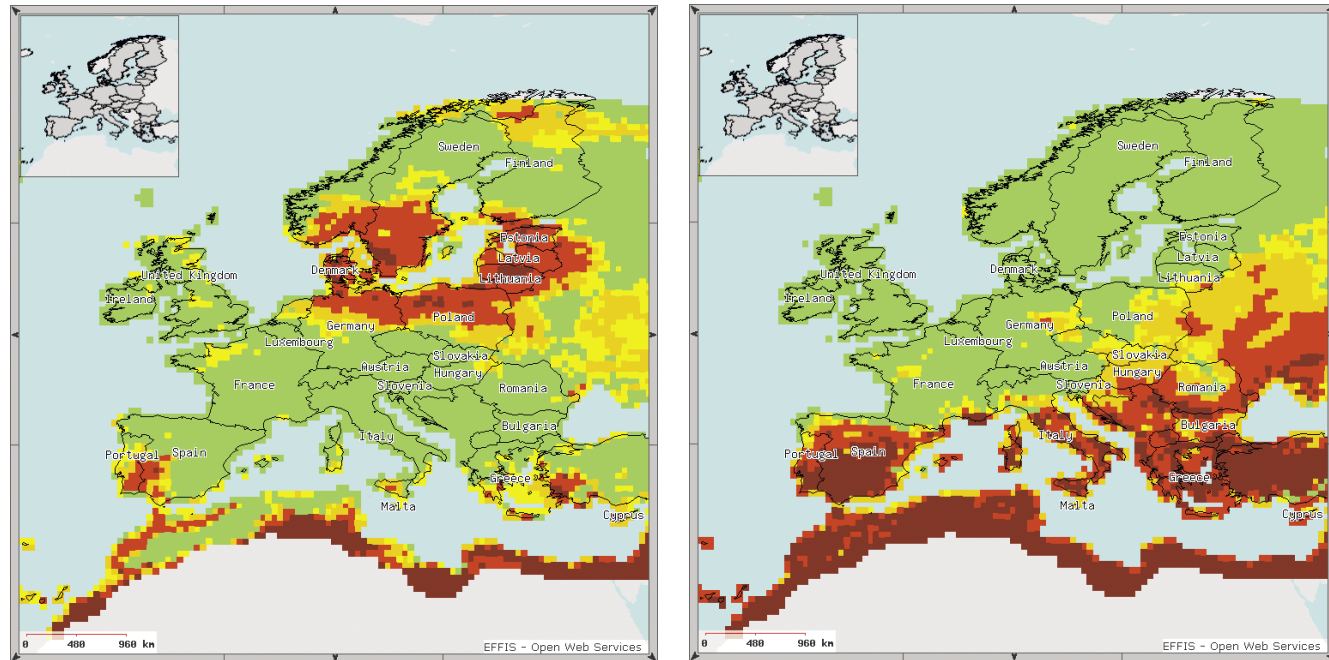
These modifications have mainly occurred since Neolithic times when fire became an essential tool for expanding grazing and agricultural lands.

The use of fire in range management for grazing continued throughout history until the present by shaping Mediterranean landscapes, for example. In Europe's temperate and boreal areas, fire became an essential tool used for the occupation of new lands. In Atlantic countries, rural communities have been burning heather and moorland landscapes for over five thousand years.

In the Mediterranean countries, traditional fire use practices are still widespread and used for different management purposes such as grazing, burning agro-forestry remains and game management.

For the most part, traditional burning has ceased in central and northern Europe.

Geographical patterns of fire risk classes in Europe for two very distinct weather situations in 2008: June 9, when extreme weather in Sweden resulted in 6,000 ha burned, with some wildfires threatening houses and families evacuated, and August 21, with a typical concentration of higher risk near the Mediterranean. Source: Joint Research Centre.

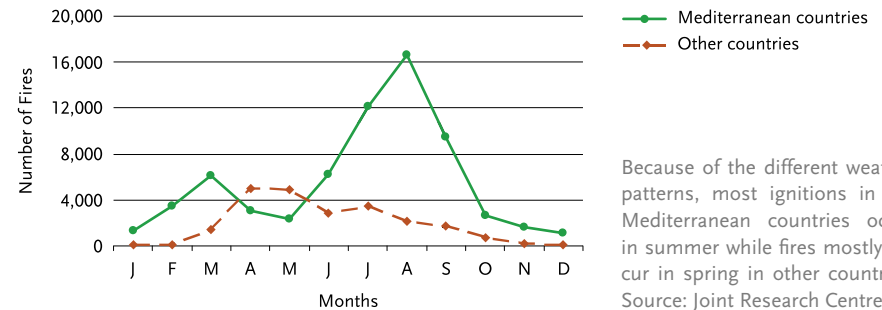


Wildfire patterns are changing in Europe

Wildfires are particularly problematic in the Mediterranean countries, where dry and hot summers desiccate the vegetation and thus provide ideal conditions for fires to ignite and spread.

Although fire weather indices in summer typically indicate a higher wildfire risk for Mediterranean countries, occasional hot and dry periods can also occur in other regions.

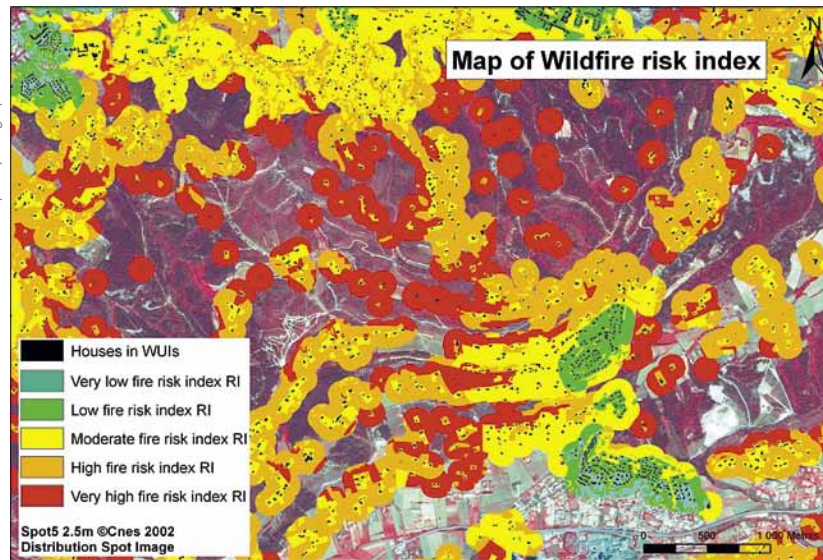
Climate change scenarios indicate that these periods are likely to aggravate and occur more frequently in the future.



Because of the different weather patterns, most ignitions in the Mediterranean countries occur in summer while fires mostly occur in spring in other countries. Source: Joint Research Centre.



Milos Bicanski/Cetty Images/All Over Press



Residents covered their faces with wet cloths as they ran to assist firemen extinguish wildfires in the suburb of Pikermi on August 24, 2009 in Athens, Greece. Authorities declared a state of emergency as the large wildfire raged destroying homes and forcing thousands to flee. The blaze was the worst suffered by mainland Greece since 2007.

Map in southern France showing the importance of the space around houses when mapping wildfire risk. Map: Corinne Lampin.

The increase of wildland urban interfaces creates a higher risk of fatalities and damage to property

The most severe consequence of large wildfires is the loss of life. Damage to property is also a major concern – in the summer of 2003, for example, 192 people lost their homes in Portugal at a cost of EUR 12.8 million and damage to other buildings was assessed at EUR 15.8 million.

Years with catastrophic wildfires	Countries affected	Total area burned (1000 ha)	Number of casualties
2000	France	24	14
	Greece	167	10
	Spain	189	7
2001	Greece	316	12
	Italy	76	3
2003	France	73	10
	Italy	92	7
	Portugal	426	21
2005	Portugal	338	18
	Spain	189	20
2007	Greece	270	80
	Italy	228	23



Integrated Fire Management:

a concept to reduce damage and maximize the benefits of fire

The paradox of fire recognises that it can be both damaging and beneficial, and that its use can range from traditional burning practices to highly specialized techniques.

The simultaneous consideration of actions to both reduce the damage caused by fire and promote the benefits of fire can be achieved through Integrated Fire Management.



Carlos Loureiro

Prescribed fire in Marão, Portugal.

Important concepts

Integrated fire management:

A concept for planning and operational systems that include social, economical, cultural and ecological evaluations with the objective of minimizing the damage and maximizing the benefits of fire. These systems include a combination of prevention and suppression strategies and techniques that integrate the use of technical fires and regulate traditional burning.

Fire management:

All activities required for the protection of burnable forest and other vegetation values from fire, and the use of fire to meet land management goals and objectives.

Traditional burning (or traditional fire use):

The use of fire by rural communities for land and resource management purposes based on traditional know-how.

Appropriate traditional fire use:

The use of traditional burning under legal regulations and good practices.

Technical fire:

The controlled use of fire carried out by qualified personnel under specific environmental conditions and based on an analysis of fire behaviour. Technical fires are divided into prescribed fires, wildfires within prescription and suppression fires.

Fire within prescription:

A prescribed fire or a wildfire that burns within prescription.

Prescribed burning (or prescribed fire):

The application of a fire under specified environmental conditions, which allow the fire to be confined to a predetermined area and to attain planned resource management objectives.

Wildfire within prescription:

A wildfire that is confined to a predetermined area and produces the fire behaviour and the fire effects required to attain the planned fire treatment and/or resource management objectives.

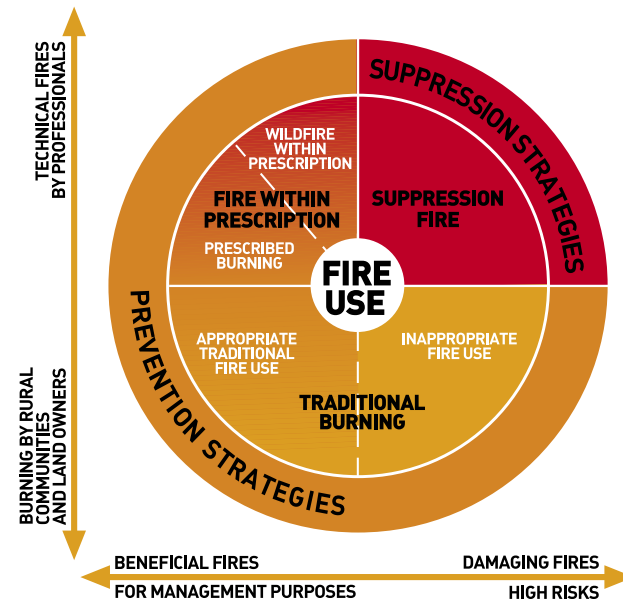
Wildfire:

Any unplanned and uncontrolled vegetation fire which, regardless of the ignition source, may require suppression response or other actions according to agency policy.

Suppression fire:

The application of a fire to accelerate or strengthen the suppression of wildfires.

INTEGRATED FIRE MANAGEMENT



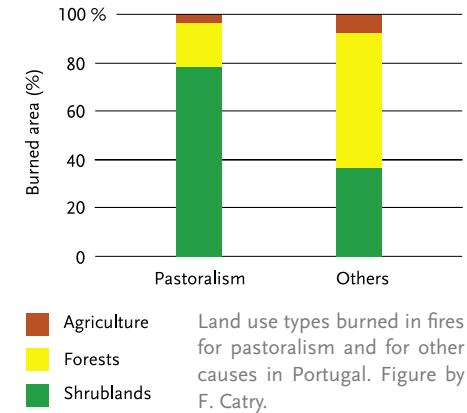
THE CENTRAL ROLE OF FIRE USE IN INTEGRATED FIRE MANAGEMENT

This figure shows that Integrated Fire Management combines both prevention and suppression strategies; these include the use of fire in the components of traditional burning, prescribed fire and suppression fire.

It also illustrates the importance of considering all fire types – from beneficial to damaging (horizontal axis); and all types of agents – from rural inhabitants to fire professionals (vertical axis).



colling/fotolia.com



Sheep grazing in Italy. Shepherds traditionally use fire for grazing improvement.

Understanding traditional fire use

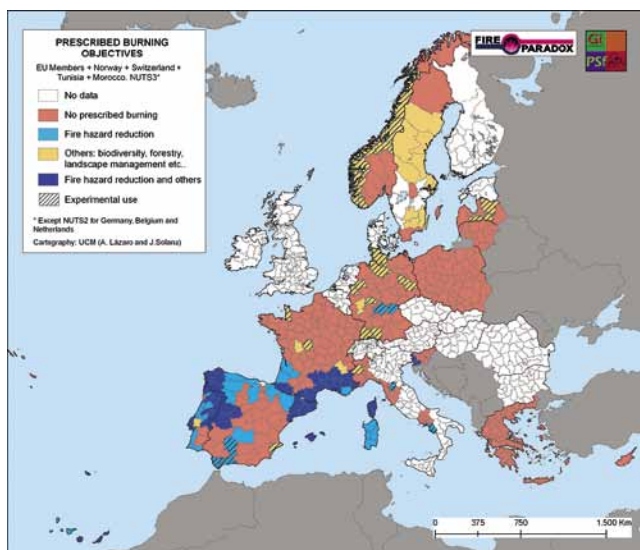
Currently, more than 95% of fires in Europe are directly or indirectly caused by humans. Some of the major anthropogenic causes of wildfires are associated with land management activities such as the burning of agricultural and forestry residues or land burning for pasture renovation.

The changing socio-economic and environmental conditions in many European rural areas (e.g. vegetation encroachment and the aging

of the rural population) have increased the risk of traditional fire use practices which, in turn, can result in damaging wildfires. The need to regulate traditional fire use is thus obvious. In some regions, traditional burning practices have been maintained or re-established based on historical precedents and the integration of traditional know-how. The potential to develop programmes to promote best practices in traditional fire use is considerable.

A study of more than seven thousand fires in Portugal (2002–2007) concluded that compared to fires caused by other means, fires caused by shepherds were significantly more concentrated in shrublands.

In these cases, pastoral fire benefits might well outweigh the risks if traditional fire use is regulated and carried out under good practices.



Map of main prescribed burning objectives in Europe.



Prescribed fire in a *Calluna* heathland in Germany. The use of prescribed fire for the conservation and restoration of the biodiversity heritage of former cultivated lands, or for the maintenance of open landscape elements with aesthetic or otherwise historic value are included in the activities conducted in the frame of the Eurasian Network for Fire in Nature Conservation and the Global Fire Monitoring Center (<http://www.fire.uni-freiburg.de>).

Reinforcing the use of prescribed burning

Prescribed burning can be applied for a variety of management objectives according to the diverse environmental and socio-economical conditions of the different regions of Europe.

In southern European countries, prescribed burning was introduced in the 1980s, mainly as fuel treatment to decrease wildfire hazards.

As more experience has been gained, the objectives of its application have broadened towards other management objectives (e.g. nature conservation, forest or game manage-

ment). This is the case in some regions in France, Spain and Portugal.

Exchanges between fire professionals under the Fire Paradox project have made it possible to introduce prescribed burning in some regions in Italy (Sardinia and Campania) with the aim of reducing fuel accumulations in pine forests and shrublands.

While prescribed burning is still forbidden by law in Greece, recent developments indicate that the situation may change.

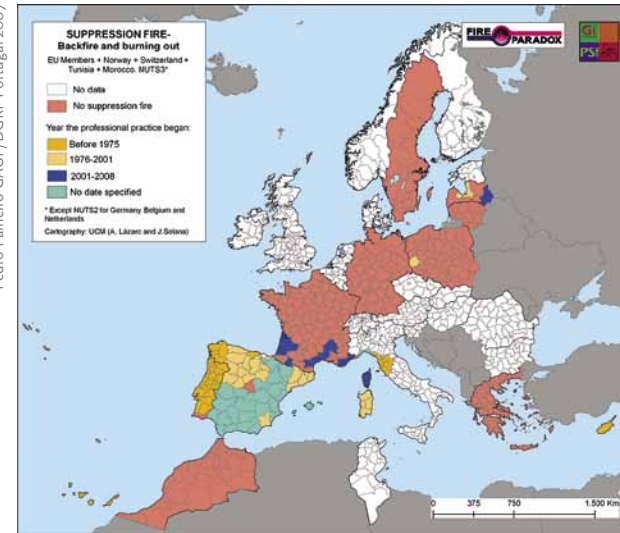
In central European and Atlantic countries, prescribed burning is used to manage endangered habitats and game, and to maintain open landscapes. This is the case in some areas of Germany, Netherlands, Denmark and the UK.

In northern Europe – Norway, Sweden and Finland – prescribed burning is promoted as a sustainable practice for forest certification and biodiversity management in protected areas.



The use of suppression fire showing the interaction with the wildfire front.

Pedro Palmeiro CAUJ/DGRF Portugal 2007



Professional practice of suppression fire including the different techniques (backfires and burning out) has different historical developments in different European regions.

Promoting suppression fire as an additional tool in fire fighting

Using suppression fire to extinguish wildfires has a long tradition in Europe. Long before fire-fighting services were established, suppression fire was used by communities to protect their own lives and property.

Recently, fire fighting organisations have been facing extreme conditions where the magnitude of wildfires has overpowered the extinction capacity of conventional fire fighting resources.

There is an increased interest, therefore, to use suppression fire as a complementary tool for fire fighting.

The main purpose of a suppression fire is to consume unburned vegetation between a control line and the wildfire front; it can also be used to change the direction or force of the wildfire's convection column.

Suppression fires can take advantage of the convective indrafts ahead of an oncoming wild-

fire. In this case, ignition timing is critical to allow for changes in wind direction.

This complex technique has to be carried out by highly experienced and trained professionals who have extensive knowledge on the physical processes behind the behaviour of interacting fire fronts. Fire Paradox provides important results for better understanding these processes.



Hermínio Botelho

Training in the use of suppression fire in Portugal.

The need for a European Framework Directive on Fire

The European dimension of the fire issue, together with the diversity of situations in fire management and use, recommends that action is taken under a global but flexible framework.

We consider that Integrated Fire Management provides the unifying concept for this framework, allowing that its various components have different levels of importance according to specific situations.

We also consider a Framework Directive to be the proper legal document at the European level, which allows a common approach under which the objectives are pursued with the means considered appropriate by each Member State.

The European Fire Framework Directive would enable the actions to be carried out at the European level; in particular, actions related to information systems (EFFIS¹) and interven-

tion in emergency situations (MIC²). Under the responsibility of the countries or regions would be actions related to evaluating risk and hazards (particularly in vulnerable wildland urban interfaces); developing Fire Management Plans and using Rural Development Programmes; and actions related to the restoration of areas degraded by damaging fire regimes.

1 EFFIS – European Forest Fire Information System
 2 MIC – Monitoring and Information Centre

Supporting Integrated Fire Management in Europe:

initiatives in education
and training



Integrated Fire Management in Europe can be supported by a Directive that would also include the central aspects of regulating fire use in traditional burning management; in the use of prescribed burning for wildfire hazard reduction, nature conservation or other land management objectives; and in the use of suppression fire.

Finally, the Directive would consider social awareness on wildfire risk and the need for using common European standards and common opportunities to establish a system for cooperation on professional training and on academic education in Europe.

The European Fire Expert Group could be instrumental in developing these initiatives.

A European contribution to the solution of a Global Paradox

Fire Paradox is a European Integrated Project which includes 30 European partners and six from Argentina, Mongolia, Morocco, Russia, South Africa and Tunisia. For more details visit: <http://fireintuition.efi.int>, www.fireparadox.org

We would like to recognise the work of the numerous researchers whose significant contributions form the basis for the discussions and proposals made in this Policy Brief.

We also acknowledge the support of the European Commission, contributions from the scientific officers and external reviewers, and the International Advisory Committee for their views and guidance.

Finally, we acknowledge the interest shown by the European Forest Institute, following the publication of the Discussion Paper 'Living with Wildfires: What Science Can Tell Us', and of the more detailed Research Report of the current project 'Towards Integrated Fire Management'. We would like to thank Andreas Schuck and his team who contributed as project partners as well as Ilpo Tikkanen, Risto Päivinen and Minna Korhonen who supported the idea and production of this Policy Brief.

Authors: Francisco Rego, Eric Rigolot, Paulo Fernandes, Cristina Montiel, Joaquim Sande Silva.

Corresponding author: Francisco Rego (frego@isa.utl.pt) | Series editors: Ilpo Tikkanen, Risto Päivinen and Minna Korhonen

ISBN: 978-952-5453-48-5

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Cover photo: Saku Ruusila

Disclaimer: This publication has been produced with the financial assistance of the European Union. The contents of this publication are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Union.



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EUROPEAN FOREST INSTITUTE

Torikatu 34, FI-80100 Joensuu, Finland
Tel. +358 10 773 4300, Fax. +358 10 773 4377
www.efi.int

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