The following paper, which formed part of the UK contribution to ECMP ’02, the third European conference on mineral planning, seeks the development of a strategic approach to European aggregate provision linked with measures to ensure environmental protection and local community control, and for mineral workings to be undertaken in a manner which gives the local community a proactive role in sustainable development. In other words, to implement the best practicable environmental option. Current annual production of construction aggregates in Europe exceeds 2 billion tonnes.

**Sources of future supply**

The authors propose that the following sources are used to meet future aggregate requirements: recycled materials, secondary materials, marine-dredged sand and gravel, small-scale inland sand and gravel and hard rock quarries, together with a major increase from very large coastal hard rock quarries. This means that the contribution from very large inland sand and gravel and hard rock quarries will be phased out. In order to ensure that industry makes the investment required, a fiscal instrument is proposed.

**Fiscal instrument**

A fiscal instrument is a financial levy charged by governments and paid by industry to ensure that particular policies, advocated by governments, are undertaken. If left purely to market forces these policies would be resisted by industry, which would prefer to pursue ‘business as usual’. In the UK, government has now implemented two fiscal instruments, one paid on every tonne of waste dumped in landfill sites and the other paid on every tonne of primary aggregate used in the UK.

The authors propose a European minerals fiscal instrument (EMFI) which...
would be used to bring about an environmentally acceptable supply of construction aggregates in the European Union, i.e., the best practicable environmental option. The EMFI would go further than the UK aggregates levy, in that it would encourage industry to invest by exempting particular environmentally acceptable methods of winning minerals. The EMFI would finance a European Sustainability Fund (ESF) which would reward communities prepared to host mineral workings by making monies available for local environmental and biodiversity projects as well as economic development. These monies would be in addition to monies received by the community in the form of mineral royalties.

Environmental justice
To this end, the concept of environmental justice is important. The authors do not believe that it is acceptable for the populous centre of the European Union to export the environmental problems associated with the winning of construction aggregates to other European communities or foreign countries and to expect them to accept lower environmental standards. Environmental justice would mean that the best possible environmental working practices would be used and that a code of practice covering all aspects of the development would be entered into between the local community and the developer. Monies would be made available from the ESF, which would be set up to refund the EMFI monies to qualifying projects.

Code of practice
It is proposed that a code of practice between the local community and the developer, covering all aspects of the mineral workings, be legally entered into. Other parties having an input into the code of practice would include other community groups, the local authority, the land and mineral owner, government and environmental NGOs, plus other interested parties.

Community control
It is clear that community involvement in negotiating a code of practice that covers economic and environmental considerations is a key difference from the present practice. In fact, it is proposed that the local community becomes the de-facto controller of all the natural resources of the community. The community would then become a royalty recipient and be entitled to additional monies returned from the EMFI to assist with both economic and environmental projects. This community control is particularly important where it is proposed to work the world-class coastal hard rock resources of Europe.

Coastal rock resources
These multi-billion tonne rock resources exist on the coasts of many of the member states of the European Union. They have already been subject to geological assessment in both Scotland and Norway and feature in the future construction aggregate strategies for both Norway and the UK. The first coastal superquarry was opened by Foster Yeoman in Scotland over 20 years ago. As part of the future supply scenario, the authors propose the replacement of the aggregates currently supplied from the very large sand and gravel and hard rock quarries of Europe with aggregates from coastal hard rock quarries. The reason that no other major aggregates company has followed Foster Yeoman’s lead is that the costs associated with winning the mineral in an environmentally acceptable manner are currently too expensive to give a satisfactory return on the capital invested. Business as usual is their preferred option and, in the absence of a European fiscal instrument, this state of affairs will continue. It is proposed that the EMFI is not paid by companies prepared to work the mineral by glory hole and/or cavern mining methods, and who sign up to a code of practice with the local community in which the local community is the lead player.

Glory hole and/or cavern mining
In order to minimize the local environmental impacts of working coastal deposits, only
glory hole and/or cavern mining should be permitted. The glory hole method removes vertical columns of rock but leaves the outside of the mountain unworked, while cavern mining leaves both the outside and the surface unworked. As these methods are more expensive than traditional open-pit working, the EMF should not be paid by companies undertaking these working methods and signing up to the code of practice.

The wider environmental implications at the delivery ends can be overcome by using floating trans-shipment terminals to break bulk. It is anticipated that, as in the oil business, consortia would be formed to work the coastal deposits. Delivery of ‘crusher-run’ product would be made to consortia members’ ‘virtual quarries’ for further processing.

Environmental implications

There is a perceived conflict between the establishment of mineral exploitation in remote, relatively unpopulated coastal areas, where potential operational impacts affect few people, and the inappropriateness of siting such industrial development in pristine surroundings.

Conflict resolution may be attained by the preservation of the natural environment of these coastal areas by ensuring minimal impacts on landscape and visual amenity, while achieving benefits to the community in terms of repopulation through employment and funding to develop local long-term sustainability.

A holistic approach to sustainable large-scale coastal minerals development is required, central to which is an environmental management system (EMS). The EMS should identify the ‘end product’ of the mineral development. In achieving this outcome, designs will be required for the various stages and elements of the development, for example the initial construction phase (the enabling works) and the exploitation phase. Potential environmental impacts may arise from the design. Restoration works should be designed on a rolling programme and residual impacts post development considered at the design stage.

However, inherent in the concept of a minerals EMS is that it should embrace matters presently covered by a number of disparate regulatory bodies, namely (in the UK): the planning authority, in respect of permitted use of the land and in matters of environmental impact assessment; the Environment Agency (SEPA in Scotland), in respect of emissions (to water and to air); and the Health & Safety Executive, in respect of safe working practices. NGOs such as Scottish Heritage also act as consultees within the planning process.

Environmental opportunities come about when the project becomes a means to an end — in exploiting the mineral for the benefit of distant consumers, local communities may benefit in the short-to-medium term through funding, but long-term benefit may accrue post development through the use of a designed void for pump-storage electricity generation, linked to wind-generated energy.

Design tools

Three-dimensional modelling systems used in underground mine design have been adapted for use as a design tool for surface mineral extraction. A safe working design in accordance with HSE regulations may be developed from which associated environmental impacts may be assessed and successful mitigation developed. These core EMS issues inform land-use decisions, provide the basis of management of health
and safety-related issues and set out required environmental controls and monitoring.

The community, sustainability and biodiversity
The reversal of declining rural populations through sustainable minerals development linked to future energy requirements may be further aided by use of mineral production by-products. Mineral ‘fines’ may be used for the re-mineralization of soils, allowing land to be brought into beneficial productive use. In Scotland, base-rich mineral dusts mixed with green-waste compost have undergone successful trials as a growing medium.

Future community self-sufficiency in agricultural produce, currently imported from central distribution centres, would be in accordance with the current trend away from the Common Agricultural Policy (CAP) and the subsidies it attracts. Distant rural communities, disbenefited by existing adverse land-use quality, may be further impacted by this action. Consequently, an EMFI that allows across-the-board sustainability through structured and visionary strategic minerals planning for Europe is to be commended.

Conclusions
In this context, the authors argue that the working of large-scale mineral deposits by glory hole and/or cavern mining techniques represents the best local environmental option. In other words, it is not necessary to destroy the environment of a community in order to save the community. Environmental justice must be applied.

It is no longer acceptable for the populous European centre to seek to obtain its future supplies of construction aggregates by exporting its environmental problems to other European communities not able to resist, or to third-world countries prepared to ignore environmental damage.

Particular attention in this analysis is paid to the fact that the European Union has world-class reserves of rock located in some of its remotest peripheral communities where inhabitants are finding it difficult to survive without the help of financial subsidies from the European Union. In this analysis between business as usual and the best practicable environmental option, the authors have examined how these world-class resources of rock can be worked to the benefit of both the local community and the wider population of the European Union.

In conclusion, the authors have attempted to show how a fiscal instrument can assist the change from business as usual to the best practicable environmental option and, in so doing, bring about an environmentally acceptable supply of construction aggregates in the EU.