

**Combining life cycle costing and life cycle assessment helps project teams make better decisions**

By David Churcher, BSRIA Sustainable Construction Group

Value engineering during project design is often used as shorthand for reducing the capital budget. This may be popular in the short term, but the true cost of such decisions may not be apparent until the operating costs of those projects are being felt. The same argument can be made about environmental impact, particularly in relation to climate change and use of natural resources. Ian Orme, who leads the consultancy and research team in BSRIA's Sustainable Construction Group, said "Understanding the long term costs and environmental impacts of traditional and new materials is a key part of making sustainable decisions in facilities management."

BSRIA is part of the NanoPigmy project which is investigating how pigments can be chemically altered to improve their properties in such a way as to reduce their life-cycle costs or environmental impacts. These pigments can then be used to develop better end-products such as paints, plastics and cement renders. BSRIA is using its expertise in life cycle costing and life cycle assessment to analyse the innovative materials developed by the other members of the NanoPigmy team and comparing them with the traditional materials that are currently specified and purchased for construction projects. The Nanopigmy project is funded through the European Union's Framework 7 research programme and involves a consortium of 8 partners from Spain, UK, Italy, Switzerland and Poland.

The benefits of the new materials being developed by NanoPigmy might be seen in lower building energy consumption because the external façade has better infra-red reflectance, or in reduced maintenance frequency because a wall surface has better self-cleaning properties. These improvements are of interest to building owners and facilities managers because they reduce the running costs of buildings. They are also of interest to policy-makers and the wider public because they reduce the environmental impact of constructed assets.

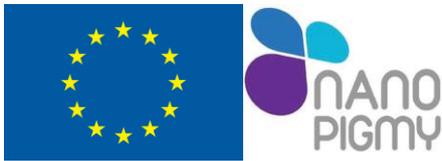
As the NanoPigmy project is still in its early phase there are no specific results to share yet. But here are two examples of how a holistic approach to economic and environmental analysis can help designers, facilities managers and building owners to make better decisions.

Example 1 is the selection of a floor covering. When viewed in terms of initial investment, carpet tiles would score well for cost when compared with a hardwood floor but less well for environmental impact because of the processing required during manufacture. When the same decision is viewed in life-cycle terms over the design life of a building, hardwood flooring becomes much more attractive because it has a very long life. Carpet is less attractive because it needs to be replaced at regular intervals – this increases the life cycle cost and also multiplies up the environmental impact. Thus the optimum decision is liable to change when environmental impact is considered as well as cost, and when life cycle impacts are considered instead of just initial investment.

Example 2 is the selection of an external facing material. Both facing bricks and cement render are likely to have high environmental impacts because of the energy involved in their manufacture. Render is likely to have a lower capital cost than brick, but in life-cycle terms the regular repainting or re-rendering of the wall also need to be taken into account. This may result in the render having an equivalent or higher life cycle cost. Thus the optimum decision is liable to change when environmental impact is considered as well as cost, and when life cycle impacts are considered instead of just initial investment.

Lifecycle considerations can affect a project decision because they take account of the on-going costs and environmental impacts rather than just the immediate effects. The combination of cost and environmental analysis can also affect the decision, particularly where advantages in one area need to be balanced against disadvantages in the other area. Experience from a high-profile project that BSRIA is involved in has shown the value of a multi-stakeholder workshop. This involved the design & construction team, the facilities management team and the client's capital projects team in an open discussion of the pro's and cons of alternative designs, using life cycle cost and life cycle carbon information to reveal the optimum materials for different aspects of the project.

The results from the NanoPigmy project will be published on the project web site at [www.nanopigmy.eu](http://www.nanopigmy.eu) after the project finishes in February 2015. This project has received funding from the European Community's Seventh Framework Programme (FP7-NMP-2011-SME-5) under grant agreement no 280393.



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