SCI-NETWORK

PROCURING INNOVATIVE AND SUSTAINABLE CONSTRUCTION

A GUIDE FOR EUROPEAN PUBLIC AUTHORITIES








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1 INTRODUCTION

The significance of the construction sector to the European economy, society and environment is difficult to overstate. A few key facts help to illustrate this[1]:

- Buildings are responsible for 42% of EU final energy consumption, and 35% of all greenhouse gas emissions.
- More than 50% of all materials extracted from earth are transformed into construction materials and products, and construction and demolition activities also account for about 33% of waste generated annually.
- The sector accounts for approximately 10% of EU GDP, and employs about 7% of the EU workforce (only "on-site").

The sector is also one facing substantial pressures and changes. All climate change agreements and strategies, at whatever level of government, recognise the necessity of drastically improving the energy efficiency of our buildings – both the construction of new, and particularly the renovation of our existing building stock. All Member States are obliged by European law to set minimum energy performance standards for all new building and major renovation work. By 2018 all new public buildings must meet "nearly zero-energy buildings", according to the recast Energy Performance of Buildings Directive[2].

At the same time public authorities across the EU are faced with making extremely challenging budget cuts due to the ongoing financial crisis, and are less able to find funds for major capital investments, with pressures also growing on maintenance budgets.

The interaction between the two drivers of energy efficiency and budget cuts is not straightforward. On the one hand, governments have less money to invest in costly renovations or new construction projects (although stimulus packages in many EU countries have increased or brought forward infrastructure projects). On the other hand the financial savings to be made by investing in energy efficiency are often substantial and make clear economic sense even in the short term. Given its significance in employment and GDP terms, it is also important for local economies to maintain a healthy construction sector.

New innovative construction materials, technologies and processes are constantly being developed which offer the prospect of significant energy/environmental performance improvements in a cost-effective manner. However, too often these opportunities are missed through public sector construction procurement practices which favour established approaches and technologies, and don't reward new ideas.



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A NOTE ON THE SNAPSHOTS

To illustrate the advice and recommendtions provided in this guide a number of short examples, called ***Snapshots****, have been included. More detailed information on each snapshot as well as many more examples can be found in the online version of the guide at* ***www.sci-network.eu****. For more information on any of the examples please write to* ***procurement@iclei.org***

[1] *Figures taken from* ***A Lead Market Initiative for Europe: Action Plan for sustainable construction. Commission of the European Communities. COM (2007) 860 final*** *and* ***Resource-efficient construction – The role of eco-innovation for the construction sector in Europe, Eco-Innovation Thematic report 2011.***

[2] *Directive 2010/31/EU on the energy performance of buildings (recast).*

1.1 WHAT IS THE AIM OF THE GUIDE?

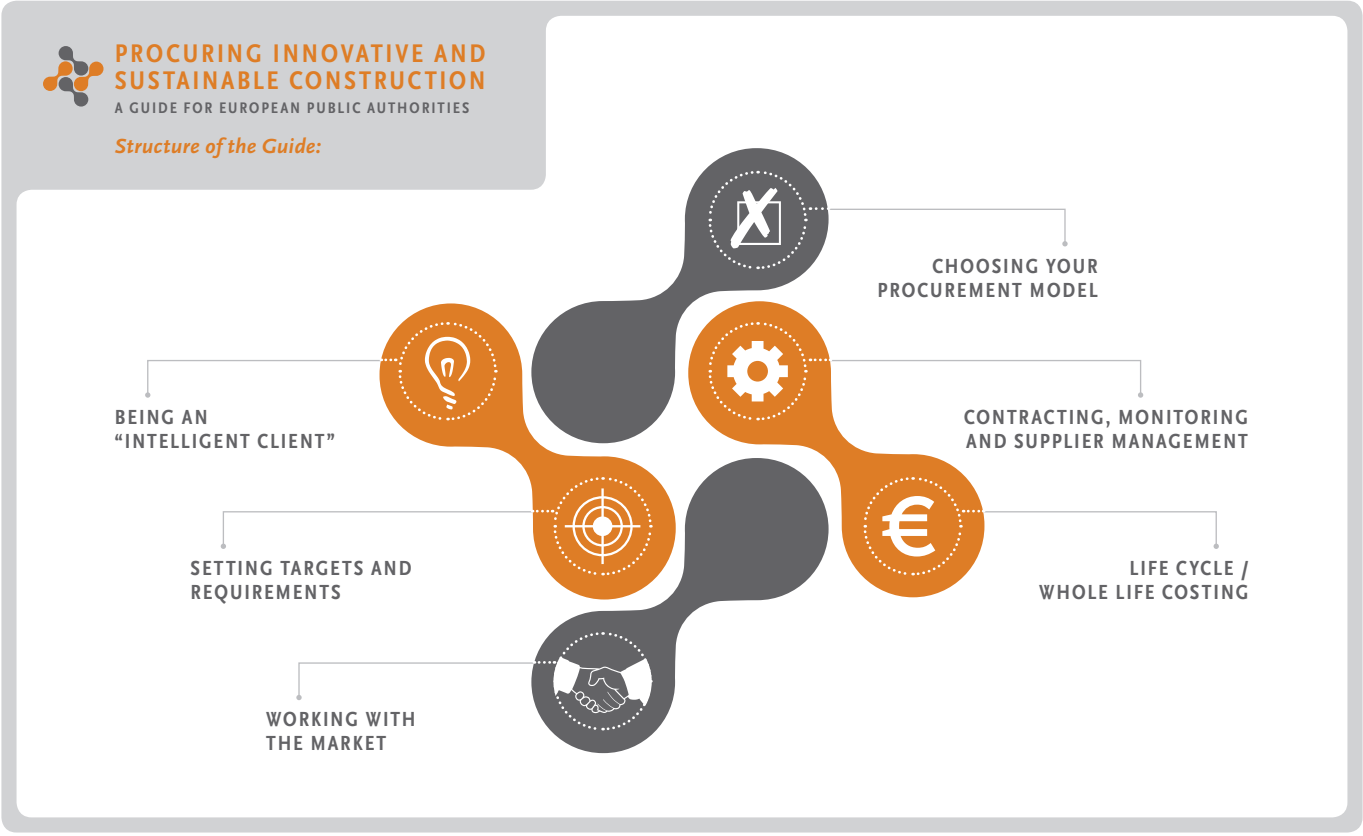
The aim of this guide is to help public authorities become "innovation friendly" in their construction procurement – to help them access the potential environmental, economic and social benefits that innovative construction solutions can bring. It offers guidance both on how best to set up your procurement process to encourage innovation and also offers information on different ways to finance investments.

The guide is principally aimed at those involved with construction procurement within EU public authorities. A summarised version of the guide aimed at decision makers is also available on the SCI-Network website (***www.sci-network.eu***).

1.2 STRUCTURE OF THE GUIDE

The guide attempts to explore how innovative solutions can best be encouraged within the many different stages and elements of construction procurement.

We have in part attempted to structure the publication roughly chronologically along the procurement process. Procurement procedures in this area however can be highly complex, and can vary substantially from project to project, so there is a considerable degree of overlap and interaction between the different sections.



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❷ BEING AN "INTELLIGENT CLIENT"

As in any procurement, getting the best solution is primarily determined by how well the procurement process itself is carried out, and the skills of those organising it. In a field as complex as construction this is especially true. The type of skills required will vary according to the type and scale of the project being undertaken, and it will need to be determined whether sufficient capacities exist within the authority, or whether they can be brought in from outside.

Being an "intelligent client" also requires knowing your true needs. The effective involvement of end users and facility managers is critical to success.

Note: *This guide assumes that design services are procured externally. In some European countries it is common for design work to be carried out by publicly-employed architects, which of course alters the required make up of the project team.*

2.1 ESTABLISHING A PROJECT TEAM

One of the most critical steps in achieving a successful construction project is setting up an effective project team with the necessary skills. The following skill areas may need to be considered:

- **PROJECT MANAGEMENT** – construction projects often involve large budgets, significant numbers of partners and subcontractors, and complex delivery schedules. As such effective project management skills are vital. Having expertise in the area of risk management should be considered for projects targeting innovative solutions.

- **TECHNICAL KNOWLEDGE** – it is critical that the contracting organisation has the technical knowledge to understand and communicate with construction professionals. This is particularly important when targeting innovative construction solutions, to help in assessing technological risks connected to the innovation.

- **LEGAL ADVICE** – some of the procurement procedures and tools referred to in this guide (energy performance contracting, public private partnerships, competitive dialogue, whole life costing) may not be familiar to many public authorities, and it is important that sufficient skills are available to ensure they are applied correctly and effectively.

- **COMMERCIAL EXPERTISE** – ensuring project objectives are achieved will require commercial skills, particularly in understanding and communicating the risk balance of the project.

- **USER INVOLVEMENT** – as outlined in section 2.5, ensuring the involvement of end users and facility managers at appropriate stages should be standard practice to ensure that user needs are appropriately met, and that operational costs and other issues are sufficiently considered.



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TEAM BUILDING IN FINLAND

For the construction of a school and day-care centre campus according to ambitious sustainability standards the City of Jyväskylä put together a team to ensure the required expertise. Staff from the city administration (construction management, facility management, education, daycare, city planning, city catering, sport facilities) were joined by various external experts (technical, architectural and financial consultancy and procurement management).

RECOMMENDATION 2.A:

Establish at the beginning a project team with the required management, technical, legal and commercial skills which the construction project requires. Ensure end user and facility manager involvement in the team.

2.2 DEVELOPING A BUSINESS CASE

Any successful construction project must be built on a well-prepared business case. A robust business case should be prepared at the outset of a project, and regularly revisited – verifying assumptions, objectives and its ongoing validity. A business case should establish clear priorities, targets and success indicators for the project (see section 3), including the balance between performance, cost and time. This provides a crucial basis for decision making within the project, and allows project success, including the impact of innovation, to be effectively assessed.

RECOMMENDATION 2.B:

Establish a robust business case, including clear objectives, priorities, and success indicators for your project.

2.3 BRINGING IN EXTERNAL EXPERTISE

Ideally, all the required skills will be available within the authority itself; however in many cases they will not – even in larger authorities more specialist skills may not be available in-house. Many authorities therefore bring in external consultants and experts to fill skills and capacity gaps within the project team.

An authority may, for example, look to employ a technical expert in sustainable construction to participate in market engagement activities prior to tendering (see section 4.2), or to assist in the assessing of submissions during a design contest (see section 5.4). Alternatively, a whole life/life cycle costing consultant may be employed to manage the integration of this costing model into the procurement process.

Relevant experts should be involved in all stages of the project from planning and design through to construction and even operation. In more comprehensive examples, a construction project management company may be employed to oversee the whole process from start to finish.

In many countries or regions there may also be public agencies able to provide direct assistance to authorities, for example in relation to energy efficiency, or innovative procurement practices.

EMPLOYING EXPERT ASSISTANCE IN ALSACE, FRANCE



The region of Alsace wished to establish a long-term contract for the running of 14 high schools to take advantage of potential energy savings. As the administration had little experience in energy performance contracting (EPC) or public private partnerships (PPP), it was decided to bring in external experts. The services of a technical, a legal, and a financial expert were procured to assist in developing the most suitable model. The final outcome was a PPP running for 20 years with a value of €64.6 million. For the first three years of the contract, the experts are still available to supervise contract implementation.



ASSISTANCE WITH FINNISH EPC PROCUREMENT

After several appeals and withdrawn calls for tender in public EPC (energy performance contract) procurements over the past few years in Finland, municipalities now often consult experts in the procurement of more complex services, helping to also build internal capacities. Contracting external expertise in energy efficiency and procurement to prepare the tendering process has proven a good way to ensure that procurement is done in a transparent and non-discriminatory way in large EPC-projects in the public sector.



REGIONAL SUPPORT IN THE UK AND AUSTRIA

- ***Re:Fit*** *in London provides direct assistance to public authorities regionally to give their buildings an energy efficiency overhaul. They can offer help in assessing baselines and potential energy savings, preparing tender documents, securing funding and in overseeing projects.*

- ***Sustainable:building in the municipality*** *is a consulting package offered to public authorities by the Vorarlberg Environmental Association in Austria. They provide assistance with the preliminary design, the planning and tendering stage, construction and performance monitoring.*

RECOMMENDATION 2.C:

Where in-house experience with innovative construction procurement is limited, consider contracting external consultants to advise or manage the process.

RECOMMENDATION 2.D:

Identify whether assistance in innovation or aspects of sustainable construction procurement can be provided by national agencies.

2.4 CO-OPERATION AND CAPACITY BUILDING

Bringing in external consultants can of course prove expensive. In the longer term, particularly for bigger authorities, it may be cost-effective to integrate training on the procurement of innovative solutions into staff development programmes. For smaller authorities with intermittent requirements it may be more effective to procure external consultants on a project by project basis.

Smaller authorities in particular may also consider whether there are options for collaborative procurement arrangements – for example in the establishment of framework contracts for expert advisors. Larger authorities may also allow others to "piggy-back" on the contracts which they award. In many countries and regions there are also public agencies which can provide direct assistance in, for example, energy efficient construction, or the procurement of innovative solutions.

RECOMMENDATION 2.E:

For larger authorities, implement internal capacity building programmes on the procurement of innovative construction solutions.

RECOMMENDATION 2.F:

Consider setting up collaborative relationships with other public authorities in the region.

RECOMMENDATION 2.G:

Explore whether national or regional agencies are available to provide expert advice at reduced or no cost.

2.5 INVOLVING END USERS AND FACILITY MANAGERS

Typically, those who are responsible for managing a construction project will not be those who ultimately manage or use the final building. This disconnect is often one of the biggest obstacles in the way of achieving optimal construction solutions.

Any construction project must be initially based on a thorough assessment of needs, and this may only be effectively delivered through close co-operation with end users and managers. Users will also be best placed to assess the practicality of different options proposed during the design process – this is especially the case where behavioural change is required of users.

An important first step is to identify the different groups which use, and are responsible for managing the building. In a school, for example, this would at least include the headmaster, the caretaker, the teachers, the pupils, the parents, the kitchen and cleaning staff, and the organisation with budgetary responsibility for operating the school. Depending on the type of project, other people in the local community may also be affected.

Managing end user/facility manager involvement can present challenges in construction procurement – not least the possibilities of raising unrealistic expectations, and the difficulties in communication between technical construction professionals and user groups. Some public authorities employ experts specifically to manage this process. Depending on the contractual/procurement model followed, they may also require the architect/project manager to develop a plan for user involvement during the process. Certain tools, such as Soft Landings[3], also exist which can help to improve this process.[4]

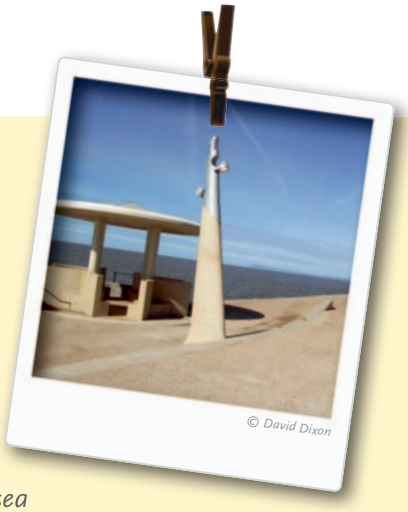
The other major consequence of this disconnect is budgetary – as responsibility for construction and operation budgets is typically separated, there is often little incentive to take operation costs into account in investment decisions. This is explored in more detail in section 7.

RECOMMENDATION 2.H:

Identify relevant user groups, and consider how to involve them throughout the construction process.

RECOMMENDATION 2.I:

Ask the architect/project manager to develop a plan for user involvement, or consider employing an experienced facilitator to manage the communication process.



REDEVELOPING CLEVELEY'S COASTAL DEFENCE AND PROMENADE, UK

Opened in 2008 this project is a unique and multi award winning combination of sea defences, protecting around 7,700 homes, and a low carbon seaside resource for locals and visitors to enjoy in the UK. The 1.3km development along the coast was built in close consultation with residents and visitors in an effort to determine what amenities they would like to see in place. This resulted in facilities that have catalysed regeneration and sustainable development, including 5 helical wind turbines generating 50 MW of energy each year to power a café as well as LED lighting along the promenade. Pursuing sustainability, innovation and collaboration this project was delivered ahead of time and below budget.

[3] ***www.bsria.co.uk/services/design/soft-landings***

[4] *For further information see the SCI-Network report on user involvement in sustainable renovation projects at* ***www.sci-network.eu***

2.6 LEARNING FROM OTHERS

Learning from other similar projects and working closely with other contracting authorities is an important element in being an "intelligent client". Most organisations tend to be poor at sharing good or best practice, including where innovation is concerned. Developing and using existing contact networks – both within and outside an authority – can help in the identification of innovative solutions, and avoid mistakes that others may have made.

RECOMMENDATION 2.J:

Learn from others experiences and best practice with similar projects. Identify relevant networks and communication channels.



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3 SETTING TARGETS AND REQUIREMENTS

No matter what type of construction project is being undertaken, the final result achieved will greatly depend on the targets and requirements set by the contracting authority, and how effectively these are defined and communicated to those carrying out the work. It is important to consider not only which target or standard to aim for, but also how this is effectively integrated within the procurement process.

3.1 SETTING ENERGY PERFORMANCE TARGETS

In most EU countries energy performance assessment and certification schemes exist for buildings. These provide both a methodology which should be used for calculating energy performance (different models are followed in different countries), and also minimum standards to be achieved. Alternatively some schemes may offer a graded performance scale – e.g. gold, silver and bronze. However, the ambition of the minimum standards set may vary significantly. The Passive House standard[5] represents a highly ambitious level of energy performance which many public authorities are now targeting in their construction projects.

When considering the lifetime costs of a building it almost invariably makes clear financial sense to aim for a highly ambitious level of energy performance. When considering the costs of a building throughout its complete life cycle, from construction to final demolition, initial investment costs are typically considerably outweighed by operation and maintenance costs – a ratio of 1:5 is often applied as a rule of thumb. Requiring strict energy performance standards therefore will usually bring considerable financial benefits (see section 7).

Where the upfront budget for construction work is restricted, however, it may be advisable to set an intermediate minimum standard and indicate a higher aspirational target which architects and construction companies can be challenged to achieve, either through setting incentives within their contract, or through running a design contest to win the contract (see section 5.4). Engaging in dialogue with architects and building contractors during the planning phase (see section 4) can help an authority to identify what should be achievable by the market and with what short and long term cost implications.

[5] *Passive House organisations exist in many EU countries. You can find an organisation in your country in the following list:* ***www.passivehouse-international.org/index.php?page_id=77***

The most influential decisions affecting energy performance are taken early in the project (during the planning and design phases). Regardless of the procurement procedure and contractual model followed, it is therefore important that targets (both minimum requirements and aspirational targets) are also set early. Ensuring these targets are clearly communicated throughout the project and in all tendering documents also makes sure all involved are working with a common understanding. For renovation projects, an accurate baseline energy performance figure must also be determined.

To the extent possible, energy performance should also be assessed at the whole building level and not at the individual component level. Although a specific component or system may work efficiently as an individual unit, it must be considered how this fits into the functioning and performance of the building as a whole.

RECOMMENDATION 3.A:

Identify an ambitious minimum quantified energy performance requirement for the construction project, based on nationally available assessment and certification schemes. Where possible, target the Passive House standard for all new construction.

RECOMMENDATION 3.B:

Alternatively, consider setting a moderate minimum performance requirement and an additional aspirational target to challenge the market to deliver. This may be the best model if there is a fixed investment budget for the project.

RECOMMENDATION 3.C:

Requirements and targets should be established during the planning phase of the project, and clearly communicated throughout.

RECOMMENDATION 3.D:

Always ensure that energy performance is assessed at the whole building level and not at the individual component/ material level.

PASSIVE HOUSE SCHOOL IN GERMANY



The necessary closure of several schools in Oberspreewald-Lausitz was turned into an opportunity to build and maintain a single school to passive house standard for the separate institutions as a public private partnership (PPP). Criteria were developed together with the Passive House Institute in Darmstadt, including a maximum heating demand of 15 kWh/(m2a). Construction work was completed within 14 months.

CLEAR SUSTAINABILITY TARGETS FOR "THE HIVE", UK



For the construction of the new Worcestershire Library and History Centre ("The Hive") in the UK, the county council, city council and university set high sustainability targets, which were all clearly defined at the project's inception. These were included in a comprehensive 160 page Detailed Design Statement (DDS) shared with potential bidders. An ambitious CO_2 target of 15.8 $kgCO_2/m^2$ was set, which became a key performance indicator for the contract. This has resulted in a solution that utilises river water in the summer to cool the building and in winter some heat is drawn from the river to enhance underfloor heating. This collaboratively developed measure is a major contributor in achieving the building's exceptionally low CO_2 output.

3.2 OTHER SUSTAINABILITY FACTORS

Whilst some of the schemes mentioned above focus on just energy performance, others[6] take into account a very wide range of sustainability indicators, including the use of sustainable building materials, indoor air quality, waste generation, noise and water use during construction and many others. The indicators and standards underlying these schemes can also be useful in setting minimum requirements or aspirational targets for the construction project.



HAROLD HILL, SUSTAINABLE ENERGY EFFICIENT FIRE STATION, UK

In the refurbishment of the Harold Hill fire station in the UK an aspirational target was set to achieve the BREEAM Excellent rating. This is based on the station design briefing developed by London Fire Brigade, which provides the framework for any new build or major refurbishment fire station. The final outcome utilised 80% of the original structure, and achieved 42% less energy use than the average London fire station. Features include; photovoltaic panels for electricity generation, solar heating, CHP, grey water recycling and motion and daylight sensor control to help lower energy use.



HISTORICAL RENOVATION IN VIENNA, AUSTRIA

The refurbishment of offices of the Austrian Trade Union Federation (ÖGB) included strict sustainability requirements, based on those developed by the GreenBuilding Program and klima:aktiv Initiative. Amongst other requirements this demanded a reduction in heating energy demand of 50% more than that required by the building code. Other requirements were included relating to the building materials used and indoor air quality. The historical façade of this office building had to remain intact which provided a further challenge. Final heating demand was reduced from 102 to 50 kWh/(m2a).

Green public procurement (GPP) criteria are also available, such as the criteria for construction projects developed by the European Commission[7]. Ecolabelling schemes, such as the EU Ecolabel and natureplus[8], and environmental product declarations also exist for individual construction materials. When determining relevant sustainability criteria it is however important to ensure that the main focus remains at the building, rather than individual component level.

How broad a set of sustainability indicators you decide to apply in your construction project may in part be determined by the level of experience and capacities available in the procurement team. Focusing on a wider set of indicators may lead to a more sustainable outcome, however it will likely be more challenging for the procurement team to manage.

RECOMMENDATION 3.E:

Focus initially on a few key sustainability indicators and targets. As experience within the team in sustainable construction procurement develops, further indicators may be added in future procurement actions.

3.3 DEVELOPING PERFORMANCE BASED SPECIFICATIONS

To encourage innovative solutions it is important not to be over prescriptive in your demands. Requirements should be framed in terms of performance (e.g. steady indoor temperature of 20-22°C, overall emissions of 15.8 $kgCO_2/m^2$ as in the snapshot on page 11), and not technically descriptive (e.g. oil-based heating system with X heating points per m^2, triple-glazed windows). This allows greater scope for architects and contractors to provide innovative ways to meet the performance targeted.

RECOMMENDATION 3.F:

Frame procurement requirements in terms of desired performance, rather than defining a specific technology or technical solution.

[6] *Such as BREEAM (**www.breeam.org**), DGNB (**www.dgnb.de**), Klima:Activ (**www.klimaaktiv.at**) or PromisE (**www.promise-luokitus.fi**)*
[7] ***www.ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm***
[8] ***www.natureplus.org***



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3.4 BUILDING INFORMATION MODELLING (BIM)

Building information modelling (BIM) is a concept which is gaining increasing attention across Europe. BIM is "a digital representation of physical and functional characteristics of a facility creating a shared knowledge resource for information about it forming a reliable basis for decisions during its life cycle, from earliest conception to demolition".[9]

BIM enables this digital model of the construction to be passed on from the design team to the main contractor and subcontractors, and then on to the owner/operator. At each stage, further information is added to the shared model by the responsible professional.

This approach helps to reduce information losses that occur when a new team takes 'ownership' of the project (see section 5), and can help lead to substantial design and construction cost savings, and performance optimisation.

RECOMMENDATION 3.G:

Consider requiring building information modelling (BIM) to be applied throughout the construction project to optimise information flows between project actors.

INNOVATIVE KERB EDGINGS IN WAKEFIELD, UK



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Interested in encouraging innovative new technical solutions, the council of Wakefield used an output performance specification when requesting supplier tenders for kerbing. Instead of tightly specifying the traditional pre-cast concrete kerb edging, the performance based specification enabled a proposal for a lightweight kerb edging made from entirely recycled materials to be considered.

The lightweight construction improved health and safety associated with manual lifting and vibration from cutting and shaping as well as the need for lifting machinery while the product also improved durability. Environmentally, the use of Durakerb also enabled a 73% reduction in carbon emissions from reduced transportation requirements and lower embodied carbon.

[9] *Definition of the UK Construction Project Information Committee.*



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4 WORKING WITH THE MARKET

Ultimately, the success of your project will depend on the ability and effort of the construction professionals you employ to develop and implement the best solutions. Finding ways to effectively inform the market of your intentions and engage with interested companies prior to the formal tendering process can bring major benefits.

4.1 COMMUNICATING AMBITION TO THE MARKET

If an authority wishes to see innovative and sustainable solutions presented by the market this ambition must be clearly communicated to the market. The public sector is often viewed by private contractors as conservative and risk averse in its procurement activities. It is important to ensure you clearly state in tender documents your desire for a sustainable outcome and your openness to innovative technologies and techniques being offered.

Highlighting specific innovative technologies you are aware of (or have identified during market engagement activities) as examples in tender documentation can also have a positive impact. The use of performance/output based specifications is also advisable.



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PROCUREMENT PROSPECTUS IN WAKEFIELD, UK

In May 2010 Wakefield Council (UK) started to develop a strategy to procure a highly energy efficient lighting system for a new swimming pool and leisure complex. Recognising that there were significant innovations in the field of lighting, Wakefield made a procurement prospectus available to the market providing details on their proposed project and inviting suggestions from all tiers of the supply chain to come forward with innovative proposals.

The most promising responses to the prospectus were followed up with workshops. Furthermore a directory of businesses that responded was published online to encourage partnering between suppliers in preparation for the call for tender.

It is also important to provide the market sufficient time to prepare for your tender. Developing appropriate solutions and identifying the partners needed to deliver them takes time – informing the market considerably in advance of your intentions will likely lead to better prepared offers once you go to tender.

Tools such as procurement prospectuses or prior information notices (PINs), which formally announce future tenders should be considered.

RECOMMENDATION 4.A:

Inform the market of your intention to reward sustainability and innovation sufficiently in advance of tendering.

RECOMMENDATION 4.B:

When tendering, clearly state your desire for a sustainable outcome and your openness to innovative solutions.

4.2 ENGAGING WITH THE MARKET

Many public authorities now undertake more in-depth dialogue with potential suppliers prior to tendering for design or construction work. This early market engagement (EME) can be an invaluable method of capturing intelligence on innovations, new processes, project feasibility and market capacity/capability which can then be factored into options appraisal, specification and procurement of a construction project.

The engagement can cover a wide range of issues including:

- **FEASIBILITY:** whether what is sought is feasible, or has ever been done;
- **CAPABILITY:** the ability of the market to achieve what is required;
- **MATURITY:** whether there is an established market for the requirement and whether there are enough suppliers in existence for competitive procurement;
- **CAPACITY:** whether the market can achieve what is required quickly enough, or on a large enough scale.

Different methods for EME exist ranging from a market survey through to meet the buyer events or industry days, where interested suppliers are informed in detail of the authority's plans, and can raise questions and pose solutions.

In many cases, the most innovative tender responses, and those that most reflect best value, are likely to come from partnerships of suppliers with difference specialisms and experience. Holding industry days, publishing directories of businesses that respond to PINs and procurement prospectuses can help companies to identify potential partners and form such partnerships. They also assist innovative SMEs in finding a way of partnering with a larger contractor to commercialise their idea for inclusion in the delivery of a contract.

Any EME activity needs to be undertaken with due regard to the principles of transparency, non-discrimination and mutual recognition in line with European procurement law. No advantage or disadvantage should be given to any supplier or group of suppliers through EME; it is important that suppliers understand that the competitive phase of procurement will be carried out separately and all suppliers will be treated on equal terms. This can be stated in any invitation to open discussions.[10]

RECOMMENDATION 4.C:

Undertake early market engagement (EME) activities for all construction-related procurements above a specified minimum threshold to identify potential new technical solutions, achievable targets and appropriate assessment schemes.

RECOMMENDATION 4.D:

Encourage partnering between suppliers by running industry days and by publishing online directories of businesses that respond to PINs and procurement prospectuses.

TARGETING FOSSIL FUEL FREE SCHOOLS IN OSLO, NORWAY



Oslo City Council decided in January 2008 that fossil fuel use in Oslo's schools should be phased out by the end of 2011, and began to look for innovative alternatives. The challenge was to assess what the market could deliver as innovative solutions, particularly for heating systems, because experiences with existing products and solutions were poor.

After identifying some initial suggestions internally, companies were then invited to a dialogue conference to consider potential solutions in detail. The information received at this meeting was then applied in preparing the tender documentation. The tender competition also began with a workshop for suppliers, where the tender documents were presented and the different suppliers could discuss joint solutions. The city was very satisfied with the result: the competition came up with many solutions that were not available on the market before the process started.

[10] *For further information see the SCI-Network report on Procuring Innovation (includes a section on Early Market Engagement) at* ***www.sci-network.eu****, and the SMART SPP publication:* ***Driving energy efficient innovation through procurement – A practical guide for public authorities*** *available at* ***www.smart-spp.eu***



INCREASING RECYCLED CONTENT IN CONSTRUCTION PROJECTS

Bristol City Council set a clear target to include as much recycled material as possible into the construction of 4 new schools with a value of around €140 million. Market research into local suppliers and materials, together with a detailed analysis of school design determined that over 15% recycled content could be achieved at no extra cost.

This gave Bristol City Council the confidence to include a minimum requirement for recycled materials in their tender. Combined with other waste reduction initiatives, Bristol City Council calculated the reduced waste disposal costs, avoidance of landfill tax and lower material wastage delivered an overall cost saving estimated at over €800,000.

4.3 PROTECTING INTELLECTUAL PROPERTY RIGHTS

The early market engagement activities outlined in recommendations 4.c and 4.d may involve a supplier or group of suppliers providing details of a new, innovative solution or technology to a public authority ahead of a formal contract process. This benefits suppliers as it allows them to demonstrate their competitive advantage and ensure that what they can offer will be taken into account in the tender process or included in the project specification. However, it also creates significant risk for the supplier in terms of the potential loss of their intellectual property rights (IPR) in regards to their innovative solution and the associated development costs. This risk may result in suppliers withholding innovation during early market engagement processes unless they feel their IPR will be sufficiently protected.

RECOMMENDATION 4.E:

When conducting formal early market engagement processes such as issuing procurement prospectuses or PINs, put in place legal assurances that suppliers' IPR will be protected, or that they will be compensated if it is used in conjunction with another supplier.


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5 CHOOSING YOUR PROCUREMENT MODEL

Construction procurement can be a highly complex procedure, and present some significant challenges for procurers – not least due to the scale of the works being procured, and the variety of professional services typically required for project delivery.

A variety of different procurement models are applied by public authorities for construction works – and typical practice also varies considerably between countries. Of particular significance is the level of separation/integration of design and construction works, how these services are procured, and who is responsible for contract supervision.

One of the major challenges in sustainable construction is ensuring that the final result meets the standards set in the initial design – split responsibilities and a lack of co-operation between the design and construction teams can increase the risk of targets not being achieved.

Effective integration between these teams will help to improve the quality and practicability of the design, allow the effective identification of issues related to supply chain availability and reliability, and generally identifying and managing risk. Applying a procurement model which best integrates the design and construction work is therefore an important factor in determining success.

Many authorities are also now seeking to combine construction work with operation and maintenance services once construction work is complete. Such approaches help provide even greater incentives to the contracted company to optimise construction works as they may directly benefit through greater operational efficiency.

There is, however, no "one-size fits all" model which can be recommended, as the appropriate model is highly dependent on the nature of the project itself, the level of in-house expertise and the authority's priorities. In addition, there is debate about the relative strengths and weaknesses of different models within the construction community.

5.1 STANDARD CONSTRUCTION PROCUREMENT MODELS

Two standard approaches to construction procurement can be identified across the EU:

A) SEPARATION OF DESIGN AND BUILD

This remains the most typical approach within the public sector, whereby a design is prepared initially, and then a construction company (main contractor) is contracted through a competitive tendering process to carry out the construction according to this design, and will likely also be responsible for the employment of subcontractors and the procurement of materials.

The design work itself may be carried out in-house (by publicly-employed architects) or also be procured through a tendering process (e.g. through a design contest see section 5.4). They may also be asked to develop the tender documents for the procurement of the construction works.

This approach has the advantage of allowing the public authority to maintain close control over the process. However the degree of interaction between the design and build teams may be minimal.

B) COMBINED DESIGN AND BUILD

Many authorities also procure the services of one contractor, who is responsible for both design and construction. An initial design brief will typically be developed by the contracting authority, and a fixed price for completion will be agreed with the selected contractor.

This model allows for significant interaction between the design and build teams, however the authority maintains less direct control over the process, and appropriate monitoring may require more in-house expertise. Combined design and build is often applied in PPP arrangements or concessions.

A variety of other models and variations on the above models exist across Europe, often with the aim of improving the degree of design and build integration, and minimising public authority risk. A non-comprehensive list is included in Annex 1.



INTERACTIVE MODEL – THOR HEYERDAHL COLLEGE IN LARVIK, NORWAY

The construction of one of the biggest new schools in Norway was intended to act as a social and educational lighthouse project with the help of innovative architectural solutions. The Norwegian interaction model for construction procurement was applied by Vestfold County Council whereby the contractor participates in the planning of the building in direct collaboration with the design team. The contractor was selected based both on their proposal and interviews with the project team. Both facility managers and end users were also involved in the design and construction phases, with a representative working full time within the project team. The main achievement of the project was the 35 % reduction of space, in comparison to other similar school projects at the time, as well as achieving an energy demand of 110 kWh/m²/year.



TWO-STAGE TENDERING IN THE NETHERLANDS

For the renewal of the historic Koemarkt (market square) in Purmerend, Netherlands, a two-stage cost-led procurement approach was used. A maximum budget of €2.4 million was set, with contract award to be based solely on quality. The authority used a two-stage design and build contract and employed a consultant to support them as the public authority had little experience of this previously. The tender procedure involved a prequalification process following which the top five bidders remained. These five integrated bid teams were invited to develop a preliminary design from which the list was reduced to three tenderers. These three bid teams produced a detailed design, from which a winning bidder was chosen. It was interesting that in this procurement process the local population of Purmerend was invited to choose the winner in a referendum. All project targets were achieved. The project was €3,000 under budget. This included a bonus of €15,000 built into the contract for early delivery which was successfully achieved by the contractor.



SEPARATE DESIGN AND BUILD IN AUSTRIA

For the renovation of the 1964-built offices of Weiz District Authority in Austria, an ambitious energy target was set – to obtain the A+ Austrian energy certificate. A planning and design team of architects and specialist consultants was procured initially, based on the experience of individuals with energy efficient construction. This team was then responsible for preparing detailed technical specifications for the procurement of construction work (materials, u-values, specifications for an innovative facade solution, etc.) and the building services (e.g. output power and performance of the HVAC system). They were also then responsible for assessing the compliance of the bids received. Construction was completed in 2011 and is estimated to have achieved an 80% reduction in heating energy requirements. Detailed energy monitoring is being carried out to evaluate the renovation measures.

RECOMMENDATION 5.A:

Identify a procurement model which ensures sufficient integration and co-operation between design and construction teams.

RECOMMENDATION 5.B:

If tendering for construction work separately from design, ensure detailed quantitative, performance based specifications (such as the maximum primary energy demand per year) are included, based on the final design. Consider also offering additional points at the evaluation stage for bidders offering to exceed these standards.

RECOMMENDATION 5.C:

When tendering for design services, request evidence of the quality of work from the bidders, not just a list of relevant projects. This should include the extent to which project sustainability and cost targets and time schedules were met. Focus on the quality of the references rather than quantity to provide greater opportunities for smaller, more innovative firms.

RECOMMENDATION 5.D:

Where the award of multiple contracts is envisioned, consider establishing a framework agreement or panel, or make use of an existing one. Ensure that targets for innovation and sustainability and monitoring of these plays a role in the award of individual contracts and, where possible, the selection of participants.

5.2 DESIGN, BUILD AND OPERATE

Many public authorities are now looking beyond the more traditional procurement approaches for construction works, to alternative procurement arrangements which combine the operation and maintenance of a building/facility with its design and construction. Such models may also involve elements of private financing and are primarily driven by two complementary advantages:

- **ATTRACTIVE FINANCING ARRANGEMENTS** – The pressure on public finances means that many authorities are examining alternative ways of funding construction projects. Approaches such as energy performance contracting (EPC) or public private partnerships (PPP) provide allow authorities to share costs, or finance them through future savings.

- **INCENTIVISING EFFICIENCY** – Making suppliers responsible for certain operating costs, in addition to construction/renovation work provides a clear incentive for them to maximise the efficiency gains.

A variety of such models exist in the European construction sector, differing in terms of responsibility for raising finance and how the service provider receives payment/generates income (e.g. through payment of an operating fee by the public authority, or through the commercial exploitation of the asset for example).

One such model is the public private partnership (PPP).[11] This model is often applied in the construction sector to harness private sector involvement in order to achieve defined development objectives. They are typically associated with larger-scale projects carried out over a number of years. The definition applied by the European Parliament is:

> *"a long-term, contractually regulated cooperation between public authorities and the private sector to carry out public assignments, in which the requisite resources are placed under joint management and project risks are apportioned appropriately on the basis of the risk management skills of the project partners."* [12]

RECOMMENDATION 5.E:

PPPs for construction should include indicators for the assessment of the project's overall sustainability, performance targets, reference projects and exit points which will cause the public authority to withdraw from the project. These indicators should be included as part of the process to select the private partner and built into the terms of the PPP agreement.[13]

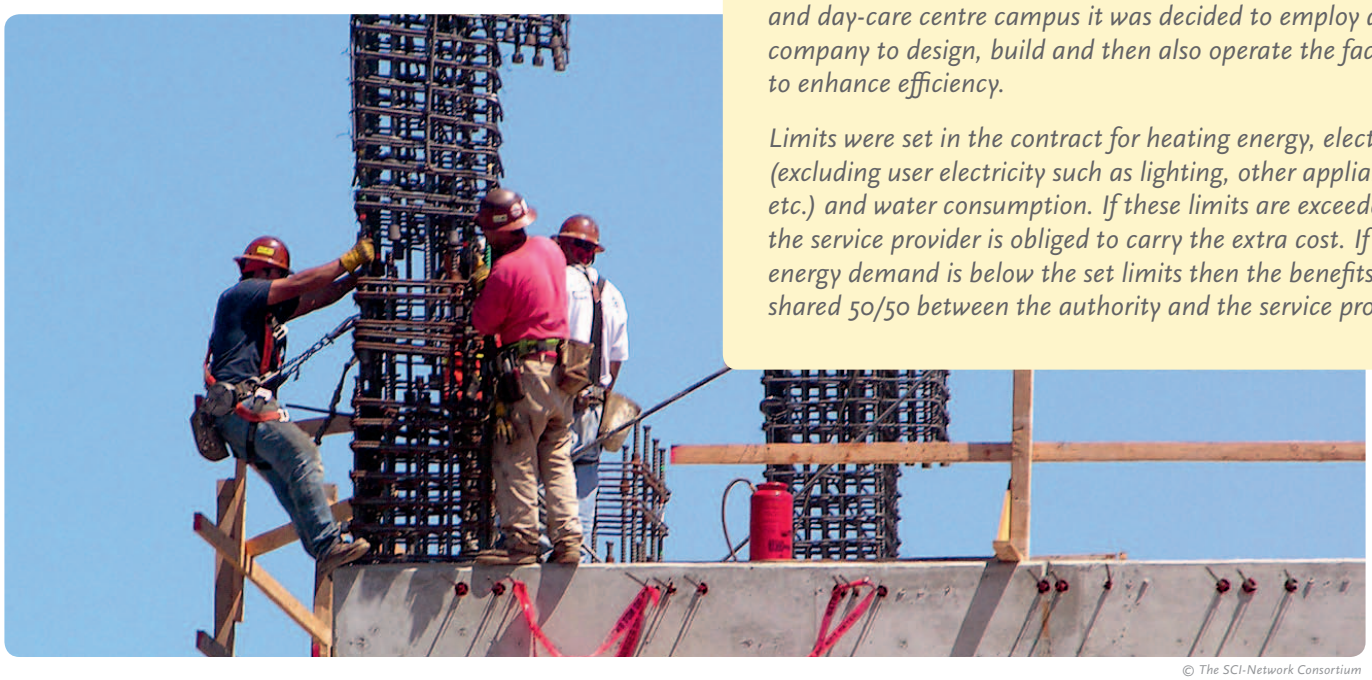


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DESIGN, BUILD, OPERATE IN JYVÄSKYLÄ, FINLAND

In 2010 the City of Jyväskylä started a project called Jyväskylän Optimi aimed at enhancing innovation and promoting life cycle thinking in procurement. For the construction of a school and day-care centre campus it was decided to employ a company to design, build and then also operate the facilities to enhance efficiency.

Limits were set in the contract for heating energy, electricity (excluding user electricity such as lighting, other appliances etc.) and water consumption. If these limits are exceeded the service provider is obliged to carry the extra cost. If energy demand is below the set limits then the benefits are shared 50/50 between the authority and the service provider.



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[11] *As considerable guidance is available elsewhere, only a very brief introduction is provided here.*

[12] *European Parliament resolution on public private partnerships and Community law on public procurement and concessions (2006/2043(INI)) 26 October 2006.*

[13] *See the SCI-Network report on Financing and Contracting Sustainable Construction - Innovative Approaches on* ***www.sci-network.eu***

5.3 ENERGY PERFORMANCE CONTRACTING (EPC)

Energy performance contracting (EPC) is another alternative procurement model which seeks to finance energy efficient refurbishments through the savings themselves over a number of years. The companies undertaking the improvements are known as energy service companies (ESCos). The upfront financing for the improvements may come from the company itself, or from a third party such as a bank. The owner or occupier of the building is normally only responsible for interest payments, although in some cases the company implementing the improvements may also receive an annual fee.

EPC is well established in a number of Member States, including Germany, Austria, the United Kingdom and France, and has in many cases been very successful in enabling or bringing forward major energy efficiency investments. In others, such as Finland and Sweden, large-scale adoption by the public sector has been slow due to problems associated with the procurement and implementation of energy performance contracts which represent good value for money and meet user requirements, within the legal procurement framework.

For larger EPCs involving a number of public buildings it is advisable to focus primarily in evaluation on the ability of the bidding ESCo's to conduct the energy analysis, the proposed project plan and the competence of the personnel to actually be involved in the particular public project, as a comparison on potential energy savings may not be straightforward, or allow the easy comparability of tenders. EPC projects are often set up as three-part contracts with analysis, investment and follow up phases respectively. The contract should ensure that there are clear exits if either party wants to withdraw from the project.

Other more flexible procedures such as the competitive dialogue and negotiated procedure may also offer some advantages in the process of appointing ESCos, as applying these procedures allows for dialogue with tenderers and can help refine requirements through successive stages leading to finalised bids. However both procedures require some level of skill and experience in engaging with suppliers if the best results are to be achieved.

For smaller EPC projects, concerning one building or a particular technological solution (e.g. ventilation) in several buildings, a simpler procurement and contract model is suitable. In such cases it is possible to evaluate the offered energy and CO_2 savings of the tenderers. It is also important that the decision is not based merely on the payback time of the investment, but on a more long term method, such as the Net Present Value.[14]



EPC THROUGH COMPETITIVE DIALOGUE IN FINLAND

The city of Hamina issued a call for tender in 2012 for an EPC project targeting energy savings and improvement of conditions in 10 buildings. The procurement was conducted using the competitive dialogue method where all candidates made a feasibility study for three of the buildings covered. These studies were the point of departure in the following negotiations where after the project conditions and the call for tender were given clarity. The selection criteria included aspects such as the quality of the proposed project plan, the suggested method of co-operation between the contractor and the authority, the energy savings guarantee, the comprehensiveness of the proposed measures and their effects on indoor climate, the use of the buildings and the operational costs.

RECOMMENDATION 5.F:

When tendering for smaller EPC projects, bid evaluation should strongly focus on the offered energy and CO_2 savings.

RECOMMENDATION 5.G:

When tendering for larger, more complex EPC contracts, bid evaluation should focus more on the expertise of the ESCo's personnel. The competitive dialogue and negotiated procedures may also be considered, as can contracting an external consultant to assist with the process.

[14] *For more information see the SCI-Network report on Financing and Contracting Sustainable Construction - Innovative Approaches on* ***www.sci-network.eu***

5.4 DESIGN COMPETITIONS

The standard approach for procuring a design team is to tender for the service based on the skills required and past experience in similar projects. An alternative model is to hold a design competition, where, typically, a preselected shortlist of designers are asked to develop an initial design concept based on the defined project requirements, which is then evaluated by a jury of experts.

The design competition can be a useful method of encouraging innovative design concepts, and factoring aspects such as energy performance, innovation and overall sustainability into the evaluation process.

Design competitions should be launched on the basis of a very clear project brief, including the minimum and aspirational energy performance targets, other sustainability targets, and the openness to innovative solutions. Whilst detailed energy demand calculations cannot be made at this stage, the overall shape and orientation of the building is the most influential aspect for energy consumption. A comparison of energy performance should therefore form a major part of the evaluation process. Having sustainable construction experts on the evaluation panel/jury is of critical importance here.

RECOMMENDATION 5.H:

When conducting a design competition provide a clear project brief outlining:

- ***The overall ambition for a highly energy efficient/ sustainable building, and the desire for innovative solutions.***
- ***A clear, quantified minimum energy performance requirement, and aspirational target.***
- ***A requirement to outline design-related solutions for reducing energy demand.***
- ***A simple and unambiguous methodology/tool for comparing the energy performance of the different offers (and other sustainability aspects).***
- ***The weighting of the different aspects in the final evaluation, including energy performance.***

RECOMMENDATION 5.I:

For design competitions, ensure that experienced architects and other experts are included in the jury to evaluate the sustainability aspects of the bids.



DESIGN COMPETITION IN GRAZ, AUSTRIA

For the reconstruction of a training centre in Graz (ABZ Lehrwerkstätten Graz Andritz) a design competition was used to select the design team. In the evaluation of the bids, one quarter of the marks were given for "resource consumption", which involved an assessment of summer/winter insulation, and of the total energy demand of the building. A simple energy demand calculation tool was used (www.cesb.cz/cesb10/papers/4_environment/076.pdf). Both architects and engineers were included in the jury, with an architect also employed to oversee the whole competition procedure.



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❻ CONTRACTING, MONITORING AND SUPPLIER MANAGEMENT

The emphasis on promoting innovation should not end once contracts with suppliers are signed. Many public authorities are including clauses within construction works contracts which help to incentivise suppliers to continue searching for improvements and innovations throughout the contract period. It is equally important to establish appropriate monitoring procedures to assess progress against targets and indicators set, and where possible, to ensure that such monitoring continues once the building is being used – Post Occupancy Evaluation (POE).

Supplier relationship management (SRM) is also receiving increased attention, in exploring how longer term relationships with suppliers can help to encourage the development and implementation of innovative technologies and techniques in the public construction sector.

6.1 INCENTIVISING INNOVATION WITHIN CONSTRUCTION CONTRACTS

Identifying and applying innovative solutions in construction projects should not end once the design is finalised. Construction contracts can be prepared in a way that incentivises suppliers to go beyond the initial design targets. Some examples:

- Introduce performance payments for key performance indicators (e.g. energy efficiency, use of recycled products, minimising waste and transport movements).
- Incorporate a gain share clause into contracts whereby savings on initial project cost estimates are shared between the contracting authority and construction company.
- Include the option of negotiating contract extensions for innovative design alterations.
- Guarantee that designers and contractors will be featured in any publicity done for buildings which meet high performance standards, or entered for awards.
- In contracts including building/facility operation, include a 'technology refresh' clause. This may require the company to upgrade to best available technology (BAT) for lighting, heating, ventilation or other systems at regular intervals or when new solutions emerge. It may be linked to incentives or penalties and can also help ensure BAT is applied initially.
- In contracts including building/facility operation, establish an 'innovation pot' which allows the savings which would be generated by an innovation (e.g. introduction of LED lighting system) to be shared between the owner and the operator.

RECOMMENDATION 6.A:

Consider the use of incentivisation in construction contracts to encourage innovation. Examples include introducing performance payments, gain share clauses and negotiating contract extensions.

RECOMMENDATION 6.B:

Include best available technology and technology refresh clauses, and an 'innovation pot' for operation of building systems and facilities, where relevant.



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6.2 MONITORING PERFORMANCE

Ensuring that construction work is carried out in accordance with the original design, and achieves the stated performance targets, requires an appropriate monitoring system. Regular performance monitoring and independent technical quality checks such as blower door tests, should be established in the contractual terms, against established performance indicators. Appropriately qualified technical staff will need to be available, or externally contracted, to carry out such monitoring.

RECOMMENDATION 6.C:

A clear performance monitoring mechanism must be applied throughout construction work, to ensure the sustainability aspects of the design are followed, as well as monitoring the environmental performance of the construction works themselves. Quality management measures (such as blower door tests) should also be embedded in construction work.

RECOMMENDATION 6.D:

The contracting authority must ensure it has the capacity to carry out oversight effectively, potentially through an external project manager.

6.3 POST OCCUPANCY EVALUATION

A true assessment of the energy performance that a building finally achieves is only possible once the building is in use. Many examples demonstrate the risk of the energy performance of final constructions being well below that anticipated by the design. Conducting a Post Occupancy Evaluation (POE) can be included in construction contracts to provide an additional performance incentive for the contractor, to reward outcomes which exceed initial expectations, and to penalise under-performance. POE is a structured review of the functional, operational and strategic performance of the building during occupation, which includes the regular collection and review of several aspects to identify key occupier and/or building performance issues:

- Occupier satisfaction
- Space utilisation
- Resource consumption

Public authorities requiring and using POE consistently report significant benefits. In financial terms, they range from reduced in-use energy consumption (reduced costs & carbon emissions), reduced construction and maintenance costs, and improved occupier productivity.

To include POE in construction contracts, these would need to include a specified period after construction completion when this applies, e.g. a full annual cycle following first occupation to take account of climatic variation impacts etc.[15]



SYSTEMATIC USE OF POE IN SCOTLAND, UK

NHS (National Health Service) Scotland is amongst the best example of an integrated, systematic and collaborative approach to POE, with up to 1% of a project's capital sum invested into POE. This mandated approach has reported not just large cost savings but importantly better health recovery rates. The system requires user needs and business outcomes to be fully integrated from the investment bid, through construction and well into operation.

Funding will not be provided without compelling evidence of user involvement. Each stage requires a summary report. A project review is completed within 1-3 months after handover and the lessons learnt are compiled and shared with others within the network.

RECOMMENDATION 6.E:

Incorporate a Post Occupancy Evaluation into construction contracts, together with a clear indication of sanctions for non-compliance with designed performance.

6.4 MANAGING RELATIONSHIPS WITH SUPPLIERS

There is an increasing trend amongst public authorities to aggregate their construction requirements into framework agreements in order to achieve economies of scale and standardisation.

The pressure for innovation is also greatest when there is significant demand. A significant contract with the public sector can reduce the supplier's risk of innovating. Furthermore, suppliers can also commit resources towards innovation for the public sector when they recognise that an authority's presence in the market is long-term rather than short-term.

Many contracting authorities use framework agreements or panels to award design, build or combined design and build contracts. This allows for shorter procurement procedures and may also improve client/contractor relations and project outcomes where there is a tangible prospect of repeat work. Framework agreements can be used to award multiple

[15] *For more information see the SCI-Network report on Post Occupancy Evaluation at* ***www.sci-network.eu***

contracts above the EU threshold whereas panels of contractors or designers are established in many Member States for award of below-threshold contracts.

The relative merits of one-off or framework contracts in fostering innovative construction solutions can be disputed. However, where frameworks are in place, often involving multiple projects, this provides an opportunity to establish a more strategic relationship with contractors and scope to work more collaboratively on the identification and deployment of innovative ideas.

Supplier relationship management (SRM) is a process for managing the interaction between two entities – one of which is supplying goods, works or services to the other entity. SRM is focused on the overall relationship with a supplier rather than a specific contract. It seeks to replace the traditionally adversarial relationship between contracting authorities and construction suppliers with one of partnership and collaboration. It is envisaged as a two-way process to mutually benefit both the buying organisation and the supplier – helping to solve problems or identify opportunities through increased collaboration.

RECOMMENDATION 6.F:

Identify potential opportunities for collaboration with other regional public authorities, and the option of establishing longer framework contracts with suppliers with a priority on innovation.

RECOMMENDATION 6.G:

Within a framework agreement, create mechanisms to assess suppliers' performance in terms of innovation and sustainability on initial projects, and using this assessment to contribute to the evaluation of mini competitions for subsequent projects.

RECOMMENDATION 6.H:

Undertake formal supplier relationship management activities with key construction suppliers and with groups of suppliers on construction-related frameworks.

RECOMMENDATION 6.I:

Hold lessons learnt workshops with suppliers and their sub-contractors once projects are completed, to help carry forward innovative ideas identified after design and during construction of a project to future initiatives with the supplier.

RECOMMENDATION 6.J:

In the case of framework agreements with multiple suppliers, consider establishing a forum to facilitate open sharing between suppliers around innovation and collaboration.

BUNDLING EPC DEMAND IN BERLIN, GERMANY



The City-State of Berlin has used energy performance contracting extensively for systems engineering in existing buildings. To avoid the energy service providers taking on only quick wins, different buildings are bundled into so called "building pools", each covering different types and standards. There are more than 1,300 buildings covered by the projects in total. The savings achieved vary across pools from 15% to 35%.

The contracts are awarded through a negotiated procedure. A rough estimate of the individual saving potentials is developed by the bidders during the tendering process. After the contract is awarded, a detailed analysis is developed, at the cost of the contractor. The contractors are responsible for the cost of refurbishment, operations, maintenance, inspection, systems management and continuous optimisation.



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7 LIFE CYCLE / WHOLE LIFE COSTING

In many construction projects, initial investments costs may only account for around 20% of the total costs which the owner will incur during the period of ownership – particularly when energy bills and maintenance costs are taken into account. If the costs of staff using buildings are included then this is reduced to just 0.5%.[16]

Whole life costing (WLC) or life cycle costing (LCC[17]) is the methodology for systematic economic consideration of all costs and benefits accruing to the owner over a set period of analysis. A true WLC approach to a construction project would take into account the costs of planning, development and design, construction and implementation, operation over the life time of the building, and decommissioning costs.

WLC can be a key enabler of more sustainable approaches to construction and of the adoption of new and innovative sustainable construction products and techniques. Whilst many sustainable construction solutions may require higher initial investments, once running costs are taken into account they will generally provide a return on investment over time. This is further emphasised when a value is given to sustainability benefits, which may also include improving occupier performance through creating a more comfortable working environment. However, the majority of public sector construction decision-making is still principally based on a comparison of investment costs only and often over the short, rather than medium to long terms.

WLC can be used at any stage of a construction project as a tool for assessing the relative costs and benefits of project alternatives – for internal investment decision making and business case development, for application by the design team at different design stages, or as an evaluation tool within competitive tendering procedures.

The strongest opportunity to use WLC is during early design stages. This is primarily because at this stage most, if not all, options are open to consideration. Over the course of the project the authority's ability to influence cost decreases. It has been estimated that 80-90% percent of the cost of running maintaining and refurbishing a building is determined at the design stage.

A variety of tools and guides on WLC for the construction sector exist including WLC frameworks (such as ISO 15686-5:2008) which provide a set of overarching principles, total building WLC tools (such as the Statsbygg LCC Analysis for Construction), which calculate the WLC of an overall building, or building component WLC tools (such as SMART SPP LCC and CO_2 Assessment Tool or Forum for the Future WLC and Carbon Tool) which can be used to compare specific systems such as heating or lighting.[18]

[16] *The Royal Academy of Engineering in the UK developed the 1:5:200 model in 1998 which suggested that if the initial construction cost of a building is 1, then its maintenance and operating costs over the years are 5, and the business operating costs in that building are 200. The 1:5:200 model should not be seen as an absolute but rather a rule of thumb.*

[17] *These two terms are often used interchangeably. The following are taken from ISO 15686-5:2008 Buildings and constructed assets – Service life planning:*
- ***LCC:** the cost of an asset, or its parts throughout its life cycle, while fulfilling the performance requirements*
- ***WLC:** a methodology for systematic economic consideration of all whole life costs and benefits over a period of analysis, as defined in the agreed scope*

[18] *For further information on WLC/LCC please see the SCI-Network report at **www.sci-network.eu***

A number of specific barriers can be identified to the greater uptake of WLC within public sector procurement:

• CAPITAL/OPERATING BUDGET SEPARATION

The capital budget of construction is typically separated from the operating budget, and public authorities may be restricted in their ability to transfer funds between capital and revenue budgets. This can lead to one authority, or a department within an authority, accepting the lowest initial cost and then handing over the building to others to maintain, as there is no incentive for the procuring authority or department to consider the operating costs.

The establishment of joint project teams with both the procuring and operating departments will help to identify potential in-use costs and design innovations at the outset. It can help to involve the end user early in the procurement process. This process could be supplemented by engaging end-users in the design process to identify in-use requirements.

• EXPERT CAPACITY AND DATA AVAILABILITY

Applying WLC can be a complex process, and many authorities will lack staff with the training and knowledge for this. This situation is compounded by the lack of available data on life cycle costs from relevant projects. Having staff appropriately trained, or employing WLC experts within the procurement team can help to overcome this issue, however initiatives to simplify and increase data storage at a national or European level would be very helpful.

RECOMMENDATION 7.A:

Identify a suitable model for WLC/LCC at project planning stage, which meets the principles of the ISO 15686-5 or equivalent, to inform decisions throughout the procurement process. This should at least cover:

- ***total construction costs,***
- ***annual operation costs,***
- ***annual maintenance cost,***
- ***annual occupier staff cost (including training for building users/managers on relevant technologies),***
- ***end of life costs.***

RECOMMENDATION 7.B:

Ensure facility managers are closely involved in WLC procedures.

INNOVATIVE KERB EDGINGS IN WAKEFIELD, UK



For the procurement of innovative kerbing in Wakefield (see also section 3), offers were assessed based on whole life costs. This took into account purchase, delivery, use, and disposal costs. In addition the Council also identified the potential social, environmental and economic impacts and costs throughout the product's lifecycle. This led to the selection of a lightweight kerbing made entirely from recycled materials, despite a purchase price 235% higher than standard solutions. The whole life cost was ultimately lower, due to improved health and safety associated with manual lifting and vibration from cutting and shaping as well as the need for lifting machinery, improved durability, and lower transportation costs due to the material being considerably lighter. CO_2 emissions due to transportation were reduced by 73%, and embodied emissions were also 17% lower.



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MUNICIPAL SWIMMING POOL IN OLHÃO

With the aim of reducing dependency on fossil fuels in 2011 the Portuguese Municipality of Olhão in the Algarve tendered for the redevelopment and management of the municipal swimming pool, with bids compared on the basis of whole life costs (WLC). Given the lack of skills and knowledge about WLC application within a regional government agency (the Regional Agency for Energy and Environment of the Algarve) was employed to assist.

The procurement process had specific WLC requirements embedded within it, looking specifically at the life-time expectancy and quality of proposed equipment. Each of the applicants for the tender process provided different budgets with different quality standards. By using WLC the real cost of competing bids could be thoroughly assessed leading to a financial and environmentally sustainable project.

Through the installation of solar panels and other equipment with a total investment cost of €85,000, the new system will enable the public authority to achieve annual savings of €15,000 in energy costs, resulting in approximately six years of payback.

RECOMMENDATION 7.C:

Evaluate the cost of bid during competitive tendering for design and/or construction work using the selected WLC/LCC model, and communicate this, together with the weighting and associated scoring, in tender documentation.

RECOMMENDATION 7.D:

If a public authority does not have the internal capability to undertake robust LCC/WLC calculations, it is recommended to either:

- ***provide training for employees on WLC/LCC based on ISO 15686-5: 2008 to enable quantity surveyors, designers and engineers to incorporate WLC in the design and planning stages of construction projects (preferred option), or***
- ***outsource the calculation to a third party expert. This is only advisable if the cost does not exceed the cost of increasing internal capability.***

RECOMMENDATION 7.E:

Joint project teams should be established and 'total budgets' piloted with both procuring and operating departments, to help share project costs between departments. It is expected this will help identify potential in-use costs and encourage design innovations from the outset. Facilities management or property departments may be asked to pay a percentage contribution towards capital cost to influence the management of the operations budget and help optimise WLC decisions at the project outset.

ANNEX 1 – OTHER CONSTRUCTION PROCUREMENT MODELS

DEVELOP AND CONSTRUCT

In this arrangement an initial design is prepared (again either in-house or by a contracted architect), which the main contractor then develops into a detailed design and is responsible for the construction.

MANAGEMENT CONTRACTING

In this arrangement a management contractor is appointed, who works alongside the design team to contribute to both design and costing, and is then also responsible for competitively procuring sub-contractors for the construction work itself.

TWO STAGE OPEN BOOK

The Two Stage Open Book model sees the public authority invite suppliers on a framework to bid for a project on the basis of an outline brief and cost benchmark. A number of contractor-consultant teams compete for the contract in a first stage with bidders being chosen based on their capacity, capability, stability, experience and strength of their supply chain, and fee (profit plus company overhead). The winning team then works up a proposal on the basis of an open book cost that meets the authority's stated outcomes and cost benchmark as a second stage.

Robust, expert, stage-gate reviews with independent scheme verification are applied throughout this model to ensure appropriate scheme definition, create commercial tension, monitor scheme development and highlight any unnecessary scope, risks and potential missed opportunities. This verification will also provide clear recommendations to the client and contractor for improvement of the proposition.

Any such verification must deliver greater benefits in terms of savings than its cost of implementation. It is also essential that steps are taken to ensure that those appointed to carry out this verification have the skills to do so effectively. Additional capacity may need to be generated in terms of these skills should the model be rolled out more widely, in order to meet expected increased demand for competent verifiers.

COST-LED PROCUREMENT

The authority puts in place a framework agreement with suppliers selected on their ability to work collaboratively to deliver on the first project.

In competition 2 or 3 integrated framework supply teams are then given the opportunity early in the life of projects to develop their bids with the client team, allowing them to bring their experience to bear to innovate. Provided at least one of the supply teams can beat an established cost ceiling, it is then selected on the relative scored attractiveness of its commercial and physical proposition and of its team members before being awarded the contract to deliver the project.



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Should none of the teams be able to deliver the work, the project is offered to suppliers outside the framework.

If the scheme price cannot be matched or bettered it should not proceed. There is a burden on the client to select a realistically challenging price, and work to enable its achievement by the industry supply chain.

The key benefits of the Cost-Led Procurement model are driven by its focus on achieving challenging cost targets, while producing further savings through continuous improvement over time.

INTEGRATED PROJECT INSURANCE

In this arrangement the authority holds a competition to appoint the members of an integrated project team who will be responsible for delivery of the project. Scoring may include elements assessing competence, capability, proven track record, maturity of behaviours, and fee declaration. The chosen team then works up a preferred solution that will deliver the outcome defined by the authority.

The significant difference between this and any existing procurement model arises with the adoption of a single (third party assured) insurance policy to cover risks associated with delivery of the project. This policy would package up all insurances currently held by the client and supply chain members, and would also take the top slice of commercial risks, covering any cost overruns on the project above and beyond a „pain-share" threshold, split transparently between public authority, the contracted party and its supply chain.

The model introduces third party independent verification of the scheme, through a series of gateways, using this mechanism to tension the model for good value for money, and also to ensure a wholesome, balanced commercial position has been struck which an insurer can take on board.

With excessive cost overruns covered by this policy for all supply chain members, the potential for a blame culture to try to pass on liability within the team is removed. Payment of claims would be based on the demonstration of loss not the assignment of blame. Yet in order to secure the insurance in the first place, the team will have to prepare a credible proposal, robustly validated by the independent expert assurer to ensure that the commercial tension is maintained, and which in turn the insurer is comfortable can be delivered.

Research from the proponents of this approach asserts that by combining the insurance policies of the suppliers and client, a saving of circa 2.5% of capital sum will be available, in turn utilised to offset the cost of insuring the top slice of commercial risks, which they also expect to be c. 2.5%, keeping the cost broadly neutral in respect of incremental insurance costs.

MORE INFORMATION

- Constructing Excellence Procurement Fact Sheet ***(www.scribd.com/doc/96454679/Procurement)***
- Interim Report of the Procurement / Lean Client Task Group: ***https://update.cabinetoffice.gov.uk/sites/default/files/resources/Procurement%20Lean%20Client%20Group%20Report%20Jan%202012_0.pdf***
- Two-Stage Tendering: An Open Approach, ILO: ***www.internationallawoffice.com/newsletters/detail. aspx?g=7a87d0a2-4059-db11-9a86-001143e35d55&redir=1***
- Designing: Ways to Involve the Contractor, Changing Roles 2009: ***www.changingroles09.nl/uploads/File/Final.Chao-Duivis.pdf***


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SCI-NETWORK

THE SCI-NETWORK

The SCI-Network, Sustainable Construction and Innovation through Procurement is a growing European network of public authorities working together to:

- explore European best practice in construction procurement
- and identify how best to encourage innovation and sustainability

This guide has been produced on the basis of a series of reports and recommendations developed by European working groups on a series of relevant topics.

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