



## PAS 2080 Article

### Managing knowledge associated with carbon reduction initiatives

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#### Introduction

Climate change is one of the global sustainability issues that have increasingly attracted infrastructure sector business attention in the early part of the twenty-first century; when a range of stakeholders, including governments, started to pay attention to the potentially very serious consequences, and to the need to take action. Central to the problem of climate change is the massive production of carbon dioxide from contemporary processes of infrastructure procurement. This requires infrastructure businesses to substantially reduce the carbon intensity within their services and requires a sophisticated knowledge-based approach.

Forward looking organisations view societal needs as opportunities to develop ideas and demonstrate low carbon technologies, to find and serve new markets, and to solve long-standing societal and business problems. For the infrastructure sector, however, the creation of economic value by integrating carbon reduction issues now increasingly poses real profound strategic challenges. These complex challenges involve numerous processes carried out and influenced by many stakeholders to set the tone and guide corporate level decisions. As infrastructure organisations try to meet these complex challenges, they need to be innovative. This often calls for the creation, use and exploitation of new knowledge. Therefore, knowledge resources must be properly managed to provide an environment for well-informed decisions. An effective management of knowledge associated with carbon reduction will help asset owners/managers, service operators, designers, and constructors to understand better on how to craft and implement various low carbon strategies for their organisational competitive advantage.

Knowledge actively enables carbon reduction related performance, problem-solving, decision-making, experience, intuition, and skills, to create value for employees, asset owners/managers, clients, and shareholders. However, the paucity of knowledge and expertise in the context of carbon reduction is a huge challenge for many infrastructure organisations. Much of the knowledge related to carbon reduction strategies evolves around on-going learning from the actions taken by managers and stakeholders who enact the organisation's carbon reduction-related change strategies. Carbon reduction strategies are defined as "key practices undertaken by an organisation to reduce carbon footprint in its entire value chain, in order to fulfil an organisation's commitments to climate change".

#### Knowledge management in the context of low carbon infrastructure

Low carbon related innovation is usually more complex (because there is typically a wider range of stakeholders) and more ambiguous (as many of the parties have contradictory

demands). As infrastructure sector organisations try to meet these challenges, knowledge is increasingly being seen as important for innovation and for producing knowledge intensive products and services desired by market so as to maintain competitive advantage. The management of knowledge is, therefore, increasingly considered an important source of sustainable competitive advantage.

The ability to identify and leverage key knowledge associated with carbon reduction strategies plays a critical role in leading change towards low carbon. A major challenge facing many infrastructure sector organisations is uncovering the most effective methods of mapping, capturing, sharing and applying new knowledge en route to economic value creation by integrating carbon reduction strategies into business. However, a primary issue for organisations is 'knowing what they know' related to low carbon practices.

Even providing easy access to explicitly captured carbon reduction related knowledge in artefacts such as written government policies and measurement documents; business processes and management systems; and even presentations, can provide employees in infrastructure organisations with tremendous effectiveness and efficiency. However, knowledge management (KM) in a low carbon context is in its infancy and has the potential to address a number of challenges that infrastructure organisations currently face with regard to carbon reduction strategies in the UK and elsewhere.

Much of the knowledge within infrastructure organisations is experience-based and tacit in nature. Some infrastructure organisations have been successful at collecting and storing explicit knowledge in organisational databases, but are not always good at tracking and sharing tacit knowledge. This calls for a dynamic and multi-functional approach to knowledge mapping. The development of carbon management related expertise databases is an early target for many organisations. However, production and maintenance of expertise databases is not simple.

Knowledge work already represents 40% of the global economy. Unfortunately, over 50% of organisational knowledge is tacit and non-formalised. It is resident in the minds of its workers. It is noted that only 20% of knowledge available to an organisation is actually used and the remaining 80% of the employee's knowledge is wasted without effectively capturing it. Hence, the capture of knowledge associated with carbon reduction initiatives is vital for any infrastructure organisation, especially key decisions, made based on experience which is usually shared informally.

Knowledge loss and time to build new carbon reduction related skills and competency issues for new hires have fuelled infrastructure organisations to capture knowledge. Furthermore, the complexity of climate change and pace of change in government policies makes it impossible even for the largest infrastructure organisations to cover all potential developments and to grow knowledge capabilities across all potentially relevant carbon reduction areas. In addition, carbon reduction initiatives require infrastructure organisations to develop and deploy new business models to reduce environmental, social and financial risks of their daily business operations. Therefore, it necessitates careful capturing of new carbon related knowledge for effective low carbon solutions.



The carbon reduction knowledge transactions apply to boundaries within organisations, between functional specialisms and between disciplines. Much new carbon reduction related knowledge is created outside the organisation boundary, so organisations must develop absorptive capacity: the capacity to access and assimilate new carbon reduction related knowledge from external sources like asset owners/managers, service operators, designers, constructors, shareholders, Government and regulators, research institutes, and from voluntary organisations. Knowledge interdependence creates new management challenges resulting from the risks and difficulties of knowledge transactions across boundaries. So too, the development of new low carbon products or services increasingly requires the integration of knowledge from many disciplines. The ability to capture and share knowledge related to carbon reduction strategies across functional and disciplinary boundaries presents particular challenges since different communities and disciplines may have little common ground for shared understandings.

There is growing realisation that knowledge sharing is critical to knowledge creation, organisational learning, and performance achievement. The creation of the new carbon reduction-related knowledge appears to be an emerging process that is related to personal work experiences that cannot be easily and precisely reproduced and controlled. Specific measures could be used to identify, codify and apply new carbon reduction related knowledge and thereby contribute to its dissemination and retention within an organisation.

Performance in various parts of the organisation can be enhanced when people communicate carbon reduction-related information, effective practices, insights, experiences, tastes, lessons learned, as well as common and uncommon sense. Collaboration is a key part of PAS2080. Therefore, sharing knowledge, when relevant, with asset owners/managers, service operators, designers, constructors, shareholders, and employees will make for an efficient and empowered team and can help to reduce confusion and prevent delays. However, for individuals in a highly competitive environment, knowledge sharing means that an individual's knowledge is disseminated to others who might be his competitors now or in the future. Thus, a giver would like to give his/her knowledge with explicit or tacit representation and inference. This is a dilemma between individual benefits and organisational benefits. Therefore, a knowledge sharing culture needs to be created to include an incentive system to motivate others to share their knowledge. The most widely used knowledge capture methods include: community of practice, video presentations, breakfast events, mentoring, seminars, bulletin board, company television channels, team briefs, forums, real-time collaboration, storytelling, and knowledge portals.

### **Recommendations for decision makers within the infrastructure sector**

Today, infrastructure sector organisations can succeed only if they are genuinely 'value-led' and adopt a holistic rather than a silo approach to climate change and other sustainability issues. The following recommendations are drawn for decision makers within the infrastructure sector business.

- The scarcity of knowledge and expertise associated with carbon reduction initiatives is, and will continue to be, a huge challenge for many infrastructure sector organisations. Therefore, there is an urgent need for developing and deploying sector wide KM

programmes in the context of carbon reduction. The infrastructure sector should liaise with universities to ensure the right skill sets are developed and also need to improve in-house training so that carbon management becomes a matter of basic knowledge for most employees and a core competency for specialists. This will help asset owners/managers, service operators, designers, and constructors to better understand how to craft and implement various carbon reduction strategies for competitive advantage.

- The Infrastructure sector organisations need to reshape their existing KM strategy in-line with the low carbon and other sustainability strategies. To gain low carbon related competitive advantage, it is necessary for decision makers to recognise and use a blend of Information and Communication Technology (ICT) and non-ICT based KM techniques and technologies. It is also advisable to use conventional, simple, low cost, and easy to use with minimum training needs KM techniques and technologies.
- It should be noted that the roles of KM techniques and technologies are not mutually exclusive, and organisations may adopt any combination of them to tackle their particular carbon reduction issues or support particular motives. For instance, if the prime reason for KM is minimising the risk of losing valuable carbon reduction related knowledge, the response may involve identifying and capturing knowledge that an organisation has. Thus, risk minimisation is closely related to KM techniques and technologies specifically aimed at locating and capturing existing valuable carbon reduction knowledge.
- To address climate change issues, knowledge is increasingly being accessed and shared across industrial sectors and national boundaries as organisations and markets become truly international and global. Cross boundary knowledge transactions also apply to boundaries within organisations, between functional specialisms and between disciplines. Therefore, stakeholders' collaboration is essential for managing knowledge associated with carbon reduction initiatives. Also, there is a need for cross-sector collaboration to capture and share best and worst practices related to managing change associated with carbon reduction initiatives.
- Through mapping, capturing, and sharing carbon reduction-related best practices, lessons learned, and new ideas from the internal and external sources could provide critical knowledge to 'knowledge workers'. This would engender efficient and effective working to reduce carbon emissions, cost and time while improving the quality of performance of infrastructure business.
- Managing knowledge associated with carbon reduction initiatives brings stimulating ideas into infrastructure organisations from the internal and external sources. This in turn contributes to the innovation process being defined as 'bringing new ideas to market'. When an organisation produces a product and/or service in an innovative and low carbon way, this adds value to an organisation. This new value, in turn, fosters reputation and ultimately affects profitability.

Taken together, the impact of management commitment and leadership, KM vision and policies, structures, reward systems, training programmes and performance reporting are key factors for successful management of knowledge in the context of carbon reduction