

# STEEL AND THE CITY OF TOMORROW

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## Abstract

*Steel is a material of choice for the construction products, vehicles, machines, appliances and containers characteristic of modern life. Many markets for steel overlap in towns and cities, and the way they develop has major implications for the relationships between steel businesses, their suppliers and customers, including governments, worldwide. By 2050 the world population could rise to ten billion, with 70% in urban areas. Unprecedented demand will be generated for material, water and energy resources to develop and operate urban areas accommodating an extra 4 billion people in 50 years. At the same time the 3 billion people already in urban areas will want their surroundings to be renewed. Whilst this is a potentially massive market opportunity for the steel industry, the carbon intensity of urban development must be reduced to avoid depletion of natural resources and climate change on a scale that would cause social and economic dislocation for future generations. The paper describes research by the Mandix Consultancy for the Steel Construction Institute to explore the challenges of a 'low carbon' economy and the initial progress in a UK partnership with Corus plc to develop its strategy for the 'City of Tomorrow'.*

## 1 CHANGING MARKET CONDITIONS

Over the last 30 years steel production has shifted to non-OECD areas as innovations have reduced entry costs for new competitors in world markets (1). In the UK, as elsewhere, steel businesses have responded to changing market conditions with efficiency measures and consolidations to maintain competitiveness. However, between 1978 and 1998, the number of UK steel makers fell by 77%, furnaces by 90% and jobs by 80% (2).

Since 1998 further falls have taken place and the trend is for an end to UK steel production as early as 2005. Clearly business-as-usual is not an attractive prospect for UK steel communities or businesses facing stranded assets and liabilities for remediating sites surplus to production need.

In relation to the UK economy, in 1970 about 12% of steel used directly in products manufactured in the UK was imported. But, by 1999, the figure had risen to 44% and in 2000 accelerated to 47%. This is quite apart from the steel contained in imported finished goods.

A strong pound, rising business rates and environmental regulations are reinforcing this long term trend to UK dependency on steel imports. The collateral closure of production plant also means that recycling capacity is being foreclosed as rising waste disposal costs and product "End of Life" regulations provide opportunities in the market for environmental goods and services (3).

Whilst UK customers have access to competitive international markets for recycled steel, any failure to arrest the UK downward trend in production capacity implies economic decline in steel communities. It means that more jobs will be lost, large areas of land will require decontamination and UK scrap steel will need exporting for recycling.

## **2 URBAN DEVELOPMENT**

Reaching a low carbon economy risks major social, economic and environmental costs. These include losing capacity for research into, and demonstration of, innovations to help share in high growth world markets for products and services needed for urban development and regeneration.

Steel is the material of choice for many urban applications including in markets for construction, vehicle, machine, appliance and packaging products. In the UK, for instance, the single largest consumer of steel is the construction market that is, essentially, urban.

Across the world massive urban market opportunities will be driven by a population expected to rise from 6 billion to around 10 billion by 2050 - with 70% or more living in towns and cities compared to around 50% now (4). Affordable and reliable infrastructure will be needed to provide a good quality of life for as many as 4 billion more people in towns and cities by 2050. Over the same period demand for regeneration of urban areas, where 3 billion people live, will continue.

## **3 SUSTAINABLE DEVELOPMENT**

If the UN is right, demand could be for the equivalent of one city for about half a million people every day for 50 years. This will place enormous pressure on material, energy and water resources and OECD experts agree that current trends are not consistent with achieving the goal of sustainable development. This could require “step change involving major market shifts and industrial restructuring” (5). ECO-efficiency (6) and resource productivity (7) are essential for environmentally and socially responsible business (8).

The impact of urban development on climate change, and vice versa, is a key issue. Steel will figure in defences against floods and coastal inundation. At the same time as such adaptations, effort to mitigate climate change will have significant impacts on carbon intensive sectors such as steel production, as governments set targets to reduce carbon dioxide emissions. This raises the question of how to distribute the burden of carbon reduction?

In the UK, the government is not only committed to action (9) but has a voluntary target of 20% reduction in carbon dioxide emissions over 1990 levels by 2010 compared to a 12.5% binding target (10). Also, a clear trend is emerging. The UK Energy Policy Review (11) was criticised by the Sustainable Development Commission (12) for not providing a clear vision for achieving a 60% reduction over 2000 levels by 2050 as proposed by a Royal Commission (13).

The UK Government has yet to respond but international research (14) indicates that 60% might be needed. If the Government decides to ratchet up its Climate Change Programme with a bigger Climate Change Levy (15) the competitiveness of UK steel businesses will be threatened.

If the consensus is for steel production to continue under a “low carbon” scenario for economic development, it is difficult to see how necessary changes can be achieved by steel businesses on their own. Public Private Partnerships will be needed to research, develop and demonstrate practical ways to reduce carbon emissions from steel supply chains and products.

## **4 SUSTAINABLE URBAN DEVELOPMENT**

The European Commission has identified that debates about environmental policies now focus on sustainable development and “sustainable urban development” in particular (16). The EC has adopted a framework for action (17) and is building a ‘City of Tomorrow’ knowledge base (18).

Urban development is a massive opportunity for the steel industry and, as now, market leadership will go to businesses that can deliver affordable products at competitive prices. However, from now on, customers with a commitment to sustainable development will be differentiating products on their capacity to add environmental and social value over whole life cycles.

Business-as-usual is not an option for a steel industry interested to share in creating the “City of Tomorrow”. Innovation is essential in the design of products and supply chains to reduce carbon intensity at a pace that outstrips economic growth rates.

This implies steel businesses marketing to urban customers 100% recycled steel products that are resource efficient to operate and dispose of. It implies supply chains and products designed to deliver “step change” in material, water and energy efficiency.

## **5 GETTING THERE FROM HERE**

Building the knowledge and physical resources needed to restructure steel supply chains to help deliver sustainable urban development in 50 years, is a task too great for the steel industry alone. Moving the industry from where it is to where it needs to be requires a strategic partnership able to deliver synergy between business plans and government policies and programmes.

Since the 1970s the global trend in steel production has been towards regionally focused Electric Arc Furnace (EAF) mini-mills typically with capacities 6 to 10 times smaller than Integrated Blast Furnace/Basic Oxygen Furnace (IBF/BOF) plants, requiring smaller land takes and less capital.

EAF mini-mills can produce steel using a feedstock of 100% scrap and if the trend continues, theoretically, the global steel industry could move to 100% recycling to take pressure off natural resources. However, reducing carbon emissions by 60% by 2050 would require EAF mini-mills at a pace that far outstrips market growth and increasing dependence on non-fossil fuel operation.

If public policy requires steel businesses to react more quickly towards recycling and non-fossil fuel electricity than the market might otherwise dictate, investment in EAF mini-mills would need affordable prices for scrap and electricity and governments ready to make good the economic, environmental and social costs of “stranding” existing, serviceable, but “non-compliant” assets.

UK carbon intensity is already reducing as a result of a “drift-from-steel” production that started in the 1970’s with exposure of ‘privatised’ businesses to world steel price competition in much the same way that in the 1990s, creation of an energy market started the so-called “dash-for-gas”.

Getting from 2002 to a low carbon economy in 2050 in a process that includes coal and steel communities implies public-private partnerships to focus support on integrating low carbon technologies in supply chains in the same way, it is being argued, that public support should be switched to environment projects in rural areas away from food price subsidies.

## 6 DOING THINGS DIFFERENT

Whilst large areas of farmland have become surplus to food production needs, reducing surplus steel production capacity has resulted in plant closures and the clearance of sites in urban areas. However, unlike rural landscapes, surplus steel production sites require de-contamination.

Policies for a low carbon economy that threaten carbon intensive steel production businesses would add to the inventory of sites. Set against this, as in other developed economies, recycling of previously developed land is government policy in the UK. The target is that, by 2008, 60% of all new housing should be on so-called "brownfield" sites.

A Government Task Force has called for complete remediation of all contaminated sites in the UK by 2030 (19). Tax credits for owners will help, whilst site values are enhanced by regulations that require developers to apply a sequential test that prioritises brownfield sites for housing.

Contaminated land is an environmental liability, however the steel industry's massive ownerships in urban areas does at least open the possibility of 'doing things different' in relation to housing demand, urban regeneration and the construction market.

In the UK urban regeneration is government policy (20). Also, housing demand is growing and a key focus for the "Rethinking Construction" campaign to improve productivity being driven forward by a partnership of construction businesses and central and devolved government (21).

Against this background the UK strategy for sustainable construction (22) identifies that research and innovation can help the construction sector develop more sustainable practices. This opens a window of opportunity for steel businesses to consider using their urban brownfield sites in large-scale projects to demonstrate steel construction supply chain innovations in partnerships with planning authorities, construction businesses and public and private developers.

This requires major funding but raises prospects for demonstrating on recycled steel production sites, steel products and services that reduce emissions far below levels currently permitted for steel production under IPPC (23) thus opening the possibility to offset costs by trading surplus emissions permits (24) from energy efficiency and renewable energy certificates (25).

## 7 CORUS AND THE CITY OF TOMORROW

Following research by the Mandix Consultancy for the Steel construction Institute, in March 2000 Corus plc launched a 5 year initiative with Mandix to develop a strategy for the *City of Tomorrow* to move Corus closer to the environmental goods and services sector and line the company up with the EC action plan on sustainable urban development (17) and the reports of UK Government Task Forces on Urban Renaissance (19) and Rethinking Construction (21).

Partnership is axiomatic and a small strategy team has been set up to explore ways of helping Corus businesses work with their customers, suppliers and academic researchers. It is based in Wales where Corus has a major presence, Mandix is based and devolved government has a duty under UK law to promote sustainable development (26). Initial projects include:

### 7.1 EC0-Cluster in Construction

Responding to the report on Rethinking Construction the City of Tomorrow team has partnered the Small Firms Research Unit at Cardiff Business School to pilot, in South Wales, an approach to construction supply chain eco-efficiency based on 'clustering' SME suppliers around lead construction businesses and projects.

Other partners included the European Regional Development Fund, the Welsh School of Architecture's Centre for Research in the Built Environment, the Construction Industry Research and Information Association, Local Authorities and construction businesses.

The project used 4 pilot clusters of SME construction suppliers as a means to target business support measures on construction supply chains. The results informed development of a business plan for the Rethinking Construction Centre for Wales launched on 22<sup>nd</sup> March 2002.

Mandix is represented on the Board of the Rethinking Construction Centre for Wales and leading the development of its approach to sustainable construction and to the provision of business support services. Corus is supporting the initiative and the Centre is the first of 12 that leading construction businesses and government want to see in UK regions.

### **7.2 Water Demand Management**

The UN has identified that within 25 years about 5 billion people (two thirds of global population) will be living in areas where it will be difficult or impossible to meet all their needs for fresh water. Given the drift to urban areas water demand management in cities will be essential to the goal of sustainable urban development.

Consequently, Corus is supporting a Mandix led project to monitor a pilot group of hotels in Wales retro-fitted with water efficiency devices. The project is to identify and disseminate best practices including via seminars and case study and guidance material via publications and websites of project partners including the Environment Agency Wales, the Wales Tourist Board, the BOC Foundation and the National Assembly for Wales Envirowise programme.

The project will provide the water industry with knowledge about the practical opportunities and economics of integrating water efficiency products into the built environment as an alternative to the financial, social and environmental impact of supply infrastructure projects proposed to enable development of an area.

The project will benefit construction clients by providing them with decision tools and benchmarks to help implement environmental improvement policies, and provide regulators with knowledge about the potential of water demand management as an alternative to supply development. It will provide the suppliers and installers of water efficiency devices with a marketing tool that promotes sustainable development and increases water market opportunities for SMEs in construction.

### **7.3 Steel and carbon sinks**

The City of Tomorrow team is partnering Coed Cymru (Welsh Wood) and others in a project to assist the economic development of indigenous broadleaf woodland in Wales as carbon sinks by exploring the opportunities for new products that integrate metal with otherwise waste wood.

Coed Cymru has proposed development of a cluster of SMEs around a central facility combining a role in R&D and training and linked this to prospects for Urban Forests based on environmental improvement through planting at Corus production facilities. Elsewhere, in London and York, innovative housing projects have used wood for cladding and finishing modular steel units.

These components could evolve into a holistic approach to develop rural woodland businesses and bio-remediated urban brownfield sites owned by Corus using wood and steel in high quality mixed use developments that are material/energy/water efficient throughout their whole life cycle.

### **7.4 Sustainable Energy**

Corus is an energy intensive business so that competitiveness in a low carbon economy is likely to depend on access to renewable energy supplies at affordable prices. At the same time Corus can make a major contribution to sustainable urban development through products to integrate renewable energy technologies directly in buildings as well as major installations, such as offshore wind farms, required to supply cities from a distance.

Whilst technological advances are required it is widely agreed that planning processes and policies need to change. There is a need to remove barriers to the high density mixed use developments needed for the economic integration in buildings of combined heat and power and photovoltaic systems.

Given the early importance of planning in the development process the City of Tomorrow team is working with the Royal Town Planning Institute to create an Energy Planning Best Practice programme. Partnership has been proposed to the UK Carbon Trust in view of its commitment to the integration of low carbon technologies in the UK economy.

## 8 CONCLUSION

Public policies to reduce the carbon intensity of market economies risk investors withdrawing from steel businesses who would be forced to withdraw from steel regions. Delivery of a low carbon economy with unprecedented urban population and viable steel businesses and communities needs partnership with governments at international, national and devolved levels.

The City of Tomorrow strategy is to help Corus integrate its environmental and social concerns with its business interest to share in the growing market for products and services needed to deliver urban development and regeneration.

The opportunity is open for a wider partnership to create a virtuous circle from demonstration of innovations to profitable market implementations that support growth in steel recycling capacity and research and development of further innovations in products and processes.

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