Steel Sourcing and Use

Aim of Credit

To encourage the reduced use of resources and responsible sourcing and supply chain associated with the use of steel in buildings.

Credit Criteria

All projects must meet the criteria 0-Responsible Steel Maker for points to be awarded for this credit. Projects teams may comply with criteria 1 and 2, or 3 and 4, depending on the primary structure of the building.

Steel		
0	Responsible Steel Maker	Conditional Requirement: 95% of the buildings steel is sourced from a Responsible Steel Maker

Steel Framed Building		
Responsible Sourcing and Supply Chain		
1	Responsible Steel Fabricator	1 point is awarded when at least 60% of the fabricated structural steelwork is supplied by a steel fabricator/steel contractor accredited to the Environmental Sustainability Charter of the Australian Steel Institute.
Reduced Use Of Resources		
2	Reduced Mass of Steel Framing	1 point is rewarded when there is a reduction in the mass of steel framing used when compared to standard practice.

Concrete Framed Building		
Reduced Use of Resources		
3	Energy-reduced manufacture	1 point is awarded when at least 60% of all reinforcing bar and mesh is produced using energy-reducing processed in its manufacture (measured by average mass by steel maker annually)
4	Reduced Use of Steel Reinforcement	1 point is awarded when there is a reduction in the mass of steel reinforcement used when compared to standard practice.

NA Criteria: If the material cost of structural and reinforcing steels represents less than 1% of the project's total contract value, or there are no new structural or reinforcing steels used in the project, this credit is 'Not Applicable' and is excluded from the points available used to calculate the Materials Category Score.

Compliance Requirements

All benchmark calculations are based on the mass of steel in the building.

Reinforcing Steel

Reinforcing steel includes reinforcing bar and mesh used in concrete reinforcement in the building structure. This includes steel in situ, stressed, and pre-cast concrete applications.

Tendons are not considered reinforcing bar and are not addressed by this credit

0. Responsible sourcing

For a steel manufacturer or a steel maker to be considered a responsible source of steel for purposes of this credit, they must show that they comply with both of the following initiatives:

The steel making facilities where the steel for the project is being sourced have a currently valid ISO 14001 Environmental Management System (EMS) in place.

Valid ISO 14001 Environmental Management System (EMS) certificates must be provided from the steel making facilities where the structural and/or reinforcing steel in the project was produced; and

The steel maker supplying the steel is a member of the World Steel Association's (WSA) Climate Action Programme (CAP). A current CAP certificate from the WSA, confirming that the steel maker is a member of the CAP, must be provided. Certificates are valid for a period of two years and must be current at the time that the Green Star documentation is submitted to achieve points for this credit.

1. Responsible Steel Fabricator

Australian Steel Institute (ASI) Environmental Sustainability Charter (ESC)

The ASI has created the ESC as part of an overarching program of steel stewardship, seeking to engage the whole steel supply chain in adopting more environmentally sustainable behaviour. This Charter is directed at the downstream manufacturing, fabricating and supply companies who are an integral part of the entire supply chain.

For criterion compliance, 60% (by mass) of the structural steel framing shall be supplied by a fabricator / contractor who is a current member of the ASI’s Environmental Sustainability Charter Group.

2. Reduced Mass of Steel Framing

The reduced mass of steel framing can be demonstrated by one of the following design initiatives:

2.1 High Strength Steel
2.2 Reduction in mass of steel framing by 5% when compared to a suitable reference building

2.1

2.2 High Strength Steel

95% of category A products and 25% of category B products meet the strength grades specified in table 1 and 2. All calculations are based on mass.

Category A Products -	**Minimum Strength Grade**
Roof Sheeting	550 MPa
Wall Sheeting	550 MPa
Profiled Steel Decking	550 MPa
Purlins	450 MPa
Girts	450 MPa
Light Steel Framing Systems	450 MPa

Table 1 : Minimum Strength Grades for Category A Products

Category B Products	**Minimum Strength Grade**
Hot-Rolled Structural Steel Sections and Plate (UB, UC, PFC, EA, UEA etc)	350 MPa
Cold-Formed Sections (SHS, RHS, CHS, channels, angles)	450 MPa
Welded Sections (WB, WC)	400 MPa

Table 1 : Minimum Strength Grades for Category B Products

Proposed Criterion

2.2 Reduction in mass of steel framing by 5% when compared to a suitable reference building

Where the use of structural steel framing is minimised, a short report must be prepared by a qualified engineer that includes the following:

- A description of how the amount of steel has been reduced
- Justification of a reference case*
- Calculations of the reduction in the total amount (by mass) of steel necessary for the design structure against the reference case
- Confirm that the reduction has been achieved by without changing the load path to other structure elements that are not steel.

*The GBCA requests feedback on how an appropriate benchmark could be defined for this criterion 2.2. Is there an industry reference that would define cost of steel per m^2 for typical building types?

3. Energy-Reducing Processes in Steel Production

To comply with this requirement, the reinforcing steel used in the project must be sourced from a steel maker using an energy-reducing process in manufacturing. It must be shown that 60% of reinforcing products, measured as a percentage of annual mass of reinforcing steel produced by the steel maker, are manufactured with this technology.

Energy reduction arising from energy-reducing processes must equate to at least 40 MJ/tonne.

To determine compliance with this benchmark, a lifecycle assessment must be made in accordance with Protocol for Demonstrating Equivalency in Energy Reduction provided in Additional Guidance.

Currently, reinforcing steel products sourced from a steel maker using a Polymer Injection Technology (PIT, as developed by the University of NSW) in manufacturing 60% of their reinforcing products is an acceptable method of demonstrating compliance with this criterion.

Proposed Criterion

4. Reduction in the Mass of Reinforcing Steel

1 point will be rewarded where the project can demonstrate a 5% reduction in the mass of reinforcing steel used in the building

The mass of reinforcing steel can be reduced by optimal fabrication or by innovative structural design. Optimal fabrication techniques may include initiatives such as reinforcing carpets, special mesh, prefabricated reinforcement cages and special couplers can be implemented to reduce the mass of reinforcement.

- A description of how the amount of reinforcing steel has been reduced
- Calculations of the reduction in the total amount (by mass) of reinforcement necessary for the design structure against a reference case
- Standard reinforcement detailing shall be defined by an industry standard such as the Australian Concrete Institute Detailing Manual

- Justification of the reference case reinforcing rates*
- Confirm that the reduction has been achieved by without changing the load path to other structure elements that are not steel.

*The GBCA requests feedback on how an appropriate benchmark could be defined for this criterion 4. Is there an industry reference that would define cost of reinforcing steel per m^2 for typical building types?

Guidance

Steel Maker

Steel makers are defined as companies that manufacture steel products from raw materials using a steel making process (e.g. Basic Oxygen Furnace or Electric Arc Furnace).

Steel Making Facility

Steel making facilities are production facilities that manufacture steel products from raw materials (e.g. iron ore or scrap metal) or manufacture steel products from slab or billet by reheating and rolling.

Steel Fabricator / Steel Contractor

Fabrication of structural steelwork refers to a process in which a steel member is prepared for assembly and erection. A fabricator will build the product, control production, manage the project, and often deliver and erect the product. The tasks involved in this process are referred to as Fabrication.

Steel contractors have full contractual responsibility for the structural steel component of the building, including coordination of all trades involved with steel fabrication, erection and detailing. Also included in this definition are any sub-contractors employed by the above performing similar functions.

World Steel Association (WSA) Climate Action Programme (CAP)

The World Steel Climate Action recognition programme is a scheme which recognises that a steel producer has fulfilled its commitment to take part in the world steel CO2 data collection program.

The data collection program is at the core of the steel industry's global steel sectoral approach to climate change. Based on a common methodology, definitions and agreed boundaries, the data collection programme enables individual steel plants to compare

themselves against both average and best performance and identify its scope for improvement.

Australian Steel Institute (ASI) Environmental Sustainability Charter (ESC)

The ASI has created the ESC as part of an overaching program of steel wtearadship, seeking to engage the whole steel suplly change in adopting more environmentally sustainable behaviour. This charter is directed at the downstream manufacturing, fabricating and supply companies who are an integral part of the entire supply chain.

Polymer Injection Technology (PIT)

Polymer injection involves the use of polymers (e.g. rubber from used car tyres) as a partial substitute for coke and as an alternate carbon injectant to produce foaming slag in Electric Arc Furnace (EAF) steel making.

This technology holds environmental benefits in the form of:

- Reduced energy consumption;
- Lower greenhouse gas emissions;
- Reduced quantities of injectants; and
- Reduced emission levels for NOx, CO and SO2.

Protocol for Demonstrating Equivalency in Energy Reduction (Equivalency Protocol)

The Equivalency Protocol is based on the same LCA methodology used in the Polymer Injection Technology (PIT) study by PE-Australasia and the University of New South Wales (PE and UNSW 2010) used to inform this credit. The energy reduction equivalency benchmark relates to the energy reduction outcomes from using PIT in an Electric Arc Furnace (EAF) steel manufacturing plant compared with standard Coke Injection Technology (CIT).

The methodology can be summarised as follows:

- Lifecycle Assessment generated in accordance with internationally applicable LCA techniques specified in IS O 14040:2006 (Environmental management - Life cycle assessment - Principles and framework) and IS O 14044:2006 (Environmental management - Life cycle assessment - Requirements and guidelines);
- The function considered is the production of steel billet. Other functions relating to the generation of co-products from steel production to be allocated on the basis of procedures recommended in IS O 14044:2006;
- The functional unit is 1 tonne of steel billet;
- The standard measure for Energy is MJ;

- Boundary conditions are 'cradle to gate', meaning all production stages from raw materials mined (cradle) to finished steel billet ready to be converted to products (gate);
- Carbon Footprint calculated and reported in terms of scope 1, 2 and 3 emissions, as defined according to World Business Council for Sustainable Development / World Resources Institute Greenhouse Gas Protocol, Corporate Accounting and Reporting Standard (WBSCD/ WRI, 2004); and
- A single independent peer review conducted on the LCA according to ISO 14044:2006.

References & Further Information

Australian Steel Institute (ASI), 2010, “Australian Steel Institute Environmental Sustainability Charter (ESC)”, found at: http://www.steel.org.au/_uploads/613_ASI_Environmental_Sustainability_Charter_Dec_00.pdf.

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Department of Environment and Conservation (NSW) (2005), “Benefits of Recycling, Sustainability Programs Division”, Found at: www.environment.nsw.gov.au/warr/BenefitRecycling.htm.

Gaballah, I. & Kanari, N. (2001), 'Recycling policy in the European Union', Journal of Metals, November, Vol. 53, No. 11, pp. 24-27.

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Hyder, 2009, “One-Steel Recycling Waste ferrous metal in Australia Estimate of steel disposed to landfill”, Hyder Consulting Pty Ltd.

Norgate 2004, “Metal Recycling: An Assessment Using Life Cycle Energy Consumption as a Sustainability Indicator”, CSIRO.

OneSteel 2009, “Polymer Injection Technology Case Study”, OneSteel Manufacturing Pty Limited.

Strezov, L and Herbertson, J, 2006b, “Life Cycle Perspectives on Steel Building Materials” The Crucible.

World Steel Association (WSA), 2010, “Climate Action”, found at: http://www.worldsteel.org/climatechange/.

World Business Council for Sustainable Development/ World Resources Institute (WBSCD/WRI), 2004, “Greenhouse Gas Protocol, Corporate Accounting and Reporting Standard”,

PE-Australasia and University of New South Wales (PE and UNSW), 2010, “Electric Arc Furnace steelmaking – a Life Cycle Assessment of two options: Coke Injection Technology (CIT) and Polymer Injection Technology (PIT) Methodology Report”.

Documentation Requirements

‘Design Review’ Submission (Optional)

Project teams are to submit information / documentation marked with an asterisk* for ‘Design Review’

AS Built Submission

All Project teams are to submit the following documentation:

Submission Template*

- Confirmation of whether the project is targeting Steel Framed Criteria or Reinforcement Criteria*
- Confirmation that 95% of all steel used in the building is sourced from a responsible steel maker*
- Percentage of steel framing that is to be fabricated by a Responsible Steel Fabricator*
- Summary and percentages of high-strength steel used*
- Summary of reduction of mass of structural steel*
- Percentage of steel reinforcement that has been produced by energy-reducing processes*
- Summary of reduction of mass of reinforcing steel*

Project teams are required to provide documentation supporting credit compliance. The following documents may be used to demonstrate compliance:

- **Steel Quantity Summary** produced by the Quantity Surveyor or other qualified professional tabulating uses of steel in the project, it’s source, specification and mass
- **Structural Specifications or Drawings**
- **Structural Engineer’s Report** demonstrating the reduction in mass of structural steel framing or reinforcing steel in the building
- **Summary of steel quantities** produced by BIM model
- **Reinforcement drawings** supporting claims of optimal fabrication techniques
- **Steel Delivery Dockets or Invoices**

- **Steel manufacturer ISO 14001 certificate** from the Steel Making facilities where the structural or reinforcing steel was produced

- **Evidence of membership to WSA's Climate Action Programme** from the Steel Making facilities where the structural or reinforcing steel was produced (See Compliance Requirements.

- **Confirmation from the Supplier stating**, where relevant based on the credit criteria claimed:

    - That they are a responsible steel maker, and listing their compliance documentation.
    - The total quantities (by mass) of structural and/or reinforcing steel supplied to the building.

- **Quantities (by mass) of structural and reinforcing steel** as percentages of the total steel products installed in the building (structural steel and reinforcing steel only).

- **ASI Certificate of Achievement** for every steel fabricator or steel contractor demonstrating that each is accredited to the ASI Environmental Sustainability Charter.

- **Energy-Reducing Processes Report** from every reinforcing steel maker, explaining the energy-reducing processes used in their steel making process and confirming that it is used in the production of at least 60% of the reinforcement products they produce on an annual basis. (See Polymer Injection Technology and Equivalency Protocol explanations in Additional Guidance). The report must contain a summary of the life cycle assessment result for this technology in accordance with the Equivalency Protocol (see additional guidance).

- **Total cost of new steel specified in the project against the project's total contract value** and the percentage (by mass) of structural steel framing and steel reinforacement summarised in a report by the Quantity Survey, Project Manager, Cost Planner or other qualified professional

- **Extract(s) from the contract** that includes the project's total value.

- **Confirmation from the Architect, Quantity Surveyor or Head Contractor** confirming that no new steel is specified in the project

Please provide your feedback on the technical content of this credit: