

Meeting sustainability beyond our shores in public works procurement practices

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ABSTRACT: There are many methods for local government to procure new assets. The key success factors are always the same, that is a concise and unambiguous design brief, clear and stringent specifications for construction, and the diligent and ongoing application of quality assurance and risk management. These attributes to successful procurement are regularly being challenged by designers and contractors who use nonconforming or noncomplying imported products and materials. It is imperative that local government addresses this issue now, as parts of the new asset may fail to reach its design life resulting in increased maintenance costs or worse, part of the structure may require early unplanned rehabilitation.

Australian suppliers must meet their WHS and environmental obligations, and with the growing volume of imported products and materials into Australia, local government should also ensure that overseas suppliers extract and process materials in a sustainable and environmentally responsible manner. The question of how this is verified and certified by the supplier is yet to be developed for imported construction materials and products. Also, there are questions about whether overseas companies are applying similar 'safe' production methods as expected by Australian suppliers under Australian regulations.

Although sustainability has matured into locally supplied mainstream products, it should never be assumed that imported products of comparable quality meet Australian safety regulations. Noncomplying or nonconforming imported materials may contain asbestos or cariogenic materials that may be considered acceptable in small quantities in another country.

This paper revisits sustainable procurement practices for local government facing the challenges of an increasing number of imported products and materials, tight financial constraints and limited resources to audit and surveil overseas suppliers, and detect counterfeit products. New government legislation to extend the chain of responsibility of suppliers and improve the reliability of overseas testing is required but this takes time. All stakeholders have a responsibility to ensure the procurement of new assets will meet the intended design life in a sustainable responsible manner.

KEYWORDS: procurement, noncomplying, nonconforming.

1 Introduction

There are many methods by which local government procure new assets. The key success factors are always the same; a concise and unambiguous design brief, clear and stringent specifications for construction, and the diligent and ongoing application of quality assurance and risk management. These attributes for successful procurement are frequently challenged by designers and contractors who intend to purchase and use nonconforming or noncomplying imported products and materials to win a contract or reduce construction costs. Accepting the lowest tender cost may result in higher risks for project quality and the delivery of the asset may be compromised. Ultimately the new asset may fail to reach its design life resulting in increased maintenance costs or at worse, part of the structure may require early unplanned rehabilitation.

Australian suppliers must meet their WHS and environmental obligations, and with the increasing usage of imported products and materials in Australia, local government should ensure that overseas suppliers extract and process materials in a sustainable and environmentally responsible manner. A methodology to effectively verify and certify imported construction materials and products that has met health and safety and environmentally sound production methods has yet to be developed.

Durability may also be in conflict with sustainability goals, especially when specifiers prioritise the use of recycled materials, such as crushed glass or crumbed rubber from tyres. The need to meet longer term design durability goals to allow a structure to be more resilient against a range of loading cases over the design life may also be in conflict with sustainability policies. While this paper does not specifically

address the balance ideal between a low whole of life cost for the asset against community expectations for sustainable and resilient structures, it highlights that sustainability practices for suppliers of imported products should be on the same 'playing field' as locally supplied products.

In this paper, 'nonconforming building products and materials' include those that:

- claim to be something they are not,
- are not fit-for-purpose, or
- do not meet required specified standards.

'Marginal materials' are products or materials with some of its material properties just outside the specified limits, are still considered nonconforming. The difference between nonconforming and noncompliant products, is that noncompliant is defined as products used in situations where they do not comply with the requirements of the National Construction Code. In addition, a product can be conforming when it arrives on site and becomes noncompliant after it is damaged or altered by incorrect application of loads. This case is not considered in the report, along with counterfeit products.

2 Increasing problems with imported products

There is an increasing number of cases documented by government agencies or authorities where overseas products have been imported and found to be not fit-for-purpose, nonconforming, noncompliant or illegal for use in Australia. It is not rational to aim for low tender prices at the cost of shorter design lives or higher maintenance costs in a limited local government budget. A resilient design should take into consideration that both locally and imported products are fit-for-purpose and do not disadvantage local suppliers who are required to meet high WHS and environmental regulations.

The following examples highlight the unsustainable practices of procuring materials and products from overseas, and subsequently finding out that replacement products are needed for the building to be used safely or for the building to meet its design intent. The direct and indirect costs to the Council when imported products are nonconforming or noncompliant are measurable, but these deficiencies damage

the Council's reputation and in some cases, disenfranchise long term local suppliers who have traditionally supplied these products to the Council.

In July 2016, work was undertaken at the Perth Children's Hospital to fit an additional mechanical smoke exhaust system into the north atrium roof made from a unitised roof panel. After creating an opening, workers raised concerns about the fibre cement sheets within the roof panels. The building contractor John Holland arranged for a fragment to be tested by NATA accredited testing facility which confirmed the presence of asbestos in the fragment. The presence of asbestos in the hospital plus other known areas of concern, such as plumbing issues (finding of lead in the water), fire doors, and damaged facade panels resulted in the WA Building Commission preparing a report on these issues on behalf of the State Government (Building Commission, 2016 & 2017).

The report noted that laws concerning the use of asbestos differ across the world, with only 55 countries banning the import and/or use of asbestos containing products. A potential reason that asbestos was present in the fibre cement sheeting is due to Chinese regulations allowing very small amounts of asbestos in its building materials. Some Chinese manufacturers produce both asbestos containing and non-asbestos product lines. Subsequently, there is the potential for the wrong products to be supplied or product substitution to occur without notification to the importer. Using asbestos in products sold in Australia is illegal, however some overseas suppliers consider the use of asbestos as a filler in cement sheets as acceptable. Once the asbestos was discovered on the project, the sheets had to be removed, properly disposed and replaced.

The fire at the Lacrosse building, Docklands, Victoria in December 2014, uncovered issues relating to the external wall panelling, and the panelling itself allowed the fire to travel the full extent of the building (MFB, 2015). The lessons learned from the Lacrosse building fire are wide reaching and may be summarised as follows:

- Performance based specifications may result in even qualified practitioners misinterpreting which requirements have

to be met.

- Third-party accreditation certificates improve uniform approaches to the assessment of products but they can also be misleading in terms of clarity of conformance to a specification or Australian Standard.
- Ongoing audits are essential to timely identify nonconforming products being used.
- There needs to be ongoing training across the industry to ensure specifications and guidelines are being met by the contractor and their suppliers, and how to assess conformance certificates.

Other examples of problems with imported products come from one of the submissions to the Senate Inquiry into nonconforming building products from the Building Products Innovation Council (BPIC, 2015) which listed various nonconforming building products. Some of these products and their effect are:

- Steel strapping and bracing used in timber framing found to be substandard in galvanisation coating. Significantly below standard and which compromise the durability of a product. Nonconforming bracing and strapping purchased directly from building product suppliers.
- Incorrect load class grates installed (not fit for purpose). The grate manufacturer and load class not identifiable (incorrect marking); Incorrect load class identifiable on the grate (false and misleading performance claims); Defective grates not of acceptable quality and not fit for purpose; and no grate weight marking (required by WHS regulation).
- Glass acoustic noise barrier alongside a Sydney roadway, comprising a 62 m span triangular tubular truss fabricated from up to 250 mm square tubular steel sections where; steel was well below specified strength (independently measured by a NATA accredited laboratory at 338 MPa versus the 450 MPa specified); The joints indicated weld cracking; The workmanship of the tube and fabricated structure was noncompliant to Australian Standards; The cross chords were filled with water, presumed to increase component weight to that specified; suspected fraud; The protective coating was noncompliant with the top urethane coat missing and signs of rusting evident.
- Three pedestrian bridges in Busselton WA

demonstrated very poor welding practice with numerous instances of lack of weld finishing (surface lumpiness, weld spatter, porosity etc.). The welds are noncompliant and may lead to premature failure. Very poor galvanising practices that will result in increased maintenance costs and most areas are not consistent with accepted practice as defined in the relevant Standards. Many instances of rusted areas already present after only a short time in service demonstrate the ongoing significant maintenance issues. The low standards of the welding brings into question the actual capacity of the welds. Most engineers would expect 100% coverage over their full length, however one weld appears to be cracked, bringing into question the capacity of the structure to take the design load.

- Asbestos was detected in cement fibre boards used by an Adelaide contractor to build the electrical substations on the Seaford rail line.

A common feature in the detection of nonconforming building materials and products is that they are often discovered incidentally after a small event or when another intervention results in the material being tested at the time or even after it has been installed into the structure. As noted in this paper, the drilling into the ceiling panel at Perth's Children Hospital led to the discovery of asbestos. The late discovery of the nonconforming materials typically delays the project and requires the material to be replaced, adds cost to the project (engaging experts to advise and recommend repairs) and diverts attention away from the overall project delivery. In this instance, asbestos products had to be disposed into a certified waste disposal site.

The cost for resolving nonconforming imported products increases as the identification for nonconformance occurs upon delivery at site and when the product is installed. The direct costs are those paid by the contractor to investigate, conduct testing, and to replace or reinstate products. In addition, there are also other significant cost and the flow on effects, such as applying a warranty rather than full replacement, seeking expert advice and repairs from the manufacturer, reduced durability in the product and lower level of service of the asset. The other costs are those borne by

Council to engage expertise, conduct parallel or specialist testing, and prepare reports to the Council management and ascertain if the investigation will add to the cost of the project.

An outcome of using nonconforming imported products may not manifest itself for many years. For example, the use of contaminated cement in concrete may result in accelerated corrosion of reinforcement, the structure not achieving its design life and future unplanned maintenance costs needs to be redirected from planned limited maintenance funding. This outcome may also result in the building or structure not being resilient to the future applied loads within the design envelope. The societal impact of the loss of the amenity can also have serious and large economic consequences.

The use of contaminated steel might seem an East European issue, however there is a real need to have effective border security to identify contaminated steel when it arrives at Australian Ports. A recent case in WA with cheap water taps (Flint, 2018) highlighted health and safety being put at risk by the use of cheap taps and other noncompliant parts that leach lead and other toxic metals into drinking water. Asset owners should make it clear to contractors attempting to win projects by using imported contaminated steel must accept the financial consequences of using these unsafe products in infrastructure projects. The recent NSW legislation titled "Building Products (Safety) Bill 2017" provides powers to specific government authorities to inspect, investigate and act where unsafe use of building products has been identified. While this legislation is not as robust as the supply chain legislation introduced into Queensland in 2017, it is a step in the right direction to preventing contractors taking advantage of less than ideal approval and surveillance practices by some government agencies.

3 Government action on procurement and responsibility

In June 2015 the federal government referred an inquiry into nonconforming building products to the Senate Economics References Committee for the investigation and reporting to the Federal government on the issue. The terms of reference were:

- The economic impact of nonconforming building products on the Australian building and construction industry.
- The impact of nonconforming building products on: industry supply chains, including importers, manufacturers and fabricators; workplace safety and any associated risks; costs passed on to customers, including any insurance and compliance costs; and the overall quality of Australian buildings;
- Possible improvements to the current regulatory frameworks for ensuring that building products conform to Australian standards, with particular reference to the effectiveness of: policing and enforcement of existing regulations; independent verification and assessment systems; surveillance and screening of imported building products; and restrictions and penalties imposed on nonconforming building products

The Senate Inquiry has produced several interim reports (ERC, 2016a, 2016b, 2017 & 2018) and it is expected that the final report will be published in August 2018.

As a consequence of the Senate Inquiry, the issue was the key agenda item at several meetings of the Building Ministers Forums and the Senior Officers Group published a paper on the issue (SOG, 2016). Also, the Queensland government took the early initiative and sought for those involved in the supply chain and installation of building products to face increased accountability and disciplinary action for the use of unsafe or noncompliant products in Queensland buildings. This follows the passage of the Building and Construction Legislation (Non-Conforming Building Products – Chain of Responsibility and Other Matters) Amendment Act 2017. Although this legislation does not discriminate against imported products, it clearly aims to eliminate 'the not my problem' approach typically taken by product suppliers, certifiers and builders when mistakes are uncovered.

This legislation provides the Queensland Building and Construction Commission (QBCC) with the power to enter, inspect, examine and test building products to ensure buildings are safe, and aligns its powers with those of other Queensland safety regulators. If an offence is suspected, the QBCC can seize property and demand documents to be

produced. The legislation focuses on the safety of products on completed structures and may be expanded to take into consideration sustainability issues in the future.

The NSW government recently introduced new legislation to address concerns about existing structures which may contain contaminated or unsafe cladding. This legislation focuses on both existing buildings and buildings under construction, however it does not address the supply chain responsibility embedded in the Queensland legislation.

4 Perils of imported innovated products

Driven by the desire for all levels of government to be innovative, there is a potential for so called innovative imported products to be nonconforming and noncompliant to Australian codes, standards and specifications. Some of these innovative products claim to use recycled materials or be sustainable, but the validity of the claims is uncertain, plus they may not be as durable as local materials and products.

The acceptance by Councils of innovative products on the basis of the completion of overseas trials by suppliers is also not a prudent course of action as the trial may not provide the necessary evaluation of the product, and may just be an opportunity for the product to be compared to common products used in that location under similar loading conditions. This paper does not discourage trials, but suggests that Councils must take a more collaborative effort and work with other Councils rather than allow suppliers to conduct various isolated trials with varying levels of data capture and appraisal. Also, one of the key goals of the trial should be to gain a better understanding of the sustainability outcomes from the innovative product and the planned maintenance activities that are required for the product to contribute to the design life of the asset.

For any innovative product to be sustainable, it must be evaluated in terms of its life cycle. For example, the use of the recycled materials and its shorter design life mean higher maintenance costs for the Council and will it subject workers to high-risk work

practices to replace this material? Councils should always request detailed technical information about the innovative product's operational and demolition phase, and conduct a risk assessment for the proposed use of the product if no engineering evidence is available.

5 The accreditation and quality assurance approach

For road and bridge construction projects, the use of drawings and specifications in the procurement process is common practice. Although it is considered appropriate for the head contractor responsible for the delivery of the project to be accredited to ISO 9001, the quality assurance requirement must also be extended to the subcontractor and suppliers. In some contracts, the head contractor must conduct audits of their work and work by subcontractors and suppliers to ensure quality assurance in all the works. It has been the authors experience that these internal audits are often not as robust as client driven audits conducted to assure quality is being delivered on site. It is recommended that the Council regularly conducts an audit of the work and follows up on the closure of nonconformances from the previous audit. To simply request the contractor to have quality management system in the contract documents will not achieve a sustainable asset and quality assurance.

Local government is unfortunately losing its engineering expertise, becoming increasingly distracted with internal and external consultation processes, and cannot always allocate the necessary resources to verify that all products and materials specified in the contract meet the properties detailed in the specification (and Australian standards and buildings codes). One successful approach to meeting product conformance requirements is using third-party accreditation schemes.

Product accreditation schemes are becoming widely used in Australia. The most common accreditation organisations in building and road construction have been 'CodeMark' and 'Australasian Certification Authority for Reinforcing and Structural Steels' (ACRS) respectively. ISO defines accreditation as a third-party declaration of genuine product

related to a conformity assessment body conveying formal demonstration of its competence to carry out specific conformity assessment tasks. JAS-ANZ notes that “accreditation entails the endorsement of a conformity assessment body's competence, credibility, independence and integrity in carrying out its conformity assessment activities” and importantly, does not assess any products or materials. Similarly, NATA accredits laboratories to conduct testing to nominated test methods, but it does not guarantee that the test results are within the specified limits or the test procedure used is appropriate for the products.

The current international accreditation system has three levels of delivery which are defined as follows:

- First-party conformity assessment – conformity assessment activity performed by the person or organisation that provides the object.
- Second-party conformity assessment – conformity assessment performed by a person or organisation that has user interest in the object.
- Third-party conformity assessment – conformity assessment activity performed by a person or body that is independent of the person or organisation providing the object, and of the user interests in the object.

Accreditation schemes, especially third-party schemes such as ACRS, are recommended for procurement practices for locally and imported products. It is important to note that these schemes do not prevent product substitution, such as when a manufacturer, importer or supplier submits their product for third party certification testing and, after the certification is granted, alters it without retesting or recertifying the product. Product substitution can also occur when a seemingly identical (and potentially nonconforming) replacement building product is offered on a construction site or elsewhere. Conversely, counterfeit building products are an unauthorised copy of a building product, often created with the intention to deceive. These products are sold to suppliers and contractors as if the product is genuine.

An accreditation scheme operated by either a government or industry organisation offers several benefits to Councils, the supply chain for suppliers and contractors:

- reduces compliance and transaction costs by only testing once
- minimises technical risk by potentially testing with a uniform approach according to the costs and risks of nonconformance
- streamlines on site operations by accepting material and products without undue re-assessment
- keeps clauses in specifications concise by referring to the materials and products meeting the requirements of the product accreditation scheme.

For example, in Roads & Maritime specification B80 for the supply of concrete to bridges, the clauses for the supplying steel reinforcement is simply:

Clause 6.1 - “The reinforcement material supplier must be certified by the Australian Certification Authority for Reinforcing Steels for the supply of reinforcement material.”

Clause 6.2.1 – “Reinforcement must be deformed bars or welded wire fabric except that plain bars or wire may be used for fitments. (A fitment is a unit of reinforcement commonly known as a tie, stirrup, ligature or helix.) All reinforcement must conform to AS/NZS 4671.”

In this example, the certificate from the reinforcement supplier provides assurance that the supplier has met the requirements of the specification and in particular, the specified properties in AS/NZS 4671 Steel reinforcing materials. The certificate does not imply however, that the method of production meets WHS regulations or uses sustainable resourcing of material components in making the steel reinforcement. The use of recycled materials and other sustainability practices are not currently covered by these third-party schemes, although these requirements could easily be introduced given sufficient incentives from local government.

Simply specifying overseas laboratories be accredited to a country-based laboratory accreditation scheme, such as NATA in Australia, in no way guarantees reliable test results. It is fair to note that International Laboratories Accreditation Cooperation (ILAC) ensures that the overseas accredited laboratory meets the ongoing requirements to ISO 17025, but the overseas accreditation scheme, may not monitor the technical capability of these laboratories to conduct

specific Australian test methods. In the USA, there are at least three accreditation bodies like NATA that accredit laboratories which test building construction materials and products. The challenges of evaluating or comparing which accreditation bodies are better is not discussed in this paper. Unless the engineer has dealt with and has a good working relationship with the overseas product supplier, it is not easy to assess the reliability of the test results and hence, product conformance or otherwise to the specification.

In the case of an overseas laboratory where English is not the primary language, the translation of test methods presents additional risks as translated operator sensitive instructions may be technically incorrect leading to modified procedures and subsequently different test results. Other concerns worth noting are:

- One of the challenges with overseas products is whether that testing has been conducted by an external (independent) or in-house laboratory attached to the manufacturing facility.
- It would be difficult to assess the competency of a laboratory by a one-off inspection or audit of the laboratory unless the skilled assessor is knowledgeable in both the test method and local language.
- How can surveillance or an audit verify that the traceability of batches in production versus continuous production products, taking into consideration the frequency of testing, product traceability from material source to final product and reviewing test results.
- There are significant difficulties in identifying under-performing laboratories because maintaining a list of these laboratories is problematic and may not result in better risk management outcomes.

6 Managing risk in procurement practices

The issue of who owns the risk and who is best to manage the risks in the delivery of local government assets, has been a contentious issue for many years. Some local government policies precludes or makes it difficult to use a Design, Construct and Maintain contract with a limited

maintenance period of the asset life. The use of Design and Construct (D&C) contracts are not necessarily a better approach to managing the risks and achieving the sustainability objectives set in the procurement policy.

These contracts are only as good as the detailed requirements set in the design brief and detailing sustainability measures can be difficult to document and evaluate bids from contractors prior to awarding the contract. In the author's experience, D&C contracts favour the goals of delivery of the initial construction at the expense of the long-term whole of life costs and sustainable assets.

The contractor is driven by the need to win the contract as a low cost and with limited time to complete the project, it is difficult to determine if the lump sum price takes into consideration the 'best interest' for Council to maintain the asset using durable materials that still meet sustainability goals. If the use of imported materials and products by the proposed contractor will reduce construction costs but the Council has limited capacity to assess compliance of the products, then a better procurement process is needed to ensure both local and imported suppliers meet the Council's sustainability goals.

7 Conclusion

This paper has detailed current trends in procurement practices where for example:

- Similar to national WHS regulations, the purchaser of a service cannot transfer their WHS liability to the provider.
- Government owned buildings and transport infrastructure have been identified with nonconforming imported products and materials being used and eventually replaced.
- The Queensland state government has shown leadership using a legislative approach to the product supply chain responsibility.

The legislation in Queensland has led to the purchaser of the service, the contractor and the supplier all being responsible for the safe delivery of a service. The procurement of products and materials to build, maintain and demolish a local government asset will become less of a simple design solution and increasingly complex one that also encompasses safety, sustainability,

resilience and social requirements, whether the materials and products used in the asset are supplied by local or overseas producers.

There are many methods which local government procures new assets. However the key success factors are always the same: a concise and unambiguous design brief; clear and stringent specifications for construction; and the diligent and ongoing application of quality assurance and risk management. The progress of successful procurement is regularly being challenged by designers and contractors using nonconforming or noncomplying imported products and materials. It is imperative that local government addresses this issue urgently, as parts of new assets may fail to reach their design life, resulting in increased maintenance costs or at worse, part of the structure may require early unplanned rehabilitation.

Australian suppliers must meet their WHS and environmental obligations, however with the growing volume of imported products and materials into Australia, local government should also ensure that overseas suppliers extract and process materials in a sustainable and environmentally responsible manner. The question of how this is verified and certified by suppliers of imported construction materials and products is yet to be determined. Also, there are questions about whether overseas companies are applying similar 'safe' production methods as expected by Australian suppliers under Australian regulations.

Although sustainability practices have matured into locally supplied mainstream products, it should never be assumed that imported products of comparable quality meet Australian safety regulations. Noncomplying or nonconforming imported materials may contain asbestos or cariogenic materials that may be considered acceptable in small quantities in another country.

This paper considers sustainable procurement practices for local government and the challenges of an increasing number of imported products and materials, increasingly tight financial constraints and limited resources to audit and surveil overseas suppliers and detect counterfeit products. New government legislation is required to extend the chain of responsibility of suppliers and improve the reliability of

overseas testing. All stakeholders have a responsibility to ensure the procurement of new assets will meet the intended design life in a sustainable and responsible manner.

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