CERP3 Decarbonization Procurement family 05

Mechanical Engineering and raw materials

Current Situation in Procurement family 13 – Services

- A majority of spend is on metallic raw materials and bespoke mechanical components.
- The processing of raw materials into bespoke mechanical components with CNC machining, fabrication and other methods is either done in-house at CERN or by 3rd party suppliers. A build to print manufacturing approach is typically applied for both.
- CERN buys high-grade materials in relatively low quantities but there is some collaboration with other research laboratories to try and leverage a greater volume with suppliers.
- Suppliers are asked questions about conflict materials to reduce the risk of human rights issues but there aren't currently any questions asked about the use of recycled materials, embodied emissions or if renewable energy is used for material processing.

When procuring goods and services, seek opportunities to apply the following decarbonization levers

Decarbonisation Lever	Description	Potential
Recycled Materials	• Using raw materials like steel with a higher recycled content can make a significant difference in the embodied carbon emissions of manufactured mechanical components • Because many metallurgical properties result from the processing of forged metal billets through re-melting, annealing and rolling high-grade metals can be manufactured with high recycled content, however, the extent to which demand outstrips supply varies for different grades	• As an example, the Electric Arc Furnace production method of steel emits ~50% less emissions than the Basic Oxygen Furnace method, given a significantly higher recycled steel content • This is in part due to the fact that high levels of energy are required to extract and process virgin materials like metal ores and hydrocarbons
3D Printing	• CERN have 3D printers on-site that have been used in the past to create spare parts made from plastic • There may be some applications for this technology for some components made in workshops in PF5, for example, 3D printers have been used to print components with superconducting metals	• 3D printing avoids waste metal from machining and fabrication, hence this is a much more material and energy-efficient process Transport emissions can also be reduced if all of the printing can be done in one place • This may also have the potential to reduce reliance on supplier lead times
Alternative Bids	• In some CERN Lowest Compliant Bid tender process, suppliers have the opportunity to present two bid submissions, one of which as an alternate does not fully meet the stated requirements, with the other being a standard compliant approach. • This is not widely used currently	• CERN can encourage bidders to complete an alternative bid submission with a focus on reduced embodied carbon through a different approach, providing CERN with the visibility of alternative means to meeting a requirement in a more sustainable way

When procuring goods and services, seek opportunities to apply the following decarbonization levers

Decarbonisation Lever	Description	Potential
Lifecycle Carbon Assessment	• CERN should ask suppliers if they can calculate the embodied carbon emissions of raw materials and finished components designs in Market Survey's • If this does not significantly limit competition then CERN can use the kgCO2e given to support the evaluation of bids	• By asking suppliers to measure the expected emissions of raw materials and components CERN can compare bids based on carbon emissions • Moreover, this will signal to suppliers that CERN want more environmentally responsible solutions
Environmentally Responsible Packaging	• Add questions in the Market Survey and ITT related to environmentally responsible packaging practices (see table for examples) • Current CERN delivery requirements are for every order to be packed individually. We should understand where this requirement can be challenged to reduce packaging volumes	• Reusable packaging eliminates the need to recycle or remanufacture single-use packaging, reducing CO2 (greenhouse gas) emissions by up to 60%
Green Transport	• Raw materials and components procured for Procurement Family 5 are transported to the CERN site from across CERN Member States • Presently there are no requirements or encouragement given to suppliers to use less carbon-intensive transport methods like rail or electric vehicles to transport materials to CERN	• With the proliferation of Electric HGV's in Europe encouraging suppliers to use hauliers with these vehicles in their fleet may be an easy win for reducing the emission in this Procurement Family Moreover, the long lifetimes of ships and recent advances in shipping technology mean that some sea freight vessels have a significantly lower environmental impact than others

To accelerate the decarbonization of procurement related to £Mechanical Engineering and raw materials, apply the following levers

Decarbonisation Lever	Action
Recycled Materials	• Begin including questions relating to recycled materials in Market Surveys • Consider feasibility, pricing differences and potential CO2 reduction through the use of recycled materials • Include this provision more widely in tender documentation if it does not significantly reduce the competitiveness of bids or balanced industrial return for CERN member states
3D Printing	• Identify components that can be manufactured using 3D given the current limitations of the technology and CERN's high precision requirements • If 3D printing isn't being fully utilized offer training to encourage more 3D print designs • Identify pilot projects to trail 3D printing for more components and compare the cost and CO2 impact
Alternative Bids	• Determine the appropriate type of requirement and level of spend at which it is appropriate to request alternative bids • Include this provision more widely in tender documentation as agreed
Lifecycle Carbon Assessment	• In the Market Survey ask suppliers if they can provide LCA's for raw materials and components • If not, CERN can offer to share LCA calculation tools from 3rd party event LCA providers like EcoChain
Environmentally Responsible Packaging	• Engage with CERN Recycling team to support the development of the packaging requirements • Review proposed changes to the CERN delivery requirements document for all Supply tenders
Green Transport	• Begin including questions relating to less carbon-intensive transport options in Market Surveys • Ask suppliers to estimate the emissions from their proposed transport method using tools like www.ecotransit.org • Include this as a requirement in tenders if it does not significantly reduce the competitiveness of bids or balanced industrial return for CERN member states

For Environmentally Responsible Procurement actions that rely on supplier collaboration CERN should prioritize working with engaged suppliers

Where would suppliers from each Procurement Code place CERN?

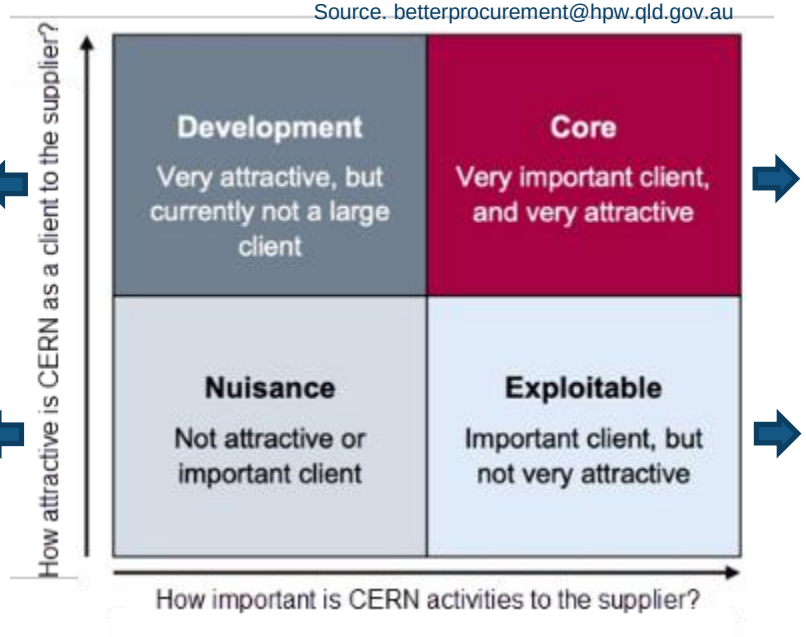
Supplier seeking to grow their business with CERN are more receptive to sustainability requests.

Opportunity for supplier in the development in terms of sustainability and innovation.

Low potential to drive sustainability issues.

If possible consider changing the supply base.

Source. betterprocurement@hpw.qld.gov.au



- *Open to change and to sustainability requests.*
- *Focus on driving sustainability objectives and influencing the supply market.*

- *Focus on improving CERN relationship with the supplier.*
- *Potential in pushing sustainability agenda through building attractiveness as a client.*