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Product policy and material scarcity challenges: the essential role of government in the past and lessons for today

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Abstract

Materials are important in economies, business, innovation activity and products, and they have quickly become essential to maintain and improve our quality of life. The world faces problems concerning material supply, but these concerns are not translated into product design activity, even though history shows that product design policy can play an important role in finding solutions to materials problems. This paper has a focus on the role of governmental policy in ensuring material availability to the state.

The case of British WWII Utility Furniture scheme is one where consumer products were designed and developed as a response to severe material shortages. This action is set in the context of wartime conditions where the products were designed, manufactured, used and often reused over a long lifetime, under very stringent governmental control.

The control came from the government ministries but was designed and manufactured by the private sector. The furniture scheme was brought in to allow workers to have a furnished home to live in, eat and rest to allow them to work to help win the war.

Drawing on policy lessons from the wartime cases this paper makes a comparison of the WWII British approach with a European 21st century action plan for the circular economy, which raises important questions for policy development.

Introduction

Material shortage has been a challenge ever since mankind first started making things (Tilton, 2003, Ashby, 2013, Ashby et al, 2016). It is only the contexts, technologies and materials that change in each case. Today materials are just as important in economies, business, innovation activity and products, and they are essential to maintain and improve quality of life. In turn how we select, extract, process, use and deal with materials has profound implications for all life on earth. The world faces material supply problems today, but these concerns are not widely acted upon, even though history shows that product design policy changes can play an important role in finding solutions to materials problems (Peck et al, 2010), (De Rijk, 2009). This paper has a focus on the role of governmental policy in the supply of products and thus ensuring material availability.

A number of writers have linked product design and the use of materials, and examples include Victor Papanek (1972), Clive Dilnot (1982) and Victor Margolin (1988, 1989, 1997). In the combined fields of critical materials (material scarcity) and product design, there are however, no published works exploring historic policy responses and relating those past responses to current and future scenarios. The majority of publications on the topic of

critical materials assess current situations and project proposals forward in time. Very few look back for policy lessons from past responses.

The case of British WWII Utility Furniture is one where civilian products were designed and developed as a response to severe material shortages. This case is set in the context of an exceptional period of political, economic, social and cultural wartime conditions where the products were designed, manufactured, used, and often reused, over a long lifetime. The scheme was conducted under very strict governmental control.

This paper draws on policy lessons from the wartime cases and makes a comparison with a European 21st century action plan for the circular economy, which raises important questions for policy development going forwards.

This paper does not seek to propose that events and actions, in a wartime material shortage situation from 70+ years ago, will provide an exact blueprint for product design policy actions required in the 21st century. For example many of the critical materials of today were not in industrial use in WWII and also many of the technologies of today did not exist then. What is proposed is that, given

a particular set of materials challenges, the British found a product design policy response that 'worked' in resolving their material scarcity / supply problems. Re-visiting their response may help in the search for solutions today.

This paper is a development of the utility furniture aspect of the TU Delft PhD thesis of David Peck (Peck, 2016). Peck's thesis did not focus on the policy aspects and this paper addresses that gap.

In research peck conducted, the 20th century was selected as the time frame in which to find suitable cases. A combination of clear materials scarcity and a distinct product design change, were sought. Peck highlighted that product design aspects as a response to materials scarcity, have not been well documented.

WWII provides a wider choice of suitable cases. Importantly product design (including policy approaches) had developed and played a clear role in solving scarcity problems (Postan, 1952, Edgerton, 2011; Reimer & Pinch, 2013; Broadberry & Howlett, 2014). In addition materials and product controls were more far reaching and adhered to much more rigorously in Britain, than in the other democratic allied nations (Broadberry & Howlett, 2014).

Peck selected five cases, one of which was the Utility Furniture Scheme, see figure 1. This case represents the furniture designed and manufactured during the war years and into the post war period.

British furniture production controls via the Utility Furniture Scheme regulated scarce materials and labour in WWII Britain, through governmental controlled rationing and statutory designs. The British Board of trade introduced the Utility Furniture Scheme in 1943. The aim was to produce new furniture using as little power, labour and material as possible, and it only to be supplied to those who needed it most. The scheme was direct governmental intervention to control the furniture market in order to control quality, prices and address supply shortages. A labelling scheme to show the product conformed to the scheme, using the CC41 logo, was applied to all items of furniture. Prices were fixed low to allow all income groups to obtain furniture when needed. The products were purchase tax exempt. Profits for producers and retailers were fixed. All stages of the supply chain were

recorded and audited. Production required a licence and production was allocated in designated geographic locations to limit transportation distances. Batch production methods were used, the design 'de-skilled' the production and division of labour was deployed. All designs has a unique government approved specification number. Large runs were encouraged. Durability and ease of repair were important. A buying permit giving access to limited coupons were issued to those who could prove a furniture need (bombed out, just married, new baby, etc.) allowing a limited amount to be purchased in any given period.

The government appointed group conducting the furniture research and approving designs later became the Council of Industrial Design. The designs did not have any features which 'wasted' material of 'unneeded' style such as carvings or mouldings. The designs conformed to a British style of modernism, see figure 2. Whilst the public had mixed views on the whole utility furniture scheme, the scheme was a success in making the best use of scarce resources whilst providing furniture to those who had need, across the nation as efficiently and economically as possible.

Utility furniture scheme: governmental policy in response to resource scarcity.

As the international threats increased through the late 1930's, British governmental thinking changed to reflect the new material requirements of a modern war. In this period more detailed plans for raw materials supply requirements were made. Preparations included the final detailed planning for future actions to secure strategic materials.

The demands for materials in the early phases of a possible war, were expected to be very high. In addition allowance had to be made for considerable dislocation in European supplies (Postan, 1952), (Hancock and Gowing, 1949).

A new Ministry of Supply started operations in August 1939, one month before hostilities broke out, and took

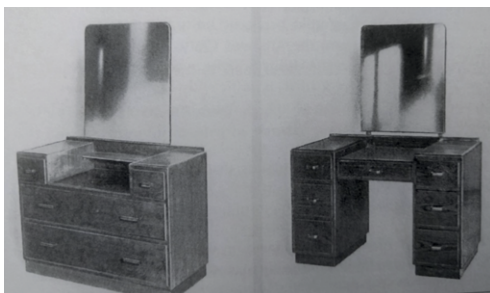


Figure 1. Examples of Utility Furniture, dressing table designs from the second Utility Furniture Catalogue published in 1947. Attfield, 1999.

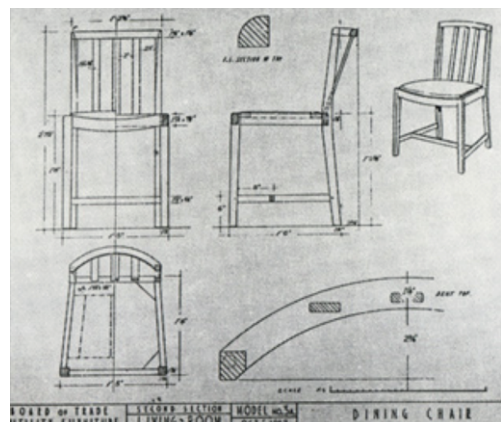


Figure 2 Government approved technical drawing detailing materials permitted, parts permitted and the appearance of the finished product.

over the 'Production, Contracts and Inspectorate' branches of the War Office. This aspect means that product 'Research and Design' came under the ministry of supply. Amongst the plans worked out in the last year of peace, were various schemes for reorganising materials supply to match the expected changes in international materials supply, to develop domestic (home produced) supplies of timber and iron ore, to plan carefully the use of scarce materials and to develop their substitution by other materials. Production would be based on a system of priorities (Postan, 1952) with the higher the war production priority, the greater allocation of material. At this stage, the production of domestic furniture was very low down the list of priorities.

When the war broke out, 56% of Britain's hardwood came from continental Europe, a source which was soon to be lost (Mills, 2008).

One of the control mechanisms deployed was statutory (legal) powers to control prices and to lay down conditions of material purchase, product sale and product use. This action can be seen in the utility furniture case. Compulsory government controls were imposed on most materials.

To a certain extent material prices were of low importance. Britain would pay if a material could be supplied. The effect of material supply on the economic performance of Britain was of interest only in that it effected the war effort. Economics as usual (peacetime economics) were suspended.

In 1940 the unrestricted allocation of timber for civilian furniture, which was deemed a non-essential product, was discontinued. A Timber Supplies Committee was set up to explore the problem of replacing furniture, damaged through the bombing of towns and cities. This Committee made a small timber allocation for the manufacture of specified products. This was in response to the upwardly spiralling prices of second hand furniture, which was quickly being bought by bombed out families (National Archives). Such spiralling prices fuelled a growing black market and the authorities were keen to show they were in

control of all aspects of the 'home front'.

It was during this period of severe scarcity, which saw a reduction in timber material supplies of over 50%, the Utility Furniture Scheme was launched. The scheme was introduced by the Board of Trade at the end of 1942. Under this scheme restrictions including the introduction of standard designs – the Utility Furniture Scheme Design, where the supply of timber was for the production of the designated, approved, design only. In addition there was also the zoning or regionalisation of supply, in order to reduce fuel used for transporting products. The Board of Trade selected the firms to make Utility Furniture, and allocated production volumes and timings to them, together with the raw materials.

The first range of Utility Furniture products became available in 1943 and the scheme formally ceased in 1952. For 6 years 1943 – 1948 the design of furniture was very tightly controlled and manufacturing firms had no freedom to adapt the limited range of designated designs at all (Pinch and Reimer, 2013), (Dover 1991).

Hugh Dalton, President of the Board of Trade appointed a Utility Furniture Advisory Committee (UFAC). This committee advised on both design and manufacture, had 9 people on it, with a mix of societal backgrounds, from research and industry. There was a call for submissions from private sector company designers to meet the utility furniture requirements.

The designers selected were Edwin Clinch and H.T. Cutler, both from the furniture design and production area of High Wycombe near London. In January 1943 the first catalogue was produced which outlined the furniture which would be on offer. This catalogue remained in place for the next 3 years, and two pages of the catalogue are shown in figure 3 below.

By February 1943 25,000 units of Utility Furniture had been sold. The Utility Furniture scheme was such a success that demand remained high and unit production increased (Mills, 2008).

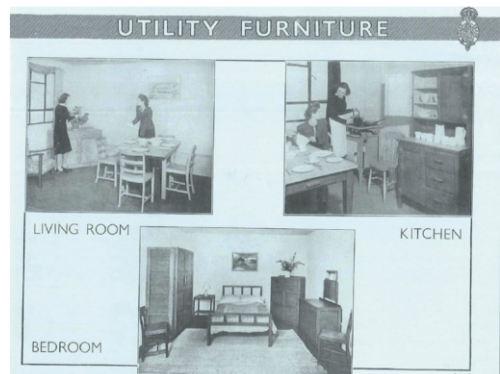
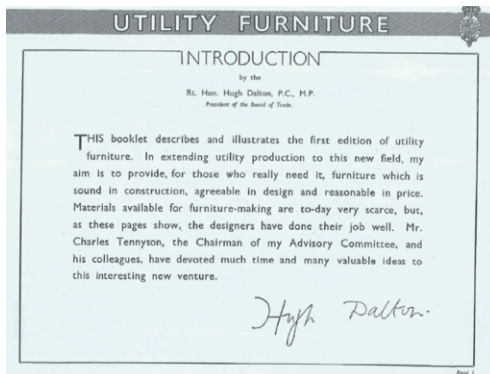


Figure 3. Pages from the first Utility Furniture Scheme catalogue, 1943 (Mills, 2008)

The WWII British product strategies for dealing with materials scarcity show that extensive systemic changes, including fundamental design change of all products, can address raw materials reductions of over 50%. The British product policy approaches played a significant part in Britain limiting the adverse effects of materials shortages, whilst providing for the needs of society.

Today, the world faces materials problems, which also require significant changes. This challenge is explained below.

21st century materials problems: material criticality

From the start of the 21st century there have been growing concerns over the increasing demand-supply of materials (Peck & Bakker, 2012), (CRM-Innonet 2014), (Bakker et al 2014), (Abraham, 2015), (Peck et al, 2015). At the same time, an awareness of the interconnectedness with energy challenges and climate change, is emerging (EU, 2014, 2015, 2016) (Köhler et al, 2013). Currently most materials

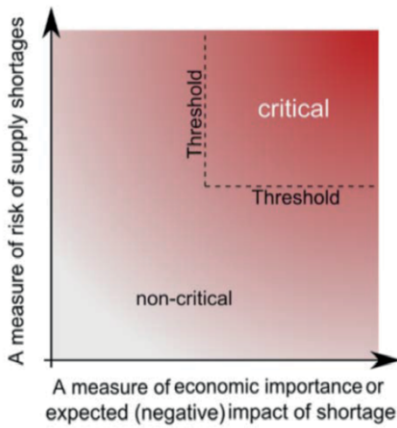


Figure 4. The two factors which determine if a material is critical; economic importance against supply risk (Sievers et al 2012).

analysis have a focus on two factors; the risk of supply disruption and the importance to the economy (Graedel T E, et al, 2009, 2012, 2013). A combination of these two factors produces the definition of 'critical materials'. This methodological approach can be shown graphically and is shown in figure 4.

Similar approaches, to determine if a material is critical or not, were developed over the period 2008-12 in a number of countries, e.g. EU, USA, UK, NL, (Peligrini, 2014). This approach was used to develop the graph in the 2014 EU report, as shown in figure 5. This two axis basis, supply risk against economic importance, is the core of most post 2008 definitions of critical materials.

EU policy on materials

In order to address the complex and interrelated challenges described above, the European Commission has developed a policy in 2008, called the EU Raw Materials Initiative (EU RMI, 2008). Part of the work is an on-going assessment of which materials are critical. The RMI is the main European Union strategy for raw materials. The RMI has been developed based on three pillars (EU RMI, 2008), (EU manifesto, 2012):

1. Ensuring a level playing field in access to resources in third countries
2. Fostering sustainable supply of raw materials from European sources
3. Boosting resource efficiency and promoting recycling.

In conjunction with the RMI the EU has developed a plan called Closing the loop – An EU action plan for the circular economy (EU closing the loop, 2015). This plan outlines a transition to a more circular economy, where the value of products, materials and resources is maintained in the economy for as long as possible and the generation of waste minimised. A range of policy actions are proposed

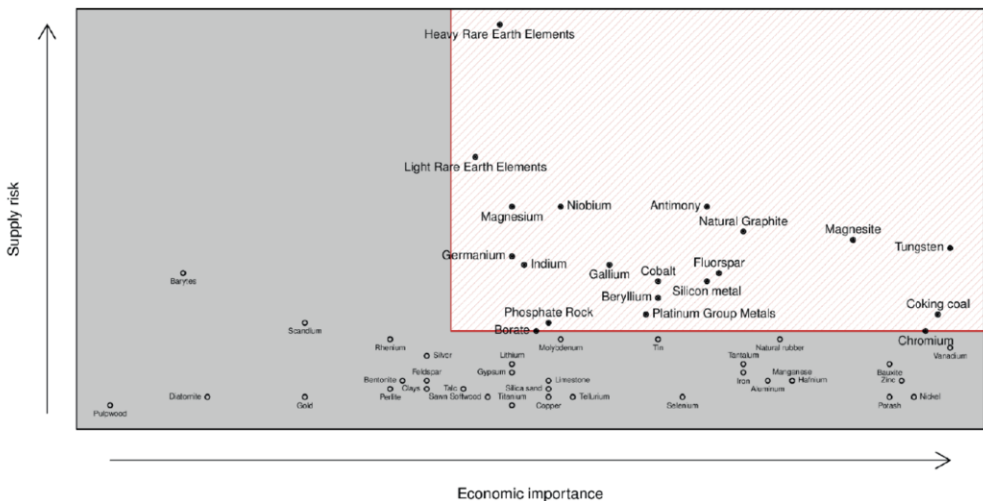


Figure 5. The two axis – economic importance against supply risk to determine criticality of a material. The EU 2014 critical list is shown (due for update in 2017), (Peliarini, 2014).

and includes incorporation of critical materials aspects. A number of policy actions are outlined in the circular plan (shown in fig 6 in the next section). One EU member state, The Netherlands, has announced that it will reduce primary materials use by 50% by 2030 as a response to the EU action plan (Netherlands Government, 2016)

Comparison of WWII and circular action plan today

This section takes the British 1943 utility furniture policy actions and the 2017 critical materials / circular economy policy actions (EU circular action plan) and compares them. The figure 6 below shows this comparison.

Conclusion

The differences in materials, technologies and circumstances between the two periods are significant and cannot be ignored. That having been said there are

many features of the two policy approaches which have significant parallels.

What does appear is the parallels between the two policy approaches are significant. Equally the differences are most profound in particular in relation to the societal aspects.

This appraisal only represents a first step in understanding the potential use of looking back in history to help develop the circular economy action plan going forwards.

In the case of the Netherlands, which has announced a reduction of primary material use of 50% by 2030, it is interesting that Britain also had over a 50% reduction in material supplies.

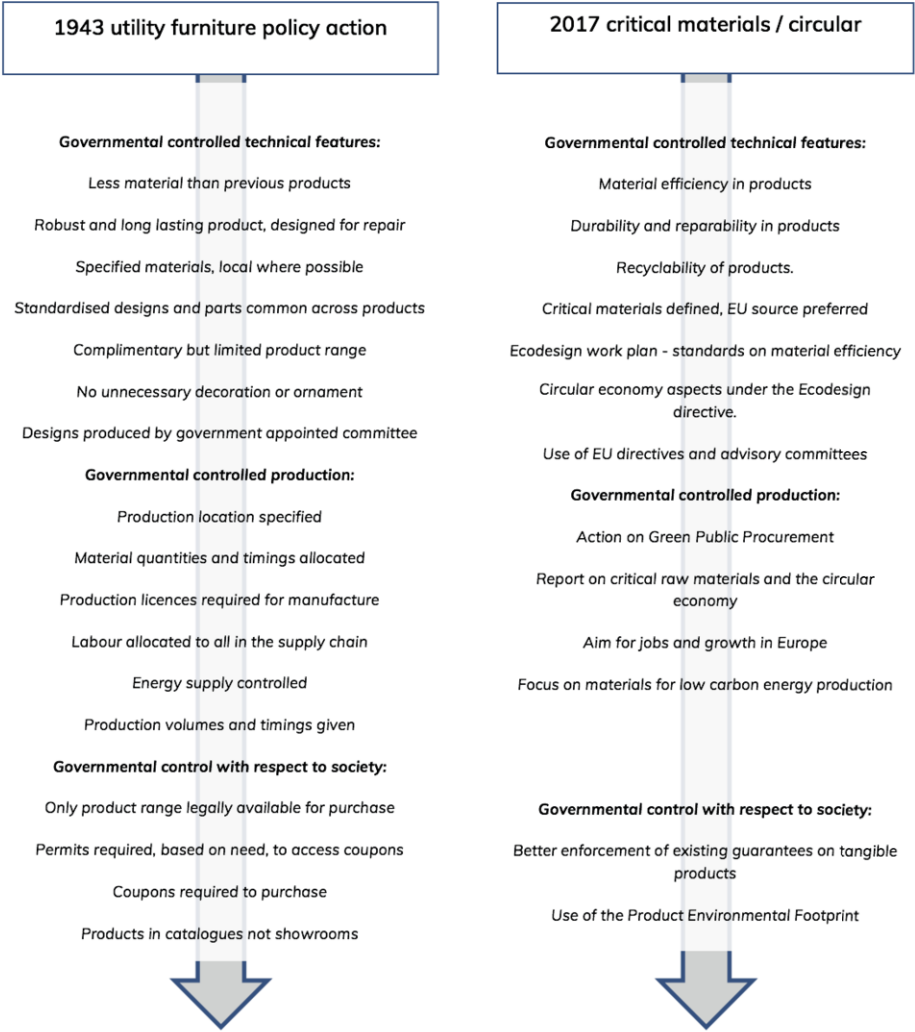


Figure 6 Comparison of 1943 utility furniture policy actions and the 2017 critical materials / circular economy policy actions

The question this paper raises is if Europe does not want all of the policy strategies used by the British in WWII (rationing, price controls, control of industry, full state control, etc.) then can the current circular economy

approach work, given the policy framework in place? What is acceptable to European society versus what action is needed? These questions need to be answered in further research.

References

- Abraham, D. S., *The Elements of Power: Gadgets, Guns, and the Struggle for a Sustainable Future in the Rare Metal Age*, Yale University Press, 2015
- Ashby, M. F., *Materials and Sustainable Development*, Butterworth-Heinemann Ltd, 2016
- Ashby M, *Materials and the Environment - eco-informed materials choice*, 2nd ed, Butterworth-Heinemann, 2013
- Attfield, Judy, Editor, *Utility reassessed. The role of ethics in the practice of design*. Pp268, Manchester University Press, Manchester, UK. Also St Martin's Press Inc. New York USA. Also UBC, Press, Vancouver, BC, Canada., 1999
- Bakker, C., Hollander M den, Hinte E van, Zijlstra Y, *Products that last: product design for circular business models*, Marcel den Hollander; 1st edition, 2014
- Broadberry, S & Howlett P, *Lessons Learned? British Mobilisation for the Two World Wars*, Conference Economic History of Coercion and State Formation, University of Warwick, 2014
- CRM_InnoNet. D4.4 CRM supply-chain analysis of Energy, ICT and electronics and Transport sectors. 2014
- De Rijk, T. *Pioneers and Barbarians: The Design and Marketing of Electrical Household Goods as Dutch Americana, 1930–45*, *Journal of Design History* 22 (2): 115–132. <https://doi.org/10.1093/jdh/epp012>, 2009
- Dilnot, C., *Design as a Society Significant Activity: An Introduction*, *Design studies* 3:2., pp.144, 1982
- Edgerton, David, *Britain's War Machine; Weapons, resources and experts in the Second World War*, Allen Lane, 2011.
- EU, *Closing the loop – An EU action plan for the circular economy*, COM (2015) 614, Brussels, 2015
- EU RMI, *The raw materials initiative — meeting our critical needs for growth and jobs in Europe*, COM(2008) 699 final, 2008
- EU, European Commission, *Memo/12/989, Manifesto for a resource efficient Europe*, Brussels, 2012.
- EU, *Strategic Implementation Plan (SIP) for the European Innovation Partnership (EIP) on Raw Materials. Call for a KIC EIT Raw Materials*, 2013
- Graedel T E, et al, *On the materials basis of modern society*, PNAS special feature, 2013.
- Graedel T E, et al. *Methodology of metal criticality determination*. *Environ Sci Technol* 46(2):1063–1070, 2012
- Graedel, T., *Defining critical materials*. In: Bleischwitz R, Welfens PJ, Zhang Z, editors. *Sustainable growth and resource productivity – economic and policy issues*. 2009
- Hancock and Gowing, *The Lessons of the British War Economy*, HMSO. 1949
- Köhler A R, Bakker C, Peck D, *Critical materials: a reason for sustainable education of industrial designers and engineers*. *European Journal of Engineering Education* Volume 38, Issue 4, pages 441–451 DOI:10.1080/03043797.2013.796341, 2013
- Victor Margolin, “Design for a Sustainable World”, *Design Issues*, vol14,2., pp. 91, 1988
- Victor Margolin, “Design for a Sustainable World”, *Design Issues*, vol14, 2., pp. 85, 1997
- Victor Margolin, *Design Discourse, History, Theory, Criticism*, Chicago press, 1989.
- Mills, J, *Utility Furniture. The 1943 Utility Furniture Catalogue with an explanation of Britain's Second World War Utility Furniture Scheme* Sabrestorm Publishing, Sevenoaks, Kent, UKpp36, 2008
- Netherlands Government, *A circular economy in The Netherlands by 2050*, The Ministry of Infrastructure and the Environment and the Ministry of Economic Affairs, also on behalf of the Ministry of Foreign Affairs and the Ministry of the Interior and Kingdom Relations, 2016
- Papanek, V , “Design for the Real World: Human Ecological and social change”, Chicago: Academy Edition, ix. 1972
- Peck, D.P.; Bakker, C.A.; Diederer, A. *Innovation and complex governance at times of scarcity of resources: A lesson from history Knowledge Collaboration & Learning for Sustainable Innovation: ERSCE-EMSU Conference, Delft, The Netherlands, 25–29 October 2010*
- Peck, D, Bakker, C, *Eco-design opportunities for critical material supply risks*, Conference; Electronics Goes Green 2012+(EGG), 2012, Pages; 1–6, Publisher, IEEE, 2012.
- Peck, D, Kandachar, P, Tempelman, E, *Critical materials from a product design perspective*, *Journal of Materials and Design*, Volume 65, January 2015, Pages 147–159, 2015
- Peck, D, *Prometheus Missing: Critical Materials and Product Design*, Delft University of Technology, 2016.
- Pellegrini, M (W.G. chair), *Report on Critical Raw Materials for the EU*, Report of the Ad hoc Working Group on defining critical raw materials, European Commission, DG Enterprise and Industry, May 2014
- Postan, Michael. M.; *British War Production, Part of the History of the Second World War*, United Kingdom Civil Series, HMSO, 1952
- Reimer S and Pinch P, *Geographies of the British government's wartime Utility furniture scheme, 1940–1945*, *Journal of Historical Geography* 39, pp 99–112, 2013
- Sievers, Henrike; Buijs, Bram; Tercero Espinoza, Luis A. : *Limits to the critical raw materials approach*. In: *Proceedings of the ICE - Waste and Resource Management* 165 (4), p 201–208. 2012
- Tilton J E, *On Borrowed Time? Assessing the Threat of Mineral Depletion*, RFF Press, Washington, D.C., p61. 2003